Exploring Differences among OHV Recreationists & the Use of GIS in Making Planning Recommendations

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Overview

- Introduction
- Research objectives
- Survey Methods
- Survey Results
- Spatial Analysis Methods
- Spatial Analysis Results
- Discussion & Conclusion

Introduction

- Explosion of OHV recreation on public lands.
  - OHV sales have tripled from 1995-2003.
  - Florida has the 2nd highest OHV sales in the southeastern US.
- Rapid push to build trails for riding opportunities.
  - Travel Management Plan of 2005
- Lack of information on OHV riders.
  - Are rider groups the same?
  - Are they tolerant of each other?
  - Is there a need to create single and multiple use trail opportunities?

Research Objective 1

To examine if goal interference related to tolerance for lifestyle diversity existed between ATV, motorcycle, and 4x4 riders.

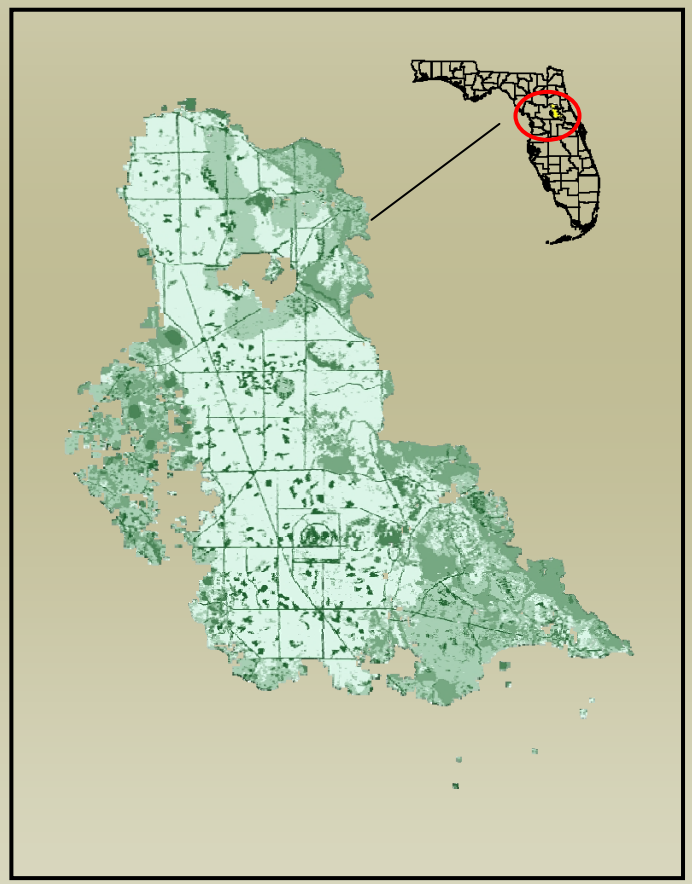
Goal Interference

- Jacob and Schreyer theory of goal interference.
  - Conflict is defined as goal interference due to another's behavior.
- Direct or indirect contact must be made.

Research Objective #2

- Explore the use of GIS in providing planning and management recommendations based on tolerance results.
  - Where is conflict more likely to occur (if at all)?
  - How can our understanding of tolerance be integrated into the planning process in order to make the most of available resources as it relates to providing riding opportunities?

Ocala National Forest



Methods

- Data Collection
  - Visitor surveys
    - On-site
      - 703
    - Mail back
      - Handed out 660
      - 295 returned
  - 43% Response rate
    - 219 ATV
    - 37 ORM
    - 39 4x4

Measuring Conflict & Tolerance

Behavior Index

- X are destructive
- X rides unsafely
- X cuts others off
- X are out of control
- X rides to fast
- X behaves in a discourteous manner

- Cronbach Alpha
  - .95 ATV's & 4x4's
  - .96 OHM's

Tolerance Index

- People on X bother me
- I find it undesirable to meet people on X

- Cronbach Alpha
  - ATV .87
  - OHM .86
  - 4x4 . 80

Thapa, B. and Graefe, A.R. (2003)
Confer, J.J., Thapa, B., and Mendelson, J.L. (2005)

