

RESEARCH ARTICLE

Landscape Analysis of Adult Florida Panther Habitat

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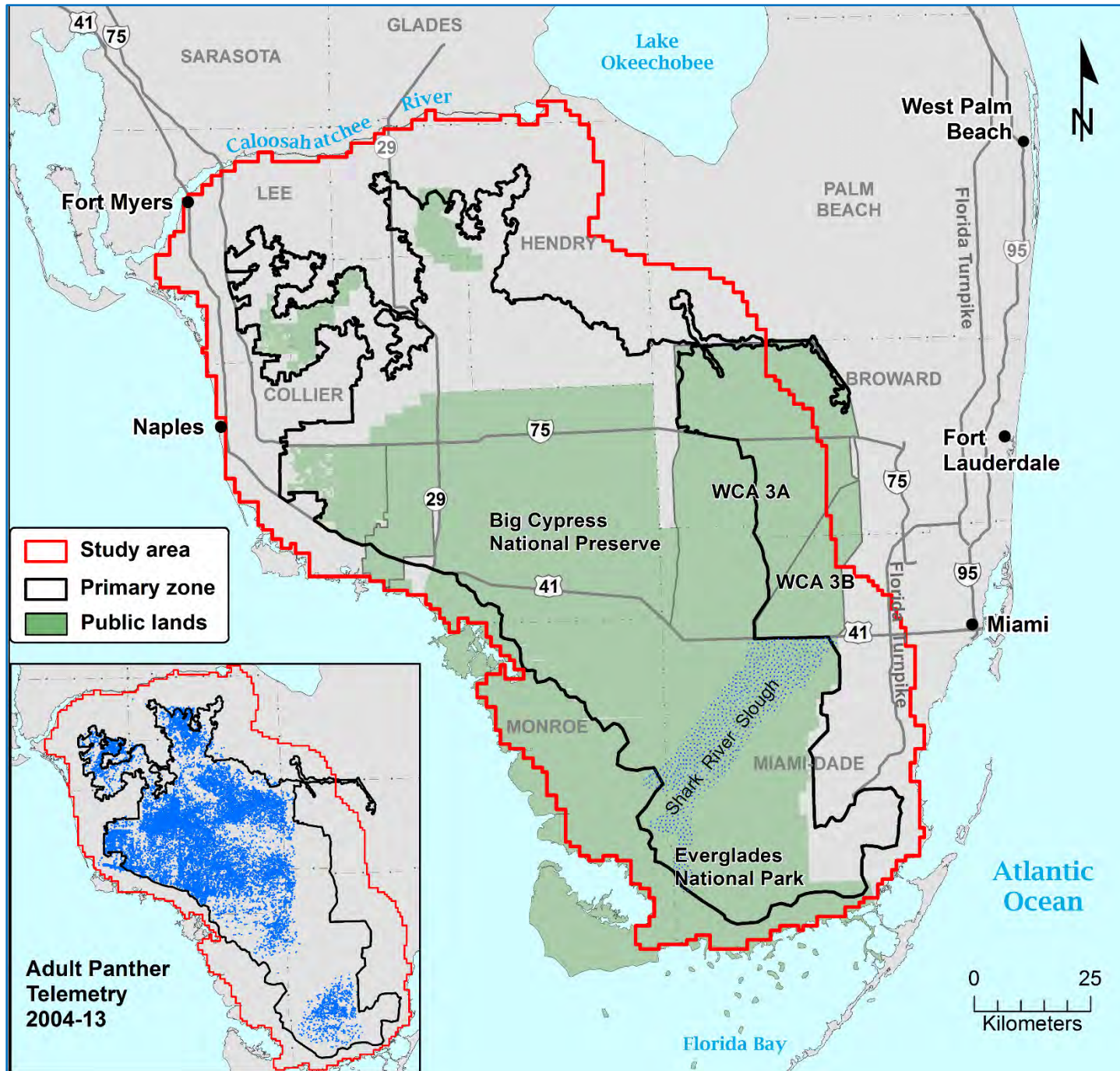
MODEL OVERVIEW

- Species Distribution Model (SDM) for the Florida panther in south Florida.
- Model type: Random Forest model with presence / absence design.
- Landscape scale model: Resolution = 1 km²
- 15 explanatory (predictor) variables:
 - 10 land cover types
 - Road density
 - Forest edge
 - Dry season water depth
 - Human density
 - Wet season water depth
- Model predicts probability of presence (panther use).

