

PSU Bicycle Parking A GIS Analysis

Adam Marx
Janel Sterbentz
June 14, 2006
GIS 2

Introduction

- Spring 2004 GIS mapping
- Winter 2006
- Analyze changes
- Classify data and create density and analysis maps
- Suggest new bike rack locations



Methods Flow Chart

Review Past
Data

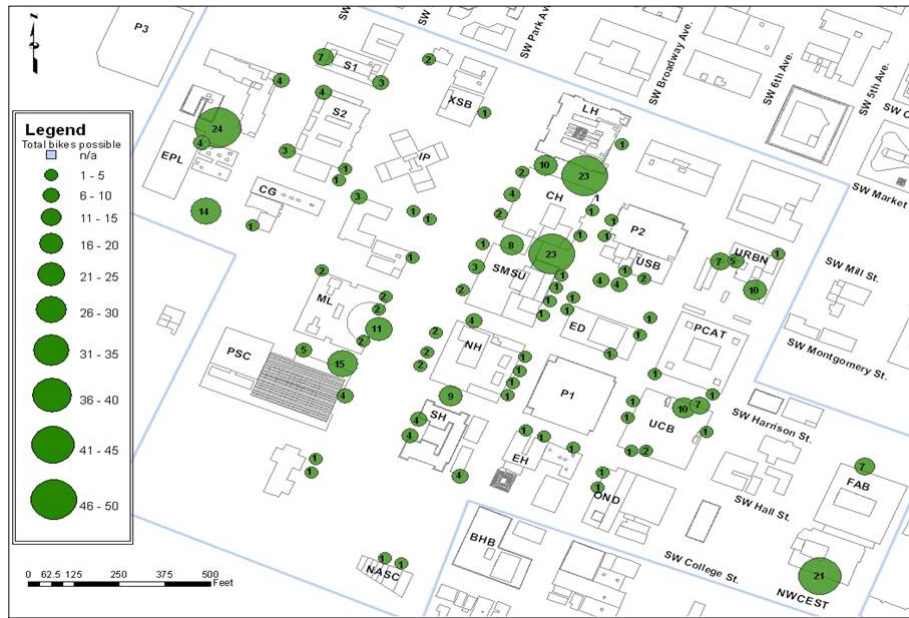
May, 2004 Bike parking and PSU buildings by intensity of use



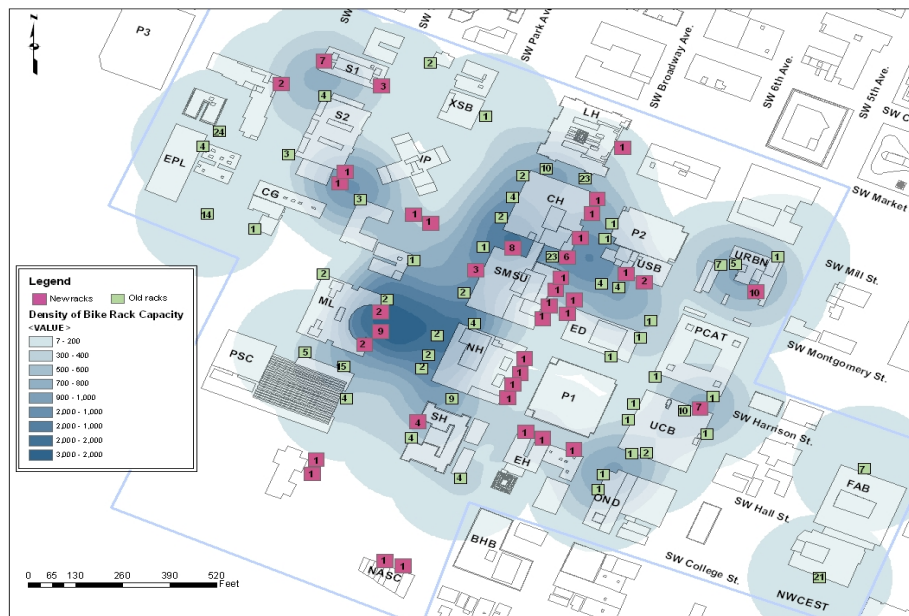
Data sources: RLIS version 2003; Renkens, Shook, & Tresidder, 2004

Prepared by: Jay Renkens, June 2004

February, 2006 Total Number of Bikes Possible



February, 2006 Average Percent Capacity: New and Old Bike Racks

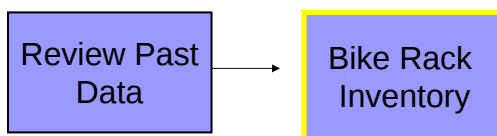


Data Layers Used

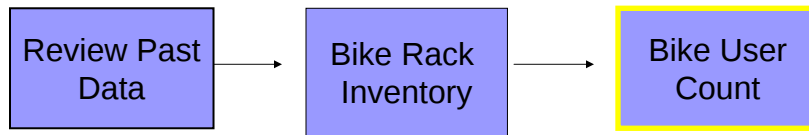
- Building footprints
- Bike rack locations
- Building entrances
- Pedestrian network
- Survey results



Methods Flow Chart



Methods Flow Chart



User Count Sheet

The User Count Sheet includes a map of the Lincoln and Cramer areas with numbered bike racks. The map shows two main areas: Lincoln (top) and Cramer (bottom). Numbered racks are indicated by small squares with numbers inside. Arrows point from the numbered racks to the corresponding numbered lines on the right.