Defining Spatial Criteria

- Define preferred areas for each rider groups based on resource attribute preferences.
  - 12 environmental attributes
  - Measured 5-point scale

Environmental Terrain Attributes

- Compact soils
- Dry, sandy soils
- Dominated by pine trees and wire grass
- A mix of pine trees and open spaces
- Dominated by hardwoods and shrubs
- A mix of pine tress, hardwoods and open spaces
- Dominated by a mix of pine tress and hardwoods
- Open with no presence of vegetation
- Scrub
- Where I can see water some of the time
- Where water could be seen all of the time
- Where I can not see water at all

Data Analysis

- One-way ANOVA's
  - Welch Statistic
  - Tamhane's T2 and Tukey's HSD
- PCA
  - 8 Vegetation terrain attributes

Part I: Results
Who are they?

Demographic Variable	ATV	OHM	4x4
Gender	78% Male	94% Male	78% Male
Age	39 years	40 years	41 years
Ethnicity	94% White	97% White	100% White
Education	32% some college	33% some college	32% some college
Income	$70-$79K	$70-$79K	$60-$69K

Part I: Results
Is there conflict?

Behavior Index	ATV (1)	OHM (2)	4x4 (3)	Welch Stat	Post Hoc
ATV Index	1.61	2.10	3.40	41.09**	1<2<3
OHM Index	1.76	1.43	3.24	1.07**	1,2<3
4x4 Index	1.83	1.97	1.67	59.50	NA

** Significant at .01 level

1 = not at all a problem

2 = Somewhat of a problem

3 = Neutral

4 = Serious problem

5 = Very serious problem

Part I: Results
Are they tolerant of each other?

Tolerance Index	ATV (1)	OHM (2)	4x4 (3)	Welch Stat	Post Hoc
ATV Tolerance	1.37	1.96	3.24	59.50**	1<2<3
OHM Tolerance	1.61	1.45	3.34	48.39**	1,2<3
4x4 Tolerance	1.66	2.08	1.83	0.065	NA

**Significant at the .01 level

1 = Strongly disagree

3 = Neutral

5 = Strongly Agree

Objective 1: Summary of Results

- Overall, conflict is asymmetrical
- Potential conflict may result from either goal interference (behavior) as well as a result of intolerance.
  - Similar results to other tolerance studies where conflict is present
- Conflict related to behavior is more easily managed.
  - Post speed limits, meet with user groups, education, post signs etc.
- Conflict as a result of intolerance is not as easily managed.
  - Other studies showing evidence of conflict relating to tolerance have suggested spatial separation (Thapa and Graefe, 2000; Vaske *et al.* 2000).

Objective II:
Exploring GIS in Planning Recommendations

GIS can help identify:

- Preferred settings for specific activities
  - Identify areas most suited for a particular activity
- Settings where groups' preferences overlap.
  - Identify areas where conflict related to tolerance is likely to occur.

Environmental Terrain Attributes: Principal Components Analysis Results

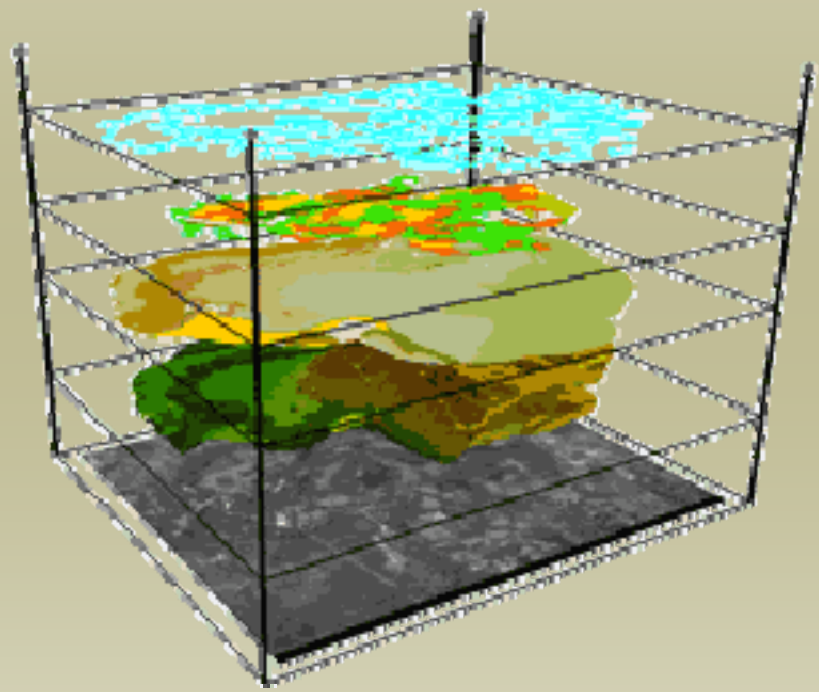
- Originally 13 environmental terrain attributes
  - 8 vegetation, 2 soils, 3 water
- Vegetation variable were reduced to 2 components that explained 70% of the variance.
  - Open habitats
  - Dense habitats
- Soil
  - Dry sandy soils
  - Compact soils
- Viewscape
  - Where water can be seen at least some of the time.
  - Where water can be see all of the time
  - Water can’t be seen at all

