CAMBRIDGE SYSTEMATICS

NCHRP 25-25 Task 02

Transportation Impacts of Smart Growth and Comprehensive Planning Initiatives

final

report

prepared for

National Cooperative Highway Research Program

prepared by

Cambridge Systematics, Inc.

with

Professor Elizabeth Deakin

May 2004

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The opinions and conclusions expressed or implied in the report are those of the research agencies alone. They are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation Officials, or the individual states and transportation agencies that participated in any way in this particular project.

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1.0 Introduction and Summary

1.1 Objectives

Comprehensive (or master) planning has long been practiced by local jurisdictions as a means of addressing principal problems and issues related to growth or decline – such as land use regulation, transportation, housing, environmental preservation, and economic development – facing the community. Since the 1970s, a number of states also have undertaken "comprehensive planning" initiatives to affect growth patterns within the state to achieve statewide objectives such as land preservation, environmental protection, and efficient use of infrastructure. Largely beginning in the late 1980s and early 1990s, metropolitan planning organizations (MPOs) also began to consider their role in promoting local comprehensive planning and growth management in support of regional objectives, including transportation-related objectives.

Since the late 1990s, the term "smart growth" has come into the popular lexicon, to mean comprehensive planning with more specifically defined objectives. While different people have different conceptions of what smart growth looks like, there is general agreement on the principles it is intended to support. The American Association of State Highway and Transportation Officials (AASHTO) views smart growth as "a variety of approaches aimed at targeting land use and development in a way that makes the most sense for communities, the economy, and the environment." The American Planning Association defines smart growth as, "Using comprehensive planning to guide, develop, revitalize and build communities for all that:

- Have a unique sense of community and place;
- Preserve and enhance valuable natural and cultural resources;
- Equitably distribute the costs and benefits of development;
- Expand the range of transportation, employment and housing choices in a fiscally responsible manner;
- Value long-range, regional considerations of sustainability over short-term incremental geographically isolated actions; and
- Promote public health and healthy communities."

While state and regional agencies have increasingly undertaken initiatives to promote comprehensive planning and (more recently) smart growth, they also are interested in determining the effects of these initiatives on actual development patterns and on related

social, environmental, and economic impacts. State Departments of Transportation (DOT) and MPOs, in particular, are interested in the transportation benefits of these initiatives. Are they having the expected benefits of reducing vehicle-miles of travel (VMT), congestion, and infrastructure costs? Are they resulting in other environmental benefits such as improved air quality?

This report addresses the need for improved information on the transportation and related impacts of state and regional comprehensive planning and smart growth initiatives. The report has two primary objectives: first, to review the methods and outcomes used to evaluate the effectiveness of smart growth and other comprehensive planning initiatives implemented by states and MPOs; and second, to provide guidance on how the impacts of these initiatives can be evaluated. The report includes:

- An inventory of state and MPO comprehensive planning initiatives;
- Case studies of six specific states and metropolitan areas, documenting the types of comprehensive planning initiatives undertaken, methods used to evaluate the transportation and environmental impacts of these initiatives, and findings on their effectiveness; and
- Recommendations, intended for state DOT and MPO staff, on how best to measure and predict the impacts of comprehensive planning initiatives.

In addition, the report includes a broader set of recommendations for cross-cutting research into the impacts of comprehensive planning and smart growth initiatives around the country.

1.2 Findings

Inventory of Initiatives

Through a nationwide review, at least 15 states were identified that have undertaken various forms of comprehensive planning and/or smart growth initiatives. The strength and form of the states' policies range from a strict statewide mandate with specific required elements, to fiscal incentives or technical assistance to complete a comprehensive plan. At least 10 states have adopted growth directive policies that focus on guiding investment, population and employment growth to existing downtown business districts or urban neighborhoods. At least five require local comprehensive plans to be consistent with a county-, regional-, or statewide-level plan. Seven states have attempted to regulate the timing of growth to ensure adequate infrastructure through concurrency requirements or adequate public facilities mandates. Typically, states have not become directly involved in the regulation of land use; instead, they affect land use indirectly through fiscal incentives, concurrency requirements, and other means.

Since MPOs in general have no regulatory authority, their primary roles in comprehensive planning have included technical analysis as well as outreach and consensus-building among local jurisdictions. A number of MPOs in recent years have undertaken regional comprehensive planning or "visioning" exercises that include a significant focus on land use as well as transportation. Aside from directing transportation investments, however, they generally must rely upon local and state governments to implement policies developed at the regional level.

Evaluation Activities

Fifty-nine evaluation studies were identified focusing on 10 states and eight metropolitan areas and counties. In addition, a handful of cross-cutting research studies were identified that compare multiple metropolitan areas. The studies describe and analyze a range of topics relating to smart growth. The majority are qualitative, providing descriptions of policies and an analysis of implementation and general effectiveness. The most commonly studied topic using quantitative methods is the effect of urban growth boundaries and other tools on housing affordability. A few studies attempt to link smart growth policies to urban spatial patterns. A small number actually operationalize the measures, collect original data, and conduct statistical regression analysis. More often, the quantitative studies attempt to link a specific policy to general trends (such as housing prices or population density).

Transportation impacts have been evaluated almost exclusively through the use of model-based forecasting, as compared to monitoring of actual conditions. This may be due in part to the difficulty of separating transportation impacts of smart growth from the influx of other factors affecting transportation conditions and trends. Most transportation forecasting studies have been undertaken by MPOs as part of regional visioning/planning initiatives.

Case Study Findings

The following six states and metropolitan areas (along with one county) were selected as case studies:

1. Florida;
2. Minneapolis-St. Paul, Minnesota;
3. Montgomery County, Maryland;
4. New Jersey;
5. Portland, Oregon; and
6. Seattle, Washington.

Some of the key cross-cutting findings from these case studies include:

- **Regional modeling studies suggest that land use strategies can have benefits for both transportation conditions and infrastructure costs.** Findings based on modeling studies from the case study regions, as well as other metropolitan regions, suggest that changing land use patterns is likely to result in some level of transportation benefits and infrastructure cost savings. Forecast reductions in VMT (the most common measure used) range from a modest one or two percent to upwards of 20 percent depending upon the extent of land use changes assumed, sensitivity of the models used, and various other assumptions. Studies using sensitive models but relatively conservative land use projections (within the realm of feasibility) tend to find reductions in VMT on the order of five percent; empirical evidence suggests that the more optimistic scenarios regarding land use patterns are unlikely to be realized in practice.

- **Empirical data also suggest that land use strategies, if they can be implemented, should have transportation benefits.** Empirical studies focusing on travel behavior and neighborhood design suggest that land use strategies can reduce vehicle-trips and VMT, with impacts ranging from incremental (one or two percent) to highly significant (over 50 percent at a neighborhood level). Measured at a regional scale, more dense and compact development patterns lead to somewhat shorter vehicle trips. They also increase non-automobile travel, although relatively high localized densities are required to realize significant mode shifts. On the other hand, as density increases, localized congestion is also likely to increase. Little empirical information is available on the effects of land use strategies on congestion, travel times, accessibility, and other "traveler-oriented" performance measures.

- **Monitoring systems are only beginning to be established**. For the most part, state and metropolitan agencies have not established monitoring systems to track land use patterns and relate them to policy implementation or to transportation system performance. This situation is beginning to change, though. States and metropolitan areas are increasingly entering into data-sharing agreements and using geographic information systems (GIS) to track land use and environmental data. State DOTs and MPOs are also increasingly incorporating system-level performance measures into their long-range transportation plans, and utilizing operations and maintenance (O&M) data to track a broader range of transportation performance measures than was previously feasible.

- **Comprehensive planning policies have evolved over time.** States, regional agencies, and local jurisdictions that have implemented comprehensive planning policies frequently revise or refine these policies in response to lessons learned about policy effectiveness, as well as to changing market conditions and political factors. This makes evaluation a challenge because the policies being evaluated are continually changing. The challenge is compounded by the time lag between policy implementation and growth pattern impacts.

- **The ability of state and regional agencies to affect land use patterns has been limited.** Few states have been willing to take a prescriptive and regulatory approach to

local land use planning. Approaches that rely primarily on voluntary cooperation and incentives *can* affect planning and growth patterns – but only as long as the state or regional agency continues to take a proactive approach to working with local jurisdictions and implementing programs and policies. The more voluntary and incentive-based are the programs, the more inconsistent are the effects. Furthermore, even in areas with strong implementation measures, it can take at least 10 to 15 years to change development practices to the extent that significant measurable impacts would be expected.

- **State and regional agency programs are helping to support the emerging smart growth movement.** In the past five to 10 years, a new set of smart growth priorities has been emerging, focusing especially on infill and urban redevelopment; compact, walkable, mixed-use communities; and transit-oriented development patterns. At the same time, market forces have also been a major factor in driving these new types of development, as have advocacy efforts led by architects, urban planners, and others.

- **Transportation concurrency, as implemented in many areas, has not been effective from a regional perspective.** Experience suggests that transportation concurrency requirements have generally been ineffective or even counterproductive – as measured by impacts on regional conditions – when implemented using only local capacity criteria. The requirements can have the consequence of steering growth towards outlying areas where there is excess capacity, thus increasing overall vehicle-travel and eventually leading to greater regional congestion. Consideration is beginning to be given, however, to methods of implementing concurrency to achieve regional benefits.

- **Non-transportation benefits of comprehensive planning policies may be more significant than transportation benefits.** While this study did not focus closely on non-transportation impacts, it appears that planning initiatives have relatively larger benefits on certain other types of impacts than on transportation. Alternative regional growth scenarios, if implemented, have been predicted to reduce land consumption for new development on the order of 50 percent or more. State efforts to protect coastlines, wetlands, and other key habitat or natural areas have in many cases been more successful because they focus on acquisition, regulation, or purchase of development rights for a relatively small amount of critical land area. In contrast, land use policies that significantly affect transportation conditions must be applied on a much larger scale, making them more difficult to implement.

1.3 Recommendations

State and Regional Monitoring Systems

Making clear linkages between comprehensive planning policies and transportation (and other) impacts is not easy. The sequence of cause-and-effect relating these two factors can be described in three steps:

1. What impacts do state and regional planning laws or policy initiatives have on local land use policies and regulations (e.g., zoning, subdivision regulations, design guidelines)?

2. What impacts do changes to local policies and regulations have on the built environment?

3. What impacts do changes to the built environment have on transportation, environmental, and other conditions?

The case studies suggest that state and regional initiatives can take a decade or more to result in significant, observable impacts to the built environment. Furthermore, changes to the built environment must occur on a widespread basis for transportation impacts can be clearly observed. These time lags and complicating factors suggest that a combination of *modeling* and *monitoring* is needed to relate growth policies to transportation impacts. Modeling and monitoring should be used together in the following ways:

- Modeling should be used to predict the impacts of growth patterns – should they occur as expected or hoped – on transportation conditions and related impacts such as emissions.

- Monitoring should be performed at four levels:

  - Monitoring of changes to local planning policies and regulations;
  - Monitoring of changes to development patterns;
  - Monitoring of regional transportation conditions; and
  - Monitoring of travel behavior in developments with different characteristics.

Existing data sources can provide information on some of these measures. For example, VMT and transit ridership can be tracked in most, if not all, areas using existing traffic and transit ridership monitoring systems. On the other hand, data sources for monitoring other indicators, including plan adoption, growth patterns, and "traveler-oriented" transportation performance measures, are less well-developed. Improvement in four key areas would be especially valuable in providing better measures of the impacts of smart growth and comprehensive planning policies:

1. **A monitoring program to track plan and program consistency.** Monitoring of local plans and ordinances, as well as state agency plans (e.g., transportation plans, critical land acquisition), provides an important indicator of the extent to which state and regional policies are being implemented by state agencies and local jurisdictions. In conjunction with such a program, regular policy research activities should be undertaken to identify which policies are most effective.

2. **A regional land use database and monitoring system.** Some form of land use monitoring system is necessary in order to determine whether comprehensive planning policies are actually having an effect on growth patterns. Ideally, this would include

the development of a parcel-level or polygon-level regional land use database that can be updated at regular intervals using tax assessor data, building permit data, and/or aerial photography. Satellite imagery also has been proven as an effective and relatively low-cost means of tracking general growth patterns.

3. **Enhancements to transportation performance monitoring systems to track traveler-oriented performance measures.** While regional VMT provides one important indicator, related especially to infrastructure costs and environmental impacts, other measures such as congestion, travel times, and highway, transit, and non-motorized accessibility provide more direct indicators of how well the transportation system is performing from the perspective of the traveler. Needed enhancements may include the collection and archiving of real-time travel speed and congestion data from specific facilities, as well as the expansion of the monitoring system to the arterial network.

4. **Enhancements to transportation and land use models.** While it is always desirable to have empirical data verifying impacts, it may be difficult or impossible to conclusively relate empirical data on transportation conditions back to specific growth patterns or policies that have been adopted. Models are valuable for isolating the effects of individual policies, and for separating the impacts of policies of interest from external trends that would have occurred regardless of planning initiatives undertaken. Significant needs in model enhancement are greater sensitivity to micro-scale land use and urban design patterns, better modeling of pedestrian and transit travel, and development and enhancement of land use models with a strong economic foundation, capable of assessing a broad range of policies.

Monitoring may be easier at a metropolitan level than at a statewide level. Even with a consistent set of statewide planning policies, implementation may vary significantly within specific regions. The mix of urban and rural land uses in most states makes it difficult to establish meaningful aggregate indicators of land use. Furthermore, travel characteristics are very different in rural areas than in urban areas, and for the most part land use policies to reduce travel in rural areas have not been adopted. Therefore, it is recommended that states wishing to evaluate the effectiveness of their comprehensive planning policies focus on the implementation and impacts of those policies in specific metropolitan areas, or other subregional units such as counties.

Areas for Further Research

In addition to enhancing state and regional agency data, models, and monitoring systems, academic research studies – focused on a single area or comparing multiple areas – can help answer key questions about comprehensive planning impacts. Three recent studies have developed regional indicators of sprawl for various metropolitan areas and have examined the correlation between these indicators and various impacts, including transportation conditions. In addition, numerous studies have focused on the linkages between land use patterns and travel behavior.

These studies cover some territory well but leave other questions unanswered. Some suggestions for further research include:

- Undertake additional policy assessment research on specific policies in specific areas, using qualitative research techniques to determine which policies are actually affecting development patterns;
- Review early regional growth management efforts (undertaken at least 10 to 15 years ago) that involved modeling of impacts, and compare forecasted to actual trends and conditions;
- Use state-of-the-practice land use and transportation models to assess the impacts of different policies in different metropolitan areas;
- Undertake additional cross-cutting comparisons among multiple cities, especially focusing on a broader range of traveler-oriented transportation performance measures;
- Conduct a nationwide review and analysis of "smart growth" policy adoption at the local level;
- Study travel behavior in emerging "new urbanist" neighborhoods, paying particular attention to the effects of local and regional accessibility;
- Study the impacts of rural/small town growth patterns on travel;
- Examine the tradeoff between proximity and congestion, as it impacts accessibility; and
- Further investigate the use of satellite imagery for detailed monitoring of growth patterns.

2.0 Inventory of Comprehensive Planning Initiatives and Evaluation Studies

2.1 Scope of This Inventory

Comprehensive (or master) planning has long been practiced by local jurisdictions as a means of addressing principal problems and issues related to growth or decline – such as land use regulation, transportation, housing, environmental preservation, and economic development – facing the community. Since the 1970s, a number of states also have undertaken "comprehensive planning" initiatives to affect growth patterns within the state to achieve statewide objectives such as land preservation, environmental protection, and efficient use of infrastructure. Largely beginning in the late 1980s and early 1990s, MPOs also began to consider their role in promoting local comprehensive planning and growth management in support of regional objectives.

Since the late 1990s, the term "smart growth" has come into the popular lexicon, to mean comprehensive planning with more specifically defined objectives. The American Association of State Highway and Transportation Officials (AASHTO) views smart growth as "a variety of approaches aimed at targeting land use and development in a way that makes the most sense for communities, the economy, and the environment." The American Planning Association (APA) defines smart growth as, "Using comprehensive planning to guide, develop, revitalize and build communities for all that:

- Have a unique sense of community and place;
- Preserve and enhance valuable natural and cultural resources;
- Equitably distribute the costs and benefits of development;
- Expand the range of transportation, employment and housing choices in a fiscally responsible manner;
- Value long-range, regional considerations of sustainability over short-term incremental geographically isolated actions; and
- Promote public health and healthy communities."[1]

[1] American Planning Association. Smart Growth Policy Guide, 2002.

In this review of comprehensive planning and smart growth initiatives, we include any policy or initiative that aims to guide, manage, or control growth and development on a *statewide* or *regional* level. We have also included selected examples of counties with significant policy initiatives. Except for these counties, policies implemented in specific local jurisdictions – independent of a state or regional policy – are not included in the inventory.

We recognize that there is some controversy around the use of the term "smart growth." Some communities embrace the term, while others are suspicious of it even while embracing the principles described above. We do not in this study attempt to pass judgment on whether any of the planning initiatives reviewed, or the actual or intended growth patterns resulting from these initiatives, can indeed be described as "smart." While "comprehensive planning" and "smart growth" are not synonymous, we use the term "smart growth" as a concise and convenient terminology to refer to planning activities undertaken with broader state and/or regional objectives in mind, especially those objectives described in the AASHTO and APA definitions of smart growth.

Our review of evaluation studies focuses primarily on "ex-post" evaluations, which use empirical evidence to look at actual impacts of policies. In some cases, however, we have also included "ex-ante" (forecasting) evaluations that predict future impacts of policies. Examples of ex-ante evaluations include MPO efforts to model alternative regional transportation and land use scenarios. While many MPOs have conducted such modeling exercises, our criteria for including them in this review is that the policies modeled are generally consistent with policies that are subsequently being implemented. Therefore, we exclude hypothetical scenarios that have not progressed to implementation.

Moving from state and regional planning policies to actual outcomes (changes in land consumption, VMT, environmental impacts, etc.) is a multi-step process. State and regional policies affect local plans, policies, and regulations; local policies affect the built environment; and the built environment affects transportation, emissions, and other outcomes. Many of the studies reviewed here focus on only one or two steps of this process (e.g., the effect of state policies on local land use changes). It is often necessary to piece together findings from multiple bodies of research in order to draw conclusions about the impacts of comprehensive planning policies.

2.2 Overview of Approach

State and regional comprehensive planning initiatives were inventoried through a review of library and Internet sources, as well as through contacts with experts at academic and non-profit institutions. The results of this review include:

- A bibliography of 59 quantitative and qualitative studies of the impacts of the initiatives, along with other references included in this report (Appendix A);
- An inventory of significant state and regional initiatives describing the objective, implementation measures, year adopted, and any evaluations that have been conducted.

Initiatives are identified from 15 states and nine metropolitan areas, as described in Appendix B, Table B.1;

- A matrix that classifies each of the identified initiatives by strategy and implementation mechanism (Appendix B, Table B.2); and

- A matrix of the 59 evaluation studies, organized by state and region, that identifies the purpose of the study (policy analysis, forecasting, or retrospective evaluation), methodology (quantitative or qualitative), and impacts assessed (Appendix B, Table B.3).[2]

The results of this inventory were then used to select six case study areas in which to make a more detailed examination of policies, monitoring efforts, and observed impacts. A summary of the case study findings is presented in Section 3.0 (the full case studies are included as Appendices C through H).

2.3 Findings on Comprehensive Planning Initiatives

Fifteen states were identified that have undertaken comprehensive planning initiatives in various forms. This list is not comprehensive, but it does include most of the states that have most aggressively attempted to guide local planning from a state level. As interest in smart growth increases, more states are beginning to undertake initiatives specifically with smart growth objectives in mind. Nine regional initiatives (in seven metropolitan areas and two counties) also were identified. While the inventory includes many of the more significant and long-standing regional initiatives, it does not include a number of very recent initiatives undertaken at the MPO level, such as some education and outreach efforts that have not yet led to consistent regional policy implementation. The two counties (Arlington, Virginia and Montgomery, Maryland) are included because of their long and well-known history of implementing comprehensive planning policies including transit-oriented development and land preservation.

State and regional agencies may attempt to guide land use planning through a variety of tools or mechanisms, including:

- **State/Regional Visioning Plan –** A state or metropolitan agency may develop a plan that identifies goals, objectives, and desired characteristics of growth patterns, e.g., focusing growth in existing cities and towns, or protecting open space.

- **Required Plans –** A state may require local jurisdictions (including cities and/or counties) to prepare a comprehensive plan. Plans by regional agencies may also be required.

[2] This matrix provides a (hopefully) comprehensive inventory of evaluation studies for the six case study areas, but the inventory may not be comprehensive for other areas. This is because the case studies investigated the literature in greater depth than the initial inventory of policies and studies.

These requirements may be accompanied by regulations or incentives aimed at achieving specific objectives in local plans, such as smart growth objectives.

- **Horizontal and/or Vertical Plan Consistency –** Horizontal consistency means that plans at a single level of government (e.g., local) are consistent with plans of neighboring jurisdictions or sister agencies. Vertical consistency means that plans at different levels (local, county, metropolitan, state) are consistent with each other. The state may establish a required or voluntary process of plan review for consistency. An MPO also may establish a voluntary consistency process.

- **Local Plan Consistency with Zoning/Infrastructure Implementation –** States may require that local zoning is consistent with the local comprehensive plan, or that local capital improvement plans are consistent with land use elements of the plan.

- **Protection of Sensitive Areas and Special Lands –** A state or other agency may implement regulations or programs to protect sensitive areas and special lands (e.g., key ecosystems, prime farmland) from development.

- **Environmental Review –** States may require that major development projects be subject to an environmental review process, similar to the Federal requirements for environmental review of major Federally funded projects.

- **Growth Directive Policies –** State and regional agencies may establish a wide range of policies and funding/incentive programs directed at steering growth into specific areas and limiting it in other areas. Examples include priority investment areas, downtown and neighborhood revitalization, and brownfields redevelopment.

- **Transportation-Oriented Policies –** This category includes policies specifically to influence growth through transportation, e.g., level of service (LOS) requirements imposed by states, or transit-oriented development initiatives undertaken by MPOs.

- **Growth Timing Policies –** These include adequate public facilities ordinances, concurrency standards, building permit caps, and other requirements (typically enacted at a state or local level) to ensure that development occurs consistent with the provision of infrastructure, or at a controlled pace.

- **Land-Release Policies –** States may require or permit the establishment of urban growth boundaries, and metropolitan agencies may establish voluntary urban growth boundaries, that control what land may be developed. The boundaries may be expanded as land inside the boundary becomes built-out.

- **Promotion of Special Land Uses –** States, metropolitan agencies, or local governments may provide incentives to promote specific land uses such as affordable housing or restoration of historic structures.

Table B.2 in Appendix B lists and categorizes the various mechanisms adopted by the states and metropolitan areas covered in this review. This table also describes how each mechanism is implemented: through a mandate, through fiscal incentives or disincentives, through permitting/regulatory procedures, or through advisory methods such as voluntary compliance programs. In addition, it identifies the various objectives of each category and lists specific tools that fall within each category.

Each of the 15 states identified has, at a minimum, implemented initiatives to require or encourage comprehensive planning at a local level. The strength and form of the policy ranges from a strict statewide mandate with specific required elements, to fiscal incentives or technical assistance to complete a comprehensive plan. About one-third of the reviewed states require local comprehensive plans to be consistent with a county-, regional-, or statewide-level plan. In most cases, the requirements are only to conduct planning, and not necessarily for plans to incorporate specific smart growth or other objectives.

Measures to ensure the protection of sensitive or special lands have been commonly enacted by state legislatures. The most frequent type involves funding for the acquisition of open space, wetlands, coastal areas, farmland or other naturally or historically significant lands. Transferable development rights is another commonly used tool for land protection.

At least 10 states have adopted growth directive policies that focus on guiding investment, population and employment growth to existing downtown business districts or urban neighborhoods. Priority funding districts and location-directed state investment are two frequently employed policies. Seven states have attempted to regulate the timing of growth to ensure adequate infrastructure through concurrency requirements or adequate public facilities mandates. Urban growth boundaries have only been established in a few areas around the country, and the strength of mechanisms to implement and enforce these boundaries varies.

The impact of "home rule" on a state's involvement in comprehensive planning is of interest to many. States are often classified as either a Dillon Rule state or a home rule state. Under Dillon's Rule, local governments possess only those powers specifically delegated to them by state law, or fairly implied from expressly granted powers. Under home rule, in contrast, local governments are assumed to have powers unless clearly denied by the state. A recent inventory classified 39 states as "Dillon's Rule" states, although in eight states this applied only to certain local jurisdictions.[3]

A recent Brookings Institution paper, though, notes that home rule and Dillon's Rule are not mutually exclusive, and indeed, that whether or not a state is "home rule" bears little relationship to the state's involvement in growth management. The authors note that, "the extent of local government autonomy depends not upon whether a state court employs Dillon's Rule but rather on the propensity of the state legislature to endow local

[3] Richardson, Gough, and Puentes (2003).

governments with autonomy. If the state legislature expresses clear intent to grant broad discretion to local governments, Dillon's Rule poses no roadblock. In some home rule states, the legislature has passed a multitude of laws prohibiting municipalities from engaging a wide variety of practices."[4] The relative influence of state versus local powers appears to be more of a continuum, with different states asserting different levels of authority. For the most part, though, states (both home rule and otherwise) have delegated to local jurisdictions most of the powers related to land use regulation. Instead, they seek to affect land use indirectly through fiscal incentives, concurrency requirements, and other means.

Since MPOs in general have no regulatory authority, their primary roles in comprehensive planning have included technical analysis as well as outreach and consensus-building among local jurisdictions. A number of MPOs in recent years have undertaken regional comprehensive planning or "visioning" exercises that include a significant focus on land use as well as transportation. Aside from directing transportation investments, however, they must rely upon local and state governments to enact implementation mechanisms.

2.4 Findings on Evaluation Studies

Fifty-nine evaluation studies were identified focusing on 10 states and eight metropolitan areas and counties. In addition, a handful of cross-cutting research studies were identified that compared multiple metropolitan areas. (Cross-cutting research studies are described in Section 5.0 of this report.) The studies describe and analyze a range of topics relating to smart growth. The majority are qualitative, providing descriptions of policies and an analysis of implementation and general effectiveness. Many of the studies – especially those identified in some of the case study areas – are policy analysis studies that examine, from a largely qualitative standpoint, the extent to which state policies have led to changes to local planning practices. A commonly studied topic using quantitative methods is the effect of urban growth boundaries and other tools on housing affordability. Studies in a handful of areas attempt to link smart growth policies to urban spatial patterns. A small number of the studies actually operationalize the measures, collect original data, and conduct statistical regression analysis. More often, the quantitative studies attempt to link a specific policy to general trends (such as housing prices or population density).

Transportation impacts have been evaluated almost exclusively through the use of model-based forecasting. This may be due in part to the difficulty of separating transportation impacts of smart growth from the influx of other factors affecting transportation conditions and trends. Most transportation studies have been undertaken by MPOs as part of regional visioning/planning initiatives.

[4] Richardson, Gough, and Puentes (2003).

The studies reviewed suggest that it is difficult to draw blanket conclusions about the impacts of a specific land use policy or set of policies. Effectiveness can vary significantly depending upon the local context and the details of implementation. A further difficulty is that many states and regions have only recently begun the process of identifying and implementing smart growth policies. As a result, there are few areas where these policies have been in effect for an amount of time that can provide sufficient data. In addition, the intended effects of smart growth policies tend to be long-term in scope, and difficult to observe in a short time period.

3.0 Case Study Findings

Based on the findings of the inventory described in Section 2.0, six areas were selected as the subjects of case studies for more detailed investigation. The objectives of the case studies are to describe:

- The specific planning initiatives adopted in each area;
- Efforts undertaken to measure the impacts of these initiatives on growth patterns and transportation conditions, including monitoring efforts by state and regional agencies as well as other research studies;
- Performance measures and data sources used; and
- What has been learned about the impacts of state and regional smart growth and comprehensive planning policies on transportation conditions.

3.1 Selection of Case Studies

Case studies were selected based on four criteria:

1. The scope (e.g., strength, duration and type) of the implemented measures. Areas with at least 10 to 15 years of implementation experience were desired, to allow time for changes to growth patterns to occur and for evaluation studies to be undertaken;
2. The amount, type and quality of completed evaluations – including at least one quantitative evaluation that focuses on transportation as well as other impacts;
3. The diversity of the areas (e.g., slow growth versus fast growth, mix of states and metropolitan areas, and geographic diversity); and
4. The extent of state authority for land use planning (home rule states versus non-home-rule states).

The following six states and metropolitan areas (along with one county) were selected as case studies:

1. **Florida –** Some of the State of Florida's policies, including comprehensive planning requirements, concurrency, and development impact review, date to the 1970s and 1980s and have been the subject of both qualitative and quantitative evaluation. In recent years, the State also has implemented policies focused more specifically on smart growth objectives.

2. **Minneapolis-St. Paul, Minnesota –** This region is known for its tax-base sharing and urban service boundary, which have been in place since the 1970s. While the evaluation of the earlier policies has very limited focus on transportation, more recent forecasting studies have looked at the regional transportation impacts of smart growth measures.

3. **Montgomery County, Maryland –** Maryland's well-publicized statewide smart growth policies are relatively recent, and little impact evaluation has been performed. However, Montgomery County in particular has implemented growth management policies since the 1960s and has been more widely evaluated. While it is only a subset of the Washington, D.C. metropolitan area, it is nevertheless a relatively large jurisdiction and therefore it is hoped that regional-scale impacts can be observed.

4. **New Jersey –** New Jersey's State Development and Redevelopment Plan was first adopted in 1992. Quantitative impacts have been forecast in two detailed studies performed for the original plan and a recent plan update. Some qualitative evaluations of the plan's implementation also have been undertaken.

5. **Portland, Oregon –** Growth management policies in Oregon have been implemented for three decades and have been the subject of a number of quantitative and qualitative studies. Because Oregon's policies easily have the strongest implementation mechanisms of any state, this case study serves as a test of what impacts might be observed if other areas' policies were effectively implemented. The case study focuses on the Portland metropolitan area, which has been the subject of most evaluation work and also has undertaken its own initiatives within the state framework.

6. **Seattle, Washington –** Statewide growth management policies, with similarities to Oregon's policies but less prescriptive, were implemented in the early 1990s and have led to considerable implementation activity by state, regional, and local agencies. The Puget Sound region also undertook its own regional land use visioning and planning efforts beginning around the same time, and has continued to pursue implementation and evaluation activities.

Table 3.1 provides some indicators of the extent to which each of the six case study states can be classified as home rule states. These include a composite ranking by degree of local discretionary authority; classification as a "Dillon's Rule" state (often regarded as the counterpart to home rule); and state involvement in growth management. As discussed in Section 2.3, it is difficult to relate home rule to its impact on state or regional growth management activities. For example, although Oregon has one of the strongest traditions of home rule, with Oregon courts rejecting Dillon's Rule and interpreting state grants of local authority liberally, Oregon's growth management plan ranks second only to Hawaii's with respect to the degree of state regulatory control.[5]

[5] Richardson, Gough, and Puentes (2003).

Table 3.1 Indicators of Home Rule in Case Study States[6]

State	Ranking by Degree of Local Discretionary Authority (1980)	Dillon's Rule State? (2002)	Statewide Growth Management? (as of 2002)
Oregon	1	No	Yes
Maryland	6	Yes	Yes
Minnesota	17	Yes	No
Florida	26	Not clear	Yes
Washington	32	Yes	Yes
New Jersey	36	No	Yes

The remainder of this section summarizes the case study results, including planning and evaluation activities in each area as well as findings on policy effectiveness. The detailed case studies are presented as Appendices C through H of this report.

3.2 Florida

Planning and Evaluation Activities

Florida's growth management laws have their roots in a set of 1972 laws passed to protect the State's natural resources from growth and development. The more comprehensive Growth Management Act, adopted in 1985, transformed Florida's environmental protection regulations into a collection of forward-looking growth management policies and associated programs. The policies and programs established or updated by the Growth Management Act include:

Consistency with Comprehensive Plans – Florida municipalities are required to adopt land use and zoning regulations and make development decisions that are consistent with their more detailed, strategic plans. Each plan must address future land use, housing, transportation, infrastructure, coastal management, conservation, recreation and open space, intergovernmental coordination, and capital improvements. Plans may be amended

[6] Ranking is from U.S. Advisory Commission on Intergovernmental Relations (1981). Dillon's Rule classification and statewide growth management classification are from Richardson, Gough, and Puentes (2003).

up to twice per year, but all amendments and new regulations are subject to State Department of Community Affairs (DCA) review. The Growth Management Act also requires local governments to adopt an evaluation and appraisal report every seven years assessing strengths and weaknesses of their comprehensive plans.

Concurrency – One component of the Growth Management Act requires public facilities and services to be in place and operational at the same time the impacts of new development occur. Local governments are not permitted to approve developments that would generate demand for public services that exceeds available capacity, as defined by LOS standards in their concurrency management plans. This "concurrency" provision is intended to ensure that local governments provide adequate public facilities to support growth. Six types of public facilities are covered by the law: potable water, sanitary sewer, drainage, parks, solid waste, and transportation. Local governments also have the option to require school concurrency.

Developments of Regional Impact – Florida's Developments of Regional Impacts (DRI) program, initiated in 1973 and subsequently amended in the 1985 Growth Management Act, first established the State's role in overseeing large-scale developments with impacts spread over more than one county. Developers of DRIs must coordinate with local governments, resource agencies, and one of the eight multi-county Regional Planning Councils in Florida to complete a detailed application for development approval (ADA), which is then reviewed by DCA. DCA recommends whether DRIs should be approved, approved with suggested mitigation conditions, or rejected, but local governments are ultimately responsible for formally approving or rejecting an ADA for a DRI.

Florida Quality Developments – The Florida Quality Developments (FQD) program was also created as part of the Growth Management Act. The FQD program provides an alternative to the DRI process for well-planned developments that take special measures protect natural resources and that incorporate the infrastructure and other facilities necessary to satisfy concurrency requirements. FQD developments follow the same general process as DRIs, but they benefit from an accelerated review process and are permitted to use the FQD certification mark in marketing materials.

Optional Sector Plans – Optional sector plans offer another alternative to the DRI process when local governments are interested in proactively planning for new development on a large scale. Sector plans are adopted in the form of a series of local comprehensive plan amendments affecting an area greater than 5,000 acres. Sector plans have two components:

1. A conceptual, long-term build-out overlay, which covers the entire area; and

2. A detailed specific area plan covering at least 1,000 acres, which includes guidance on land use and other local issues.

Sector plans are intended to anticipate future development; they are not created for specific developments. However, counties may approve large-scale developments in the area covered by a sector plan without applying the DRI process.

Land Conservation – Florida has a long tradition of land conservation. The nation's first wildlife refuge and the first national forest in the East are located in Florida, and the State first started acquiring environmentally sensitive land in 1964. Florida Department of Environmental Protection's Preservation 2000 (P-2000) Program was established in 1990 and has since been responsible for preserving more than 1.25 million acres of environmentally sensitive land in Florida. The new Florida Forever program, which replaces P-2000, takes a broader approach to conservation by funding restoration activities and purchasing conservation easements in addition to outright land purchases. Florida Forever provides $3 billion in revenue bonds over 10 years, 22 percent of which are dedicated to the Florida Communities Trust for the purchase of urban open space to provide parks and greenways.

Current Activities – With rapid growth straining public facilities and natural resources, Florida has in recent years developed guidelines and regulations concerning regional planning for educational facilities, sanitary, sewer, public safety, solid waste, drainage, potable water, parks and recreation, and transportation facilities. DCA also is developing a Fiscal Impact Analysis Model to help local governments better estimate potential revenue that can be generated by new development and the costs associated with providing infrastructure and services for that development. The model is intended to enable local governments to make more fiscally prudent land use decisions.

Findings

The Growth Management Study Commission convened at the order of the Governor in 2000 to assess the strengths and deficiencies of Florida's growth management policies. The Commission found that:

> "…although the processes established by the existing growth management laws were well intended, the quality of growth has not met expectations, the strains on infrastructure have been only marginally reduced and, in essence, a more complicated, more costly process has been established which does not provide the expected corresponding benefits."

The Commission developed eight recommendations for improving the State's growth management policies. These recommendations are discussed in detail in Appendix C.

Florida's concurrency regulation has generally been criticized as a well-intentioned but ineffective policy for controlling growth. For one, concurrency places emphasis on expanding the transportation system to accommodate new development instead of tempering demand for travel through sustainable development. Due to rapid population growth and the slow pace of new infrastructure construction, congestion in Florida's largest metro areas has grown beyond levels specified in various local concurrency management plans. Concurrency also has been accused of contributing to sprawl as demand not accommodated by infill developments is met by far-flung suburban residential areas.

Adjacent municipalities in Florida do not coordinate their comprehensive plans and development decisions, and there is no vertical consistency between local, regional, and state plans. Therefore, even if one municipality's local roads and other infrastructure is sufficient to handle new development, impacts can spill over to adjacent areas. In late 2003, the Florida Transportation Commission (FTC) published a series of recommendations regarding regional coordination in transportation planning. In addition to recommendations regarding MPO board membership, the FTC's final report recommended readjusting the boundaries of Florida's MPOs by combining existing single-county MPOs into one multi-county MPO where a metropolitan area as defined by the U.S. Census Bureau encompasses more than one county. In the future when previously separate urbanized areas are combined into a single urbanized area as a result of the decennial census, the FTC recommends merging the two MPOs into a single MPO covering the entire urbanized area.

3.3 Minneapolis-St. Paul, Minnesota

Planning and Evaluation Activities

The Minneapolis-St. Paul metropolitan area is nationally known for its relatively strong regional governance and for its efforts to reduce fiscal inequities through tax-base sharing. For the last three decades, the Metropolitan Council – a seven-county regional governing body and also the designated MPO – has had the authority to create regional master plans related to wastewater services, surface transportation, airports, and parks, and to review local plans for consistency with regional goals and objectives. This authority has included the establishment of a Metropolitan Urban Services Area (MUSA) to stage the provision of wastewater treatment services, and therefore control the location of suburban development. Also over this timeframe, the region has implemented tax-base revenue sharing which involves the redistribution of 40 percent of revenues from new commercial and industrial development through a regional pool.

More recently – since the mid-1990s – the region has begun to undertake efforts focused specifically on smart growth objectives. State legislation passed in 1996 and 1997 has provided funding to support the development and implementation of master plans for walkable communities, transit-oriented development, infill and brownfields redevelopment, and affordable housing. The Metropolitan Council has established and updated a set of broad regional objectives for growth. With state and metropolitan funding, community groups and research institutions have undertaken at least three major studies to examine future development patterns within the region and measure the impacts of the patterns on transportation, land use, and the environment. One of these studies included extensive public involvement in the development and evaluation of future growth options.

Findings

While the long-standing regional efforts to control the provision of urban services and reduce fiscal disparities have exemplary aspects, they were not undertaken with transportation objectives, and their effect on transportation conditions, if any, has not been measured. More recent efforts focused specifically on smart growth objectives promise transportation benefits (based on modeling exercises) and are beginning to show implementation results. However, it is too early to measure the impacts of implemented projects in the real world.

Some of the key findings on the impacts of metropolitan planning initiatives, especially on transportation and land use patterns in the Twin Cities, include:

- Communities – with the assistance of state and metropolitan-level resources – are beginning to develop and implement plans for walkable, higher-density neighborhoods and town centers in a number of locations. Modeling studies suggest that implementation of such developments likely to occur within the framework of existing comprehensive plans will achieve positive, although modest, impacts on transportation conditions. Other modeling studies have found that potentially more significant transportation benefits (a 13 to 17 percent reduction in regionwide VMT) would result from more widespread changes in community design practices. Given current market trends and political conditions, though, the assumptions behind these studies appear to be speculative rather than likely to be achieved.

- A combination of low-cost and readily available land, consumer demand, and local zoning ordinances have led to the predominant development style over the past few decades being low-density, single-family housing. This trend continued through the 1990s. Within the past five years, though, a combination of factors – including demographic shifts, rising land prices, changes in state tax policy, and state fiscal incentive programs – appears to be shifting the market towards greater production of higher-density, multifamily housing as well as stimulating urban redevelopment. This trend is expected to increase in the future.

- During the 1970s and 1980s, the MUSA was largely effective at achieving orderly, *contiguous* development patterns, but it had little or no effect on the density or design of development in the region (and in fact, was not used by the Metropolitan Council for these purposes). The MUSA has gradually been expanded over time to accommodate forecast development, rather than being used in the more restrictive way that Oregon's urban growth boundaries have been applied to manage growth. More recently, though, there is evidence of leapfrog development outside of the seven-county region, in response to tightening land supply within the MUSA. The impacts of the MUSA on transportation conditions have not been evaluated.

- The tax-base sharing plan has, on the whole, appeared to reduce fiscal inequities. As a result, it may be helping to keep older, inner-ring communities more attractive. On the other hand, it has not eliminated incentives for suburbs to compete with each other for development. Also, other characteristics of the tax system – notably a high reliance

on the property tax – have been implicated as encouraging suburban sprawl and working against smart growth objectives. The impacts of tax-base sharing on transportation conditions have not been evaluated.

- The Metropolitan Council has not used its regional planning powers to significantly affect the nature of development occurring within the region, apart from containing it within the MUSA. Regional growth policies and principles have in general been advisory in nature rather than prescriptive. Furthermore, while there is interest in smart growth development there has not been a public mandate within the region to override local planning sovereignty in support of regional objectives. Since the late 1990s, however, the State and the Metropolitan Council have provided financial and technical support to local governments for the planning and implementation of projects consistent with smart growth objectives.

3.4 Montgomery County, Maryland

Planning and Evaluation Activities

Montgomery County's growth management policies were borne out of a 1964 initiative to preserve open space and farmland in wedges between radial highway corridors. The county's "Wedges and Corridors" initiative designated five categories of development, with the highest density closest to Washington, D.C. and major transportation facilities. In 1973, the county implemented a precursor to an urban growth boundary by designating most of the western and north agricultural areas in the county as a Rural Zone, with a minimum five-acre lot size. The establishment of the Rural Zone was consistent with the "Rural Preserve" wedge envisioned by the Corridors and Wedges initiative, but the action was not sufficient to prevent the loss of farmland to development.

When the county downzoned land in the rural preserve in 1980 to 25 acres per unit, it set up a system by which landowners in the rural preserve could transfer their development rights to landowners in other areas of the county where higher densities were allowed. The new Transferable Development Rights (TDR) system allowed development rights to be sold on the open market without government interference, which proved to be a boon to Montgomery County's preponderance of small, family-owned farms.

The county adopted its Adequate Public Facilities Ordinance (APFO) in 1973, requiring development to be synchronized with the provision of public facilities necessary to support that development. Initially the county developed its own guidelines to define "adequate" public facilities, but in the midst of a development boom in the 1980s, the county enacted legislation requiring the development of an Annual Growth Policy (AGP) to standardize the determination of how much development could occur in each year given available public facilities. The APFO and AGP affect only the timing of new development – the allowable location, amount, type, and mix of development are all specified in the Montgomery County General Plan, master plans, and sector plans.

The APFO requires transportation facilities, schools, water and sewage facilities, and police, fire and health services to have adequate excess capacity to absorb the increased burden imposed by a proposed new development. The county uses two procedures to determine adequacy for transportation facilities. The first procedure, the Policy Area Transportation Review, specifies the number of jobs and housing units that can be accommodated by the existing transportation system and any projects included in the first five years of the Capital Improvement Program. Each July, the County Council adopts a "staging ceiling" for the county's 25 policy areas, which specifies the maximum amount of development that can be approved during the following year. If the amount of development already approved in a policy area exceeds the staging ceiling adopted by the County Council, no new development can be approved in the following year, but previously approved developments can still move forward. A second transportation test, the Local Area Transportation Review determines if the traffic generated by a development will cause traffic congestion at nearby intersections to exceed an established LOS standard. Roadway LOS standards vary by policy area, depending on levels of transit service and usage. In limited cases, the county may approve new development in sectors that are under a development moratorium.

Findings

Although strong growth management policies have successfully preserved the rural character of northwestern Montgomery County, the policies may have served to divert development to other areas in Metropolitan Washington. For example, Frederick County, Montgomery County's neighbor to the north, has seen development concentrated on its southern edge, adjacent to Montgomery County's rural preserve.

Montgomery County's APFO has been lauded as an effective tool for coordinating development and investments in infrastructure and also criticized as a burden on developers and property owners. Although the county claims that the APFO has not reduced the amount of growth that would have occurred in Montgomery without the ordinance, the failure of Montgomery County and the State of Maryland to complete the transportation improvements listed in the 1969 General Plan also effectively limited the capacity for development in the county. A lack of high-capacity, high-speed transportation facilities has led to congestion on the local arterial system and higher travel times from residential areas to employment centers. Therefore, it is unclear to what extent the county's success in controlling development is due to the APFO as compared to market forces responding to transportation conditions.

The county's Agricultural Reserve is credited with dramatically slowing the pace of development in rural areas. During the 1970s, Montgomery lost more than 2,000 acres of farmland to development each year; in the 10 years following the adoption of the Agricultural Reserve, fewer than 3,500 acres of farmland were lost to development.

The county has been successful at attracting private investment to the areas around Metrorail heavy rail regional transit stations. Millions of square feet of office and retail space and thousands of residential units have been built within walking distance of the

12 Metro rail stations in Montgomery County, and the stations continue to attract large-scale, mixed use developments today which generate significant transit ridership. It is not clear, however, whether the county's transit-oriented development has substantially absorbed demand for development that otherwise would have occurred elsewhere in the county versus the Washington, D.C. region as a whole. One study concluded that growth management measures in Montgomery County have altered subdivision design, resulting in denser and more internally connective neighborhoods, but have been ineffectual at improving land use mix and accessibility to commercial uses on a regional level.

3.5 New Jersey

Planning and Evaluation Activities

Activities directed at smart growth objectives were first undertaken in New Jersey on a statewide basis in 1985, with the creation of the New Jersey State Planning Commission and the passage of the 1985 State Planning Act. This act required the creation of a State Development and Redevelopment Plan (SDRP), which was ultimately adopted in 1992 and subsequently updated in 2001. A policy document, the purpose of the SDRP is to "guide public and private development toward compact, mixed-use landforms that make the most efficient use of existing and planned infrastructure, as well as other systems, to meet present and future growth projections."

Since the time of its adoption, the State has implemented a variety of activities and programs directed at achieving the goals of the SDRP. These implementation activities have included:

- Cross-acceptance, a legislatively required process by which county and municipal comprehensive plans are compared to the state plan, and negotiations undertaken to reconcile differences;

- Provision of a variety of regulatory and financial incentives for activities such as farmland and open space preservation, as well as redevelopment in existing urbanized areas; and

- Greater emphasis of state transportation spending priorities on investment in transit, bicycle, and pedestrian facilities, as well as giving priority to highway improvements in designated growth areas.

As required by the State Planning Act, a number of evaluation studies have been undertaken to forecast or measure the impacts of the SDRP. Most notably, extensive forecasting efforts were undertaken in both 1992 and 2000 to predict the impacts of SDRP (if fully implemented) on a variety of indicators, including transportation. At least three studies have examined the extent to which SDRP policies have been effectively implemented.

One of these specifically examined NJDOT's policies and programs, and the extent to which they are consistent with SDRP goals and objectives. Two additional studies have focused on outcomes, one measuring the extent of farmland preservation and the other examining transit ridership in designated Transit Villages. Efforts to monitor other performance indicators are beginning to be undertaken by various state agencies.

Findings

The following conclusions can be drawn regarding the smart growth policies implemented and evaluation efforts undertaken to date in New Jersey:

- According to forecasting models, the SDRP, if fully implemented, has the potential for significant savings in required road and other infrastructure investment (reducing new road needs by 23 percent), as well as significant increases in transit ridership. The plan also has significant benefits as measured in terms of land consumption (a 34 percent reduction) and other environmental and community indicators.

- The history of localized-level planning and a lack of regulatory power on many planning issues have made the SDRP difficult to implement. One report notes that "few elements of the plan have actually been implemented because state agencies have failed to use it consistently in their spending and rule-making, and local officials have generally ignored it in local planning and zoning decisions." As one example, farmland preservation has fallen well short of goals.

- With respect to transportation in particular, one report notes that although NJDOT operates in a manner that largely supports the goals of the SDRP, "there are, however, no operational guidelines that link day-to-day departmental activity to SDRP policies." The Department, though, has recently taken steps to examine its programs and projects for consistency with the SDRP, and is initiating new programs consistent with SDRP objectives.

- A number of implementation programs for SDRP-related policies – including municipal planning grants, transit villages planning, brownfields remediation, and incentives for urban housing redevelopment and neighborhood revitalization – have only been adopted very recently (1998 through 2003). As a result, it is too early to evaluate the outcomes of these programs on SDRP objectives.

Transportation impacts of SDRP-related activities have not been systematically monitored or assessed. The State has recently begun to set up monitoring systems to track performance measures related to the SDRP.

3.6 Portland, Oregon

Planning and Evaluation Activities

Oregon is recognized nationwide for strong growth management policies that have been in place since the 1960s. Although counties have the authority of home rule, the State has required since 1969 that all cities adopt comprehensive plans. Since 1973, these plans have had to be consistent with the established statewide planning goals. The State of Oregon also has strongly emphasized the role of citizens in planning activities. In 1975, the governor created 1000 Friends of Oregon, a nonprofit citizen advisory commission, to monitor comprehensive plans for consistency with statewide planning goals. 1000 Friends of Oregon has continued to be influential in guiding and shaping growth throughout the State.

Oregon is particularly known for implementation of urban growth boundaries (UGB). The State has utilized this strategy for over two decades to guide the development needed to accommodate its population growth. By 1980, all cities in the State were required to adopt a UGB. In addition, Oregon state agencies have made a concerted effort to coordinate transportation infrastructure and land use planning on many levels. The Land Conservation and Development Commission has worked closely with the Oregon DOT on initiatives such as the Transportation Planning Rule and the Transportation and Growth Management Program to work toward higher levels of accessibility and decreased sprawl. The 1999 Oregon Highway Plan includes a section on land use and transportation policy that guides highway development in accordance with smart growth ideals.

The Portland metropolitan region is equally known for its efforts to implement smart growth-related initiatives. The region's UGB was adopted in 1977 and is regulated by the area's regional government, Metro. Metro was created in 1979, and exists today as the only elective metropolitan regional government in the United States. Metro has created initiatives such as the Regional Transportation Plan, the Region 2040 Growth Concept, the Transit-Oriented Development Implementation Program and the Urban Growth Functional Plan to further the goals of smart growth through the coordination and land use and transportation. Other local government agencies, such as Tri-Met (the regional transit agency) and the City of Portland, have been instrumental in coordination of efforts to further smart growth ideals.

Findings

While the Portland region has been viewed as a test bed for growth policies and been the subject of many studies, evidence is mixed on whether the region is realizing growth patterns consistent with its objectives. The following statements can be made based on studies completed to date:

- Forecasting studies have suggested that land use policies can have transportation benefits for the region. The Land Use, Transportation, and Air Quality Connection (LUTRAQ) modeling project undertaken in the early 1990s suggested that growth patterns based on higher-density, mixed-use, and transit-oriented communities in urban areas could accommodate forecast growth while reducing VMT by about six percent and vehicle hours of delay by over 50 percent.

- The urban growth boundary has effectively restricted urban development outside of this boundary. It also appears to be having an impact on the density of new development, especially since the early 1990s, as residential densities increased during the 1990s and a significant percentage of new housing starts are now occurring as infill and redevelopment. Impacts in the 1980s may have been less, since the land supply was largely adequate to accommodate new development and growth pressures were lower.

- Additional statewide and metropolitan planning initiatives (begun in the early 1990s) have been required to begin guiding development into desired patterns inside the urban growth boundary. Following these initiatives, changes have been made to local comprehensive plans and zoning to increase densities, mixed-use development, and walkability, especially in designated centers. However, the market has somewhat lagged regulation. Densities in designated regional centers are less than planned, and "sprawl-type" development continues to occur, especially in outlying areas. On the other hand, internal street and pedestrian connectivity appears to be increasing, and significant examples of mixed-use and transit-oriented development are occurring.

- VMT per capita in the region, while increasing through the early 1990s, have stabilized in the late 1990s and may even be declining slightly. Compared with another high-growth region without growth controls (Atlanta), Portland has performed much better at controlling the increase of per capita VMT, limiting land development, and increasing transit ridership.

- In the 1990s, housing prices increased rapidly in the region. A considerable amount of debate has centered around whether this can be attributed to the growth boundary, or to other economic forces, and evidence exists to support both sides of the debate. Housing prices in other western cities without comprehensive growth controls also increased rapidly over this time period.

3.7 Seattle, Washington

Planning and Evaluation Activities

In 1990 the Washington State Legislature passed the Growth Management Act (GMA). The act required most counties and cities in the State to conduct comprehensive planning with growth management objectives. The act also included requirements for internal

consistency of plans, and for coordination of plans among local jurisdictions and among counties in contiguous urbanized areas. The act provided tools (in the form of planning grants and technical assistance) to conduct planning. Enforcement of the act was to be done through three regional hearings boards that would hear appeals of plans brought by advocacy groups or other stakeholders. The act also included transportation concurrency requirements for development affecting local roads.

Also in 1990, the four-county central Puget Sound region adopted VISION 2020, a transportation and land use vision for the region. Although VISION 2020 was developed independent of the State GMA, it was implemented within the GMA framework, and was consistent with GMA objectives. VISION 2020 called for focusing growth in 21 urban centers and eight manufacturing/industrial centers. The urban centers were to include concentrations of population and employment in mixed-use, walkable environments, connected by high-capacity transit service. VISION 2020 has been implemented through local plan development, voluntary regional review of plans for consistency, MPO-led outreach and demonstration programs, and through capital projects in the transportation improvement program (TIP).

A number of monitoring and evaluation studies have been undertaken related to both the GMA and VISION 2020. The VISION 2020 adoption process included a forecasting effort that looked at five regional alternatives. The State and region have monitored the extent to which plans consistent with the GMA have been developed. The four counties in the central Puget Sound region have monitored development trends, consistent with State requirements. The Puget Sound Regional Council (PSRC) has evaluated the extent to which growth is occurring in designated urban centers with expected characteristics. PSRC recently began to undertake regional monitoring of transportation conditions, and as part of this program has reported regional VMT data since 1980. Beginning in 1995, King County initiated a more intensive program of monitoring both land use patterns and transportation conditions. Some independent evaluations also have been undertaken.

Findings

Findings from the various efforts to monitor and evaluate the GMA and VISION 2020 can be summarized as follows:

- Modeling conducted in support of VISION 2020 projected modest transportation benefits (three to five percent reduction in VMT) if the land use and transportation policies laid out in the vision were implemented. Much more significant impacts, however, were expected in the areas of land preservation and related environmental impacts, including a 47 to 58 percent reduction in open space consumed.

- Regional VMT per capita stopped increasing and instead remained nearly constant over the 1990s, suggesting that growth management policies may be helping to limit growth in vehicle travel. Performance monitoring of travel time and speed data has only begun, so conclusions cannot be drawn on these measures.

- The Growth Management Act has clearly had an impact on how planning is done in Washington State and in the central Puget Sound region. Comprehensive planning, including transportation, land use, and other factors, has been undertaken on a widespread basis by both counties and cities. Counties and cities have collaborated on developing multi-county and countywide planning policies, and have participated in consistency reviews led by regional agencies.

