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Colorado State University

Utah State
UNIVERSITY



Resource Sensitive Transit Planning in National Parks

Steve Lawson, Ph.D.

- Peter Newman, Colorado State University
- Chris Monz, Utah State University
- Robert Chamberlin, Resource Systems Group
- Janet Choi, MIT
- Ben Swanson, Resource Systems Group
- Brett Kiser, Resource Systems Group
- David Pettebone, Yosemite National Park
- Larry Gamble, Rocky Mountain National Park

Outline

- Background, Framework, and Purpose
- Case Study: RMNP Shuttle System
- Implications for RMNP and Other Parks



Transportation-related Impacts of Recreation



User capacity

The types & amounts of visitor use that can be accommodated, while maintaining desired resource conditions and meaningful visitor experiences



Transportation System Solutions & User Capacity

Transportation solutions are
decisions about:

- When, where, how, & how many visitors are provided access
- Resource conditions & visitor experiences
- Inextricably linked with user capacity



Resource Sensitive Transit Planning

Transit planning that:

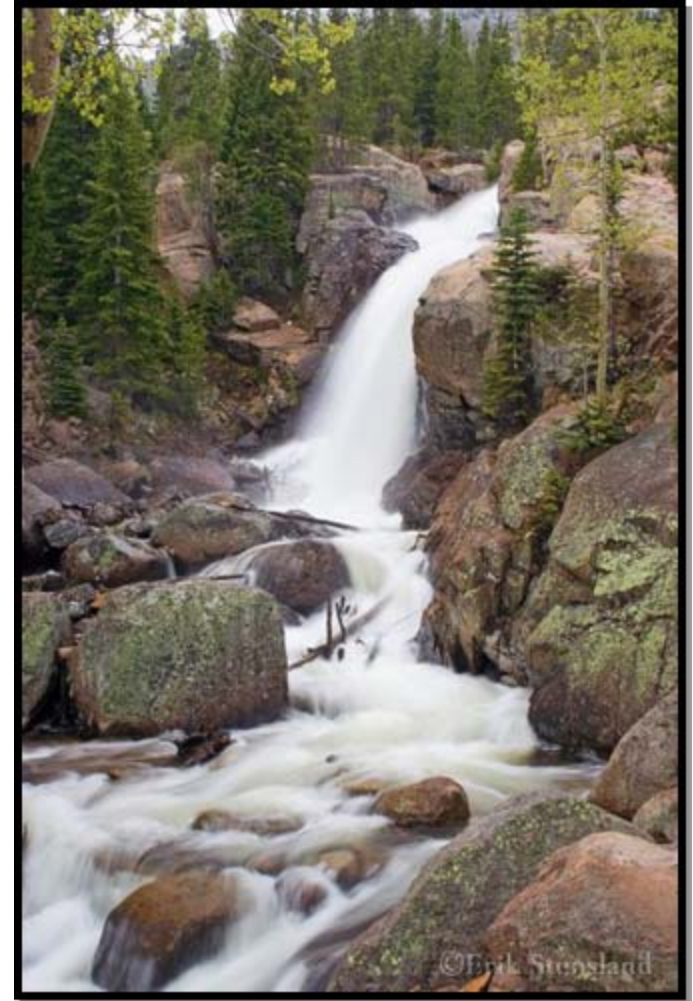
- Addresses a park issue/need
- Is financially feasible and sustainable
- Improves transportation system performance and safety

And

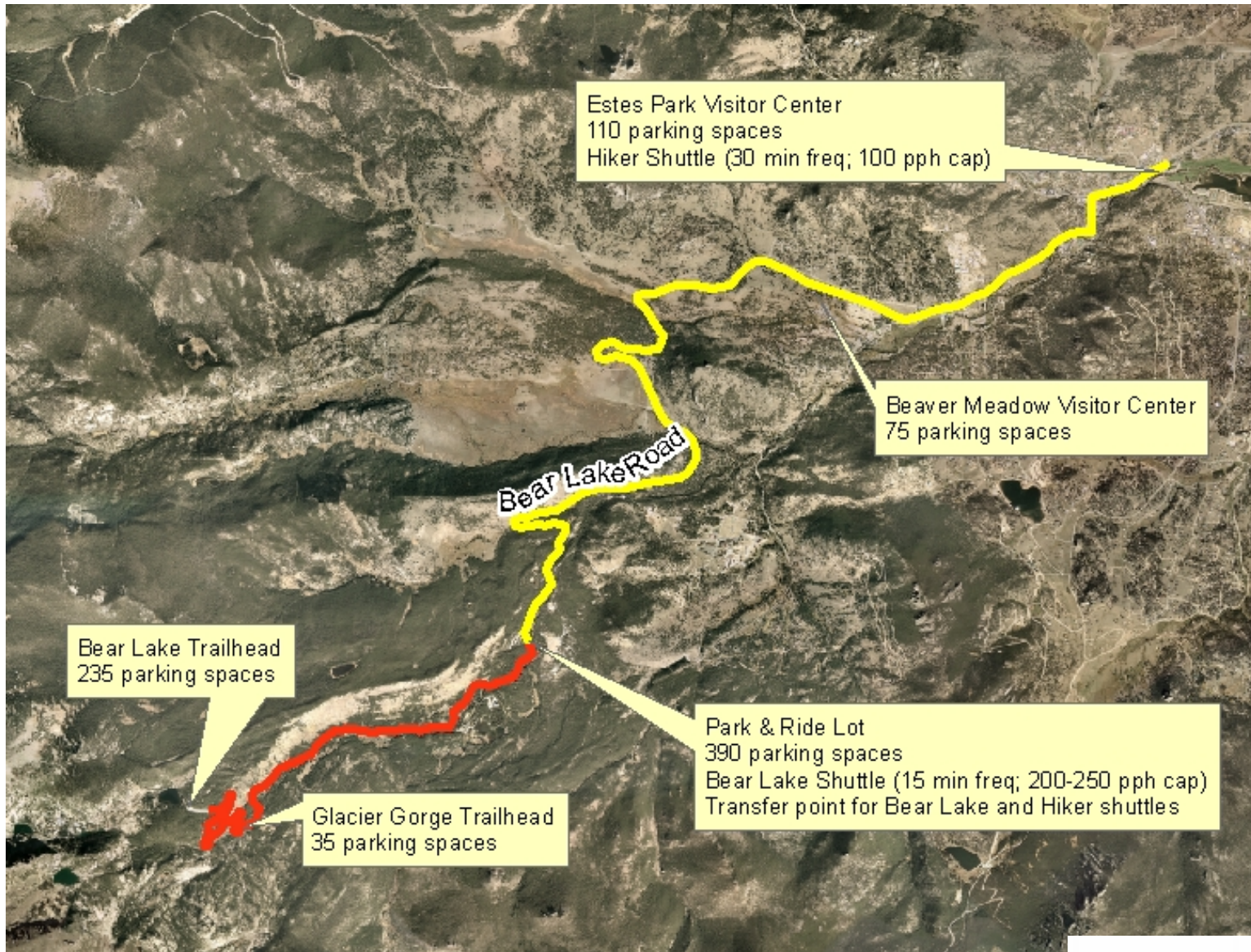
- Designs operations in accordance with user capacities