Environmental Terrain Attributes: Spatial Criteria

- Vegetation
  - Forest Density
    - Density $\geq$ 60% classified as “dense”
    - Density $\leq$ 59% classified as “open”
- Soils
  - Soils Map
    - Soils classified into “compact” and dry/sandy by soil drainage
- Water
  - Surface Water
    - Proximity analysis was performed to identify areas where could be seen some of the time
    - Viewshed analysis was performed to evaluate where water could be seen all of the time

Environmental Terrain Attributes & Mapping Group Preference

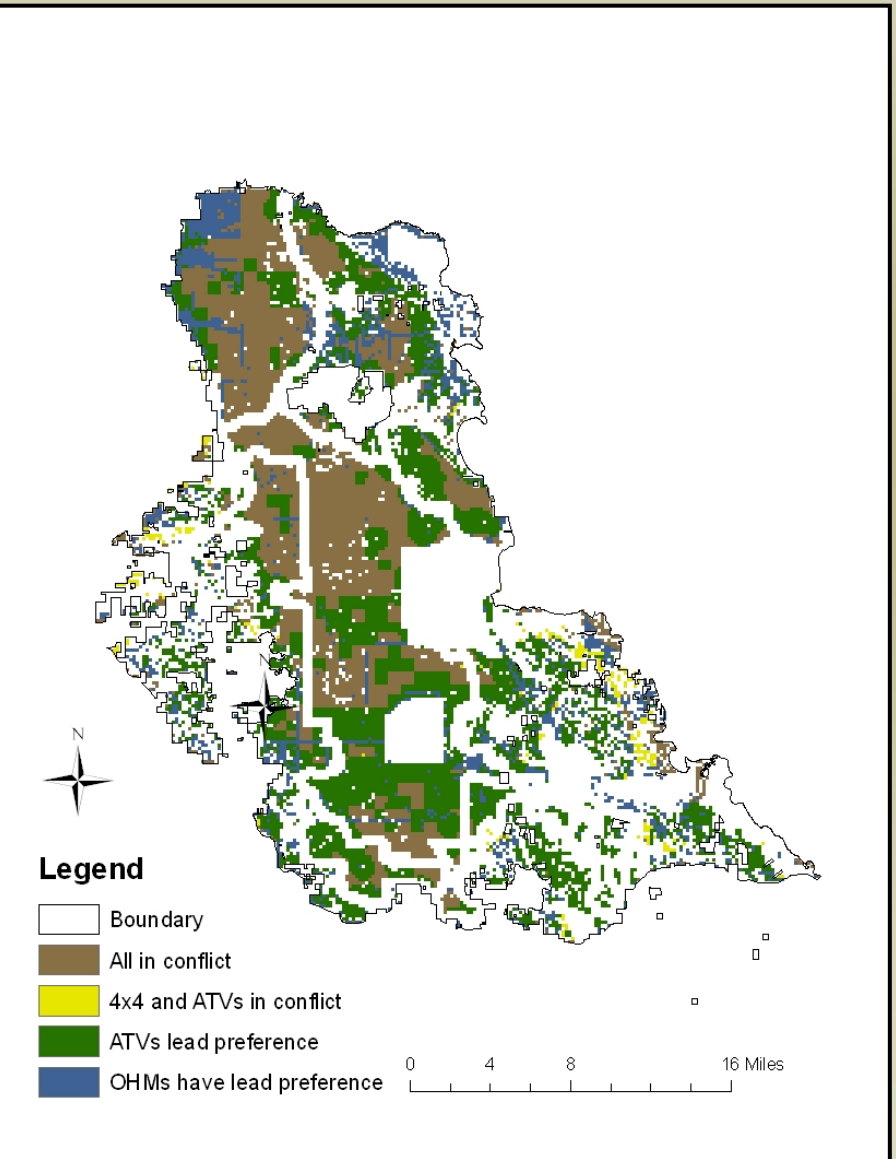
- Groups' preference values for spatial attributes were assigned to layers.
- Each user group's layer was overlaid in order to create a recreation terrain preference model for each rider group.
- The models are meant to represent preference rather the actual use.
- Individual models assume the user will pick a setting that best satisfies his/her needs.



