

The Importance of Interregional Refueling Availability to the Purchase Decision

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SUSTAINABLE TRANSPORTATION ENERGY PATHWAYS

An Institute of Transportation Studies Program

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How Many Alt Fuel Stations do You Need, and Where do You Put Them?

- ▶ There are at least two answers to this question
 - Wherever they will get the most usage
 - Wherever they will convince the greatest number of people to buy vehicles
- ▶ Many cite high usage as the primary justification for station construction
- ▶ However the value of a station that is infrequently used may not be predicated solely on the frequency of usage

Research Question

- ▶ What effect does expanding the number of *destinations* (independent of usage) have on the attractiveness of an alternative fuel vehicle?

Methods

- ▶ Administered a survey trading off purchase price with refueling availability (pretest only)
- ▶ Respondents could make their own refueling network
- ▶ Stations were ranked in importance
- ▶ Vehicle was assumed to use a petroleum derived fuel incompatible with gasoline/diesel technology
- ▶ Fuel price, range, performance etc. same as for a gasoline vehicle

Map Questionnaire

- ▶ Instructions:
- ▶ Draw your activity space consisting of roads and areas you are familiar with
- ▶ Place station 1 near your residence
- ▶ Place stations 2-10 in rank order to enable travel to the most important places in your activity space



- navigate
- draw polygon
- drag feature

Activity Space Functions

Erase and Redo

Modify

Online Survey – Fix a Price You Will Likely Spend on Your Next Vehicle



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4. Considering a Vehicle Purchase

4.02 Please put your price range for the next new or used vehicle you are considering (Example: \$10,000-15,000).

Minimum: \$

Maximum: \$

4.03 Now take your price range and choose a value in-between that represents the most likely price you expect to pay within the above range.

Most likely price: \$

4.04 Imagine the vehicle you are most likely to replace were being repaired, and were not available. If you needed to make a trip more than 50 miles away and transit were not available, what alternative would you choose to make the trip?

Choose only one of the following

- Use one of the other vehicles I or my spouse own
- Borrow a friend's vehicle
- Rent a vehicle
- Other
- No answer

Online Survey – Make Tradeoffs Based on Number of Refueling Locations

4.06 ----- ONE STATION -----

4.07 Would you accept a vehicle that could fuel at only *ONE* station near your home if the vehicle were given to you at *no cost* in place of the vehicle you are considering buying in the future?

- Yes
 No
 No answer

4.08 What is the maximum price you would pay for a vehicle that you could only refuel at *ONE* station near your home in place of the vehicle you are considering buying in the future? (Example: \$7000 would mean you would pay \$7000 for this vehicle with limited refueling, but not \$7001.)

\$

4.09 ----- TEN STATIONS -----

4.10 Looking at your map, would you accept a vehicle that could fuel at all *TEN* stations you indicated if the vehicle were given to you at *no cost* in place of the vehicle you are considering buying in the future?

- Yes
 No
 No answer

4.11 What is the maximum price you would pay for a vehicle that you could only refuel at *TEN* stations near your home in place of the vehicle you are considering buying in the future? (Example: \$7000 would mean you would pay \$7000 for this vehicle with limited refueling, but not \$7001.)