Develop approaches to explicitly integrate transportation and user capacity planning in parks and public lands



Case Study –RMNP Shuttle Service



Background – RMNP Shuttle System

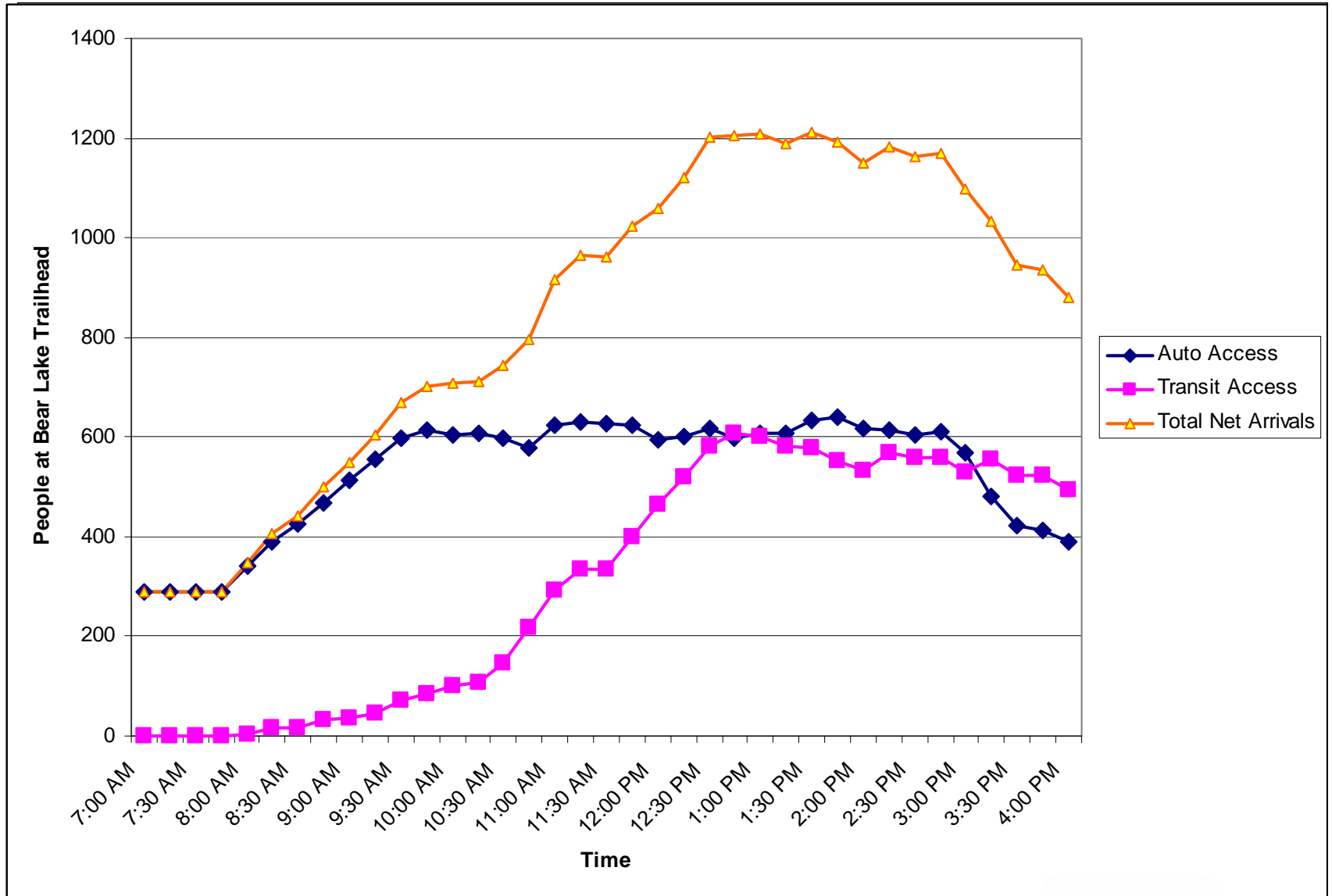
High frequency shuttle service has increased access to popular sites in the Bear Lake Road Corridor

Shuttle service is generally operated according to demand

Transportation benefits have been documented in previous studies (e.g., reduce parking congestion)

Visitor experience and resource-related implications of resulting visitation levels are not known