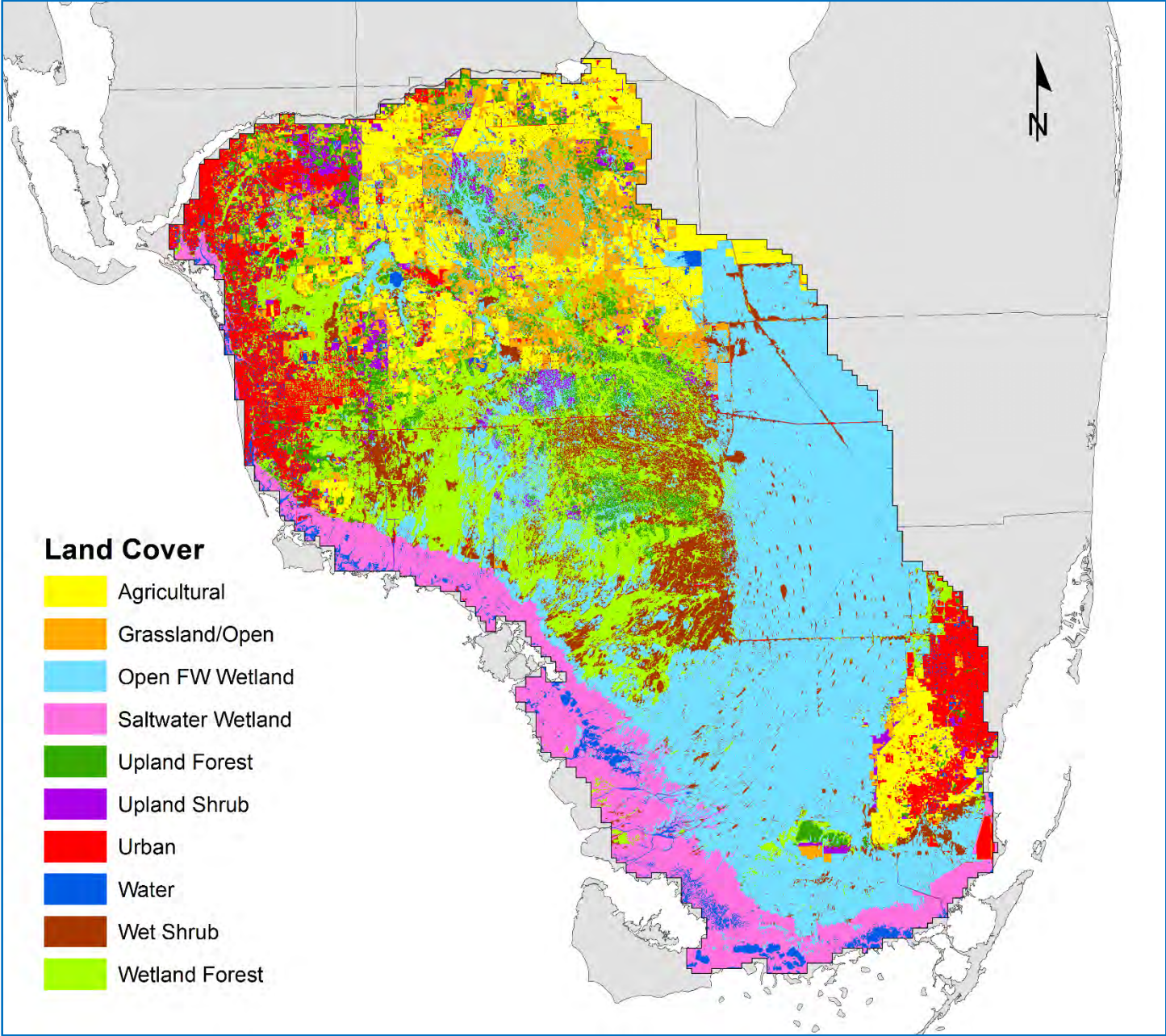
MODEL APPLICATIONS

- Evaluating impacts of proposed developments
- Prioritizing areas for panther conservation (e.g., panther conservation banks, fee title purchases)
- Identifying areas for possible panther reintroductions
- Evaluating the impacts of sea level rise and changes in hydrology (climate change, CERP)