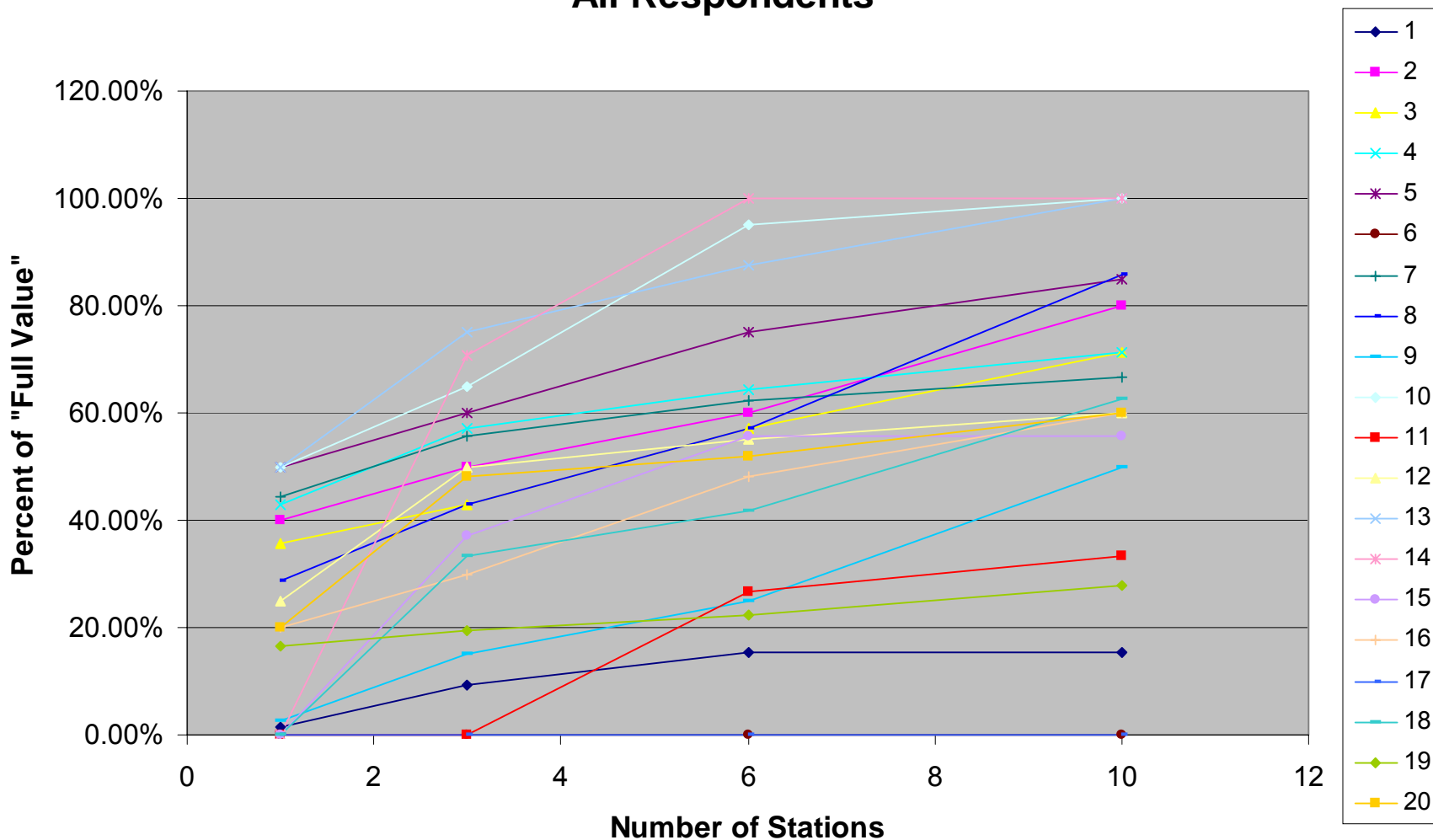
\$

Respondents

- ▶ Convenience sample of 20 University Employees
- ▶ 12 live in Davis, 8 outside Davis
- ▶ 8 women, 12 men
- ▶ 9 one vehicle households
- ▶ 11 multi-vehicle households

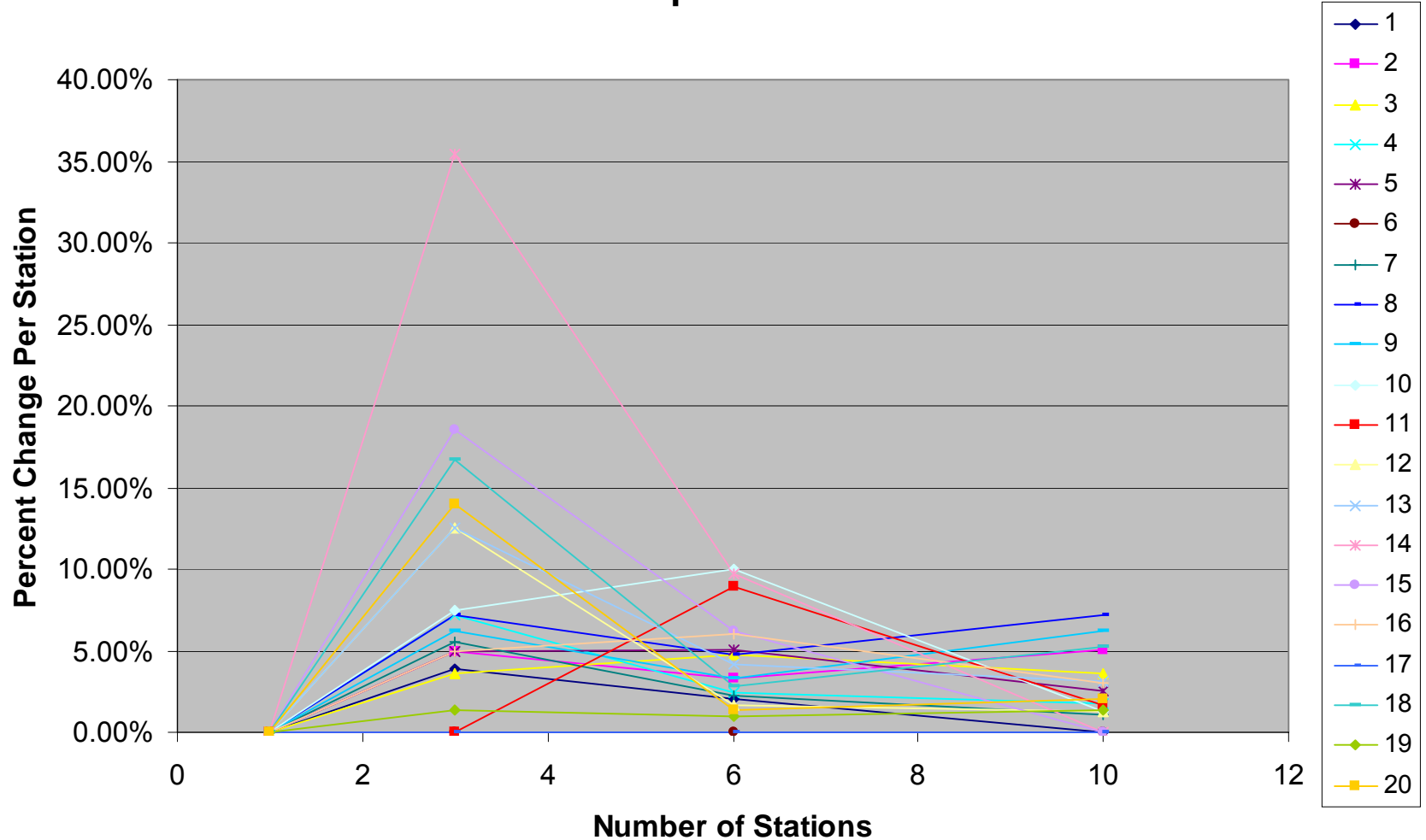
All Respondents – Percent of Purchase Price of Gasoline Vehicle