- The strength of plans at achieving stated growth management objectives has varied widely by jurisdiction. The GMA gives jurisdictions considerable flexibility as to how they implement GMA policies and objectives. Enforcement through regional hearings boards has happened, but on an inconsistent basis, as challenges must be initiated by advocacy groups.

- Within the central Puget Sound region, King County – covering over half of the region's population and one-third its land area – appears to have taken the strongest approach to growth management. County policies appear to have played a significant role in increasing average residential density, reducing rural land development, and protecting farmland. The other three counties in the region continue to show higher proportions of rural development and greater amounts of farmland loss, although the density of new development has increased in recent years.

- VISION 2020s stated objective of concentrating growth in "urban centers" has been realized slower than expected. The most significant growth – probably aided by market trends – has taken place in central Seattle. Most of the centers in suburban areas have not seen population or employment increases consistent with expectations. Nevertheless, within the past five years significant progress has been noted by many local jurisdictions to change plans, zoning, and infrastructure in these centers to support higher-density, mixed-use, pedestrian-friendly development, and some changes to development practices are now in evidence.

- Transportation concurrency policies have been controversial and recent studies have suggested the need for reform. They do not appear to directly support growth management objectives, and in some cases may undermine them. However, their application has been more flexible than in some other states (such as Florida). Also, concurrency and other tools (such as impact fees and capital improvement portions of plans) may have helped jurisdictions to finance transportation improvements and plan more effectively for transportation needs.

3.8 Cross-Cutting Findings

The six case study areas discussed above, while not the full set of areas implementing comprehensive planning, represent some of the most advanced examples of its application and evaluation. As a result, in conjunction with the inventory findings discussed in Section 2.0 they provide a basis for drawing state-of-the-practice conclusions and lessons

learned regarding the implementation and evaluation of comprehensive planning and smart growth policies throughout the country. Some of the key cross-cutting findings relevant to this study include:

Regional modeling studies suggest that land use strategies can have positive benefits for both transportation conditions and infrastructure costs. Table 3.2 summarizes modeling results from the case study regions. Findings from these as well as other regions suggest that changing land use patterns to create more compact and contiguous development, focus development in urban centers and other higher-density, mixed-use activity centers well-served by transit, and create more walkable communities is likely to result in some level of transportation benefits and infrastructure cost savings. The magnitude of these benefits ranges from incremental (two or three percent) to highly significant (20 percent or more) depending upon the extent of land use changes assumed, sensitivity of the models used, and various other assumptions. The more recent studies using more sensitive models but tempered with potentially achievable land use assumptions tend to give VMT reduction results on the order of five percent.[7] Empirical evidence suggests that the more optimistic scenarios regarding land use patterns are unlikely to be realized in practice. Also, the models are generally less reliable for forecasting traveler-oriented measures such as travel time, congestion, and delay, than for forecasting overall levels of vehicle-travel (and associated emissions impacts and infrastructure requirements).

Empirical data also suggest that land use strategies can have positive transportation impacts. A limited number of empirical studies from the case study regions focusing on travel behavior and neighborhood design suggest that land use strategies can reduce vehicle-trips and VMT at a neighborhood level, but that the magnitude of impacts varies significantly depending upon the range of land use characteristics explored and the regional context. These findings are consistent with the broader literature on land use and travel behavior (see Section 5.0).

Monitoring systems are only beginning to be established. For the most part, state and metropolitan agencies have not – at least until very recently – established monitoring systems to track land use patterns and relate them to policy implementation or to transportation system performance. This situation is beginning to change, though, largely as a result of two factors: first, an increased interest in performance monitoring in general; and second, the development of computerized data systems that make the collection and analysis of land use data considerably easier than in the past. States and metropolitan areas are increasingly entering into data-sharing agreements and developing GIS-based systems to track land use and environmental data. State DOTs and MPOs are also increasingly incorporating system-level performance measures into their long-range transportation plans, and utilizing operations and maintenance (O&M) data to track a broader range of transportation performance measures than was previously feasible.

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[7] *C.f.* the Portland LUTRAQ study as well as modeling studies in Sacramento and Salt Lake City documented in the FHWA Toolbox for Regional Policy Analysis, http://www.fhwa.dot.gov/planning/toolbox/index.htm

Table 3.2 Summary of Growth Scenario Modeling Results

Region	Study	Transportation Findings	Other Findings	Methodological Notes
Minneapolis-St. Paul	Smart Growth Twin Cities, et al. (2002)	• 13-17% reduction in VMT • 6-10% reduction in congested vehicle-hours	• 12-14% reduction in infrastructure costs • 47-52% reduction in new land developed	Land use alternatives: 57-75% of new development in compact, walkable communities
	Center for Energy and Environment, et al. (1999)	• 2% reduction in VMT	• 64% reduction in new local roads required • 25% reduction in arterial and regional road costs	Transportation modeling did not consider urban design or non-motorized trip-making
New Jersey (central)	Middlesex Somerset Mercer Regional Council (1991)	• 10-18% reduction in suburban vehicle-trips • 9-12% reduction in peak-period VMT • 11-21% increase in peak travel speeds		Findings do not reflect conditions in two core cities (Trenton, New Brunswick) due to modeling limitations
New Jersey (statewide)	Center for Urban Policy Research (2000)	• 150% increase in transit use	• 23% reduction in new roads and road costs • 34% reduction in new land developed	
Portland	1,000 Friends of Oregon (1997)	• 6% reduction in VMT • 53% reduction in VHD		
Seattle	Puget Sound Council of Governments (1990b)	• 3-5% reduction in VMT • 1-2% increase in VHD	• 1% increase in infrastructure costs • 47-58% decrease in open space consumed	Transportation modeling did not consider urban design or non-motorized trip-making

Comprehensive planning policies have evolved over time. States, regional agencies, and local jurisdictions that have implemented comprehensive planning policies frequently revise or refine these policies in response to lessons learned about policy effectiveness, as well as to changing market conditions and political factors. For example, while Oregon began 30 years ago to implement urban growth boundaries as its primary growth management tool, within the past 10 to 15 years a much broader array of tools have been

implemented due to the recognition that growth boundaries alone would not steer development in desired patterns. This makes evaluation a challenge because the policies being evaluated are continually changing; this challenge is compounded by the time lag between policy implementation and growth pattern impacts.

The ability of state and regional agencies to affect land use patterns has been limited. Few (if any) states have been willing to take as prescriptive and regulatory an approach to involvement in local planning as has Oregon. Approaches that rely primarily on voluntary cooperation and incentives *can* affect planning and growth patterns – but only as long as the state or regional agency continues to take a proactive approach to working with local jurisdictions and implementing programs and policies. States have faced the challenge of implementing programs in a manner that significantly affects planning and growth patterns, without engendering sufficient political backlash to weaken the program to the point of irrelevance. The more voluntary and incentive-based are the programs, the more inconsistent are the effects (implemented primarily in willing jurisdictions). Experience in New Jersey suggests that even with continued proactive state involvement, actual changes to planning practices and development patterns are likely to fall well short of goals.

State and regional agency programs have helped support the emerging smart growth movement. In the past five to 10 years, a new set of smart growth priorities has been emerging, focusing especially on infill and urban redevelopment; compact, walkable, mixed-use communities; and transit-oriented development patterns. Planning and implementation grants awarded by Federal, state, and regional agencies have helped encourage local jurisdictions to conduct planning and implement projects oriented towards achieving these characteristics. However, market forces – especially increasing land and housing prices, and a renewed interest in urban living among young people and older couples – have also been a major factor in driving these new types of development, as have advocacy efforts led by architects, urban planners, and others. The specific role of state and regional policies and programs in helping to bring about these new development patterns will probably remain difficult, if not impossible, to determine. Also, the extent to which these practices will remain a niche market versus become accepted into common practice is currently unclear.

Transportation concurrency, as implemented in many areas, has not been effective from a regional perspective. Experience in Florida and Washington suggests that transportation concurrency requirements have generally been ineffective or even counterproductive – as measured by impacts on regional conditions – when implemented using only local capacity criteria. The requirements can have the consequence of steering growth towards outlying areas where there is excess capacity, thus increasing overall vehicle-travel and eventually leading to greater regional congestion. Consideration is beginning to be given, however, to methods of implementing concurrency on a regional basis (i.e., comprehensive planning that considers the location and phasing of both growth and transportation facilities); Montgomery County's approach has been closer to this model. Also, concurrency requirements can be effective, if properly implemented, at obtaining private-sector financing of infrastructure improvements.

Non-transportation benefits of comprehensive planning policies may be more significant than transportation benefits. While this study did not focus closely on non-transportation impacts, it appears that planning initiatives can perhaps have larger benefits on certain other types of impacts than on transportation. For example, state efforts to protect coastlines, wetlands, and other key habitat or natural areas have in many cases been successful because they focus on acquisition, regulation, or purchase of development rights for a relatively small amount of land area. In contrast, land use policies that significantly affect transportation conditions must be applied on a larger scale, making them more difficult to implement.

4.0 Recommendations for Measuring Impacts

The objective of this section is to develop guidance for transportation planners at state DOTs and MPOs on how best to measure the impacts of comprehensive planning initiatives, and how to predict the range of impacts these initiatives can be expected to produce. This section provides an overview of the recommended approach to monitoring the impacts of planning activities; discusses the various performance measures, data sources, and methods that can be used (based on the case study findings) to monitor these impacts; and provides some suggestions for using these data sources to draw conclusions about the impacts of smart growth and comprehensive planning policies.

4.1 Overview of Measurement Approach

Making clear linkages between comprehensive planning policies and transportation (and other) impacts is not easy. The sequence of cause-and-effect relating these two factors can be described in three steps:

1. What impacts do state and regional planning laws or policy initiatives have on local land use policies and regulations (e.g., zoning, subdivision regulations, design guidelines)?

2. What impacts do changes to local policies and regulations have on the built environment?

3. What impacts do changes to the built environment have on transportation, environmental, and other conditions?

The case studies suggest that state and regional initiatives can take a decade or more to result in significant, observable impacts to the built environment. Furthermore, changes to the built environment must occur on a widespread basis for transportation impacts can be clearly observed. During the time that these changes are taking place, other factors – such as demographic trends, fuel prices, highway and transit capital investment projects – also can cause significant changes in actual transportation conditions.

These time lags and complicating factors suggest that a combination of *modeling* and *monitoring* is needed to relate growth policies to transportation impacts. One particular technique, by itself, will not provide definitive answers. Multiple techniques should be used to verify findings from individual methods. Modeling and monitoring should be used together in the following ways:

- Modeling should be used to predict the impacts of growth patterns – should they occur as expected or hoped – on transportation conditions and related impacts such as emissions.

- Monitoring should be performed at four levels:

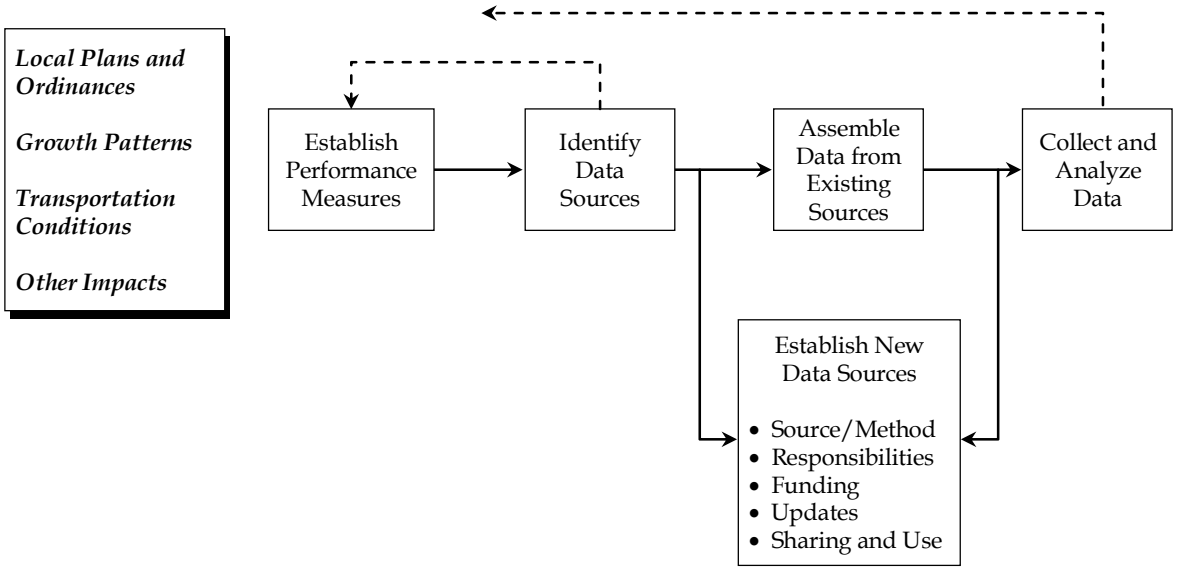
  1. Monitoring of changes to local planning policies and regulations;
  2. Monitoring of changes to development patterns;
  3. Monitoring of regional transportation conditions; and
  4. Monitoring of travel behavior in developments with different characteristics.

If monitoring shows that changes to planning regulations and development patterns are occurring, then transportation modeling can be used to assess the magnitude of transportation impacts resulting from these changes while controlling for other, exogenous factors. Monitoring of regional transportation conditions and of travel behavior in developments with specific characteristics can help confirm that the expected transportation impacts are taking place. If changes to planning regulations and development patterns are *not* being observed, or are inconsistent with growth management objectives, then the forecasted transportation benefits would not be expected to materialize.

While some of these monitoring approaches may require collection and analysis of new data, others can utilize existing data sources. Existing transportation models can be used directly or modified for the purposes of growth impact assessment (and in many cases, already are being used this way). Aggregate measures of transportation system performance often exist already or may be assembled with relative ease. Data on land use policies and patterns tend to be less well-developed, but state and regional initiatives are underway in many areas to improve land use data. Improving the data available to monitor regional land use patterns and transportation conditions has many benefits aside from simply monitoring the impacts of land use policies: the same data sources can be used to support transportation planning and modeling, environmental planning, regional economic and demographic analysis, and other activities. States and MPOs throughout the country are taking advantage of emerging geographic information systems (GIS) capabilities to build regional or statewide land use and environmental databases, and to facilitate and promote data sharing among state, regional, and local entities. These same efforts can help to support the monitoring of land use policy impacts.

A carefully thought-out process for establishing a monitoring system is important. Figure 4.1 shows a simplified representation of this process. The first step in this process is to identify performance measures that relate to state or regional goals and objectives. Identification of performance measures should be done in conjunction with key stakeholder agencies, including those who will be involved in the collection and use of the data, as well as the public. This step can be performed as part of a statewide or regional transportation and/or land use planning process, or as follow-on work to the development of a regional plan or vision. This initial step may also involve the definition of targets or benchmarks for each performance measure.

Figure 4.1 Establishing a Monitoring System



Once performance measures are identified, data sources to support these measures need to be established. This may involve the use of existing data sources, such as HPMS data, as well as the development of new data sources, such as a regional land use database. When establishing new data sources, the data collection method should be identified, along with institutional responsibilities, funding sources, methods and frequency of updates, and data sharing and usage agreements. The development of performance measures and data sources is by necessity an iterative process. For example, performance measures must be selected for which data can be obtained with a reasonable level of effort. It may not be possible to set targets until baseline performance data have been assembled.

The final steps of this process involve collecting the data and analyzing it on a regular basis. Analysis can be as simple as showing existing conditions or trends. It also may involve statistical analysis to examine correlations among different measures. This step can provide feedback into the refinement of performance measures and enhancement of data sets, as well as into the continued refinement of plans, policies, and programs.

4.2 Modeling

Modeling Practice and Capabilities

In traditional transportation planning practice, travel demand models have been used to forecast future transportation system needs and assess alternatives based on a single, assumed set of land use (population and employment) projections. Increasingly, though, these models are now being used to compare the transportation impacts of multiple future land use scenarios – some of which correspond to "trend" conditions, others of which represent some hypothetical future based on the successful implementation of policies to change growth patterns. Regional land use models are also beginning to come into more common use. These models can be used to test feedback between transportation and land use investments, and also to test some types of land use policies such as growth controls, zoning changes, or fiscal incentives to steer development.

Considerable attention has been paid in recent years to the ability of these regional models to measure the effects of growth policies and land use patterns on transportation conditions, so this topic will not be discussed in detail here.[8] Some of the primary conclusions from these studies include:

- Typical travel demand models are good for examining the impacts of the allocation of growth within a region. Most need enhancements, however, if they are to evaluate the transportation impacts of micro-scale land use design elements such as pedestrian friendliness, mix of uses, or transit-oriented development. A growing number of metropolitan areas are enhancing their models to incorporate some ability to consider these issues.

- Typical travel demand models are best suited to examine VMT as a transportation performance measure. Most models produce outputs of travel speeds and traveler delay, but the quality of speed functions and calibration varies and most models do not account well for intersection delay. Performance measures provided by regional models, other than VMT, should be viewed with caution.

- Many models either do not include transit or non-motorized mode choices, or have a rudimentary transit component. In many cases, model enhancements are required in order to examine the transit ridership and mode split impacts of land use strategies. Also, most models do not incorporate land use characteristics, or feedback from transportation modal availability, into the automobile ownership component of the model.

- Subarea models have been successfully used to look at land use policies for specific geographic areas in more detail, without the same level of effort involved in

[8] C.f. Parsons Brinckerhoff Quade & Douglas, Inc. and KPMG Peat Marwick LLP (2000); Federal Highway Administration (2001).

modifying the entire regional model. An example is the I-35W corridor coalition in Minneapolis.

- Statewide models are in general too coarse to examine the transportation impacts of statewide land use policies, although Oregon has experimented with refining its statewide model for this purpose.

- Land use models such as UrbanSim and MEPLAN are beginning to see broader application, but are still being used in only a handful of United States cities. These models are labor-intensive to develop although they can also provide valuable information for policy analysis. Improvements to regional land use data are facilitating the development of these models. Sketch-level models such as CommunityViz, INDEX, and PLACE3S are increasingly available to help in assessing the direction and relative magnitude of differences among scenarios, without involving the expense and level of effort of establishing a full-scale regional land use model.

Recommendations

Recommendations for improving travel forecasting capabilities to better reflect land use strategies include:

- In the short term, improve existing metropolitan travel demand models (where they have not been already) so that they are better capable of forecasting the impacts of land use changes on travel patterns and conditions. This is likely to require not only some model development effort, but also attention to data collection – for example, travel survey data collection that adequately samples transit and non-motorized travelers, and development of land use data that describes land use patterns at a finer level of detail than the standard population and employment by TAZ. This is typically the domain of the MPO, and a number of MPOs have already completed or initiated such efforts.[9]

- In the longer term, pursue new modeling paradigms, such as activity-based models and microsimulation, that show great promise to further improve the practice of land use policy assessment. Such models have been applied on an experimental basis, but are not yet widely adopted.

- Consider developing a regional land use model. The more sophisticated land use models in existence today can help assess the extent to which different land use policies will be effective at changing land use patterns. This will provide an advance in forecasting capabilities compared to the current state of practice where future land use policy scenarios must simply be assumed to be effective.

[9] Various documents on the topic of both short-term and long-term model improvements are published through the Travel Model Improvement Program (TMIP), http://tmip.fhwa.dot.gov.

4.3 Monitoring Changes to Land Use Plans and Regulations

Measures Used

The first step in monitoring the implementation of state and regional comprehensive planning policies is to monitor changes to local land use policies and regulations (as well as changes to policies by any state agencies with implementation responsibilities). Statewide and regional agencies rarely have the power to make land use decisions, and instead must work towards land use policy objectives through some combination of education and outreach, fiscal and regulatory incentives or disincentives, and a cooperative plan review process.

While changes to local land use policies and regulations are no guarantee that growth patterns will change, they are generally recognized as an important step in helping to facilitate this change. Therefore, monitoring the number of jurisdictions implementing changes to plans, policies, and regulations consistent with statewide or regional land use objectives – as well as the specific nature of these changes – is an important step in monitoring the overall impact of statewide and regional comprehensive planning initiatives.

While specific measures of interest will vary by area, some examples of measures that state and regional agencies have monitored include:

- Comprehensive plan policies are consistent with state and/or regional policies regarding growth;
- Plans designate adequate land to accommodate projected levels of residential, commercial, and industrial development;
- Plans designate growth areas and preservation areas consistent with state and/or regional objectives;
- Plans and zoning require or allow higher densities and mixed-use development in designated activity or growth centers;
- The comprehensive plan identifies a connected network of local streets as well as bicycle and pedestrian facilities;
- Design guidelines require or promote transit and pedestrian-friendly design, especially in designated transit service areas, activity/growth centers, and other neighborhoods intended to be urban in character;
- Street design guidelines include multimodal accommodations;
- Subdivision ordinances require sidewalks and pedestrian connections between neighborhoods;

- Requirements or provisions are made for driveway consolidation and access permitting along major arterials; and

- Zoning codes allow or encourage developers to apply traditional neighborhood design practices.

Furthermore, it is also important to track the implementation strength of these measures. Indicators of implementation strength include:

- Required versus permissive designations (e.g., establishment of maximum parking requirements as well as the lowering of minimum requirements);

- Extent of the area to which alternative designations must or may apply;

- Regulatory and/or fiscal incentives provided, and especially, regulatory streamlining for alternatives patterns of development; and

- Enforcement mechanisms in place.

Data Sources

Monitoring of these factors can be performed through a regular and systematic review of local comprehensive plans and regulatory documents. A checklist should be established of key elements. An initial data gathering effort will be necessary to review all jurisdictions' planning and regulatory documents. After this point, updates can be performed at regular intervals, or as changes to individual jurisdictions' plans are adopted. The extent to which local jurisdictions self-report data using an established reporting template, as compared to regional or state agency reviewing plans themselves, may vary. If a state or region has in place a plan cross-acceptance process, this process can be used to track plan consistency with specific objectives.

In the case studies undertaken for this project, the Portland and Seattle metropolitan regions were both identified as areas where local plans are being reviewed and monitored for consistency with state and regional objectives. New Jersey is also beginning to use the cross-acceptance process for this purpose. In Portland, Metro is monitoring plan implementation through its annual compliance reports, the first of which was issued in 2002. In the compliance reporting process, each jurisdiction is required to report on its status of adopting various standards as set forth in the region's Urban Growth Management Functional Plan (there are approximately 25 specific standards that must be met).

In Seattle, the Puget Sound Regional Council's (PSRC) voluntary and collaborative policy and plan review process has been used for monitoring purposes. Within this process, PSRC staff work with local jurisdictions and agencies to review and assure consistency among local, countywide, and regional plans and policies. To facilitate certification review, PSRC developed a questionnaire for local jurisdictions explaining the requirements of the policy and plan review process and providing a format for describing local

jurisdiction plans and amendments. The agency also completed a review in 2002 focusing specifically on the region's identified growth centers and manufacturing centers, which examined the extent to which local comprehensive plans and design guidelines are consistent with regional objectives and guidance for these centers.

One caution regarding plan monitoring is that the interpretation of whether a plan is actually consistent with state or regional objectives may be somewhat subjective. For example, the plans of all but five jurisdictions in the central Puget Sound region have been certified by the MPO as complying with regional objectives. On the other hand, a growth management advocacy group suggests that many plans fall short on achieving the changes needed to implement regional smart growth.

Recommendations

Areas wishing to track changes to land use plans and ordinances may use the following procedure:

- Work with local jurisdictions to establish a process for plan monitoring, and discuss any benefits the jurisdictions may receive in return (e.g., planning assistance or prioritized capital funding);
- Identify what elements or characteristics of local comprehensive plans and ordinances would be consistent with state or regional comprehensive planning or smart growth objectives (create a checklist);
- Collect and review local plans and ordinances, or develop a self-administering survey tool for local jurisdictions;
- Request local jurisdictions to provide information on updates to plans and zoning as they occur; and
- Prepare a summary evaluation at regular intervals to track progress.

While state planning requirements exist to varying degrees in places such as Oregon and Washington, monitoring efforts can be undertaken even in the absence of such requirements. It may be more difficult to obtain a comprehensive set of data, however, if reporting is not required. In the absence of state requirements, it is recommended that regional agencies wishing to establish a regional plan monitoring system work closely with local jurisdictions to discuss the value of such a system and to agree on the ways in which the information will be collected and used.

4.4 Monitoring Growth Patterns

Measures Used

Areas that have monitored land use patterns have focused on some or all of the following primary impacts:

- **Location of Growth –** By tracking locations of new housing and employment, it is possible to determine the extent to which growth is occurring consistent or inconsistent with local and regional objectives, e.g., in particular areas such as designated urban, activity, or growth centers, or in areas that are intended to remain rural in character.

- **Residential Density –** The average density of new residential developments provides an indication of how efficiently land is being used.

- **Trends in Urbanization –** The comparison of the percentage changes of newly developed urban land versus urban population growth provides information on the efficiency of new growth, as does the percent of new residential growth units occurring on redeveloped land.

- **Mix of Homes, Jobs, and Services –** Especially in designated activity or growth centers, mixed-use development is often an objective to facilitate alternatives to automobile travel.

- **Network Accessibility –** Various measures of the accessibility of transportation networks (streets and non-motorized paths) can provide an indication of a community's walkability.

- **Land Preservation –** The quality and quantity of natural resource preservation can be measured through the area of agricultural, forest, or other undeveloped land, and through the measure of farmland and average size of farms. Measures may also focus on specific objectives such as the percentage of identified critical habitat that is protected from development.

Data Sources

The ease with which the measures identified above can be tracked varies. At a minimum, population and employment can be monitored at a Census tract or traffic analysis zone (TAZ) level every 10 years. These data can provide general indicators of the location, density, and mix of new development. Many areas engage in more frequent updates of these data at these levels for transportation planning and regional demographic analysis purposes, using state-covered employment data, building permit data, or other locally available sources. Road networks identified through Census or state DOT databases can be used to provide basic measures of street connectivity in new development. Some

environmental land use data (such as wetlands, steep slopes, public lands, and land cover) may be readily available from Federal or state sources, while other data (such as sensitive habitat areas or the quality of agricultural land) may need to be developed through a special study.

More detailed analysis of land use patterns as they affect transportation, such as the specific locations, density, mix, and walkability of new development, requires data sources that are referenced with geographic precision and updated more frequently (ideally every one to three years). Sources of this level of detailed data generally include some combination of parcel-level land use databases, building permit data, and aerial or satellite photography. Field surveys may also be used, for example, to examine the walkability of new development.

Land Use Database

Before any change detection of land use can be performed, it is necessary for an inventory of the land to be assembled. Two basic approaches to this task exist. The first is to create a parcel-based database, utilizing predefined areas, such as tax lots, as the foundation. Although this strategy has the advantage of generally already being in a government's possession, it is not without its problems. For instance, since parcels are dynamic entities that are frequently altered by developers and governments, they must be continually updated. In addition, since various attributes must be assigned to parcels in a Geographic Information System (GIS), it is common for one parcel to overlap a number of features, thereby needlessly disaggregating the data. For example, one parcel may be split down the middle and zoned two different ways, or a parcel may straddle two census tracts that each contain population data for part of the area. This problem is exacerbated in areas near the urban fringe, where parcels are of a large size.

An alternative to a parcel-based system is to use a dataset built from layers of homogenous polygons. Each layer contains pertinent information, ranging from tax lot boundaries to the location of flood plains. This method, although more complicated and costly, results in layers of information that lose none of the base-level data's precision, while also allowing the selection of areas based upon more detailed search criteria. Since neither approach is incorrect, the choice with which strategy to use will ultimately depend on a variety of factors that include need, cost, and available data.

Clearly, the initial collection of land use data can prove to be the largest stumbling block in the process. While most MPOs and local governments generally have some level of data on hand, it may not always prove to be sufficient for all planning needs. Regardless of which of the two strategies detailed above is followed, one of the key data sets required for any analysis is a parcel or lot layer that contains the land use information. Tax lot information is often coded digitally, and, if not already in the planner's possession, may well be available from the tax assessor's office. The possibility exists for access to free lot information in those cases where planners do not have this information at hand, since utility companies often code the data for their own uses.

A secondary data source that is frequently utilized is aerial photography or satellite imagery (also known as remote sensing). Parcels can be generated from such photographs if the data does not already exist, but this is a long and arduous process. A more common occurrence is for the accuracy of lot boundaries that have already been digitized to be increased through overlay rectification procedures. Lots can also be broken into smaller subdivisions, thereby allowing for more detailed (and thus more accurate) land use parcels. How frequently this is conducted depends on budgetary constraints and staff capacities.

Regardless of which data source is used for the creation of the study area's parcels, the maintenance of the dataset is not an effortless task. As lots are subdivided or urban boundaries modified, rectification of the dataset must be conducted manually. It is generally possible to update the land use of any given parcel with relative ease if the data is collected from tax assessor information and stored electronically in a database, since the new land use database file can be relinked to the parcel boundary files. In those cases where aerial photography is the source of land use information, the update process will be more lengthy. The amount of time between updates to the parcel information may vary depending upon budgetary constraints.

Since the process of updating layer information from aerial photographs is such a lengthy one, some work has been conducted into examining whether or not the process can be automated. In most cases, though, it has been discerned that any automation beyond basic routines would likely impact the level of accuracy that is currently associated with the process. Although in some agencies this would be an acceptable tradeoff, those that rely on their models as an income source, such as Portland Metro, are not willing to risk losing clients due to offering an inferior product.

One current weakness in data collection techniques is that, in general, collected parcel information only contains information that relates to the number of buildings on the lot rather than the number of housing units. While this allows planners to effectively map the number and location of single family homes, it does not allow for a full analysis at the housing unit level. As a result, an apartment complex that houses 152 people in 90 units can appear in the tabulation of data no differently than a small three unit condominium.

A further difficulty exists with respect to the classification of farmland. It is not always possible to discern the difference between agricultural land and vacant land from aerial photography, county assessor's data, or community input. As a result, farmland can easily be labeled as undeveloped, vacant, or rural. Several regions also reported difficulties in the inventory and analysis of commercial and industrial land uses due to a lack of existing information and the subsequent cost of the data collection.

Other Data Sources

After the creation of the base land use data layer, several other pieces of data are useful to any land use monitoring effort. Road networks can be incorporated from a variety of data sources, including the census bureau's Topographically Integrated Geographic Encoding and Referencing (TIGER) line files or local tax assessment files, or can be digitized using

aerial photographs. Often, the state DOT will maintain a statewide road centerline file that contains information on every road segment and its characteristics, which may be more accurate and up-to-date than the TIGER files. The primary sources, update frequency, and types of information included in these databases vary from state to state. The use of a street line file that has been registered with street name information allows for the geo-coding of subsequent data sets, which allows for vastly improved analytical capabilities.

State-covered employment databases, along with private sources such as Dun & Bradstreet, represent a potential source of geo-referenced employment data. State-covered employment (ES-202) data have been used in some states by MPOs to update TAZ-level employment estimates. These data, however, generally require some cleaning and data checking (e.g., for employers with multiple locations), and some states are reluctant to share data on specific employers with other agencies. Private sources also have their limitations and may not include all employers.

An additional source of useful information on land use is the Natural Resources Inventory (NRI), which is maintained by the U.S. Department of Agriculture. The data are collected through the use of statistical sample points, some 800,000 in number, and can be used for year-to-year comparisons. The NRI survey contains land use information for all non-Federally owned land, and historically has been conducted every five years. As of 2001, however, the database will be updated on an annual basis (albeit using a reduced number of sample points). Since land use is extrapolated from sample points, the data are not considered accurate enough for local analysis, although they are considered statistically reliable for multi-county use. The NRI data were used in a recent study, funded by the Brookings Institution, that compared changes in urbanized area development densities in metropolitan areas throughout the United States between 1982 and 1997.

Building permit issuance data can provide valuable information as to where growth or redevelopment is occurring. Building permits include valuable information such as the address of the location to which it was issued, size and/or number of buildings, and land area of the parcel or plat. Most GIS software packages incorporate the ability to geo-code the data if an encoded street network exists. Not only does this allow the initial inclusion of the permit database to be handled swiftly, but any updates require minimal time. As such, building permits represent a high-quality data source that not only provides accurate information as to where growth is occurring, but can also be updated cheaply and quickly on a regular basis. One caution with building permit data is that occasionally after a permit is obtained, a project may be delayed or canceled.

Since building permit issuance is generally handled at the local level, one common side effect is for a lack of consistency in the information that is reported to the regional planning organizations. In some regions, permit tracking is only supplied to MPOs at the county level; in other words, only the number of permits that were issued within each county can be mapped. Although some basic patterns may be visible, any detailed analysis of development can not be performed. It has been the experience of several regional governments and MPOs that while local communities already have a digital map that represents the location of issued building permits, there has been reluctance to share this

information. In other regions, differences in classification categories has led to regional organizations limited to the use of only the most basic information available from the permits.

Satellite or aerial photography has been used in some areas to monitor land cover and land use change, even in the absence of a parcel-level database. For example, researchers in central Indiana have used satellite imagery to determine land use for a 44-county region at the level of a 30-meter grid cell. Since the data are only capable of distinguishing two levels of urban development (low- and high-density), they are not useful for tracking population versus employment growth, land use mix, or design/connectivity measures. However, they are useful for tracking the extent to which land is converted from rural to urban uses, and the types of rural land converted (e.g., farmland, forest, riparian). Satellite imagery is now available at increasingly high levels of resolution (2.5 meters or less) which may increasingly make it a lower-cost substitute for aerial photography when imagery is needed covering large areas. Satellite data have been used to track urbanization trends in many other areas of the country including Buffalo, New York; Charleston, South Carolina; and Michigan.

Updating the various databases ranges in complexity, from virtually effortless to investing as much time in the update as in the initial dataset creation. The tax assessor database, for example, in most cases can simply be relinked to the parcel boundary files with each update. Many MPOs replace the county parcel dataset as frequently as the databases are released, which is often quarterly. As has already been detailed, aerial photographs represent the other end of the spectrum, with updates often performed from scratch.

Recommendations

A parcel-level land use database, while not a requirement for tracking development patterns, is of great value for examining land use measures at a detailed level including land use mix, density of recent and planned development, and other characteristics. Many metropolitan areas throughout the country – including such disparate areas as Portland, Orlando, Sacramento, Atlanta, and Kansas City – have established, or are in various stages of establishing, a parcel-level database. Many areas also have been creating centralized GIS databases of locally designated existing and planned land use designations. Despite concerns with data-sharing in some areas, the metropolitan-level collection of building permit data is also being used to track the location, type, and density of new developments within a region. Remote sensing has proven valuable either to validate or update land use derived from other sources (typically on a three- to five-year cycle), or to track land cover and land urbanization. In addition, attention is beginning to be paid to street networks and non-motorized facility GIS coverage as a way of tracking the accessibility of new development.

Steps in establishing a regional land use database include:

- Convene a working group of stakeholders who would contribute to, and/or benefit from, a regional land information database (e.g., local planning staff, utilities, tax assessors, real estate interests);
- Define goals, objectives, and data requirements for a regional land information system;
- Investigate availability of data from existing sources, such as tax assessor data, city and county existing land use and comprehensive plans, building permits, and street centerline files;
- Investigate other potential sources of data, such as satellite or aerial photography and natural resource inventories;
- Assign responsibilities and develop data sharing and use agreements;
- Identify procedures for updating data;
- Design the database; and
- Collect data and populate the database.

Some of the steps of the process described above may proceed in parallel. For example, the task of data acquisition should commence early during the process. This also allows for identification of alternate data sources if some records prove to be unattainable. As much relevant data as possible should be acquired, although all the information collected should be validated initially to ensure both the precision of the boundaries used and that the accuracy of the data is suitable for the database.

A technique that has been used to great effect in a number of areas is to make use of a data sharing agreement. This agreement can be between public governments or with private companies. By sharing data that already exists or combining local data into a regional database, costs can be kept down while extensive amounts of information are acquired. A regional agreement is ideal, since local governments will likely maintain their databases on a regular schedule, thereby ensuring that a regional dataset remains up-to-date and accurate. If the organizations are interested in a data-sharing agreement, it is worth making the effort to establish common guidelines for collecting and formatting the data to ensure compatibility at the regional level. Data-sharing agreements can also be used to identify the mutual benefits to all parties (including local jurisdictions, regional agencies, and other stakeholders) and overcome concerns about the potential misuse of information that is shared.

4.5 Monitoring Transportation Conditions

Measures Used

The following are some of the primary indicators used to measure transportation conditions and performance at a regional level, whether for tracking the impacts of smart growth policies or for other purposes:

- VMT per capita;
- Vehicle-hours or person-hours of delay (VHD and PHD) per capita, per licensed driver, per vehicle using the system, or per VMT (also the total amount of delay, either VHD or PHD);
- Amount of congestion, which may be expressed in units such as percent of VMT at different levels of service, percent of person-hours of travel under congested conditions, or as continuous indices (e.g., Travel Rate Index);
- Average travel times or travel speeds, which may be measured for specific corridors or representative origin-destination pairs;
- Total transit ridership;
- Non-single occupancy vehicle (SOV) mode share; and
- Accessibility to employment, e.g., average number of jobs that can be reached within 30 minutes by a person living in the region.

Of these measures, VMT per capita, transit ridership, and non-SOV mode share are most commonly used for performance monitoring, since they are readily available from local and national data sources in most cities. While these measures most closely relate to environmental impacts from transportation, they do not provide a good indication of how well the system is functioning from the perspective of the traveler. Other traveler-oriented measures, including delay, congestion, travel times/speeds, and accessibility, are most commonly taken from travel demand forecasting models (using mathematical relationships between traffic volumes, road capacity, and travel speeds). State and regional agencies, however, are increasingly implementing data collection systems so that delay, congestion, and time/speed data can be observed empirically, providing a more reliable assessment of how well the transportation system is performing at providing mobility and accessibility.

In the past few years, measurement of travel time reliability has received increased attention as an important aspect of travel that should be monitored. Travel time reliability essentially describes how travel times (or any other basic measurement of travel activity or congestion, as described above) vary over time. Its significance relates to the fact that congestion is caused by several underlying factors, many of which are events that do not

occur in the same way every day (e.g., incidents, weather, work zones, special events, and even day-to-day variability in travel demand).

Measures for travel time reliability are based on describing the size and shape of the travel time distribution over time. Traditional statistical measures such as standard deviation and percentiles may be used. A related measure that has proven useful in describing reliability patterns is the Buffer Index, computed as:

$$\text{Buffer Index} = \left[\frac{\text{95th Percentile Travel Time} - \text{Average Travel Time}}{\text{Average Travel Rate}} \times 100\% \right]$$

The Buffer Index expresses the amount of extra "buffer" time needed to be on-time 95 percent of the time (late one day per month). Indexing the measure provides a time and distance neutral measure, but the actual minute values could be used by an individual traveler for a particular trip length. The index is calculated for each road segment and a weighted average is calculated using vehicle-miles of travel as the weighting factor.

Data Sources

National Data Sources

The Highway Performance Monitoring System (HPMS), initiated in 1978, provides a national database of standardized data from each state DOT on the extent, condition, performance, use, and operating characteristics of the Nation's highways.[10] Data from the HPMS are used by the Federal Highway Administration (FHWA) and the U.S. DOT to prepare the biennial Condition and Performance Reports[11] to Congress and the annual *Highway Statistics*[12] series.

HPMS data are collected by states using a variety of methods. In Florida, HPMS data are drawn from Florida DOT's *Roadway Characteristics Inventory (RCI)*, a detailed database of roadway information maintained by FDOT's seven district offices. Districts are responsible for updating the RCI on a regular basis using AADT values derived from thousands of direct traffic count locations located around the State.

[10] HPMS documentation is available at: http://www.fhwa.dot.gov/policy/ohpi/hpms/

[11] The FHWA's Conditions and Performance Report for FY 2002 is available at: http://www.fhwa.dot.gov/reports/2002plan/

[12] http://www.fhwa.dot.gov/policy/ohpi/hss/index.htm

HPMS summary data are available at the state and national level via the Bureau of Transportation Statistics' TranStats web site.[13] The web site archives many useful performance measurements and comparison statistics, including:

- Average annual daily traffic (AADT) data at the state level by roadway functional class;
- VMT by state and by functional class; and
- Roadway length and lane-miles by functional class.

Historical HPMS data are available on the TranStats web site for 1993 to the present. The data can be used to evaluate whether growth management policies have had desired effects on VMT and highway system usage at the state level. The next section will discuss how HPMS data are collected by states can be used to perform more detailed analyses at the sub-state level.

The Federal Transit Administration monitors trends and conditions in the nation's transit systems through the National Transit Database (NTD).[14] Summary information from the NTD data is available for 1996 to the present on the NTD web site and on the TranStats web site. The NTD contains information on transit services supplied and consumed for 539 transit agencies in the United States, such as transit vehicle revenue miles, revenue hours of service, unlinked passenger trips, and passenger miles traveled. These and other metrics can be used to compare the effectiveness of growth management policies aimed at increasing transit ridership across metropolitan areas, or, in some cases, cities within a metropolitan area.

HPMS data and NTD data can be used for trend analysis at a regional level and for broad-brush comparisons across regions. Both HPMS and NTD data, though, are subject to reporting errors and inconsistencies that naturally arise from variations in the data collection methods of 50 state DOTs and hundreds of transit agencies.

The HPMS and NTD data sets offer insights into transportation system usage, but several studies have used this data to perform more detailed analyses of system performance, and congestion in particular, at the metropolitan level. The annual *Urban Mobility Study*,[15] published by the Texas Transportation Institute (TTI), is perhaps the best-known comparison of congestion nationwide, providing statistics that are widely cited in the news media each year following the release of the report. The Urban Mobility Study publishes several measures of system performance for 75 United States cities:

[13] http://www.transtats.bts.gov/

[14] http://www.fta.dot.gov/transit_data_info/national_transit_db/614_ENG_HTML.htm

[15] http://mobility.tamu.edu/ums/

- A Roadway Congestion Index, or "RCI," is the ratio of daily traffic volume to the supply of roadway and is used to estimate the number of hours of the day that a region's highways experience congested conditions;

- The cost of congestion, which is the sum of monetary cost of delay and the cost of fuel consumed in congestion; and

- The possible effects of basic congestion reduction strategies, including an assessment of the number of lanes that would be necessary to maintain a constant level of congestion and the number of carpooler and transit riders that would be necessary to accommodate rising demand for travel with no increase in roadway lane-miles.

Although some of TTI's assumptions have been questioned (e.g., the use of average estimated travel speeds in each city instead of measured speeds to calculate delay), the study offers a consistent method of comparing congestion across regions. However, congestion management techniques such as incident management teams and operational improvements have tended to be discounted by the study, since the study's methodology only estimates congestion levels based on roadway capacity, not operational strategies. Beginning with the 2003 report, however, the TTI methodology has been expanded to account for a limited number of operations and maintenance strategies, including ramp metering, incident management, high-occupancy vehicle (HOV) usage, and traffic signal coordination.

State and Regional Monitoring Efforts

National data sources can be used to evaluate general trends by region, but individual regions may need to develop their own data sources and monitoring efforts to evaluate measures in addition to VMT and transit ridership, or to evaluate measures at a subregional level (e.g., localized traffic congestion or travel times along specific corridors). Different states and regions have developed data and tools of varying degrees of sophistication to perform this level of monitoring.

The Mobility Monitoring Program, a cooperative study between the Texas Transportation Institute (TTI) and Cambridge Systematics, Inc. and funded by the FHWA, is an ongoing program to monitor highway performance with direct measurements of congestion rather than relying on estimated or modeled data. The program currently has 21 mid- to large-sized cities around the United States that are participating; roughly five to seven new cities are added every year. In addition to providing direct measurements of congestion, the program also increases awareness of efforts around the country to archive traffic data and identify data that may be useful for investigating the effects of policy decisions.

According to the study, many cities and regions around the country have infrastructure in place to monitor traffic conditions on regional roadways, but relatively few archive the data to analyze trends over time. The report attributes the limited archiving and data analysis to resource constraints in light of the cost and time required to collect, store, and analyze data. However, the authors go on to say that "some of the problem is that transportation professionals and decision-makers have not 'mined' this dataset or asked the

questions that would encourage, fund or mandate that data of sufficient quality and completeness be available for at least the sections of road where monitoring equipment has been installed."

Not surprisingly, the authors find that while many cities may archive their data, those that use the data to support ongoing performance monitoring and policy evaluations have had an opportunity to refine the data and the collection methods and thus have produce higher-quality data sets. Most cities and regions will undergo an adjustment and calibration phase during initial data collection efforts, with refinements to their methodology.

The authors of the study are careful to attach qualifications to the inferences and conclusions that can be drawn from the study, most notably that data should not be compared across cities. The study investigates only freeway travel, which represents only a portion of all travel in a given city. Only "a handful" of cities monitor traffic flows on major or minor arterials off the freeway system, according to the study, but an expansion of monitoring and archiving activities at non-freeway locations is necessary to gain a complete understanding of regional traffic flow and travel demand.

As shown in Table 4.1, the extent of a city's freeway system that is instrumented with full-time vehicle detection equipment varies widely across the United States. The share of total regionwide VMT measured by the vehicle detection equipment is roughly proportional to the region's freeway lane-miles (that is, the region's dependence on freeways for intraregional travel). However, few systems provide the comprehensive, disaggregate data needed to evaluate the impacts of growth management policies on a broader range of traveler-oriented performance measures.

Before embarking on a costly effort to develop a transportation system performance monitoring system, the limitations of these various data sources should be understood. In particular, data collected from unmanned, electronic sources, such as loop detectors, should be carefully scrutinized before being accepted at face value. Loop detectors and other sensors have the potential to malfunction, and some equipment may demonstrate a tendency to systematically over- or undercount vehicles when observed over time and compared with other count methods.[16] The Mobility Monitoring Program cites the need for careful initial calibration and continued monitoring of data collection equipment.

Of the 21 cities surveyed in the Mobility Monitoring Program, several monitoring efforts exemplify the state of the practice, while others use techniques more suitable for regions that have few financial and staff resources with which to work.

[16]See, for example, Turner, et al. (1999), a study of San Antonio's extensive TransGuide Intelligent Transportation Systems (ITS) infrastructure that showed certain sensors were consistently undercounting vehicles on high-volume facilities.

Table 4.1 Extent of Coverage of Vehicle Count Locations on Freeway Networks in 21 United States Cities

	Instrumented Corridors				Urban Freeway System	
	Lane-Miles		Annual VMT		Lane-	Annual VMT
City	Number	Percent	(1,000)	Percent	Miles	(1,000)
Albany, New York	86	16%	495	24%	550	2,090
Atlanta, Georgia	522	23%	4,835	31%	2,280	15,670
Austin, Texas	146	26%	405	12%	572	3,432
Charlotte, North Carolina	83	17%	895	31%	485	2,850
Cincinnati, Ohio/Kentucky	913	91%	1,645	28%	1,000	5,820
Detroit, Michigan	752	42%	3,990	35%	1,810	11,300
Hampton Roads, Virginia	171	19%	385	9%	915	4,245
Houston, Texas	1,900	77%	N/A	N/A	2,460	14,965
Long Island, New York	502	7%	3,405	9%	6,760	37,840
Los Angeles, California	3,700	66%	23,345	49%	5,610	47,360
Louisville, Ohio/Kentucky	77	11%	535	15%	670	3,625
Milwaukee, Wisconsin	695	100+%	2,885	83%	605	3,485
Minneapolis-St. Paul, Minnesota	990	62%	5,665	55%	1,595	10,290
Orlando, Florida	192	26%	2,705	74%	735	3,640
Philadelphia, Pennsylvania	690	39%	2,585	28%	1,750	9,345
Phoenix, Arizona	420	37%	2,405	31%	1,140	7,885
Pittsburgh, Pennsylvania	415	35%	1,190	29%	1,830	4,130
Portland, Oregon	210	30%	2,010	43%	700	4,625
San Antonio, Texas	505	47%	1,890	34%	1,065	5,640
San Diego, California	1,195	67%	6,405	51%	1,759	12,625
Seattle, Washington	602	42%	5,410	61%	1,420	8,920

Source: Texas Transportation Institute (2003).

In **Seattle**, PSRC tracks and forecasts VMT and transit ridership in support of VISION 2020, the region's primary transportation and land use policy document. The Washington State Department of Transportation (WSDOT) has installed inductive loop detectors on more than 600 lane-miles of freeway in the Puget Sound region and is able to monitor and archive data from the sensors at a central traffic operations center. WSDOT measures:

- VMT;
- AADT;
- Average peak travel time;
- Average time with and without incidents; and
- The 95 percent reliable travel time on monitored freeways.

As part of its VISION 2020 monitoring efforts, PSRC is beginning to use these data to provide travel time data for 11 sample commutes throughout the region, and to report average speed on specific facilities. Reporting of these measures began in 2001.

The Metropolitan Council in **Minneapolis** is in the process of adopting a set of performance measures and associated targets as part of Framework 2030, the region's long-range vision for transportation, wastewater, parks, and aviation. Transportation-related performance measures are to include:

- Lane-miles of roadway added per year;
- VMT per capita per day;
- Hours spent in congestion; and
- Amount of transit service provided and transit ridership.

As in Seattle, inductive loops embedded in the road surface are used to record traffic data on Minneapolis freeways, and to determine VMT and congestion data. The loop detectors are relatively inexpensive to install and maintain and provide data 24 hours per day. While loop detectors are the most widely used technology to monitor traffic conditions, other techniques are available:

- **Atlanta** uses video image processing and microwave radar to monitor traffic flows on 53 miles of its 300-mile freeway system. Microwave radar has the capability to measure traffic volume, lane occupancy, speed, headway, and vehicle classification. Video images can provide information on traffic density, but are affected by lighting and weather conditions.

- In **Houston** and **San Antonio**, loop detector data is used in combination with anonymous toll transponder tracking to provide real-time, measured travel time information for roadway segments. Loop detectors alone can be used to estimate segment travel times based on travel speeds and lane occupancies, but toll transponders affixed to a large enough sample of vehicles in traffic provide the most accurate measurements. Travel time data can then be broadcast to other drivers via variable message signs, television and radio traffic reports, and web sites, and archived for later analysis.

Highway performance monitoring allows regions and communities to judge the effects of growth management policies on congestion and highway system usage. The more monitoring sites included in a system, the more disaggregate the information available for policy analyses. Continuous data collection can allow regions to analyze temporal variations in travel demand, such as weekend travel patterns and seasonal increases or decreases in demand.

Cities with a desire to promote transit use as part of a broader growth management initiative have expanded their performance measurement capabilities to analyze transit systems in addition to highway facilities.

The **Transit Performance Monitoring System (TPMS)**, which is funded by the Federal Transit Administration and administered by the American Public Transportation Association, collects information from transit operators and riders related to three policy objectives: mobility, congestion management, and livable communities. The TPMS includes a basic, 12-question survey that transit operators can blend into their existing, localized rider surveys. By asking riders what modes of transportation they used to access the service, what modes they will use to access their final destinations, and whether they are transit-dependent or choice riders, the surveys can help transit agencies and land use policy-makers assess whether land use patterns around transit stations enable walking trips and transit trips to take the place of private vehicle trips.

Seattle's PSRC plans to include measures of transit system supply, use, and efficiency in its *Transit System Performance Monitoring Report*.[17] At the time of this writing, the first edition of the report, which contains baseline data for 2000, was under development and only the first two chapters were available. The second chapter of the report contains data on transit passenger trips (absolute, per capita, and per service hour) and system efficiency, as measured by operating cost per passenger trip. The systemwide measures can be used to gauge the effectiveness of regionwide strategies to increase transit use, but not the effectiveness of a specific, localized action such as a new transit-oriented development. Future chapters will contain more detailed information on transit performance in congested travel corridors and will be better suited to localized analyses. As data are collected over time, the PSRC will be able to analyze trends and evaluate the effects of comprehensive planning initiatives.

Portland's regional transit agency, Tri-Met, uses an automated bus dispatch system with automatic vehicle location (AVL) technology to track bus locations, travel speeds, and travel times between stops. Automatic passenger counters (APCs) are placed in buses to provide more accurate and detailed passenger boarding data on all routes at all times of day. The technology used in Portland to track bus locations and count passengers is widely used in transit systems around the world. AVL technology makes use of global positioning system (GPS) satellites to track the locations of buses in a transit fleet. APCs can use infrared sensors or treadle mats on bus steps to count passengers boarding and leaving a bus. Over time, detailed information on passenger boarding and unloading locations can help communities discover which areas are transit-friendly (from both a housing and an employment perspective) and which communities provide the best connectivity to transit routes, making the bus a viable option.

Recommendations

There are many reasons – in addition to measuring the impacts of smart growth and comprehensive planning policies – for a state or region to improve its transportation data collection and performance monitoring systems. Some areas are already doing so, making

[17] Puget Sound Regional Council, 2004.

use of various Operations and Maintenance (O&M) data sources to move beyond the basic VMT measures provided by the HPMS. These monitoring systems serve a variety of short-term purposes, including helping to improve real-time traffic and transit operations (for example, through incident response or traffic management strategies), and providing travelers with real-time information on travel conditions. They can improve the calibration and validation of travel demand forecasting models to more closely match real world conditions. Furthermore, they support long-term objectives of monitoring the ongoing effectiveness of transportation investment and operations strategies, as well as land use policies, at improving mobility and accessibility in the region.

In working to enhance transportation monitoring systems with the objective of measuring smart growth policy impacts, some specific recommendations can be made:

- Careful attention should be paid to archiving data from O&M sources. These data provide continuous measurements at very detailed time and spatial scales that can be used for long-term monitoring. Three advantages of these data over traditional data sources are: 1) the errors associated with expanding short samples are eliminated; 2) they are the only way to develop travel time reliability measures (which require a history of travel conditions); and 3) they provide inputs to new and emerging models such as traffic simulation and emissions models without requiring original data collection. Because land use policies can take a long time to implement and to affect the built environment, long-term monitoring – over a period of 20 to 30 years – is necessary to measure impacts. While long-term archiving of second-by-second traffic data is not necessary, key summary measures such as hourly volumes and average traffic speeds on network links should be archived so that researchers have access to these data many years in the future.

- Given the shortcomings of using VMT as the sole transportation performance measure, attention should be paid to the use of emerging data sources, such as electronic toll transponders, to monitor travel times and speeds on specific corridors (as well as overall average speeds by time of day). Researchers are also developing innovative methods of using traditional traffic detection equipment such as loop detectors to measure travel speeds and delay. These data are more frequently being collected especially for the use of traveler information systems, but again, need to be archived for future use and suitable for aggregate-level analysis.

- Consideration should be given to expanding the network of non-freeway traffic detectors to better monitor conditions on arterial (and possibly local) streets, if the existing traffic monitoring network is insufficient to provide comprehensive evidence on non-freeway conditions.

- Collection and archiving of geocoded transit boarding and alighting data may be valuable in helping to assess the ridership impacts of specific development patterns (e.g., transit-oriented developments or new urbanist neighborhoods). Simultaneous archiving of LOS data (e.g., service frequency by route/location) also is important to support retrospective analysis at this level of geographic detail.

- Metropolitan agencies conducting travel surveys should pay attention to sampling and data collection approaches so that the survey data can be used to evaluate the impacts of land use conditions on travel behavior. Techniques may include oversampling in pedestrian-oriented neighborhoods if few of these types of neighborhoods exist in the region, and collecting data using global positioning systems (GPS) to allow a more detailed evaluation of routes traveled, especially by non-motorized travelers. One example of these applications is the recent SMARTRAQ activity-based survey conducted in the Atlanta metropolitan region, which surveyed 8,000 households regarding vehicular activity, physical activity, and residential preference.