Numbered racks on the map:

- Lincoln: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
- Cramer: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23

Numbered lines for counting:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Instructions:

- Check off for each bike parked
- 2 bikes possible per rack
- Or
- Add more lines if there are more racks or bikes
- Staple flyer on each bike
- Thanks!
- Also mark on the map any bikes locked to anything other than a bike rack

PSU Bicycle Transportation Survey Spring - Microsoft Internet Explorer

Address: http://survey.ot.pdx.edu/sv/web.d/janel@bike.htm

PSU Bicycle Transportation Survey Spring

This survey will take about 1-3 minutes to complete. Your responses will help the university improve the bicycle transportation options available to you. If you have any questions about this survey or the purpose of the results, please contact Janel Sterbentz at 503-725-9005 or janel@ot.pdx.edu.
Note: Please read all choices before selecting your answers.

1) Please enter the 3-digit code printed on the survey card you received on your bicycle.

Format: XXX

2) If you do not have a code, or forgot it, describe the location where you usually park. (eg. Cramer, south side, nearest to Broadway St.)

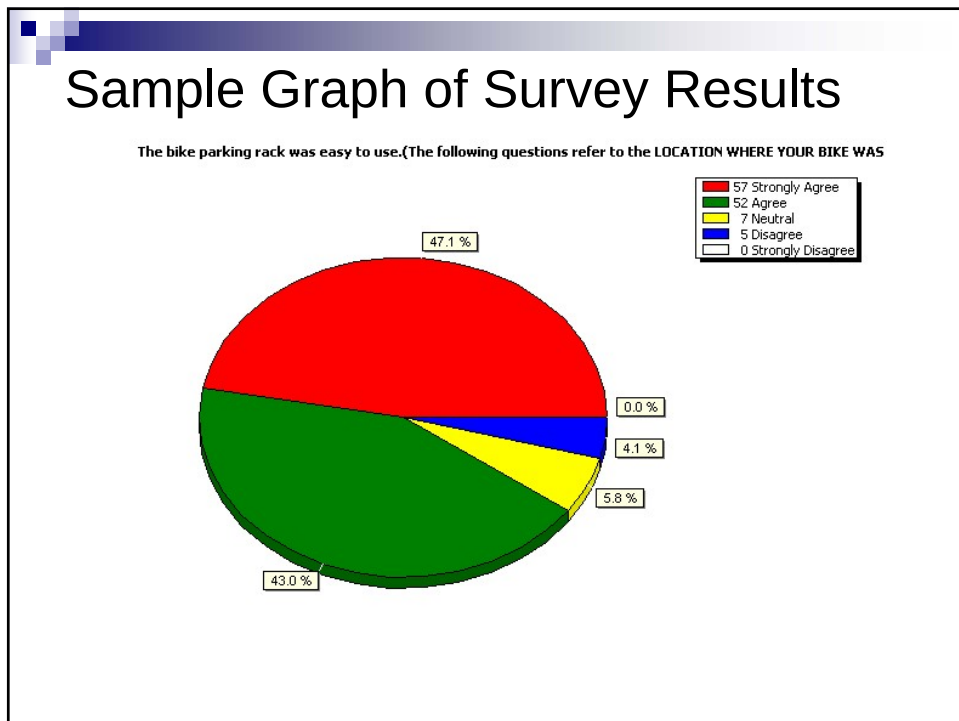
3) The following questions refer to the LOCATION WHERE YOUR BIKE WAS PARKED when you received the survey card.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I felt my bike was safe from damage at this location.	☐	☐	☐	☐	☐
I felt my bike was safe from theft at this location.	☐	☐	☐	☐	☐
Spacing between bike racks allowed sufficient room to lock my bike.	☐	☐	☐	☐	☐
I parked in this location because I know there is always plenty of bike parking available.	☐	☐	☐	☐	☐
The bike parking rack was easy to use.	☐	☐	☐	☐	☐
The bike parking was close to the place(s) I needed to go.	☐	☐	☐	☐	☐

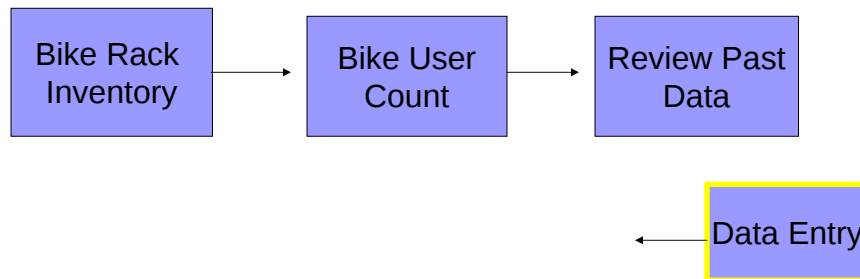
4) What is your overall impression of the bike parking you used?