Environmental Terrain Preference & Mapping Potential Conflict

- Each rider group's preference map was combined and reclassified into areas of potential conflict based on user group's tolerance.
- Conflict was noted to most likely occur in places when 4x4 riders and at least one other rider group shared the highest preference for an area.
- Where one user group holds higher preference over the other two, the area is given preference to that group.

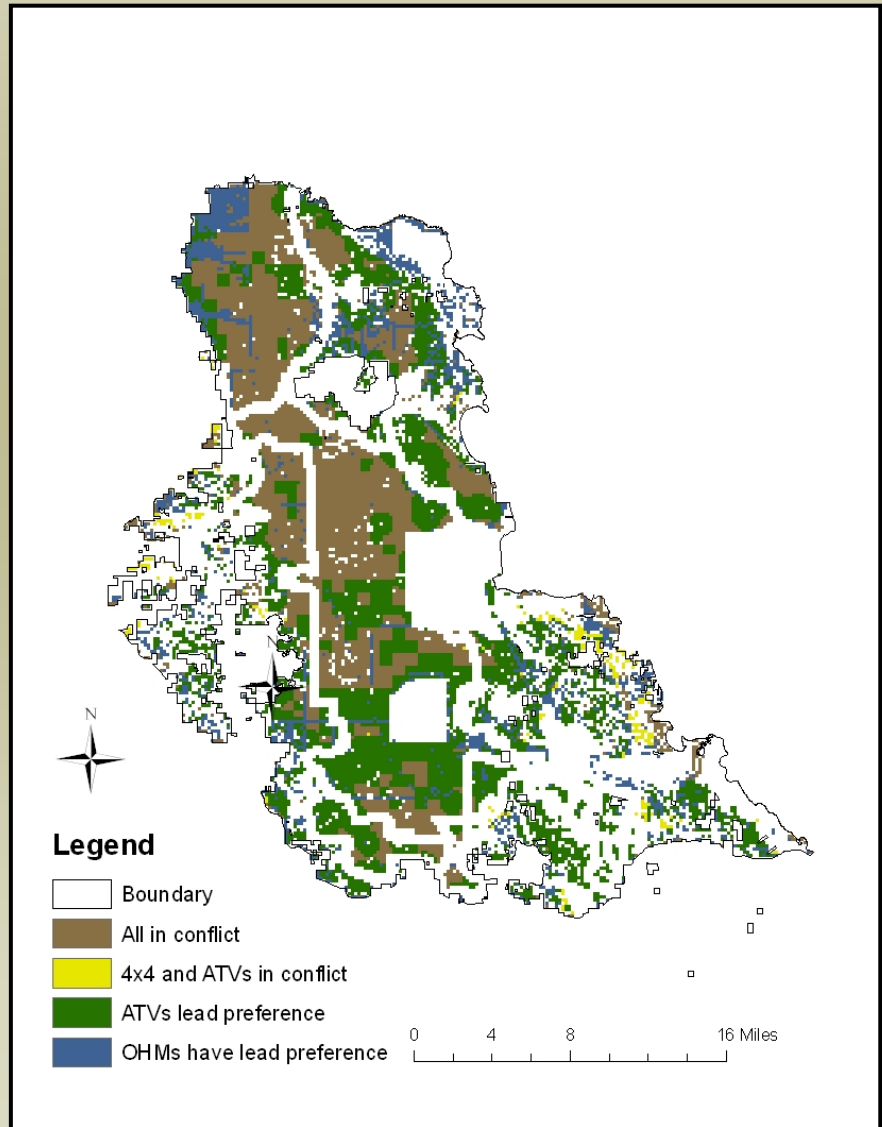