4.6 Other Measures

A variety of other environmental, economic, and community measures have been used to track the impacts of state and regional comprehensive planning policies. Examples include:

- Emissions of air pollutants and air quality status;
- Infrastructure costs, including transportation, water, sewer, and other utilities;
- Water consumption;
- Impermeable surface area, which relates to stormwater runoff;
- Energy consumption and greenhouse gas emissions;
- Housing affordability;
- Economic health, as measured (for example) through per-capita income; and
- Fiscal health of communities or fiscal disparity.

Two of these measures of particular interest to transportation agencies are emissions from motor vehicles, and costs of transportation infrastructure and operations. These two measures, although not the primary focus of this case study, are discussed briefly below.

Air Quality and Motor Vehicle Emissions

Air quality (as described through monitored concentrations of criteria pollutants) is important to transportation agencies because of the linkages between transportation and air quality planning established under the Clean Air Act Amendments of 1990 and ISTEA, and because of the potential implications of air quality non-attainment for transportation programs and funding. Because of the complexity of factors that influence ambient pollutant concentrations, air quality *per se* is difficult to monitor in a way that can be directly related to transportation system or land use changes or land use policies. Instead, the best approach towards monitoring emissions and air quality impacts is to *model* emissions changes based on observed changes in traffic conditions.

Emissions of air pollutants from motor vehicles are closely related to VMT, and as a first-order approximation can be derived from VMT through the application of emission factors derived from emissions models. They also depend upon traffic flow, congestion conditions, and other factors such as average trip lengths. While speed-based emission factors are commonly applied to regional emissions analysis, it is less common for emissions analysis techniques to be enhanced to account for more detailed traffic conditions.

Land use policies may or may not affect emissions in direct proportion to VMT. Land use strategies that cluster development into smaller areas at higher densities may reduce overall VMT and vehicle-trips, but may increase localized congestion which leads to higher emissions in certain locations. Also, strategies that make vehicle-trips shorter, but do not reduce the total number of vehicle-trips, may not have the expected emissions benefit because cold starts are not reduced. (Conversely, strategies that increase non-motorized trips may have higher benefits because these are typically short trips with higher emissions.) Methods such as separating start-based from trip-based emissions represent one approach to addressing these factors. A recent EPA-sponsored analysis of transit-oriented development land use alternatives in Charlotte, North Carolina found that not accounting for vehicle starts led to overestimating the emissions benefits of some strategies by up to 40 percent.[18] In the future, broader application of travel simulation models, along with improvements to emissions models, may allow for more detailed evaluation of emissions resulting from different traffic flow conditions.

Infrastructure Costs

Infrastructure costs include regional and local transportation facilities, as well as utilities including water, sewerage, electricity, telephone, and natural gas distribution. Empirical studies suggest that infrastructure costs can be reduced with more dense and compact development patterns, since fewer square feet of roads or linear feet of other utilities must be provided.[19] The relationship is not always simple, however, and its magnitude has been debated. Furthermore, at high densities, costs may sometimes increase because of the greater difficulty of building or maintaining infrastructure in a dense urban environment.

None of the areas reviewed in the case studies have established systematic monitoring systems for infrastructure costs, although some (such as New Jersey and Seattle) have forecast the total infrastructure costs of different transportation and land use scenarios. Monitoring of infrastructure costs is complicated by the different levels at which these costs are incurred (regional/state government, local government, private sector) and by the "lumpy" nature of infrastructure investment. It is not sufficient to simply monitor annual spending levels; it may be greater in some years than in others due to different capital investments, and this also does not account for whether spending on maintenance

[18] Cambridge Systematics, Inc. and Industrial Economics, Inc. (forthcoming).

[19] Burchell, Robert W., et al. (2002).

is sufficient to maintain the capital stock over time. Relating transportation costs to growth patterns can be particularly difficult, as it is important to control for similar levels of service when comparing costs between two different growth scenarios, areas, etc. While a simple measure of local transportation service is whether it provides access to each property, measures of regional infrastructure performance (such as accessibility or congestion) are not standardized in a way that can be easily related to levels of investment.

A combination of two methods is often used to forecast infrastructure costs of different transportation and land use alternatives:

- Review of the estimated costs of projects contained in regional transportation and land use plan alternatives; and

- Cost-of-development models that relate development density, location (infill versus greenfields), and possibly other factors to local and private-sector infrastructure costs (these models may include both local roads and other utilities).

These approaches were used in the Seattle VISION 2020 development process, as well as in other areas such as Denver and Salt Lake City for analyzing regional scenarios. In New Jersey, a simple model was developed relating road density to population density, and assuming a per-mile cost of road. Some considerations should be kept in mind in applying these approaches. First, the cost models vary in their data sources and level of sophistication. Development costs may vary by area depending upon specific standards set (e.g., street widths, pavement depth) or other local conditions not directly related to regional growth patterns. The projects included in regional transportation-land use plan alternatives do not always provide the same level or quality of service; therefore it may be difficult to separate the cost implications of different growth patterns from different levels of transportation service.

Some empirical measures of transportation expenditures are available. States are required to provide annual highway finance reporting via FHWA's Form 536 Local Highway Finance Report, which reports expenditures both by the state and by local jurisdictions, as reported by local jurisdictions. However, reporting by local jurisdictions is not always consistent and if reports are not submitted, estimates may need to be made based on old data. Also this source does not track private-sector expenditures such as subdivision roads. Furthermore, expenditures must be measured over a relatively long period of time because of fluctuations from year to year resulting from budget conditions, major capital investments, etc. National reporting is performed only at the state level, so this data source is not directly useful for metropolitan- or regional-level analysis, unless source reports can be obtained and analyzed.

Transit expenditures are somewhat easier to track, as they are reported annually for each transit property and separated by capital versus operating expenditures. These data are provided in the National Transit Database (NTD) and can easily be summarized for a given state or metropolitan area. Again, however, the same caveats apply regarding the lumpiness of capital expenditures from year to year as well as potential reporting inconsistencies. Furthermore, a simple analysis of transit expenditure data over time does not directly provide information about the impacts of growth patterns on infrastructure costs,

as service levels may be increased or decreased for other reasons. Other measures – such as transit service productivity – also are important to examine in looking at policy impacts from a regional perspective. A modeling approach may be better for this purpose; for example, New Jersey, in analyzing the costs of the SDRP, developed a model to forecast transit ridership based on population density and proximity to a bus or train station. From such a model, service requirements can be estimated and cost estimates developed for different growth patterns.

4.7 Overall Recommendations

Priority Needs

Table 4.2 provides a summary of some of the various measures of performance that have been proposed for regional smart growth and comprehensive planning policy monitoring, as well as specific attributes, data sources, and some potential limitations of these data sources.

The above discussions point to four priority areas for improvement that would be most valuable in providing a better measure of the impacts of smart growth and comprehensive planning policies:

1. **A monitoring program to track plan and program consistency.** Monitoring of local plans and ordinances, as well as state agency plans (e.g., transportation plans, critical land acquisition), provides an important indicator of the extent to which state and regional policies are being implemented by state agencies and local jurisdictions. A plan consistency review or cross-acceptance process can be used for this objective, or a separate program established to review state and local plans, programs, and ordinances for policy consistency. In conjunction with such a program, regular policy research activities – e.g., structured interviews with local government staff, elected officials, and developers – should be undertaken to identify which policies are most effective.

2. **A regional land use database and monitoring system.** Some form of land use monitoring system is necessary in order to determine whether comprehensive planning policies are actually having an effect on growth patterns. Ideally, this would include the development of a parcel-level or polygon-level regional land use database that can be updated at regular intervals using tax assessor data, building permit data, and/or aerial photography. However, this can be a significant undertaking that may stretch beyond the financial or political capabilities of some areas. Satellite imagery also has been proven as an effective and relatively low-cost means of tracking general growth patterns. Either method will probably need to be supplemented by development site plan review, field surveys, or some other method of evaluating the specific design characteristics of new development.

Table 4.2 Summary of Potential Data Sources for Monitoring

Measure(s) of Performance	Specific Attributes	Potential Data Sources	Key Issues
Land Use Measures			
• Number of jurisdictions with plans and implementing ordinances consistent with state/regional objectives	• Growth policy areas[a] • Adequate capacity for forecast development • Density and design characteristics[b] • Concurrency/APF requirements	• Survey of jurisdictions • Review of plans and ordinances	• Self-reported versus independently certified • Interpretation of "consistency" may be subjective • Enforceability of plans/ordinances
• Strength of implementation tools	• Required versus permissive designations • Extent of area to which designations must/may apply • Incentives provided (regulatory, fiscal) • Enforcement mechanisms, and extent of use	• Survey of jurisdictions • Review of plans and ordinances	• Self-reported versus independently certified • Some measures of "strength" cannot be quantified easily
• Extent to which form of new development is consistent with state/regional plan objectives	• Amount of growth by policy area	• Building permits by jurisdiction • Geocoded building permits • Tax assessor parcel data • Remote sensing • Decennial Census	• Geographic imprecision (if not geocoded) • Was permitted actually constructed? • Census – time lag
	• Density of new development	• Building permits • Tax assessor parcel data • Census (10 years) • Remote sensing • National Resources Inventory	• Measurement of density (net versus gross; extent of unbuilt land included) • Multifamily, mixed-use, multistory buildings
	• Design characteristics of new development	• Surveys of local jurisdictions (number of units of development certified in accordance with alt. zoning/subdivision regulations) • Review of development plans • Observation – field surveys • Remote sensing	• Qualitative factors – need checklist/criteria • Potentially labor-intensive process

[a] For example, rural preservation areas/growth boundaries, designated growth/activity centers, transit station areas, infill areas.

[b] For example, mixed-use, street connectivity, sidewalks/pedestrian facilities, setback/façade requirements.

Table 4.2 Summary of Potential Data Sources for Monitoring (continued)

Measure(s) of Performance	Specific Attributes	Potential Data Sources	Key Issues
Transportation Measures			
• Reduced demand for vehicle transportation	• Regional VMT; VMT per capita	• HPMS • Regional travel demand model	• Comprehensive coverage • Externally generated VMT • Accurate population estimate to calculate per-capita VMT
	• Transit ridership	• Transit agency rider counts	
	• Non-automobile mode share	• Census (10 yrs) • Metropolitan household travel survey • Site-specific survey (specific types of development)	
• Increased mobility/ accessibility	• Vehicle-hours (person-hours) of delay or congestion	• Travel demand model • TTI congestion index • O&M traffic monitoring data	• Demand model, TTI: Calibration of speed functions based on VMT and capacity data • O&M: regional monitoring with limited deployment
	• Average travel speed	• Travel demand model • O&M traffic monitoring data • Field surveys (sampling)	• Model: Calibration of speed functions based on VMT and capacity data • O&M, field surveys: regional monitoring with limited deployment
	• Accessibility to jobs, services	• Travel demand model	• Modeled data only
Other Measures			
• Reduced infrastructure costs	• Cost of regional trans. system (construction, maintenance, operations)	• Analysis of transportation expenditures • Projected expenditures in long-range plan	• Trend analysis given "lumpy" nature of capital investments; accounting for life-cycle costs
	• Cost of other utilities and services	• Cost of development model	• Modeled data only – difficult to monitor
	• Cost of local roads	• Cost of development model	• Modeled data only – difficult to monitor

Table 4.2 Summary of Potential Data Sources for Monitoring (continued)

Measure(s) of Performance	Specific Attributes	Potential Data Sources	Key Issues
Other Measures (continued)			
• Reduced environmental impacts	• Emissions from transportation sources	• Modeling based on transportation activity data	• Modeled data only • Accounting for land use/urban design features • Accounting for congestion/traffic flow conditions
	• Total developed land area	• Remote sensing • Building permits, densities • Tax assessor parcel data	• Definition of developed (e.g., large parcels relative to building size)
	• Land conversion by prior use/habitat (agriculture, forest, wetland, ecological value, open space/recreation)	• Geocoded development data or remote sensing data, plus land cover/habitat/natural resources data	• Available inventory of land cover/habitat/natural resources • Geographic accuracy of development data
	• Impermeable surface area	• Model based on amount of development by type • Remote sensing	• Rough estimates (modeled) • Detail of remote sensing data; level of effort

3. **Enhancements to transportation performance monitoring systems to track traveler-oriented performance measures.** While regional VMT provides one important indicator, related especially to infrastructure costs and environmental impacts, other measures such as congestion, travel times, and highway, transit, and non-motorized accessibility provide more direct indicators of how well the transportation system is performing from the perspective of the traveler. Needed enhancements may include the collection and archiving of real-time travel speed and congestion data from specific facilities, as well as the expansion of the monitoring system to the arterial network.

4. **Enhancements to transportation and land use models.** While it is always desirable to have empirical data verifying impacts, to some extent, it may be difficult or impossible to conclusively relate empirical data on transportation conditions back to specific growth patterns or policies that have been adopted. Models are valuable for isolating the effects of individual policies, and for separating the impacts of policies of interest from external trends that would have occurred regardless of planning initiatives undertaken. Significant needs in model enhancement are greater sensitivity to micro-scale land use and urban design patterns, better modeling of pedestrian and transit travel, and development and enhancement of economically based land use models capable of assessing a broad range of policies.

Some work is being conducted to advance the state of practice in land use monitoring. For example, research led by Dr. Gerrit Knaap at the National Center for Smart Growth Research and Education at the University of Maryland is focusing on how the measurement of both urban form and development capacity can be used for policy analysis and land use decision-making, and how the measurement process can be aided through the use of geographic information systems. Projects underway at the center include a national assessment of the capacity of MPOs to use GIS for land use and transportation planning, in which the center will provide matching funds to four or five regional organizations to develop and implement land market monitoring programs, and a study focusing on the measurement of the urban form through the development of quantitative measures that were subsequently used to conduct policy analysis in five metropolitan areas.

Making Use of the Data

Once monitoring systems have been established, the key question then becomes, how does an agency use the land use and transportation monitoring data to establish the effectiveness of statewide or regional comprehensive planning policies? The task is not easy, because of the complex series of linkages, long time scale of effects, and other factors that may confound any definite attribution of causality. Some possible approaches, along with their limitations, include:

- **Compare observed land use patterns to recent and historical trends, as well as to predicted patterns.** An assessment of whether land use patterns are changing is a necessary first step to determine whether any transportation impacts might be observed. If past forecasting exercises have been undertaken providing a "trend" forecast and various alternative scenario forecasts, existing conditions can be compared to these different forecasts to determine which one is most closely being replicated.

- **Conduct a time-series comparison of land use patterns and transportation conditions**, over an historical period of a decade or more. This approach is useful for monitoring whether a region is making progress toward achieving its goals. However, it cannot by itself establish a clear causality between specific land use policies (or even the entire set of policies) and transportation conditions. For example, population and employment growth may lead to deteriorating transportation conditions regardless of the form in which it occurs; while transportation network improvements may lead to improved conditions even while growth is occurring. Some clues may be gained, however, by looking at inflections (changes) in growth trends and their temporal relationship to changes in transportation conditions.

- **Compare travel behavior originating in specific neighborhoods**, according to land use characteristic. This approach may establish a clearer linkage between detailed land use patterns and travel patterns. For example, it can establish the extent to which vehicle-travel is reduced in neotraditional or infill neighborhoods. On the other hand, it is less adequate for evaluating effects on regional system performance – for example, congestion may increase in localized areas even if total travel is reduced. Therefore

this type of research is insufficient (by itself) to examine systemwide impacts, although it can support the enhancement of models that evaluate such impacts.

- **Conduct a retrospective modeling exercise**, in which current transportation conditions are modeled for observed existing land use versus previously forecast baseline land use conditions for the same year. Compared to forecasting modeling exercises this approach has the advantage that land use patterns are observed rather than hypothetical outcomes of policies. However, this approach does require the assumption that the previously forecast baseline land use conditions would have occurred, in the absence of any policy adoption.

Regardless of the analysis approach, it will probably be easier to undertake evaluations at a metropolitan or regional level than at a statewide level. Even with a consistent set of statewide planning policies, implementation may vary significantly within specific regions, depending upon the size of the metropolitan area, growth pressures, local policy conditions, and other factors. The mix of urban and rural land uses in most states makes it difficult to establish meaningful aggregate indicators of land use. Furthermore, travel characteristics are very different in rural areas than in urban areas, and for the most part land use policies to reduce travel in rural areas (aside from those bordering or considered part of a metropolitan area) have not been adopted. Therefore, it is recommended that states wishing to evaluate the effectiveness of their comprehensive planning policies focus on the implementation and impacts of those policies in specific metropolitan areas, or other subregional units (such as counties).

5.0 Cross-Cutting Research Findings and Research Needs

The primary focus of this report is on how state and metropolitan agencies can establish and use monitoring systems to evaluate the effects of comprehensive planning and smart growth policies. It is also useful, however, to review cross-cutting research on the topic, as it has implications for the expected effects of policies adopted in specific states and metropolitan areas. This section provides an overview of recent research, including studies on land use and travel behavior and nationwide studies that examine measures of urban growth (or "sprawl") in various cities and relate them to transportation performance and other impacts. The section also includes a number of suggestions for further research on the various relationships among planning policies, growth patterns, and transportation and related impacts.

5.1 Recent Cross-Cutting Research

Land Use and Travel Behavior

Cervero and Ewing (2001) summarize the existing literature on the effects of land use on travel behavior. The authors note that the potential to moderate travel demand through changes in the built environment is the subject of more than 50 recent empirical studies. These studies focus on the impacts of neighborhood and activity center designs, land use patterns, transportation networks, and urban design features. Some of their conclusions include:

- Overall trip frequencies differ little, if at all, between built environments;
- Trip lengths are shorter in traditional urban settings that are more accessible, have higher densities, or feature mixed uses;
- Walking is more prevalent in traditional urban settings. Transit use appears to be as well, though to a lesser degree than walking;
- Total household vehicular travel, whether VMT or VHT, is primarily a function of regional accessibility. This means that dense, mixed-use developments in the middle of nowhere may offer only modest regional travel benefits; and
- Individual urban design features seldom prove significant, but composite measures of transit and pedestrian accessibility bear some relationship to mode choices.

The authors' findings also suggest some areas for further research:

- Mode choice has received the most intensive study, whereas trip lengths have received relatively little attention;
- Interest in transportation network impacts on travel is recent, and studies are far less numerous than studies of land-use impacts; and
- With few exceptions, parking is neglected in travel studies.

Informal review of the literature by the current study authors also suggests conclusions consistent with Cervero and Ewing's. While empirical studies focusing on travel behavior and neighborhood design have found that land use strategies can reduce vehicle-trips and VMT, the range of impacts extends from incremental (one or two percent) to highly significant (50 percent or more at a neighborhood level) depending upon the range of land use characteristics explored and the regional context. Measured at a regional scale, more dense and compact development patterns lead to somewhat shorter vehicle trips. However, relatively high localized densities of 15 to 20 residential units per acre or more – augmented by mixed land use patterns, pedestrian-accessible street networks, and high-quality transit – are required to realize significant mode shifts to non-automobile modes of travel. Incremental changes to densities (e.g., increasing from two to four dwelling units per acre) or to walkability (e.g., adding sidewalks to suburban neighborhoods) are likely to have only marginal benefits from a transportation perspective (although they may have more significant benefits as measured by land preservation, recreational opportunity, and other community impacts). Furthermore, as density increases, localized congestion is also likely to increase. The tradeoff between increased accessibility due to proximity, and decreased accessibility due to congestion, has not been conclusively explored.

Regional Indicators of Sprawl and Its Impacts

Three recent studies have developed regional indicators of sprawl and examined the correlation between these indicators and various impacts, including transportation conditions. A report for Smart Growth America[20] defines various quantitative measures of sprawl for 83 metropolitan areas, and relating these measures to transportation and other indicators. The authors create a "sprawl index" based on four factors: residential density; neighborhood mix of homes, jobs, and services; strength of activity centers and downtowns; and accessibility of the street network, each of which is based on a number of measurable components. The report finds that people living in more sprawling regions tend to drive greater distances, own more cars, breathe more polluted air, face a greater risk of traffic fatalities, and walk and use transit less. For example, the report finds an

[20] Ewing, Pendall, and Chen (no date).

average difference of 10.8 daily VMT per capita for the most sprawling versus most compact regions, a difference of 26 vehicles owned per 100 households, a difference of five percent in transit commute mode share, and a fatality rate of 36 versus 23 fatal accidents per 100,000 VMT. On the other hand, the report finds that sprawling regions exhibit no difference in congestion delay and average commute times compared to less sprawling regions.

The U.S. Environmental Protection Agency (2004) examines transportation networks and system performance in 13 metropolitan areas. The report measures the degree of connectivity, pedestrian environment, and availability of transit and relates these measures to vehicle-trips and VMT per capita, congestion (using the Texas Transportation Institute index), and emissions. The 13 cities are compared in five "peer groups" corresponding to different levels of population. The report concludes that smart growth transportation network characteristics are correlated with superior transportation performance in four of the five peer groups, with no difference in the fifth group.

Researchers at the Brookings Institution[21] measure the urban density of metropolitan areas in 1982 and 1997, using population estimates from the U.S. Census and urbanized (developed) land area obtained from the U.S. National Resources Inventory's survey of land use, conducted every five years. While this study does not examine transportation impacts, it does point to some important differences in growth patterns among different regions of the United States. The West is home to some of the densest metropolitan areas (and metropolitan growth) in the nation, while the South is accommodating a great deal of population growth but at much lower densities. In the Northeast and Midwest, slow growing metropolitan areas have consumed extremely large amounts of land for urbanization in order to accommodate very small quantities of population growth. The authors suggest that the high densities in the West may be due to factors including topographic barriers to expansion, heavy reliance on public water and sewer systems, and production home-building practices.

The report also makes observations on the relationship between growth patterns and planning factors. Metropolitan areas tend to consume more land for urbanization if they have fragmented local governments. Counterintuitively, though, metropolitan areas in states with growth management (legislation requiring local governments to submit comprehensive growth plans to a state agency for review) sprawled more. Rather than inferring that growth management causes sprawl, the authors suggest that states adopted growth management precisely because they were both growing rapidly and experiencing rapid density declines.

[21] Fulton, Pendall, Nguyen, and Harrison (2001).

5.2 Research Recommendations

The following is a list of potential research needs that can help relate smart growth and comprehensive planning policies to transportation and other impacts. It is based in part on the case studies as well as on a broader consideration of the existing literature. The list is not meant to be comprehensive, nor prioritized. Researchers active in the field should be consulted to identify which specific research questions are of greatest interest and also which methods and approaches might be most feasible.

Undertake policy assessment research on specific policies in specific areas. Qualitative research methods, such as interviews with local planning staff, elected officials, and developers, can provide important insights into which state and regional policies have actually led to changes to local land use policies, ordinances, and development patterns. While this type of policy assessment often occurs informally, it should be conducted on a more formal and regular basis by any agency working to implement smart growth and other comprehensive planning policies. State and regional agencies should conduct an in-depth evaluation of the impacts of their policies at least every five years. The knowledge gained should be used to refine policies and develop more effective approaches, and should also be shared with a national audience through conferences, peer exchanges, publications, etc.

Review early regional growth management efforts (undertaken circa the early 1990s) that involved modeling of impacts. Examples include Denver, Portland, and Seattle. It would be interesting to revisit the land use and transportation assumptions in these modeling exercises, and to compare actual development patterns and transportation conditions with the various trends and scenarios analyzed at the time.

Use state-of-the-practice models to assess the impacts of various policies. Economics-based land use models capable of assessing a reasonable range of land use policy initiatives have been developed in a small, but growing, number of United States metropolitan areas. The capabilities of these models should be tapped, e.g., to examine the effects of growth management policies versus other factors on land consumption, housing prices, and other factors. (Output from these models also can be used as inputs to transportation models to assess transportation effects.) Modeling of this type is important because it represents a way of untangling the effects of specific policies from the effects of other factors (such as population growth and topographic constraints to development).

Undertake additional cross-cutting comparisons among multiple cities. Studies of any single metropolitan area or region may ultimately prove inadequate to establish a clear causality between land use policies and transportation conditions. Broader research efforts, as described above, may be necessary to compare trends among regions, thereby helping to net out the effects of exogenous factors. A particularly fruitful comparison might be undertaken between high-growth cities in the South and the West, expanding the Brookings Institution study to examine transportation measures as well as growth patterns. Attention should be paid to gathering a broader range of transportation indicators,

possibly using regional travel models in addition to monitoring data, to develop better indicators of congestion delay, accessibility, and other traveler-oriented measures.

Conduct a nationwide review and analysis of smart growth policy adoption at the local level. A sample of metropolitan areas or states could be selected, representing different geographic contexts and different levels of state/regional agency initiative (ranging from none to voluntary to specific planning requirements). The local adoption of smart growth policies and ordinances could be reviewed over an historical period of 10 to 15 years or more. Time-series analysis could potentially be used to distinguish the effects of state and regional initiatives from broader national trends leading to the adoption of smart growth policies.[22]

Study travel behavior in emerging "new urbanist" neighborhoods. A recent inventory identified 648 neighborhood-scale new urban communities throughout the country.[23] Particular attention should be paid both to local accessibility (e.g., proximity to shopping, school) and regional accessibility (e.g., distance to the CBD and other major activity centers) when looking at travel differences among individuals and households. Much of the existing research comparing travel in different neighborhoods has focused on larger cities on the west coast, with some research in southern cities. Additional attention should especially be paid to locations in other parts of the country (Midwest, east coast, and mountain states) where fewer studies have been conducted; and to small and medium sized metropolitan areas.

Study the impacts of rural/small town growth patterns on travel. Little attention has been paid to land use and travel patterns outside of the context of medium to large metropolitan areas. A question of particular interest is the effect of clustering development in "traditional" walkable, main street-centered towns, compared to more dispersed patterns served exclusive by automobile-oriented commerce.

Examine the tradeoff between proximity and congestion, as it impacts accessibility. More dense development patterns should increase accessibility by bringing people and destinations closer together, but also may decrease it because congestion increases (and therefore travel speeds decrease). The tradeoff between these two factors is not well understood, and will depend not only on development patterns but on the transportation options provided (capacity of road network, pedestrian/transit connections, etc.).

Further investigate the use of satellite imagery for detailed monitoring of growth patterns. Beginning in 2002, satellite imagery covering the entire planet has become available at 2.5- to 5-meter resolution from the French satellite SPOT5. Previously, the best available imagery was at 10-meter resolution. The fine-resolution data might be used to develop rough measures of localized urban form, e.g., percent of land area covered by

[22] This task may be admittedly a difficult one; aside from the problem of data collection, Hanley and Knaap (1998) note that "A consensus has yet to form on how the implementation of plans should be assessed, and the results of those who have tried are not encouraging."

[23] New Urban News Vol. 9 No. 1 (January-February 2004).

buildings, orientation of buildings to streets, and density of the street network. The three-dimensional capabilities of the SPOT5 data may even allow a rough estimation of building heights. The data can be obtained at a cost of $3,000 to $6,000 per image covering a single city, although data processing techniques would be required to make the satellite imagery useful. Through sufficient automation, this might represent a cheaper and more comprehensive source of land use data. Such data could be used not only for monitoring growth patterns but also for developing localized land use descriptors for use in conjunction with travel surveys to study travel behavior.

Appendix A

Bibliography

Bibliography

General/Multistate

American Planning Association (2002). *Planning for Smart Growth: 2002 State of the States*. www.planning.org/growingsmart

Anderson, Heidi A. (1999). *Use and Implementation of Urban Growth Boundaries.* The Center for Regional and Neighborhood Action.

Burchell, Robert W,. David Listoken and Catherine C. Galley (2000). *Smart Growth: More Than a Ghost of Urban Policy Past, Less Than a Bold New Horizon*. Housing Policy Debate, Vol. 11, Issue 4. Fannie Mae Foundation.

Burchell, Robert W., et al. (1998). *The Costs of Sprawl Revisited.* Transit Cooperative Research Program (TCRP) Report 39. National Academy Press: Washington D.C.

Burchell, Robert W., et al. (2002). *Costs of Sprawl – 2000.* Transit Cooperative Research Program (TCRP) Report 74. National Academy Press: Washington D.C.

Cambridge Systematics, Inc. and Industrial Economics, Inc. (forthcoming). *Quantification of Air Quality Emissions Benefits from Brownfield and Infill Development Projects.* Prepared for U.S. Environmental Protection Agency, Office of Transportation and Air Quality.

Dunphy, Robert T. (1995). *Transportation-Oriented Development: Making a Difference?* Urban Land, July 1995.

Ewing, Reid, and Robert Cervero (2001). *Travel and the Built Environment: A Synthesis.* Transportation Research Record No. 1780.

Ewing, Reid; Rolf Pendall and Don Chen (no date). *Measuring Sprawl and its Impact.* Prepared for Smart Growth America. http://www.smartgrowthamerica.com

Federal Highway Administration **(**2001). *Integrated Transportation and Land Use Forecasting: Sensitivity Tests of Alternative Model Systems Configuration.* Publication No. FHWA-EP-01-025.

Fulton, William; Rolf Pendall, Mai Nguyen, and Alicia Harrison (2001). *Who Sprawls Most? How Growth Patterns Differ Across the U.S.* Brookings Institution: Washington, D.C. www.brook.edu.

Greenberg, Michael, Karen Lowrie, Henry Mayer, Tyler Miller and Laura Solitaire (2000). *Brownfield Redevelopment as a Smart Growth Option.* National Center for Neighborhood and Brownfields Redevelopment.

Handy, Susan (2002). *Smart Growth and the Transportation-Land Use Connection: What Does the Research Tell Us?* Prepared for *New Urbanism and Smart Growth: A Research Symposium*, May 2002.

Moudon, Anne Vernez, and Michael Hubner eds. (2003). *Monitoring Land Supply with Geographic Information Systems: Theory, Practice, and Parcel-Based Approaches.* John Wiley & Sons, Inc.

Nelson, Arthur C. (2001). *Smart Growth or Business-As-Usual? Contrasting Outcomes of Different Approaches to Managing Growth.* American Planning Association, 2001 National Planning Conference.

Nelson, Arthur C. and Duncan, James (1995). *Growth Management Principles and Practices.* The American Planning Association: Chicago, Illinois.

Parsons Brinckerhoff Quade & Douglas, Inc. and KPMG Peat Marwick LLP (2000). *Data Collection and Modeling Requirements for Assessing Transportation Impacts of Micro-Scale Design.* Prepared for Federal Highway Administration, Publication No. FHWA-EP-01-003, http://tmip.tamu.edu/clearinghouse/docs/microscale/

Pendall, Rolf and Martin, Jonathan (2002). *Holding the Line: Urban Containment in the United States.* The Brookings Institution Center on Urban and Metropolitan Policy.

Porter, Douglas R. (1996). *Managing Performance in Managing Growth* in Performance Standards for Growth Management. PAS Report 461, Porter, R.D. ed. APA Planning Press: Chicago, Illinois.

Richardson, Jesse J. Jr.; Megan Zimmerman Gough, and Robert Puentes (2003). *Is Home Rule the Answer? Clarifying the Influence of Dillon's Rule on Growth Management.* Discussion paper prepared for the Brookings Institution, Washington, D.C. http:// www.brookings.edu/es/urban/publications/dillonsrule.htm

Song, Yan (2002). *Impacts of Urban Growth Management on Urban Form: A Comparative Study of Portland, Oregon, Orange County, Florida and Montgomery County, Maryland.* National Center for Smart Growth Research and Education, University of Maryland. Presented at New Urbanism and Smart Growth: A Research Symposium, College Park, Maryland, May 2002. http://www.smartgrowth.umd.edu/events/recentevents.htm.

Staley, Samuel; Jefferson Edgens and Gerard Mildner (1999). *A Line in the Land: Urban Growth Boundaries, Smart Growth, and Housing Affordability.* Reason Public Policy Institute., Policy Study No. 263.

Staley, Samuel and Leonard Gilroy (2001). *Smart Growth and Housing Affordability: Evidence from Statewide Planning Laws.* Reason Public Policy Institute, Policy Study No. 287.

Texas Transportation Institute (2003). *2003 Urban Mobility Report*. University of Texas at Arlington.

Turnbull, Geoffrey K. *Local Tax Base Sharing: An Incentive for Intergovernmental Cooperation.* Fiscal Research Program. Andrew Young School of Policy Studies, Georgia State University. http://frp.aysps.gsu.edu/frp/frpreports/Report_75/rpt75examples.htm. Accessed 7/23/2003.

United States Advisory Commission on Intergovernmental Relations (1981). *Measuring Local Discretionary Authority.* USAICR, M-131. Washington, D.C.

Weitz, Jerry (1999). *Sprawl Busting: State Programs to Guide Growth.* Chicago, Illinois: American Planning Association.

California

Drolet, Suzanne (2002). *Transportation Policy and Urban Form: Case Study: San Diego*. American Planning Association – Transportation Planning Division Newsletter, Vol. XXVI No. 3, Summer 2002.

Elliot, Michael (1981). *The Impact of Growth Control Regulations on Housing Prices in California.* AREUEA Journal, Vol. 9:115:133.

Landis, John (1992). *Do Growth Controls Work? A New Assessment*. Journal of the American Planning Association, Vol. 58:489-508.

Leiter, R. (1996). *The Use of Threshold Standards in Chula Vista's Growth Management Program* in Performance Standards for Growth Management. PAS Report 461, Porter, R.D. ed. APA Planning Press: Chicago, Illinois.

O'Toole, Randall (2003). *San Jose Demonstrates the Limits of Urban Growth Boundaries and Urban Rail.* Reason Public Policy Institute, Policy Study No. 309.

Florida

Downs, Anthony (2003). *Why Florida's Concurrency Principles (for Controlling New Development By Regulating Road Construction) Do Not – and Cannot – Work Effectively*. Transportation Quarterly, Vol. 57, No. 1, Winter 2003 (13-18).

Florida Natural Areas Inventory (2002). *Florida Forever Conservation Needs Assessment*. Prepared for the Florida Forever Advisory Council under direction of the Division of State Lands, Florida Department of Environmental Protection.

Florida Department of Transportation (2003). *Trends and Conditions Report – 2003.* http://www.dot.state.fl.us/planning/policy/trends/default.htm.

Florida Transportation Commission (2003). *Assessment of Florida's Regional and Intermodal Transportation Planning Process*.

Galvez, Janet (1997). *The Florida Elusive Snowbird*. University of Florida Bureau of Economic and Business Research.

Pelham, Thomas G. (2001). *Restructuring Florida's Growth Management System: Alternative Approaches to Plan Implementation and Concurrency*. University of Florida Journal of Law and Public Policy, Spring 2001, pp. 299-310.

Steiner, R. (2001). *Florida's Transportation Concurrency: Are the Current Tools Adequate to Meet the Need for Coordinated Land Use and Transportation?* University of Florida Journal of Law and Public Policy, Spring 2001, pp. 269-297.

Trust For Public Land (2002). *Florida's County Land Conservation Programs.* http:// www.tpl.org

University of Florida Geoplan Center (2002). Florida Geographic Data Library. http:// www.fgdl.org/

University of Florida Bureau of Economic and Business Research (2003). *Florida Statistical Abstract 2002*.

Weaver, Ronald L. (2001). *Concurrency, Concurrency Alternatives, Infrastructure, Planning and Regional Solution Issues*. University of Florida Journal of Law and Public Policy, Spring 2001, pp. 251-267.

■ Georgia

Georgia Department of Community Affairs (1998). *Georgia's Future: Beyond Growth Strategies*.

Maine

The Maine State Planning Office (2003). *We Have a Choice: Report to the Joint Standing Committee on Natural Resources to Evaluate Maine's Growth Management Program*.

Maryland

Knaap, Gerrit-Jan (2001). *An Inquiry into the Promise and Prospects of Smart Growth.* Prepared for Presentation at the International Workshop on Urban Growth Management, October 2001.

Maryland National Capital Park and Planning Commission (1964). *On Wedges and Corridors: A General Plan for the Maryland-Washington Regional District in Montgomery and Prince George's Counties*.

Maryland Office of Planning (1995). *Managing Maryland's Growth: Urban Growth Boundaries*.

Maryland Office of Planning (2000). *Managing Maryland's Growth: Revisiting the Comprehensive Plan: The Six-Year Review*.

Montgomery County Planning Board (1969). *Montgomery County General Plan.*

Natural Resources Defense Council (2001). *Solving Sprawl: Models of Smart Growth in Communities Across America.* Island Press. Excerpted at: http://www.nrdc.org/cities/smartGrowth/solve/mont.asp, accessed June 2003.

Marriot, R., Loehr, C., and K., Moritz, (1996). *Managing Growth with Performance Standards in Montgomery County, Maryland*. In: Performance Standards for Growth Management. PAS Report 461, Porter, R.D. ed. APA Planning Press: Chicago, Illinois.

Minnesota

1000 Friends of Minnesota (1999). *Growing Smart in Minnesota.* St. Paul, Minnesota. www.1000fom.org/publications.htm.

American Planning Association (2002). *Planning for Smart Growth: 2002 State of the States*. www.planning.org/growingsmart.

Barnes, Gary and Gary Davis (1999). *Land Use and Travel Choices in the Twin Cities, 1958-1990.* Transportation and Regional Growth Report No. 6: Center for Transportation Studies, University of Minnesota. http://www.cts.umn.edu/trg/.

Builders Association of the Twin Cities and the Metropolitan Council (2001). *Twin Cities Metropolitan Area Urban Land Supply Study – 2001.* St. Paul, Minnesota. www.metrocouncil.org.

Center for Energy and the Environment, Minnesotans for an Energy-Efficient Economy, and 1000 Friends of Minnesota (1999). *Two Roads Diverge: Analyzing Growth Scenarios for the Twin Cities Region.* www.mncee.org.

Johnson, Curtis (2003). *Market Choices and Fair Prices.* Transportation and Regional Growth Report No. 17: Center for Transportation Studies, University of Minnesota. http://www.cts.umn.edu/trg/.

Metropolitan Council (1996). *Regional Blueprint*. St. Paul, Minnesota. www.metrocouncil.org.

Metropolitan Council (1999). *1990 Travel Behavior Inventory.* St. Paul, Minnesota. www.metrocouncil.org.

Metropolitan Council (2002). *Twin Cities Area – Statistical Profile.* www.metrocouncil.org.

Metropolitan Council (2003a). *2000 Travel Behavior Inventory.* www.metrocouncil.org.

Metropolitan Council (2003b). *Framework 2030* public hearing draft, October 2003. www.metrocouncil.org.

Minnesota Department of Transportation (2002). *Moving Minnesota 2003,* draft, July 2002. St. Paul, Minnesota.

Minnesota Planning (2002). *Under Construction: Tools and Techniques for Local Planning.* http://www.eqb.state.mn.us/SDI/smart.html.

Nearly, Pamela, and John James (2000). *Taxing Our Strengths: How Minnesota's Property Tax System Weakens Our Communities.* 1000 Friends of Minnesota, St. Paul, Minnesota. http://www.1000fom.org/publications.htm.

Nelson, Arthur C. and James Duncan (1995). *Growth Management Principles and Practices.* The American Planning Association. Chicago, Illinois.

Orfield, Myron (1997). *Metropolitics: A Regional Agenda for Community and Stability.* The Brookings Institution: Washington, D.C. and the Lincoln Institute of Land Policy: Cambridge, Massachusetts.

Park, Adeline (2003). *Tax-Base Revenue Sharing* (working paper). State and Local Government Initiatives for Growth Management and Open Space Preservation: Policy Research Project, LBJ School of Public Affairs and Community and Regional Planning Department, University of Texas at Austin. http://uts.cc.utexas.edu/~bobprp/statesprawl/planning%20tool%20reports.htm.

Regional Strategies Working Group (2002). *Designing a Better Regional Blueprint.* Minnesota Center for Environmental Advocacy: St. Paul, Minnesota. www.mncenter.org.

Smart Growth Twin Cities, Metropolitan Council, and Calthorpe Associates (2002). *Smart Growth Twin Cities Regional Development Options Report*. www.metrocouncil.org/sgtc/.

Swenson, Carol J. and Frederick C. Dock (2003). *Urban Design, Transportation, Environment and Urban Growth: Transit Supportive Urban Design Impacts on Suburban Land Use and Transportation Planning.* Transportation and Regional Growth Report No. 11: Center for Transportation Studies, University of Minnesota. http://www.cts.umn.edu/trg/.

Turnbull, Geoffrey K. (2002). *Local Tax-Base Sharing: An Incentive for Intergovernmental Cooperation*. Fiscal Research Center Report No. 75, Andrew Young School of Policy Studies, Atlanta, GA. http://frp.aysps.gsu.edu/frp/frpreports/.

Ward, Edward (2003). *A Systems Thinking Perspective on the Transportation and Regional Growth Study.* Transportation and Regional Growth Report No. 12: Center for Transportation Studies, University of Minnesota. http://www.cts.umn.edu/trg/.

York, Marie L., et al. (1989). *Encouraging Compact Development in Florida.* Fort Lauderdale, Florida: Florida Atlantic University/Florida International University Joint Center for Environmental and Urban Problems.

New Jersey

Cambridge Systematics, Inc., et al. (2002). *NJDOT Implementation of Smart Growth Through the State Development and Redevelopment Plan.* Prepared for New Jersey Department of Transportation.

Center for Urban Policy Research (2000). *The Costs and Benefits of Alternative Growth Patterns: The Impact Assessment of the New Jersey State Plan.* Rutgers University.

Middlesex Somerset Mercer Regional Council (1991). *The Impact of Various Land Use Strategies on Suburban Mobility, Final Report.* Princeton, New Jersey. http://ntl.bts.gov/DOCS/470.html

New Jersey Department of Community Affairs (no date). *New Jersey State Laws Linked to the State Planning Act*. Office of Smart Growth, http://www.nj.gov/dca/osg/resources/rules/statelaws.shtml, accessed August 2003.

New Jersey Department of Community Affairs (2001). *New Jersey State Development and Redevelopment Plan.* http://www.nj.gov/dca/osg/plan/

New Jersey Department of Community Affairs (2003a), *Accomplishments 2002*, http://www.nj.gov/dca/02annual/02accomplish.htm, accessed August 2003.

New Jersey Department of Community Affairs (2003b). *New Jersey has a long tradition of Smart Growth*, http://www.nj.gov/dca/osg/smart/chronology.shtml, accessed August 2003.

New Jersey Department of Transportation and New Jersey Transit (2001). *Transportation Choices 2025.* http://www.njchoices.com/

New Jersey Future (1998). *Case Study: Hillsborough Township*, http://www.njfuture.org/HTMLSrc/hillsborough.html, accessed August 2003.

New Jersey Future (2001). *Rethinking Farmland Preservation in New Jersey*, http://www.njfuture.org/HTMLSrc/farmland_intro.html, accessed September 2003.

New Jersey Future (2003). *Our Guide to the New Jersey State Plan*, http://www.njfuture.org/HTMLSrc/stateplan.html, accessed August 2003.

North Jersey Transportation Planning Authority (2003). *North Jersey Strategy Evaluation.* http://www.njtpa.com/planning/strat_eval/SE_reports.html

Orfield, Myron, and Thomas Luce (2003). *New Jersey Metropatterns: A Regional Agenda for Community and Stability in New Jersey.* Ameregis with the New Jersey Regional Coalition: Minneapolis, Minnesota. www.amerigis.com

Parmar, Anuradha (2003). *New Jersey State Development and Redevelopment Plan.* Open Space Preservation and Growth Management PRP. Class project, University of Texas at Austin.

Renne, John and Jan Wells (2003a). *Emerging European-Style Planning in the United States: Transit-Oriented Development*. Voorhees Transportation Policy Institute, Rutgers University; paper for presentation at ACSP-AESOP 2003, Leuven, Belgium.

Renne, John and Jan Wells (2003b). *Transit Villages in New Jersey: Success Factors, Obstacles and Recommendations*. Voorhees Transportation Policy Institute, Rutgers University.

State of New Jersey (1992). *Modern Forms of Municipal Government.* State Commission on County and Municipal Government.

State of New Jersey (1999), 208th Legislature, Senate Bill No. 16. http://www.njleg.state.nj.us/9899/Bills/S0500/16_I1.PDF.

■ North Carolina

Avin, Uri, Robert Cervero and Boyd Cauble (1999). Integrating Land Use and Transportation Planning: A Case Study of Charlotte-Mecklenburg County. *Proceedings of the American Planning Association 1999 National Planning Conference.*

Oregon

1000 Friends of Oregon (1996). *Making the Land Use, Transportation, Air Quality Connection* (LUTRAQ): Analysis of Alternatives. Vol. 5. Portland, Oregon. www.friends.org/resources/lut_reports.html.

1000 Friends of Oregon (2002). *A Citizen's Guide to Transportation Policy and Planning*. Portland, Oregon. www.friends.org/goods/transguide.pdf.

Anderson, Heidi A. (1999). *Use and Implementation of Urban Growth Boundaries.* Center for Regional and Neighborhood Action, Denver, Colorado.

Arrington, G.B., Jr. (1996). *Beyond the Field of Dreams: Light Rail and Growth Management in Portland.* Tri-Met, Portland, Oregon.

Cambridge Systematics, Inc. (2000). *Case Studies of Land Use Approaches to Travel Demand Management: Oregon and Maryland.* Oakland, California.

City of Portland, Office of Transportation (2002). *Portland Transportation System Plan.* Portland, Oregon. http://www.trans.ci.portland.or.us/Planning/TSPSummary.htm.

City of Portland, Bureau of Planning (2003a). *Comprehensive Plan Goals and Policies*. Portland, Oregon (revised November, 2003). www.planning.ci.portland.or.us/pdf/ComprehensivePlan.pdf.

City of Portland, Bureau of Planning (2003b). *Portland Oregon Present.* Portland, Oregon. www.planning.ci.portland.or.us/cp_pp_over.html.

Dill, Jennifer (2004). *Travel Behavior and Attitudes: New Urbanist vs. Traditional Suburban Neighborhoods*. Portland State University. Paper presented at the 2004 Annual Meeting of the Transportation Research Board.

Downs, Anthony (2002). *Have Housing Prices Risen Faster in Portland Than Elsewhere?* Fannie Mae Foundation, *Housing Policy Debate*. Vol. 13, Issue 1. www.fanniemaefoundation.org/programs.hpd/v13i1-downs.shtml.

ECONorthwest (2001a). *Metro Urban Centers: An Evaluation of the Density of Development*. Eugene, Oregon.

ECONorthwest (2001b), *A Guidebook for Evaluating the Indirect Land Use and Growth Impacts of Highway Improvements*. Eugene, Oregon.

Hanley, Paul F, and Knaap, Gerrit (1998). *The Spatial Reconfiguration of the Portland Metropolitan Area, A Baseline Measurement and Preliminary Assessment* in Transportation, Land Use, and Air Quality: Making the Connection, American Society of Civil Engineers Conference Proceedings, May 1998.

Institute of Portland Metropolitan Studies (2003). *Metropolitan Briefing Book.* www.upa.pdx. edu/IMS/ourregion/metrobriefpdfs/MBB2003complete.pdf.

Metro (2000). *The Nature of 2040: The Region's 50-Year Plan for Managing Growth.* Portland, Oregon. www.metro-region.org/library_docs/land_use/2040history.pdf.

Metro (2003). *The Portland Region: How are We Doing?* Portland, Oregon. www.metro-region.org/library_docs/land_use/2040_report.pdf.

Moore, Terry (1998). *Oregon's Growth Management: What's Working… What Isn't… So What?* in Transportation, Land Use, and Air Quality: Making the Connection, American Society of Civil Engineers Conference Proceedings, May 1998.

Nelson, Arthur C. (2001). *Smart Growth or Business-As-Usual? Contrasting Outcomes of Different Approaches to Managing Growth.* American Planning Association, 2001 National Planning Conference, New Orleans, Louisiana.

Nelson, Arthur C. and James Duncan (1995). *Growth Management Principles and Practices.* The American Planning Association, Chicago, Illinois.

Oregon Department of Land Conservation and Development (no date). *Oregon's 19 Statewide Planning Goals and Guidelines.* www.lcd.state.or.us/goalhtml/goals.html, accessed December 2003.

Oregon Department of Transportation (1992). *Oregon Transportation Plan.* Salem, Oregon.

Oregon Department of Transportation (1999a). *Oregon Highway Plan.* Salem, Oregon. www.odot.state.or.us/tdb/planning/highway/.

Oregon Department of Transportation (1999b). *Oregon Transportation Plan: 1999 Status Report.* Salem, Oregon. www.odot.state.or.us/tdb/policy/otp/.

Oregon Progress Board (2001). *Achieving the Oregon Shines Vision: The 2001 Benchmark Performance Report.* Report to the Legislative Assembly. http://www.econ.state.or.us/opb/fullrep.pdf.

Oregon Transportation and Growth Management Program (2003). *2001-2003 Biennium: Supporting Local Planning that Fosters Livable, Transportation Efficient Communities.* http://www.lcd.state.or.us/tgm/TGM_for_web.pdf.

QuantEcon (2002). *Smart Growth and Its Effects on Housing Markets: The New Segregation.* The National Center for Public Policy Research, Washington, D.C.

Reason Public Policy Institute (1999). *Urban Growth Boundaries and Housing Affordability: Lessons from Portland.* Policy Brief No. 11.

Song, Yan, and Gerrit-Jan Knaap (2004). *Measuring Urban Form: Is Portland Winning the War on Sprawl?* In Journal of the American Planning Association, Spring 2004, Vol. 70, No. 2.

Tri-Met (1998). *At Work in the Field of Dreams: Light Rail and Smart Growth in Portland.* Portland, Oregon. www.trimet.org/inside/publications/pdf/fieldofdreams.pdf.

Tri-Met (2002). *Community Building Sourcebook*. Portland, Oregon. www.trimet.org/inside/publications/sourcebook.htm.

Tri-Met (2003). *2003 Transit Investment Plan*. Portland, Oregon. www.trimet.org/improving/tip/.

■ Tennessee

Chattanooga Hamilton County Regional Agency (2003). *Chattanooga Smart Growth Project*.

Porter, Douglas R. (2002). *Tennessee's Growth Policy Act: Purposes, Implementation, and Effects on Development*. Growth Management Institute.

■ Utah

Utah Governors Office of Planning and Budget (2000). *Strategy Analysis*. Quality Growth Efficiency Tools Technical Committee, draft, April 2000. http://www.envisionutah.org/

■ Washington

1000 Friends of Washington (1999). Sprawl Watch Report Card. www.1000friends.org

1000 Friends of Washington (2000). *Get Smart Washington: Managing Growth in the New Millennium*. www.1000friends.org

1000 Friends of Washington (2003). *Outlook* newsletter, June 2003. www.1000friends.org

Corr, O. Casey (1990). *Seattle in Captivity*. Planning 56, 1:18-21.

Frank, Lawrence D., and Gary Pivo (1994). *Impacts of Mixed Use and Density on Utilization of Three Modes of Travel: Single-Occupant Vehicle, Transit, and Walking.* Transportation Research Record 1466.

Fulton, William (1999). *Ring Around the Region*. Planning Practice. American Planning Association, March, 1999.

Hallenbeck, Mark E.; Dan Carlson, and Jill Simmons (2003). *The Possibilities of Transportation Concurrency: Proposal and Evaluation of Measurement Alternatives.* Washington State Transportation Research Center, University of Washington. http://depts.washington.edu/trac/concurrency/

King County (2003). *2003 King County Annual Growth Report.* http://www.metrokc.gov/budget/agr/agr03/

Moudon, Anne Vernez, Paul Hess, Mary-Catherine Snyder, and Kiril Stanilov (1999). *Site Design and Pedestrian Travel*. Transportation Research Record 1674.

Nelson, Arthur C. and James Duncan (1995). *Growth Management Principles and Practices.* The American Planning Association. Chicago, Illinois.

Northwest Environment Watch (2002). *Sprawl and Smart Growth in Greater Seattle-Tacoma.* www.northwestwatch.org/press/seattlegrowth.html

Pierce County (2002). Pierce County Buildable Lands Report, p. 8. http://www.co.pierce.wa.us/PC/services/home/property/pals/landuse/buildablelands2.htm

Puget Sound Council of Governments (1990a). *VISION 2020.* Available through Puget Sound Regional Council, Seattle, Washington.

Puget Sound Council of Governments (1990b). *VISION 2020: Growth Strategy and Transportation Plan for the central Puget Sound region: Final Environmental Impact Statement.* Available through Puget Sound Regional Council, Seattle, Washington.

Puget Sound Regional Council (1995). *VISION 2020: 1995 Update.* http://www.psrc.org/projects/vision/vision2020.htm

Puget Sound Regional Council (2001). *Destination 2030.* Seattle, Washington.

Puget Sound Regional Council (2002a). central Puget Sound regio*nal Growth Centers 2002.* http://www.psrc.org/projects/monitoring/rgc.htm

Puget Sound Regional Council (2002b). *Regional Project Evaluation Criteria.* http://www.psrc.org/projects/tip/selection/2002/2002rpc.htm

Puget Sound Regional Council (2003a). *Adopted Policy and Plan Review Process, Revised: September 2003.* http://www.psrc.org/projects/planreview/index.htm

Puget Sound Regional Council (2003b). *Assessing the Effectiveness of Concurrency: Final Report.* http://www.psrc.org/projects/growth/concur/reports.htm

Puget Sound Regional Council (2003c). *Metropolitan Transportation System: Roadways and Ferries*. http://www.psrc.org/datapubs/pubs/publist/publist_monitoring.htm

Puget Sound Regional Council (2003d). *Policy and Plan Review Status Report: September 2003.* http://www.psrc.org/projects/planreview/index.htm

Puget Sound Regional Council (2003e). *Transportation Finance 1989-2000*. http://www.psrc.org/projects/monitoring/reports.htm

Trohimovich, Tim (2001). *Current Issues in Growth Management/Land Use and Transportation: The "New Cities" Experience.* 1000 Friends of Washington. www.depts.washington.edu/trac/concurrency

Trohimovich, Tim (2002). *The Growth Management Act (GMA) After More Than 10 Years: Another Look and a Response to Criticisms.* 1000 Friends of Washington. www.1000friends.org

Washington State Department of Community, Trade, and Economic Development (no date). *Overview of the Growth Management Act.* www.cted.wa.gov

Washington State Department of Community, Trade, and Economic Development (no date). *Concurrency and GMA*. www.cted.wa.gov

Washington State Department of Community, Trade, and Economic Development (no date). *Urban Growth Areas*. www.cted.wa.gov

Washington State Department of Community, Trade, and Economic Development (1997). *Growth Management Services: Status Report.* Olympia, Washington.

Washington State Department of Community, Trade, and Economic Development (2002). *Growth Management Act Requirements Progress Report 1*. Olympia, Washington.

Washington State Department of Community, Trade, and Economic Development (2003). *Buildable Lands Program: 2002 Evaluation Report.* Olympia, Washington. www.cted.wa.gov

Washington State Land Use Study Commission (1998). *Final Report*. Olympia, Washington: Trade and Economic Development. http://www.ocd.wa.gov/info/lgd/landuse/report/toc.html.

Washington State Office of Financial Management (2002). *Washington State County Growth Management Population Projections: 2000 to 2025.* http://www.ofm.wa.gov/pop/gma/index.htm

Woolston, Derek W. (1996). *Simply A Matter Of Growing Pains? Evaluating The Controversy Surrounding The Growth Management Hearings Boards.* Note and Comment, 71 Washington Law Review 1219, 1249, October 1996.

Yan, Shuming, P.E. (1998). *Road LOS Standards and Land Use Density – Making the Connection*, in Transportation, Land Use, and Air Quality: Making the Connection, American Society of Civil Engineers Conference Proceedings, May 1998.