All Respondents



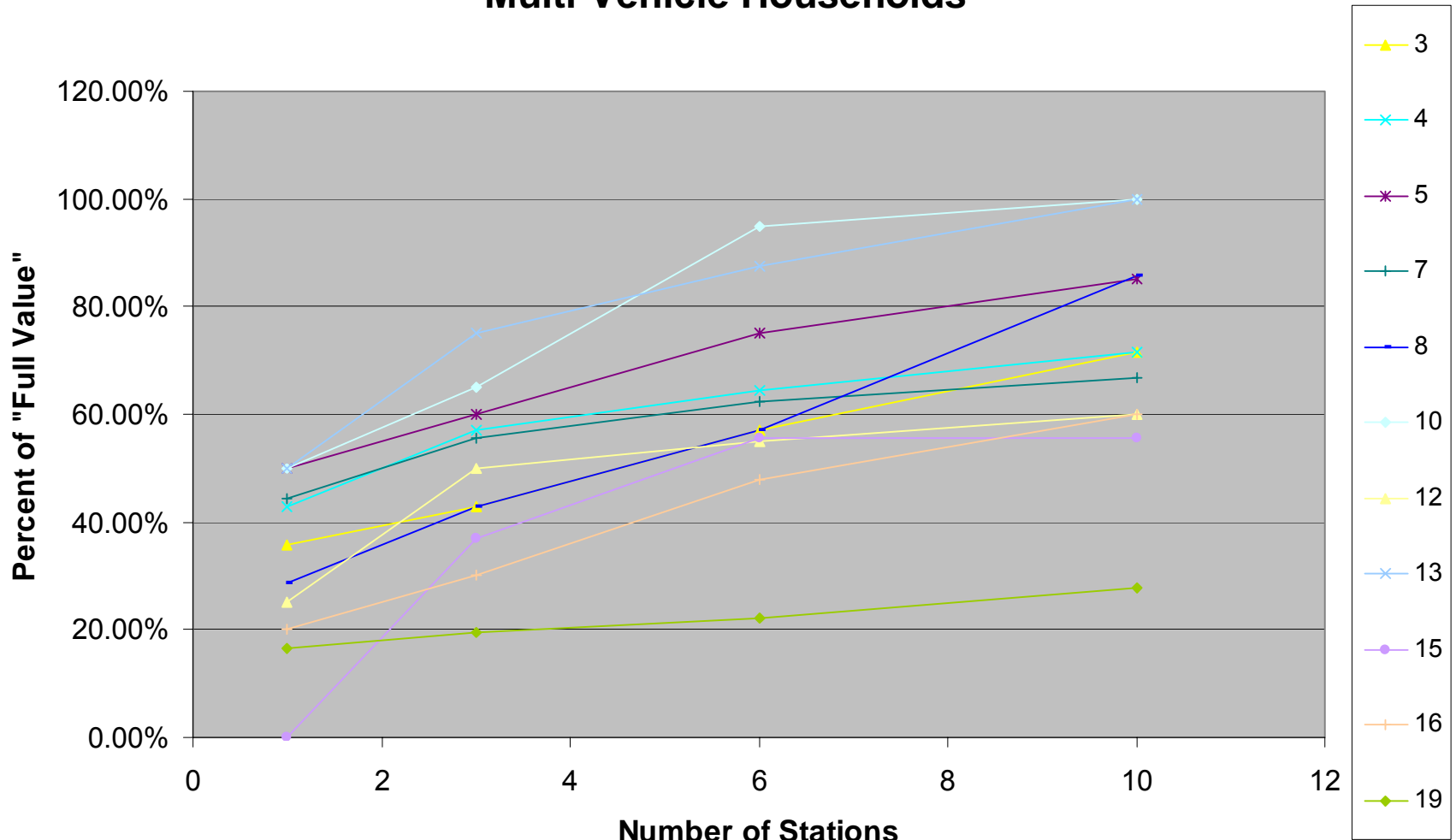
All Respondents – Marginal Value Per Station

All Respondents



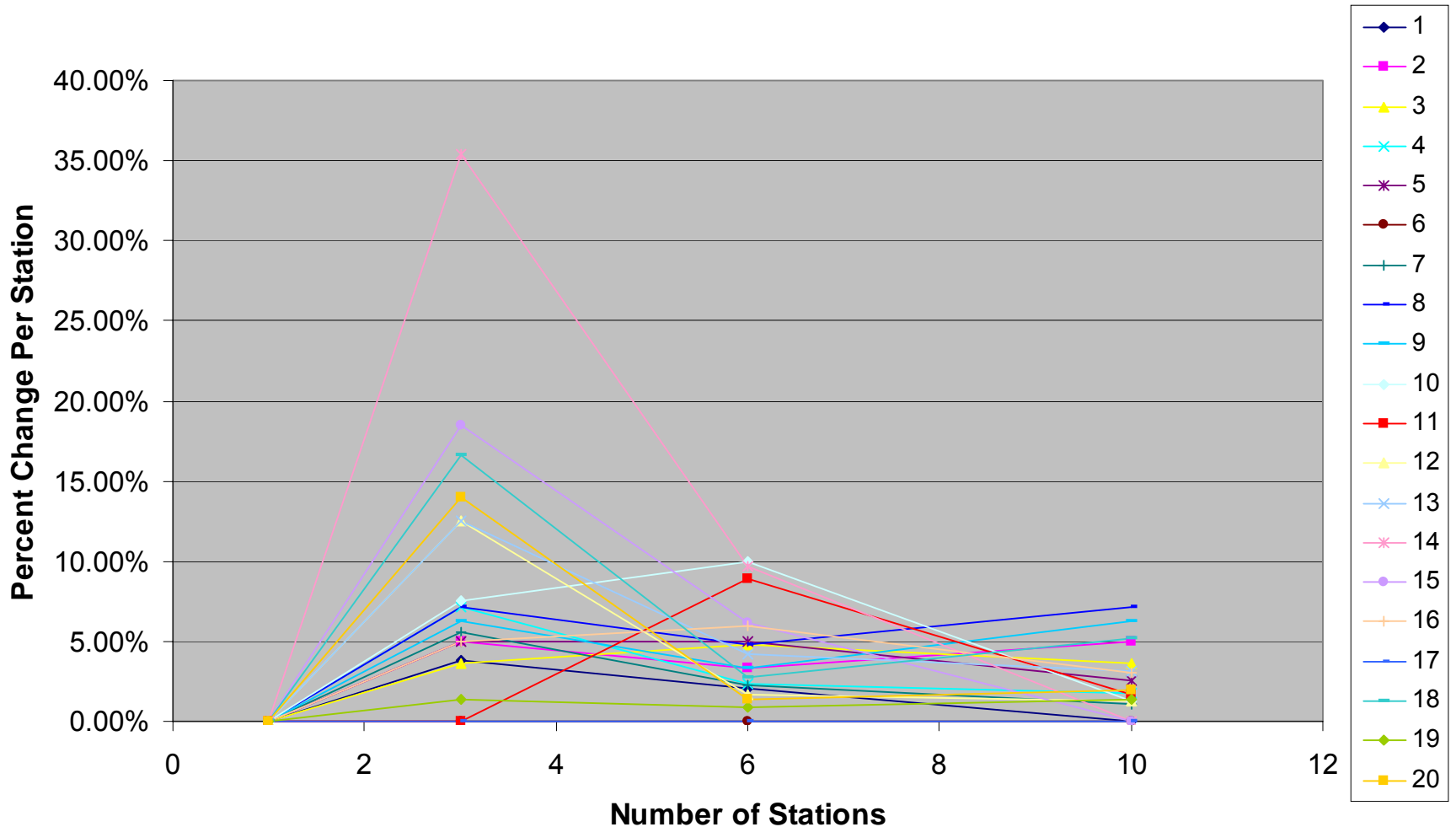
Multi Vehicle Households – Percent of Full Value