☐ Excellent
☐ Very good
☐ Good
☐ Fair
☐ Poor

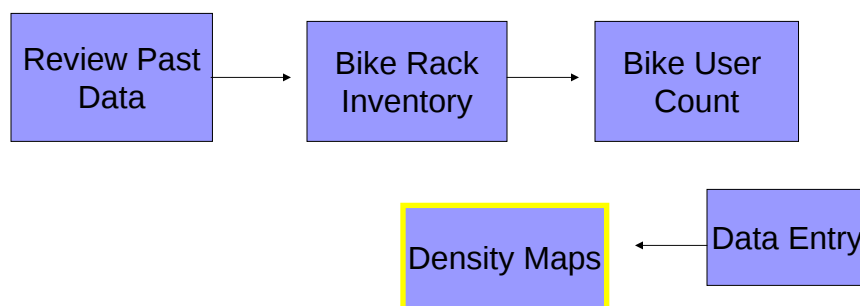
5) Regarding PSU BIKE PARKING IN GENERAL:



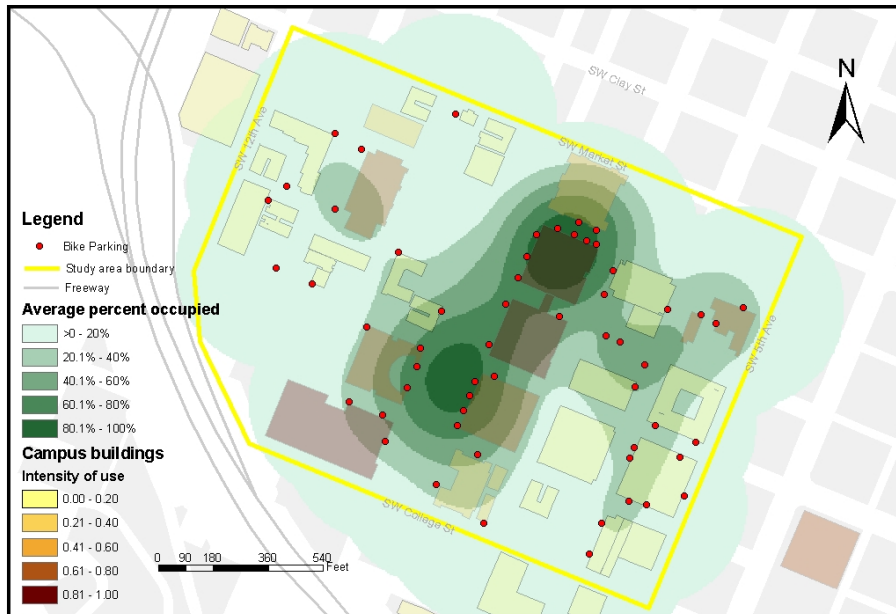
Methods Flow Chart



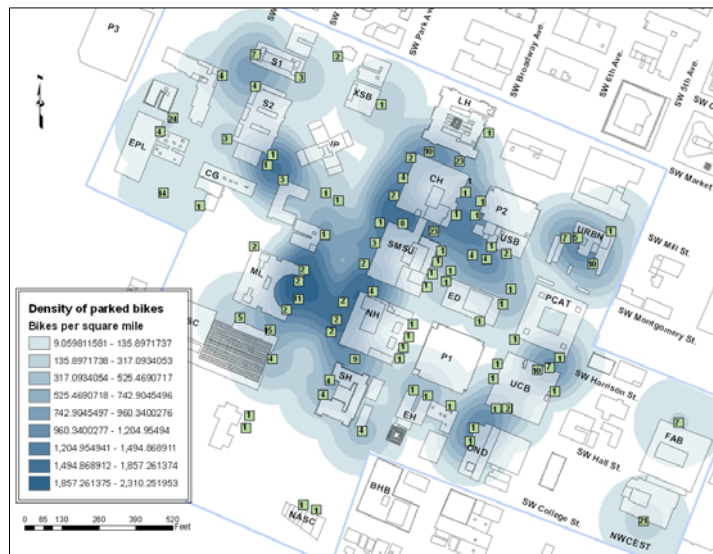
Methods Flow Chart



2004 Average percent of occupied spaces on the PSU campus



Average density of parked bikes – winter 2006

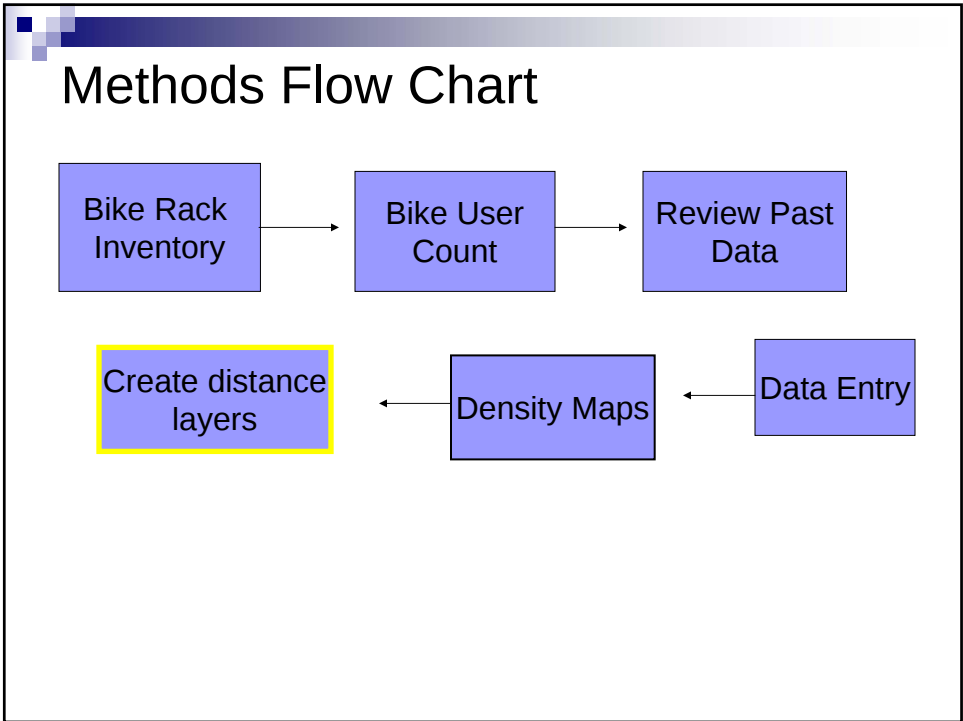


Average density of parked bikes – spring 2006

Density of parked bikes
Bikes per square mile

15.84999663 - 237.7349494
237.7349495 - 554.714892
554.7148921 - 903.3926079
903.392608 - 1,252.070734
1,252.070735 - 1,616.597656
1,616.597657 - 1,996.973575
1,996.973576 - 2,488.292471
2,488.292472 - 3,201.497319
3,201.49732 - 4,041.494141