Appendix B

Inventory Tables

Table B.1 Inventory of Initiatives by State

State	Initiative	Objective	Implementation Measures	When Adopted
Arizona				
	Transfer of Development Rights	Focus growth in designated areas without restricting value of privately held lands.	• Municipalities authorized to establish procedures for TDR.	1998
	Arizona Preserve Initiative (API)	Encourage the preservation of state lands near urban areas as open space for future generations.	• Open space preservation through acquisition, purchase of development rights, implementation of conservation practices on private, state or Federal lands.	1996
	Growing Smarter Act	• Strengthen municipal and county planning by requiring that new general and comprehensive plans be readopted regularly and that all zoning conforms to plan. • Change how state trust lands are planned and managed by emphasizing the preservation of open space.	• Stricter standards for formulation and adoption of comprehensive plans. • Land commissioner given stricter standards for oversight of trust lands. • API funds available for purchase of development rights.	1998
	Growing Smarter Plus Act	• Strengthen the power of both municipalities and local citizens in planning. • Encourage infill development.	• Requires large or fast-growing communities to establish voter-approved general plans that include designated growth areas. • Grants counties the same power as cities to assess developer impact fees. • Requires local general plans to have water supply analysis. • Prohibits municipalities, without approval of the landowner, from designating private lands or state trust lands as open space, recreation, conservation or agricultural lands in order to meet a general plan's open space and growth elements. • Requires municipalities to adopt a citizen review process for rezoning. • Authorizes municipalities to designate infill incentive districts and adopt an infill incentive plan to encourage redevelopment in such districts. • Requires authorization for subdivision and split parcel review involving five or fewer lots.	2000

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
California				
	General Plan Law	Ensure thoughtful planning throughout California.	• Each city and county required to adopt a general plan "for the physical development of the county or city, and any land outside its boundaries which bears relation to its planning." • In counties and general law cities, zoning and specific plans are required to conform to general plan.	1950s
	Transit Village Development Planning Act	Encourage mixed-use development close to transit stations.	City or county that adopts a plan is eligible for state transportation funds.	1994
	Land Acquisition Program, Habitat Conservation Fund, Resources Trust Fund, etc.	Protect environmentally sensitive lands and habitats.	Various funding mechanisms available for purchasing land to be protected.	
	Environmental Enhancement and Mitigation Program	Mitigate the effects of transportation development through grants to local, state or Federal agencies and nonprofits.	Grants can be used to acquire resource land or land for roadside recreational opportunities.	1990
	Natural Heritage Preservation Tax Credit Act	Preservation of land for protection of wildlife habitat, open space or agricultural land.	Income tax credit of up to 55 percent of the fair market value to individuals or corporations who donate property for the protection of wildlife habitat, open space or agricultural land.	2000
	S.B. 221/S.B. 610	Ensure public water systems can accommodate large development projects.	• Local governments must include proof of adequate water supply as one condition of approving subdivision housing projects involving 500 or more residential units. • Public water systems must prepare water supply assessments for large development projects.	2001

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
California (continued)				
	Executive Order D-46-01	Promote downtown revitalization by reusing state buildings in downtown and central city areas.	• Smart growth patterns of development receive maximum support. • Renovations of state-owned buildings done with high-quality plans. • Public process. • Facilities to be built should be located near transit and affordable housing.	
	Urban Growth Boundaries	Stop suburban sprawl.	Self-adoption in a few communities in Northern California.	Late 1990s
San Jose	General Plan	Limit/prevent development on 200 sq miles of land around city limits, became official UGB in 1996.	No regulatory power or policies.	Early 1970s/ 1996
San Diego	Tiered Growth Management Plan	Phase new development based upon the availability of new infrastructure.	Various policies and implementation tools for different parts of the City.	1979
	TOD initiative	Reduce auto trips, avoid roadway expansion, reduce congestion, improve air quality, strengthen neighborhoods.	• Transit overlay zone reduces parking in areas that have high level of transit service. • City has adopted Transit-Oriented Development Design Guidelines that apply to new developments.	1992
	Land Use Distribution Element	Ensure regionwide consistency in local land use plans.	• San Diego Association of Governments (SANDAG) projects benefits to those who participate (e.g., reduced VMT, increase in transit usage, energy savings, etc.). • Funds allocated to cooperating jurisdictions.	1990s
	Region 2020	Help local governments prepare for projected growth.	SANDAG aids local governments in integrating transportation, land use, economic, and demographic studies to help plan.	1993
	Transit Accessibility Projects	Discourage auto trips into downtown.	Development projects with transit accessibility given priority.	1994

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
California (continued)				
Bay Area	Transportation for Livable Communities	Encourage redevelopment efforts which add housing and economic vitality to older business and community centers with a strong multimodal transportation connection.	Grants available for planning and construction.	Late 1990s
Colorado				
Denver	Mile-High Compact	Guide growth on a regional basis in the Denver region.	Five counties and 25 municipalities joined pact to link growth plans to regional plan (Metro Vision 2020).	2000
Florida*				
	Growth Management Act	• State plan used as guide for local comprehensive plans. • Concurrency, consistency, compact development.	• Local plans non-compliant with state plan ineligible for grants. • Required elements for local plans. • Must combat urban sprawl and promote urban renewal.	1985
	Development of Regional Impact (DRI)	• Protect areas of state concern through state designation and regulation of developments large enough to have an impact on the region.	• Department of Community Affairs (DCA) reviews DRIs for compliance with state law, makes recommendations to local governments for approval. • Developer, DCA or local government can appeal local government decisions to governor or cabinet.	1972, revised 2002
	Florida Quality Developments Program (FQD)	• Encourage development that has been thoughtfully planned, protects natural resources, and pays for its infrastructure.	• Developments must meet specific set of requirements that can include protecting resources, infill/reuse development, consideration of open space, consistency with state plan, etc. • Developments that receive FQD status have expeditious and timely review, and are allowed to advertise as an FQD development.	2002

* See case study for a more complete inventory.

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Florida* (continued)				
	Anti-sprawl policy	Ensure that individual plans are not encouraging what state has defined as "sprawl."	• Must not fit into any one of 13 descriptions that are identified as encouraging sprawl. • 10 criterion provided for evaluating whether plan is discouraging sprawl.	1993
	Preservation 2000/ Florida Forever	Increase the preservation of wetlands and forests.	• Additional state funding available for the acquisition of land for preservation. • Florida Forever was updated version, and included additional monies for urban lands, park protection and conservation easements.	1990/1998
Georgia				
	Georgia Planning Act	Identify and conserve regionally important resources throughout the state by local-/ regional-level planning. Assist counties and cities in updating their plans by encouraging joint planning and developing a web-based online tool (PlanBuilder).	• Local governments without a comprehensive plan lose accreditation and are ineligible for grants and loans. • Developments of Regional Impact (DRIs) review process.	1989
	Minimum Planning Standards	Regulate/coordinate local and regional plans.	New standards must be met for plans to receive state's accreditation.	1990
	Development of Regional Impact (DRI)	• Evaluate the impact of large-scale developments. • Coordinate Georgia Regional Transportation Authority's plans with development.	• Regional Development Center and Georgia Regional Transportation Authority review all DRI-designated projects. • Local government has power to use findings of Regional Development Center to reject, approve or impose regulations on development. • 2001 revision included new physical size thresholds for developments that required DRI review to include more developments.	1989, revised 2001
	Transfer of Development Rights	Preserve open space/farmland without depriving land owners of value of land by allowing higher densities in certain areas.		1998

* See case study for a more complete inventory.

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Georgia (continued)				
	Livable Centers Initiative	"To promote quality growth in the region by encouraging greater mobility and livability within existing employment and town centers, thereby using the infrastructure already in place instead of building anew."	Grants awarded to development projects that meet the intent of the initiative.	2000
	Georgia Regional Transit Authority	Combine road, transit, bikeway and sidewalk projects designed to reduce traffic congestion and improve air quality.	GRTA can veto local or state projects that do not meet goals. Local/state governments can override, but lose state and Federal funding.	1999
	Georgia Greenspace Program	Help developed and rapidly developing counties and municipalities preserve open space.	Funding available to localities to help protect at least 20 percent of the open space in each county of the state.	2000
Maine				
	Planning and Land Use Regulation Act	Protect Maine's natural resources with an emphasis on orderly growth and development in appropriate places.	• The state will assist local government in creating voluntary comprehensive plans.	1989
	Infrastructure Investment	Guide growth to designated areas.	• State's infrastructure money can only be used in designated growth areas or those with adequate service capacity.	2000
	Maine Downtown Center	Encourage downtown revitalization.	• Funds for downtown revitalization projects. • New schools sited in growth areas.	2000
	Great American Neighborhood initiative	Promote creation and revitalization of dense, walkable, mixed-use communities.	• Educational program to convince homebuyers of benefits of denser, walkable communities. • Low-interest loan available to developers who use "livable design" standards.	2000

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Maryland				
	Planning Act	Control sprawl, concentrate growth in areas with existing infrastructure, preserve agricultural lands.	• All municipalities must show that growth will happen in "concentrated suitable areas"– can be UGB or not. • UGB (or other method) established on local level, method/model depending upon local needs and issues.	1992
	Smart Growth Areas Act	Revitalize cities and towns, preserve farmland, reduce costs of infrastructure.	• State funding only supplied for projects in designated Priority Funding Areas (PFA's). • Rural Legacy funds available to purchase development rights on property with significant agricultural, historic or natural resources. • Growth Corridors established to absorb growth. • All comprehensive plans must have a vision related to the protection of sensitive areas and development in suitable areas.	1997
	Smart Codes	Guide growth into certain areas, encourage infill development and the rehabilitation of existing buildings.	• Priority funding goes to jurisdictions that accept codes without amendment.	2000
	Rural Legacy Program	Protect open space and limit sprawl.	• Funds allocated to counties to help preserve farmland, open space, etc.	
	Maryland Greenprint Program	Preserve farmland, create integrated and linked system of preserved areas.	• Funds available for purchase of easements.	2001
	Community Legacy Program	Supports neighborhood revitalization efforts, helps communities focus on comprehensive planning strategies and approaches to revitalization.	• Provides funds that fill in gaps between existing programs, provides consultation and planning support services.	2002

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Maryland (continued)				
Montgomery County*	Downzoning combined with Transfer of Development Rights (TDR) in Agricultural Reserve	Preserve farmland without penalizing farm landowners by reducing value of land.	• Limits placed on new development in Agricultural Reserve to one unit/25 acres. • Landowners retain development rights at one unit/five acres and can sell those units on open market to developers building in other areas who want greater densities than allowed.	1979
	Annual Growth Policy	Match growth with utility and service capacity (transportation is principal factor) – concurrency.	• Transportation Adequacy Testing using a policy area transportation review and local area transportation review.	1986
	Comprehensive Plan	Focus growth in "corridors" served by highway and transit while preserving land in the "wedges" between the corridors.	• Zoning, TDR.	1962 Various updates
Massachusetts				
	Community Development Plan Program	Advance voluntary planning throughout the state.	• Municipalities encouraged to develop community plans that address future needs.	2000
	Community Preservation Act	Aid local governments to acquire open space, historic resources, recreational land and affordable housing.	• Local governments authorized to establish up to three percent property tax to fund these actions.	2000
Minnesota				
	Regional Planning Legislation	Coordinate growth with urban infrastructure and services.	Urban Service areas to guide growth.	Early 1970s
	Growth Plan for Metropolitan Urban Service Area	Encourage/discourage development in specific areas.	• Controls growth by location of utility construction. • Service extension granted to cities on case by case basis.	1980
	Sustainable Development Act	Help local governments undertake sustainable development.	• Model ordinance and planning guide available to local governments.	1996

* See case study for a more complete inventory.

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Minnesota (continued)				
	Community-Based Planning Act	Provide communities with alternative planning and dispute resolution processes, enable communities to establish urban growth boundaries.	• Advisory services and planning tools made available for use on a voluntary basis.	1997
Twin Cities*	Twin Cities Fiscal Disparities Plan	Tax base revenue sharing used to pool the property taxes of municipalities of a region and redistributes the fund.	• Forty percent of growth in commercial and industrial property in each jurisdiction is pooled into a fund. • Funds are redistributed based on population.	1971
	Livable Communities Act	Promote developments in mixed-use, walkable communities; promote infill and brownfields redevelopment.	• Funding for plan and project implementation.	1996
New Jersey*				
	State Development and Redevelopment Plan (SDRDP)	Focus growth in centers, away from rural and environmentally sensitive areas.	Incentives are awarded to municipalities that develop in accordance with the NJ-SDRDP's goals.	1992
	Transit Villages Initiative	Create TODs in New Jersey.	Municipalities are given priority to funding once established as a Transit Village.	1999
	Garden State Preservation Trust Act	Preservation of 1,000,000 acres (500,000 farmland and 500,000 open space) throughout the state.	Money allocated for the purchase of lands.	1998
	Green Acres Program	"to achieve, in partnership with others, a system of interconnected open spaces, whose protection will preserve and enhance New Jersey's natural environment and its historic, scenic, and recreational resources for public use and enjoyment."	Money available to match county/municipal funds for open space, recreation and park development.	1961
	State Agriculture Development Committee's (SADC) programs	Preserve farmlands, open space and encourage proactive planning.	• Planning incentives grant program. • County easement purchase program. • Fee-simple purchase program (SADC purchased farms and auctions them with deed restrictions).	

* See case study for a more complete inventory.

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
North Carolina				
Charlotte	"Centers and corridors" growth strategy	Increase development density in five proposed transit corridors and at key centers.	• Zoning overlay districts. • Transit station area planning. • Transportation impact waivers and targeted funding to encourage development in specific areas.	
Oregon*				
	2040 Growth Concept and 2040 Framework Plan	Create compact urban growth, multimodal transportation system, protect market-based preferences over regulation.	Framework Plan sets binding targets and performance measures for each of the cities and counties.	1995/1997
	Land Conservation and Development Act (UGB)	Prevent sprawl, protect agriculture, increase density, redirect investment into inner cities.	All incorporated cities required to implement urban growth boundaries.	1973
	Buildable Lands and Housing Needs	Coordinate UGBs with population forecasts, 20-year UGBs required for all cities, inventory of buildable land required.	Expansion of UGB required if buildable land will not accommodate forecasted population growth.	1995
	Annexation	Make better use of infrastructure, encourage collaborative planning, address economic viability of special districts, encourage creation of long-term master plans.	Allows a city or district to receive approval in a single election for a series of annexations that can be put into effect individually.	1992
	Transportation and Growth Management Program	Implement state planning requirements, promote compact, pedestrian-friendly, mixed-use development.	State provides grants to local governments to help them develop comprehensive plans.	1993
	Quality Communities	Encourage energy-efficient, low-emissions projects.	Target state funds toward development that is environmentally friendly and meets state planning goals.	2000
Portland*	Region 2040 Growth Concept/Urban Growth Management Functional Plan	Establish a growth framework for the region, including different levels of growth centers.	Requirements for local plan consistency with regional objectives; incentives and technical assistance for projects.	1995
	Metropolitan Service District	Control/advise growth in Portland metro region.	Elected regional government approves extension of public facilities, adjusts UGB, controls local zoning.	1979

* See case study for a more complete inventory.

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Pennsylvania				
	Pennsylvania Municipalities Planning Code	Set historical framework for local comprehensive planning in the state.	• Municipalities required to adopt a comprehensive plan. • Municipalities that have plans accepted by county are eligible for state funding and grants.	1968 (amended 1988 and 1990)
	Growing Greener	Protection of environmentally sensitive and significant land, development of recreational land.	• Funding available for purchase and protection of land.	1999
	Growing Smarter	Provide counties and municipalities with the tools necessary to plan for healthy economic growth and development, and to conserve urban and rural resources while protecting private property rights.	• Local governments able to create "locally designated growth areas." • Transferable Development Rights. • State agencies advised to rely on local plans when making funding and permitting decisions. • Downtown Location Law requires state services to locate in central business districts.	2000
	Industrial Sites Environmental Assessment Act	Encourage infill development and remediation of brownfield sites.	• State provides performance-based loans to businesses and communities for remediation and cleanup of non-hazardous sites.	2000
Rhode Island				
	Comprehensive Planning and Land Use Regulation Act	Ensure coordinated and well-planning growth strategies.	• All municipalities required to adopt comprehensive plans that are compliant with State Guide Plan. • Comprehensive plans must address natural resources, farmland and open space.	1988
	Development Impact Fee Act	Ensure that public facilities are available to serve new growth.	• Local governments can assess fee to developer to pay for needed infrastructure improvements.	2000
	Open Space 2000 Campaign	Protect Rhode Island's "unique natural heritage."	• Funding available to purchase land for protection.	2000
	Historic Building Renovation	Improve climate for urban reinvestment.	• Tax credits available for 30 percent of rehabilitation costs on certified historic structures.	2001

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Rhode Island (continued)				
	Business Improvement District	Improve services in downtown Providence.	• Businesses in Providence can elect to tax themselves to provide funding for area improvements.	2001
Tennessee				
	Growth Policy Law	Enable local governments to plan more effectively, match timing of growth and services, minimize sprawl, curb annexations/ municipal incorporations.	• All cities and counties required to adopt comprehensive plans and collaborate in defining growth boundaries and designating areas of future growth.	1998
	Brownfield Redevelopment Amendment	Expedite brownfield cleanup and reuse across the state.	• State provides funds for screening, investigation, remediation, containment, or clean up of designated site.	2001
Utah				
	Envision Utah	Develop and analyze regional transportation/ land use scenarios for a 10-county area of northern Utah, through an extensive public process.	State technical assistance for data analysis/modeling.	1997
	Quality Growth Strategy	Work with communities to implement a "quality growth strategy" consistent with the preferred scenario outcome of the Envision Utah project.	Educational efforts and technical assistance to local communities to develop community plans, revise zoning, work with developers, etc. Transportation investments.	1999
Virginia				
Arlington County	General Land Use Plan (GLUP)	Focus growth toward transit stations, encourage mixed-use development, create pedestrian-friendly communities.	• Incentive zoning. • Bonus density privileges for affordable housing development.	First adopted 1961, amended over time

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Washington*				
	Growth Management Act	Manage growth throughout the state.	• Cities/counties required to adopt 20-year plans to avoid urban sprawl and protect environment. • LOS standards must be established and met for all comprehensive plans. • Concurrency- infrastructure must be in place within six years of development being built. • Urban Growth Area (UGA).	1990
	Shoreline Management Act	Prevents the inherent harm of development along the shoreline by coordinating and evaluating proposed plans.	Preferences are granted to uses that: • Protect the quality of water and the natural environment. • Depend on proximity to the shoreline. • Preserve and enhance public access or increase recreational opportunities for the public along the shoreline.	1971
	State Environmental Policy Act (SEPA)	Identifies possible environmental impacts of proposed projects, regulations, policies or plans. The information provided during the review process helps decision-makers, applicants and the public understand the consequences of the project.	The lead agency reviews the EIS or DNS and recommends revisions, approval or rejection for the project, plan or policy.	1971/1998
	Washington Wildlife and Recreation Program	Preservation of land for wildlife and recreation.	Funding available for the purpose of habitat conservation and creation of outdoor recreation spaces.	1990
	Trust Land Transfer Program (TLT)	Funds school construction while protecting natural resources by preventing the overcutting of forests.	TLT funds are used to pay the timber value of a particular parcel of land. Money goes into school construction budget, land is transferred to open space/recreation. Additional land is purchased to replace Trust lands.	1989

* See case study for a more complete inventory.

Table B.1 Inventory of Initiatives by State (continued)

State	Initiative	Objective	Implementation Measures	When Adopted
Washington* (continued)				
Seattle Region	Vision 2020	Establish a transportation and land use vision for the region.	• Transportation plans and programs. • Voluntary plan review process. • Education (e.g., for TOD) and outreach incentives.	1990
Thurston County	Thurston County Urban Management Agreement	Concentrate urban growth within planned areas.	• Established two-tiered boundary for short- and long-term growth. • Land outside of boundary is downzoned. • Very strict on extending municipal services outside of boundary. • Achieved through voluntary agreement.	1988
Wisconsin				
	Growth Management Law	Ensure well-planned growth.	• Every community must adopt a comprehensive plan by 2010. • Grants available to help municipalities with their plan. • Municipalities and counties that adopt plans that meet state standards will qualify for Smart Growth Dividend in 2005.	1999
	Housing and Economic Development Authority Bill	Revitalization of downtowns.	• Small businesses locating to vacant storefronts are eligible for loans. • Corporation conducting business in designated zone will receive package of tax and investment credits and incentives.	

* See case study for a more complete inventory.

Table B.2 Growth Management Strategy Matrix

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	**Required Plans**	**Horizontal/ Vertical Plan Consistency**	**Local Plan Consistency (with Zoning/ Infrastructure Implementation)**	**Protection of Sensitive Areas and Special Lands**	**Environmental Review**	**Growth Directive Policies**	**Transportation-Oriented Policies**	**Growth-Timing Policies**	**Land-Release Policies**	**Promotion of Special Land Uses**
State											
Arizona				Require Zoning Consistent with Plan (Growing Smarter Act) (1)	Transferable Development Rights (4)		Impact Fees (Growing Smarter Plus Act) (1)		Adequate Public Facilities Standards (Growing Smarter Plus Act) (1)		
					Land Acquisition and Banking (Arizona Preserve Initiative) (2)		Priority Investment/ Funding Areas (Growing Smarter Plus Act) (4)				
					Conservation Easements (Arizona Preserve Initiative) (2)						
					Purchase of Development Rights (Arizona Preserve Initiative) (2)						
California		Comprehensive Plans (1) (4)		Require Zoning Consistent with Plan (1)	Land Acquisition and Banking (Land Acquisition Program, Habitat Conservation Fund, Resources Trust Fund, Environmental Enhancement and Mitigation Program, etc) (2)	Development of Regional Impact (S.B. 610) (1)	Priority Investment Areas (D-46-01) (1)	LOS Standards (1)	Adequate Public Facilities Standards (S.B. 221) (1)	Urban Growth Boundaries (local implementation) (4)	
					Tax Credits for Land Donation (Natural Heritage Preservation Tax Credit Act) (2)		Transit-Oriented Development (Transit Village Plan) (2)				

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.2 Growth Management Strategy Matrix (continued)

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	Required Plans	Horizontal/ Vertical Plan Consistency	Local Plan Consistency (with Zoning/ Infrastructure Implementation)	Protection of Sensitive Areas and Special Lands	Environmental Review	Growth Directive Policies	Transportation-Oriented Policies	Growth-Timing Policies	Land-Release Policies	Promotion of Special Land Uses
State											
Florida			Vertical Plan Consistency (Growth Management Act/Anti-Sprawl Policy) (2)		Land Acquisition and Banking (Florida Forever) (2)	Development of Regional Impact (1)		LOS Standards (1)	Concurrency (Growth Management Act) (2)		
					Quality Development Program (Florida Quality Development Program) (3)						
					Conservation Easements (Florida Forever) (2)						
Georgia		Comprehensive Plans (Georgia Planning Act) (2)	Vertical Plan Consistency (Minimum Planning Standards) (1)		Transferable Development Rights (3)		Development of Regional Impact (Georgia Planning Act) (1)	Transit-Friendly Communities (GRTA) (2)			
		Technical Support for Planning (4)			Open Space Preservation (Georgia Greenspace Program) (2)		Infill Development (2)				
Maine		Comprehensive Plans (Planning and Land Use Regulation Act) (4)					Priority Investment/ Funding Areas (1)				
							Downtown Revitalization (Maine Downtown Center) (1) (4)				
							Traditional Neighborhood Development (2) (4)				

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.2 Growth Management Strategy Matrix (continued)

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	**Required Plans**	**Horizontal/ Vertical Plan Consistency**	**Local Plan Consistency (with Zoning/ Infrastructure Implementation)**	**Protection of Sensitive Areas and Special Lands**	**Environmental Review**	**Growth Directive Policies**	**Transportation-Oriented Policies**	**Growth-Timing Policies**	**Land-Release Policies**	**Promotion of Special Land Uses**
State											
Maryland			Vertical Plan Consistency (Comprehensive Plan Vision) (1)	Vertical Plan Consistency (Anti-Sprawl Initiative) (4)	Farmland Preservation (Rural Legacy Funds/Maryland Greenprint Program) (2)		Priority Funding Areas (2)		Concurrency (Annual Growth Policy) (2)	Urban Growth Boundaries (4)	Targeted Tax Abatement (Rehabilitation Property Tax Credits) (2)
					Open Space Linkage (Maryland Greenprint Program) (2)		Rehabilitation Zoning Codes (Smart Codes) (2) (3)				
							Neighborhood Revitalization (Community Legacy Program) (2) (4)				
							Downzoning and Transferable Development Rights in Agricultural Areas (2)				
Massachusetts		Comprehensive Plans (Community Development Plan Program) (4)			Land Acquisition and Banking (Community Preservation Act) (4)						Tax Surcharge (Community Preservation Act)
Minnesota		Comprehensive Plans (Sustainable Development Act and Community-Based Planning Act) (4)					Livable Communities Act (2)		Adequate Public Facilities Standards (Growth Plan for Metropolitan Urban Service Area) (4)	Urban Service Areas (Regional Planning Legislation) (4)	

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.2 Growth Management Strategy Matrix (continued)

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	Required Plans	Horizontal/ Vertical Plan Consistency	Local Plan Consistency (with Zoning/ Infrastructure Implementation)	Protection of Sensitive Areas and Special Lands	Environmental Review	Growth Directive Policies	Transportation-Oriented Policies	Growth-Timing Policies	Land-Release Policies	Promotion of Special Land Uses
State											
New Jersey	State Development and Redevelopment Plan (2) (4)		Cross-Acceptance Process (State Development and Redevelopment Plan) (4)		Farmland Preservation (Garden State Farmland Preservation Trust Fund) (2)		Downtown Revitalization (2)	Transit-Oriented Development (Transit Village Initiative) (2)	Impact Assessment (Wastewater Assessment) (1)		
					Land Acquisition and Banking (Green Aces Program) (2)						
					Conservation Easements (SADC program) (2)						
					Fee Simple Purchase Program (SADC program) (2)						
Oregon		Comprehensive Plans (Transportation and Growth Management Program) (2)	Vertical Plan Consistency (Transportation and Growth Management Program) (2)	Require Infrastructure Consistent with Plan (1)			Priority Investment Areas (2)	Transit- and ped/bike-friendly communities (Transportation and Growth Management Program) (2)		Urban Growth Boundaries (Land Conservation and Development Act) (1)	
Pennsylvania			Cross-Acceptance Process (Pennsylvania Municipalities Planning Code) (2)		Land Acquisition and Banking (Growing Greener) (2)		Priority Investment Areas (Growing Smarter) (1)			Urban Service Areas/ Boundaries (Growing Smarter) (4)	
					Transferable Development Rights (Growing Smarter) (4)		Brownfield Redevelopment (Industrial Sites Environmental Assessment Act) (2)				

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.2 Growth Management Strategy Matrix (continued)

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	**Required Plans**	**Horizontal/ Vertical Plan Consistency**	**Local Plan Consistency (with Zoning/ Infrastructure Implementation)**	**Protection of Sensitive Areas and Special Lands**	**Environmental Review**	**Growth Directive Policies**	**Transportation-Oriented Policies**	**Growth-Timing Policies**	**Land-Release Policies**	**Promotion of Special Land Uses**
State											
Rhode Island			Vertical Plan Consistency (Comprehensive Planning and Land Use Regulation Act) (1)	Require Zoning Consistent with Plan (Comprehensive Planning and Land Use Regulation Act) (1)	Land Acquisition and Banking (Open Space 2000 Campaign) (2)		Impact Fees (Development Impact Fee Act) (1)				Targeted Tax Abatement (2)
							Downtown Revitalization (Business Improvement District) (4)				
Tennessee			Vertical Plan Consistency (Growth Policy Act) (1)				Brownfield Redevelopment (Brownfield Redevelopment Amendment) (4)				
Washington		Comprehensive Plans (Growth Management Act) (1)			Permitting (Shoreline Management Act) (3)	Environmental Impact Statement (State Environmental Policy Act) (4)		LOS Standards (Growth Management Act) (1)	Concurrency (Growth Management Act) (1)	Urban Growth Boundaries (Growth Management Act) (1)	
					Land Acquisition and Banking (Washington Wildlife and Recreation Program and Trust Land Transfer Program) (2)						
					Transferable Development Rights (Trust Land Transfer Program) (4)						
Wisconsin		Comprehensive Plans (Growth Management Law) (1) (2)					Special Financing Districts (2)				

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.2 Growth Management Strategy Matrix (continued)

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	Required Plans	Horizontal/ Vertical Plan Consistency	Local Plan Consistency (with Zoning/ Infrastructure Implementation)	Protection of Sensitive Areas and Special Lands	Environmental Review	Growth Directive Policies	Transportation-Oriented Policies	Growth-Timing Policies	Land-Release Policies	Promotion of Special Land Uses
Region											
Arlington County, VA	Comprehensive Plan (1)						Incentive Zoning (General Land Use Plan) (4)	Transit Oriented Development (plans, outreach, zoning) (1) (4)			Density Bonus (General Land Use Plan) (4)
Denver, CO	Regional land use plan (Metro Vision 2020 Plan) (4)		Required plan consistency with Metro Vision Elements (Mile High Compact – partially implemented) (1)				Infill Development (plans, outreach, zoning) (1) (4)	Transit Oriented Development (plans, outreach, zoning) (1) (4)		Urban Growth Boundary (Mile High Compact) (4)	
Minneapolis/ St. Paul, MN							Tax Base Sharing (Twin Cities Fiscal Disparities Plan/Iron Range Fiscal Disparities Program) (1)				
Montgomery County, MD	Comprehensive Plan (1)				Transferable Development Rights (4)		Downzoning (4)		Adequate Public Facilities Standards (Annual Growth Policy) (1)		
Portland, OR	Regional land use vision and plans (2040 Growth Concept, Regional Urban Growth Goals and Objectives) (1) (4)		Required local plan updates consistent with regional plan (Urban Growth Management Functional Plan) (1)		Urban Reserve Planning (1), (4)		Tax increment finance and subsidies to support infill and TOD (Urban Renewal Districts, TOD Revolving Fund) (2) Zoning to Support Growth Centers (1)	Required zoning changes to support TOD, bike, ped. (Growth Mgmt. Functional Plan) (1)		Urban Growth Boundary, Urban Reserves (1)	
Salt Lake City, UT	Regional land use vision (Envision Utah/ Quality Growth Strategy) (4)		Encourage local plan changes consistent with regional vision (4)								
San Diego, CA	Regional Growth Management Strategy (4)				Multiple Species Conservation Plan			Transit-Oriented Development (TOD Initiative) (4)		Staged urbanization areas with infrastructure priority (2)	

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.2 Growth Management Strategy Matrix (continued)

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	**Required Plans**	**Horizontal/ Vertical Plan Consistency**	**Local Plan Consistency (with Zoning/ Infrastructure Implementation)**	**Protection of Sensitive Areas and Special Lands**	**Environmental Review**	**Growth Directive Policies**	**Transportation-Oriented Policies**	**Growth-Timing Policies**	**Land-Release Policies**	**Promotion of Special Land Uses**
Region											
San Francisco Bay Area, CA							Infill Development (Transportation for Livable Communities) (2)	Transit-Oriented Development (Transportation for Livable Communities) (2)			
Seattle, WA	Regional land use plan (Vision 2020) (1)		Required local plan updates consistent with regional plan (1)				Vision 2020 Growth Centers (4)	Transit-Oriented Development (Transit Station Communities Program) (4)		Urban Growth Boundary (4)	
Objectives											
	Ensure public process	Ensure public process	Ensure public process	Ensure adequate infrastructure	Coastal Zone Preservation	Protect areas of environmental significance	Infill Development	Parking Reductions	Slow growth	Compact Land Patterns	Affordable Housing
	Growth consistent with community vision	Growth consistent with community vision	Growth consistent with community vision	Ensure implementation of accepted plan	Wetlands Preservation	Minimize/ mitigate community and infrastructure impacts	Compact/Cluster Development	Ped/Bike friendliness	Allow time for planning	Land preservation	Rehabilitation of Existing Buildings
	Implement protections for environment and land resources	Implement protections for environment and land resources	Implement protections for environment and land resources		Historic Preservation		Traditional Neighborhood Development	Transit-Friendly communities	Ensure coordination of infrastructure		
	Coordinate plans to achieve desired growth objectives	Coordinate plans to achieve desired growth objectives	Coordinate plans to achieve desired growth objectives		Farmland Preservation		Transit-Oriented Development	Transit-Oriented Development			
					Open Space Linkage		Downtown Revitalization				
					Parks and Recreation		Neighborhood Revitalization				
					Open Space Preservation		Brownfield Redevelopment				
							Jobs-Housing Balance				
							Development in areas served by infrastructure				

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.2 Growth Management Strategy Matrix (continued)

	Growth Management Strategies						Growth Management Strategies				
	State/Regional Visioning Plan	**Required Plans**	**Horizontal/ Vertical Plan Consistency**	**Local Plan Consistency (with Zoning/ Infrastructure Implementation)**	**Protection of Sensitive Areas and Special Lands**	**Environmental Review**	**Growth Directive Policies**	**Transportation-Oriented Policies**	**Growth-Timing Policies**	**Land-Release Policies**	**Promotion of Special Land Uses**
Tools											
	Public process	State Development Plans	Vertical Plan Consistency	Vertical Plan Consistency	Transferable Development Rights	Development of Regional Impact	Priority Investment/ Funding Areas	LOS Standards	Concurrency	Urban Growth Boundaries	Targeted Tax Abatement
	Coordination and outreach	Comprehensive Plans	Horizontal Plan Consistency	Horizontal Plan Consistency	Land Acquisition and Banking	Environmental Impact Statement	Mixed-Use Zoning	Parking Restrictions	Adequate Public Facilities Standards	Intermediate Growth Boundaries	Low-interest loans
		Specific-Area Development Plans	Cross-Acceptance Process	Cross-Acceptance Process	Conservation Easements		Planned Unit Development	Ped/Bike Improvements	Impact Assessment	Urban Development Reserves	Grants
		Strategic Policy Plans		Require Zoning Consistent with Plan	Differential Assessment Programs		Overlay Zoning/ Districts	Location Efficient Mortgages		Urban Service Areas/ Boundaries	Fair-share Requirements
		Fiscal/Technical Support for Planning		Require Infrastructure Consistent with Plan	Permitting		Minimum Density Zoning/ Standards	Roadway Design Standards			Inclusionary Zoning
					Environmental Review		Upzoning/ Downzoning	Infrastructure Provision/ Direction			Tax Surcharge
					Purchase of Development Rights		Rehabilitation Zoning Codes				Density Bonus

Measures of Implementation Key: (1) Mandates; (2) Fiscal Incentives/Disincentives; (3) Permitting; (4) Advisory.

Table B.3 Evaluation Studies: Methodologies and Impacts Assessed

State/Region	Study	Purpose*			Type		Impacts Assessed					
		Evaluation	Forecast	Policy Anal.	Quantitative	Qualitative	Land Use	Trans.	Other Infra.	Housing	Enviro.	Other
California												
	Anderson (1999)			●		●						
	Elliot (1981)	●			●					●		
	Landis (1992)	●			●		●			●		
	Pendall and Martin (2002)	●				●	●			●		
	Staley, Edgens and Mildner (1999)	●			●		●			●		
San Diego	Drolet (2002)	●				●						
	Dunphy (1995)			●		●						
Florida												
	Anderson (1999)			●		●						
	Downs (2003)	●				●	●	●		●		
	Pelham (2001)			●		●						
	Song (2002)	●			●		●	●				
	Staley and Gilroy (2001)	●			●					●		
	Steiner (2001)			●		●						
	Trust for Public Land (2002)			●		●						
	Weaver (2001)			●		●						
	Weitz (1999)			●		●						
Georgia												
	Department of Community Affairs (1998)			●		●						
	Nelson (2001)	●			●		●	●		●	●	●
	Weitz (1999)			●		●						
Maine												
	State Planning Office (2003)	●			●		●					

* **"Evaluation"** refers to retrospective, empirical evaluation of impacts. "Forecast" refers to modeling (forecasting) of impacts.
"Policy Analysis" refers to an assessment of policy implementation, without examining the impacts of these policies.

Table B.3 Evaluation Studies: Methodologies and Impacts Assessed (continued)

State/Region	Study	Purpose*			Type		Impacts Assessed					
		Evaluation	Forecast	Policy Anal.	Quantitative	Qualitative	Land Use	Trans.	Other Infra.	Housing	Enviro.	Other
Maryland												
	Anderson (1999)			●		●						
	Knaap (2001)	●				●						
	Maryland Office of Planning (1995)			●		●						
	Maryland Office of Planning (2000)			●		●						
	Pendall and Martin (2002)	●				●	●			●		
	Song (2002)	●			●		●	●				
Montgomery County	Natural Resources Defense Council (2001)	●				●	●					
	Marriot, Loehr and Moritz (1996)	●				●		●				
Minnesota												
Minneapolis/ St. Paul	Center for Energy and Environment (1999)		●		●		●	●	●	●	●	●
	Barnes and Davis (1999)	●			●		●	●				
	Smart Growth Twin Cities, et al. (2002)		●		●		●	●	●	●	●	●
	Swenson and Dock (2003)		●		●		●	●				
New Jersey												
	Cambridge Systematics, et al. (2002)			●		●		●				
	Center for Urban Policy Research (2000)		●		●		●	●	●	●		●
	Parmar (2003)			●		●						
	Renne and Wells (2003a)	●				●						
	Renne and Wells (2003b)	●				●						

* **"Evaluation"** refers to retrospective, empirical evaluation of impacts. "Forecast" refers to modeling (forecasting) of impacts.
"Policy Analysis" refers to an assessment of policy implementation, without examining the impacts of these policies.

Table B.3 Evaluation Studies: Methodologies and Impacts Assessed (continued)

State/Region	Study	Purpose*			Type		Impacts Assessed					
		Evaluation	Forecast	Policy Anal.	Quantitative	Qualitative	Land Use	Trans.	Other Infra.	Housing	Enviro.	Other
North Carolina												
Charlotte	Avin, Cervero and Cauble (1999)		●		●		●	●				
Oregon												
	Anderson (1999)			●		●						
	Moore (1998)	●				●	●					
	Nelson (2001)	●			●		●	●		●	●	●
	Oregon Progress Board (2001)			●		●						
	Reason Public Policy Institute (1999)	●			●		●			●		
	Song (2002)	●			●		●	●				
	Staley, Edgens and Mildner (1999)	●			●		●			●		
	Staley and Gilroy (2001)	●			●					●		
	Weitz (1999)			●		●						
Portland	1000 Friends of Oregon (1996)		●		●		●	●			●	
	Arrington (1996)	●			●		●	●				
	Downs (2002)	●			●					●		
	Dunphy (1995)			●		●						
	ECONorthwest (2001a)	●			●		●					
	Hanley and Knaap (1998)	●			●		●	●				
	Nelson (2001)	●			●		●	●		●	●	●
	Pendall and Martin (2002)	●				●	●			●		
	QuantEcon (2002)	●			●					●		

* **"Evaluation"** refers to retrospective, empirical evaluation of impacts. "Forecast" refers to modeling (forecasting) of impacts.
"Policy Analysis" refers to an assessment of policy implementation, without examining the impacts of these policies.

Table B.3 Evaluation Studies: Methodologies and Impacts Assessed (continued)

State/Region	Study	Purpose*			Type		Impacts Assessed					
		Evaluation	Forecast	Policy Anal.	Quantitative	Qualitative	Land Use	Trans.	Other Infra.	Housing	Enviro.	Other
Tennessee												
	Pendall and Martin (2002)					●	●			●		
	Porter (2002)			●		●						
Chattanooga	Chattanooga Hamilton County Regional Agency (2003)	●			●		●	●			●	
Utah												
	Utah Governor's Office of Planning and Budget (2000)		●		●		●	●	●		●	
Washington												
	1000 Friends of Washington (2000)	●		●	●	●	●					
	Anderson (1999)			●		●						
	Pendall and Martin (2002)					●	●			●		
	Staley and Gilroy (2001)	●			●					●		
	Trohimovich (2002)			●		●						
	Washington State Land Use Study Commission (1998)			●		●						
	Washington State DCTED (2002)			●	●							
	Weitz (1999)			●		●						
	Woolston (1996)			●		●						

* **"Evaluation"** refers to retrospective, empirical evaluation of impacts. "Forecast" refers to modeling (forecasting) of impacts.
"Policy Analysis" refers to an assessment of policy implementation, without examining the impacts of these policies.

Table B.3 Evaluation Studies: Methodologies and Impacts Assessed (continued)

State/Region	Study	Purpose*			Type		Impacts Assessed					
		Evaluation	Forecast	Policy Anal.	Quantitative	Qualitative	Land Use	Trans.	Other Infra.	Housing	Enviro.	Other
Washington (continued)												
Seattle-Tacoma	1000 Friends of Washington (1999)	●				●	●					
	Northwest Environment Watch (2002)	●			●		●					
	Fulton (1999)	●			●		●	●				
	Hallenbeck, Carlson, and Simmons (2003)			●		●		●				
	King County (2003)	●			●		●					
	Puget Sound Regional Council (2002a)	●			●	●	●	●				
	Puget Sound Regional Council (2003b)			●		●		●				
	Puget Sound Regional Council (2003d)			●	●							
	Washington State DCTED (2003)	●			●		●					
Thurston County	Yan (1998)	●				●		●				

* **"Evaluation"** refers to retrospective, empirical evaluation of impacts. "Forecast" refers to modeling (forecasting) of impacts.
"Policy Analysis" refers to an assessment of policy implementation, without examining the impacts of these policies.

Appendix C

Case Study: Florida

1.0 Overview

This case study discusses the history of comprehensive planning and growth management at the state level in Florida, and related evaluation efforts. The case study is organized into the following sections:

- **Section 2.0** discusses historical and recent planning initiatives led by the State, various MPOs, and other groups;
- **Section 3.0** describes studies undertaken to *forecast* the outcomes of programs directed at smart growth objectives;
- **Section 4.0** describes *policy* studies to evaluate how effectively these programs have been implemented; and
- **Section 5.0** describes *outcome* studies that have attempted to measure the actual impacts of state planning programs.

2.0 History of Comprehensive Planning

2.1 Planning Context

Geographical Context

Florida is America's 26th largest state in terms of land area, but with 16 million residents the State ranks fourth in the country in terms of population and eighth in terms of population density, according to the 2000 Census. Florida added three million residents between 1990 and 2000, an increase of 16 percent over the period or an annualized growth rate of over two percent. Florida's rapid growth is expected to continue: the State is forecast to add eight million residents, for a total of 24.4 million, by 2030. Growth will be widespread as 33 of Florida's 67 counties are expected to grow by 50 percent or more between 2000 and 2030.[24]

Almost 93 percent of Florida's population lives in one of the 20 metropolitan areas in the State, which encompass 34 of Florida's 67 counties. Six metropolitan areas in Florida have populations over one million. [The Miami and Fort Lauderdale metropolitan areas, both of which have populations over one million, are combined into a single consolidated metropolitan statistical areas (CMSA) by the U.S. Census, but are counted separately here.] The population in Florida's metropolitan areas grew 138 percent from 1970 to 2000.

U.S. Census population statistics for Florida do not take into account the substantial number of seasonal residents who live part-time in the State but may maintain their second households year-round. A 1997 study by the Bureau of Economic and Business Research at the University of Florida found that the State's unofficial population swells by nearly one million in the peak winter months, with three quarters of these "snowbirds" concentrating in seven metropolitan areas in southwest and southeast Florida.[25] In addition to temporary residents, Florida welcomed 70 million tourists in 2000. The State is forecast to welcome over 100 million tourists per year by 2020.[26]

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[24] University of Florida Bureau of Economic and Business Research (2003). Historical data from U.S. Bureau of the Census, 1990 and 2000 Census.

[25] Galvez (1997).

[26] Visit Florida (2002), www.flausa.com.

With the notable exception of Orlando, Florida's largest urban cores are located on or near the Atlantic Ocean or Gulf of Mexico. New development is able to spread inland uninhibited by geographical constraints other than natural lakes and sinkholes. Between 1970 and 2000, urbanized areas along the I-4 corridor from Tampa-St. Petersburg across the peninsula to Daytona Beach began to grow together. Central Florida is becoming a triangle of development as Orlando's rapidly expanding suburbs in the I-4 growth corridor converge with university-related growth in Gainesville and large, self-contained retirement cities being established in former orange groves near Ocala.[27] In Southeast Florida, the metropolis extending from Miami to West Palm Beach is growing further northward along the coast, and several smaller urbanized areas dotting the Gulf coast in Southwest Florida have the highest growth rates in the State.

Population growth and accompanying consumption of land for development are threatening Florida's native wildlife and plant populations. Currently almost 100 plant and animal species in Florida are listed as threatened or endangered by the U.S. Fish and Wildlife Service. Approximately one-fourth of Florida's total land area is public land in local, state, or Federal ownership and functions as important wildlife habitats and recreation areas.[28] Many more square miles of environmentally sensitive land or development rights are in private ownership. A recent assessment of Florida's environmental resources estimated that approximately 33 percent of the State needs to be protected from development in order to preserve the State's biodiversity and natural resources.[29]

Development pressures also have contributed to the loss of farm and ranch land in Florida. Independent farmers and large corporate landowners around the State have determined that their land is more valuable as a retirement community or other development. Due to development restrictions in the Everglades, which lie just west of the Miami-Ft. Lauderdale-West Palm Beach megalopolis, almost all land between the "no-build" line and the coast is being converted to development along a 75-mile band. Southeast Florida farm land in "transition areas" bordering existing development is worth three times as much per acre as similar land in other parts of the State.

Political Context

The Division of Community Planning in the Florida Department of Community Affairs (DCA) is responsible for ensuring that all comprehensive plans and plan amendments developed by Florida's 67 counties, 408 municipalities, and two special districts conform with state growth management laws and regulations. DCA also is responsible for

[27] Florida's newest urbanized area, Lady Lake, is located between Ocala and Orlando. According to the U.S. Census Bureau, half of Lady Lake's 51,000 residents are over age 60. In the United States as a whole, 15 percent of the population is over age 60.

[28] University of Florida Geoplan Center (2002).

[29] Florida Natural Areas Inventory (2002).

reviewing applications for large-scale developments and identifying regional and statewide impacts of these developments.

Currently there is no statewide comprehensive land use plan in Florida, but a map showing a compendium of the local land use elements of all comprehensive plans in Florida was created in 1994. Examples of coordinated regional planning are limited: there are 25 Metropolitan Planning Organizations (MPOs) for Florida's 28 urbanized areas and 20 metropolitan areas. Most MPOs (19 of 25) are single-county MPOs, but several have formed loose, non-binding coordination agreements (e.g., the Chairs Coordinating Committee in the Tampa Bay region).

2.2 Policy Initiatives Undertaken

Growth management initiatives in Florida date back to 1972, when four separate laws were adopted:

1. The Land and Water Management Act;
2. The State Comprehensive Planning Act;
3. The Land Conservation Act; and
4. The Water Resources Act.

These initial efforts to protect Florida's natural resources from growth and development established several key programs that form the foundation of Florida's current growth management laws. However, the more comprehensive Growth Management Act, adopted in 1985, transformed Florida's environmental protection regulations into a collection of forward-looking growth management policies and associated programs. The policies and programs established or updated by the Growth Management Act include:

Consistency with Comprehensive Plans – The 1975 Local Government Comprehensive Planning and Land Development Regulation Act first required Florida's municipalities to develop comprehensive plans. However, these plans typically contained only high-level goals and policies. Since the passage of the Growth Management Act, Florida municipalities have been required to adopt land use and zoning regulations and make development decisions that are consistent with their more detailed, strategic plans. Each plan must address future land use, housing, transportation, infrastructure, coastal management, conservation, recreation and open space, intergovernmental coordination, and capital improvements. Plans may be amended up to twice per year, but all amendments and new regulations are subject to DCA review.

The Growth Management Act also requires local governments to adopt an evaluation and appraisal (EAR) report every seven years assessing strengths and weaknesses of their comprehensive plans. Each government then amends its comprehensive plan based on

the findings of the report. DCA reviews each local government's EAR as well as any comprehensive plan amendments that result from the EAR, and the department also reviews comprehensive plan amendments that are proposed by local governments in interim years. Each jurisdiction with 2,500 or more residents completed its first EAR in the early-to-mid 1990s. Beginning in 2003 all jurisdictions, regardless of size, were required to complete an EAR every seven years.

Concurrency – One component of the Growth Management Act requires public facilities and services to be in place and operational at the same time the impacts of new development occur. This "concurrency" provision is intended to ensure that local governments provide adequate public facilities to support growth. Six types of public facilities are covered by the law: potable water, sanitary sewer, drainage, parks, solid waste, and transportation. Local governments also have the option to require school concurrency.

According to the concurrency provision, local governments are not permitted to approve developments that would generate demand for public services that exceeds available capacity, as defined by level of service (LOS) standards in their concurrency management plans. The concurrency section of the Growth Management Act was subsequently amended to allow for greater flexibility in designated urban infill and redevelopment areas, where some public services are more likely to be at or above capacity but where others may be better suited to accommodate growth. Another amendment allowed local governments to collect impact fees from developers to offset the cost of providing public infrastructure directly related to the impacts of the development.

Developments of Regional Impact – Florida's Developments of Regional Impacts (DRI) program, initiated in 1973 and subsequently amended in the 1985 Growth Management Act, first established the State's role in overseeing large-scale developments with impacts spread over more than one county. When determining whether a development qualifies as a DRI, local governments first and foremost must consider whether the development conforms to adopted local comprehensive plans and zoning regulations. If so, the Florida Legislature and DCA have established thresholds that are used to determine if a project may be a DRI.[30]

Developers of DRIs must coordinate with local governments, resource agencies, and one of the eight multi-county Regional Planning Councils in Florida to complete a detailed application for development approval (ADA), which is then reviewed by DCA. DCA recommends whether DRIs should be approved, approved with suggested mitigation conditions, or rejected, but local governments are ultimately responsible for formally approving or rejecting an ADA for a DRI. If, due to market conditions or other reasons, a developer decides to alter the composition or scale of a previously approved development, the change may be considered a "substantial deviation" that is subject to addition DRI review.

[30]Section 380.0651 F.S. See also Florida Department of Community Affairs Administrative Code Chapter 9J-2, *Rules of Procedure and Practice Pertaining to Developments of Regional Impact*.

Developers of DRIs may be required to pay impact fees in lieu of providing adequate public facilities to accommodate the impacts of the development, but only if non-DRI developments also are required to pay the fees. Impact fees and any land transferred by a developer to a local government (e.g., for a school or park) must be expressly designated and used to accommodate impacts reasonably attributable to the proposed development. These impact fees also may satisfy concurrency requirements as described above.

Florida Quality Developments – The Florida Quality Developments (FQD) program was also created as part of the Growth Management Act. The FQD program provides an alternative to the DRI process for well-planned developments that take special measures protect natural resources and that incorporate the infrastructure and other facilities necessary to satisfy concurrency requirements. FQD developments follow the same general process as DRIs, but they benefit from an accelerated review process and are permitted to use the FQD certification mark in marketing materials. As of 2003, 20 developments had been certified as Florida Quality Developments.

Optional Sector Plans – Optional sector plans offer another alternative to the DRI process when local governments are interested in proactively planning for new development on a large scale. Sector plans are adopted in the form of a series of local comprehensive plan amendments affecting an area greater than 5,000 acres. Sector plans have two components:

1. A conceptual, long-term build-out overlay, which covers the entire area; and

2. A detailed specific area plan covering at least 1,000 acres, which includes guidance on land use and other local issues.

Sector plans are intended to anticipate future development; they are not created for specific developments. However, counties may approve large-scale developments in the area covered by a sector plan without applying the DRI process. Currently four of Florida's 67 counties are involved in optional sector planning.

Land Conservation – Florida has a long tradition of land conservation. The nation's first wildlife refuge and the first national forest in the East are located in Florida, and the State first started acquiring environmentally sensitive land in 1964. Florida Department of Environmental Protection's Preservation 2000 (P-2000) Program was established in 1990 and has since been responsible for preserving more than 1.25 million acres of environmentally sensitive land in Florida. The new Florida Forever program, which replaces P-2000, takes a broader approach to conservation by funding restoration activities and purchasing conservation easements in addition to outright land purchases. Florida Forever provides $3 billion in revenue bonds over 10 years, 22 percent of which are dedicated to the Florida Communities Trust (FCT) for the purchase of urban open space to provide parks and greenways.

Recent Statewide Growth Management Initiatives – With rapid growth straining public facilities and natural resources, Florida has in recent years developed guidelines and regulations concerning regional planning for educational facilities, sanitary, sewer, public safety, solid waste, drainage, potable water, parks and recreation, and transportation facilities. All counties with populations greater than 100,000 must prepare an Interlocal

Service Delivery Report that identifies deficits or duplication of services within the county. The first round of reports was submitted to DCA on January 1, 2004.

DCA also is developing a Fiscal Impact Analysis Model to help local governments better estimate potential revenue that can be generated by new development and the costs associated with providing infrastructure and services for that development. The model is intended to enable local governments to make more fiscally prudent land use decisions.

2.3 Transportation Linkages

Although the Growth Management Act strengthened the State's role in land use planning, there has historically been a weak link between transportation and land use planning at the state level in Florida. DCA's role in transportation planning has typically been limited to review and comment on the list of funded projects contained in Florida Department of Transportation (FDOT) and Metropolitan Planning Organization (MPO) work programs. MPOs in Florida consider local land use plans when developing transportation plans, but since most MPOs cover a single county, there has been limited coordination between transportation and land use planning even at a regional level.

One goal of FDOT's new Efficient Transportation Decision-Making (ETDM) process is to foster greater participation in the transportation planning process by DCA, various state and Federal resource agencies, and other Federal, state, and local agencies with an interest in transportation planning. The ETDM process was originally conceived in response to provisions in the Federal Transportation Equity Act for the 21st Century (TEA-21) that provide incentives for states to accelerate their environmental review processes. The program has evolved into a broader initiative to inform and gather input from all of FDOT's partners from the earliest stages of the transportation planning process through final design and implementation.

In late 2003, a new FDOT transportation and land use planner began work on-site at the DCA offices to carry out DCA's review responsibilities as outlined in agreements between DCA and FDOT. An expanded transportation planning staff also will expand DCA's ability to provide technical assistance to local governments in the area of transportation and land use coordination, and will allow of specialized input during the review of comprehensive plans, plan amendments, EARs, and DRI projects.

3.0 Forecast Outcomes

Neither the Florida Department of Community Affairs nor the Florida Department of Transportation attempted to forecast the outcomes of the growth management policies adopted in 1972 and subsequently revised.

4.0 Policy Evaluation

This section summarizes several studies that have assessed the effectiveness of growth management policies that have been implemented by the State of Florida.

4.1 Growth Management Study Commission

The Growth Management Study Commission convened at the order of the Governor in 2000 to assess the strengths and deficiencies of Florida's growth management policies. The Commission found that:

> "…although the processes established by the existing growth management laws were well intended, the quality of growth has not met expectations, the strains on infrastructure have been only marginally reduced and, in essence, a more complicated, more costly process has been established which does not provide the expected corresponding benefits."

The Commission developed eight recommendations for improving the State's growth management policies:

1. "Revise the State Comprehensive Plan to more clearly establish a primary vision statement for Florida with a healthy, vibrant, and sustainable economy as its priority." The state comprehensive plan was adopted in 1985, but it was last amended in 1987.

