NOTES

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A CROSS-TABULATION OF LAND-COVER TYPES BY CONSERVATION LANDS IN FLORIDA

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Florida has a diversity of public and private lands that is dedicated to protecting valued natural resources. Many new areas will be added to the list of conservation lands as a result of the state's various land-acquisition programs. Some useful information to consider when evaluating proposed land-protection efforts would be a cross-tabulation of current conservation lands by different land-cover types throughout Florida. Such figures would help to quantify the land-cover types currently found on conservation lands versus land-cover types remaining outside of conservation lands. These figures might also aid in general land-use planning efforts.

The creation of a land-cover map of Florida (Kautz et al. 1991) and a computerized map of major conservation lands in Florida (Fig. 1) enables such a cross-tabulation to be conducted. Florida's land-cover map (Kautz et al. 1991) was developed using Landsat thematic mapper data collected from 1987 to 1989. These data were categorized into 22 cover types that correspond to other land-cover classifications used for Florida (e.g., Davis 1967, Hartman 1978) and allowed for reasonable accuracy. The cell size of the Landsat cover map is 0.10 ha (0.25 acres), though practical resolution is about 1-2 ha (2-5 acres). A thorough description of the classification methods, land-cover types, etc. goes beyond the scope of this paper, but it should be noted that Landsat data provides only a coarse description of vegetative communities. The map prepared by Kautz et al. (1991) is the most accurate statewide map available, but it may overlook or misclassify small tracts of different plant communities. Kautz et al. (1991) estimate the overall accuracy of the land-cover map to be about 70-85%, but accuracy varies among cover types.

Conservation areas were broadly defined to include public and private land-holdings (e.g., Nature Conservancy preserves) where the maintenance of biodiversity is an important management goal. The map of conservation areas (Fig. 1) was digitized from county road maps prepared by the Florida Department of Transportation and the *Florida Atlas & Gazetteer* (1987, DeLorme Publishing Co.). The scales of these maps are 1:126720 and 1:150000, respectively. This map of conservation lands was prepared to help develop habitat protection strategies for many terrestrial vertebrates; thus certain aquatic preserves (e.g., John Pennekamp National Park) were not processed. The cross-tabulation of conservation areas by land-cover types was conducted using geographic information system software (TYDAC 1988).

The cross-tabulation (Table 1) provides an estimate of the amount of different land-cover types found within conservation lands and the total amount remaining in Florida. Subtotals by broader categories of vegetated uplands, vegetated wetlands, water, and "other" cover types are also provided (Table 1). Roughly 18.7% of the terrestrial area of Florida lies in conservation lands. The average percentage of all remaining land-cover types on conservation areas in Florida is 34.3%, but there is great variation in the percentages of specific cover types. Among vegetated upland cover types, coastal strand and tropical hardwood hammock are the least represented in terms of total area. However, based on percentages,

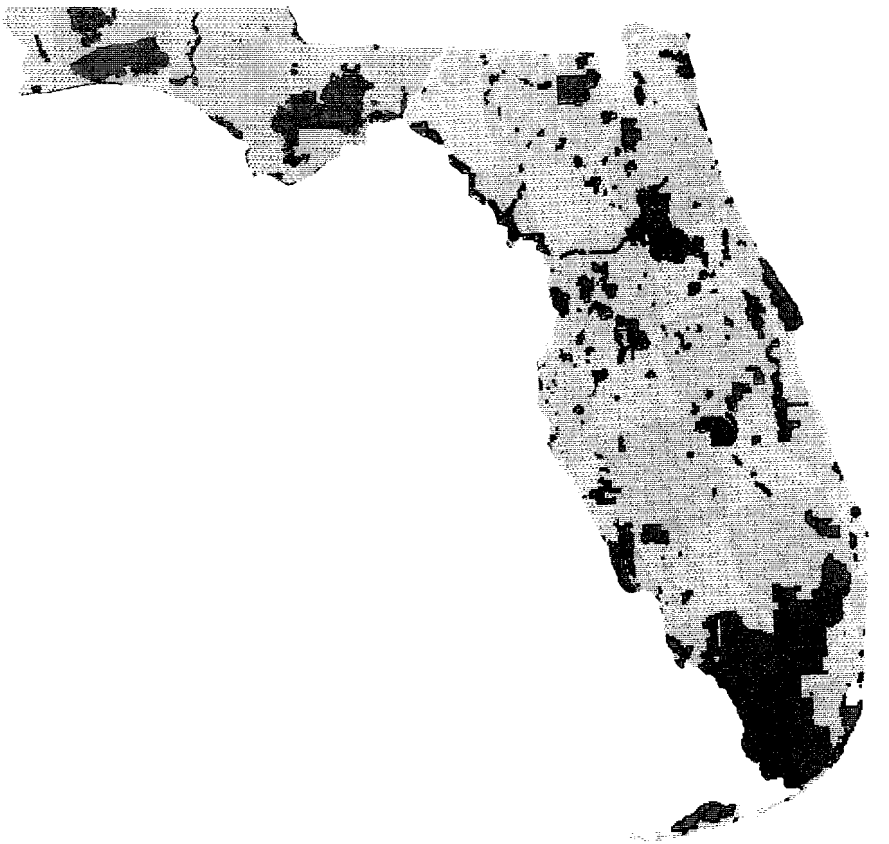

Figure 1. Major conservation lands in Florida are shown as darkened areas.

approximately half of the remaining coastal strand and tropical hardwood hammock is found on conservation lands. Among vegetated wetland cover types, bay swamp has the smallest total area on conservation areas, whereas the remaining percentage of hardwood swamp on conservation lands is smallest. Among the category of "other" land-cover types mapped, exotic plant communities has the largest percentage on conservation lands, while the shrub and brush land-cover type is most abundant.