Objective II: Spatial Analysis Results



- Conflict is most likely to occur within the northern and central portions of the forest
  - 4x4/ATV/OHM: 40%
  - 4x4/ATV conflict: 2%
  - 4x4/OHM conflict: NA

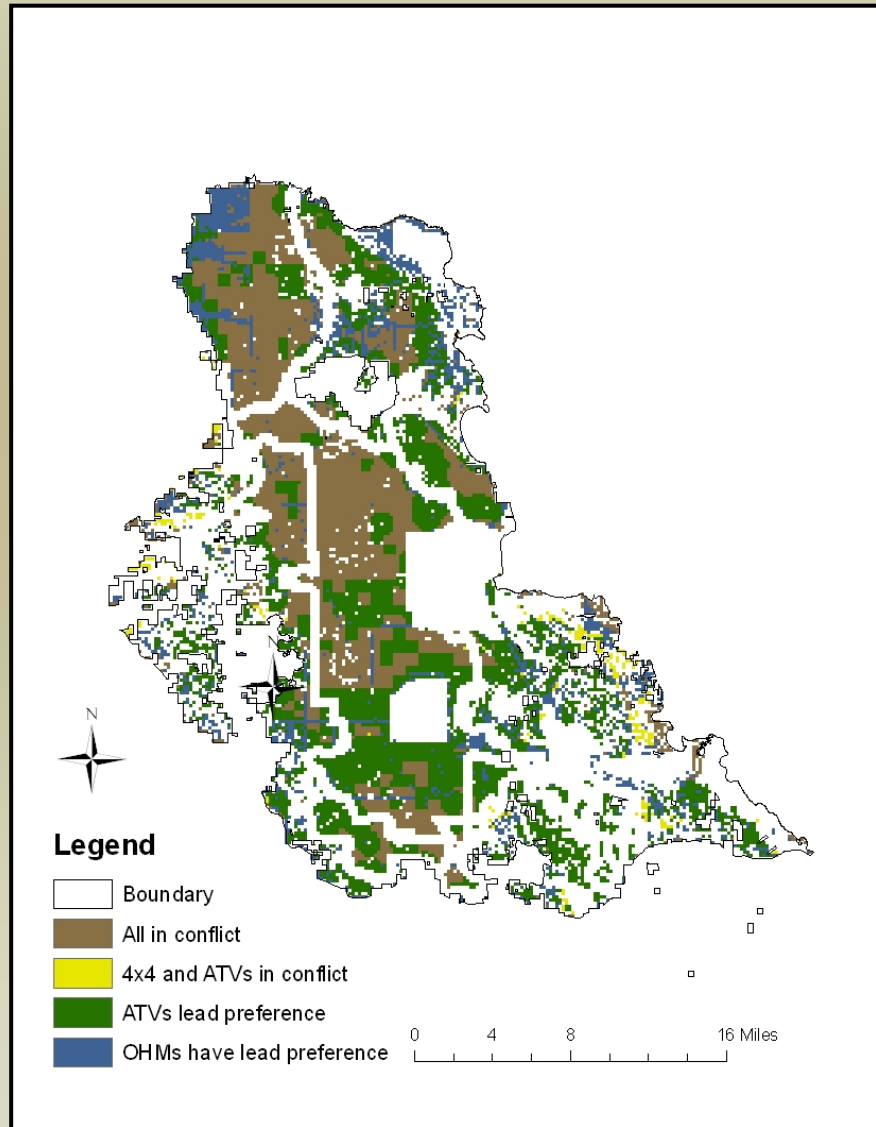
Objective II: Spatial Analysis Results

- ATV lead preference mostly occurs in south central region
- OHM lead preference mostly occurs along the outer edges of the forest
- No lead preference areas for 4x4s
  - All preferred areas are shared with other riders