2. "Develop a uniform methodology for reviewing the costs and benefits of local land use decisions." The Commission found that local governments were making planning decisions without considering the full cost of the infrastructure necessary to support new development. The Department of Community Affairs (DCA) is currently developing a Fiscal Impact Analysis Model to help local governments assess the revenues and costs associated with land use decisions.

3. "Empower citizens to better understand and participate in the growth management process." Recognizing the importance of establishing a consensus and the value of getting public and partner buy-in through information and feedback, the Commission itself held open meetings around the State and provided public access to all documents reviewed by the members during their deliberations.

4. "Focus the state's review of local comprehensive plan amendments on those that implicate compelling state interests as designated by state agencies and reviewed and approved by the legislature." The Commission likened the state-local relationship to

that of a parent using strong, top-down oversight and management procedures. However, by 2000 local governments had accrued 15 years of experience with the Growth Management Act, tailoring the provisions of the act to their own needs and circumstances. Meanwhile, in order to meet the stringent requirements of the Growth Management Act local governments were forced to continue to devote resources to compliance. The Commission recommended that the state transition from the role of a parent to the role of a partner and co-worker and transfer many regulatory responsibilities to local governments.

5. "Design and implement regional cooperation agreements for developments with extra-jurisdictional impacts to eventually eliminate the DRI process." The Commission recommended substituting improved intergovernmental coordination for the current arduous and costly DRI process.

6. "Require that each local government adopt a financially feasible public school facilities element to reflect the integration of school board facilities work programs and the future land use element and capital improvement programs of the local government." Recognizing the role schools play in growing livable communities, the Commission recommended making school concurrency mandatory in every jurisdiction in Florida.

7. "Authorize incentives for an effective urban revitalization policy, including dedicated sources of revenues for "fix-it-first" backlog of infrastructure needs in targeted infill areas." The Commission recommended creating high-density urban areas with unique local characters and diverse populations to attract economic development. Transportation planning should promote multimodal mobility.

8. "Develop an incentive-based state rural policy, which restores rural land values and protects private property rights, including dedication of additional revenue for public purchase of conservation and agricultural easements and a special overlay of transferable density allocations for rural property to be used for the implementation of cluster development in appropriate locations." Population growth and demand for low-density, affordable housing had increased development pressures on rural land adjacent to urbanized areas. Acknowledging that Florida's growth management laws had in some cases accelerated the expansion of urbanized areas, the Commission recommended an aggressive approach to farmland conservation while planning carefully for rural economic development in locations where resources and infrastructure can support the growth.

4.2 Concurrency

The Growth Management Act's concurrency provision attracted national attention when it was passed and has been the most-analyzed portion of the act. Concurrency has generally

been criticized as a well-intentioned but ineffective policy for controlling growth for a variety of reasons:[31]

- Concurrency places emphasis on expanding the transportation system to accommodate new development instead of tempering demand for travel through sustainable development.

- Peak-hour traffic has expanded faster than human population since 1970. Since the state and local governments have not raised sufficient revenue to provide enough road capacity to meet the demand, congestion has grown beyond desired levels.

- Adjacent municipalities do not coordinate their comprehensive plans and development decisions, and there is no vertical consistency between local, regional, and state plans. Therefore, even if one municipality's local roads and other infrastructure is sufficient to handle new development, impacts can spill over to adjacent areas.

- Originally, the policy effectively prohibited infill development, since public facilities in developed areas – and transportation facilities in particular – were already at or near capacity. The law was amended to allow for development in narrowly defined Transportation Concurrency Exception Areas, but these designated areas did not provide sufficient opportunities to absorb the demand for development. Demand has been met in low-cost areas on the urban fringe, leading to expansion of urbanized areas.

4.3 Regional Coordination

In late 2003, the Florida Transportation Commission (FTC) published a series of recommendations regarding regional coordination in transportation planning.[32] The FTC commissioned the University of South Florida's Center for Urban Transportation Research (CUTR) to investigate the structure and practices of Florida's MPOs. In addition to recommendations regarding MPO board membership, the FTC's final report recommended readjusting the boundaries of Florida's MPOs as part of an annual audit of MPO compliance with state and Federal regulations regarding regional planning. The FTC recommended combining existing single-county MPOs into one multi-county MPO where a metropolitan area as defined by the U.S. Census Bureau encompasses more than one county. In the future when previously separate urbanized areas are combined into a single urbanized area as a result of the decennial census, the FTC recommends merging the two MPOs into a single MPO covering the entire urbanized area.

[31] C.f. Downs (2003); Pelham (2001); and Steiner (2001).

[32] Florida Transportation Commission (2003).

5.0 Outcome Evaluation

This section describes studies to measure the outcomes of growth management and smart growth policies on transportation, land use, and other community and environmental indicators.

5.1 Evaluation Studies

Development Trends

The urbanized areas of Florida's eight largest metropolitan areas grew by 1,000 square miles or 26 percent between 1990 and 2000 and their population densities fell by three percent.[33]

Transportation Conditions

According to the Florida Department of Transportation (FDOT), vehicle miles of travel (VMT) on Florida roadways has increased at a much greater rate than population growth in the past decade. VMT on all public roads increased by 24 percent from 1990 to 2000 while the State's population increased 16 percent. Transit ridership has increased at the same rate as population over the past 10 years and the share of all Florida households with no car dropped from nine percent in 1990 to eight percent in 2000.[34]

Over the same period, the population of Florida's eight largest metropolitan areas increased by 26 percent, VMT on freeways in those areas increased by 65 percent, and freeway lane-miles increased by 35 percent. Annual person hours of delay in these areas increased 139 percent between 1990 and 2000.[35]

[33] U.S. Census Bureau, Census 2000 and 1990.

[34] Florida Department of Transportation (2003).

[35] Texas Transportation Institute (2003).

5.2 Monitoring Efforts

The Center for Urban Transportation Research (CUTR) at the University of South Florida currently is supporting FDOT in the development of the Florida Transportation Indicators database and web site. The database and web site contain current and reliable data about the transportation system and will eventually allow for an analysis of trends over time using consistent data sources. The measures contained in the database include:

- Vehicle miles of travel;
- Registered vehicles;
- Transit boardings;
- Amtrak boardings;
- Licensed drivers;
- Commercial airline passengers;
- Road mileage;
- Fuel sales;
- Tourism;
- Safety statistics;
- Population data;
- Cruise activity; and
- Freight activity.

Currently measures of land consumption or development patterns are not included on the site, but transportation measures such as vehicle miles traveled on state roadways can serve as indicators of the effectiveness of growth management policies. FDOT is planning to add statistics regarding the transportation system's impacts on land use in future editions of the Trends and Conditions report.

Appendix D

Case Study: Minneapolis-St. Paul, Minnesota

1.0 Overview

This case study discusses the history of comprehensive planning and growth management in Minnesota and in the Minneapolis-St. Paul region, as well as related evaluation efforts. The case study is organized into the following sections:

- **Section 2.0** discusses historical and recent planning initiatives led by the State, the MPO, and other groups;
- **Section 3.0** describes studies undertaken to *forecast* the outcomes of programs directed at smart growth objectives;
- **Section 4.0** describes *policy* studies to evaluate how effectively these programs have been implemented; and
- **Section 5.0** describes *outcome* studies that have attempted to measure the actual impacts of state planning programs, as well as planned monitoring efforts.

2.0 History of Comprehensive Planning

2.1 Planning Context

Geographical Context

The Minneapolis-St. Paul region is a seven-county region with a year 2000 population of just over 2.6 million. (The Census-defined Metropolitan Statistical Area includes 13 counties and nearly three million inhabitants, but the seven-county region is most commonly used for planning purposes.) Between 1990 and 2000, the population of the seven-county region grew by 15.4 percent, representing an annual growth rate of 1.2 percent. By the year 2020, regional forecasts project the population to grow by 500,000 more people, increasing to 3.1 million.

As of 1997, 55 percent of the land in this seven-county region was urbanized.[36] The topography is generally flat and there are no geographical barriers to the expansion of the region, although the St. Croix River to the east (forming the border between Minnesota and Wisconsin) limits transportation capacity in this direction. Nearly 1,000 lakes and three major rivers comprise about six percent of the region's land area, and the region maintains an extensive system of parks and trails. A recent report on regional growth notes that "Minnesota and the Twin Cities … have abundant amounts of relatively low-cost land and good quality water resources, which enable the development of attractive residential and commercial properties in 'green field' places."[37]

Median income for a four-person household has soared, rising by the year 2000 to $70,500. That is 13 percent above the national average and 64 percent higher than it was in 1990. The region ranked 17th in the nation on this measure in 1990; today it ranks fifth.[38]

[36] Metropolitan Council (2002).

[37] Ward (2003).

[38] Johnson (2003).

Political Context

The Metropolitan Council is a regional governmental body with responsibility for both providing regional public services and assisting development planning in the seven-county Twin Cities region. Its responsibilities include waste water management, transportation planning, transit service provision, aviation, parks and open space, water management, and the administration of housing assistance. The Council is the designated metropolitan planning organization (MPO) for the region. The seven-county region over which its authority extends contains all or part of 189 cities and townships.

Created by an act of the Minnesota State Legislature in 1967, the Council is considered by many to be the most innovative and successful experiment in regional government.[39] The Council is considered a "top-down" governing body. It is made up of 17 members appointed by the Governor of Minnesota, 16 of whom represent a geographic district, and one who serves as a chair at-large. This was done to ensure that the Council will not be the captive of local governments, yet it is an arrangement which is still debated today.

2.2 Policy Initiatives Undertaken

Authority for Comprehensive Planning

The Legislature has recognized the importance of local planning for nearly five decades, passing laws that enable communities to develop plans and exercise various growth management authorities. In 1925, the Minnesota Supreme Court sanctioned the use of comprehensive planning and zoning as legitimate tools for promoting the general welfare of the public. Some of the key laws that form the general foundation for comprehensive planning and growth management in Minnesota include:[40]

- **1939 Township Planning and Zoning** (Minnesota Statutes, sections 366.10–.18). This act authorized townships to plan and regulate land use to, among other things, prevent excessive concentration or wasteful scattering of population.

- **1943 Joint Exercise of Powers Act** (Minnesota Statutes, Section 471.59). This act authorizes governmental units to enter into voluntary agreements to cooperatively offer services or perform functions to all participating governments.

- **1959 County Planning Enabling Act** (Minnesota Statutes, sections 394.21–.37). This act authorized counties to adopt planning tools and land use controls. The law

[39] Nelson and Duncan (1995), page 30.

[40] Minnesota Planning (2002).

specifies that when adopted by ordinance, a comprehensive plan "must be the basis for official controls." Official controls include zoning and subdivision regulations and official maps.

- **1965 Municipal Planning Enabling Act** (Minnesota Statutes, sections 462.351–.365). This act authorized cities to adopt planning tools and land use controls. The law requires the municipal planning agency to take into account the plans of the county, neighboring cities and townships when planning. Official controls for townships cannot be inconsistent with or less restrictive than the county's controls.

- **1967 Creation of Metropolitan Council**. The Minnesota Legislature declared that it was creating the Metropolitan Council "to coordinate the planning and development of the metropolitan area…" (Minn. Session Laws 1967, Section 1).

- **1969 Regional Development Act** (Minnesota Statutes, sections 462.381–.397). This act authorized creation of regional development commissions in 12 areas of the State outside of the Twin Cities metropolitan area.

- **1976 Metropolitan Land Planning Act** (Minnesota Statutes, sections 473.851–.871). This act mandates the creation of coordinated plans, programs and controls by all local governments in the seven-county Twin Cities region for planned, orderly and staged development that is consistent with metropolitan system plans prepared by the Metropolitan Council.

- **1982 Municipal Planning Act revisions.** Township authority was expanded with revisions to this act (Minnesota Statutes, sections 462.351–.365).

- **1996 Sustainable Development Act** (Minnesota Statutes, Section 4A.07)**.** This act required Minnesota Planning, the state planning agency at the time, to develop and periodically update a sustainable development planning guide, as well as a model ordinance for use by local governments. The purpose of this guide and model ordinance is to help local governments undertake development that "meets the needs of the present without compromising the ability of future generations to meet their own needs."

- **1997 Community-Based Planning Act** (Laws of Minnesota 1997, Sections 4A.08–.09). This act established a planning process specific to communities, created an alternative dispute resolution process, and enabled communities to establish urban growth boundaries in addition to authorizing pilot projects and funds to undertake planning. In 1999, the State reported that 16 of 87 counties, along with numerous cities, townships, and other local government units, were participating in the voluntary program.[41] This act expired in July 2001 and was not renewed.

[41] American Planning Association (2002).

Metropolitan Initiatives

A number of these legislative actions, as well as other initiatives, have enabled or provided resources for planning specifically for the Twin Cities metropolitan area. The more significant initiatives for this region are discussed below.

Metropolitan Council

As noted above, the Minnesota Legislature declared in 1967 that it was creating the Metropolitan Council "to coordinate the planning and development of the metropolitan area…" The agency was created largely to deal with the provision of sewer service in growing suburban communities, although its value in coordinating other regional functions also was recognized. The Metropolitan Council prepares regional demographic forecasts as well as systems plans for wastewater, parks, transit, and airports consistent with these forecasts.

The powers of the agency were expanded under the Metropolitan Land Planning Act of 1976 (see below) and the Metropolitan Reorganization Act of 1994. The 1994 act merged the functions of three agencies (the Metropolitan Transit Commission, the Regional Transit Board and the Metropolitan Waste Control Commission) into one – the Metropolitan Council.

Twin Cities Fiscal Disparities Plan

The Twin Cities Fiscal Disparities Plan, enacted in 1971 by the Minnesota legislature, is the nation's largest tax-base sharing program. Its stated purpose is to increase the likelihood of orderly urban development by:

- Reducing interjurisdictional competition for business location and expansion;
- Creating incentives for localities to coordinate their behavior to work for the growth of the area as a whole;
- Increasing protection of the environment by reducing fiscal pressure to develop flood plains and open spaces; and
- Providing help to local governments with the greatest financial pressures.[42]

The plan pools 40 percent of growth in commercial and industrial property valuation since 1971, and redistributes funds based on population. These funds also support the services provided by the Metro Council. In 2000, this fund collected about 20 percent of all commercial/industrial property taxes collected in the region. 140 municipalities were recipients of the fund, and 47 contributed to the fund.

[42] Turnbull (2002).

Metropolitan Land Planning Act[43]

This 1976 act requires local governments in the Twin Cities region to prepare comprehensive plans consistent with the Metropolitan Council's metropolitan systems plans for wastewater, parks, transit, and airports. The Council reviews all plan amendments and must approve them.[44]

The Council prepares forecasts of regional growth based on such information as U.S. Census data, regional growth trends and demographics. With each community, the Council negotiates the share of growth for which that community will plan, taking into account Council policies, local land use patterns, developable land supply and the community's current comprehensive plan. The Council then revises its Development Framework to include regional policies and plans (for transportation, wastewater, airports and parks) to accommodate the forecasted growth, with the participation of local governments, area organizations and citizens. Each local government is given responsibility for meeting local needs within the regional framework. Once it revises its local plan, the community sends its plan to adjacent municipalities for them to consider the plan's impact and to the Council for its review.

The Land Planning Act requires the Council to consider a plan's compatibility with the plans of other communities and its consistency with adopted Council policy plans, as well as its conformity with metropolitan system plans. If the Council finds that a community's plan is more likely than not to have a substantial impact on or contain a substantial departure from metropolitan system plans, the Council can require the community to modify its local plan to assure conformance with the metropolitan system plans. Once a community adopts its comprehensive plan, state law does not allow it to adopt any zoning ordinance, fiscal device or other official control that conflicts with its comprehensive plan or which permits activity in conflict with metropolitan system plans.

The most recent round of comprehensive plan updates was due at the end of 1998, and the next round will be due at the end of 2008.

Metropolitan Urban Services Area

To help in implementing the metropolitan systems plans required under the Metropolitan Land Planning Act, the Metropolitan Council has adopted a staging mechanism known as the metropolitan urban service area (MUSA). The Council designates a MUSA sufficient to serve the amount of growth it predicts for the next 20-year planning period and obligates itself to extend metropolitan systems, most notably wastewater treatment, through the MUSA in five-year increments.[45]

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[43] This discussion is primarily based on Regional Strategies Working Group (2002).

[44] Nelson and Duncan (1995), page 31.

[45] Regional Strategies Working Group (2002).

The 2020 MUSA was established through the 1998 comprehensive plan review process. During the next comprehensive plan update process, the Council will work with local communities to ensure there is enough land to accommodate forecasted 2030 growth, developing plans that extend staging to continue to maintain a 20-year land supply over time. Currently, the metropolitan wastewater disposal system provides wastewater treatment services to 90 percent of the region's population and most of its commerce and industry.[46]

Livable Communities Act

The 1995 Livable Communities Act was intended to increase the supply of affordable housing, clean up Brownfields, and foster transit-supportive development demonstration projects in the Twin Cities metropolitan region. The Metropolitan Council administers the Livable Communities Act programs. The act provides grants to communities for the following purposes: 1) to clean up polluted land for redevelopment and new jobs; 2) to create development or redevelopment that demonstrates efficient and cost-effective use of land and infrastructure, a range of housing types and costs, commercial and community uses, walkable neighborhoods, and easy access to transit and open space; and 3) to create affordable housing opportunities.

Between 1996 and 2003, the program awarded $44.5 million to finance the cleanup of 996 acres supporting over 12,000 new or retained jobs. The program also provided 92 grants, totaling $42 million, to 36 communities and three multi-community coalitions for the development and implementation of plans to revitalize older neighborhoods or to create new mixed-use neighborhoods. According to the Metropolitan Council, funded projects have included 6,860 new and 400 rehabilitated housing units. If achieved, overall goals in place with 106 communities would add nearly 35,000 additional rental housing units by 2010.[47]

Regional Framework

The Council is required to prepare a Development Guide consisting of all of its policy statements, plans, and programs. The crucial element of the Development Guide that unifies all of the statements, plans, and programs is the "regional framework" (known prior to 2003 as the "regional blueprint"). The Council adopted a *Regional Blueprint* in December 1996[48] to establish policies and strategies to deal with the growth predicted in the region between 2000 and 2020. An updated *Blueprint* 2030, prepared in 2002, identified a number of goals strategically directed at the main causes of the region's sprawling settlement patterns. A change in administration, however, has led to *Blueprint* 2030 being superseded by a new document, *Framework* 2030, anticipated for approval in January 2004.[49] According

[46] Metropolitan Council (2003b).

[47] Metropolitan Council web site, www.metrocouncil.org, accessed December 2003.

[48] Metropolitan Council (1996).

[49] Metropolitan Council (2003b).

to the Metropolitan Council, the *Framework* 2030 is more concise and straightforward than *Blueprint* 2030, and includes a greater emphasis on working collaboratively with local governments.

The Metropolitan Council notes that previously, the regional growth strategy focused on *how much* development occurred in growing communities at the region's developing edge. The new framework pays more attention to *how* development occurs – such as the mix of land uses, the number of housing units per acre, and the potential for transit and local street connections. The framework emphasizes the need for intensified development in centers along transportation corridors and in rural centers that want to grow and that lie along major highways. The framework provides growing cities with flexibility to decide where development occurs within broader areas that are planned and staged for development, consistent with regional perspectives. The framework emphasizes reinvestment in older areas throughout the region, and encourages market-based housing production, including a mix of single-family and multifamily homes consistent with demographic and socioeconomic characteristics.

Framework 2030 identifies an urban area and a rural area, each of which occupies approximately half of the region. The urban area is divided into two specific geographic planning areas: the Developing Communities and the Developed Communities. The rural area is divided into four specific geographic planning areas: Rural Centers/Rural Growth Centers, the Diversified Rural Communities, the Rural Residential Areas and the Agricultural Areas. The Council has established benchmarks indicating the overall densities that planned development patterns in each of the geographic planning areas can be expected to achieve. As previously noted, the Council negotiates a share of the regional forecasts with each community, and the community-accepted forecasts become the basis for regional systems plans.

Framework 2030 anticipates that 30 percent of the 475,000 new housing units required between 2000 and 2030 will be reinvestment, including redevelopment, adaptive reuse, and infill. A 50/50 split is assumed between single-family and townhouse/multifamily units, consistent with assessment of market needs. The plan anticipates that the current MUSA is adequate to serve needs through 2020, but must be expanded by five percent to meet needs through 2030.

Smart Growth Twin Cities

The Smart Growth Twin Cities (SGTC) project, funded by the McKnight Foundation, was designed to demonstrate how communities can develop walkable, mixed-use neighborhoods that preserve open space and community appeal, while minimizing costs by taking advantage of existing investments in transportation and sewers. This project began in July 2000 and ran through the end of 2002. It included the selection of six "opportunity sites" throughout the region receiving site planning consulting services from a team led by Calthorpe Associates; a subregional planning initiative for communities along the Mississippi River; and the preparation of three development options for regional growth

through 2020, developed through a participatory, workshop-based process.[50] The implications of each option were assessed and intended for use as input to the development of *Blueprint 2030* by the Council. The extent to which these findings subsequently influenced the development of *Framework 2030* is not known, although *Framework 2030* does not go as far as the SGTC effort in proposing a major shift towards more walkable, transit-oriented development patterns in the region.

Affordable Housing Enhancement Demonstration

Under the Affordable Housing Enhancement Demonstration (AHED) program, the Metropolitan Council is making available $3 million in Federal–aid highway funds for transportation enhancements for development or redevelopment of mixed-income, compact, walkable, and transit-friendly communities with affordable housing. These transportation activities may include items such as sidewalks, bike paths, street construction, transit or hub development costs, street improvements, park-and-ride lots, street lighting, access management on roadways, and transit service such as a circulator connecting a transit station to the area to be developed or redeveloped to include an affordable housing component. Candidate projects were first solicited in November 2002.[51]

Transit Station Area Planning

Led by the City of Minneapolis, station area planning has been undertaken for the Hiawatha light-rail line, scheduled to begin operations in 2004. Planning has focused on the creation of mixed-use, transit-supportive neighborhoods while preserving the livability of existing neighborhoods. Planning activities have included the development of master plans, zoning changes, and other implementation tools to help spur development consistent with these plans.[52]

Other Recent Activities

Stronger growth management programs, such as requirements or additional funding incentives, have been introduced but not approved at the state level. For example, in 2001, a proposal was introduced that would have required local zoning and land use controls to conform with land use plans. A 2002 proposal would have required metropolitan area local governments to establish urban growth boundaries.[53]

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[50] Smart Growth Twin Cities *et al.* (2002).

[51] Metropolitan Council web site, www.metrocouncil.org. Accessed November 2003.

[52] Metropolitan Council web site, www.metrocouncil.org. Accessed November 2003.

[53] American Planning Association (2002).

In part spurred by state funding incentives, cities such as Brooklyn Park, Burnsville, Maple Grove, Plymouth, Ramsey and St. Louis Park are working to create town centers with a mix of housing, commercial and civic uses to provide a gathering place and focal point for their community. Older suburbs such as Chaska, Hopkins, New Brighton, Robbinsdale and White Bear Lake have brought new life to their more traditional downtowns through similar development efforts. Also, coalitions of communities along the Interstate 494 and 35W corridors have been actively exploring the connections between transportation and land use as part of their efforts to deal with traffic concerns.[54]

2.3 Transportation Linkages

Growth Policies

The more long-standing regional growth management policies in the Twin Cities region are primarily focused on the provision of wastewater treatment services and achievement of tax-base equity, rather than on transportation-specific policies. Local and regional transportation plan consistency may be considered through the requirement for local comprehensive plans and the Metropolitan Council's review of these plans, but explicit transportation-related objectives for this process (aside from consistency) have not been articulated.

In recent years (since the mid-1990s), smart growth transportation-related policies have begun to be pursued through state fiscal incentives, especially the Livable Communities Act and the Affordable Housing Enhancement Demonstration. The Livable Communities Act, while not a transportation-specific program, has funded the development and implementation of small-area master plans that incorporate transit- and pedestrian-friendly design and interconnected local street systems. The AHED program is funding transportation projects that support the development or redevelopment of mixed-income, compact, walkable, and transit-friendly communities with affordable housing.

Transportation Project Funding Criteria

The Ventura administration (1998–2002) established smart growth criteria for evaluating capital budget requests. Representatives from 11 state agencies, including Transportation and Planning as well as the Metropolitan Council, participated in developing these criteria. The performance of a proposal was rated on four criteria: stewardship, efficiency, choice, and accountability. Each criterion was rated as being a net contribution to smart growth, a net negative effect, or a neutral effect. The Administration's Executive Budget Team, which included representatives from the Governor's Office, Minnesota Planning

[54] Regional Strategies Working Group (2002).

and the departments of Finance and Administration, used these criteria as one screen in determining the Governor's bonding priorities.[55] Smart growth criteria are not being explicitly applied under the new Pawlenty administration, which took office in 2003.

The current Metropolitan Council criteria for project selection, which are based on the 1996 *Regional Blueprint*, include land use-related criteria. Of a total of 1,200 points, 300 points are provided for Blueprint implementation, including 100 points for "land use and transportation integration," 100 points for "integration of modes," and 100 points for supporting "affordable housing." The "land use and transportation integration" criterion requires project sponsors to describe how projects support existing comprehensive plans; development or redevelopment of mixed use, compact nodes along transportation corridors; intensification of development; access to jobs, including for low-income workers; development nodes/job concentrations; and Brownfields redevelopment. The "integration of modes" criterion requires project sponsors to describe pedestrian, bicycle, and transit amenities. These criteria, along with the transportation policy plan, will be updated in 2004 to reflect the new *Regional Framework*. While the term smart growth is not being used by the new administration, the new plan and criteria are likely to continue to incorporate land use objectives.[56]

While it is difficult to evaluate the effects of land use and smart growth criteria on transportation funding priorities, some shifts in priorities for regional transportation funding were exhibited in the 1990s and into the current decade. Most notably these include major high-occupancy vehicle (HOV) and transit investments, including the construction of the Hiawatha Light Rail Line (to be completed in 2004) and HOV lanes on I-394 (early 1990s) and I-35W south (pending). Investments also have been made towards developing a regional network of bicycle/pedestrian trails, and expansion of the rail transit network is planned. At the same time, freeway expansion also is expected to continue; *Framework 2030* sets an objective of adding 300 additional lane miles of freeway by 2030, a growth of 20 percent over the 2000 baseline level.

[55]Minnesota Department of Administration, http://www.eqb.state.mn.us/SDI/smart.html

[56]Personal correspondence with Carl Ohrn, Metropolitan Council, January 12, 2004.

3.0 Forecast Outcomes

3.1 Transportation and Regional Growth

The Transportation and Regional Growth research project was undertaken beginning in approximately 1998 and concluding in 2003, as a collaboration among the University of Minnesota, Center for Urban and Regional Affairs, Minnesota Department of Transportation, Metropolitan Council, and the Minnesota Local Road Research Board. The project was a research and educational effort designed to aid the Twin Cities region in understanding the linkages between land use, community development and transportation in the Twin Cities metropolitan area.

One of the project's efforts examined the transportation impacts of urban design and transportation investment strategies for a coalition of seven communities along I-35 north of St. Paul, ranging from inner-ring suburbs (Roseville) to outer-ring suburbs (Blaine).[57] Known as the I-35 North Metro Corridor Coalition, these communities already had collaborated to examine the implementation of smart growth transportation and land use policies. This study enhanced the regional transportation model to enable better evaluation of transit-supportive urban design and to address the relationship between land use density and trip type, vehicle trip-reduction and transit usage, shorter-distance trip-making, pedestrian activity, and proximity to transit. The enhanced model was run to compare a conventional suburban growth scenario with a transit-supportive growth scenario in the corridor. The model was used to test the following policies:

- Clustering of population and employment in areas determined "more appropriate" for transit-supportive development, based on a review of each city's comprehensive plan and on preliminary planning information from the Coalition. A total of 19 transit-supportive sites were included, representing 1,000 acres of mixed-use development (compared to 7,900 acres of total new development);

- Transit-supportive internal site design (e.g., connected streets, smaller block sizes, and pedestrian facilities), with site design characteristics based on transit-supportive development proposals for four sites within the subregion; and

- Transportation improvements, including a new road network, new minor arterial linkages, increases in transit service, and new transit service.

[57] Swenson and Dock (2003).

Results of the study suggest the following:

- Modifications to the model to create greater detail and include land use characteristics were successful in identifying trip-making differences among alternatives;
- Viable suburban locations for transit-supportive development exist that are consistent with local comprehensive plans and regional transportation policies;
- If developed with transit-supportive patterns, these areas would serve to capture some subregional trips and also convert some trips from auto to walking, leading to a rate of VMT growth lower than the rate of population growth;[58]
- The primary increase in transit ridership would be for commute trips to the regional CBD employment centers; and
- Transit-supportive development shows its greatest potential when it is planned and implemented on a regional level, with interjurisdictional cooperation.

3.2 Analysis of Regional Growth Scenarios

A study was completed in 1999 to analyze growth scenarios for the Twin Cities region. This study was funded by the Minnesota legislature and undertaken by the Center for Energy and Environment, Minnesotans for an Energy-Efficient Economy, and 1000 Friends of Minnesota. The study included modeling of transportation, infrastructure, and social impacts, a public survey, and focus groups and public forums to discuss the study's findings.

The year 2020 growth scenarios included a "Sprawling Scenario" based on trends in the region's housing market over the last 10 years and zoning ordinances, and a Smart Growth Scenario based on densities and policies to accommodate growth while protecting natural features, prime agricultural areas, and greenway connections. Most growth in this second scenario was placed in areas with existing infrastructure, and includes mixed-use development. The Smart Growth Scenario housing mix, consisting of 50 percent single-family detached (compared to 70 percent in the Sprawling Scenario), was consistent with demographic projections for housing needs.

New development under the Smart Growth Scenario is built at 5.5 units per acre, requiring approximately 47,900 new acres, compared to 2.1 units per acre under the Sprawling Scenario, requiring approximately 135,500 new acres. Transportation impacts in 2020 were forecasted using the Metro Council's TRANPLAN model (without any

[58] It was not possible to measure total VMT changes because of the subregional nature of the model and the fact that study area population and employment were not held constant.

enhancements to account for urban design or non-motorized trip-making). Under the Smart Growth Scenario, future VMT increases from 51.3 million daily in 1995 to 72.2 million daily in 2020. Under the Sprawling Scenario, there is a further increase to 73.8 million daily VMT in 2020. An analysis of local infrastructure requirements showed that the Sprawling Scenario would require 3,396 miles of new local roads, compared to 1,201 miles under the Smart Growth Scenario. Total local infrastructure costs for new housing would be $5.3 billion compared to $2.3 billion. Regional road needs were estimated in proportion to the amount of additional congestion forecast under each scenario. Over a 25-year period, the Sprawling Scenario was estimated to require an additional $871 million for the construction and maintenance of collector and regional roads, compared to the $3.5 billion budgeted by Mn/DOT.

3.3 Smart Growth Twin Cities

The Smart Growth Twin Cities regional visioning effort, undertaken in 2000 through 2002, included a more detailed modeling effort to forecast regional transportation, land use, and environmental indicators for the year 2030 under three different growth scenarios.[59] The scenarios were evaluated with respect to various performance measures, including:

- Land consumption;
- Percent of households and jobs in reinvestment areas;
- Housing mix;
- Households and employees within one-quarter mile and one-half mile of transit;
- Transit ridership;
- Free-flow and congested vehicle-hours of travel;
- Person-hours of travel;
- Emissions; and
- Public infrastructure costs.

Transportation modeling was performed using the regional model, but vehicle trip rates and VMT per capita were adjusted using elasticities to account for urban design factors, including the density, diversity, and mix of uses in an area as well as regional accessibility. These elasticities were based on a combination of analysis of local travel survey and land use data and evidence from national studies. Selected transportation, land use, and infrastructure cost indicators are shown in Table 3.1.

[59]Smart Growth Twin Cities *et al.* (2002).

Table 3.1 Modeling Results for 2030 from Smart Growth Twin Cities Study[a]

Indicator	Option A	Option B	Option C	B versus A	C versus A
Transportation					
VMT (daily, millions)	17.5	15.3	14.5	-13%	-17%
Vehicle-hours congested (daily)	755,117	710,269	682,510	-6%	-10%
Transit trips	40,283	114,674	154,345	185%	283%
Land Use					
Acres of new development	182,922	96,972	87,173	-47%	-52%
Net density of new residential development (units/acre)	4.4	6.8	8.4	56%	92%
Single-family detached, percent of all new units[b]	66%	55%	50%	-17%	-24%
Infrastructure Cost					
Total infra cost ($billions)	20.9	18.4	17.9	-12%	-14%

[a] "Option A" is a mosaic of the 193 local comprehensive plans in the seven-county region and consists of mostly auto-oriented new development (75 percent). Option B is derived directly from the ideas expressed in the SGTC public workshops and balances more compact, auto-oriented development (43 percent) with a greater amount of walkable, mixed-use development (57 percent). Option C is also based on public input from the workshops, with a greater proportion of walkable development (75 percent) and reinvestment than Option B.

[b] Estimated from chart; actual numbers not provided in the report.

4.0 Policy Evaluation

The following section describes studies that have been undertaken to assess the extent to which growth management policies have been effectively implemented by state, regional, and local agencies in Minnesota. The section also summarizes findings on two specific, long-standing regional policies: tax-base revenue sharing and the Metropolitan Urban Services Boundary.

4.1 Statewide Planning Initiatives

A report by 1000 Friends of Minnesota[60] draws the following conclusions:

- Land use planning in Minnesota is fragmented. Statutes provide local governments the authority to plan. Many of the State's current zoning and subdivision regulations do not facilitate smart growth; and
- The State's property tax system provides incentives for larger lot, higher priced residential homes. Tax increment financing and tax-base sharing have been implemented, but have been insufficient to slow the effects of sprawl.

4.2 Regional Planning Initiatives

The Metropolitan Council has been widely regarded for its strong regional role in planning for water management, parks, airports, and other infrastructure. However, its involvement in land use planning issues – aside from these regional infrastructure concerns – appears to be limited. 1000 Friends of Minnesota notes that the Metropolitan Council does not have sufficient authority to ensure that local plans facilitate regional growth management goals.

The Regional Strategies Working Group, a coalition of housing, transit, environmental, and growth management organizations, issued a report in 2002 describing how the Metropolitan Council could strengthen its Regional Blueprint.[61] This report includes a critique of the effectiveness at which the Metropolitan Council has carried out its regional planning authorities. The working group states that:

[60] 1000 Friends of Minnesota (1999).

[61] Regional Strategies Working Group (2002).

"The Metropolitan Council is nationally identified as a model for regional growth management. However, its record does not match its reputation. Of the nation's top 25 largest metropolitan areas, the Twin Cities has been the most sprawling in the past 20 years with the exception of only Atlanta. The reason for the disconnect between the Council's potential and its record is that the Council has a history of pulling its punches in applying its special set of regional authorities and has been more interested in serving growth than in seeking to direct it in ways that would be regionally beneficial."

The working group further argues that "The Council construes the difference between its right to review and its right to require modifications to mean that it may comment on a comprehensive plan's conformity with the Council's policies and plans but may only require modifications if it has a substantial impact on a metropolitan system." For example, the Council has allowed development plans in rural areas with substantially greater ("near urban") densities than its policy of no more than one unit per 10 acres.

With respect to transportation, "the Council's planning for transportation has been directed at eliminating congestion and improving traffic."

Critiquing the proposed *Blueprint 2030*, the group notes that the Blueprint's goals are unlikely to play out in practice due to a lack of effective implementation strategies, with the primary implementation tool being the Council's authority over regional infrastructure investments. Evaluating its relationship to the Smart Growth Twin Cities project, the group notes that "Although it reflects some elements of the workshop models, the new Blueprint does not set out a clearly articulated vision for the region based on Calthorpe's work, show examples of the more compact forms of development that could be supported by Calthorpe's models, or explain the benefits that would flow to the region if the more compact forms of development were implemented."[62]

4.3 Regional Growth Trends

The Transportation and Regional Growth Study included a summary of the findings from the various components of the study.[63] Some of the findings related to regional growth include:

- Census statistics demonstrate that growth in the outer suburbs is faster than growth in either the inner suburbs or the central cities of the Twin Cities. The "agglomeration benefits" that used to be attractive to employers and workers in the center cities are no longer dominant. Instead, the rapid growth in specialized and service jobs, along with the increase in self-employed persons, has meant that people can choose to work closer to home.

[62] Regional Strategies Working Group (2002).

[63] Ward (2003).

- The decentralization of jobs and population into relatively affluent communities, along with enabling legislation, has enhanced local control over land use and transportation options. There is not yet a sufficient constituency in the region that sees the need to override local control in favor of a centralized regional authority to decide on land use.

4.4 Tax-Base Sharing

The impacts of tax-base sharing have been studied by multiple authors.[64] For the most part, high tax-base areas appear to be contributing to low tax-base areas, thus reducing fiscal disparities. There are, however, some exceptions. Wealthy residential suburbs with little or no commercial or industrial development benefit from the system. Low tax-base areas with high costs of providing services contribute to the fund because the system only takes into account growth, not the overall service demands of poor communities.[65] The overall effect of tax-base sharing has been to reduce – but not eliminate – fiscal disparities,[66] although this reduction may be marginal.[67] When the program began, the core cities of Minneapolis and St. Paul were major beneficiaries. By the late 1980s, Minneapolis was a net contributor due to the successful redevelopment of its downtown, and St. Paul had reduced its reliance on the regional pool.[68] The extent to which the tax-sharing program has resulted in better land use planning is not clear; jurisdictions still have an incentive to compete for commercial development since they get to keep 60 percent of new tax revenues.

Criticisms of the property tax structure may suggest to some extent the negation of benefits associated with regional tax-base sharing. 1000 Friends of Minnesota asserts that the State's reliance on property taxes, compared to income and sales taxes, is high compared to most states. The tax is blamed for encouraging larger-lot, single-family homes, and for falling hardest on renters and low-income property owners, who tend to reside in inner-city areas.[69] The Metropolitan Council, though, suggest that recently enacted tax changes may be helping to address this problem. The Council notes that since the year 2000, the market has produced both rental and ownership units in response to heavy consumer demand, boosted by changes in state tax policy. The new-housing market, which has historically favored single-family housing, is responding with a shift toward attached homes, such as townhouses and condominiums.[70]

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[64] *C.f.* York (1989), Orfield (1997), Nearly and James (2000), Turnbull (2002), Park (2003).

[65] Park (2003).

[66] York (1989), as cited in Nelson and Duncan (1995), page 34.

[67] Orfield (1997), page 87.

[68] York, *op cit*.

[69] Nearly and James (2000).

[70] Metropolitan Council (2003b).

4.5 Metropolitan Urban Services Boundary

No evidence was found in this review that the Metropolitan Council has used its planning authorities in ways that would significantly affect the *density* or *design* of development within the Twin Cities region, compared to patterns that would be achieved based on local zoning and market forces. Studies have found that the Metropolitan Council's MUSA was generally effective in maintaining *contiguous* growth during the 1970s and 1980s, with the MUSA slowly but steadily expanding over this time period.[71] Recent evidence, however, suggests that the MUSA may now be leading to increasing "leapfrog" development outside the Council's seven-county service area. Still relatively inexpensive fuel prices, combined with rising prices for land inside the MUSA, have stimulated a market for urban development beyond the seven-county jurisdiction of the Council. Building permits in so-called collar counties have accounted for a rising share of the new building permits. By 2001, permits for new housing in six of these counties (including two in Wisconsin) were 25 percent of the total for a broader 19-county area.[72]

[71] Johnson (2003).

[72] Johnson (2003), based on unspecified citations of "Builders Association of the Twin Cities (1996)" and "Lukermann and Adams."

5.0 Outcome Evaluation

This section describes studies to measure the outcomes of growth management and smart growth policies on transportation, land use, and other community and environmental indicators.

5.1 Development Trends

Regional Data Sources

Since the 1970s, the Metropolitan Council, the regional planning agency and MPO for the Minneapolis-St. Paul region, has established a Metropolitan Urban Services Area (MUSA) to guide the location in which suburban development occurs consistent with provision of wastewater treatment infrastructure. As part of its responsibilities, the agency monitors development trends and forecasts future growth and urbanized land and infrastructure needs. Since the mid-1990s, the agency also has worked with communities to create regional development objectives and provide technical assistance in support of these objectives.

The Council uses two primary datasets for its analysis of land use and growth patterns. The first is county parcel data, which is compiled from information collected by the region's county tax assessors. The land use data contained within the parcels is updated quarterly. Tax assessor data also are used to generate building values and square footage values, which help to determine which areas are undergoing change. The second source of information is ortho-imagery, with flights conducted every three to five years. The photographs cover an area of approximately 3,000 square miles, and cost between $50,000 and $80,000 to collect. The subsequent conversion and quality control requires a full-time staff of between four and five people working for six months. The focus has always been on determining the use of the land as seen rather than relying on the assessor's boundaries.

Building permits are collected annually with forms sent out to 186 jurisdictions for completion. These forms are returned to the Metropolitan Council, although the information is aggregated to the county level and can not therefore be geocoded. One shortfall is that for residential surveys, information is only collected on the number of permits that are issued for single family units and multifamily units, and the information is collected at the county level only. While this is useful for calculating building density and illustrating the impact of growth, staff members would like to be able to identify how many units are in a condominium or an apartment block so that more accurate calculations can be performed. Local communities have been reluctant to provide the Council with more detailed

information from the permits. Building permits are also collected for nonresidential buildings. The analysis of these permits allows the staff to predict areas where job growth will occur, and also reveals connections between different types of development, economic conditions, and public infrastructure needs.

Forecasting of the future job market is performed through the use of employment counts are based on covered employment and wages records from the Minnesota Department of Employment and Economic Development. This data is updated on a quarterly basis, although it provides information only down to the city level. Additional information is obtained through census information, such as poverty levels and population density.

The Council is responsible for the production of a comprehensive plan every ten years, which highlights how much growth is expected to occur, and in which areas infill should be encouraged. Recently, this has been supplemented with a land study that focused on five of the area's communities that are expected to accommodate a significant amount of household growth in the near future. Within each community, the number of residential units that were planned for construction was compared with the amount of land available within the MUSA, the constraints on that land, and the amount of land to be added to the MUSA over the following decade. The results not only provided some sense of adequacy of the remaining land supply to cope with future growth, but also served to ensure that infrastructure requirements would be met.

The Metropolitan Council will soon engage with Gerrit Knaap, Director of Research at the National Center for Smart Growth at the University of Maryland, in a land market monitoring program that will focus on the in-fill and re-use of land. This effort will require the re-focusing of resources internally, and will involve four staff working on the project part-time over a period of two years.

Evaluation Results

Data and evaluation studies show fairly clearly that over the 1970s, 1980s, and 1990s new development in the Twin Cities region has consisted predominately of low-density, single-family housing. Observers have attributed this to a combination of market demand, availability of low-cost land, and restrictive local zoning regulations. "Local governments hold most of the cards in determining development patterns. Their zoning ordinances and rules for developing communities favor a low-density and largely homogeneous pattern…the low-density, single-family subdivision… became the norm."[73]

The Regional Strategies Working Group notes that between 1982 and 1997, the population of the Twin Cities grew by 25.1 percent but the amount of land subject to urbanization grew by 61.1 percent. This rate of land use change is substantially higher than most of the

[73] Johnson (2003), based on unspecified citation of Adams.

Twin Cities' peer regions.[74] Analysis of housing data by the Metropolitan Council in the early 1990s showed that the average residential density in developing suburbs was decreasing. Average net residential densities on urbanized land in 1990 were 2.1 dwelling units per residential acre in the developing suburbs, 2.8 in suburbs approaching capacity, 4.1 in established suburbs, and 7.9 in the core cities (Minneapolis and St. Paul). This was due to larger lot sizes for single-family homes, as well as a decline in attached single-family and multifamily units.[75]

Primary analysis of Metropolitan Council data also shows that developed acreage per capita has continued to increase over time (Table 5.1).

Table 5.1 Trends in Developed Land (Acres per Capita)[a]

Year	Residential Acreage/ Capita	Total Developed Land/ Capita
1970	0.110	0.209
1980	0.125	0.237
1990	0.132	0.240
2000	0.140	0.257

[a] Author's calculations based on population and developed land data from the Metropolitan Council (www.metrocouncil.org, accessed November 2003). Includes land both inside and outside the Metropolitan Urban Services Boundary.

It appears, though, that the predominance of the low-density, single-family pattern may be lessening. The Metropolitan Council notes that "the new-housing market, which has historically favored single-family housing, is responding with a shift toward attached homes, such as townhouses and condominiums. The trend will strengthen in future years as baby-boomers grow older… Many cities are planning for mixed-use areas in their comprehensive plans and making changes to local ordinances and official controls to encourage those types of land uses."[76]

The *Development Framework 2030* includes residential density assumptions that are based on emerging local growth trends as identified by Council staff working with cities. These assumptions are shown in Table 5.2. An overall new residential density of four units per acre is assumed. An increase over past assumptions (the 2001 urban land study assumed three units per acre), this increase appears to be due to a shift in the assumed mix of

[74] Regional Strategies Working Group (2002).

[75] Center for Energy and the Environment *et al* (1999).

[76] Metropolitan Council (2003b).

single-family detached versus attached and multifamily housing to approximately 50 percent of each type, rather than a significant shift in the assumed densities of any particular housing type.

Table 5.2 Current and Forecast Densities of New Housing in Twin Cities Region

Area Type	Housing Type	2000 Density	Framework 2030 Density
Central Cities	Single-family	4.8	5.0
	Townhouse/multifamily	19.8	20.0
Fully Developed Suburbs	Single-family	2.5	3.0
	Townhouse/multifamily	11.2	11.0
Developing Suburbs	Single-family	2.1	2.6
	Townhouse/multifamily	7.0	7.5
Rural Growth Centers	Single-family	2.4	3.0
	Townhouse/multifamily	8.8	9.0

The Builders Association of the Twin Cities and the Metropolitan Council, in a study of urban land supply, note that "Some neighboring communities have chosen to constrain the natural growth that the market would support, or to develop at urban densities. Some, however, have chosen to take more growth. Although there may be some subregional constraints that will limit housing opportunities, as a region there appears to be sufficient land to accommodate growth through 2020."[77]

5.2 Transportation Conditions

A report produced as part of the Transportation and Regional Growth study examined the effects of land development patterns on travel choices by residents of the Twin Cities area over the 1958 to 1990 period, focusing primarily on time spent traveling.[78] The authors concluded that daily time per traveler changed only very slightly over this time, despite very significant changes in land use. The authors also concluded that that land use *per se* did not play a significant role in travel choices when other factors were controlled for. Dense central areas generated much less mileage per person, but this was almost entirely

[77] Builders Association of the Twin Cities and Metropolitan Council (2001).

[78] Barnes and Davis (1999).

because of lower speeds, not because central city residents spent much less time driving. Overall, there was less than a 20 percent difference in average time spent driving per day between central city and outer suburbs, and this difference arose entirely from commute times. Non-work travel time showed no systematic variation by location. The one area in which land use played a significant role was that large dense job locations attracted very high shares for non-auto modes.

More recent evidence, though, suggests that transportation conditions may be worsening. The Texas Transportation Institute's *2001 Urban Mobility Report* found that the portion of peak-period travel occurring under congested conditions increased more than fivefold between 1982 and 2000 – an increase that tied with Atlanta's for the second fastest rate of congestion growth in the nation.[79] Commutes of longer than 40 minutes have increased by 32 percent since 1990. According to Mn/DOT, 65 percent of freeway travel in the region now occurs under congested conditions. VMT are projected to increase by at least one-third over the next 20 years, which will double the current extent of traffic delays.[80]

In the early 1990s, the Metropolitan Council published a compendium of 1970 to 1990 travel statistics. This study found that while the population of the seven-county area increased by 20 percent over this period, daily VMT increased by 130 percent. The average vehicle trip distance rose from 5.09 to 6.55 miles.[81] An updated travel behavior inventory has been published based on the 2000 household travel survey. This inventory includes information on household trip rates, trip purposes, modes, vehicle occupancy, travel time, and trip length.[82] This report, however, does not include time-series data from previous surveys, and does not discuss whether the survey methods are consistent enough to allow such a comparison.

5.3 Planned Monitoring Efforts

Regional Performance Monitoring

The Metropolitan Council currently is not monitoring regional performance indicators for its growth plans and strategies. It is, however, in the process of adopting a set of performance measures and associated targets as part of *Framework* 2030.[83] These measures, which are slated for adoption in January 2004, include:

[79] Cited in Metropolitan Council (2003b).

[80] Cited in Johnson (2003).

[81] Metropolitan Council (1999), as cited in Center for Energy and the Environment *et al* (1999).

[82] Metropolitan Council (2003a).

[83] Metropolitan Council (2003b).

- Housing unit production by location (Developing Communities, Developed Communities, Rural Growth Centers, and other rural areas);
- Housing choice (mix of single-family, townhouse, multifamily, and number of affordable units produced per year);
- Amount of land to be added to the MUSA by 2030, based on 2008 comprehensive plan updates;
- Lane miles added per year;
- VMT per capita per day;
- Hours spent in congestion;
- Amount of transit service provided, and transit ridership; and
- Various environmental indicators covering air quality, water quality, etc.

The Metropolitan Council is not planning to reconstruct these measures historically, although data would be available to do so for some of the measures. For example, the Council has collected annual building permit data from communities for many years to support its demographic forecasts. The Council also has conducted aerial surveys of the region since the 1970s, and has recently used these surveys to create digitized maps of land use.

Statewide Transportation Performance Monitoring

Mn/DOT, as part of its statewide planning activities, is in the process of establishing performance measures for the transportation system. These include measures specifically for the Twin Cities region. Proposed measures include:

- Ratio of peak to off-peak travel time (travel rate index, as reported by the Texas Transportation Institute);
- Travel time reliability – percent of peak travel taking no longer than an accepted time (data to be developed starting in 2004); and
- Duration and extent of congestion – percent of freeway miles that are congested or severely congested (baseline measurements are available for 1993–2000).[84]

[84] Minnesota Department of Transportation (2002).

Appendix E

Case Study: Montgomery County, Maryland

1.0 Overview

This case study discusses the history of comprehensive planning and growth management in Montgomery County, Maryland, and related evaluation efforts. The case study is organized into the following sections:

- **Section 2.0** discusses historical and recent planning initiatives led by the county;
- **Section 3.0** describes studies undertaken to *forecast* the outcomes of programs directed at smart growth objectives;
- **Section 4.0** describes *policy* studies to evaluate how effectively these programs have been implemented; and
- **Section 5.0** describes *outcome* studies that have attempted to measure the actual impacts of state planning programs.

2.0 History of Comprehensive Planning

2.1 Planning Context

Geographical Context

Montgomery County is the largest jurisdiction in Maryland, with a population of over 870,000 as of the 2000 Census. Montgomery is one of 33 jurisdictions (including 24 counties in Maryland, Virginia, and West Virginia) that make up the Washington-Baltimore Consolidated Metropolitan Statistical Area. The 2000 population of the Washington-Baltimore CMSA was 7.6 million, making it the fourth-largest metropolitan area in the United States.

Between 1990 and 2000, the population of the entire Washington-Baltimore CMSA grew 18 percent. A greater share of population growth in the Washington, D.C. region in both absolute and percentage terms has occurred on the Virginia side of the Potomac River. America's third-fastest-growing county, Loudon County, Virginia, grew by 97 percent between 1990 and 2000 with the addition of 83,000 people. In comparison, Montgomery County's population grew 15 percent over the same period as the much larger population base increased by 116,000.

During the 1980s and 1990s Montgomery County transformed itself from a bedroom community for Washington, D.C. (which forms the southern border with the county) into a major employment hub. Montgomery County has enjoyed stronger employment growth than even Baltimore City, Maryland's largest city, and in 2001 the county's 450,000 jobs outnumbered Baltimore's 380,000.[85] Montgomery County's current transportation system and development patterns reflect an early and consistent policy decision to direct growth to southeastern Montgomery County, which is served by the county's only east-west freeway (a portion of the Washington Beltway), two rapid transit corridors (opposite ends of the U-shaped Washington Metro Red Line), and a commuter rail line. A radial, north-south freeway corridor formed by Clara Barton Parkway and Interstate 270 links central Washington D.C. to Montgomery County's employment centers and residential areas.

[85] Maryland Department of Business and Economic Development, http://www.choosemaryland.org/

Political Context

Montgomery County is a national leader in the development and implementation of growth management policies. The Montgomery County Department of Park and Planning operates within the Maryland-National Capital Park and Planning Commission, an organization established in 1927 to plan public parks and coordinate land use planning in the two Maryland counties bordering Washington, D.C.: Montgomery and Prince Georges.

The Montgomery County Department of Park and Planning prepares Master Plans for each area of the county and reviews proposed developments for conformance with county planning and zoning regulations. The Montgomery County Planning Board is responsible for setting policies and making final development approvals.

As a home rule county, Montgomery has flexibility to enact its own zoning regulations and land use policies. The Maryland Department of Planning is responsible for ensuring that local comprehensive plans, zoning regulations, and land use policies are consistent with statewide priorities.

2.2 Policy Initiatives Undertaken

Montgomery County

The Maryland National Capital Park and Planning Commission's Wedges and Corridors initiative was adopted in 1964 in response to the Federal government's plan to concentrate Federal employment in central Washington D.C. and develop a radial freeway system to provide access to the city's core from fast-growing suburban residential areas. The commission's planners expected population outflows from Washington, D.C. to accelerate due to planned transportation improvements linking Montgomery and Prince Georges Counties and the new Washington Beltway to central D.C. The Wedges and Corridors initiative was the commission's earliest attempt to control the location of development and it continues to serve as the foundation of Montgomery's growth management policy today.

Montgomery County's General Plan[86] calls for development to be concentrated along the Washington Beltway and radial transportation corridors, separated by areas of preserved open space. The Plan designates five "wedges" of development:

[86] Montgomery County Planning Board (1969). The plan was revisited in 1993, when the goals and objectives of the plan were revised and the plan's impacts were evaluated in a report entitled *Then and Now*. Documentation relating to the General Plan can be found on the web at: http://www.mc-mncppc.org/publicationdb/publicationresult.cfm

1. The high-density **Urban Ring**, including all land inside the Washington Beltway adjacent to the District of Columbia plus an arc of land north of the beltway and east of I-270 that is currently served by the two ends of the Washington Metro Red Line (rapid transit);

2. The **I-270 Corridor**, with medium to high-density employment centers and other commercial and mixed land uses served by I-270 and a commuter rail line;

3. The **Suburban Communities**, providing a mix of single and multifamily residential areas adjacent to employment centers;

4. The **Residential Wedge**, providing a low-density buffer between urbanized areas and undeveloped rural areas; and

5. The **Agricultural Wedge**, which is intended to remain undeveloped as farmland.

Figure E.1 contains a reprint of a map from the 1969 General Plan showing the general extent of each wedge.