There is a dramatic difference in the percentages of remaining vegetated upland cover types found on conservation lands versus the percentages of remaining wetland cover types (19.9% versus 46.9%). This difference underscores the historic focus on large wetland systems in land-preservation efforts. Unfortunately, many of Florida's rarest species are associated with vegetated upland cover types (Kautz 1984, Muller et al. 1989). Upland cover types also house diverse animal (Kautz 1984) and plant communities (Myers and Ewell 1990).

One comparison that might be made is to compare Florida's current land-cover map to Davis' (1967) "original" land-cover map for Florida. Unfortunately, the coarse nature of Davis' map makes this impossible. To depict coastal strand on his 1:2000000 scale map, Davis had to use a line that was several hundred meters wide. This width is much wider

Table 1. Cross-tabulation of land-cover types by conservation lands in Florida. Area figures are km².

Cover type	Conservation lands	Total remaining	Proportion
Vegetated upland cover types			
coastal strand	20.5	40.9	50.2%
dry prairie	995.7	6000.0	16.6%
pineland	4752.9	29972.3	15.9%
sandpine scrub	815.0	1087.3	75.0%
sandhill	1521.4	3987.9	38.2%
xeric oak scrub	275.7	667.5	41.3%
mixed hardwood pine	145.9	1252.1	11.9%
hardwood hammock	1418.2	7399.8	19.2%
tropical hammock	26.0	52.0	50.0%
Upland subtotal	9974.7	50459.8	19.87%
Wetland cover types			
coastal marsh	1196.2	1195.0	60.0%
freshwater marsh	6027.8	9650.2	62.3%
cypress	1744.0	5837.6	29.9%
hardwood swamp	1542.6	6739.7	21.8%
bay swamp	125.8	538.1	23.4%
shrub swamp	1296.5	2217.7	58.5%
mangrove swamp	1757.2	2231.0	78.9%
bottomland hardwood	208.1	428.7	48.3%
Wetland subtotal	13892.3	29638.0	46.9%
Other cover types			
grass and agriculture	605.2	28632.3	2.1%
shrub and brush	1072.6	15807.3	6.8%
exotic plant	17.2	156.0	12.4%
barren	731.9	15499.5	4.6%
Other types subtotal	2426.9	60095.1	4.0%
total without water	26293.9	140192.9	18.7%
water	4710.1	17252.6	27.2%
Total	31004.0	157445.5	19.7%

than the actual distribution of coastal strand. Davis was also unable to depict any intermix of cypress swamp and pine flatwoods, lakes and sandhill, etc., with any precision. The land-cover map used here suffers from similar problems, but at a much finer scale (i.e., tens of meters rather than hundreds of meters).

It is inappropriate to propose that certain cover types are "adequately represented" based on these analyses. Such evaluations require a more extensive analysis of species area requirements, endemism, population viability, and habitat quality. Although the figures presented here may be helpful in establishing general goals for future land-protection efforts, more specific information is needed to protect representative examples of different cover types and viable populations of rare species. For example, there are several rare, endemic species associated with xeric oak scrub that may be inadequately represented on the current system of conservation areas. If these species are not represented, or rep-

resented by populations with low chances of continued existence, then additional oak scrub needs to be protected despite the current representation of oak scrub on conservation lands. On the other hand, these analyses do help to show the poor representation of upland cover types on conservation lands in comparison to wetland cover types. Increased attention needs to be given to many upland cover types.

Literature Cited

DAVIS, J. H. 1967. General map of natural vegetation of Florida. University of Florida, Gainesville.

HARTMAN, B. J. 1978. Description of major terrestrial and wetland habitats of Florida, pages xvi-xix *in* Rare and endangered biota of Florida. Volume 2, Birds (H. W. Kale II, ed.). University Presses of Florida, Gainesville.

KAUTZ, R. 1984. Criteria for evaluating impacts of development on wildlife habitats. Proc. Annu. Conf. Southeast Assoc. Fish and Wildl. Agenc. 38:121-136.

KAUTZ, R., G. MAULDIN, AND T. GILBERT. 1991. Mapping Florida wildlife habitat using Landsat Thematic Mapper Imagery. Final Report. Florida Game and Fresh Water Fish Commission, Tallahassee.

MULLER, J., D. HARDIN, D. JACKSON, S. GATEWOOD, AND N. CAIRE. 1989. Summary report on the vascular plants, animals, and plant communities endemic to Florida. Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program Technical Report 7, Tallahassee.

MYERS, R., AND J. EWELL (eds.). 1990. Ecosystems of Florida. University of Central Florida Press, Orlando.

TYDAC. 1988. SPANS Spatial Analysis System. Version 4.30. TYDAC Technologies, Inc., Ottawa.

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LOGGERHEAD SHRIKES EAT CRAYFISH

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Loggerhead Shrikes (*Lanius ludovicianus*) are opportunistic feeders that feed largely on invertebrates (Beal and McAtee 1912, Howell 1932, Craig 1978, Scott and Morrison 1990), although they may consume mammals when insects are scarce (Judd 1898, Kridelbaugh 1982). Graber et al. (1973) showed that shrikes adjust their diet according to prey availability, and even feed on road-kills (Robertson 1930).

John Condit, of the Ohio State University's Museum of Zoology, initially discovered that loggerhead shrikes caught and impaled crayfish (*Procambryus alleni*; Hobbs and Hobbs 1991) at the MacArthur Agro-ecology Center of the Archbold Biological Station, in February 1991. This occurred on the territory of a shrike that had a shallow canal (~ 1 m deep) flowing through its boundaries. It is unusual for shrikes to prey on crustaceans, and to date reports have implied that only isopods have been taken as prey (Scott and Morrison 1990).