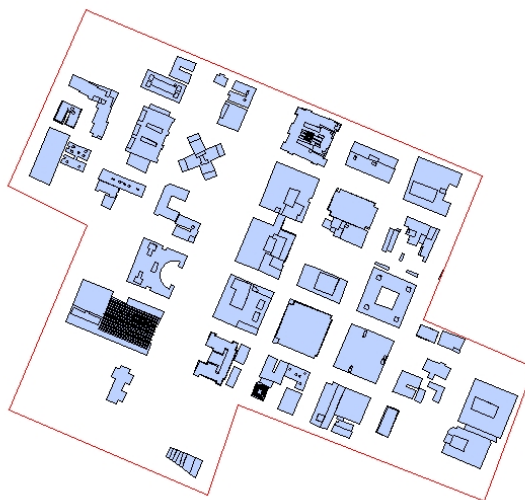
0 65 130 260 390 520 Feet



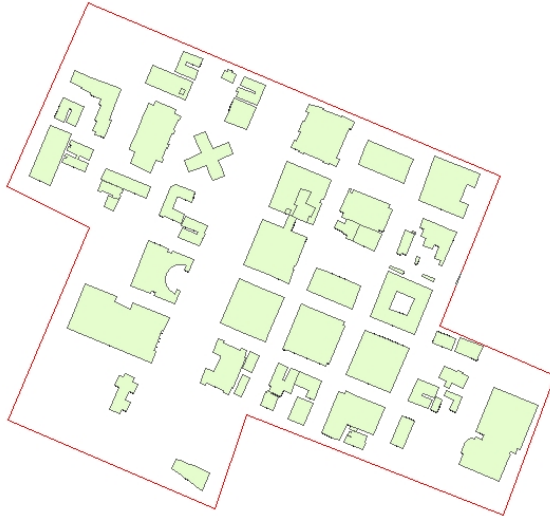
Original Building Layer



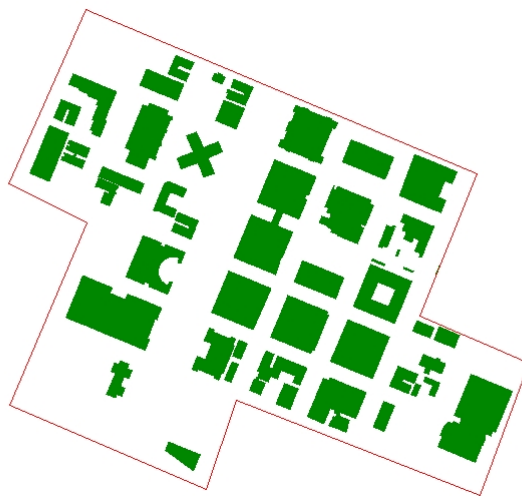
Clipped Building Layer



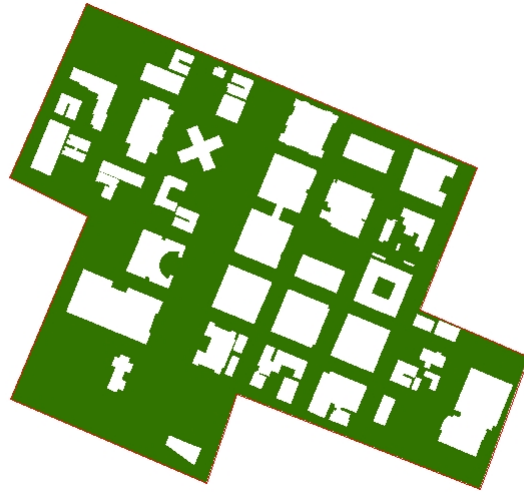
Dissolved Building Layer



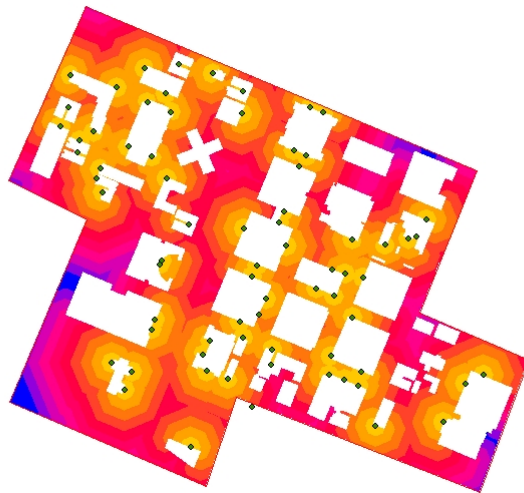
Rasterized Building Layer



Reclassified Building Cost Layer



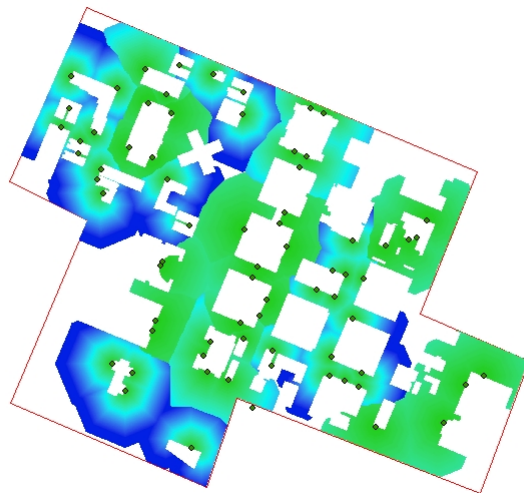
Doorway Distance Layer



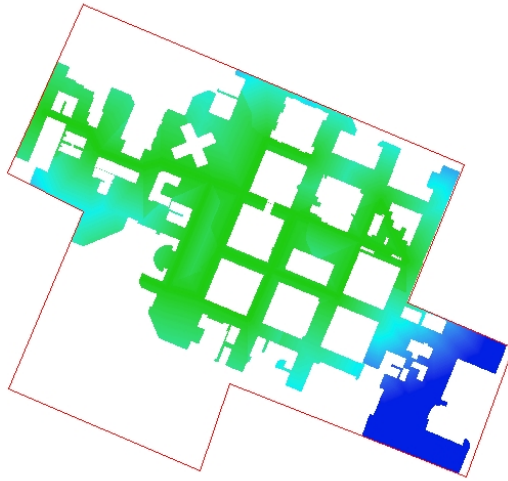