STUDY AREA



EXPLANATORY VARIABLES: Land Cover



EXPLANATORY VARIABLES: Other

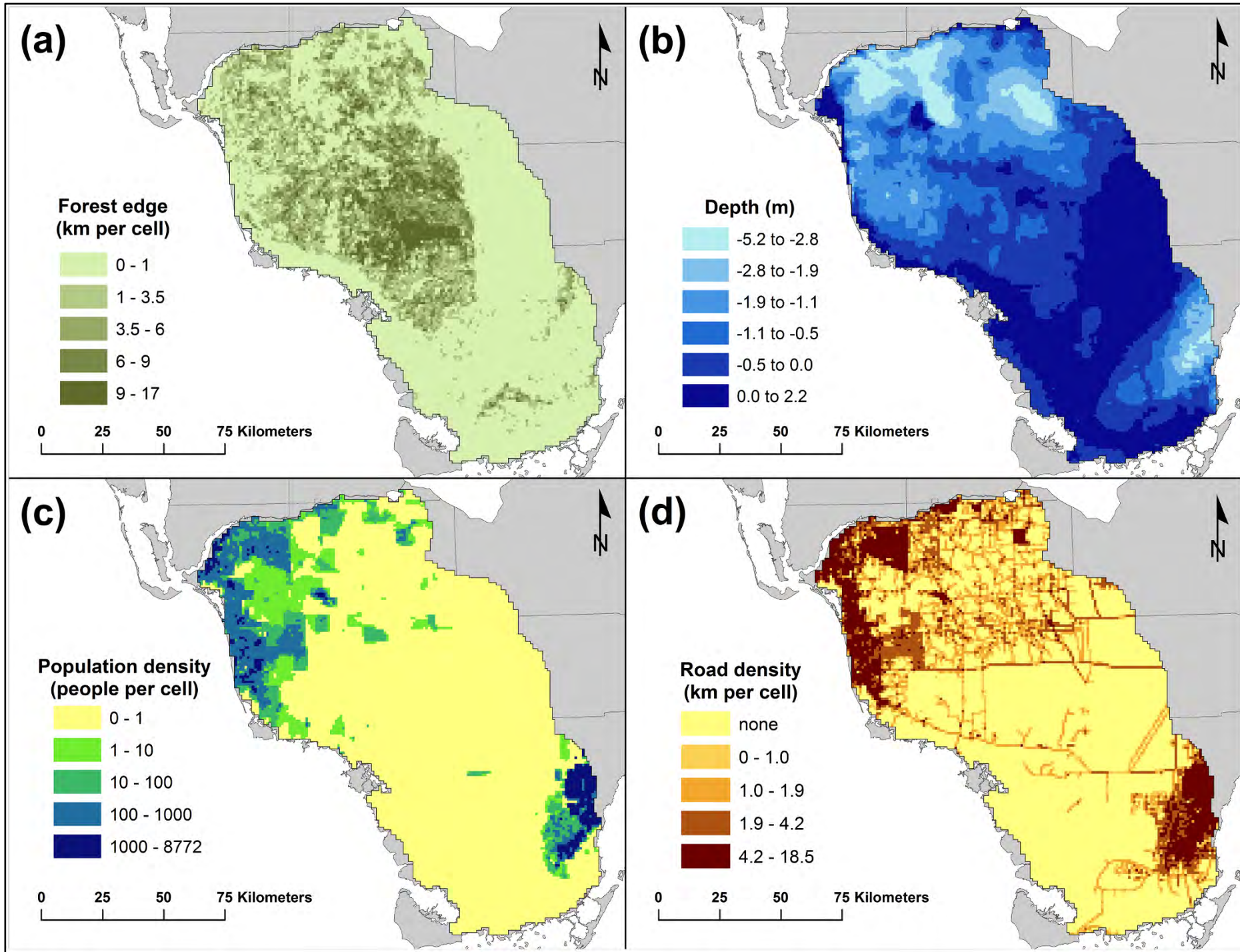
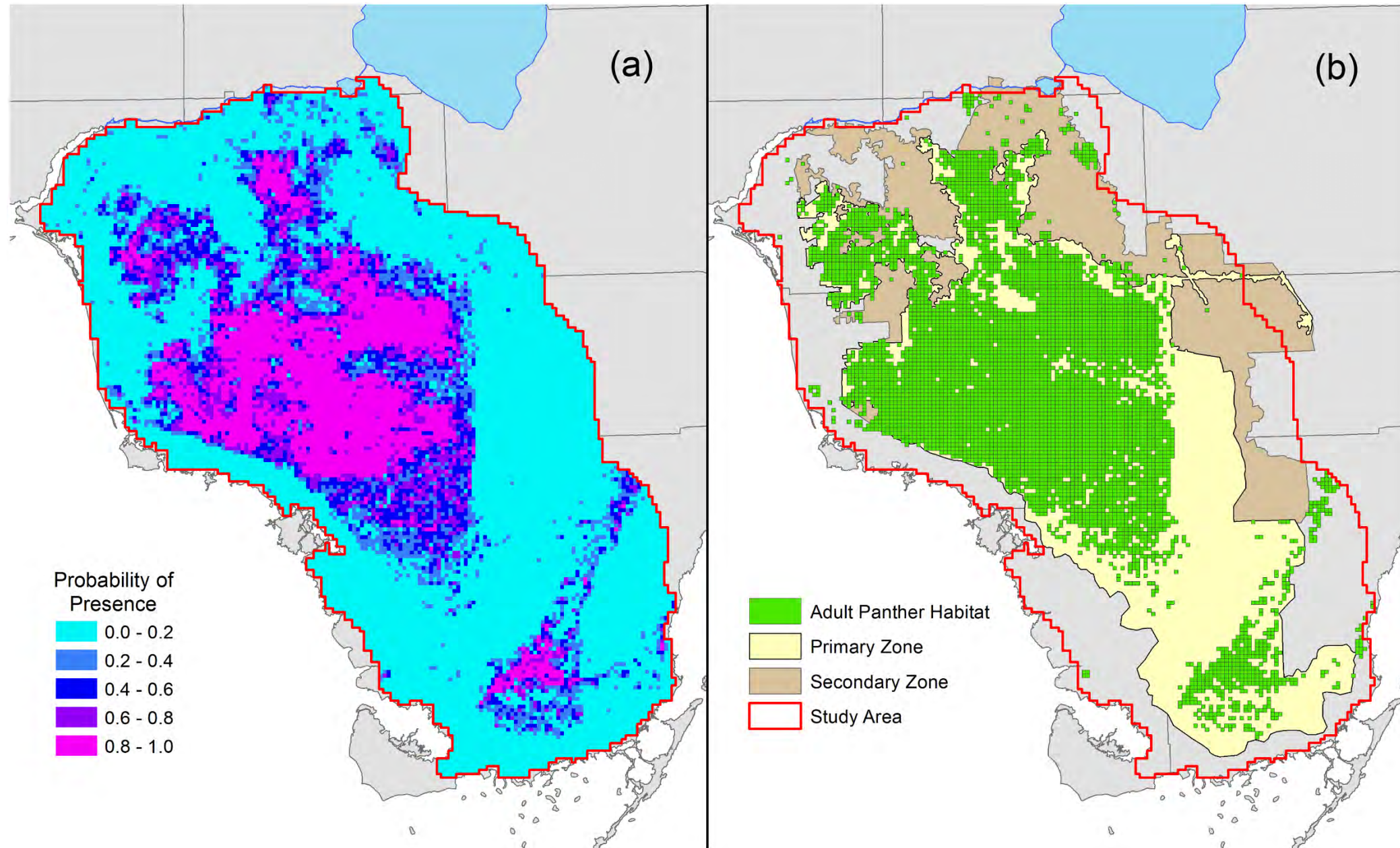