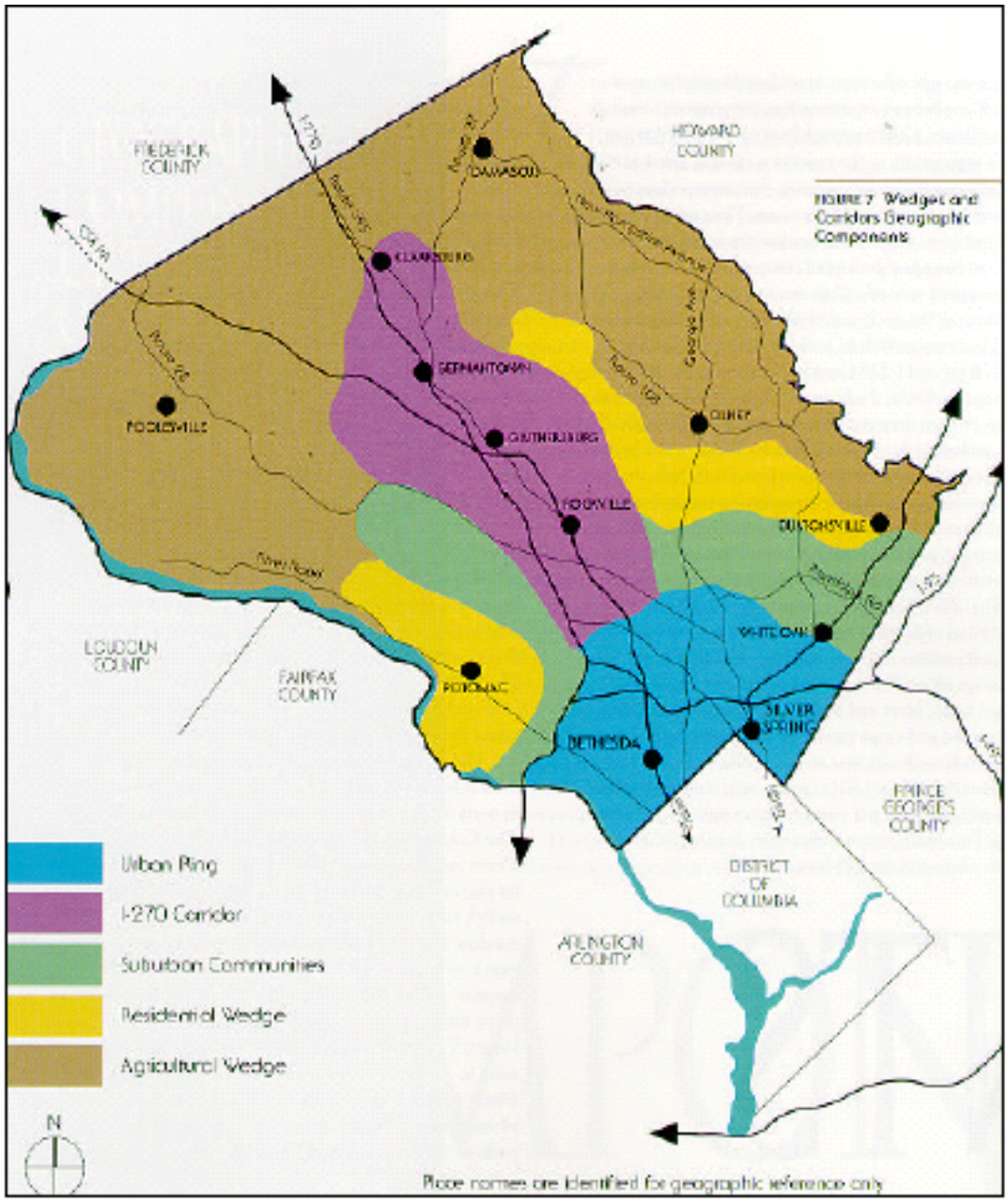
In 1973, the county implemented a precursor to an urban growth boundary by designating most of the western and north agricultural areas in the county as a Rural Zone, with a minimum five-acre lot size. The establishment of the Rural Zone was consistent with the "Rural Preserve" wedge envisioned by the Corridors and Wedges initiative, but the action was not sufficient to prevent development. Between 1973 and 1979, Montgomery County lost 12,268 acres of farmland; most of the lost land was located in the Rural Zone.[87]

The County Council adopted a new master plan in 1980 limiting development to one dwelling unit per 25 acres in an expanded Rural Zone, which was renamed the Agricultural Reserve. To mitigate the financial blow to property owners whose property would lose value due to downzoning, the county allowed rural landowners to sell their development rights at the previous five acres per unit to developers who were interested in building at densities higher than otherwise allowed in other areas of the county. The new Transferable Development Rights (TDR) system allowed development rights to be sold on the open market without government interference, which proved to be a boon to Montgomery County's preponderance of small, family-owned farms.

Also in 1973, the county adopted an Adequate Public Facilities Ordinance (APFO) as part of broader subdivision regulations. The APFO requires development to be synchronized with the provision of public facilities necessary to support that development. The APFO is intended to help developers identify areas of the county where developments are likely to be approved and help the county identify future infrastructure needs before development occurs.

[87] Natural Resources Defense Council (2001).

Figure E.1 Map Showing the Five Proposed Development Areas in the Maryland-National Capital Park and Planning Commission's Original Corridors and Wedges Plan



Source: Maryland National Capital Park and Planning Commission, *On Wedges and Corridors: A General Plan for the Maryland-Washington Regional District in Montgomery and Prince George's Counties,* 1964.

Initially the county developed its own guidelines to define "adequate" public facilities, but in the midst of a development boom in the 1980s, the county enacted legislation requiring the development of an Annual Growth Policy (AGP) to standardize the determination of how much development could occur in each year given available public facilities. The APFO and AGP affect only the timing of new development – the allowable location, amount, type, and mix of development are all specified in the Montgomery County General Plan, master plans, and sector plans.

The APFO requires transportation facilities, schools, water and sewage facilities, and police, fire and health services to have adequate excess capacity to absorb the increased burden imposed by a proposed new development. A five-year projection is performed for schools and transportation facilities, since the county has deemed five years to be the average length of time needed to acquire building permits and complete construction of a new development in Montgomery County. Water and sewer service must be planned to be provided within two years of the development application according to the county's Ten-Year Water and Sewer Plan. Although planning is done for all four categories of facilities, since the APFO was enacted the only constraint on development timing has been availability of transportation facilities.

The county uses two procedures to determine adequacy for transportation facilities. The first procedure, the Policy Area Transportation Review, divides the county into 25 policy areas, plus the cities of Rockville and Gaithersburg. The AGP specifies the number of jobs and housing units that can be accommodated by the existing transportation system and any projects included in the first five years of the Capital Improvement Program. Each July, the County Council adopts a "staging ceiling" for each policy area which specifies the maximum amount of development that can be approved during the following year. If the amount of development already approved in a policy area exceeds the staging ceiling adopted by the County Council, no new development can be approved in the following year, but previously approved developments can still move forward.[88] Once a project is approved, it retains the right to develop for five to 12 years and counts against a sector's capacity to approve new projects.

A second transportation test, the Local Area Transportation Review (LATR) determines if the traffic generated by a development will cause traffic congestion at nearby intersections to exceed an established level of service standard. Roadway level of service standards vary by policy area, depending on levels of transit service and usage. For example, in policy areas with Metro rapid transit stations, traffic volumes can be 25 percent higher than in rural policy areas.

Any subdivision plan that is forecast to generate more than five trips is subject to Policy Area Transportation Review, and any plan that is forecast to generate more than 50 trips is

[88]Staging ceilings are published for the Rockville and Gaithersburg policy areas, but the county does not have the jurisdiction to limit development in the two independent cities. The two cities have signed a Memorandum of Understanding with the county agreeing to respect the plans of neighboring areas when making land use policy decisions.

subject to Local Area Transportation Review. In limited cases, the county may approve new development in sectors that are under a development moratorium:

- Places of worship are exempt from all adequate public facilities tests only if they are "on a unrecorded parcel which has not changed size or shape since June 1, 1958."[89]

- Small scale developments that generate five or fewer peak-hour automobile trips are automatically exempt from Policy Area and Local Area Transportation Reviews.

- Projects that contain a significant affordable housing component may be exempt from Policy Area Transportation Review but are still subject to Local Area Transportation Review and all other adequate facilities tests.

- Projects for which the developer pays for the full cost of transportation system capacity necessary to accommodate the development's growth can pass the Policy Area Transportation Review through a provision called "staging ceiling flexibility." These developments still are required to pass all other public facilities tests, including Local Area Transportation Review.

- Landowners that decide to create a special development district to assess special fees to pay for needed transportation improvements over time also may be accommodated via staging ceiling flexibility.

- Compact development atop Metro stations may meet Policy Area and Local Area Transportation Reviews by mitigating 50 percent of forecast trips, paying impact fees for transportation improvements, and participating in the area's transportation management organization. Also in Metro station policy areas, developers may convert all or part of an approved non-residential development to residential development at a rate of between 0.5 and 0.75 jobs per residential unit.

Two additional provisions have lapsed, but may still apply to developments approved prior to their respective appeals:

1. Until October 2001, residential developers were able to pay impact fees in lieu of making transportation system improvements (applied to a maximum of 300 units per policy area per year); and

2. Until May 1, 2003, non-residential developers that had submitted subdivision applications on or before May 12, 1998 were allowed to use an alternate "Pay-and-Go" system, which allowed non-residential developers to pay a tax in lieu of making transportation system improvements.

[89] Chapter 50-35(k)(7), Montgomery County Code.

State of Maryland

Planning activities at the state level have historically supported Montgomery County's initiatives, but Maryland did not take a strong role in land use planning until the passage of the 1992 Economic Growth, Resource Protection, and Planning Act. Prior to 1992, the State's role in land use was limited to providing non-binding input to counties and local jurisdictions regarding the State's position on major development decisions and land use policies. Several conservation-oriented laws were enacted prior to 1992, with particularly strong protections for the Chesapeake Bay and its tributaries, but counties and cities were responsible for local land use planning.

The 1992 Economic Growth, Resource Protection, and Planning Act redefined the roles of the state, county, and local governments in land use planning. The Act laid out seven specific visions that local governments were required to adopt in their comprehensive plans, and the local zoning codes and regulations were required to be amended to be consistent with these goals and the overall plans. The Act also required local governments to add two new elements to their comprehensive plans addressing protection of environmentally sensitive areas and additional flexibility and innovation in the approval process for developments in environmentally sensitive areas.

In 1997, Maryland's General Assembly passed a collection of laws that are collectively known as "Smart Growth." There are five main components to Maryland's Smart Growth program:

1. The **Priority Funding Areas** program, which provides financial incentives to local governments to steer development to designated growth areas;

2. The **Brownfields** component that provides incentives for the redevelopment of disused industrial sites;

3. The **Live Near Your Work** initiative that promotes shorter commutes by offering incentives for people to relocate their residences closer to their places of employment;

4. The **Job Creation Tax Credits** program for economic development; and

5. The **Rural Legacy** program to protect farmland throughout the State from development pressures.

Several of these statewide policies were based on the corresponding Montgomery County initiative discussed earlier in this section. Therefore, none of the new policies are expected to have a dramatic effect on Montgomery County. Since Maryland's Smart Growth program is only six years old, it will not be evaluated in this paper, but the program does provide context for the discussion of Montgomery's policies.

3.0 Forecast Outcomes

The 1964 Maryland-National Capital Park and Planning Commission's original "Corridor and Wedges" study[90] contained the following prescient remark:

> "If the question [of where and how people in suburban Washington are to be housed] is left entirely to chance, the Regional District is sure to become a congested, formless urban agglomeration where people will continue to reside only because the living environment elsewhere is no better."[91]

The plan document did not contain any quantitative or qualitative forecast outcomes of the Corridors and Wedges policy, other than comparing the policy to the "do nothing" alternative that would presumably lead to uncontrolled sprawl. No subsequent studies have been identified during the literature review for this effort.

[90] Maryland National Capital Park and Planning Commission (1964).

[91] Ibid, p. 11.

4.0 Policy Evaluation

This section summarizes several studies that have assessed the effectiveness of growth management policies that have been implemented by Montgomery County.

4.1 Annual Growth Policy

Although strong growth management policies have successfully preserved the rural character of northwestern Montgomery County, the policies may have served to divert development to other areas in Metropolitan Washington, such as Loudon County, Virginia. In addition, since I-270 extends north from Montgomery into Frederick County, Maryland, the access that road provides to employment centers in Montgomery County and Washington, D.C. may have contributed to Frederick County's 30 percent population growth between 1990 and 2000. Most of Frederick County's growth has been concentrated on the southern edge of the county adjacent to Montgomery County's rural preserve.

4.2 Adequate Public Facilities Ordinance

Montgomery County's Adequate Public Facilities Ordinance (APFO) has been lauded as an effective tool for coordinating development and investments in infrastructure and also criticized as a burden on developers and property owners.[92] Although the county claims that the APFO has not reduced the amount of growth that would have occurred in Montgomery without the ordinance, the failure of Montgomery County and the State of Maryland to complete the transportation improvements listed in the 1969 General Plan also effectively limited the capacity for development in the county. A lack of high-capacity, high-speed transportation facilities has led to congestion on the local arterial system and higher travel times from residential areas to employment centers. Therefore, it is unclear whether Montgomery's success is due to the APFO or to market forces.

[92]Song (2002).

4.3 Agricultural Reserve

Montgomery County's agricultural reserve has successfully created a protected greenbelt around densely developed areas in the southern portion of the county. Policies to encourage growth around transit facilities and other existing transportation infrastructure have resulted in several high-density, mixed-use hubs surrounding rapid transit stations and freeway interchanges. However, the rural greenbelt may have caused development to leapfrog to counties further from the urban core, such as Frederick County.

Urban containment strategies similar to the Rural Zone have seen mixed results around the United States. The success of Montgomery County's initiative may be attributable to several factors:

- Montgomery County has implemented the Rural Zone in close coordination with increased development densities in desired development zones elsewhere in the county. The demand for growth has been accommodated through a proactive approach in which the county dictates where development can occur and simultaneously provides the necessary public infrastructure to accommodate the development.

- The county's policies have not been substantially altered since they were enacted. The development and implementation process was compelling enough to provide a degree of immunity from upheavals that can accompany leadership changes in county government.

- The county's policies have been supported and complemented by actions and policy decisions at the state level, particularly with regards to funding for mass transit and targeted investments in transportation in designated growth areas.

5.0 Outcome Evaluation

This section describes studies to measure the outcomes of growth management and smart growth policies on transportation, land use, and other community and environmental indicators.

5.1 Evaluation Studies

Development Trends

According to Montgomery County's *Fiscal Year 2002 Annual Growth Policy Report*, the AGP is regulating growth efficiently without inhibiting economic development in the county. From 1990 to 1997, the county added new development capacity faster than development occurred. From 1998 through 2001, rapid economic growth led to an increase in development approvals such that development outpaced added transportation capacity. However, the AGP has approved enough development capacity to support at least 20 years of job growth and at least 10 years of housing growth in every policy area of the county.

Although Montgomery County has successfully steered development to the southeast and preserved farmland in the northwest, housing affordability has become a problem. Demand for affordable housing has been met by new residential developments just across the county line in Frederick County, which lies at the north end of the I-270 corridor and the northwest corner of the Washington-Baltimore CMSA. However, Montgomery County's affordable housing problem is common to all of Washington, D.C.'s inner ring suburbs and may not be a product of its growth management policies. The rapid growth of Loudon County, Virginia, also is attributable to that county's supply of affordable land relative to the more expensive land in close-in counties on the Virginia side of the Potomac River.

Montgomery County was included in a recent comparison of urban form measures.[93] The study analyzed Portland (three counties); Orange County, Florida; and Montgomery County, Maryland in an attempt to measure the impacts of growth management programs on urban form. The study used geographic information systems (GIS) data from regional parcel-based land use databases, street network centerlines, and zoning to compute five urban form measures: street design and connectivity, density, land use mix, accessibility, and pedestrian access. The researchers found that development patterns in all five

[93]Song (2002).

counties were similar. Since the late 1980s or early 1990s, neighborhoods in all five counties are becoming better internally connected, but are simultaneously becoming less externally connected. Also, in Montgomery County (as well as Orange County and one of the three Portland counties), accessibility and pedestrian walkability to commercial land uses are decreasing. The study concluded that growth management measures in Montgomery County (and Orange County) have altered subdivision design, resulting in denser and more internally connective neighborhoods, but have been ineffectual at improving land use mix and accessibility to commercial uses on a regional level.

The Metropolitan Washington Area Transit Authority (WMATA) has teamed with Montgomery County and several local jurisdictions to create joint development projects at seven Metro stations in Montgomery County. In addition, the county has zoned the areas surrounding all 12 Metro stations in Montgomery to accommodate high-density, mixed-use development.

As an example of the success of transit-oriented development partnerships, the area surrounding Silver Spring Metro station is now home to the 500,000-square-foot headquarters of Discovery Communications. An additional mixed use development adjacent to the station will contain 260,000 square feet of office space, 50,000 square feet of retail space, 250 residential units and a 150-room hotel. At the other end of the Red Line, a new development at White Flint Metro station is being planned with 1.2 million square feet of office space, 200,000 square feet of retail space and 1,338 apartments. The development will produce an estimated 6,496 additional daily Metro trips at the White Flint station. These proposals are representative of the many millions of square feet of mixed-use development that has already occurred around several other Metro stations in Montgomery County, both on land owned by WMATA and other parcels within walking distance of the stations.

Farmland Preservation

According to the Natural Resources Defense Council,[94] between 1980 and 2000 more than 40,000 acres of Montgomery County farmland were preserved through development rights transfers. An additional 10,000 acres are protected through voluntary cooperation with state and county conservation easement programs. The 50,000 acres of protected land amounts to 15 percent of the total land area of Montgomery County. An additional 43,000 acres of farmland lies in the county's Agricultural Reserve.

The Agricultural Reserve is credited with dramatically slowing the pace of development in Montgomery County's rural areas. During the 1970s, Montgomery lost more than 2,000 acres of farmland to development each year; in the 10 years following the adoption of the Agricultural Reserve, fewer than 3,500 acres of farmland were lost to development.

[94] Natural Resources Defense Council (2001).

In comparison, Loudon County, located west of Montgomery County across the Potomac River, did not adopt comprehensive growth management policies until the county was in the midst of extraordinary suburban sprawl and loss of farmland during the 1990s. Loudon County lost an estimated 20,000 acres of farmland, equal to six percent of the county's total land area, between 1987 and 1997.[95]

5.2 Monitoring Efforts

Montgomery County's Annual Growth Policy Report provides a yearly update of available development capacity, which is calculated by subtracting the amount of development in the permitting pipeline from the amount of additional development that can be accommodated based on transportation improvements funded in the first five years of adopted budgets.

Development in the permitting pipeline is calculated using the following sources:

- Preliminary plans approved by the Montgomery County Planning Board;
- Sewer connections for residential projects;
- Public buildings at the issuance of building permit;
- Preliminary plans approved by the City of Gaithersburg;
- Preliminary plans approved by the City of Rockville;
- Record plats approved by the Town of Poolesville; and
- Building permits for so-called "loophole" properties that meet the requirements outlined in the APFO, as described in Section 2.0 of this document.

[95] Ibid.

Appendix F

Case Study: New Jersey

1.0 Overview

This case study discusses the history of state-level comprehensive planning in New Jersey and related evaluation efforts. The case study is organized into the following sections:

- **Section 2.0** discusses the history of state comprehensive planning in New Jersey, including specific planning initiatives;
- **Section 3.0** describes studies undertaken to *forecast* the outcomes of state-led programs directed at smart growth objectives;
- **Section 4.0** describes *policy* studies to evaluate how effectively these programs have been implemented; and
- **Section 5.0** describes *outcome* studies that have attempted to measure the actual impacts of state planning programs.

2.0 History of Comprehensive Planning

2.1 State Planning Context

The State of New Jersey is the fourth smallest state by land area and eighth largest state by population in the country. This combination results in an overall density of 1,100 people per square mile, making it the nation's most densely populated state.[96] A high percentage of the land area in New Jersey functions as suburbs of New York City and Philadelphia. According to the U.S. Census Bureau, the entire State is "metropolitan," and is either in the Philadelphia or New York metro region.[97] However, despite the overall high population density of the State, New Jersey continues to grow mostly as a suburbanized region. Between 1970 and 1990 the amount of land considered "urbanized"[98] by the U.S. Census Bureau increased by 36 percent, while the population living in these areas increased by only nine percent. While there have been instances of urban revitalization during the past few decades, the majority of the "urbanization" has occurred in low-density areas, far from traditional urban centers.

Within the State, there are eight major cities (Atlantic City, Camden, Elizabeth, Jersey City, Newark, New Brunswick, Paterson and Trenton) which house 12 percent of total residents. These cities have continually been called upon to provide a disproportionate share of the State's services using limited tax resources, and as a result have become fiscally strapped.[99]

Located within New Jersey's 21 counties are 566 municipalities and 613 school districts. According to the 2000 U.S. Census, the average population of the municipalities in 2000 was just under 15,000, and the median population size was just over 7,500 residents. The Home Rule Act of 1917 awarded all municipalities, regardless of size or classification, the same governing rights. The entire land area of New Jersey is included in one of the 566 incorporated municipalities. As a result, there is no annexation and no need for creation of special districts as commonly seen in other states. All decisions about where to provide

[96] Center for Urban Policy Research (2000), p. 25.

[97] Orfield and Luce (2003).

[98] The U.S. Census Bureau classifies "urban" as incorporated cities, villages, boroughs and towns of 2,500 people or more.

[99] Orfield and Luce (2003).

services on the urban fringe are handled on the municipality level. Municipalities have the jurisdiction to appoint a planning board, and all but a handful has one.[100]

State planning in New Jersey dates back as far as the 1930s. Statewide planning efforts initially dealt with issues including parks and public lands, water supply and sewage disposal, and transportation and utility services. In the 1950s and 1960s they were expanded to encompass the provision of planning aid to communities, the formation of regional planning entities, urban renewal activities, and the assessment of the State's ability to accommodate future population growth. In the mid-1970s, the State prepared State Development Guide Plans to address Federal requirements for obtaining planning aid.[101]

New Jersey State Development and Redevelopment Plan

The genesis of current statewide planning dates to 1975 and 1982, when the *Mt. Laurel* and *Mt. Laurel II* Supreme Court cases found that local governments had used their zoning powers in exclusionary ways that limited the availability of low and moderate income housing. Largely in response to these court decisions, the State Legislature passed both the State Planning Act and the Fair Housing Act in 1985, to coordinate planning and regulatory efforts and increase opportunities to provide affordable housing in communities throughout the State.

The 1985 State Planning Act established the New Jersey State Planning Commission, which includes representation from state government, local government and the public. The Commission is responsible for coordination of state land use policies and implementation of the New Jersey State Development and Redevelopment Plan (SDRP), which was first adopted in 1992 and later revised and readopted in 2001. Since the SDRP itself is not regulatory, the Commission must rely on related statutes, incentives, priority funding and educational/awareness campaigns to achieve any coordinated regional land use.[102] It is up to each individual municipality to decide whether to align their planning and zoning practices with the recommendations of the SDRP.[103]

The purpose of the SDRP is to "guide public and private development toward compact, mixed-use landforms that make the most efficient use of existing and planned infrastructure, as well as other systems, to meet present and future growth projections."[104] To reach these ends, the SDRP has defined the following nine goals:

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[100] State of New Jersey (1992).

[101] New Jersey Department of Community Affairs (2003a).

[102] Parmar (2003).

[103] State of New Jersey (1992).

[104] Center for Urban Policy Research (2000), p. 31.

1. Revitalize the State's cities and towns;
2. Conserve the State's natural resources and systems;
3. Promote beneficial economic growth, development, and renewal for all residents of New Jersey;
4. Protect the environment and prevent and clean up pollution;
5. Provide adequate public facilities and services at a reasonable cost;
6. Provide adequate housing at a reasonable cost;
7. Preserve and enhance areas with historic, cultural, scenic, and recreational value;
8. Ensure sound and integrated planning and implementation statewide; and
9. Achieve all of the State Plan goals by coordinating public and private actions to guide future growth into compact, ecologically designed forms of development and redevelopment, consistent with the statewide policies and the policy objectives of each planning area.[105]

The SDRP has broken the State into five different planning areas based upon existing conditions and the future potential for growth. These five planning areas (PAs) are:

- PA1: Metropolitan Planning Area;
- PA2: Suburban Planning Area;
- PA3: Fringe Planning Area;
- PA4: Rural Planning Area; and
- PA5: Environmentally Sensitive Planning Area.[106]

Each area has unique growth capacities and strategies for implementation according to the goals of the SDRP. Through specific policies and programs, growth and development is focused in PA1, PA2 and PA3, while land in PA4 and PA5 is conserved and preserved as open space, protected areas or agricultural lands. Any growth that occurs in PA4 or PA5 must be in a designated center within that region. The SDRP identifies five types of centers – urban, regional, town, village and hamlet –each with designated appropriate growth characteristics. A major objective of the SDRP is to focus the State's growth in these compact centers.

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[105] Center for Urban Policy Research (2000), p. 35.

[106] New Jersey Future (2003).

The State Planning Act of 1985 required that the SDRP be created and adopted through a process of cross-acceptance. This process ensured that governments of all levels, stakeholders and the public participated in the creation of the plan. The cross-acceptance process involves three distinct phases:

1. **Comparison** of the State Plan to county and municipal comprehensive plans to note any inconsistencies between the two;

2. **Negotiation** among all entities involved to reconcile any inconsistencies found between the State Plan and local-level plans; and

3. **Final Review** of the plan with an opportunity for governmental entities, stakeholders and the public to comment.[107]

In addition to this mandatory cross-acceptance process, the State is currently working to implement a voluntary plan endorsement process, established in the 2001 State Plan. The State is providing a number of incentives, including planning technical assistance, speedier turnaround on permitting, and prioritization of capital improvements, to jurisdictions whose plans are endorsed as being consistent with the State Plan. The State has awarded over $8.0 million awarded to county, regional and local planning offices to prepare regional plans eligible for Plan Endorsement.

Although the SDRP is a non-regulatory document, its guidelines have been upheld by the court system. In 1998 a court case was brought to the New Jersey State Superior Court by New Jersey Future, a local non-profit organization. The Council on Affordable Housing (COAH) had approved construction of a large-scale housing development on agricultural land that the SDRP had identified as inappropriate for intensive development. The judge asked COAH to reconsider, who rescinded certification of the development. This case has set a precedent for developers and municipalities alike to follow the guidelines set out in the SDRP.[108]

2.2 Policy Initiatives and Implementation Tools[109]

New Jersey's Home Rule Act of 1917 delegates land use decisions to the municipal government level, thereby limiting state involvement in zoning and other land use decisions. Although the SDRP is a non-regulatory document, there are a number of statutes and state programs that relate either directly or indirectly to the SDRP, providing enforcement and

[107] New Jersey Future (2003).

[108] New Jersey Future (1998).

[109] This section is based primarily on: New Jersey Department of Community Affairs (no date); and New Jersey Department of Community Affairs (2003b).

implementation mechanisms. These are discussed under four categories: general planning programs; environmental protection, land conservation, and historic preservation; urban revitalization and Brownfields cleanup; and housing. Transportation –related programs are discussed separately in Section 2.3.

General Planning Initiatives

Capital Budgeting and Planning Commission (1986) – Each year the New Jersey Commission on Capital Budgeting and Planning is required to prepare a State Capital Improvement Plan which is consistent with the goals of the SDRP. Although the commission reviews only a limited number of projects and the state government is not required to use its plan, the plan is submitted to the governor and legislature for review during the annual budget decision process.

Municipal Land Use Law (1991) – Municipalities completing a master plan must include a statement that describes how the document relates to the master plans of surrounding municipalities, the county master plan and the SDRP.

Smart Growth Policy Council (2002) – Under the administration of Governor James McGreevey, the State has placed an increased emphasis on smart growth. An executive order calls for interagency coordination in advancing smart growth principles. The Smart Growth Policy Council is a group of Cabinet members and senior administration officials charged with the task of coordinating state-level actions to ensure consistency with the SDRP.

Smart Future Planning Grants (2003) – Municipalities, counties and regional organizations that are interested in developing plans that further the cause of smart growth in their community are eligible to apply for a Smart Future Planning Grant. This money is intended to promote the development of comprehensive planning that furthers the goals of the SDRP. A government or agency that is awarded a grant can then select a prequalified planning consultant to assist them in their project.

Environmental Protection, Land Conservation, and Historic Preservation

Green Acres Program (1961) – Statewide land-use regulations in New Jersey date back to the mid-1900s, and stem from a concern for the preservation of open space. The 1961 Green Acres Bond Act approved funding for the purchase of open space and recreation areas. This act is still in effect today, and can be used by municipalities as matching funds for the acquisition of open space in their communities. The most recent initiative under the Green Acres Program umbrella is the *1999 Garden State Preservation Trust Act* which sets money aside for the preservation of one million acres over the next 10 years.

Payment in Lieu of Taxes (PILT) (1977) – Municipalities are given payment from the State in lieu of property taxes on land that has been purchased by the DEP for recreational use or conservation purposes.

Environmental Infrastructure Trust (1985) – This program provides low-cost financing for the construction of environmental infrastructure projects that enhance and protect ground and surface water resources, ensure the safety of drinking water supplies, and make possible responsible and sustainable economic development. Augmented by a Revolving Loan Fund, it provides a mechanism by which the State can influence the location of sewage treatment plants and sewage line extensions consistent with the SDRP.

Coastal Area Facilities Review Act (1993) – The Department of Environmental Protection (DEP) is required to consult with the State Planning Commission when adopting rules and regulations to ensure that they coordinate with the SDRP.

Historic Preservation Bond Program (1994) – The New Jersey Historic Trust is required to incorporate the SDRP's policies on historic, cultural and scenic resources as part of its review and ranking criteria for projects applying for funding.

Garden State Farmland Preservation Trust Program (1999) – Administered by the State Agriculture Development Committee, this initiative provides grants for the purchase of development easements or fee simple titles.

Urban Revitalization and Brownfields Remediation

Main Street Program (1989) – Every two years the New Jersey Department of Community Affairs accepts applications and designates selected communities to join the program. These communities receive technical support and training to assist in restoring their Main Streets as centers of community and economic activity.

Brownfields and Contaminated Site Remediation Act (1998) – New Jersey has identified brownfield remediation as a key to infill development and inner-city revitalization. The program provides 100 percent funding for investigation and recommendation for remediation to municipalities that are interested in redevelopment. In addition, there are a variety of low-interest loans and tax abatement incentives available to both municipalities and private developers who are taking on the expense of remediation for the purpose of development. In 2002, Governor McGreevey signed additional legislation allowing reimbursement to developers of up to 75 percent of the cost of remediation.

Neighborhood Revitalization Tax Credit Act (2002) – In order to provide distressed neighborhoods with the resources to make their own decisions about the best path toward revitalization, the Neighborhood Revitalization Tax Credit Act provides community-based organizations with up to $10 million a year in tax credits. The program seeks to build strong public-private partnerships that collaborate in strategic planning processes towards the goal of neighborhood revitalization.

Redevelopment Area Bond Financing Law and Revenue Allocation District Financing Act (2002) – This act provides tools for municipalities to fund redevelopment plans. It allows local governments to issue tax-exempt bonds and/or special assessments on property benefiting from the improvements. These monies enable distressed areas to begin the process of revitalization and act as a catalyst to lure private investment.

Housing

Local Redevelopment and Housing Law (1992) – Any municipal government adopting a redevelopment plan must explain the coordinated relationship between the redevelopment plan and the master plans of surrounding municipalities, the county master plan and the SDRP.

Fair Housing Act (1993) – The Council on Affordable Housing is required to adjust affordable housing requirement numbers to coordinate with growth designations as described in the SDRP. The Council and the State Planning Commission have historically been guided by a memorandum of agreement drafted and executed by each body in the early 1990s to have the two agencies coordinate their activities.

Market-Oriented Neighborhood Investment (MONI) (2002) – The New Jersey Housing and Mortgage Finance Agency (HMFA) has initiated the MONI program in an effort to increase the economic stability of distressed areas by creating neighborhoods that are attractive to a diverse mix of people. The program works by assisting private developers and non-profit housing agencies to build housing that combines low-income, moderate-income and market rate units in the same development. Funds are also available to urban first-time homebuyers to provide them with below-market mortgages.

Homeworks (2002) – As development in New Jersey has become increasingly dispersed, congestion levels and average commute distance have climbed for the average resident. The Homeworks Program creates incentives for New Jerseyans to live closer to their job, by providing subsidized down payments and mortgage rates on homes within a close proximity of their place of employment.

At Home Downtown (2002) – Mixed-use development in urban centers creates a 24-hour vibrancy to which many residents are attracted. The At Home Downtown program strives to bring this dynamism back to many neighborhood commercial districts and downtowns by providing reduced-rate loans to business owners, non-profit organizations and investors who acquire, refinance or renovate buildings that have ground floor commercial space and rental housing units above.

City Living Program (2002) – Like the At Home Downtown Program, the new City Living Program seeks to make inner city areas attractive for a diverse group of New Jersey residents. The program will create or rehabilitate 800 units of market-rate housing in designated urban areas.

Smart Start (2003) – The Smart Start program is available to first time homebuyers who earn less than 80 percent of the HMFA's county income limits. If the home being purchased in located is a designated smart growth area, the purchaser is eligible for a second mortgage to be used for down payment and/or closing costs up to four percent of the first mortgage.

Live Where You Work Program (LWYW) (2003) – Residents of New Jersey who choose to live in the same municipality where they work are eligible for funds that go beyond the Homeworks initiative. Home buyers will receive a low-interest 30-year mortgage, down

payment and closing costs in an amount up to four percent of the first mortgage loan amount, and one percent expanded housing and debt underwriting ratios to borrowers participating in the program. The municipality of employment and residence must choose to participate in the program for homebuyers to receive the subsidy.

2.3 Transportation Linkages

Transportation projects have a potentially strong influence on the State's ability to meet the goals of the SDRP. State transportation policies to support the SDRP were originally established following passage of the 1985 State Planning Act. The Highway Access Management Act and the Congestion Relief and Transportation Trust Fund Renewal Act specifically state that transportation funding should be prioritized for projects that fall within the SDRP's guidelines. Since 1999, the State has embarked on a number of additional programs and initiatives to reexamine its programs and practices, and to better support growth centers and other objectives of the SDRP through transportation policies and investments.

Various state-led transportation initiatives have included:

Transportation Development District Act (1989) – Counties interested in establishing a transportation development district must have a state-endorsed county master plan, and create the district in coordination with the county master plan and the SDRP. Only one such district has been created in the State, however, so the act's utility has been limited.

Highway Access Management Act (1989) – This act establishes an agreement between the New Jersey Department of Transportation (NJDOT) and New Jersey Transit (NJ TRANSIT) to attempt to further the goals of the SDRP through their policies and investments. The Resource Planning and Management Map is expected to be used in identifying appropriate points of access for transportation infrastructure projects.

Department of Transportation Act (1992) – NJDOT is required to consult with the New Jersey Office of Smart Growth (OSG) in an effort to coordinate the State Transportation Plan with statewide transportation needs.

State Plan Implementation Team (1999) – NJDOT established a State Plan Implementation Team ("I-Team") in 1999 to devise operational guidelines for the agency to implement the State Plan. The team undertook a critical review of its policies, programs, and procedures and the extent to which they support implementation of the SDRP.

Transit-Friendly Communities (1999) – During the past 15 years, a considerable effort and $7.5 billion has been spent to upgrade, expand and connect all of New Jersey's passenger transit lines. The Transit-Friendly Communities program was launched to educate local governments and non-profits about effective ways to leverage the community development opportunities that accompany these improvements. This program, offered by NJ TRANSIT, OSG and a number of regional non-profit agencies, was initially sponsored

through a Federal Highway Administration Transportation and Community and System Preservation Pilot Program (TCSP) grant. The pilot program provided 11 communities with technical and financial assistance to better link stations with their surrounding area.

Transit Villages Initiative (1999) – In an attempt to link growth in urban centers with high-quality public transportation service, the NJDOT launched the Transit Villages Initiative. Municipalities that have an existing passenger rail or bus facility and have prepared a master plan or redevelopment ordinance around their station area (or were part of the Transit-Friendly Communities Program) are eligible to be designated a Transit Village. Transit Villages receive assistance in implementing their planning goals and priority consideration for a variety of transportation and downtown revitalization-related grants.

Smart Growth Pilot Corridor Studies (1999) – NJDOT has undertaken eight pilot projects for integrating transportation and land use planning, focused on corridors ranging from two to 30 miles in length. NJDOT is focusing on community involvement and is providing technical and financial resources to assist local governments with land use planning in conjunction with planning for transportation corridor improvements. Two major corridor studies are focusing on Route 1 in Middlesex and Mercer counties and Route 9 in Ocean County.

Context Sensitive Design (1999) – NJDOT formally incorporated context sensitive design (CSD) into its procedures in 1999 and since then has conducted a series of statewide trainings in context-sensitive design reaching over 600 DOT staff, local agency staff, and consultants. The trainings address community placemaking, engineering and liability issues, consensus-building and community participation, and conflict resolution and negotiation. CSD supports SDRP objectives by enhancing livability in older, established communities identified as centers in the State Plan.

Congestion Relief and Transportation Trust Fund Renewal Act (2000) – To further the goals of congestion relief and enhanced mobility throughout the State, this act provides a mandate that "the State should consider and utilize, where appropriate, transportation approaches and concepts to reduce congestion, enhance mobility, discourage sprawl, and assist in the redevelopment of our cities, enhance suburbs and town centers, and otherwise improve the quality of life of our citizens."[110]

Local Aid for Centers of Place Program (2000) – Municipalities designated as Centers through the SDRP are eligible for funds to support non-traditional transportation improvements. The projects must fall into one of the following categories: pedestrian and bicycle facilities, scenic or historic transportation program, parking and circulation management, landscape/beautification of transportation-related facilities or rehabilitation of transportation structures. The money is allocated through a competitive application process, and is funded by the New Jersey Transportation Trust Fund.

[110] State of New Jersey (1999).

SDRP objectives also are being pursued through policies, funding priorities, and projects identified in the long-range plan and transportation improvement program. The statewide long-range transportation plan (*Transportation Choices 2025)* adopted in 2001 incorporates many of the stated goals of the SDRP (see Section 3.0). In Fiscal Year 2001, Governor McGreevey mandated that NJDOT spend no more than four percent of its total annual funds for highway widening and expansion. This spending cap has remained consistent, and was most recently readopted in the Transportation Capital Program for 2004. A subcommittee of the Smart Growth Policy Council plays an important role in the funding of transportation projects. This group, consisting of NJDOT and OSG employees, reviews projects that are in the proposal stage, using a baseline checklist to determine if the project supports the goals of the SDRP (see Appendix A). Projects that are located in areas with a state endorsed comprehensive plan receive priority for funding.

New Jersey also has made investment in transit a priority. It is a State that is well-served by public transportation, with strong regional connections by bus, rail, light rail and ferry, and NJ TRANSIT is the largest statewide transit agency in the country. Major projects recently completed or underway include the Hudson Bergen Light Rail line providing North Jersey with connections to Manhattan, the 34-mile-long Southern Jersey New Jersey Light Rail Transit System connecting Trenton and Camden, and commuter rail improvements.

Housing programs discussed above, including Homeworks, At Home Downtown, and the City Living Program, also support transportation objectives by providing incentives for people to live closer to their workplace or to live in compact urban areas where trips are shorter and alternatives to the automobile more viable.

3.0 Forecast Outcomes

3.1 State Development and Redevelopment Plan

Since the SDRP was adopted in 1992, two legislatively-mandated forecasting studies have been undertaken by the New Jersey Office of Smart Growth. Both examined the long-term effect of planned growth under the SDRP. The first was completed in 1992, in conjunction with the plan. The second was completed in 2000, and is an updated version of the first, using advanced modeling techniques. Therefore, only the second report is discussed in this case study analysis.

The most recent study, entitled *The Costs and Benefits of Alternative Growth Patterns: The Impact Assessment of the New Jersey State Plan*, was conducted by the Center for Urban Policy Research at Rutgers University. The study compares two futures: a continuation of recent growth patterns (TREND), and growth patterns that would emerge as a result of full implementation of the SDRP (PLAN).

The assessment of each growth pattern is done in five areas: economic, environmental, infrastructure, community life and intergovernmental coordination. Within each area, subareas are designated with outcome measures. The State's 566 communities are analyzed separately in each of the categories, and then the aggregate is taken to complete the overall evaluation and comparison. This enables the study to analyze the community-level and provide accuracy on state-level outcomes. Recent data for each of the five areas are used to project 20 years into the future. 2000 data combined with a careful interpretation of how the SDRP will impact growth is used to project PLAN growth for 2020.

The model provided the following outcomes for the five assessment areas:

1. Economic Assessment

- **Population –** Both PLAN and TREND will accommodate 908,000 new residents throughout the State by 2020. While TREND will see most of the new population locating in suburban areas, PLAN will send the majority of new residents to urban areas and planned centers.

- **Employment –** There will be 802,500 new jobs created throughout New Jersey by 2020. The PLAN version of growth will have twice the number of jobs located in urban communities. Since these areas tend to have a higher number of unemployed residents, the State unemployment rate would be lower as a result of PLAN growth.

- **Household Growth and Income –** Both growth patterns predict and accommodate 467,000 new households throughout the State by 2020. The PLAN growth scenario will place 10 times the number of new households in urban areas and more densely populated designated centers, compared to the TREND scenario. TREND growth will bring a $380 million loss in household income statewide, while PLAN will increase income by over $3 billion.

- **Tax Base Growth –** The model forecasts an overall tax base growth of $85 billion by 2020. The PLAN scenario will bring the majority of that tax base growth to urban areas. In contrast, TREND will place most of that growth in the suburbs, locating two percent of it in urban areas.

- **Fiscal Impacts –** The implementation of PLAN development will reduce fiscal deficits attributable to growth by $160 million annually.

2. Environmental Assessment

- **Developable Land –** By the year 2020, TREND development will require 52 percent more land than the PLAN model (conversion of 355,000 versus 233,000 acres). Under PLAN, almost all of the saved land will be in suburban and rural areas.

- **Agricultural Land –** Implementing PLAN growth patterns will save 68,000 acres of agricultural land by the year 2020, more than one out of every two acres converted under the TREND forecast.

- **Environmentally Fragile Land –** As a result of PLAN development, 45,000 acres of environmentally fragile land will be saved by 2020.

3. Infrastructure Investment

- **Roads –** A simple model was created for the purpose of this study (CUPR ROAD) that projects road density as a function of population density. This relationship is non-linear and convex; higher-density municipalities require fewer new centerline miles per capita than lower-density municipalities to accommodate growth. To calculate projected costs, the study assumed a centerline mile cost of $1 million for new roadway. The study found that the PLAN growth scenario would save 870 centerline miles of local roadway and $870 million in local road infrastructure costs, compared to $3.72 billion required under the TREND scenario, a reduction of 23 percent.[111]

- **Transit –** To forecast future levels of transit use, two separate models were employed. A regression-based model predicted the number of people using transit based on population density and proximity to a bus or train station. A community-profile model was then used to predict the change in number of transit

[111] Center for Urban Policy Research (2000), p. 170.

users based on current levels of transit use. This model assumed that people moving into a new community would follow the mode share patterns of current residents. 1990 work trip census data was used to measure the percentage of residents taking transit to work. These two models combined predicted that implementing PLAN growth would increase transit use for commute trips by 150 percent.[112]

- **Water and Sewer –** Over the 20-year projected period, PLAN growth would save $1.45 billion in water and sewer infrastructure.

4. Community Life Assessment

- **Quality of Community Life –** This outcome is measured using 26 regional and 18 local factors (including wealth, educational attainment, housing ownership, community amenities, etc.). Due to its growth in suburban areas, TREND provides a slightly higher level of quality of life in the short term. However, the study suggests that in the long-term PLAN would lead to an overall higher quality of life.

- **Housing Supply and Demand and Housing Costs –** In either scenario, housing affordability is going to decrease over the next 20 years. However, in the PLAN version, housing affordability will decrease less, and therefore more families will be able to afford a house in 2020 using this growth pattern.

5. Intergovernmental Coordination

- The PLAN scenario will provide local- and county-level governments with more opportunity to build relationships with state agencies than the TREND growth scenario will.

3.2 Transportation

NJDOT and NJ TRANSIT conduct their own forecasting study through the statewide long-range transportation plan. The most recent report, *Transportation Choices 2025*, was released in March 2001. The plan sets seven goals:

1. Maintain and preserve our transportation system for present and future generations;

2. Improve the safety and security of the transportation system;

3. Improve the effectiveness, efficiency, and attractiveness of transportation services responsive to the needs of the customer;

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[112] Center for Urban Policy Research (2000), p. 196.

4. Improve the process of providing transportation facilities and services;

5. Promote economic development;

6. Improve the quality of life for users of the transportation system and those affected by its use; and

7. Use transportation to shape desired development patterns consistent with the SDRP.[113]

The strategic plan was created by evaluating alternative scenarios to determine the most effective approach to relieve congestion and improve mobility. The three demand models utilized by New Jersey's MPOs were employed to create a statewide travel demand tool. The projections showed that a multimodal approach to transportation improvements combined with a pattern of center-based growth, as recommended in the SDRP, is the best strategy for improving the effectiveness and efficiency of the transportation system.[114]

Transportation Choices 2025 initiates the practice of utilizing performance measures throughout the State to track progress and impacts. The report proposes a set of indicators that relate to each of the plan's seven goals (see Appendix B), and suggests that these indicators are tracked and monitored regularly.[115]

A research study in the early 1990s examined the impacts of land use strategies on mobility in central New Jersey.[116] The study tested the traffic impact of locating the region's new employees in Trenton and New Brunswick, as well as in tightly clustered suburban employment centers. Under scenarios proposed in the study, new residents would work and shop closer to their homes, their living environment would be more conducive to walking and reduced auto use, opportunities for transit and ridesharing would be available to commuters, and a significant number of people would take advantage of these choices because of incentives provided by regional demand management policies. The study demonstrates that this approach to land use could lead to a 10 to 18 percent reduction in suburban vehicle trips and a nine to 12 percent reduction in morning peak period VMT. Average morning peak period travel speeds on the regional network would increase by 11 to 21 percent.

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[113] New Jersey Department of Transportation and New Jersey Transit (2001), p. i.

[114] *ibid*, p. v.

[115] *ibid*, p. 117.

[116] Middlesex Somerset Mercer Regional Council (1991).

4.0 Policy Evaluation

The following section describes studies that have been undertaken to assess the extent to which SDRP policies have been effectively implemented by state and local agencies in New Jersey. First, the studies are described; then, findings are summarized.

4.1 Studies Undertaken

NJDOT Implementation of Smart Growth through the State Development and Redevelopment Plan

In 2002, NJDOT hired Cambridge Systematics (CS) to examine the extent to which current processes and practices are consistent with SDRP goals, and to make recommendations for improvement where necessary. The study assessed 13 polices, programs and practices, three major Departmental and program areas and two major NJDOT projects.[117]

New Jersey State Development and Redevelopment Plan

As part of a team of students looking at exemplary programs of growth management at the University of Texas at Austin, Anuradha Parmar completed a brief analysis of New Jersey's State Development and Redevelopment Plan.[118] The report summarizes the history of growth management in the State, and uses some basic indicators to analyze SDRP's goals of urban revitalization and economic development, environmental protection, development in centers and urban areas, transportation improvements, and preservation of the State's heritage areas as a cultural asset.

New Jersey Metropatterns

The New Jersey Metropatterns study[119] was initiated by the New Jersey Regional Council, a statewide partnership of organizations that describe themselves as "promoting an anti-sprawl, pro-development, socially equitable and environmentally friendly agenda of research." The study was conducted by Ameregis, a private firm that uses GIS tools to document and analyze development patterns throughout the United States.

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[117] Cambridge Systematics, Inc., et al. (2002).

[118] Parmar (2003).

[119] Orfield and Luce (2003).

The authors identify three current trends that influence growth throughout the State:

1. Growth is still occurring primarily in the suburbs, and continued suburbanization is not necessarily an indicator of increased wealth. Many of the older suburbs are suffering from the same ills that inner cities have been faced with for decades.

2. The heavy reliance on local property taxes for the funding of municipal services has negative impacts for all State residents. It means that inner-city areas with less property value are struggling to pay for schools, emergency services and other needs. Suburban towns become biased toward certain types of development ("rateables") that will bring them the most money in taxes, such as large housing developments affordable only to middle class and upper-middle class families.

3. In a race to keep up with traffic congestion, transportation improvements (mostly roadway expansion) have been spreading people out and contributing to sprawl.

The authors looked at general trends in population, wealth, travel and land consumption to come to some conclusions about the causes of these trends and suggest potential solutions.

4.2 Findings

The studies find that New Jersey has created a statewide plan which, if implemented, could go far to address many of the issues that the State is facing. However, the history of localized-level planning and a lack of regulatory power have made the SDRP difficult to implement.

The Ameregis report states that "unfortunately, few elements of the plan have actually been implemented because state agencies have failed to use it consistently in their spending and rule-making, and local officials have generally ignored it in local planning and zoning decisions."[120]

Parmar writes: "Thus, although the state plan has conceived, in its goals and objectives, the importance of channeling growth toward centers and away from sensitive lands, its non-regulatory status has had limited success in meeting those goals."[121]

With respect to transportation in particular, the CS report finds that NJDOT's programs, policies, and practices are largely consistent with SDRP goals. The report notes that between 60 and 70 percent of the Department's capital investment is regularly committed to maintenance and safety improvements, two of the top priorities established in the

[120] Orfield and Luce (2003).

[121] Parmar (2003).

SDRP; a significant proportion of the Department's annual operating budget supports non-capital programs and activities that also directly support general and specific SDRP goals and policies; and the Department continues to launch new initiatives, such as the Context-Sensitive Design program, that reflect an increasing commitment to and innovation in support of SDRP policies. On the other hand, the report notes that "there are no operational guidelines that link day-to-day Departmental activity to SDRP policies, nor does the Department staff have full knowledge and understanding of SDRP content and their respective roles in supporting the SDRP."[122]

One recommendation made by CS was the implementation of a "Policy Screening for SDRP Consistency" tool (see Appendix C). This table lists all of the SDRP policies related to transportation projects, and provides a framework for consistency evaluation. Although not officially adopted, NJDOT has begun experimenting with the table and utilizing it on a test basis during Smart Growth Project Review Sessions.

[122] Cambridge Systematics, Inc., et al. (2002).

5.0 Outcome Evaluation

This section describes studies to measure the outcomes of SDRP policies in transportation, land use, and other community and environmental indicators. The scope of these studies is limited, and no comprehensive studies of SDRP outcomes have been undertaken.

5.1 Evaluation Studies

Transit Village Initiative

As described above, the Transit Village Initiative program was launched by the New Jersey Department of Transportation in 1999 in an attempt to focus residential and employment growth around transit stations. Although it is premature to conduct a study that looks at the change in travel patterns, demographics, housing affordability or other proposed outcomes, researchers at the Voorhees Transportation Center have evaluated a number of measures to determine the successes and obstacles that have been met thus far. A 2003 study looked at seven designated Transit Villages: Morristown, Pleasantville, Rahway, South Orange, South Amboy and Rutherford.[123] Year 2000 U.S. Census data were used to examine demographics, income, household structure, home ownership and travel modes for the one-half-mile radius around each transit station. This analysis revealed that:

> "Transit Villages in New Jersey feature a younger population, more racial and ethnic diversity, higher percentage of immigrants, lower household incomes, more singles, more rental housing, higher vacancy rates, and exhibit better transit habits – less cars, higher use of trains and bus, and more residents walking to work."

The evaluators also conducted a series of interviews with stakeholders in the state and municipal government, and in the private sector. A number of obstacles were identified including contaminated land or Brownfields, acquisition of land for development, bureaucracy of state agencies, cost, conflict in funding sources, and fear of school children (due to cost). On the flip side, representatives of each group who have been a part of the Transit Village Initiative process expressed that a new level of partnership is occurring between state and local governments, something that has rarely been achieved in New Jersey, a strong home rule State.

[123] Renne and Wells (2003b).

The authors found that through the Transit Village Initiative, planning in New Jersey is shifting from a typically American, local-level strategy to one that more closely resembles the kind of regional planning that has been going on in Europe for centuries. In addition, it appears that New Jersey has done a good job of identifying those towns that have the characteristics which make Transit-Oriented Development and other smart growth strategies feasible and ultimately successful. Whether or not the Transit Village Initiative will be effective in harnessing this potential to achieve the goals of smart growth is yet to be determined.

North Jersey Strategy Evaluation

The North Jersey Strategy Evaluation was conducted on behalf of the North Jersey Transportation Planning Authority (NJTPA) to assess the level of mobility and accessibility of its 158 districts.[124] Although not directly assessing smart growth policies, the transportation performance aspects that were measured are consistent with many indicators consistently used in smart growth analysis work. These indicators include:

- **Accessibility –** Can travel destinations be reached?
- **Reliability –** Can the transportation system always be counted on?
- **Sustainability –** Can the system maintain performance over time?
- **Intermodality –** Are different modes well-connected?
- **Highway Mobility –** Can roads be traveled without delay?
- **Transit Mobility –** Can public transit be used without delay or overcrowding?
- **Walk/Bike Mobility –** Are walking and bicycling effective modes of travel?
- **Freight Mobility –** Can freight be moved without delay?

Each of the 158 districts was assigned a needs score, based on the performance goal established for that area, and a forecasted performance measurement. Simultaneously, 24 candidate strategy types were developed, representing types of actions that could help the region obtain the established goals. Matching areas of need where strategies could be employed resulted in a complex matrix of benefits. This matrix has been utilized to establish specific localized accessibility and mobility goals. If employed successfully, the region of Northern New Jersey will realize higher levels of accessibility and mobility, one important component of smart growth.

Rethinking Farmland Preservation in New Jersey

New Jersey Future, a nonprofit research and advocacy organization that focuses on smart growth and sustainable development issues, released this study in 2001 evaluating the

[124] North Jersey Transportation Planning Authority (2003).

effectiveness of the State's "Million Acres" preservation program launched in 1999.[125] The initiative aimed to preserve half a million acres of farmland by 2010.

The study found that as of December 31, 2000, the State had preserved 69,500 acres. It predicted that by 2010, only 245,000 additional acres of farmland were likely to be added to this stock. This number is only 63 percent of the total goal, and represents only a third of the farmland in that State in the year 2000. The report concludes that the reasons for insufficient preservation include a lack of financial resources, administrative complaints, and a cumbersome application process. The areas that are being preserved are being done in a "checkerboard," with large subdivisioned parcels separating them.

The report recommends a number of policy changes to increase the number of farmland acres that are effectively preserved in the near future. These include implementing stronger growth management measures, limiting new infrastructure (such as sewers), legislating new tools for municipalities (such as transfer of development rights), and reforming farmland tax policy.

Research in Progress

The following research activities are currently underway on various New Jersey planning initiatives.

- John Renne is a Ph.D. candidate at the Bloustein School of Planning and Public Policy and a Project Manager for the Voorhees Transportation Policy Institute. His current dissertation research looks at the implications of Transit-Oriented Development in New Jersey and throughout the United States.

- David Salvesen and Raymond Burby at the UNC Chapel Hill Center for Urban and Regional Studies are currently conducting a study that examines the impact of new building codes in New Jersey and Maryland on the number of, and dollar value invested in, rehabilitation projects throughout those States.

- NJDOT has hired DMJM + Harris to conduct a comprehensive transportation and land use assessment of the U.S. 1 corridor between Trenton and New Brunswick. The goal of this project is to analyze the relationship between several highway capacity improvement projects and the goals of the SDRP.

- Feather O'Connor Houstoun has recently completed a study for the William Penn Foundation in which she examines the impacts and limitations of the New Jersey State Plan compared to other growth management initiatives in other States.

[125] New Jersey Future (2001).

5.2 Monitoring Efforts

According to the State Planning Act, the SDRP must be revised and re-adopted every three years. There are a number of tools that the State uses to monitor, evaluate and adopt the plan during each time period.