Doorway Cost Allocation Layer



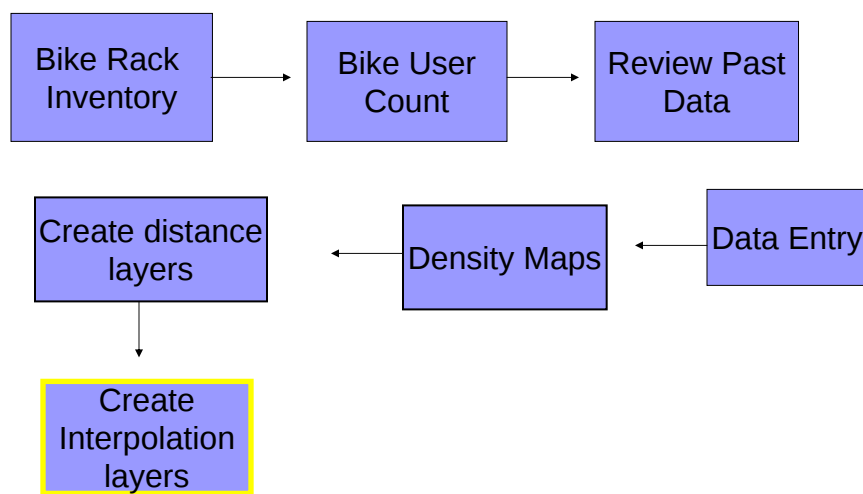
Final Weighted Doorway Layer



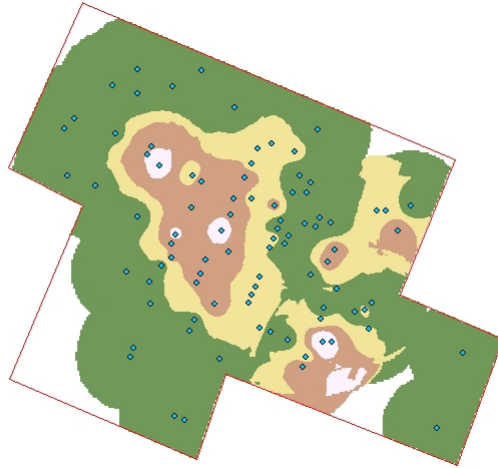
Final Weighted Pedestrian Layer



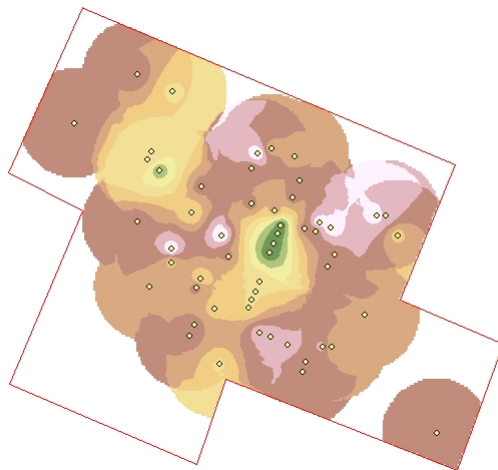
Methods Flow Chart



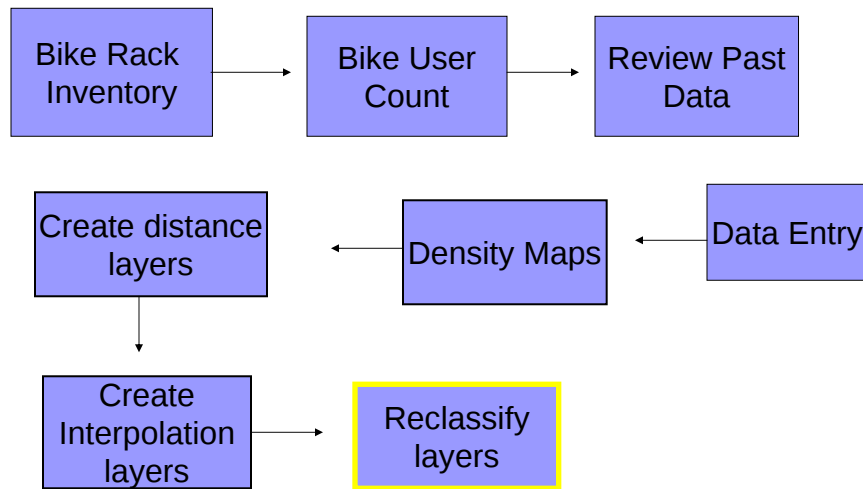
Percent Capacity Interpolation



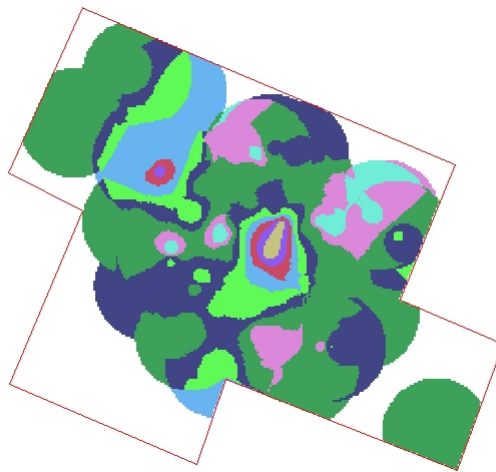
Theft Risk Interpolation



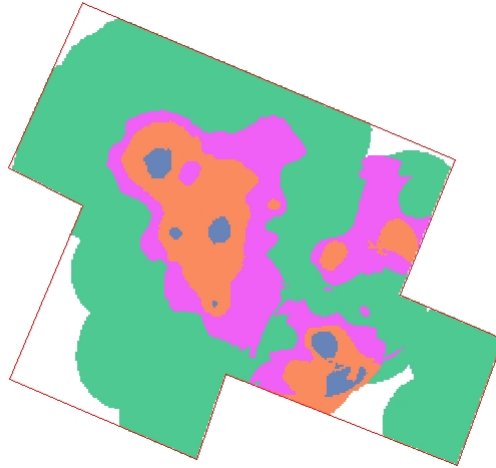
Methods Flow Chart



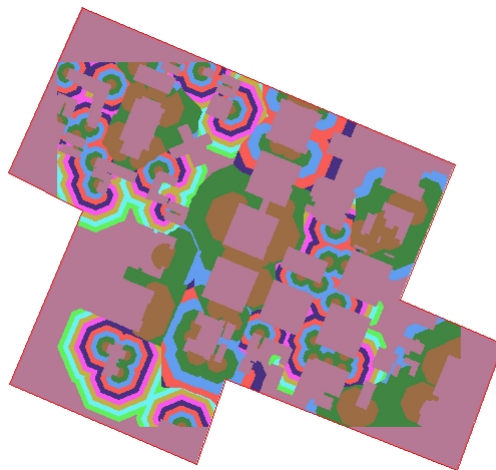