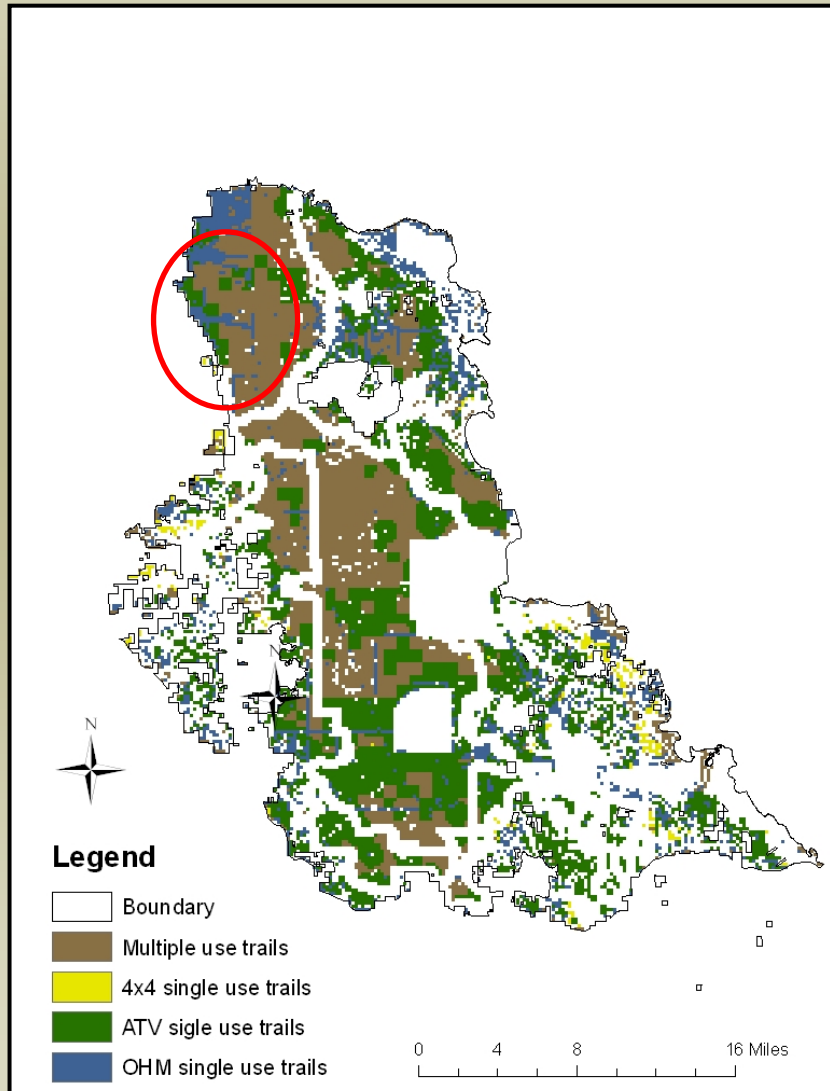
Management Implications

- Conflict affects a small percentage of users
- Offering diverse opportunities may help spatially separate users
  - Multiple use opportunities
  - Single use opportunities



Management Implications

- Disperse use over a specified area
  - Areas where the most combinations of preferences occur.



Summary

- Not all OHV users perceive themselves as the same.
  - Differences should be considered when planning for riding opportunities.
- Understanding conflict within a spatial context can help managers in the planning process.
  - Create more diverse riding opportunities
  - Utilize available resources in a way that helps minimize impact
- Managers should work closely with user groups.
  - In the planning phase
    - Formal and Informal Surveys
    - A series of focus groups or nominal group meetings
  - Communicating available opportunities once trails/areas are designated

Questions ?

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Limitations

- The spatial model only considers riders environmental attribute preference (physical setting) only.
  - Social preferences
  - Management preferences
- Evaluates conflict potential from a planning phase only
  - Methods can be adapted to existing trail systems