Unintended Consequence of RMNP Shuttle

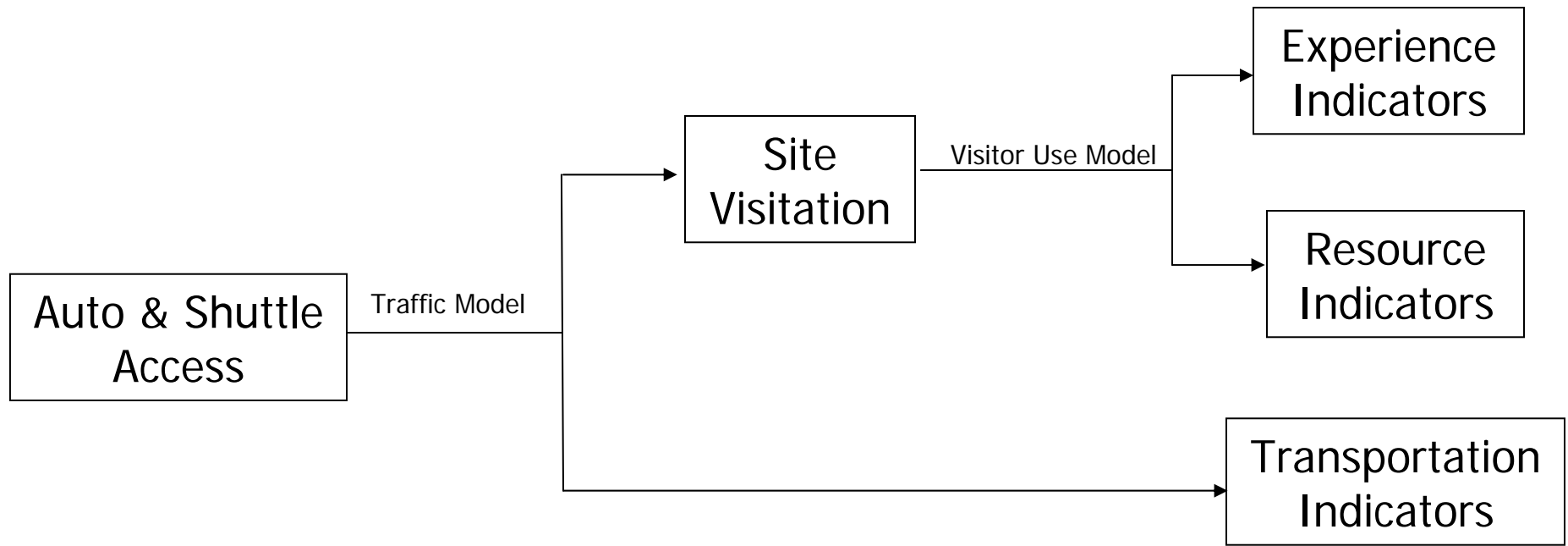


Purpose

Improve the NPS's ability to operate RMNP's shuttle service according to fundamental visitor experience and resource protection objectives



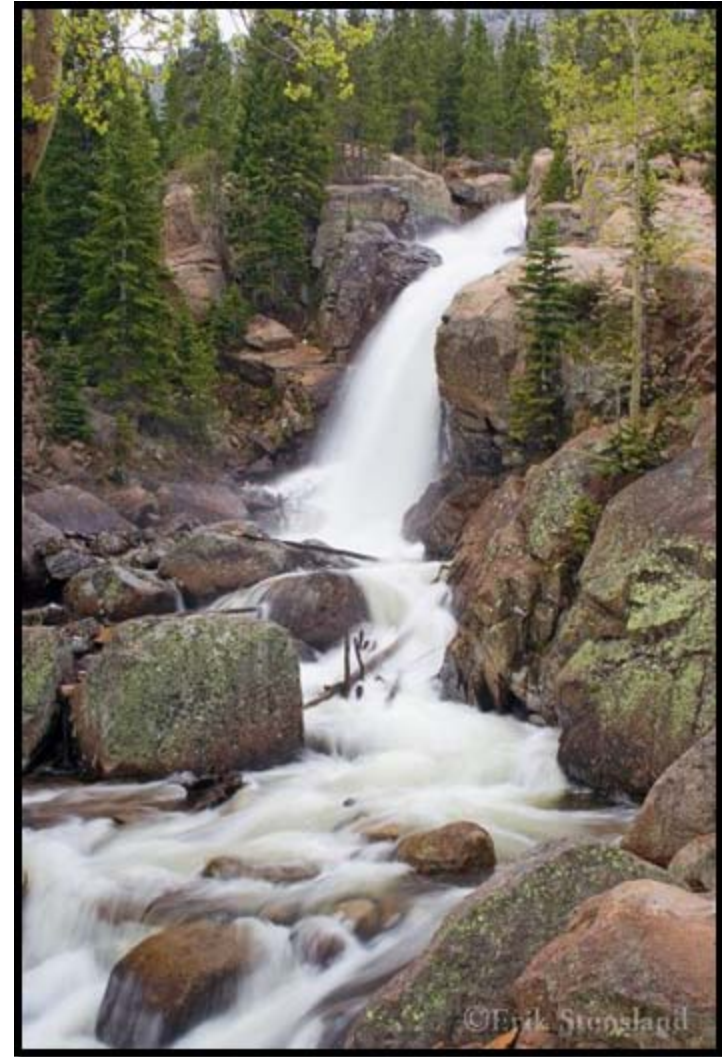
Integrated Transportation & Visitor Use Model