Multi-Vehicle Households



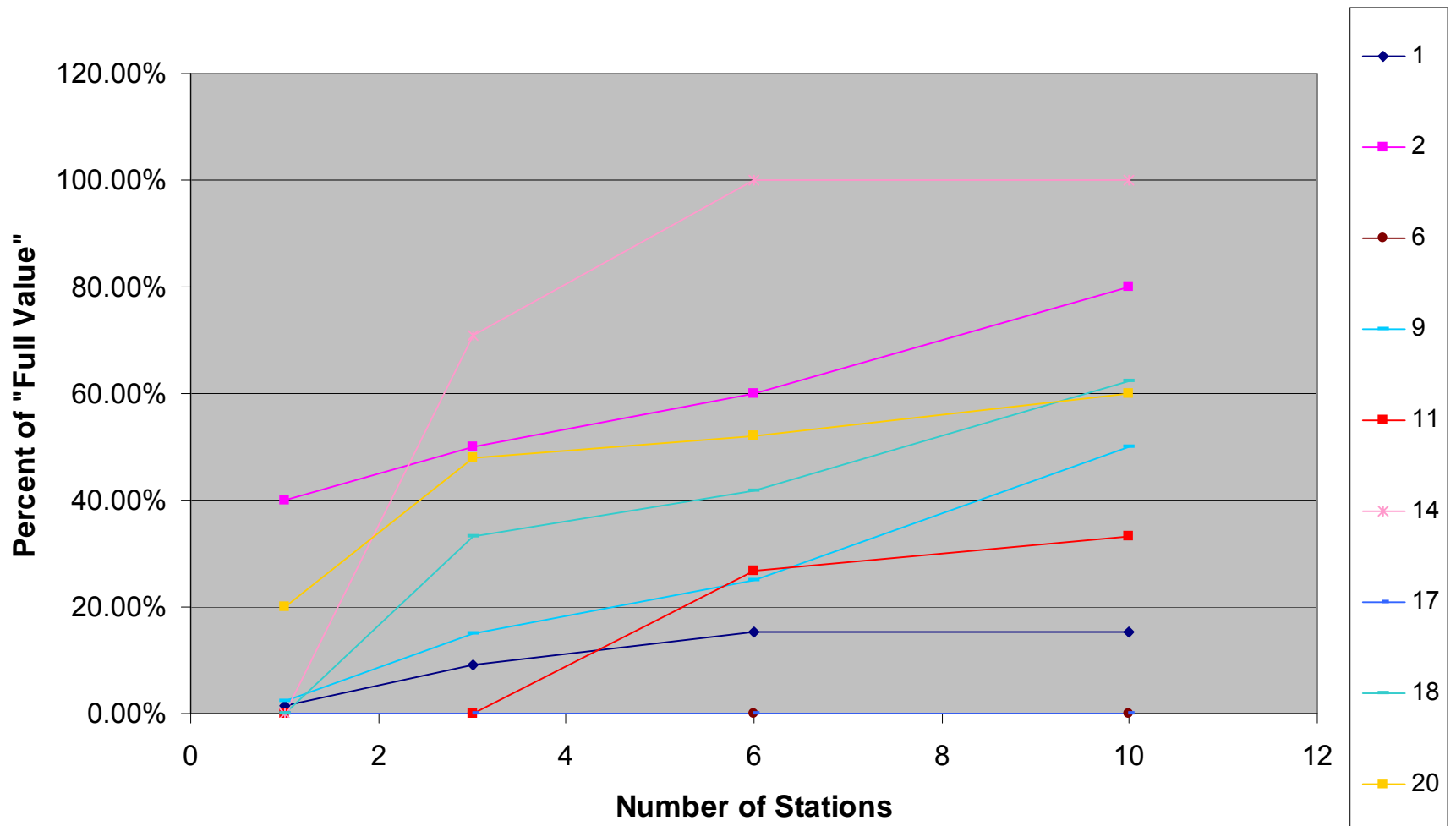
Multi-vehicle Households – Marginal Value Per Station