Fig 3. Probability of presence and adult panther habitat.



SUMMARY OF RF MODEL PREDICTIONS

- Model calculates a probability of presence (P) for each cell, based on the mixture of landscape characteristics in the cell.
- The model identified 5579 km² of adult (breeding) panther habitat (cutoff threshold = 0.338).
- Model supports the current Primary Zone, except:
 - WCAs
 - Shark River Slough
 - “Witch’s finger”
- Secondary Zone contains very little adult habitat (3.8%).
- Some good panther habitat was identified outside the Primary and Secondary Zones (2.4%).

Table 2. Accuracy metrics for the Florida panther habitat model.

Method of Calculation	PCC^a	Specificity	Sensitivity	Kappa	AUC^b
resubstitution	98.7	98.5	99.1	0.97	1.00
out-of-bag	87.7	87.6	87.7	0.71	0.95
10-fold cross validation	87.5	87.4	87.7	0.71	0.95

^aPercent correctly classified.

^bArea under the receiver operating characteristic curve.

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VARIABLE IMPORTANCE

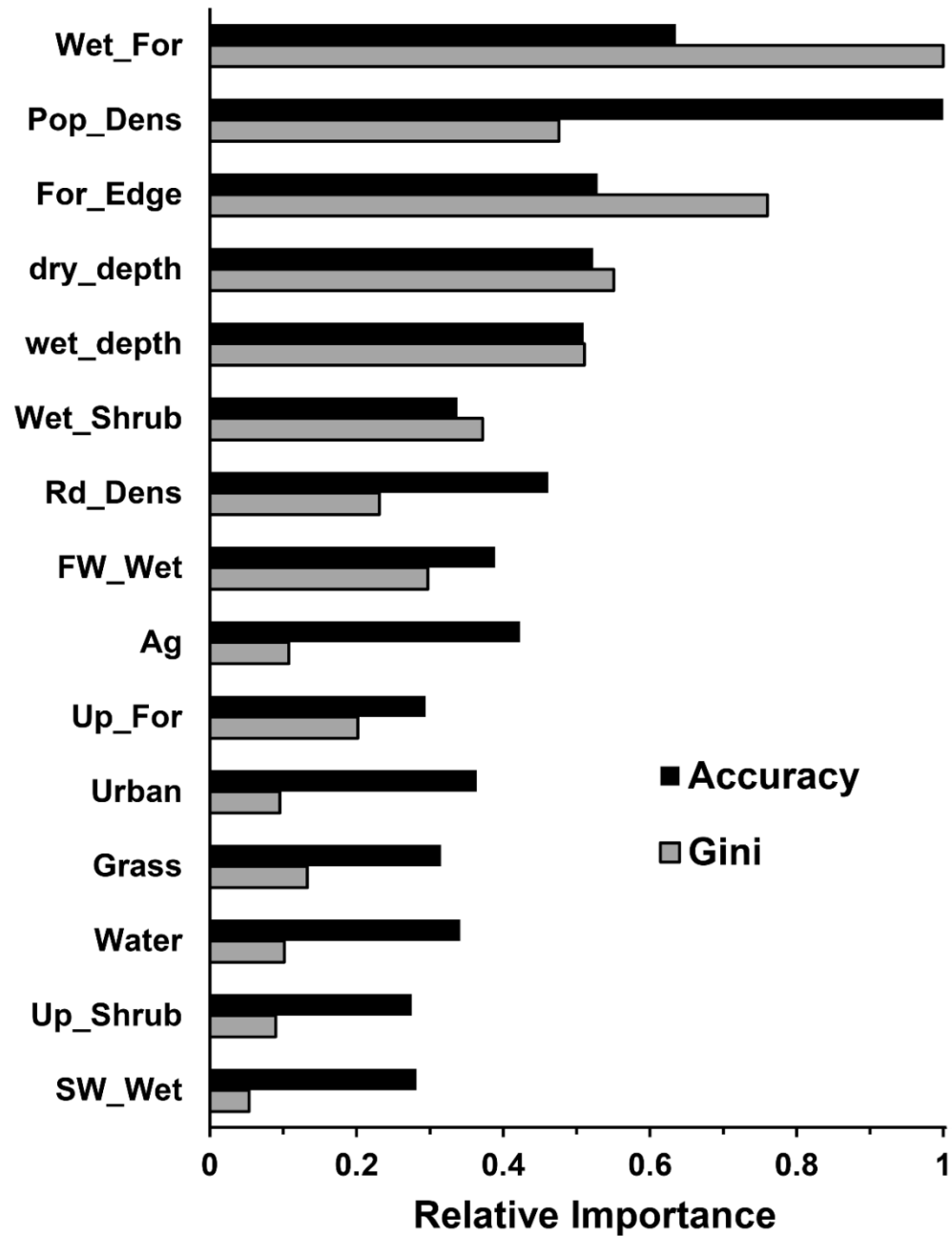
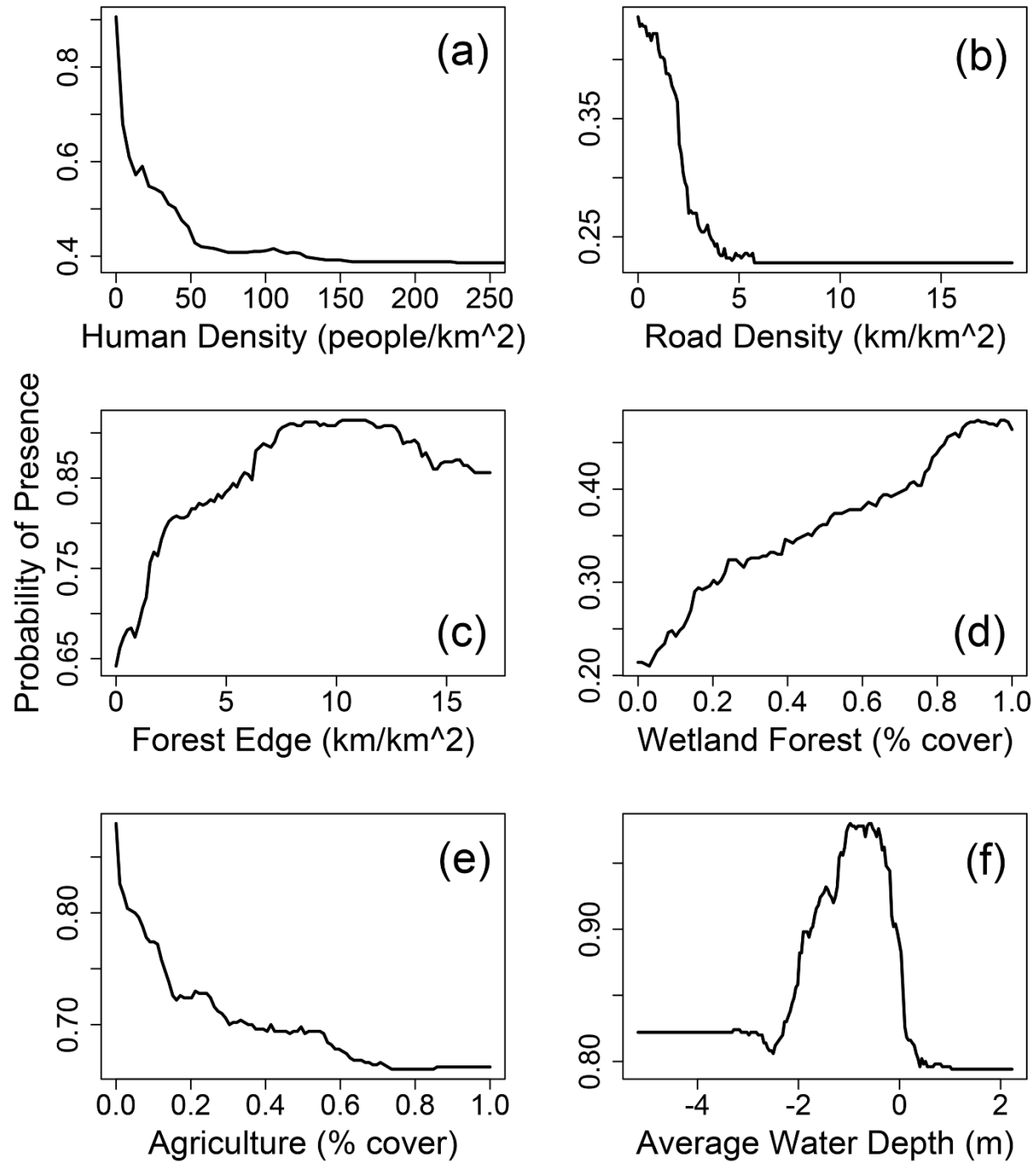