Theft Interpolation Reclass



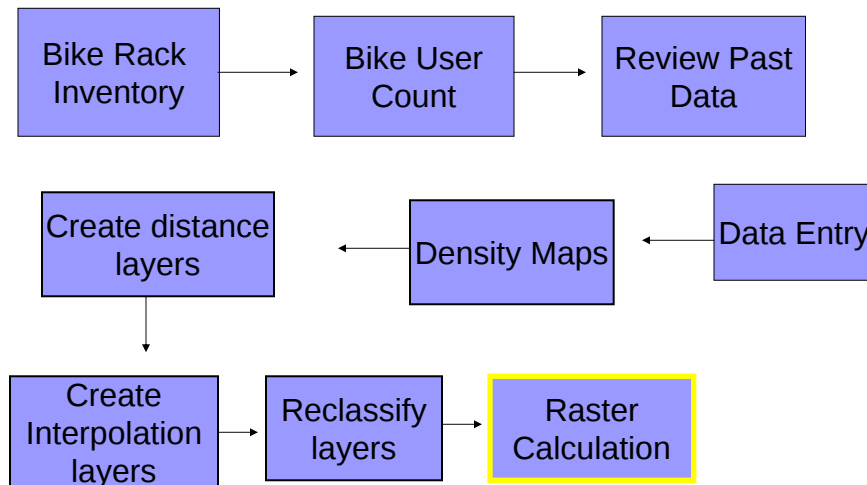
Capacity Interpolation Reclass



Doorway Distance Reclass



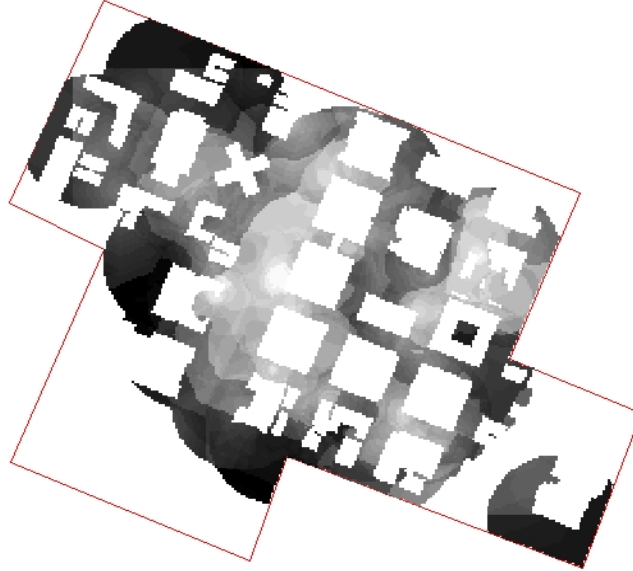
Methods Flow Chart



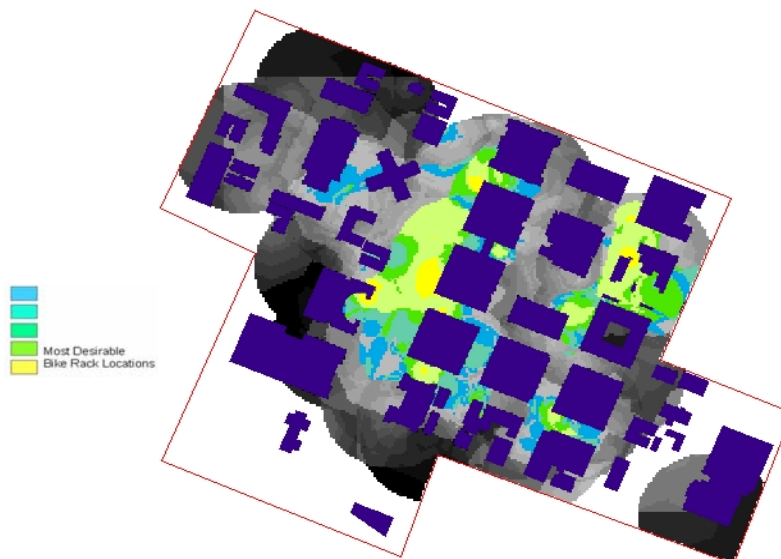
Raster Calculator Weights

- Theft risk – 0.32
 - Close to destination – 0.26
 - Damage risk – 0.15
 - Available space – -0.27
-
- Percentage of capacity – 0.50
 - Near building entrance – 0.26
 - Near pedestrian network – 0.24