The cross-acceptance process is used each time the plan is readopted. It ensures consistency between the regional-level SDRP and local-level comprehensive plans, which inevitably have jurisdiction over land use decisions. The Office of Smart Growth will begin the next round of cross-acceptance in March 2004. All 566 municipalities and 21 counties will have one full year to comment on the State Plan Policy Map (includes planning area designations, town centers, etc.), and current SDRP policies. All comments will be considered for revision before the SDRP is readopted.

The Infrastructure Needs Assessment provides information about existing capacity and forecasted need. It is revised and updated as often as the SDRP is readopted, and provides a framework for infrastructure investment decisions.

Finally, the State Planning Act requires that the effectiveness of the SDRP be monitored on an ongoing basis. The process monitors the same five categories that were used in the CUPR report: economic, environmental, infrastructure, community life and intergovernmental coordination. To monitor these areas, indicators have been identified for use as variables. Each indicator has been given a target goal and date whereby it is expected to have achieved that goal. The 2001 State Plan[126] identifies six main indicators (with specific targets) that are broad-based and cover all of the SDRP's goals:

1. New development, population and employment located in the Metropolitan and Suburban Planning Areas or within Centers in the Fringe, Rural and Environmentally Sensitive Planning Areas;

2. The amount of land permanently dedicated to open space and farmland preservation;

3. Percent of New Jersey's streams that support aquatic life;

4. Meet present and prospective needs for public infrastructure systems;

5. Progress in socioeconomic revitalization for the 68 municipalities eligible for Urban Coordinating Council assistance; and

6. The degree to which local plans and state agency plans are consistent with the SDRP.

[126] New Jersey Department of Community Affairs (2001).

In addition, there are 27 indicators (organized into the five main categories mentioned above) which are used to describe and evaluate the current status and effectiveness of the SDRP.

The Office of Smart Growth has plans to begin monitoring of the SDRP on a regular basis once the 2004 revision and readoption process is complete. Heretofore, it has relied on outside agencies, departments and organizations to monitor the effectiveness of the SDRP on development patterns throughout the State. The Office, along with other stakeholders, is also undertaking a process to revisit its performance measures. Its objective is to focus on a limited number of "headline" indicators that relate to core goals and objectives and also can be collected without an excessive level of effort. For example, the Office believes that the amount of development occurring in designated growth centers is a key measure that is not currently being tracked, and is examining ways of collecting this information. The Office also is examining transportation data to determine the most appropriate measures that can be collected.[127]

NJDOT has conducted some informal internal analysis to gain an understanding about their level of success of SDRP implementation and consistency. They have identified 20 smart growth projects that are in the funding pipeline. In addition they have begun utilizing the performance indicators recommended in the *Transportation Choices 2025* Long-Range Transportation Plan. Through informal monitoring, they found that 90 percent of their projects funded in 2002 were located in Planning Areas 1 and 2, with only a small fraction located in Planning Area 3. In addition, 96 percent of NJDOT's annual budget is used for preservation of the current system.

[127] Personal communication with Herman Volk, Office of Smart Growth, March 2004.

Appendix G

Case Study: Portland, Oregon

1.0 Overview

This case study discusses the history of comprehensive planning and growth management in the State of Oregon and the Portland metropolitan region, and related evaluation efforts. The case study is organized into the following sections:

- **Section 2.0** discusses historical and recent planning initiatives led by the State, the MPO, and other groups;
- **Section 3.0** describes studies undertaken to *forecast* the outcomes of programs directed at smart growth objectives;
- **Section 4.0** describes *policy* studies to evaluate how effectively these programs have been implemented; and
- **Section 5.0** describes *outcome* studies that have attempted to measure the actual impacts of state planning programs, as well as planned monitoring and evaluation efforts.

2.0 History of Comprehensive Planning

2.1 Planning Context

Geographical Context

The State of Oregon covers over 98,000 square miles, and is the ninth largest state in the United States. It is known for its preserved open space and natural beauty. Ten percent of the country's timber is located in Oregon's forests, and the State is the leading provider of lumber nationwide. Oregon also is home to many of the country's highest mountains, including Mt. Hood which stands 11,239 feet above sea level.[128]

Although Oregon is perceived as a rural state, three quarters of the State's 3.4 million residents currently live in cities or towns, and almost half live within the boundaries of the Portland metropolitan area. Oregon has seen rapid population growth in recent years. Between 1990 and 2000 the population increased by 20.4 percent, representing the 11th largest percent increase during that time period nationwide. This population growth was concentrated in the Portland region.[129]

The Portland-Vancouver, Oregon-Washington Metropolitan Statistical Area (MSA), as defined in the 2000 U.S. Census, contains six counties: Clackamas, Columbia, Multnomah, Washington, and Yamhill in Oregon; and Clark County in Washington. The population of the MSA in 2000 was 1.9 million. The region experienced a population growth of 26.3 percent between 1990 and 2000. This increase is the 33rd highest percent change out of 280 MSAs around the United States, and is a growth rate twice that of the national average. Although Portland is the most densely populated city in the State, the recent population growth has predominately occurred in the outlying areas of the metropolitan region.[130] Population forecasts predict an annual growth rate of 1.8 percent, reaching a total population of 2.3 million by 2010.[131]

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[128] http://www.netstate.com/states/geography/or_geography.htm; accessed 12/23/2003.

[129] U.S. 2000 Census, www.census.gov.

[130] Institute of Portland Metropolitan Studies (2003).

[131] *Ibid*., page 47.

Political Context

Thirty-six counties comprise the State of Oregon. Before 1958, counties acted as agents of state government. A 1958 constitutional amendment allowed home rule charters. Since then, nine counties have chosen to adopt a charter, enabling voters to elect their own county government organization.[132]

Portland Metro (originally known as the Metropolitan Service District) was established in 1979 by popular vote. It is charged with providing services to a region of three counties (Clackamas, Multnomah and Washington) and 24 cities that at the time of its establishment comprised the Portland metropolitan area. As of 2000, these counties included about 1.44 million people, or three-quarters of the MSA's population. Metro's responsibilities include regional land use planning, transportation planning, and other regional service provision. Metro is the only directly elected regional government in the United States with a home-rule charter.

Clark County, Washington (population 345,000) lies just across the Columbia River from Portland and is considered part of the Portland-Vancouver MSA. Clark County lies within commuting distance of downtown Portland and is connected by two freeway bridges (I-5 and I-205). Clark County is subject to the growth management regulations of Washington rather than Oregon.

2.2 Policy Initiatives Undertaken

State Initiatives

Planning Legislation

Oregon's history of local planning and zoning goes back as far as 1919, with the first municipal level legislation for land use control. In 1947, counties were awarded the authority of land use planning. It was not until 1969 that local governments were required to complete comprehensive plans and to zone their land with the adoption of Senate Bill 10. This bill was the first in a series of legislative acts mandating growth control policies throughout Oregon. State legislative and administrative actions related to growth management and comprehensive planning include:

- **1969 Senate Bill 10 –** The original land use planning act, Senate Bill 10 not only required that local governments plan and zone their land, it also allowed the governor to enforce land use regulations on areas not regulated by county and city governments. The bill also established 10 statewide planning goals, the first in the country, which were adopted in a general election in 1970.

[132] Oregon Historical County Records Guide, www.sos.state.or.us/archives/county/cpctygov.html.

- **1971 Coastal Zone Management Act –** This act created the Oregon Coastal Conservation and Development Commission and established a mandate to prepare a comprehensive plan that would regulate development along the coast, superseding any other overlapping local plans.

- **1973 Senate Bill 100 –** This bill reinforced the requirements set forth in Senate Bill 10. It required that every local government not only prepare a comprehensive plan, but that it be consistent with the aforementioned statewide planning goals. It also required that communities establish urban growth boundaries (UGB). The Land Conservation and Development Commission (LCDC) was established to oversee statewide planning activities.

- **1973 Senate Bill 769** – The Columbia Region Association of Governments (CRAG), established in 1967 as a council of governments, was given the authority to coordinate planning in the three-county Portland region. CRAG was responsible for the proposal of the first urban growth boundary in the State when it adopted the Portland region's UGB in 1977.

- **1974 Adoption of Statewide Planning Goals –** LCDC conducted extensive public outreach efforts to establish and adopt 14 statewide planning goals. These goals required that every county and city in the State of Oregon prepare a compliant comprehensive plan within one year. Five additional goals were adopted by 1976.

- **1975 Establishment of 1000 Friends of Oregon –** Governor Tom McCall created 1000 Friends of Oregon, a nonprofit organization, to oversee and monitor the implementation of Senate Bill 100.

- **1980 Urban Growth Boundaries –** LCDC revised the 14th statewide planning goal, urbanization, to require that all cities adopt UGBs.

- **1989 Oregon Shines Strategic Plan and Creation of Oregon Progress Board –** In response to the economic slowdown of the 1980s, the Legislature introduced the Oregon Shines strategic plan to boost the state economy. In addition, it created the Oregon Progress Board to monitor and measure the success of the strategic plan's goals through a series of benchmarks.

- **1991 Transportation Planning Rule –** LCDC established the Transportation Planning Rule in an effort to coordinate land use and transportation planning with the overall goal of reducing the number of vehicle trips on state and local roadways. The rule requires that all local governments with jurisdiction over a population of 2,500 or more develop and implement a transportation system plan that supports multiple modes of travel.

- **1993 Transportation and Growth Management Program –** ODOT and the Department of Land Conservation and Development (DLCD) collaborated to create the joint Transportation and Growth Management Program (TGM). The program assists local governments in land use and transportation coordination in an effort to make more

efficient use of the transportation infrastructure, and to facilitate the creation of more livable neighborhoods and vital centers.

- **1995 House Bill 2709 (Buildable Lands and Housing Needs) –** This law codified current planning practices and growth management strategies. A consistent process for establishing urban growth boundaries (UGB) was created, and county and city population forecasts were coordinated. House Bill 2709 also required local governments to create an inventory of buildable land and project their future housing needs. Those areas that were not able to meet forecasted needs were required to demonstrate the implementation of strategies to meet these needs, such as expanding UGBs or increasing residential density requirements.

Urban Growth Boundaries

State legislation adopted in 1973 required every municipality with a population of over 2,500 to adopt an urban growth boundary as part of its comprehensive plan. The legislation required that "lands within the UGB be available for development concurrent with the provision of key urban facilities and services in accordance with locally adopted development standards…" and should be able to accommodate growth over a 20-year period.[133]

UGBs are implemented through comprehensive plans, agreements between local governments, and the state land use system. Oregon has established a four-tiered system of handling disputes that may arise. First, any disputes over the boundary or related zoning, development permits, etc., are considered at a local level before a hearing officer. Second, the decision may be appealed to the local government's city council or board of county commissioners. Third, an a appeal may be made to the state Land Use Board of Appeals (LUBA), a three-member board appointed by the governor and confirmed by the State Senate. Finally, decisions made by the LUBA may be appealed to the State's circuit courts. In addition to these appeal methods, mediation is a common way of resolving disputes between local governments. The State provides some funding for dispute mediation services.[134]

Comprehensive Planning

Oregon's land use law requires that every county and incorporated city submit a comprehensive plan, consistent with statewide planning goals. Unincorporated communities (those that are mostly rural or agricultural, lie outside of the urban growth boundary of any city, and are not incorporated as a city) must have set boundaries established by the county that distinguish this area from exception areas, resource or other rural lands.

[133] ORS 197.712 and 197.752, as cited in Anderson (1999).

[134] Anderson (1999).

Established unincorporated communities must be included in the county's comprehensive plan and planning process.[135]

The Land Conservation and Development Commission is comprised of seven citizen members who are appointed by the governor and confirmed by the State Legislature. The LCDC reviews local comprehensive plans and plan amendments for general requirements and statewide planning goal consistency. The Department of Land Conservation and Development serves as the administrative partner to the LCDC. The DLCD provides technical assistance and administers grants to local governments. It also is responsible for developing new legislation and policies in response to current trends and issues.

Statewide Planning Goals

By 1976, the LCDC had adopted 19 statewide planning goals to guide cities and counties in their comprehensive plan adoption process.[136] Goals number 2, 12, and 14 are most relevant to growth management strategies.

Goal 2: Land Use Planning – The purpose of Goal 2 is "to establish a land use and planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions." It provides explicit guidelines for the content required in a comprehensive plan. Goal 2 also states that plans must be consistent with state and other regional and local comprehensive plans. Each plan must state clearly how they will meet the statewide planning goals, and include specific implementation measures that will be used to meet these goals. Two types of implementation measures are required: management implementation measures and site and area specific implementation measures. These can include ordinances that control land development, building permits and public facility construction plans, in addition to others.

Goal 12: Transportation – Goal 12 aims "to provide and encourage a safe, convenient and economic transportation system." Transportation plans should, among other things, conform with local and regional comprehensive land use plans. The planning and implementation guidelines provided in Goal 12 include statements about the integration of land use and transportation infrastructure. For example, the guidelines state that "lands adjacent to major mass transit stations, freeway interchanges, and other major air, land and water terminals should be managed and controlled so as to be consistent with and supportive of the land use and development patterns identified in the comprehensive plan of the jurisdiction within which the facilities are located." The implementation section provides specific impact areas that must be studied in the process of creating plans for new transportation facilities, including local land use patterns.

Goal 14: Urbanization – The purpose of Goal 14 is "to provide for an orderly and efficient transition from rural to urban land use." Urban growth boundaries are the required tool

[135] Oregon Statute ORS 197.040.

[136] Oregon Department of Land Conservation and Development (no date).

that will create this transition. The implementation guidelines describe specific tools that can be utilized to manage the size and shape of future development. These tools include the phasing of public facilities, the phasing and location of transportation facilities, financial incentives (such as tax incentives or disincentives), local land use controls, multiple use and joint development practices, and capital improvement plans.

Metropolitan Initiatives

A number of state legislative actions, as well as regional initiatives, have enabled or provided resources for planning specifically for the Portland metropolitan area. The more significant initiatives for this region are discussed below.

Regional Government

The Portland Metropolitan Service District was established in 1979 by the voters in the Portland region and is the only directly elected regional government in the United States with a home-rule charter. This agency inherited the functions of the previous Columbia Region Association of Governments (CRAG) and was given additional responsibilities. Its name was officially changed to "Metro" in 1992. Its responsibilities include regional land use planning, transportation planning, solid waste disposal, operation of the city's zoo and convention center, acquisition and management of parks and open space, and relevant data collection and dissemination.

Metro has undertaken regional land use policy and transportation initiatives with the objective of shaping development in the region. It adopted the first regional transportation plan in 1982. The plan has been revised periodically and most recently was readopted in 2000. The Region 2040 Growth Concept was adopted in 1995 and the Urban Growth Management Functional Plan was adopted in 1996 (both discussed below).

Urban Growth Boundary

The first Urban Growth Boundary for the Portland region was set in 1977 by CRAG, and approved by the State in 1980. An Intermediate Growth Boundary (IGB) also was in effect through 1985, limiting urban development to certain areas with the long-term UGB.[137] Land was set aside in urban development reserves outside the growth boundary, to allow for future expansion of the boundary.

Metro inherited the original boundary and made only minor adjustments until 1998 and 2002, when it expanded the UGB to accommodate projected 20-year population growth. The 1998 expansion added 4,000 acres, bringing the total land inside the boundary to 236,000 acres (369 square miles). In 2002, an additional 18,600 acres were brought inside the boundary, in order to accommodate forecast population growth through 2022.

[137] Nelson and Duncan (1995).

Region 2040 Growth Concept

In 1990, Metro initiated an extensive public process to develop a 50-year growth concept for the region. This process started with the adoption of Regional Urban Growth Goals and Objectives (RUGGO) by Metro in 1991. The process culminated in the adoption of the *Region 2040 Growth Concept* in 1995.[138] The Growth Concept fulfills the statewide requirement for a long-range plan and defines the form of regional growth and development for the Portland region. The Growth Concept is based on the following principles:

- Expanding the UGB to a modest extent;
- Using land more wisely through infill and redevelopment, emphasizing higher-density and mixed-use development in key centers and corridors;
- Focusing jobs and shopping closer to where people live;
- Expanding transportation choices; and
- Protecting prime farmland, rural reserves, open spaces, and other environmentally sensitive lands.[139]

A key feature of the 2040 Growth Concept is a map illustrating the location of 11 types of designated planning design types based on their land use types, location, and existing transportation infrastructure. These design types include central city, regional centers, town centers, main streets, corridors, station communities, inner neighborhoods, outer neighborhoods, regionally significant industrial areas, industrial areas, and employment areas.

Urban Growth Management Functional Plan[140]

The Urban Growth Management Functional Plan, adopted by Metro in 1996, establishes a set of requirements and tools to be used to reach the goals set out in the *Region 2040 Growth Concept*. The Functional Plan describes 12 titles:

Title 1: Requirements for Housing and Employment Accommodation – Each city and county must allow development based on determined capacity for jobs and housing. If a city or county would like to reduce capacity in a specific location, it must be accommodated in another location.

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[138] Metro, "2040 Growth Concept," http://www.metro-region.org/article.cfm?articleid=231, accessed December 2003.

[139] City of Portland, Office of Transportation (2002).

[140] Metro, "Urban Growth Management Functional Plan Summary," http://www.metro-region.org/article.cfm?articleid=274, accessed December 2003.

Title 2: Regional Parking Policy – The Functional Plan includes a regional parking policy to establish appropriate minimum and maximum parking space requirements for different types of development.

Title 3: Water Quality, Flood Management and Fish and Wildlife Conservation – Title 3 contains performance standards that affect location and types of development to protect against flooding, water pollution and erosion.

Title 4: Industrial and Other Employment Areas – Certain areas have development restrictions placed on them in the form of maximum square footage of a given type of use. Non-industrial uses are limited in designated industrial areas. Retail uses in designated employment areas are limited to less than 60,000 square feet unless adequate transportation facilities are in place to support larger uses.

Title 5: Neighbor Cities and Rural Reserves – In an effort to protect existing green corridors, Title 5 requires that comprehensive plans that share jurisdiction of these areas adopt policies that establish them as rural reserves.

Title 6: Central City, Regional Centers, Town Centers and Station Communities – Development in designated centers is encouraged in the 2040 Growth Concept. The Functional Plan supports this effort by providing assistance to centers to identify barriers to development and implement strategies and incentives to attract investment and growth.

Title 7: Affordable Housing – All cities and counties are held responsible for providing housing opportunities for people of all income levels. Title 7 requires that each local government implement methods in their plans to supply a range of housing options.

Title 8: Compliance Measures – Title 8 insures that the 2040 Metro Growth Concept is implemented equally across all cities and counties, and that all local governments are held to the same standards.

Title 9: Performance Measures – Indicators have been identified to measure the success of the 2040 Growth concept and the Functional Plan. Local governments are required to gather necessary data, and the indicators are analyzed at the local and regional level. Policy changes are made based on these outcome measures.

Title 10: Definitions

Title 11: Planning for New Urban Areas – Title 11 addresses the handling of areas brought inside the urban growth boundary. This land must be included in the comprehensive plan before it can be developed.

Title 12: Protection of Residential Neighborhoods – Title 12 protects existing neighborhoods from air and water pollution, noise and crime, and establishes appropriate levels of adequate services.

The Functional Plan came into effect in February 1997. Jurisdictions had two years to comply with the requirements contained in Titles 1, 2, 4, 5, and 6. Not all jurisdictions were able to amend their comprehensive plans and implementing ordinances by these dates. Time extensions as late as December 2002 were granted by Metro to a number of jurisdictions to complete their compliance efforts. The plan was amended in 2002, and new items have been introduced for which compliance requirements are ongoing.

Metro's Centers Program[141]

The 2040 Growth Concept promotes a land use pattern of higher-density and mixed-use development in designated centers. In addition to the central city of Portland, there are seven regional centers, 30 town centers, and numerous station communities and main streets designated in the plan. Although some of these areas already are developed, many of them could hold a higher concentration of residential or employment areas to make more efficient use of existing infrastructure. The Centers Program is intended to promote infill development and the reuse of existing building in designated centers. Intensive, mixed-use development is being promoted around transit stations, institutions and large employment centers. In addition to promoting a mix of uses in centers, the Centers Program outlines land uses that are not appropriate. These include auto dependent uses, excessive parking, storage facilities and large areas of impervious surfaces.

In November 2003, Metro approved a resolution naming Beaverton as the pilot for the Centers Program, and appropriated $100,000 for developing a strategy for the pilot center as a model. The city already had completed most of the necessary planning for the center, and Metro's pilot project will identify barriers to growth and opportunities and actions for further developing the area consistent with growth objectives.

City of Portland Comprehensive Plan

In compliance with the requirements of the LDCD, the City of Portland adopted a comprehensive plan in 1980 that address the 14 statewide goals that apply to an urban area. The plan also is consistent with the regional goals adopted by Metro, and those of the adjacent communities such as Multnomah, Washington and Clackamas Counties.[142]

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[141] Metro, "Mixed Use Centers," http://www.metro-region.org/article.cfm?articleid=6547, accessed December 2003.

[142] City of Portland Bureau of Planning (2003a).

2.3 Transportation Linkages

Statewide

The State of Oregon has initiated strong policies in an effort to coordinate the integration of transportation and land use. ODOT and DLCD are held equally responsible for shaping the State's growth, and are expected to work collaboratively to achieve the relevant statewide planning goals.

Transportation Planning Rule

The Transportation Planning Rule (TPR) was adopted in 1991 by LCDC and DLCD. The TPR's goal is to "support a pattern of travel and land use in urban areas which will avoid the air pollution, traffic and livability problems faced by other areas of the country."[143] The TPR requires that each local jurisdiction adopt a transportation system plan (TSP) that will reduce vehicle miles traveled (VMT) and coordinate land use and transportation infrastructure. Comprehensive plans should promote increased densities among transit corridors of both residential and commercial buildings to achieve a better jobs to housing ratio balance. When improvement projects are proposed for local roads, a number of scenarios must be analyzed to assess the impacts and identify the option that best fits with the goals of the TPR.

The TPR requires that the City of Portland adopt a TSP that will reduce VMT per capita by 10 percent over a 20-year period from the date that the plan is adopted. The other larger cities in the State are required to adopt plans that will reduce VMT by five percent.

Oregon Transportation Plan

ODOT is governed by the Oregon Transportation Commission (OTC), a citizen commission appointed by the Governor. In 1992, the OTC adopted the Oregon Transportation Plan (OTP) as a series of guidelines for ODOT to follow in developing statewide plans and policies for all modes of travel.[144] The goal of the OTP is "to guide the development of a safe, convenient and efficient transportation system, which promotes economic prosperity and livability for all Oregonians." The OTP meets the requirements of the Transportation Planning Rule. All local plans must be consistent with the OTP.

The OTP has four major goals, pertaining to characteristics of the system, livability, economic development, and implementation. The livability goal is to "develop a multimodal transportation system that provides access to the entire state, supports acknowledged and comprehensive land use plans, is sensitive to regional differences, and supports livability

[143] 1000 Friends of Oregon (2002).

[144] Oregon Department of Transportation (1992).

in urban and rural areas." The OTP is linked to state benchmarks that measure urban mobility, air quality and economic prosperity. The OTP also includes level of service targets for each geographic region by transportation mode.

1999 Oregon Highway Plan

The Oregon Highway Plan[145] was adopted in 1999 and is the most influential of all statewide modal plans. The plan is extensive, and goes much further than simply setting goals of moving people and goods efficiently and safely. The Policy Element includes a Land Use and Transportation section, addressing ways in which highways can have a strong influence at the local community level and vice versa. The Land Use and Transportation Policy "emphasizes development patterns that maintain state highways for regional and intercity mobility and compact development patterns that are less dependent on state highways than linear development for access and local circulation."

Many of the actions associated with the Land Use and Transportation Policy emphasize development in accordance with the tenets of smart growth. These include working with local governments to develop and implement plans that support compact development, and developing design guidelines for highways that accommodate a range of automobile, pedestrian, bicycle and transit modes. In addition, the policy section identifies four highway segment designations to guide planning and management decisions for state highways. These designations are: Special Transportation Area; Commercial Centers; Urban Business Areas; and Urban. These classifications are utilized in collaboration with local governments in land use planning activities such as comprehensive plan and zoning code reviews, major development proposals, site acquisition, urban growth boundary amendments, and developing major investment studies. The policy also distinguishes between areas that are inside of urban growth boundaries and those that are outside, and identifies types of development that are appropriate in each area.

The Special Transportation Area (STA) designation is a unique and innovative method for furthering Oregon's state land use. An STA is "a designated compact district located on a state highway within an urban growth boundary in which the need for appropriate local access outweighs the considerations of highway mobility…and convenience of movement…and is focused upon pedestrian, bicycle and transit modes." In addition, an STA has most but not necessarily all of the following attributes: mixed uses, closely spaced buildings with minimal setbacks, sidewalks, interconnected local street networks, parking on-street and behind or to the side of buildings, and convenient automobile and pedestrian circulation within the center and off the state highway.

STA designation by ODOT is followed by a collaboration with the local jurisdiction to create a management plan that includes goals and objectives, defined boundaries, design standards, strategies to address through traffic and parking, a methodology for analysis of regional and local impacts, identification for improvements and operational strategies.

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[145] Oregon Department of Transportation (1999a).

Transportation and Growth Management Program

In 1993 DLCD and ODOT created the Transportation and Growth Management Program (TGM) to further the initiatives set forth in the TPR and the subsequently adopted Oregon Highway Plan. The focus of the program is "to plan for livable neighborhoods and vital centers – connected by an efficient transportation network that provides convenient options for travel and commerce."[146] The TGM program has four tools that are available to help local governments work to reach this goal:

- **Grants –** TGM program grants can be used by local governments to develop local transportation system plans and implementation measures, land use plan changes which help meet transportation needs, and urban management strategies.

- **Design Assistance –** The TGM Quick Response Team will produce transportation efficient design alternatives for development proposals. The team will work individually with a community or a developer to meet smart development design objectives.

- **Code Assistance –** TGM staff will assist local government officials in preparing and amending transportation system and land use plans, and applying urban growth management tools.

- **Education –** The TGM outreach staff conduct workshops for practitioners to promote the understanding and acceptance of smart development principles.[147]

Metropolitan Region

Transportation Plans and Programs

Metro's Regional Transportation Plan (RTP) is a blueprint for transportation improvements over a 20-year period. The first RTP was adopted in 1982, and it was most recently readopted in 2000, with more amendments made in 2002. The 2000 RTP supports the Region 2040 Growth Concept through policies linking transportation and land use, and through strategic investments that support desired growth patterns. Examples of policies and objectives supporting the Growth Concept include:

- Ensure the identified function, design, capacity, and level of service of transportation facilities are consistent with applicable regional land use and transportation policies as well as the adjacent land use patterns;

[146] Oregon Transportation and Growth Management Program (2003).

[147] 1000 Friends of Oregon, 2002, page 20.

- Design regional streets with a modal orientation that reflects the function and character of surrounding land uses, consistent with a regional street design classification system;

- Design local street systems to complement planned land uses and to reduce dependence on major streets for local circulation;

- Provide street, bicycle and pedestrian connections to transit routes within and between residential, commercial and employment areas and other activity centers;

- Support the development of innovative tools, including transit-oriented development, the location efficient mortgage and others; and

- Place the highest funding priority on projects and programs that best serve the transportation needs of the central city, regional centers, intermodal facilities and industrial areas.

1000 Friends of Oregon, a growth management advocacy group, notes that some shifts in transportation priorities have been noted in the region. In 1997, the region decided not to build a beltway around its most rapidly growing southwestern quadrant. Over the next 40 years, the region plans to build only a few short highway segments totaling less than 40 miles. The region opened a first light rail line, to the eastern suburbs, in 1986; in 1998, a second rail line to the western suburbs, 18 miles long, opened.[148] A review of the 2020 "priority" (financially constrained) system identified in the RTP suggests that it places a strong funding emphasis on alternative modes. Of road-related funding, 30 percent is targeted specifically towards bicycle and pedestrian improvements.

Transit-Oriented Development

Transit-oriented development began in the Portland region in the early 1980s with the Eastside Transit Station Area Planning Program. This program coincided with the MAX Light Rail Eastside extension, which began operating in 1986. The initial program was successful in increasing property values around the stations, but did not promote the type of development that was expected.[149]

In the early 1990s, in anticipation of the opening of the MAX Light Rail Westside extension, Tri-Met and the Cities of Portland, Beaverton, and Hillsboro began the Westside Station Area Planning Program. Learning from the experiences on the Eastside line, the program attempted to collaborate with local governments by updating comprehensive

[148] www.friends.org, accessed January 2004.

[149] www.todadvocate.com/pdxcasestudy.htm, accessed December 2003.

plans and amending development regulations to encourage transit-oriented development in the station areas.[150]

In 1998 Metro's Transit-Oriented Development (TOD) Implementation Program added to these efforts for both the Eastside and Westside branches of the lines. The program was designed to make TOD more financially feasible by providing incentive programs. Available funds are used for appropriate TOD site acquisition. After being planned and reparceled, the property is sold to developers under an agreement that the development will be in accordance with TOD principles. The purchase price of the land is written down when the cost of required development would be prohibitive to the private developer.[151]

Transit-Oriented Development Tax Exemptions

In 1996, the City of Portland adopted this program to promote the construction of higher-density residential units near transit stations. Eligible projects are relieved of property taxes on residential improvements for up to 10 consecutive years. The projects must satisfy specific density and affordability requirements. Developments with facilities that serve the public, such as child care centers, are held to slightly lower density and affordability standards. Applicants must demonstrate that the project would not be financially feasible without the tax exemption status.[152]

Tri-Met's Transit Investment Plan

Tri-Met, the regional transit authority, released the first Transportation Investment Plan in 2002. It has a five-year scope, and is updated annually. It integrates the 2040 Growth Concept and Regional Transportation Plan goals to promote regional livability. Although the focus of the plan is on transit service and facility improvements, Tri-Met is committed to working with other agencies to promote transit-oriented development and improve regional accessibility.[153]

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[150] Ibid.

[151] Metro, Transit-oriented Development Implementation Program, http://www.metro-region.org/article.cfm?ArticleID=140, accessed December 2003.

[152] Tri-Met (2002).

[153] Tri-Met (2003).

3.0 Forecast Outcomes

3.1 Making the Land Use, Transportation, Air Quality Connection (LUTRAQ)

The LUTRAQ project was initiated in 1988 by 1000 Friends of Oregon in response to a proposal for a new highway through Washington County, part of the Portland metropolitan region. Opponents of the Western Bypass argued that the answer to accommodating future population growth was not increased freeway capacity. The creators of the LUTRAQ model set out to demonstrate that land use patterns could influence travel mode choice, and that non-auto modes could help reduce traffic congestion. The LUTRAQ model presented a different growth scenario which was included in ODOT's environmental impact statement for the Western Bypass, and ultimately adopted as the preferred alternative to accommodate future growth.

The LUTRAQ alternative follows the basic principles of smart growth; more density near transit stations, walkable communities, mixed-use neighborhoods, a range of transportation options, and ample public open space. The LUTRAQ scenario was compared to both a no build and a highways only scenario in a number of transportation-related outcome measures. The analysis showed that after a period of 20 years, the LUTRAQ scenario would outperform the highways only scenario on all criteria. Table 3.1 shows the transportation outcome analysis data for the urbanized area of Washington County.

In an attempt to better predict travel demand based on physical land use, the LUTRAQ regional travel demand model included a "pedestrian environment factor." This factor incorporated four attributes of a neighborhood's built environment: ease of street crossings, sidewalk continuity, local street connections and topography. Analysis and predictions showed that incorporating these factors into a neighborhood could reduce VMT per household by up to 10 percent.

The land use and transportation alternative identified through the LUTRAQ model was integrated into Metro's 2040 Growth Concept plan. The same principles were utilized in development of the Transportation Planning Rule and Tri-Met's Station Area Planning initiative. The LUTRAQ effort has been successful in integrating the plans and policies of many state and regional agencies to guide future growth in a cooperative manner.

Table 3.1 Transportation Performance Measures from the LUTRAQ Study[a]

	No Build	Highways Only	LUTRAQ	LUTRAQ TOD Areas Only
Work Mode Trip Choice:				
Walk/Bike	2.8%	2.5%	3.5%	5%
Transit	7.5%	8.8%	18.2%	28.2%
Carpool	14%	13.6%	20.1%	17.2%
Drive Alone	75.8%	75.1%	58.2%	49.6%
Vehicle Trips/Household	7.53	7.5	7.17	5.79
Vehicle Hours of Delay (compared to No Build)	-	-43%	-53.2%	
Vehicle Miles Traveled (compared to No Build)	-	1.6%	-6.4%	

[a] 1000 Friends of Oregon (1997).

3.2 Metro's 2040 Growth Concept

The process of adopting the 2040 Growth Concept in 1995 involved predicting the shape of the region's future based on policies structuring development. The recommended alternative predicts the following:[154]

- A 40 percent population increase by 2017 will be accommodated by a two percent expansion of the urban area;
- Existing centers and corridors served by transit will accommodate 40 percent of all households and two-thirds of all jobs;
- Increased residential densities will only occur in 30 percent of existing neighborhoods, while 70 percent will be left unchanged;
- Fourteen percent of the land within the UGB will be dedicated open space; and
- A planned three-fold increase in transit service will result in a 300 percent increase in transit mode share of work trips in all regional centers.

[154] Tri-Met (1998).

4.0 Policy Evaluation

The following section describes studies and reviews that have been undertaken to assess the extent to which growth management policies have been effectively implemented by state, regional, and local agencies in Oregon.

Oregon's strict urban growth boundary and growth management policy have been the subject of much discussion and comment. While some studies have looked at measurable outcomes as a result of Oregon's policies (discussed in Section 5.0), there are a number of reports that make more general qualitative claims and comments on both experience both statewide and in the Portland region.

4.1 Urban Growth Boundaries

In a speech delivered at the Conference on Cities in North America in 1995, Ethan Seltzer, the Director of the Institute of Portland Metropolitan Studies, provided 10 "lessons learned" about smart growth in Portland.[155] There are a number of these lessons that are worth noting, and applicable to other areas:

- Citizen involvement in planning provides legitimacy, generates ideas and lends ownership to the eventual plan;
- Leaders are important, as are strong citizen coalitions;
- Growth management incurs costs as well as providing benefits; and
- An urban growth boundary must be accompanied by a growth management plan to be effective.

This last point is a message found in other studies. A report by Cambridge Systematics for the New Jersey Department of Transportation reviewed Oregon's approach to transportation demand management. The review noted that Oregon's experience has shown that although an urban growth boundary alone can be effective at preserving farmland outside, it will not prevent the development of sprawl within the UGB. The report found that "steps taken to streamline the permitting process and provide developers with

[155] Institute of Portland Metropolitan Studies (2003).

predictability actually facilitated conventional suburban development patterns within the growth boundaries."[156]

Nelson and Duncan speak specifically about some of Oregon's additional problems. There has been disagreement about how much land to include within the UGBs. Developers and citizens have consistently pressured municipalities to include more land in their UGBs. In the case of Salem, LCDC rejected the comprehensive plan twice stating that there was more land included than necessary based on population projections. In 1982 LCDC finally accepted the plan after facing serious political pressure. The state court of appeals then overturned the acceptance citing a violation of state goals. The UGB was ultimately redrawn with 2,400 acres less of undeveloped land. 1000 Friends of Oregon similarly claimed in the 1980s that the UGB includes 21,000 more acres than are needed to accommodate growth. In response, Metro argued that existing suburban developments scattered throughout the region had committed the land to urban development.[157]

4.2 Region 2040 Growth Concept

The Portland region's Growth Concept was adopted relatively recently (1995) and therefore has not been evaluated to the same extent as statewide growth management policies. However, some early evaluations have focused on the extent to which local plans, as well as development patterns, are consistent with the Growth Concept and the requirements of the Urban Growth Management Functional Plan, which came into effect in 1997.

Evidence does suggest that counties and cities have made changes to zoning and subdivision regulations consistent with the Functional Plan. Such changes include higher-density and mixed-use zoning in designated centers (including transit station areas), subdivision requirements for street connectivity and pedestrian facilities, and more detailed design requirements in some centers. Portland Metro is monitoring plan implementation through its annual compliance reports, the first of which was issued in 2002.[158] As of the December 2002 compliance deadline, Metro found that the 27 jurisdictions in the region (24 cities and three counties) had reached a compliance rate of 93 percent. (The compliance rate is not the total number of jurisdictions meeting all requirements, but rather reflects jurisdictional compliance with each of 17 elements of the six Titles of the Functional Plan, excluding Title 7, Affordable Housing.) By December 2003, the compliance rate had reached 98 percent. Examples of changes made by local jurisdictions to comprehensive plans and zoning include:

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[156] Cambridge Systematics, Inc. (2000).

[157] Nelson and Duncan (1995), page 77.

[158] Metro (2002). *Urban Growth Management Functional Plan: Annual Compliance Report.* Portland, Oregon.

- Setting minimum densities by area type;
- Increasing zoned capacities for dwelling units and jobs;
- Permitting accessory dwelling units;
- Permitting partitioning of lots at least twice the size of the minimum lot size;
- Restricting the locations of large-scale retail uses;
- Protecting industrial and employment areas (partitioning standards); and
- Setting parking requirements, including minimums and maximums, blended parking ratios, and limits to the amount of land dedicated to parking.

To the extent that requirements were not met by the reporting deadline, Metro staff will continue to work with jurisdictions to complete the compliance work. A third compliance report will be issued in December 2004.

Regional street design guidelines and street connectivity standards were also initially required under the Functional Plan, but were moved to the Regional Transportation Plan in 2000. All jurisdictions have complied with adopting the street design and connectivity requirements. With respect to designated centers (regional centers, town centers, etc.), in addition to the above zoning changes, jurisdictions are required to: develop strategies to enhance centers, including siting of government offices in centers; designate Special Transportation Areas (STAs) for use in statewide transportation policy; and report on progress on development in centers.

One criticism of the region's growth management strategies has been that they are not resulting in the expected and often required densities in designated urban centers. In 2001, Metro commissioned ECONorthwest to study this issue.[159] The study provides an economic analysis of two questions – what are the causes of lower densities, and what policies could have the most impact on increasing densities. The researchers reviewed a sample of recent projects and interviewed local officials and developers about factors influencing the nature and density of development. The findings of the study include:

- The primary reason for under-building in urban areas is the lack of financial feasibility. Absent assistance from the public sector, current market conditions do not allow redevelopment and infill construction in urban areas to be profitable;
- Land values are good indicators of when density becomes profitable. The public sector must use policy to increase the value of urban areas in order to make building at higher densities feasible;

[159] ECONorthwest (2001).

- Zoning is still ahead of the market. In order for land in urban areas to be developed according to zoning regulations and be profitable for developers, market conditions and public policy must reduce developable land regionwide, increase transportation and other amenities in urban areas, and create a greater demand for housing; and

- The fact that zoning is ahead of the market is not a condemnation of public policy. Zoning regulations currently require densities that are more urbanized than the Portland region currently is ready to be.

The report recommends policies that would be most effective at increasing density in urban centers, including continuing to allow dense development; reduce entitlement, planning and information costs to developers; providing regulatory relief; and providing direct financial incentives for development. As noted previously, Metro, Tri-Met and local jurisdictions are continuing to undertake initiatives with the objective of increasing development in centers.

5.0 Outcome Evaluation

This section describes studies to measure the outcomes of growth management and smart growth policies on transportation, land use, and other community and environmental indicators. Source of monitoring and evaluation data include:

- Statewide monitoring of Oregon Benchmarks by the Oregon Progress Board, and of transportation measures by the Oregon Department of Transportation;
- Regional monitoring of the 2040 Growth Concept by Portland Metro (the first monitoring report was published in 2003);
- Monitoring by the City of Portland of development trends and travel within the city; and
- Academic studies comparing growth trends and transportation conditions in the Portland region to those in other areas of the country.

Findings are reported for development trends and for transportation conditions. Study results on housing affordability also are described, as the relationship between growth boundaries and housing prices in the Portland region has been a widely debated topic.

5.1 Development Trends

Regional Monitoring

Hanley and Knaap (1998) attempt to measure the consistency of growth in the Portland region with regional objectives by examining building permit data from Washington County, collected over the 1990 – 1996 period. The permit data are acquired from Metro's Regional Land Information System. The authors focus on the proportion of development activity occurring in "special areas" including regional centers, town centers, main streets, and transportation corridors, which they note were first defined in 1992 as part of the 2040 growth plan development. As a baseline, they assume that the distribution of permits would have been proportional to land area. The authors find that:

- The percentage of commercial and multifamily permits issued in the special areas is disproportionately high, relative to the amount of land zoned for these uses;

- The percentage of industrial and single-family permits issued in the special areas is disproportionately low, relative to the amount of land zoned for these uses;

- The proportionalities do not seem to be increasing or decreasing over time.

The authors note that the results could be interpreted as supporting the success of growth management policies; namely, that higher-density development is occurring in the designated centers. On the other hand, they note that since this trend is not increasing over time, it is not clear that causality can be attributed to the 2040 growth plan itself.

The first regional monitoring report for the 2040 Growth Concept was issued by Portland Metro in 2003. At least some of the indicators in the report suggests that land use trends are generally following the patterns intended by the creators of the region's growth management policies. Land use measures indicate that:[160]

- Land zoned for industrial and commercial activities has decreased, while land zoned for mixed-use development increased;

- As intended in the 2040 plan, densities in existing neighborhoods have remained stable overall;

- New residential development is more compact, allowing the region to accommodate more residents per acre inside the UGB. Between 1996 and 2000, the average lot size declined, with development on lots larger than 5,000 square feet decreasing and development on lots smaller than 5,000 square feet increasing;

- In 2000, new single-family housing density averaged 6.2 units per acre, while new multifamily housing density averaged 21.6 units per acre;

- Sixty-two percent of the region's employment and 30 percent of the population is located in designated mixed-use centers and corridors;

- Single-family housing permits continue to be issued at a higher rate than multifamily housing permits, with single-family permits annually ranging from 50 to 80 percent of all permits (depending upon the state of the economy); and

- Metro has exceeded the open space acreage acquisition goal set for 1995.

[160] Metro (2003).

A report by Tri-Met indicates that lot sizes for new single-family residences dropped from 13,800 square feet in the 1980s to 6,200 square feet in 1995 (data sources unspecified). Townhouses went from almost no market share to 12 percent of market; redevelopment and infill accounted for 24 percent of all new residential development and 35 percent of new employment in 1995.[161] Tri-Met also reports that by the opening of the Westside light rail line in 1998, nearly 7,000 new houses and apartments were permitted or under construction in transit-oriented developments next to the line.[162]

ECONorthwest conducted a study for ODOT on the land use and growth impacts of highway improvements.[163] As part of this effort, the researchers compared urban development patterns over time, using satellite imagery, with the location of state highway corridors. The results showed that urban development patterns do not tend to cluster along highway corridors. However, it is possible that highway facilities allow greater access to other areas in the region and therefore encourage development there.

City of Portland

The City of Portland released a performance report in November 2003 that provides data on citywide development trends.[164] The report shows mixed results with respect to regional growth management objectives. Findings include:

- The City of Portland has reached its goal of capturing at least 20 percent of regional growth;
- Fifty-eight percent of multifamily units were built within 2040 mixed use centers between 1997 and 2002; over 70 percent of larger projects (40 units or more) were built in designated centers;
- Little development in the 2040 centers is actually being built at the required and expected densities;
- Most development in 2040 centers has required public subsidies of some type;
- Only a few of the 2040 centers are actually meeting Metro's goals for urban form and mix of goods and services; and
- Where infill development is occurring, it is frequently not meeting Metro's design standards and is often dominated by driveways and garages.

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[161] Arrington (1996).

[162] Tri-Met (1998).

[163] ECONorthwest (2001).

[164] City of Portland Bureau of Planning (2003).

This report suggests that while the performance measures on a *regional* level are generally consistent with goals, what is actually occurring at a *neighborhood* level is not what Metro and other local agencies have intended.

Comparisons with Other Areas

Recent studies have attempted to measure the impacts of the region's growth strategies on development patterns and compare these patterns with those of other metropolitan areas. Nelson (2001) compared recent trends in the Portland region and the State of Oregon to those in Atlanta and the State of Georgia in an attempt to measure the impacts of strong growth management strategies (Portland) compared to weak strategies (Atlanta). The study looked at the percent of developed land on the statewide level (data were not available at the regional level), obtained from the Natural Resources Conservation Service, as a means of determining development patterns. Population estimates were taken from the U.S. Bureau of the Census. The study found that both states had comparable population increases and a significant number of new acres developed. However, in Georgia developed land per resident increased by 30 percent, while in the Portland region it remained stable between 1987 and 1997 (Table 5.1).

Table 5.1 Land Developed 1987-1997, Oregon and Georgia[a]

State	Year	Developed Area	Percent Developed	Population	Developed Acres per Resident
Georgia	1987	2,698,200	7.8%	6,208,479	0.43
	1997	4,238,100	12.3%	7,486,094	0.57
	Change	1,539,900	57.1%	20.6%	30%
Oregon	1987	1,071,300	3.6%	2,700,996	0.40
	1997	1,295,500	4.3%	3,243,254	0.40
	Change	224,200	20.9%	20.1%	1%

[a] Nelson (2001). The source document identifies a 1997 developed acre per resident in Georgia of 0.97, a change of 125.6 percent from 1987. This appears to be a computational or typographical error and the "developed acres per resident" are calculated in this table based on developed area and population.

Nelson also attempted to show a difference in the mix of land uses between the two metropolitan areas. The American Housing Survey provides data on the change in land uses within 300 feet of all households. Nelson included these data in his study as an indicator of mixed-use development. The data shows that in Atlanta, the types of land uses that are increasingly located near housing are other residential areas and residential parking. Conversely, commercial, industrial and institutional land uses are decreasing. In contrast, commercial, industrial and institutional uses are increasingly located near homes, replacing other residential uses in Portland. This indicates that neighborhoods are

becoming more mixed-use in Portland, increasing accessibility and potentially reducing reliance on the automobile for work, school and shopping trips.[165]

The Portland, Oregon region was included in a recent comparison of urban form measures.[166] The study analyzed Portland (three counties); Orange County, Florida; and Montgomery County, Maryland in an attempt to measure the impacts of growth management programs on urban form. The study used GIS data from regional parcel-based land use databases, street network centerlines, and zoning to compute five urban form measures: street design and connectivity, density, land use mix, accessibility, and pedestrian access. The researchers found that development patterns in all five counties were similar. Generally, neighborhoods are becoming better internally connected while simultaneously becoming less externally connected. Out of the five counties in the study, Multnomah and Washington in Oregon were the only two where accessibility and pedestrian walkability to commercial land uses were not decreasing. The study concluded that Oregon's growth management tools have been effective at improving the urban form within subdivisions, but they have not been able to impact design at the regional level.

Another study used census data to examine trends in urban form at the neighborhood level since the 1940s in Washington County (the western county of the Portland area).[167] The study found changing trends in some (but not all) measures beginning in the 1990s. Single-family dwelling unit density has increased since the 1960s but is now increasing at a faster rate, and internal street connectivity and pedestrian access to commercial areas and bus stops have improved since the early 1990s. External connectivity (measured by distance between neighborhood access points) continues to decline, however, and the mixing of land uses remains limited. The authors conclude that "Portland is winning the war on urban sprawl at the neighborhood scale, or at least appears to have won some important battles; but progress remains elusive at the regional scale."

Other data suggest that overall growth patterns in Portland (measured by urban density) have not been all that different from other cities in the western United States. Researchers at the Brookings Institution[168] measured the urban density of metropolitan areas in 1982 and 1997, using population estimates from the U.S. Census and urbanized (developed) land area obtained from the U.S. National Resources Inventory's survey of land use, conducted every five years. The study found that the Portland-Vancouver region added 49 percent to its urbanized land area over this period, compared to a 32 percent population gain. These rates of increase were almost identical to the average rates of increase for metropolitan areas in the western U.S. The ratio of land urbanization to population growth was about the same in Portland-Vancouver as in the Seattle-Tacoma metropolitan area (weaker growth controls) and Salt Lake City-Ogden metropolitan area (no growth controls). Cities in the southwest – including Las Vegas, Phoenix, and San Diego – showed

[165] Nelson (2001).

[166] Song (2002).

[167] Song and Knaap (2004).

[168] Fulton, Pendall, Nguyen, and Harrison (2001).

higher rates of population growth relative to urbanized area growth. These areas also showed higher overall population densities in 1997 (6.7 to 7.5 persons per acre) than Portland, Seattle, and Salt Lake City (5.0 to 5.1 persons per acre).[169]

Regional Data Sources

The Portland region's comprehensive approach to planning has led it develop a thorough and well developed GIS so that policies can not only be implemented but also their effectiveness monitored. When Portland established its GIS, the regional government, Metro, had little digital data in its possession, and found itself desperately short of the funds required to set up the system from scratch. As such, Metro brokered a deal with the local electricity company that granted them access to the required data. In 1980, Portland General Electric (PGE) purchased aerial photographs of the region from which they digitized street center lines, tax lots, and street names. Ten years later, an agreement was reached for PGE to provide their CAD files to Metro free of charge in exchange for Metro both converting the files into polygons for use within a GIS, and for the subsequent maintenance of the dataset. The resulting polygons were linked to tax account information and formed the basis of Portland's GIS, the Regional Land Information System (RLIS). Over the following years, additional parcels have been added to the database, resulting in the level of accuracy increasing, which benefits all parties concerned. Metro purchases a rectified aerial photograph once per year, which subsequently requires three technicians to work for three months to perform the overlay procedure completely.

Metro envisions RLIS as the tool through which their regional framework plan policies can be tested and honed. These policies include the establishment of population and job growth targets for each jurisdiction; the reduction of parking in all future development; the protection of stream corridors and wetlands; the concentration of new commercial development in existing centers; the creation of affordable housing; and the management of traffic congestion. The demands on RLIS are therefore quite strenuous, requiring a comprehensive data set. In fact, 75 layers of demographic, employment, environmental, and transportation data are maintained for the entire region. Much of this information is geo-coded to the census bureau's TIGER line files, which contain street center lines, census tracts, and political boundaries. Among the vast amount of data that is collected are building permits, employer locations, vegetation cover, school and hospital locations, traffic analysis zones, and the updated tax lots initially translated from PGE's dataset.

A potential benefit from the creation of an extensive land use monitoring system such as RLIS is that it may be possible to generate additional revenue from selling advice or information based off of resulting modeling work. Portland's RLIS system is expected to generate $450,000 in 2004 for the MPO, money which will be spent on maintaining and

[169] Note that these data include the Vancouver, Washington metropolitan area, which is part of the Portland-Vancouver Consolidated Metropolitan Statistical Area but is not subject to State of Oregon growth controls.

improving the model itself. Although RLIS initially required state funding, it subsequently became a money maker through press releases, advertisements, and word of mouth that spread tales of the model's use and effectiveness in the private sector.

5.2 Transportation Conditions

Regional Monitoring

Metro's 2003 report provides data on key transportation measures. Increasing population growth throughout the region has resulted in a continued increase in traffic congestion on freeways. However, per person vehicle miles of travel stabilized since around 1995 and showed signs of dropping in 1999 and 2000. Concurrently, transit ridership has increased. Since 1990, ridership has grown at a faster rate than both population and VMT.[170]

A City of Portland report provides data on recent trends at the citywide and metropolitan level.[171] In addition to the development trend data discussed in Section 5.1, this report states:

- According to data from the Federal Highway Administration, Portland region residents have a lower VMT than residents in other metropolitan areas of comparable size (about 20 miles per day, compared to a range of 21 to 29 in other areas);
- VMT in the Portland metropolitan area declined steadily between 1998 and 2001 (by about five percent over this period); and
- Tri-Met reported a 50 percent increase in transit ridership between 1990 and 1999.

Statewide Monitoring

ODOT's 1999 *Oregon Transportation Plan Status Report* evaluates the progress of the plan through performance measures.[172] Performance measures related to access/mobility and land use are shown in Table 5.2 for 1990 and 1998. These statewide measures show a slight increase in commuting time, no change in single-occupancy vehicle (SOV) commuting rates, and a slight increase in VMT per capita in metropolitan areas.

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[170] Metro (2003).

[171] City of Portland Bureau of Planning (2003a).

[172] Oregon Department of Transportation (1999b).

Table 5.2 Statewide Transportation Performance Measures

Category	Measure	1990	1998
Access/Mobility	Percent of Oregonians commuting less than 30 minutes	88%	86%
	Percent of Oregonians commuting during peak hours by means other than a single occupancy vehicle	29%	29%
	Percent of Oregonians living in communities with daily intercity service	N/A	99%
	Percent of urban state and local highways with bicycle lanes and sidewalks	N/A	6%
Land Use	Annual VMT/capita in metropolitan areas	7,733	8,165

Oregon's long-term strategic plan, *Oregon Shines*, was initially adopted in 1992 and has been amended periodically ever since. The strategic plan established three goals: quality jobs for all Oregonians; safe, caring and engaged communities; and healthy sustainable surroundings. Each goal has a series of related objectives. Benchmarks and targets were created to measure progress and success periodically. The Oregon Progress Board was established to evaluate the benchmarks and monitor the State's progress. Table 5.3 shows the benchmarks relevant to transportation. The benchmarks show a slight increase in VMT per capita over the late 1990s and a decrease in non-SOV commuting mode share. Trends in hours of travel delay per driver cannot be identified.[173]

Table 5.3 Selected Statewide Benchmarks

Benchmark	1995	1996	1997	1998	1999	2000
68. Hours of travel delay per driver per year in urban areas						
a. Portland Metro	50	55	52			
b. All other	8	9	12			
70. Percentage of Oregonians who commute during peak hours by means other than a single occupancy vehicle		33%		29%		27%
71. Vehicle miles traveled per capita in Oregon metropolitan areas (per year)	7,982	8,105	8,175	8,165	8,247	

[173] Oregon Progress Board (2001).

Comparison with Other Areas

Nelson (2001) uses Nationwide Personal Transportation Survey (NPTS) data from 1990 and 1995 to compare statewide VMT per household in Oregon and Georgia. His analysis found that per household VMT in Georgia increased by nearly 17 percent over this period, compared to a 1.5 percent increase in Oregon. Comparing metropolitan journey-to-work trends using the same data set, he found that distance to work rose by 30 percent in the Atlanta metropolitan area but fell by two percent in the Portland metropolitan area, while commute time rose by 23 percent in Atlanta but only 13 percent in Portland between 1990 and 1995. In addition, transit and walk/bike mode share increased in Portland, but decreased in Atlanta.[174]

Travel Behavior in Portland Neighborhoods

A recent study looking at the impacts of new urbanist development on travel patterns was completed at Portland State University by Dill.[175] The study compares a new urbanist neighborhood, Fairview Village, with two control neighborhoods, Cherry Ridge and Hampton Pointe. All three are located in the Portland metropolitan region, were built at around the same time and have housing stock of similar size and value. The only major differences between Fairview Village and the two control neighborhoods are its new urbanist attributes: a range of housing types and sizes (multifamily and single family), smaller lot sizes, and the accessibility of shops and services. Surveys were administered to households in all three neighborhoods asking about household characteristics, factors important in choosing a home and travel patterns.

The results of the survey showed that residents in Fairview Village drive less, walk more and own fewer vehicles. Residents in Fairview Village are more likely than their counterparts in suburban neighborhoods to walk to a destination, and not simply to walk for exercise. Residents of Fairview Village also placed more importance on being within walking distance of shopping and other services than the residents in the other neighborhoods did. This finding supports the self-selection theory that people who want to walk more and drive less will find places to live where that is possible. The fact that residents in Fairview Village own fewer cars per household may be due to the fact that they do not need to rely on a car as often, or alternatively that they prefer walking and choose not to own as many vehicles. After controlling for vehicle ownership, the results still show a significant negative correlation between VMT and whether the household lived in

[174] Nelson (2001). The NPTS is not recommended for use at a state or metropolitan level, and some of the figures presented in Nelson's paper have been disputed by others (c.f. a critique by Wendell Cox, http://www.gppf.org/pubs/analyses/2001/american_dream_boundaries.htm). Therefore this study should be viewed with caution.