Data Collection

Traffic, parking, and transit
ridership counts

Hiking route surveys and
visitor use counts



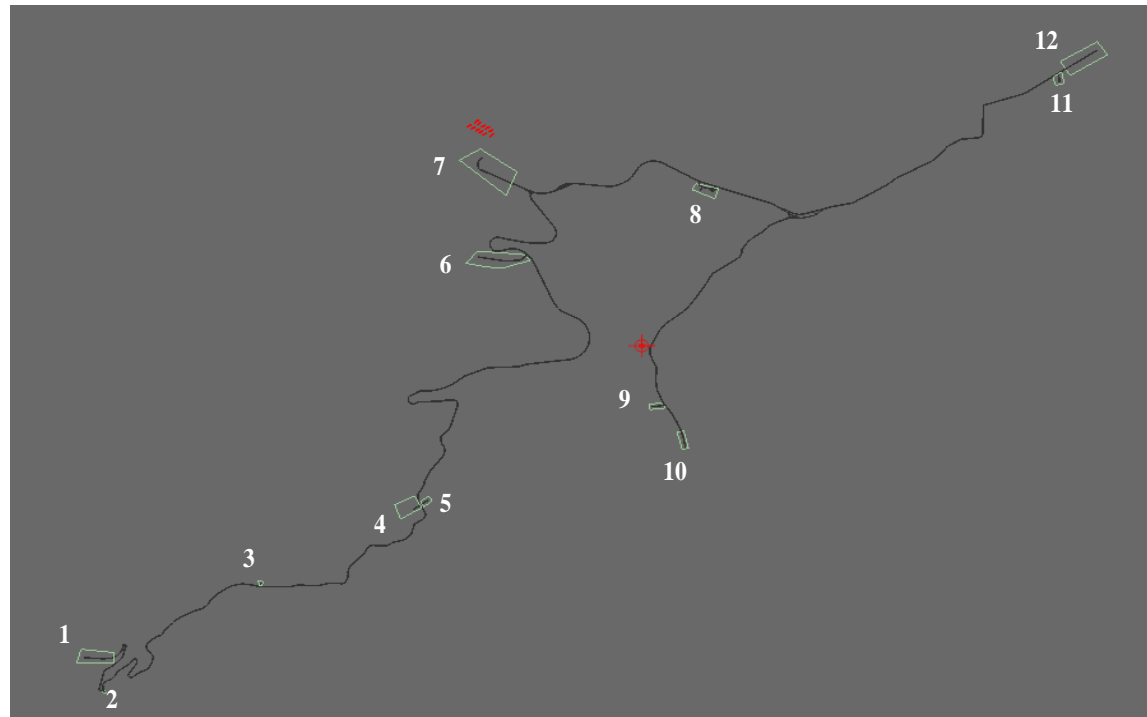
Transportation Model

Paramics

12 OD zones

8th busiest day, 2008















ITS-induced mode shifts



Transportation Model - Outputs

Indicator		Scenario	Value	% Change
Transportation Related Indicators	Vehicle Miles Traveled (VMT)	Baseline	52,183	52,183
		10% Capture	51,257	-2%
		25% Capture	49,541	-5%
	Vehicle Hours Traveled (VHT)	Baseline	1,606	1,606 hours/day
		10% Capture	1,579	-2%
		25% Capture	1,516	-6%
	Emissions (CO2, CO, NOx, and VOCs)	Baseline	23,780	23,780
		10% Capture	23,358	-2%
		25% Capture	22,576	-5%
	Fuel Consumption (gal)	Baseline	2,609	2,609 gal/day
		10% Capture	2,563	-2%
		25% Capture	2,477	-5%
	Glacier Gorge Parking Lot Utilization	Baseline	86%	86% full
		10% Capture	84%	-2%
		25% Capture	81%	-5%
	Bear Lake Parking Lot Utilization	Baseline	75%	75% full
		10% Capture	68%	-7%
		25% Capture	58%	-17%
	Bear Lake Park-&-Ride Utilization	Baseline	73%	73% full
		10% Capture	80%	8%
		25% Capture	92%	19%

Transportation Model - Outputs

		Indicator	Scenario	Value	% Change
Transit Related Indicators	Operating Hours		Baseline	70	70 hours/day
			10% Capture	100	 43%
			25% Capture	100	 43%
	Operating Costs (\$/day)		Baseline	\$4,900	\$4,900 /day
			10% Capture	\$7,000	 43%
			25% Capture	\$7,000	 43%
	Passengers/Day		Baseline	3073	3,073 passengers/day
			10% Capture	3765	 23%
		25% Capture	4803	 56%	
Passengers/Hour		Baseline	307	307 passengers/hour	
		10% Capture	377	 23%	
		25% Capture	480	 56%	
Transit Miles Traveled/Day		Baseline	775	775 miles/day	
		10% Capture	1345	 74%	
		25% Capture	1345	 74%	
Passengers/Transit Mile Travelled		Baseline	4.0	4 passengers/mile	
		10% Capture	2.8	 -29%	
		25% Capture	3.6	 -10%	
Cost/Passenger (\$)		Baseline	\$1.59	\$1.59 /passenger	
		10% Capture	\$1.86	 17%	
		25% Capture	\$1.46	 -9%	

Transportation Model - Outputs

Arrival "schedules"

Transit and Autos

Baseline & mode shifts

Visitor use model
"drivers"

Mode	Time	Sim Time	Group Arrivals
Personal Vehicle	7:00 AM	0	8
Personal Vehicle	7:30 AM	30	28
Personal Vehicle	8:00 AM	60	29
Personal Vehicle	8:30 AM	90	47
Personal Vehicle	9:00 AM	120	50
Personal Vehicle	9:30 AM	150	41
Personal Vehicle	10:00 AM	180	44
Personal Vehicle	10:30 AM	210	34
Personal Vehicle	11:00 AM	240	32
Personal Vehicle	11:30 AM	270	35
Personal Vehicle	12:00 PM	300	30
Personal Vehicle	12:30 PM	330	30
Personal Vehicle	1:00 PM	360	30
Personal Vehicle	1:30 PM	390	45
Personal Vehicle	2:00 PM	420	44
Personal Vehicle	2:30 PM	450	29
Personal Vehicle	3:00 PM	480	18
Personal Vehicle	3:30 PM	510	9
Personal Vehicle	4:00 PM	540	7
Personal Vehicle	4:30 PM	570	5