Multi-Vehicle Households

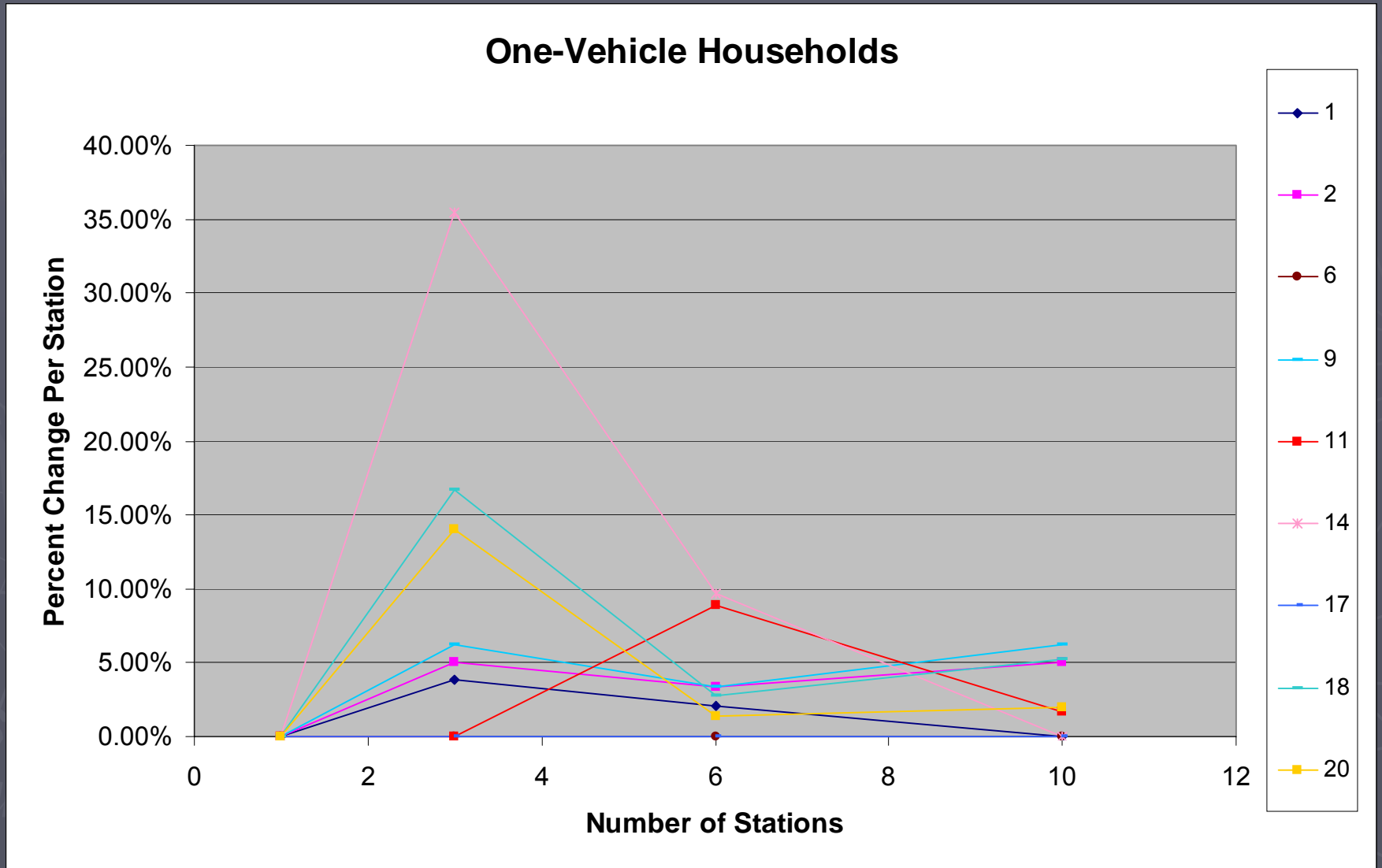


One-vehicle Households – Percent of Full Value

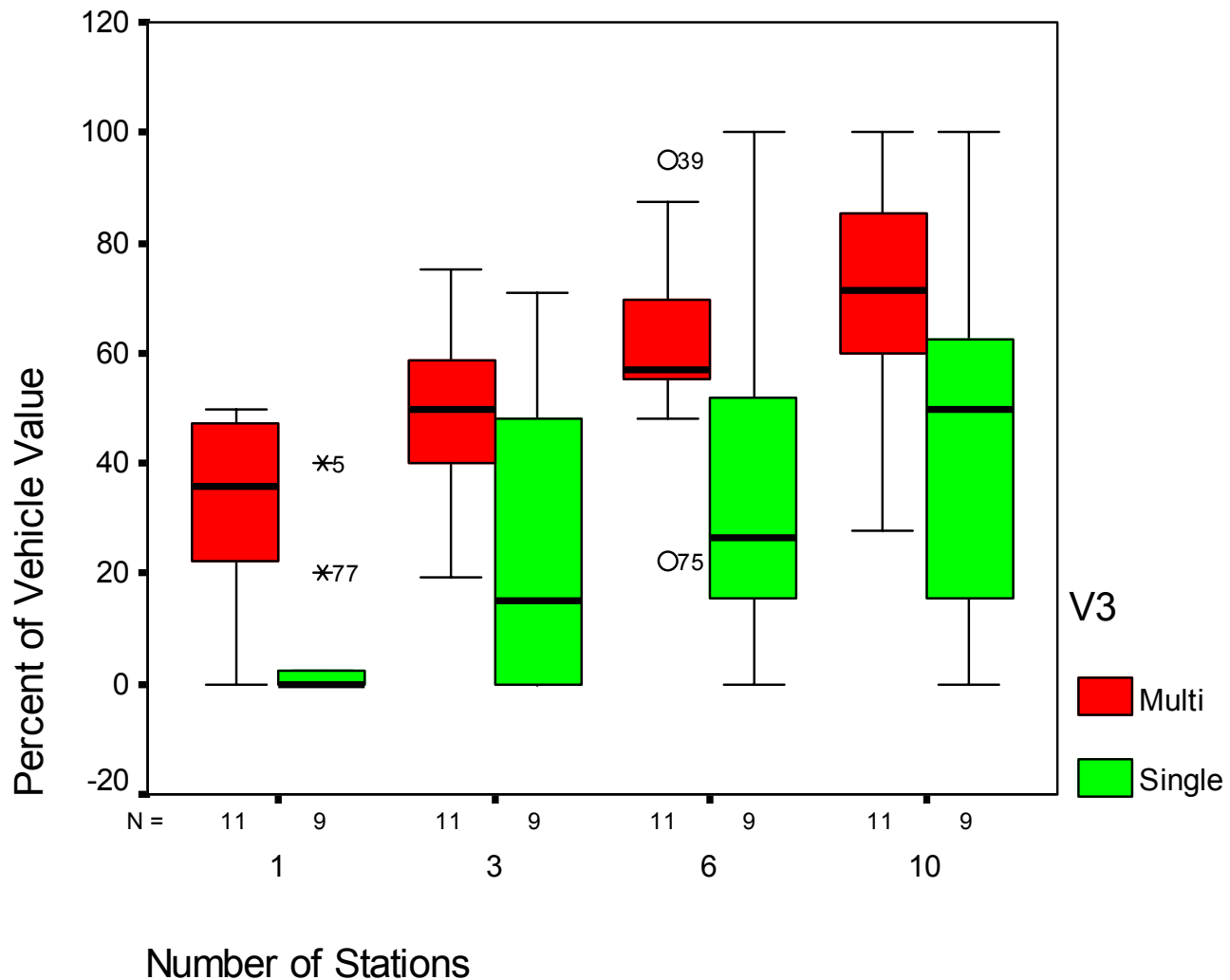