Raster Calculator Results



More Desirable Locations



2004 Locations where 2 spaces would generate 50% occupancy

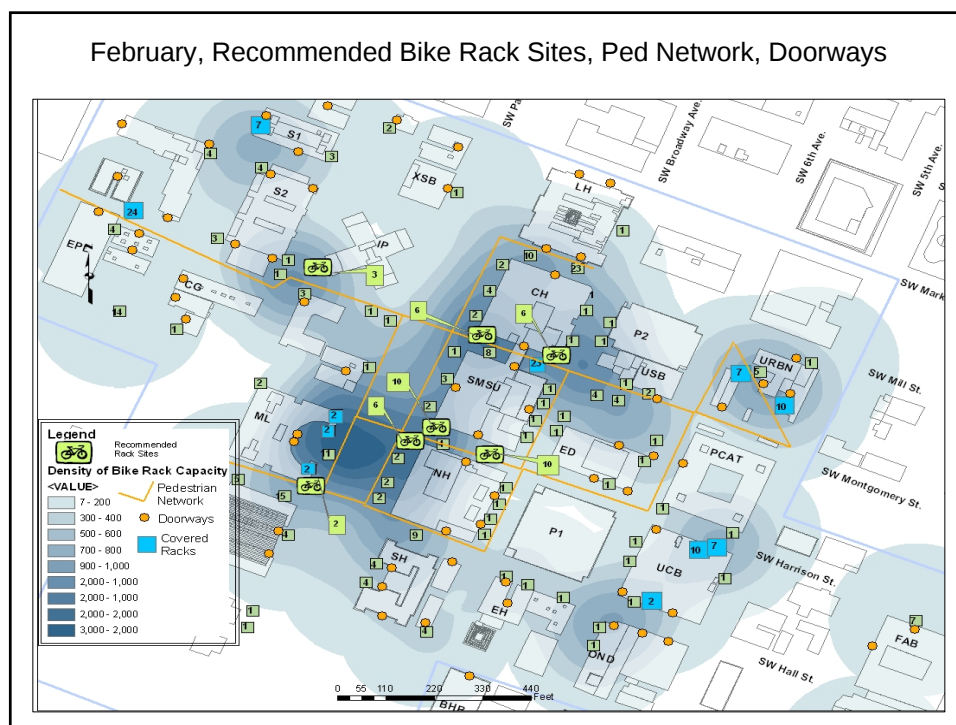
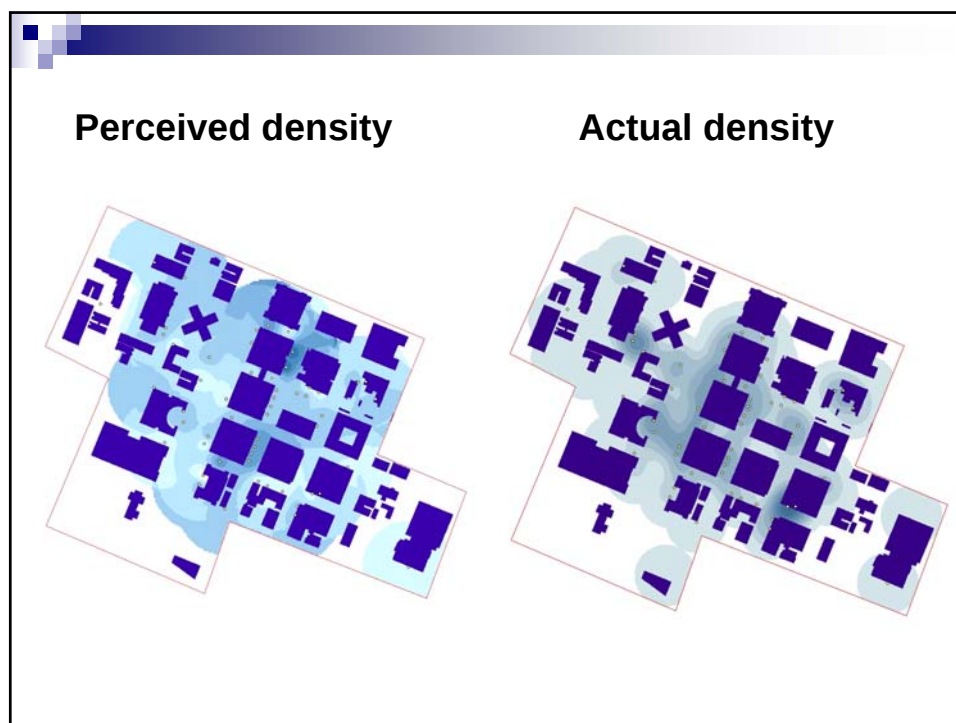


Data sources: RLIS version 2003; Renkens, Shook, & Tresidder, 2004

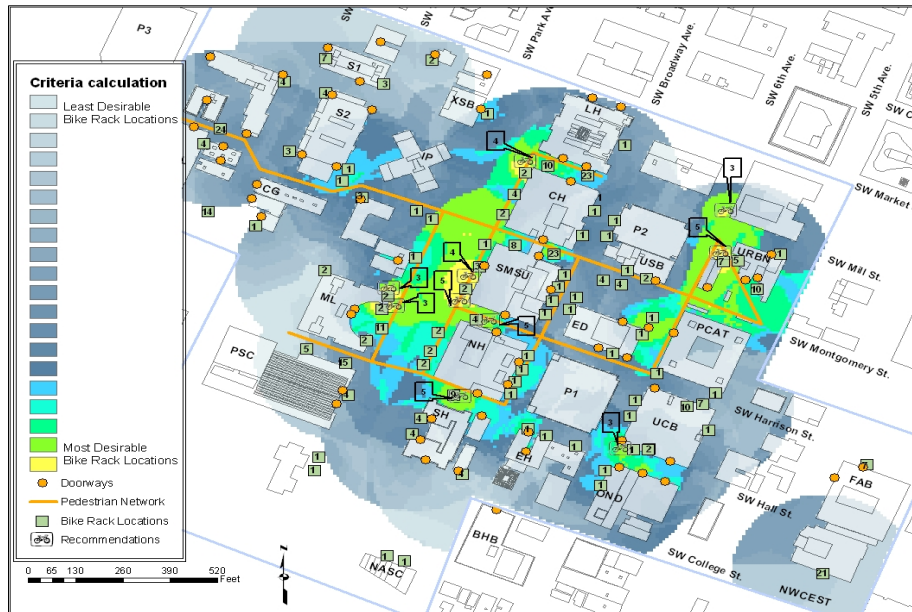
Prepared by: Jay Renkens, June 2004

Results

- Density of bike racks spread rather evenly
- High capacity bike parking centered around library and SMSU
- Uncovered bike racks more heavily used in spring than in winter
- Perceived theft and damage risk concentrated along Broadway and 10th Avenue
- Bike racks near center of campus perceived as easier to use



Recommended New Bike Rack Locations



Conclusions

- ❑ Multi-criteria analysis identified need for more bike racks on east side of campus that would otherwise have been overlooked
- ❑ More bike racks are needed near heavily-used buildings towards the center of campus



Limitations

- Small sample size (124 responses at 55 of the 90 bike racks on campus – 60%)
 - 34% response rate (9% of total PSU cyclists)
- Using survey results limited the size of the study area
- Some criteria weights based on survey results – subjective rather than objective measurements
- Other criteria weights (like bike density) were arbitrary



Possible Improvements

- More empirical data - i.e., theft statistics
- More physical characteristics - i.e., lighting data, covered sites
- Larger sample - results from all campus bike racks

Questions?