Visitor Use Models

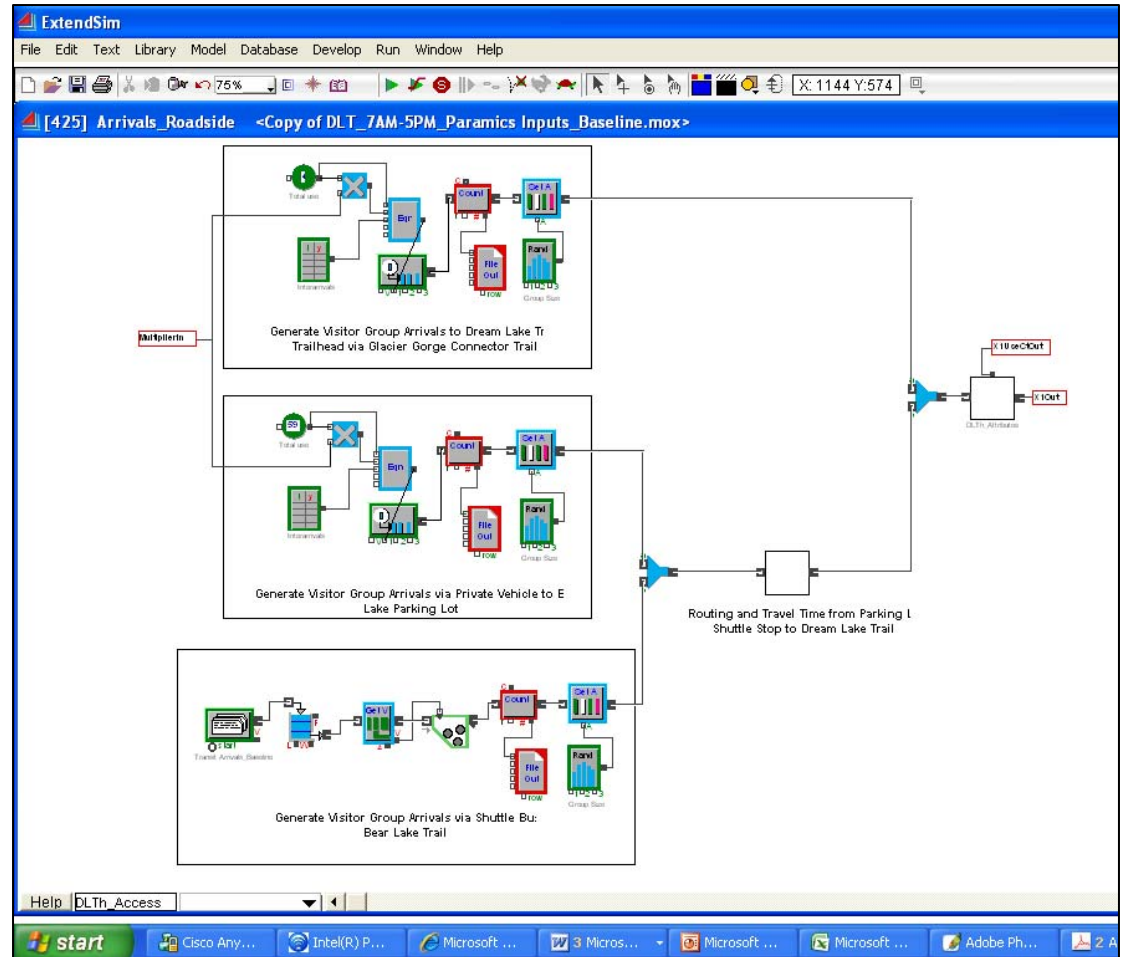
Extend

Arrival schedules

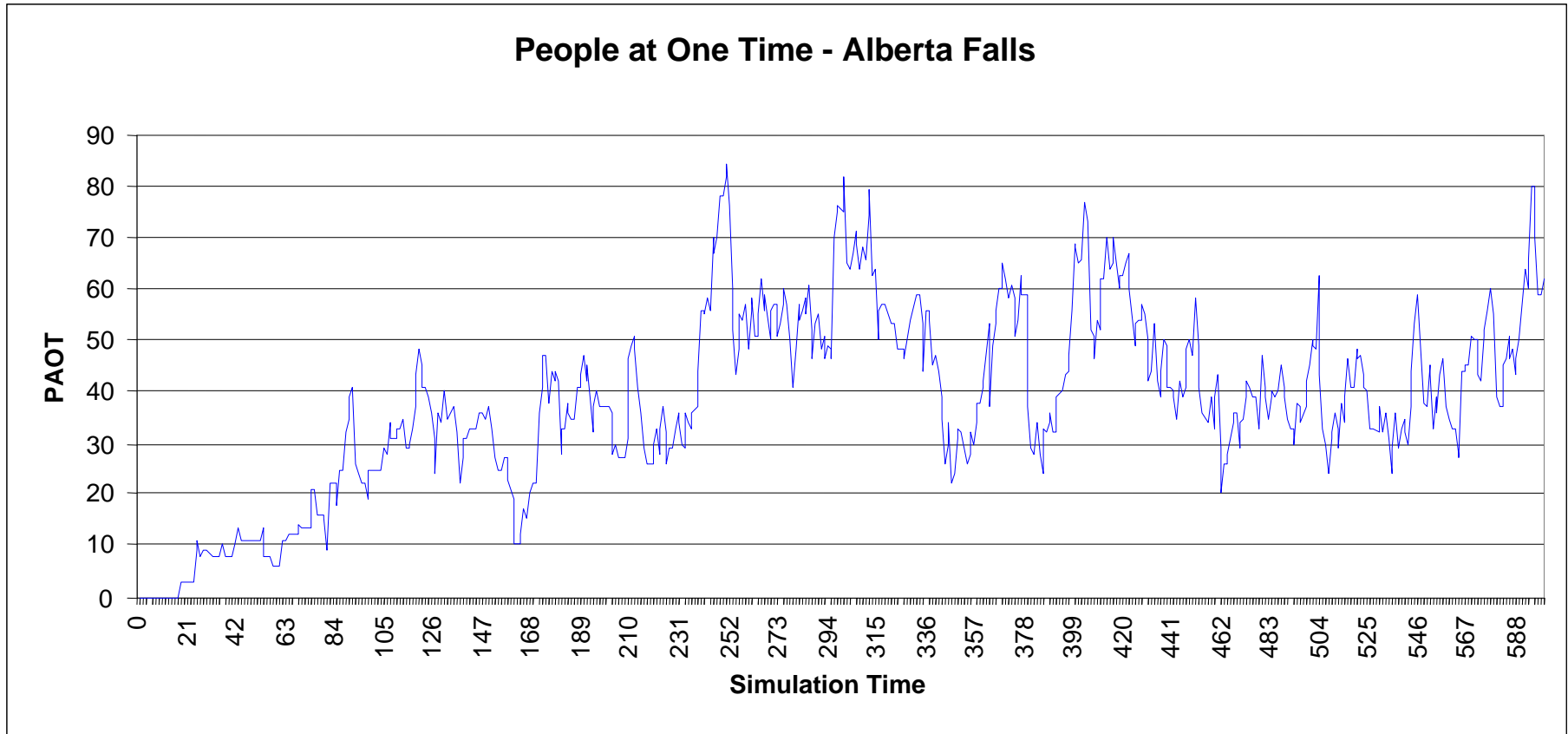
Hiking routes and times

Baseline and mode shift scenarios

User capacity estimates

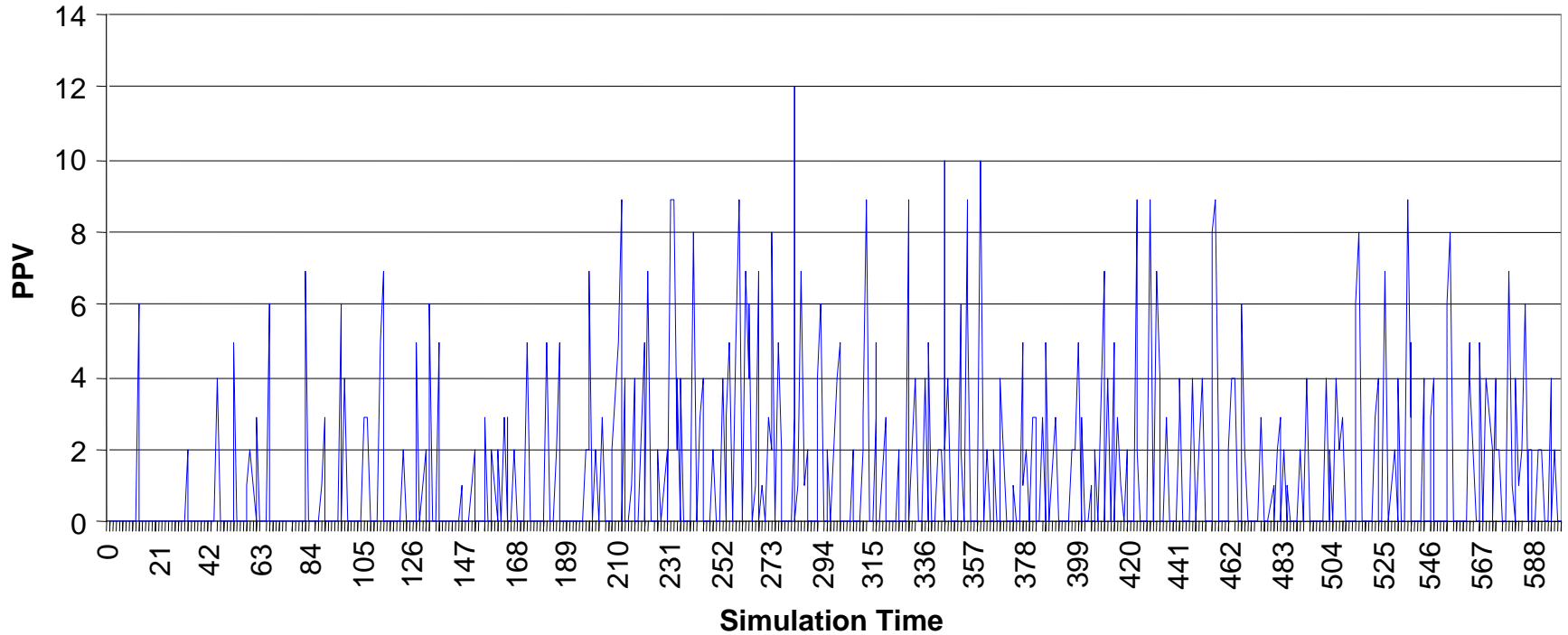


Visitor Use Model Simulations



Visitor Use Model Simulations (cont.)