One-Vehicle Households



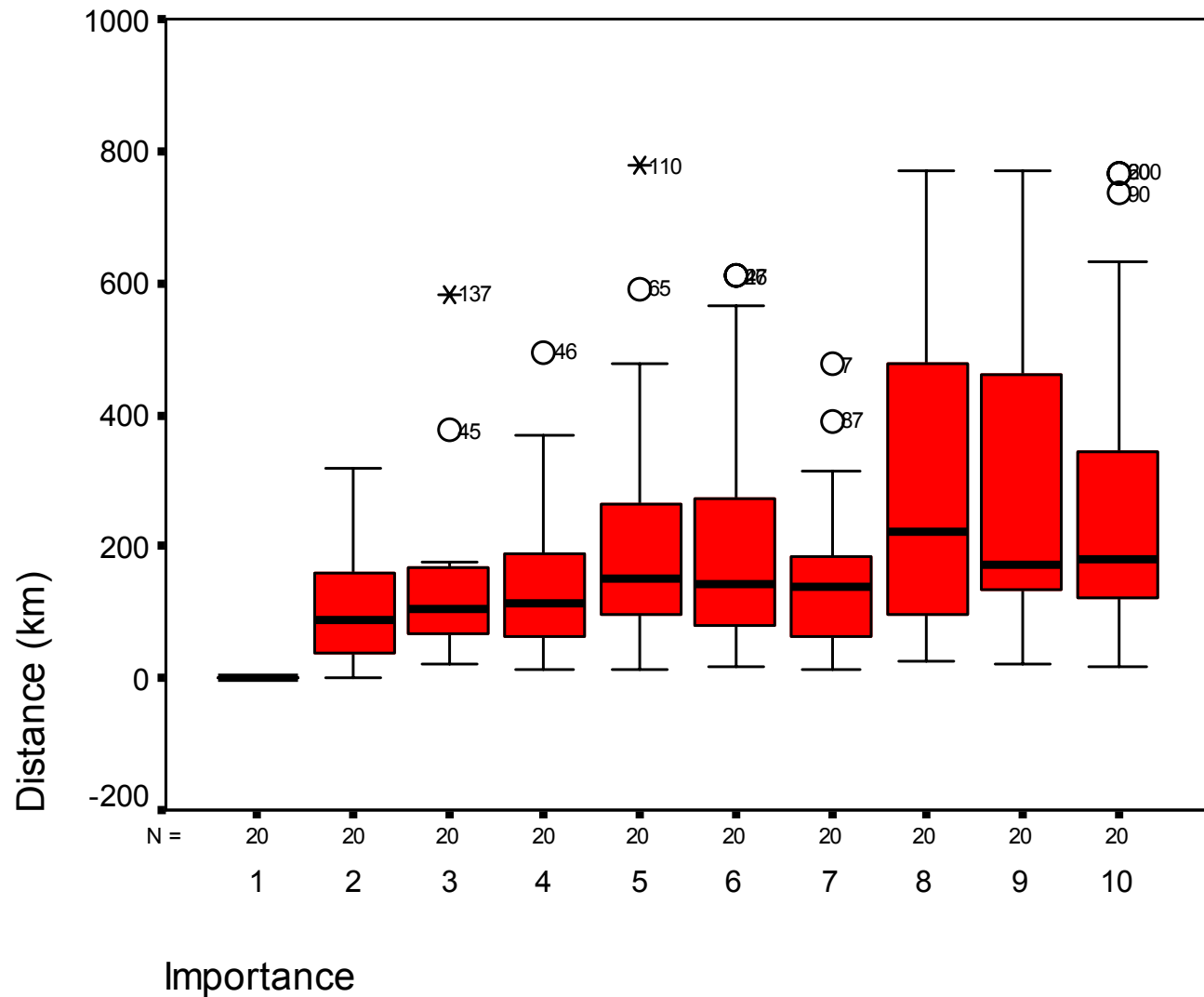
One-vehicle Households – Marginal Value Per Station