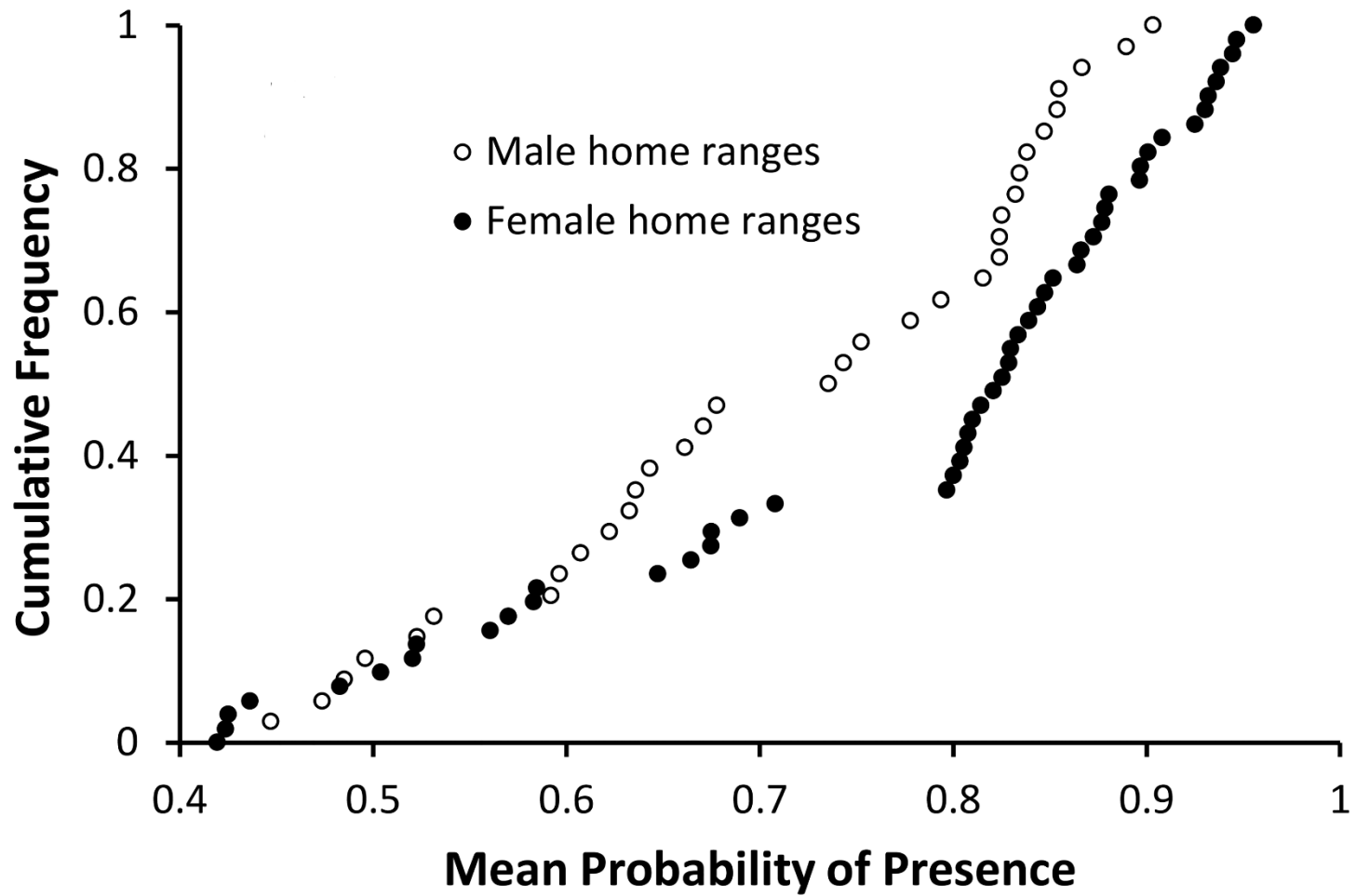
Fig 5. Sensitivity of model predictions (probability of presence, P) to changes in selected explanatory variables.



SUMMARY OF VARIABLE IMPORTANCE

- The most important factors determining panther presence are:
 1. Amount of forest cover (+)
 2. Human population density (-)
 3. Amount of forest edge (+)
 4. Water depth (Hydrology) (+/-)
- Road density(-) and agriculture(-) were of medium importance.
- Upland cover types (upland forest(+), upland shrub, grasslands) were relatively unimportant.

Fig 6. Average probability of presence in Florida panther home ranges.



RECOMMENDATIONS

1. Redraw the panther “zones” based on habitat value.
 - A large part of PZ is not good adult panther habitat.
 - Almost none of SZ is good habitat.
 - Some good habitat exists outside both zones.

2. Revise or replace the current Panther Habitat Assessment Methodology (“panther tool”).
 - There is much less habitat remaining than assumed by the tool.
 - Goal: Protect the remaining breeding habitat.

3. Establish additional panther population(s) north of the river.
 - Insufficient habitat exists south of the river to support one viable population.*
 - Use SDM to identify the best location(s).

Questions?



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