People per Viewscape - Glacier Gorge Trail (50m Section)



Visitor Surveys: Crowding Thresholds



Very Unacceptable					Very Acceptable			
-4	-3	-2	-1	0	1	2	3	4

Simulations: Percent Time Thresholds Exceeded



Glacier Gorge Trail
8 People



Alberta Falls
25 People

Simulations: Percent Time Thresholds Exceeded

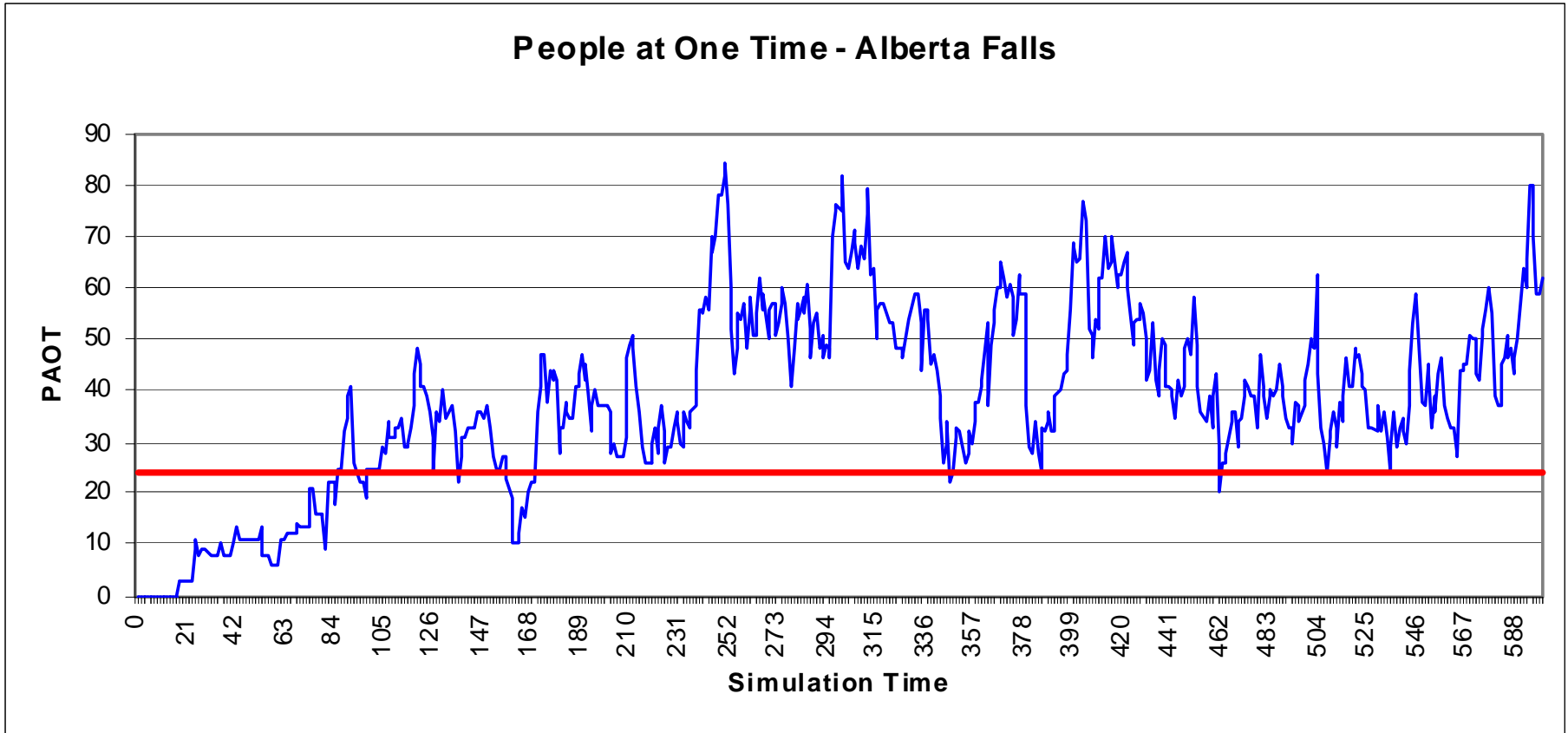


Dream Lake Trail
8 People



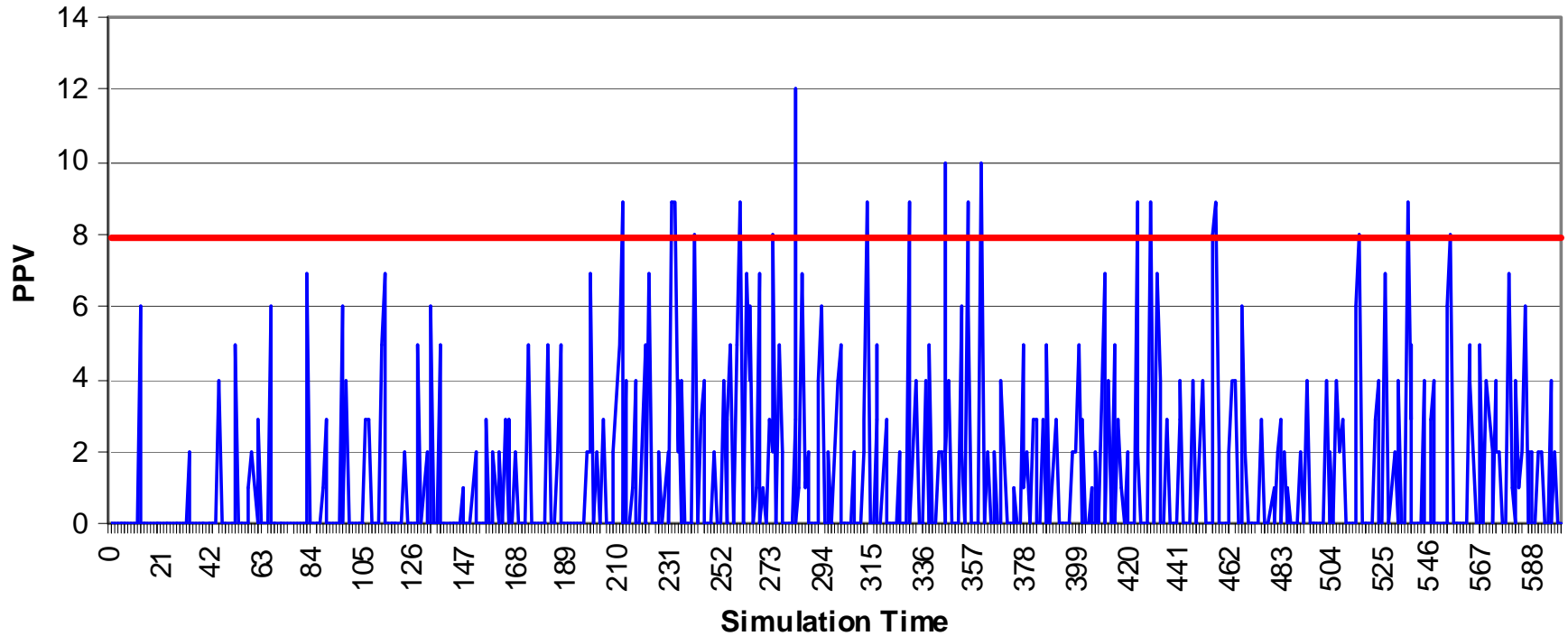
Emerald Lake
15 People

Simulations: Percent Time Thresholds Exceeded

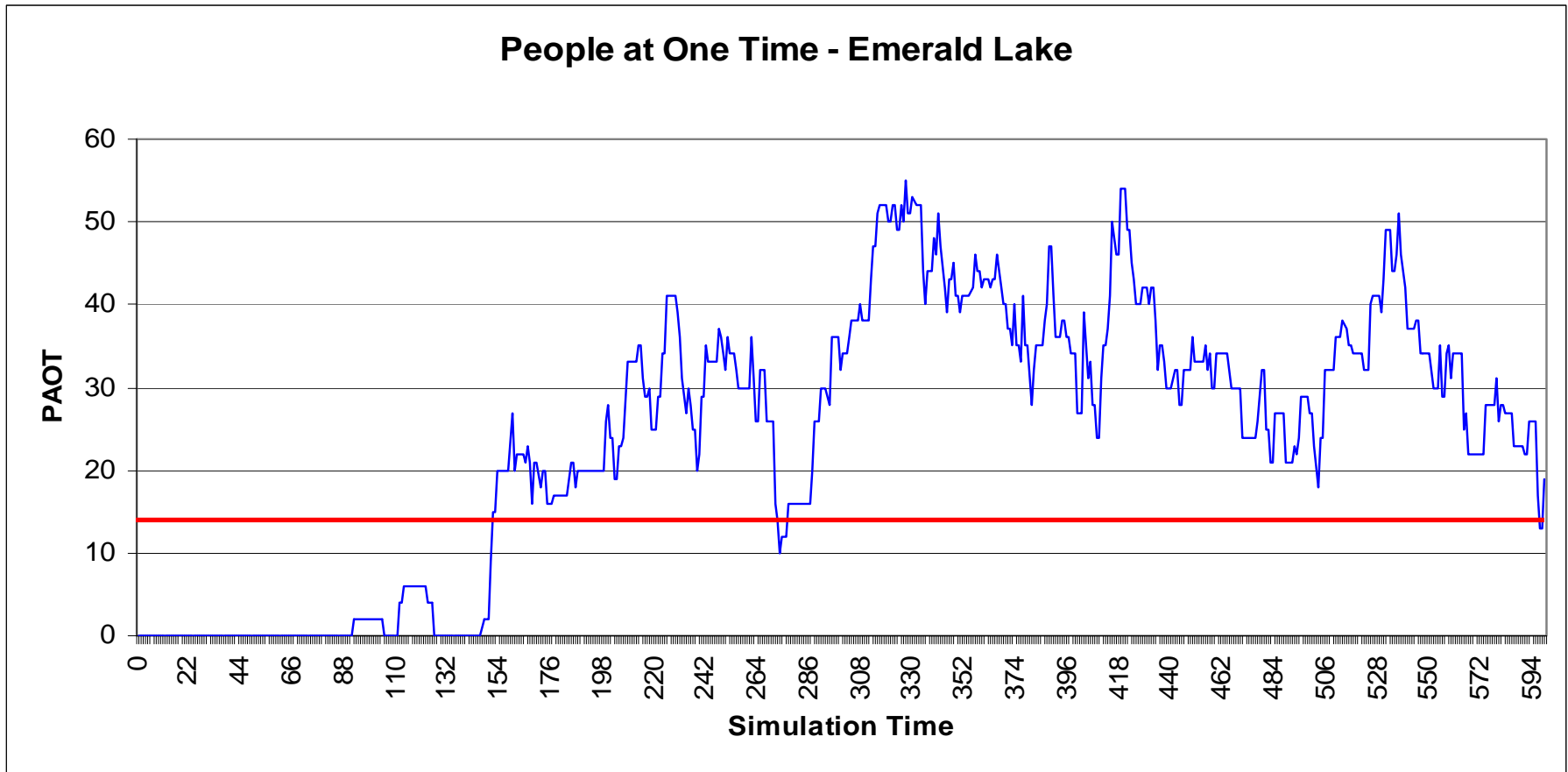


Simulations: Percent Time Thresholds Exceeded

People per Viewscape - Glacier Gorge Trail (50m Section)