Comparison of Multi and Single-Vehicle Households



Distance vs. Importance

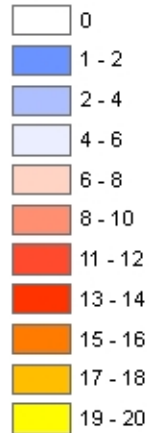


Activity Space Overlap

Legend

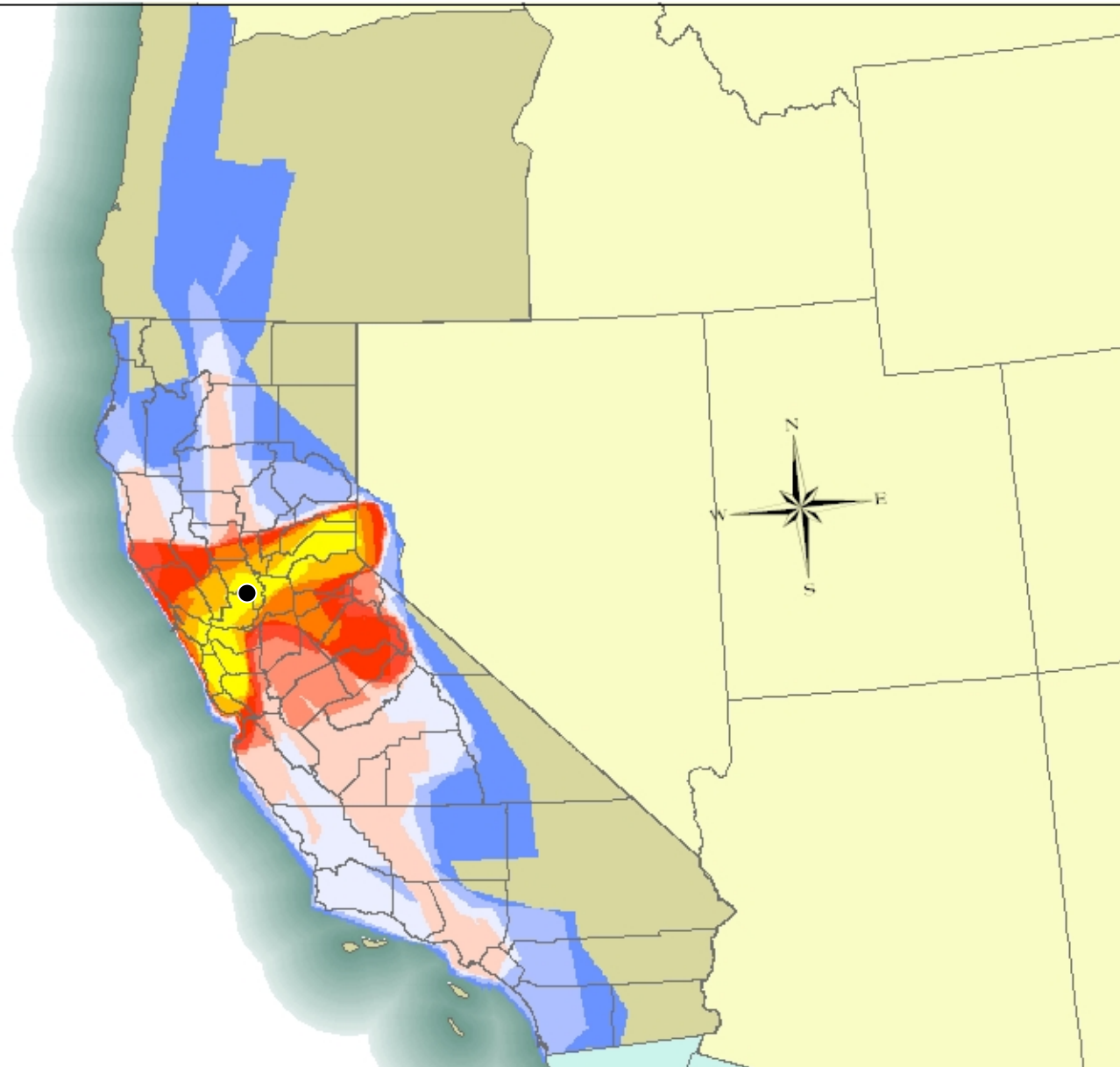
Activity Space Overlap

VALUE



0 35 70 140 210 280 Miles

0 35 70 140 210 280 Kilometers

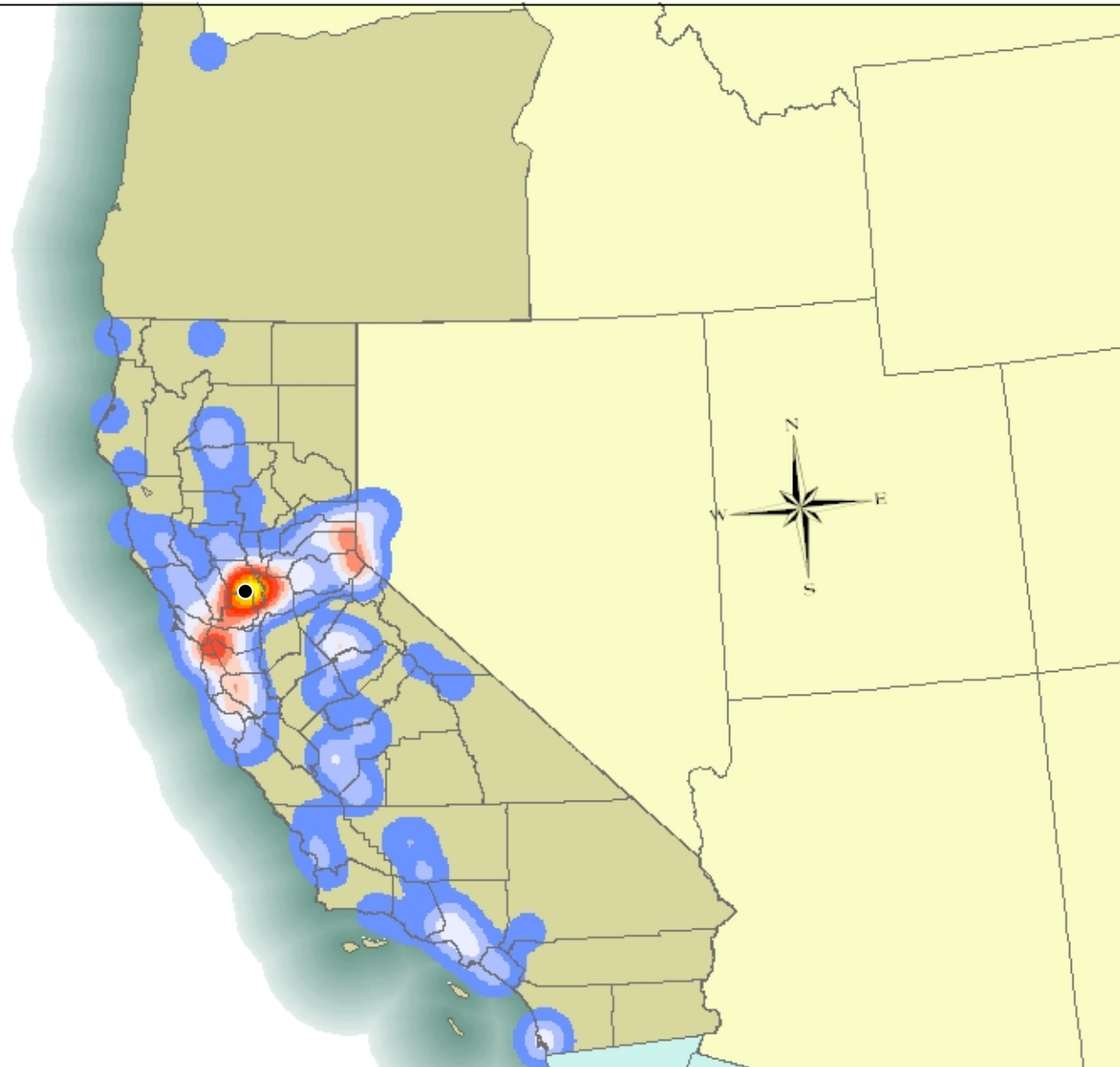
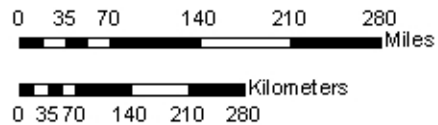
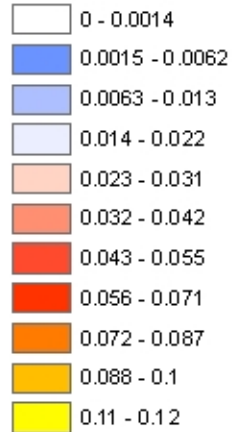