[175] Dill (2004).

Fairview Village. Therefore, the authors conclude that Fairview Village's new urbanist design features are having a positive impact on non-auto travel mode choice.

5.3 Other Impacts

Perhaps the most studied impact of Oregon's urban growth boundary policy has been housing affordability. A number of studies have cited UGB implementation in the Portland region and other cities or regions as a direct cause of increasing housing costs. For example, a study published by the Reason Public Policy Institute makes the following claims:[176]

- "Portland now ranks among the 10 percent least affordable housing markets in the nation;
- The average housing density has increased from five homes per acre to eight homes per acre while multifamily housing units make up about half of all new building permits;[177]
- Even with these increases in density, the Portland area is expected to have a housing deficit of almost 9,000 housing units by 2040;
- High rates of infill and redevelopment were associated with low overall levels of housing production; and
- More than 80,000 single-family homes became "unaffordable" to Portland residents as a result of housing-price inflation."

QuantEcon conducted a similar study in 2002, resulting in similar findings. This study extrapolated the data to other cities and claimed that "had Portland's policies been applied in major metropolitan areas nationwide over the last 10 years, over a million young and disadvantaged families, 260,000 of them minority families, would have been denied the dream of home ownership."[178]

Nelson's smart growth comparison analysis questions these trends. He claims that typical measures of housing affordability are inaccurate, since they do not include housing payments, taxes, utilities, repairs and maintenance and transportation. He admits that

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[176] Reason Public Policy Institute (1999).

[177] Metro 1998 data were utilized for this report. As stated in the Development Trends section, Metro 2003 data show that single-family residential permits have been issued at a higher rate than multi-family residential permits in recent years.

[178] QuantEcon (2002).

Portland's housing prices are rising, but questions whether they are really "unaffordable" for residents when all data are considered. A comparison to Atlanta shows that overall, housing is more affordable in Portland.[179]

Another study refuting the link between UGBs and housing inaffordability was conducted at the Brookings Institution. A multiple regression analysis with 25 independent variables was used to determine correlations with housing prices in various U.S. metropolitan areas. The study found that:

- The existence of a UGB does not cause housing prices to rise faster than a similar area without a UGB; and
- A tightly drawn and enforced UGB can, for a short period of time, increase the cost of housing, if combined with other factors stimulating growth in the region.

The study notes that housing prices in Portland rose most significantly in the early 1990s, when the economy was strong. Prior to this time, there was sufficient undeveloped land within the UGB, and insufficient economic growth, to put upward pressure on housing prices. By the mid-1990s, job growth had slowed, and developers had adjusted to building on smaller lots and more multifamily housing; as a result, the rate of inflation of housing prices decreased. Furthermore, housing prices also inflated rapidly in the early 1990s in other metropolitan areas that did not have growth boundaries.

The study concludes that a simple correlation between UGBs and housing prices cannot be drawn. Careful consideration of current market trends should be made when implementing growth boundary policies, but such policies should not be fully condemned.[180]

[179] Nelson (2001).

[180] Downs (2002).

Appendix H

Case Study: Seattle, Washington

1.0 Overview

This case study discusses the history of comprehensive planning and growth management in Washington State and in the Seattle region, as well as related evaluation efforts. The case study is organized into the following sections:

- **Section 2.0** discusses historical and recent planning initiatives led by the State, the MPO, and other groups;
- **Section 3.0** describes studies undertaken to *forecast* the outcomes of programs directed at smart growth objectives;
- **Section 4.0** describes *policy* studies to evaluate how effectively these programs have been implemented; and
- **Section 5.0** describes *outcome* studies that have attempted to measure the actual impacts of state planning programs, as well as planned monitoring efforts and future research.

2.0 History of Comprehensive Planning

2.1 Planning Context

Geographical and Economic Context

The Seattle-Tacoma Metropolitan Statistical Area covers a four-county region also known as the central Puget Sound region. As of 2000, the total population of this region was nearly 3.3 million, and total employment was 1.7 million. The four counties cover a land area of nearly 6,300 square miles. The region contains a wide variety of landforms including saltwater coastline, river floodplains, plateaus, slopes and mountains, punctuated with lakes and salmon streams. Because of the numerous bodies of water and the hilly terrain, topography has been somewhat of a constraining and directing factor in the development of the region.

Population and employment both increased by about 20 percent between 1990 and 2000. The region's economy, though, is notoriously cyclical, in part due to the region's dependence on a small number of major industries. State forecasts project the total population of the region to increase by a low of 12 percent to a high of 39 percent between 2000 and 2020, with a best estimate of 25 percent.[181]

Political Context

Regional Governance

The Puget Sound Regional Council (PSRC) is an association that serves as a forum for developing policies and making decisions about regional growth and transportation issues in the four-county central Puget Sound region. The Council is the designated metropolitan planning organization (MPO) for the region. The Council's members include four counties, 70 cities and towns, three ports, and two state agencies, the Washington State Department of Transportation (WSDOT) and the Transportation Commission. The Council identifies its functions as follows:

[181] Washington State Office of Financial Management (2002). Washington State County Growth Management Population Projections: 2000 to 2025. http://www.ofm.wa.gov/pop/gma/index.htm

- Meet MPO transportation planning responsibilities for the four counties;
- Fulfill regional transportation planning organization requirements prescribed by state law for the four counties, including ensuring that regional transportation and land-use plans are integrated and that state, regional and local transportation plans are consistent;
- Maintain the adopted regional growth and transportation strategy, and prepare multi-county planning policies for the region;
- Develop and maintain a regional data base, and forecast and monitor economic, demographic and travel conditions in the region;
- Provide technical assistance to local governments, the state and Federal governments, and business and community organizations; and
- Provide a forum to discuss emerging regional issues.

The Council is governed by a General Assembly, which is comprised of all members and meets at least annually, and an Executive Board, which is appointed by the General Assembly and meets monthly. The Growth Management and Transportation Policy Boards advise the Executive Board, and include representatives of Council members as well as other regional stakeholder groups. Various other staff and stakeholder committees also advise and carry out the work of the Council.

Counties

Counties fulfill an important planning role in Washington State and are responsible for comprehensive planning outside of incorporated jurisdictions. The four counties in the central Puget Sound region include King, Snohomish, Pierce, and Kitsap. Three of these counties border Puget Sound to the east and stretch far inland, to the crest of the Cascade Mountains. King County, covering 2,130 square miles and containing 1.8 million people, is the most populous county in the State of Washington and includes the City of Seattle and most of its suburbs. Snohomish County (population 606,000) lies to the north of King County and includes the City of Everett, while Pierce County (population 701,000) lies to the south of King County and includes the City of Tacoma. Kitsap County (population 232,000), includes most of the Kitsap Peninsula and some islands that lie across Puget Sound to the west of Seattle.

Because of its large population, land area, and central location, King County plays an especially important role in regional growth management. The county currently contains 40 local jurisdictions. The county provides a number of countywide services, including comprehensive planning consistent with the State's Growth Management Act, more detailed planning for unincorporated areas, bus service (King County Transit), water and land resource protection, and wastewater treatment. A series of incorporations and annexations over the 1990s has shifted the percentage of residents living in unincorporated

areas of the county from 41 percent in 1989 to 20 percent in 2000. By 2012, the entire urban-designated area is expected to be within city limits.[182]

2.2 Policy Initiatives Undertaken

State Initiatives

Prior to 1990, Washington's land use and environmental laws were a patchwork enacted over 100 years – a constitution written to address the problems of the 1880s, planning enabling laws adopted in the 1930s, and environmental acts passed in the 1970s.[183] While local comprehensive planning was not commonly performed before 1970, there was a significant upswing in the 1970s, probably attributable to the availability of Federal and state financial assistance for planning and to heightened popular support for environmental regulation. By 1976, most of the State's counties and over half of its cities had adopted comprehensive plans.[184] Also in the late 1960s and early 1970s, multi-county planning agencies were formed, including the Puget Sound Council of Governments (PSCOG), the precursor to PSRC. Local comprehensive planning, though, was not synonymous with growth management, and an investigation in the late 1980s found that at the time there were no regional growth management practices in the Puget Sound region.[185]

1990 Growth Management Act[186]

The Washington State Legislature adopted the Growth Management Act (GMA) in 1990, and has amended it a number of times since then to further define requirements and establish a framework for coordination among local governments. The GMA adopts the principles of growth boundaries (from Oregon) and concurrency (from Florida), but retains more flexibility and avoids the "top-down" planning approach taken in Oregon.[187] The GMA includes basic planning requirements for all counties to designate critical areas and resource lands. In addition, certain counties and the cities within them – representing the faster-growing counties and cities – are required to prepare comprehensive plans.

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[182] King County (2003).

[183] Puget Sound Regional Council (1995).

[184] Weitz (1999), pp. 59-61.

[185] Corr (1990), as cited in Weitz (1999), p. 112.

[186] Unless otherwise noted, material from this section is taken from Washington State Department of Community, Trade, and Economic Development. *Overview of the Growth Management Act* (no date). www.cted.wa.gov

[187] Weitz (1999), p. 114.

Currently, 29 of 39 counties in the State of Washington are subject to the GMA requirements for comprehensive planning. Other counties may choose to conduct planning. The basic steps that local governments fully planning under the GMA are to follow include:

- Agree on countywide planning policies to guide regional issues (these countywide policies must be adopted by the legislative body of each county, in cooperation with all cities and towns in the county);
- Designate urban growth areas to accommodate projected 20-year growth in each county, based on population forecasts provided by the State;
- Adopt comprehensive plans with chapters that fit together, including land use, transportation, housing, capital facilities, utilities, shorelines, and rural (for counties);[188]
- Identify lands useful for public purposes and essential public facilities, such as airports, educational facilities, and utility and transportation corridors; and
- Adopt development regulations (e.g., zoning, concurrency) that carry out GMA comprehensive plans.

GMA plans and regulations are to be guided by 14 goals, including: focus growth in urban areas, reduce sprawl, provide efficient transportation, protect property rights, and protect the environment. Comprehensive plans must be internally consistent, that is, elements within the plan must be mutually reinforcing. Consistency is also required between the plans of adjacent jurisdictions. In addition, development regulations must be consistent with local comprehensive plans.

1997 amendments to the act required that counties review, and if necessary revise, comprehensive plans for consistency with the GMA by September 2002 and at least every five years thereafter. In addition to comprehensive plans, local governments and agencies must annually prepare and adopt six-year comprehensive transportation programs, which are also to include transit, bicycle and pedestrian needs. These programs must be consistent with the transportation element of the local comprehensive plan and with the regional transportation plan.

Three hearings boards, one for each region of the State, resolve disputes about whether a local government is in compliance with the GMA. The Central Puget Sound Growth Management Hearings Board is the review board for the four central Puget Sound region counties. The boards are not required to review every plan, but instead respond to appeals initiated by other parties. Each board includes three members. The board may send a plan or regulation back to the local government for changes. In exceptional cases, where the plan or regulation would interfere significantly with the fulfillment of GMA goals, the board may invalidate all or part of a plan or regulation. For enforcement, the

[188] Economic development was added as a required component in 2002.

board can request that the governor impose fiscal sanctions. Plans are presumed valid upon adoption unless a hearings board finds they are not in compliance with the GMA.

The GMA continues to be debated at the State Legislature. Proponents introduce ways to strengthen or enhance its implementation, while opponents seek to weaken the act. The direction of change depends upon the political climate. In 2003 and 2004, with more conservative state leadership, GMA proponents have focused primarily on blocking attempts to weaken or undermine the act, such as eliminating funding for the hearings boards or eliminating funding for local planning grants.

Concurrency[189]

The GMA requires that transportation improvements or strategies to accommodate development impacts be made concurrently with land development. "Concurrency" is defined by the GMA to mean that any needed improvements or strategies are in place at the time of development or that a financial commitment exists to complete the improvements or strategies within six years. In their comprehensive plans, communities establish the level of service (LOS) they intend to provide, and also determine how the transportation network within their boundaries will be managed or expanded to maintain the adopted LOS. If concurrency cannot be demonstrated, local jurisdictions are prohibited from approving development until improvements are made concurrent with this development. To reduce inconsistency between neighboring jurisdictions, local plans are reviewed and certified by MPOs and regional transportation planning organizations.

Development concurrency tests are only required for local roads, and not for the state highway network. 1998 amendments to the GMA,[190] however, required cities or counties to include LOS standards for state highways in local comprehensive plans, in order to monitor the performance of the system, evaluate improvement strategies, and facilitate coordination between county/city and state six-year transportation investment programs.

Urban Growth Areas[191]

The GMA encourages directing population growth into urban areas. Urban growth areas (UGAs) are areas designated by a county, with input from towns and cities, where urban development is to occur. Incorporated cities and towns are by definition UGAs. Counties may establish additional UGAs based on existing or planned extension of public facilities and services.

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[189] Washington State Department of Community, Trade, and Economic Development (no date). *Concurrency & GMA*.

[190] RCW 36.70A.070

[191] Washington State Department of Community, Trade, and Economic Development (no date). *Urban Growth Areas*.

Communities planning under the GMA are to monitor their UGAs to determine if they are properly sized. If UGAs are filling up faster than expected or growth is occurring at lower densities than planned for, measures are to be adopted that will be likely to increase consistency. At least every 10 years, jurisdictions are required to review UGAs, including densities, and make changes, if needed.[192] The county comprehensive plan designating UGAs and the densities permitted in the UGAs by the comprehensive plans of the county and each city located within UGAs need to be revised to accommodate the urban growth projected to occur in the county for the next 20 years.

Buildable Lands Program

1997 amendments to the GMA created the Buildable Lands Program.[193] Six western Washington counties – including the four central Puget Sound region counties – and the cities located within their boundaries are required to establish a monitoring and evaluation program to determine if the actual growth and development is consistent with what was planned for in the countywide planning policies and comprehensive plans. Measures other than expanding UGAs (such as increasing densities) must be taken to correct any inconsistencies. The State provided a total of $5.4 million in grants to the counties over the 1997-2002 period to implement this program. However, the legislature terminated state funding for the program after 2002.

Other GMA Implementation Tools

The Washington State Department of Community, Trade, and Economic Development (CTED) provides technical and financial assistance to help local governments manage growth and is required to serve as the central coordinator for state government in implementing the GMA. Between 1991 and 2003, CTED provided more than $55 million in local growth management grants, including nearly $12 million to King County and its numerous municipalities, over $5 million to Pierce County and its cities, over $5 million to Kitsap County and its cities, and nearly $4 million to Snohomish County and its cities.[194]

Metropolitan Initiatives

Multi-County Planning Policies

State growth management legislation did not establish multi-county planning councils or contain other requirements for regional planning. Instead, counties fulfill the role of regional planning entities, an approach likely taken because of the large size of counties in Washington State. The GMA did require, however, that multi-county planning policies be

[192] RCW 36.70A.130(3)

[193] RCW 36.70A.215

[194] Trohimovich (2002), p. 33.

adopted by counties with contiguous urban areas and with at least 450,000 population. This requirement applies to King, Snohomish, and Pierce Counties in the Seattle metropolitan area, and Kitsap County has participated in the development of these policies as well. The *Multi-County Planning Policies* were adopted in March of 1993 by the General Assembly of the Puget Sound Regional Council (PSRC) as an amendment to *VISION 2020*.

VISION 2020

In October 1990, the Puget Sound Council of Governments (PSCOG, now the Puget Sound Regional Council) adopted VISION 2020, the long-range growth, economic, and transportation strategy for the central Puget Sound region. VISION 2020 called for the containment of growth, limiting the extent of sprawl into surrounding farmlands, forests, and open spaces. It called for concentrating about 40 percent of new employment into about 15 centers, and connecting these centers with a regional rapid transit system. Six categories of "central places," ranging from the regional center to small towns, were defined. VISION 2020 was the result of a planning process initiated in 1987 by PSCOG. The process included detailed analysis of five alternative growth and mobility futures, as well as broad participation by local government staff, policy-makers, and the public. VISION 2020 included updates to the regional transportation plan. It called for a split in the distribution of transportation expenditures of 52 percent for transit, 38 percent for roads, and 10 percent for demand management.

Implementation of VISION 2020 was to depend upon cooperation among the regional agency, cities, counties, transit agencies, and the State. One of the first steps was to define criteria for and designate growth centers, with local input. These centers were defined using minimum growth densities (employees and residents per acre), minimum size (total employment), maximum size (land area), minimum transit service, and various descriptive characteristics.

The VISION 2020 effort was undertaken in parallel with state-level growth management initiatives, rather than in response to these initiatives. The 1990 State GMA, however, did influence the planning framework under which VISION 2020 is implemented and provided important implementation tools for VISION 2020. According to VISION 2020, the plan recognized the State GMA requirement to create comprehensive plans, and was intended as the regional policy perspective for the growth management and transportation elements of these plans.[195]

VISION 2020 – 1995 Update

VISION 2020 was updated in 1995.[196] The update was intended to reinforce VISION 2020 as adopted public policy while incorporating appropriate work from local comprehensive

[195] Puget Sound Council of Governments (1990a).

[196] Puget Sound Regional Council (1995).

plans, countywide planning policies, and regional and state transportation plans for the area. The 1995 update included a much more detailed list of policies, strategies, and implementation steps. The update defined 21 growth centers and eight industrial/ manufacturing centers, most less than 1.5 square miles in area. The update contains the GMA-required multi-county planning policies for King, Kitsap, Pierce and Snohomish counties.

PSRC initially undertook three primary efforts to help to implement VISION 2020: policy and plan review, development of the Transportation Improvement Program (TIP), and monitoring. Since the 1995 update, PSRC has undertaken additional implementation activities, largely focused on the collection and sharing of information related to various implementation practices (e.g., infill and transit-oriented development). It also has disbursed grants for planning and demonstration projects.

Beginning in 2003 the Regional Council has begun a process to update VISION 2020 that will be completed in 2007. A full public process will be undertaken and an Environmental Impact Statement (EIS) developed.

Policy and Plan Review

Policy and plan review is a collaborative, voluntary process in which PSRC works with local jurisdictions and agencies to review and assure consistency among local and regional plans and policies. The process includes three types of review: 1) voluntary coordination and consultation on local, regional, and transportation agency plans; 2) consistency review of countywide and multi-county planning policies (for consistency with the GMA); and 3) certification of countywide planning policies and transportation elements in local comprehensive plans (for consistency with transportation policies and the long-range plan).

Problems identified in the review are first addressed through staff to staff discussions. Unresolved issues are referred to the appropriate planning bodies, policy boards and/or the PSRC Executive Board for consideration. If inconsistencies remain on planning policies, any involved party may request the CTED to provide mediation services pursuant to the Growth Management Act.[197]

Transportation Plans and Programs

Long-range transportation plans consistent with VISION 2020 were adopted in 1990 and in 1995 at the time of the VISION 2020 effort. *Destination 2030*[198] was adopted in May 2001 as the most recent functional transportation element of VISION 2020, and serves as the current long-range regional and metropolitan transportation plan for the central Puget Sound region. *Destination 2030* lays out a long-range vision for a multimodal transportation system that links major population and job centers throughout the region by pro-

[197] Puget Sound Regional Council (2003a).

[198] Puget Sound Regional Council (2001).

viding a variety of transportation choices. Compared to previous plans, it takes additional steps to coordinate the long-range transportation plan with the land use policies and objectives of VISION 2020. A major policy focus of *Destination 2030* calls for coordinating transportation and land use planning to support transit and pedestrian-oriented land use patterns within the urban area, especially in regional growth centers.[199] Mechanisms for implementing the land use aspects of *Destination 2030* include capital improvements to support development in urban centers, and the voluntary policy and plan review process undertaken by PSRC.

The 2002 Regional Transportation Improvement Program (TIP) Policy Framework was specifically designed to prioritize and support projects that focused on the development of regional growth centers and the corridors that connected them. The point system for scoring candidate TIP projects is heavily weighted towards projects that support growth objectives (e.g., increased densities, internal circulation, multimodal access) in designated urban centers as well as connections between these centers.[200]

County Initiatives

King County

King County's regional role was expanded in 1996 with the consolidation of King County Government with the Municipality of Metropolitan Seattle. The county's planning responsibilities include: participating in regional and multi-county policy planning and functional planning; coordinating countywide policy planning for both incorporated and unincorporated areas; and conducting comprehensive planning, subarea planning, neighborhood planning, and zoning for unincorporated areas of the county. The county also has responsibility for the planning and provision of various other public services, including sewers, parks, trails and open space. The county provides countywide transit service and builds and maintains arterials of countywide and regional significance within unincorporated areas.

King County began undertaken activities related to growth management prior to passage of the State GMA. The County adopted its first comprehensive plan in 1964. Two decades later, the 1985 Comprehensive Plan identified an urban growth boundary line to limit urban growth to areas with the infrastructure needed for facilities and services. It also established policies to preserve rural areas, conserve the natural environment and designate resource lands for long-term agriculture and forest production.[201] During the 1980s, the county purchased the development rights to about 13,000 acres of agricultural land

[199] Puget Sound Regional Council (2002a).

[200] Puget Sound Regional Council (2002b).

[201] King County web site, http://www.metrokc.gov/

east of Seattle and applied nonexclusive agricultural zoning on another 17,000 acres in the same area.[202]

After passage of the State GMA, King County adopted countywide planning policies which set the framework for the county's and cities' comprehensive plans. The policies are developed by a planning council that consists of elected officials from King County, cities and towns in King County, and special purpose districts. The countywide planning policies, adopted in 1992 and last updated in 2002, establish an UGA within the western one-third of King County where most growth and development is targeted. Some of the goals of the policies include: reducing urban sprawl, protecting rural areas, providing affordable housing throughout the county, and coordinating protection of environmentally sensitive areas. The plan calls for providing a balanced transportation infrastructure in urban areas to support development, while emphasizing maintenance and safety in rural areas.

King County's first comprehensive plan under the GMA was adopted in 1994. Substantive changes were made in 2000, and will be made every subsequent four years. The comprehensive plan is the guiding policy document for all land use and development regulations in unincorporated King County, and for regional services throughout the county. The plan is implemented through adopted regulations, including the King County Zoning Code and other code titles such as Water and Sewer Systems, Roads and Bridges, and Land Segregation. All development proposals in King County must meet the requirements of the code.

The King County Transfer of Development Rights (TDR) Program was adopted as a pilot project in October 1998 and converted to permanent status in September 2001. The TDR Program allows individuals to purchase and sell residential development rights from lands that provide a public benefit. Such lands include farm, forest, open space, regional trails and designated urban separator lands and habitat for threatened or endangered species. Landowners receive financial compensation without developing or selling their land and the public receives permanent preservation of the land. Transferred development rights can be used to build additional houses on other parcels in more appropriate areas.[203]

Other Counties

The three other counties in the central Puget Sound region also have adopted countywide planning policies and comprehensive plans consistent with State GMA requirements. These were first adopted in the early 1990s (1992-1995) and have been amended at various times since then. In each county, a council comprised of representatives of local jurisdictions was formed to develop the countywide planning policies. Comprehensive plans for all four counties in the central Puget Sound region will be given major revisions in 2004, consistent with GMA requirements.

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[202] Nelson and Duncan (1995), p. 50.

[203] King County web site, http://www.metrokc.gov/

2.3 Transportation Linkages

The GMA includes a number of tools to address transportation, in addition to its land use tools supporting compact development:[204]

- Cities and counties are required to prepare capital facility and transportation elements to address their mobility needs;
- Cities and counties are required to adopt transportation concurrency systems to match growth with the transportation facilities needed to accommodate growth;
- Cities and counties have the authority to adopt transportation impact fees, although these fees are limited; and
- Cities and counties must analyze the impacts of the comprehensive plan on state highways and recommend needed transportation facilities for the state highways.

Within the central Puget Sound region, the linkages between transportation and land use and growth management planning appear to be relatively strong. These linkages include the following mechanisms:

- VISION 2020 included a set of alternatives where transportation networks varied in order to support the land use vision for the region. The final preferred strategy was based on a series of compact growth centers served by high-capacity transit;
- The long-range transportation plan is considered a functional part of VISION 2020 and is directed at the regional plan's objectives. The transportation plan includes land use as well as transportation strategies;
- Transportation investments to support the land use policies are intended to be implemented through the TIP. The most recent TIP (2002) included land use-related project selection criteria;
- State and regional planning assistance has been directed at helping communities create more walkable, transit-supportive communities in designated centers; and
- Concurrency requirements mean that communities must ensure adequate provision of local infrastructure before approving development. However, communities are given flexibility in implementing concurrency, especially through the freedom to set their own level of service standards.

[204] Trohimovich (2002).

3.0 Forecast Outcomes

3.1 VISION 2020

In support of the VISION 2020 development process and Environmental Impact Statement (EIS), the Puget Sound Council of Governments conducted modeling and assessment of the impacts of various transportation and growth scenarios for the region. Six scenarios were analyzed:

- No Action (trend development patterns, no major transportation investments);
- Existing Plans (growth based on local plans; investment in a regional transit system; minor expansion of highway capacity);
- Major Centers (concentrate jobs in a few major employment centers; invest heavily in transit; focus higher-density residential development in walkable areas served by transit);
- Multiple Centers (concentrate new employment and housing growth in a larger number of walkable centers, including small, medium, and large communities, served by transit; heavy transit emphasis, but less transit investment and more highway investment than Major Centers);
- Dispersed Growth (continue more dispersed, lower-density employment and housing patterns; invest in a regional network of highways; maintain present levels of bus transit service);
- Preferred (a combination of the Major Centers and Multiple Centers alternatives – contain urbanization; focus employment growth in 10 to 15 transit-served centers; encourage higher-density residential development in walkable areas served by transit).

Table 3.1 shows the forecast impacts of the Preferred alternative in 2020, compared to the Existing Plans and Dispersed Growth alternatives. Transportation impacts are based on the regional travel demand model. Open space consumed is based on PSCOG's adaptation of the DRAM/EMPAL land use model system. Infrastructure costs are based on a combination of cost estimates for major transportation projects, and empirically derived relationships between service costs, total population, and population density for other public services. Because of the limitations of the travel demand modeling system, the transportation findings only reflect regional growth impacts, and do not account for urban design characteristics or non-motorized trip making.

Table 3.1 Forecast Impacts of VISION 2020[205]

Performance Measure (2020)	Existing Plans	Dispersed Growth Alternative	Preferred Alternative
Transportation Conditions			
Daily VMT (millions)	98.1	100.7	95.4
Daily Vehicle-Hours of Delay (millions)	0.83	0.82	0.84
Average PM Speed (mph)	15.0	15.0	16.0
Work Percent Transit	12.8	6.9	14.1
Percent of Regional Network with v/c > 0.9	20.6	20.0	20.3
Infrastructure Costs (billions of 1990 dollars)	***229.2***	***228.8***	***231.1***
Highways	14.9	19.7	12.4
Transit	16.6	12.0	20.7
Other Public Services	198.2	197.1	198.0
Open Space Consumed (square miles)	***750.0***	***950.0***	***400.0***

Table 3.1 shows that the Preferred alternative was anticipated to reduce VMT by about 2.7 percent compared to the Existing Plans alternative and 5.3 percent compared to the Dispersed Growth alternative. Work-trip transit ridership would be about 10 percent higher than under the Existing Plans alternative and about double that of the Dispersed Growth alternative. Other transportation performance measures show little difference among alternatives. Total infrastructure costs are about one percent higher under the Preferred alternative due to higher levels of investment in transit. Open space consumption is reduced significantly. Note that these criteria represent only a small subset of the performance measures considered in evaluating VISION 2020.

[205] Puget Sound Council of Governments (1990b).

4.0 Policy Evaluation

4.1 State Growth Management Act

Adoption of Plans

According to the State, adoption of comprehensive plans and implementing regulations consistent with the 1990 GMA proceeded more slowly than anticipated, but nevertheless nearly all cities and counties have complied. By 1997, all 29 required counties (of 39 total counties in the State) had adopted planning policies, 23 had adopted urban growth areas, 18 had adopted comprehensive plans, and 24 had adopted development regulations.[206] By 2002, 27 of the 29 counties had adopted comprehensive plans. For GMA cities, 212 of 216 had adopted comprehensive plans and 199 had adopted zoning regulations.[207]

A September 2003 status report by PSRC shows that approximately 85 municipalities in the central Puget Sound region have adopted comprehensive plans (most in the mid-1990s). Of these, all but five have been certified by PSRC.[208] Under the GMA these plans must be updated by December 2004.

Role of Growth Management Hearings Boards

The Growth Management Hearings Boards (GMHB) are three regional bodies established to oversee GMA implementation, and specifically to resolve questions as to whether local plans and policies are consistent with the GMA. Numerous cases have been brought before the hearings boards. A 1996 review notes that "The Boards are vital to the successful implementation of the GMA…The large number of petitions heard by the Boards and the constant backlog of cases in superior court demonstrates the need for a separate GMA dispute resolution system."[209]

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[206] Washington State Department of Community, Trade, and Economic Development (1997), as cited in Weitz (1999), p. 118.

[207] Washington State Department of Community, Trade, and Economic Development (2002).

[208] Puget Sound Regional Council (2003d).

[209] Woolston (1996), as cited in Trohimovich (2002).

The Central Puget Sound hearings board has decided various cases which involve appropriate urban densities and the sizing of urban growth areas. Some of the board's decisions include:[210]

- Counties must "show their work" when designating UGAs. The board presumes actions of the local jurisdiction are valid. However, when challenged, documentation must be provided that supports the actions taken by the jurisdiction;
- The GMA requires every city to designate all lands within its jurisdiction at appropriate urban densities; and
- An oversupply (safety factor) of developable land within an urban growth area is reasonable, because it helps maintain real estate sales competition and assure continued affordability of land. If a safety factor exceeds 25 percent of the needed capacity (projected over a 20-year period) and is brought before the board, the board will scrutinize the justification in its decision.

The Central Puget Sound board has overturned county and local actions that are inconsistent with the GMA. For example, in 2002 and 2003 the board overturned five actions taken by Snohomish County, such as a rezoning of a ranch outside of the UGA for residential development.

The boards have been controversial because they have had to interpret a law that is sometimes vague, therefore creating a body of common law.[211] However, 1,000 Friends of Washington, an advocacy group focused on growth management issues, has argued that the boards have effectively enforced the GMA in a manner that is consistent with the statute, rather than arbitrary or biased. For example, hearings board rulings appealed to the courts were upheld 95 percent of the time (342 out of 362 appeals). The growth boards defer to local governments, and typically let the policy decisions of cities and counties stand when they comply with the GMA. Use of the boards is inconsistent, though. Their involvement is contingent upon an appeal being filed by a stakeholder or advocacy group, and potentially nonconforming plans or actions are not always appealed.[212]

Impacts of the Growth Management Act

An American Planning Association evaluation of state planning laws concluded that Washington's GMA is "one of the most comprehensive and modern planning statutes in the country." The association notes that "there is consensus that the law is slowing sprawl

[210] Pierce County (2002).

[211] Gary Pivo, as paraphrased in Fulton (1999).

[212] Trohimovich (2002), p. 17.

and guiding growth out of rural lands and into urban growth areas."[213] On the other hand, the GMA has created deep political divisions and led to mixed effects in terms of the strength of plans. One scholar notes that the mandate has led to two types of plans – strong ones prepared by jurisdictions that would have done a good job of growth management anyway, and weak ones produced by jurisdictions that are highly resistant to the idea.[214]

In a 10-year evaluation of the Growth Management Act, 1,000 Friends of Washington reviewed the GMA goals, commented on the extent to which they have been achieved, and made recommendations for improvement.[215] The organization notes that, while it could be improved, the GMA has had an overall beneficial effect on planning in Washington State. Progress has been made towards many goals, but implementation has been mixed. Examples of findings include:

- The GMA has led to better plans, better permitting, better financing tools, better economic development tools, and better resource protection;
- The GMA has contributed significantly to the success of cities in attracting density and growth in downtowns;
- Local government compliance with GMA has been uneven. Those jurisdictions whose plans have been appealed have been held to a higher standard than those whose plans have not; and
- It is difficult to conduct an accurate assessment of the State's achievements under growth management because the State has not established and monitored key benchmarks.

With respect to transportation, the report notes that transportation and land use decisions are often still made with little regard for their impacts on one another. Roads constructed to connect urban areas become the impetus for local development activity along the new roadway corridors. Furthermore, the State does not have clearly defined criteria by which to determine whether transportation concurrency is achieving its underlying goal – improving mobility and accessibility.

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[213] American Planning Association (2002).

[214] Pivo, *ibid.*

[215] 1,000 Friends of Washington (2000).

4.2 VISION 2020 and the Metropolitan Transportation Plans

To support VISION 2020 implementation, PSRC committed to monitoring various aspects of plan implementation. In the 1995 update to VISION 2020, PSRC noted that "substantial progress has been made to implement its strategies…for example, jurisdictions have identified urban growth areas, critical areas and resource lands, and have designated urban centers as locations for concentrated urban growth. Counties have adopted countywide planning policies that guide and promote consistency among local comprehensive plans."

PSRC has undertaken an evaluation of regional growth centers, published in 2002, and has published a series of trends reports on indicators such as population, development, and transportation. Findings of these evaluations are discussed in Section 5.0.

Assessments of the extent to which transportation plans and programs in the 1990s were consistent with original VISION 2020 objectives were not identified. A 2003 report by PSRC, however, traces the history of transportation finance over the 1989-2000 period, illustrating general funding levels and priorities.[216] On average, total transportation-related revenues and expenditures grew by approximately seven percent annually. Revenues for and expenditures on state highways, however, declined over this period at an annual rate of 0.8 percent annually, on average (most of the decline happened since 1995, and can be attributed to decreases in the construction program). Revenues for local transit, county roads, state roads, and ferries grew at about the same rate as overall revenues. The formation of a regional transit authority, Sound Transit, resulted in a significant new transportation program, with revenues of $438 million in 2000, or 18 percent of total transportation revenues in that year. Overall, the distribution of funding changed over the 1990s so that transit now receives an equivalent or slightly greater amount of funding than highways (VISION 2020 anticipated a funding split of 52 percent for transit, 38 percent for roads, and 10 percent for demand management).

4.3 Concurrency

A report by 1,000 Friends of Washington[217] asserts that, "It is fair to say that there is significant dissatisfaction with current concurrency systems. Neighborhood groups are dissatisfied because concurrency systems have not been adopted, have not been well designed, or have not been effectively implemented or enforced. Some communities have been concerned that concurrency will be expensive to administer, the concurrency system will not result in the urban form they want, the system will require them to build facilities they do not want to build, or they cannot fund the facilities needed to achieve

[216] Puget Sound Regional Council (2003e).

[217] Trohimovich (2001).

concurrency. The development community is concerned that concurrency requirements will reduce predictability and result in development denials. The environmental community is concerned that poorly designed auto-oriented systems will lead to sprawl, excessive spending on single-occupancy vehicle facilities, and auto-oriented community design rather than human-oriented design."

PSRC and a coalition of local jurisdictions have both recently completed assessments of concurrency that include recommendations to improve its effectiveness while supporting state and regional growth management objectives. As part of regional monitoring efforts called for in *Destination 2030*, PSRC undertook a work program, completed in 2003, to assess the effectiveness of transportation concurrency programs throughout the region.[218] The study found that:

- Jurisdictions' concurrency programs vary widely in how they are implemented and in the standards set;
- While most local agency staff agree that the concept of concurrency has utility, many also believe that transportation concurrency requirements, in practice, fall somewhere between insignificant and harmful;
- While most jurisdictions indicate that their concurrency programs have had little impact on development, a small group (primarily larger jurisdictions) indicated that there has been a meaningful impact; and
- Most jurisdictions have used concurrency to finance local transportation facility improvements (through various revenue-generating arrangements), although the full cost is rarely assessed.

The study made recommendations for improving the concurrency process, including developing a more multimodal approach, increasing coordination among jurisdictions, and tailoring concurrency in subareas so as not to inhibit development in urban centers.

The cities of Bellevue, Redmond, Kirkland, and Issaquah (eastern suburbs of Seattle) undertook the Eastside Transportation Concurrency Study[219] to look at the effects of the GMA's transportation concurrency requirement on their communities, and to look at ways the concurrency requirement could be reoriented to reinforce the cities' growth management objectives. The study notes that, "Since the GMA's adoption in 1990, it has become apparent that the transportation concurrency requirement, in some respects, work against the growth management principles of the Act and cities' own comprehensive plans. This study was commissioned to look at whether there are problems in the way concurrency is currently implemented."

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[218] Puget Sound Regional Council (2003b).

[219] Hallenbeck, Carlson, and Simmons (2003).

Findings include:

- Approaches to the selection of LOS standards and the implementation of concurrency laws on the Eastside vary considerably. For example, Kirkland recognizes that some congestion will necessarily come with new development, and has set its standards high enough that so that concurrency laws will not hinder its ability to implement the comprehensive plan's land use vision. Issaquah, on the other hand, has set LOS standards so that they prevent existing traffic congestion from becoming more acute, even if it means denying new development. In Issaquah, concurrency has become a major barrier to implementation of the comprehensive plan.

- Concurrency's local focus neglects the fact that a considerable amount of traffic generated by new development comes from distant destinations. As a consequence, regional pass-through traffic has become one of the most significant obstacles intermediary jurisdictions face in implementing concurrency. A regional approach is needed that considers effects of development in different jurisdictions.

5.0 Outcome Evaluation

This section describes studies to measure the outcomes of growth management and smart growth policies on transportation, land use, and other community and environmental indicators. Evaluation studies as well as new and ongoing monitoring efforts are described for both development trends and transportation conditions.

5.1 Development Trends

Both regional and county-level efforts to monitor development trends are underway or have been completed. These efforts include:

- PSRC's "Puget Sound Milestones" monitoring program, designed to track and regularly report on the region's progress toward implementing the policies and achieving the goals put forth in VISION 2020 and *Destination 2030*. A 2002 report evaluated the extent to which Regional Growth Centers policies are being implemented;
- Monitoring requirements of the six counties in the Buildable Lands Program (no longer active after 2002);
- King County's Benchmark Process to measure outcomes of its Countywide Planning Policies. To date, reports have been published covering the period 1995 through 2002; and
- Independent studies undertaken by two advocacy groups.

Regional Growth Centers Report[220]

This report was undertaken by PSRC in 2002 to evaluate the extent to which growth is actually occurring in the 21 designated growth centers and eight manufacturing/ industrial centers, and the character of these centers. The report included in-depth case studies of each growth center, as well as overall summary statistics. In addition to examining trends in total population, housing units, and employment, the analysis looked at other measures including percent of land use by type; off-street parking supply; transportation options; and measures such as average block size, street density, and street

[220] Puget Sound Regional Council (2002a).

connectivity that relate to pedestrian and transit accessibility. The study also surveyed local jurisdictions regarding the application of design guidelines adopted in *Destination 2030*.

The report made the following findings:

- In the year 2000, the regional growth centers represented just over 2.4 percent of the land, 5.0 percent of the population, 6.6 percent of the housing units, and 28.6 percent of the employment within the region's urban growth area (UGA). The average size of centers is 1.14 square miles.

- Between 1990 and 2000, population and housing increased by over 20 percent in these centers, bringing them to 56 percent of their 2012 population targets. (In comparison, regional population increased by about the same amount – 19 percent – over this period.) About two-thirds of this increase occurred in a handful of centers – downtown Seattle, the adjoining First Hill/Capitol Hill neighborhoods, and downtown Bellevue. Continuation of present rates of growth will lead to the achievement of about 70 percent of planned 2012 targets by 2020. The rate of growth increased in the second half of the 1990s.

- The rate of job growth in centers was nearly identical to overall regional job growth. Between 1995 and 2000, jobs increased by over 18 percent, to 69 percent of the combined 2012 employment target of cities with regional growth centers. However, over 80 percent of job growth occurred in just five centers: Bellevue Downtown, Seattle Downtown, Seattle First Hill/Capitol Hill, Seattle University Community, and Tukwila.

- While many centers are meeting or close to VISION 2020 guidance for employment density thresholds, most of the centers are well below minimum housing density thresholds. Some cities have aggressive plans to add substantial numbers of housing units within centers. Others have planned for only nominal increases in population while assuming large increases in jobs. Attracting housing and population growth at planned concentrations remains a challenge for many regional growth centers.

- Cities have developed stand-alone subarea plans for 12 of the 21 regional growth centers. However, several jurisdictions, even though they have designated regional growth centers, do not actively plan for them as such.

- Many of the regional growth centers – especially newer, more suburban centers – lack general features identified in VISION 2020 that support pedestrian movement, bicycle travel, access to transit, and efficient access for cars. However, most of the centers are making good efforts at responding to the issues that the 10 design guidelines adopted in *Destination 2030* are intended to address. At least 12 centers are taking actions to increase density, complete local street grids, and complete sidewalk and bike/trail networks. Most have adopted pedestrian-oriented design standards for new development and zoning that encourages mixed-use development.

Buildable Lands Evaluation Report[221]

The six counties in the Buildable Lands Program, including all four Central Puget Sound counties, have monitored development trends consistent with state requirements. Jurisdictions collected building permit and subdivision data for the 1995-2000 period, and used these records to calculate actual development densities and future needs. The average achieved residential dwelling units per acre in the UGAs as indicated in the counties' reports are: King 7.3, Pierce 4.0, Snohomish 8.9, and Kitsap 3.9. (Snohomish and Kitsap estimates were developed using slightly different methodologies than the other two counties, which may have resulted in higher estimates.)

Two specific examples are given in the report to show how residential development is changing. In Pierce County, residential densities have increased from under two to more than four dwelling units per acre from 1995 to 2000, and a trend towards even higher densities appears to be occurring as the county's GMA policies take effect. An analysis of density trends in King County shows that a significant movement toward greater density in residential land is taking place.

King County Benchmark Process

King County established a Benchmark Process to measure outcomes of its Countywide Planning Policies adopted in 1994. The county selected 45 benchmark indicators related to the economy, land use, affordable housing, transportation, and the environment, and began monitoring them in 1995. The county's 2003 report notes that the county is achieving strong urban-level densities that match or exceed planned densities.[222] Specific findings of this report include:

- From 1996 through 2002 urban land in King County was consumed at a slower rate than the rate of population growth. Urban population grew by 9.4 percent, while developed land area grew by only 4.5 percent;
- Average single-family permit densities increased from 3.8 units per acre in 1996-2000 to 5.3 units per acre in 2002. Average multifamily permit densities showed a jump from 22.0 to 38.3 units per acre between these two time periods;
- The proportion of new development occurring in rural areas has been cut in half, from eight to four percent, compared to the 1996-1998 period;
- Within the urban area of King County, 53 percent of all new residential permits issued in 2002 were on redevelopable land; and

[221] Washington State Department of Community, Trade, and Economic Development (2003).

[222] King County (2003).

- The proportion of new residential development occurring in designated Urban Centers, which had reached a high of 53 percent in 2000, fell to 18 percent in 2002 due to the weak economy. While Seattle and Bellevue's Urban Centers continue to grow, there has been little or no new residential development occurring in many of the sub-urban Urban Centers.

King County notes that it has capacity for 263,000 more housing units – more than twice the capacity needed to accommodate the remaining household growth target, and the capacity for over 600,000 more jobs – several times the remaining target of 110,000 jobs. A total of 58 percent of capacity for residential units is on redevelopable land, rather than vacant land. Sixty-six percent of total capacity is identified as being in multifamily/ mixed-use developments. (This is consistent with actual building trends in the best economic years of the past decade, but in poor economic years multifamily construction has lagged single-family construction.)

1,000 Friends of Washington Review

In a 10-year evaluation of the Growth Management Act published in 2000, 1,000 Friends of Washington reviewed data on development trends in the central Puget Sound region.[223] The group's report notes that implementation of the GMA has varied considerably by county and jurisdiction. Between 1992 and 1997, the most recent period for which figures are available, Pierce County lost 7,882 acres – more than 13 percent – of its farmland. Snohomish County lost 13,565 acres of farmland. On the other hand, King County during the same period lost just 637 acres of farmland, despite being faced with far greater growth pressures, because of effective agricultural preservation policies. In Pierce County, based on more recent data, 38 percent of new development is occurring outside of urban growth boundaries, despite the fact that the county's growth boundaries extend far into the countryside. Pierce County's comprehensive plan fails to meet minimum standards that are legally enforceable.[224]

The organization's 1999 Sprawl Report Card looked at 33 cities in the central Puget Sound region and ranked them on how well they are stopping sprawl. The rankings are based on existing density, zoning and land use policies to support compact development, transit service, parking policies, pedestrian and bicycle-friendly streets, and affordable housing and jobs/housing policies. They found that some communities have implemented sprawl-stopping policies such as small-lot single-family zoning, moderate and high-density multifamily uses; and accessory housing regulations. In many communities, though, these policies have not been implemented. The report found that the four counties within the central Puget Sound region have a mixed record on stemming growth outside of urbanized areas. As of 1999, the percent of county growth occurring outside of

[223] 1,000 Friends of Washington (2000).

[224] 1,000 Friends of Washington (2003).

urbanized areas was 54 percent in Kitsap County, 38 percent in Pierce County, 17 percent in Snohomish County, and only eight percent in King County.[225]

The organization also notes that much of the new development in King County has been in existing central urban neighborhoods. The City of Seattle's growth rate increased during the 1990s after turning around a 30-year decline in the mid-80s. In 2000, Seattle received 44 percent of the county's new residential units, more than 6,500 housing units.[226]

Northwest Environment Watch Review

A 2002 report by Northwest Environment Watch asserts that the Seattle region's policies have largely been unsuccessful in stopping sprawl, at least compared to other Pacific Northwest cities.[227] The report is based on an analysis of 1990 and 2000 Census data. The report notes that during the 1990s, 55 percent of new population growth took place in low-density areas with fewer than 12 people per acre. The Greater Seattle-Tacoma region uses 25 percent more land per resident than does greater Portland, and 75 percent more than greater Vancouver, BC. Sprawl was worst in northern Pierce County and Snohomish County, where the share of residents living in so-called compact communities increased from only 11 percent and 10 percent, respectively, in 1990, to 12 and 14 percent in 2000. (For comparison, one-third of King County residents live in compact communities.)

Regional Data Sources

PSRC maintains a GIS land use database that is used to guide land-use planning for the region. The GIS does not make any use of aerial photography due to what staff believe would be an inordinate investment of time and resources. However, county assessor files are used to provide information about existing land use at the parcel level. Due to the different classifications used by the counties, this land use information must be reclassified in generalized broad groups. Furthermore, since this information is only periodically updated by the assessor's office, regional council staff make an effort to update the database and remove inaccuracies by observing aerial photographs and conducting field studies.

King County, which includes about two-thirds of the entire population of the Seattle region, has established its own, more detailed land monitoring system. Building permits are collected from 40 different jurisdictions using a standardized form by the PSRC, and contain information on the number of authorized new units, demolitions or lost units, net total units, net single family units, net total multifamily units, and net multifamily units in

[225] 1,000 Friends of Washington (1999).

[226] Trohimovich (2001).

[227] Northwest Environment Watch (2002).

multiple unit structures. The resulting data are subsequently geocoded and used to effectively chart growth patterns by King County. This feat is made possible through technical requirements released as part of the State Buildable Land Program Guidelines and recommendations from the King County Land Capacity Task Force. The end product is a common methodology for the cities and the county to use in the estimation of land capacity, with enough flexibility in the framework to allow for local variation in data resources, land use regulations, land base conditions, and market conditions. Due to this flexibility within a structured set of guidelines, the end result is a data set that is both reliable and comparable across the entire county, allowing a detailed analysis of the building permits to occur.

The building permits are used to calculate average building density of new development, which then serves as the basis for assumptions about future development yield on vacant land as well as land that could potentially be redeveloped. Collected information includes the number of dwelling units per acre for residential units, while FARs are used to measure the intensity of commercial development. In lots where mixed-use buildings stand, both values are tabulated, based on analytical apportioning of the site area. Another advantage to the use of standardized procedures is their ability to integrate automated permit tracking systems that were used in some counties with the regular paper records that are used by the remainder. The use of automation not only reduces the chance for transcription errors to occur, but also considerably speeds up the compilation of data. If detailed information is not collected on the permits, confusion and difficulties can occur during analysis when parcels are classified only as 'mixed-use' (with no information on what combination of uses are present and to what degree) or 'partially-developed' (with no information on what the development is, what the timeframe is, or how much development there is).

The majority of the measurement work at PSRC is conducted by the individual jurisdictions. The role of the regional government in such a case is to organize the data into a meaningful collection at the regional level. Using this information, recommendations for future planning can be established, and the effectiveness of past policies can be assessed. To this end, a number of data sets are used in addition to the land use coverage and building permits, including employment data, roadway and transit locations, and a regional economic and demographic database. The employment data is gathered quarterly from The State of Washington's Covered Employment and Wages datasets.

Research Underway

Research is underway at the University of Washington by Paul Waddell, et al. on the effects of the urban growth boundary on housing prices in the Seattle region.

5.2 Transportation Conditions

Past Trends

As part of a performance monitoring effort initiated in 2001 by *Destination 2030*, PSRC has compiled historical data on VMT and demographic indicators. Table 5.1 compares the historical rate of VMT growth with population and employment growth over the period 1981-2000. While VMT increased faster than population and employment in the 1980s, it increased at about the same rate in the 1990s.

Table 5.1 Population, Employment, and VMT Growth in the Puget Sound Region[228]

Year	Population	Employed Persons	Average Weekday VMT
1981	2,309,400	1,021,200	39,430,600
1985	2,436,200	1,115,800	50,600,400
4-year average annual growth rate (1981-1985)	1.3%	2.2%	6.4%
1990	2,748,800	1,434,500	67,532,500
5-year average annual growth rate (1985-1990)	2.4%	5.2%	5.9%
1995	3,020,000	1,523,900	71,701,200
5-year average annual growth rate (1990-1995)	1.9%	1.2%	1.2%
2000	3,275,800	1,718,800	78,410,700
5-year average annual growth rate (1995-2000)	1.6%	2.4%	1.8%
2001	3,323,700	1,659,900	78,222,100
1-year annual growth rate (2000-2001)	1.5%	-0.03%	-0.2%

Table 5.2 compares VISION 2020 projections of population, employment, VMT, and transit ridership with observed data in 1990 and 2000. Direct comparisons between forecast and observed data are difficult, because VISION 2020 only forecast transportation performance measures for 2020, not 2000, and because there were some discrepancies in baseline (1990) population, employment, and VMT data between different VISION 2020

[228] Puget Sound Regional Council (2003c). (Data compiled from the U.S. Census, Washington State estimates, and the Highway Performance Monitoring System.)

documents and recent monitoring estimates by PSRC. Consistent data also are not available from published sources for other transportation performance measures such as congestion and delay. Nevertheless, this comparison provides a general indication of the extent to which the region is growing at the rate projected in VISION 2020, as well as the extent to which transportation performance objectives are being realized.

Table 5.2 VISION 2020 Forecast versus Actual[229]

	VISION 2020 (1990)			PSRC Monitoring Data (2003)	
Indicator	**1990 Actual**	**2000 Forecast**	**2020 Forecast[a]**	**1990 Actual**	**2000 Actual**
Population (millions)	2.7	3.1	4.1	2.75	3.32
Employment (millions)[b]	1.4	1.7	2.3	1.43	1.72
Daily VMT (millions)	55.1	–	101/95	62.1	78.4
Transit fixed-route passenger trips (millions)	–	–	39%/218% increase over 1990	98.0	130.0

[a] Where a range is shown, the first number refers to the "Dispersed Growth" alternative; the second number refers to the "Preferred" alternative.

[b] VISION 2020 EIS shows slightly different employment figures than summary document. Numbers reported here are from the summary document.

Table 5.2 shows that VISION 2020 population and employment forecasts for 2000 were very close to actual levels. Actual VMT increased by 26 percent over a 10-year period, compared with a forecast increase of 72 to 83 percent (for the Preferred versus Dispersed Growth alternatives) over a 30-year period. It is therefore not clear which alternative VMT is tracking more closely. Transit ridership increased by 33 percent over the 1990-2000 period, compared to a total forecast increase of 39 percent under the Dispersed Growth alternative and 218 percent under the Preferred alternative. This suggests that transit ridership is increasing more quickly than projected under the Dispersed Growth alternative, but not at a rate to meet ridership projections under the Preferred alternative.

[229] Source: Authors, compiled from *VISION 2020 Environmental Impact Statement* and *VISION 2020* summary document, and from various PSRC monitoring documents published in 2003.

Future Monitoring Efforts

As part of the Puget Sound Milestones effort, PSRC is creating a series of reports focusing on system performance and trend monitoring, as well as on plan implementation monitoring. For transportation, reports have already been developed on the Roadways and Ferries system and on Regional Transit. Reports are forthcoming on other modes, and additional indicators of transit service and performance will be evaluated.

Transportation monitoring is focusing on three observable indicators: speed, reliability, and travel time. Recently, WSDOT has begun reporting on travel time and travel time reliability for a number of highly traveled routes where data collection equipment is currently installed. Data are being collected through inductive loop detectors maintained by WSDOT. PSRC's 2003 Roadways and Ferries monitoring report provides average travel times for 11 sample commutes in the region. The following measures are provided: average peak travel time, average time with and without incidents, and the 95 percent reliable travel time. Average speed is also reported for specific facilities. Since monitoring of these measures was begun in 2001, no time-series data are available.

Travel Behavior and Neighborhood Design

At least three studies in the past decade have explored the relationship between neighborhood design and travel behavior in existing communities in the Seattle region. While these studies do not directly indicate the impacts of growth management policies, they do suggest ways in which state and regional policies aimed at affecting development patterns might be expected to change travel behavior.

Frank and Pivo (1994) combine travel survey data, census data, state employment data, and parcel-level land use data to study the impacts of mixed use and density on utilization of alternative modes of travel. They find that SOV travel decreases at employment densities of 20 to 50 jobs per acre, and transit use increases dramatically at densities over 75 jobs per acre. They find that gross population density at origins and destinations of shopping trips correlates strongly with mode choice, with walk trips most sensitive to increases in population density. Relationships are nonlinear, and densities need to exceed 13 residents per acre for changes in mode choice to be detected. Non-SOV mode shares are highest for trips that have higher densities and mixes of uses at both the origin and destination of the trip end.

A later analysis of travel survey and census data by Frank, Stone, and Bachman (1999) controls for household size, income, and number of vehicles. The study finds that both VMT and VHT are lower in areas with smaller blocks and in areas of higher population and employment densities. Vehicle trip frequency is also lower in areas of high household density and high employment density at the workplace.

Moudon, Hess, Snyder, and Stanilov (1999) examine 12 neighborhood centers in the Puget Sound area, matching these sites in terms of gross residential density and commercial development intensity. They evaluate the sites according to various measures of

walkability (block size, street connectivity, extent of pedestrian facilities, etc.) and compare pedestrian activity among the sites. They find that pedestrian volumes at sites with urban design characteristics average two to four times those at sites with suburban design characteristics.

The findings of these studies support the hypothesis that the growth strategies contained in VISION 2020 and implemented under the GMA should reduce VMT and increase non-automobile mode share. Without a detailed analysis of changes in development patterns or modeling of travel impacts, however, it is impossible to say what would be the expected magnitude of these changes on a regional level.