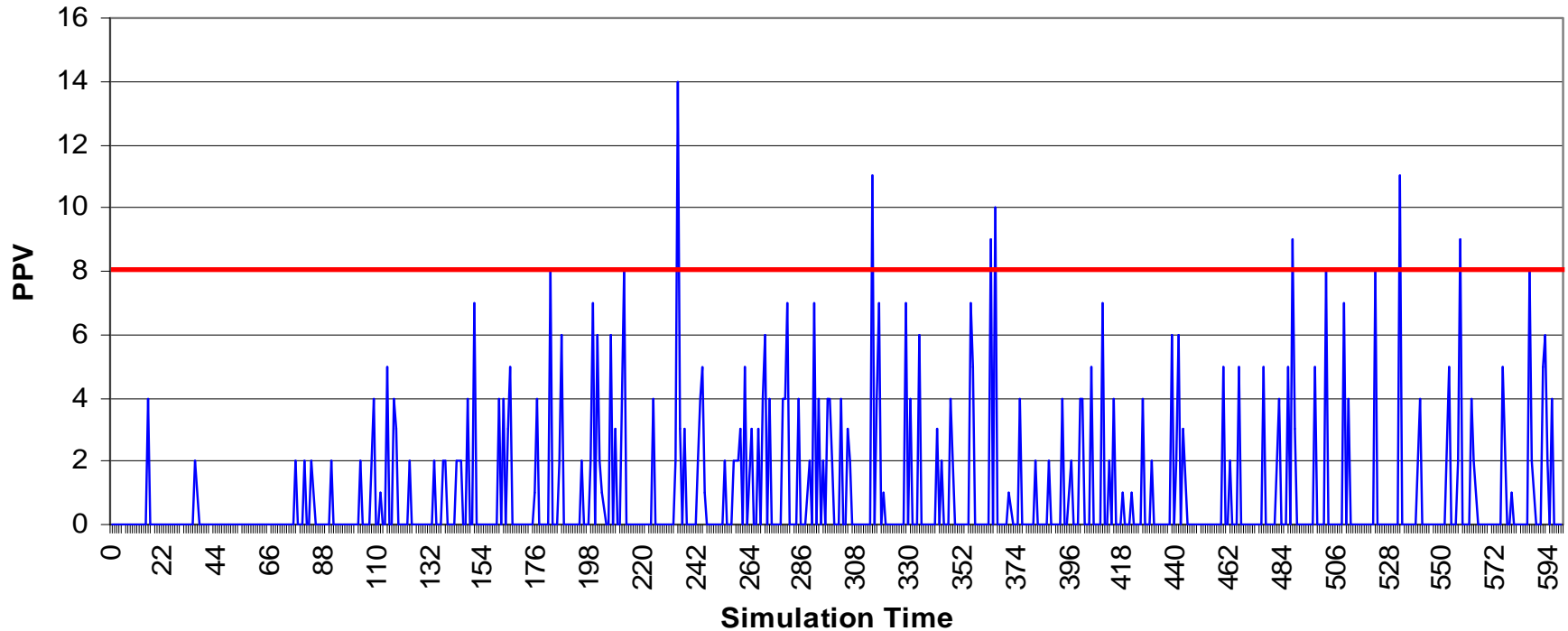


Simulations: Percent Time Thresholds Exceeded



Simulations: Percent Time Thresholds Exceeded

People per Viewscape - Dream Lake Trail (50m Section)



Simulations: Percent Time Thresholds Exceeded

Crowding Threshold	Glacier Gorge Trail (PPV)	Alberta Falls (PAOT)	Dream Lake Trail (PPV)	Emerald Lake (PAOT)
Acceptability	2.0%	20.1%	1.8%	51.7%

Simulations: User Capacity Estimates

Crowding Threshold	Glacier Gorge Trail to Alberta Falls (2008 Visitation = 1,367)	Dream Lake Trail to Emerald Lake (2008 Visitation = 1,099)
Acceptability	1318 (-3.6%)	684 (-37.8%)

Conclusion

RMNP shuttle service has several beneficial effects on transportation indicators

Shifting more visitors to shuttle service would enhance benefits

Substantially increased access to study sites

Crowding at study sites is common and pronounced



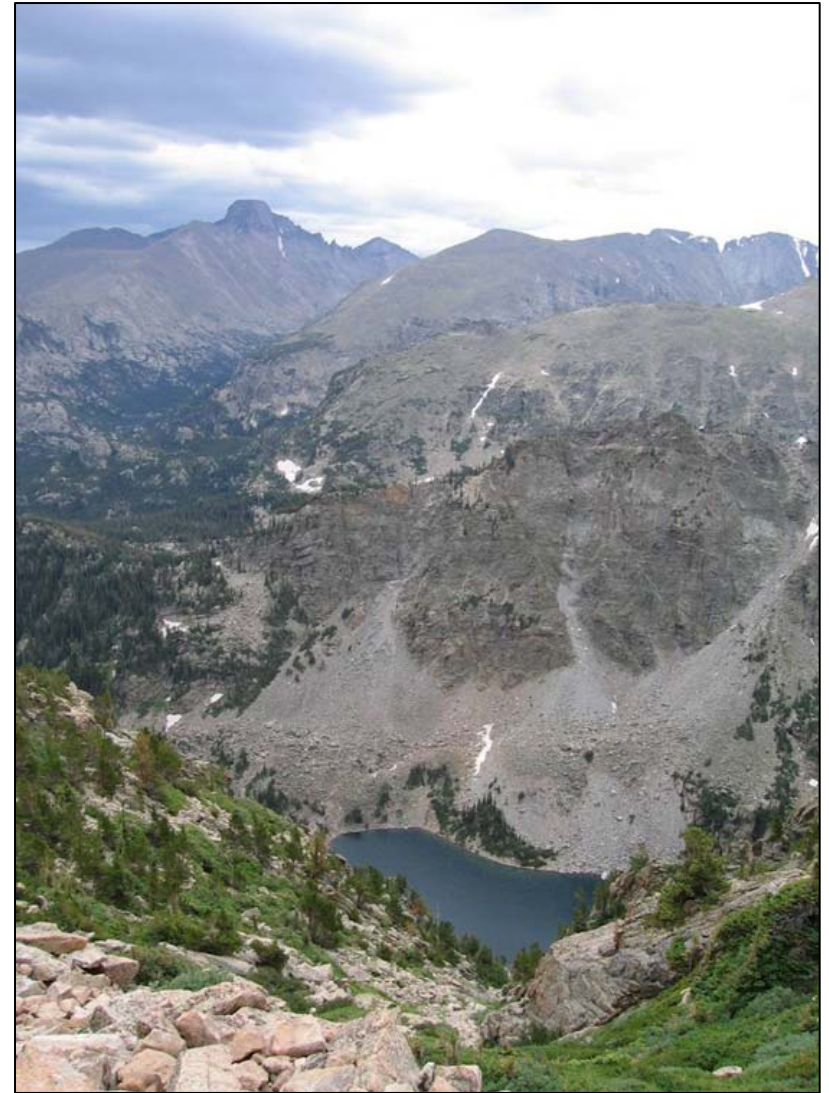
Conclusion

“Too many people” most significant issue in CSU and USU surveys

Shuttle service could be used to redistribute some visitor use

ITS emphasizing avoidance of crowding/parking congestion

Resource capacity of substitute sites and financial feasibility of additional service routes being considered



Questions