Station Intensity by Marginal Value

Legend

Station Intensity by Marginal Value

All Respondents

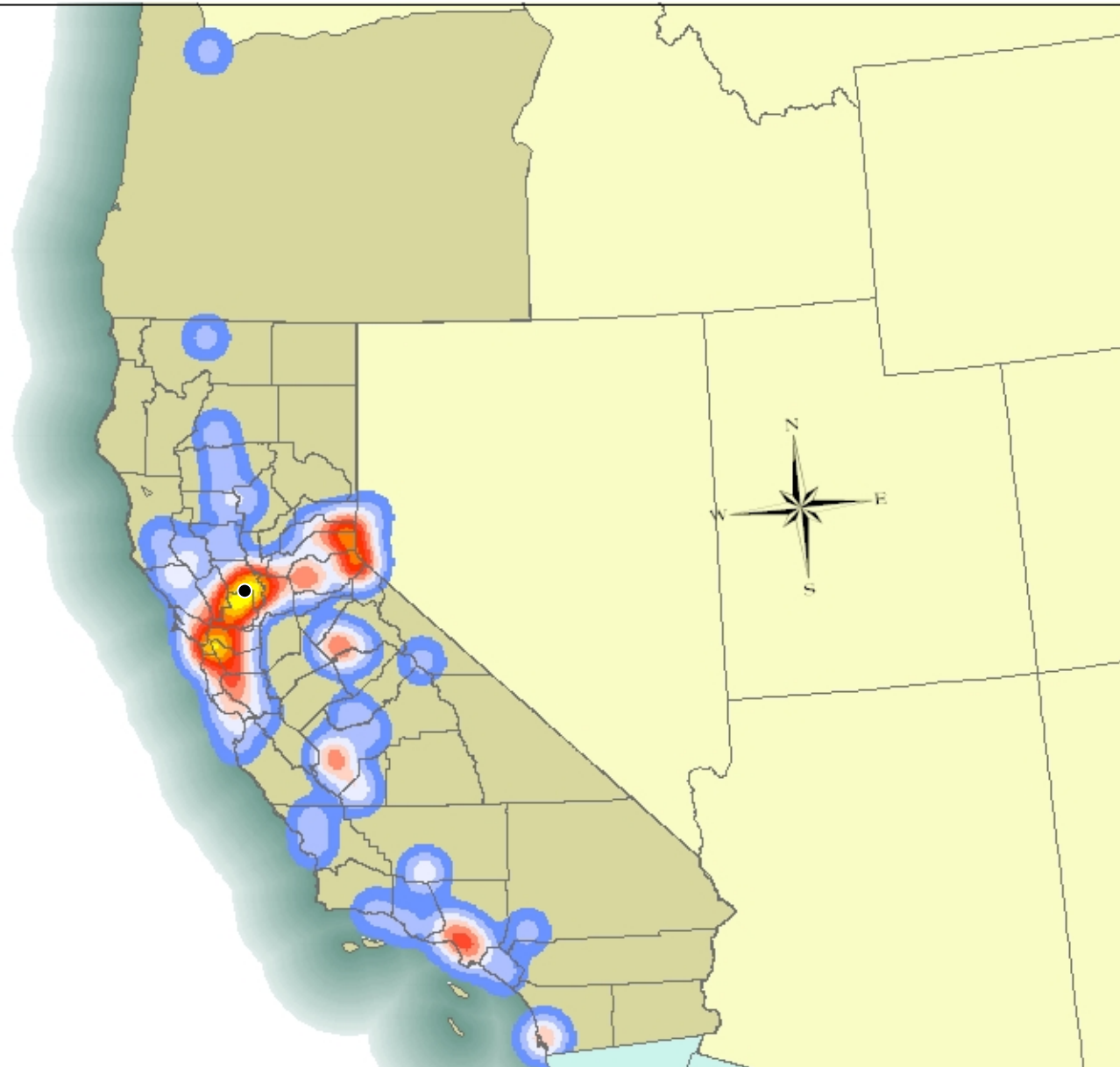
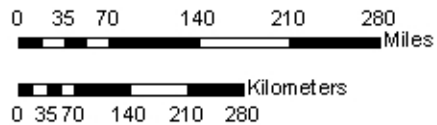
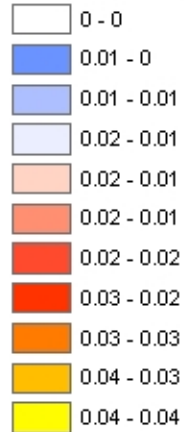


Station Intensity - Only Davis Residents

Legend

Station Intensity by Marginal Value

Davis Resident External Locations



Initial Indications

- ▶ Multi-vehicle households find much greater value in a vehicle with a limited infrastructure.
- ▶ One station in one's hometown results in a vehicle retaining 20%-50% of its value for multi vehicle households. Mostly zero for one vehicle households.
- ▶ 10 station networks providing mobility throughout one's activity space results in a vehicle retaining 55%-100% of its value for multi vehicle households. 0% to 100% for one vehicle households.
- ▶ Infrequently visited weekend spots have a noticeable effect on initial attractiveness of a vehicle

Limitations of The Method

- ▶ The general population is notoriously unreliable in stated response surveys about refueling availability
 - No experience using a vehicle with limited refueling
 - No real monetary consequences for survey choices
- ▶ Some ambiguity in the questions regarding activity space and station placement

Future Work

- ▶ Pretest again
- ▶ Do a full scale survey
- ▶ Modify the survey for CNG drivers assuming they know better how to make the tradeoff valuation

Acknowledgements

- ▶ STEPS program and sponsors
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