POLICY IMPLICATIONS OF GEORGIA'S COASTAL MARSH HAMMOCK BIOLOGICAL SURVEYS

Laura P. Jones[1] and Maria S. Calvi[2]

AUTHORS: [1]Coastal/Wetlands Specialist, Southern Environmental Law Center, 200 West Franklin Street, Suite 330, Chapel Hill, NC 27516; [2]Graduate student, Duke University Nicholas School of the Environment and Earth Sciences, Box 90328, Durham, NC 27708.
REFERENCE: Proceedings of the 2003 Georgia Water Resources Conference, held April 23-24, 2003, at the University of Georgia. Kathryn J. Hatcher, editor, Institute of Ecology, The University of Georgia, Athens, Georgia.

Abstract. Between October 2001 and September 2002, the Southern Environmental Law Center, in conjunction with the Georgia Conservancy and the Altamaha Riverkeeper, conducted a series of biological inventories of marshland hammocks in the coastal region of Georgia. The surveys represent the first comprehensive investigation of these unique and threatened coastal resources. Marsh hammocks support maritime forests, a disappearing natural community. Many hammocks provide roosting and nesting areas for wading birds (including the endangered wood stork), as well as habitat for diamondback terrapin and other wildlife. Although hammocks are facing increasing development pressure, a lack of information about these resources is hampering conservation efforts of state agencies and private conservation organizations. Preliminary data analyses have revealed that, because of their varying locations, sizes, and origins, marsh hammocks exhibit widely diverse characteristics. Only through additional investigation can we gain a sound understanding of marsh hammocks and the dynamic role they play in our marshland ecosystem.

INTRODUCTION

Georgia's unique marsh hammocks are a subset of back barrier islands - areas of upland imbedded in Georgia's vast tidal marshes and ranging in size from less than one acre to over 1,000 acres. Approximately 1,200 hammocks comprising over 17,000 acres are now identified and mapped on the Georgia coast. Most marsh hammocks support maritime forests, a disappearing natural community. The Partners in Flight program has identified maritime forests as one of three priority habitats for conservation of migratory songbirds in the South Atlantic coastal region. Many hammocks provide roosting and nesting areas for wading birds (including the endangered wood stork), as well as habitat for diamondback terrapin, and other wildlife. Although these general ecological attributes are recognized, no systematic biological surveys of Georgia's marsh hammocks have been published and there is little site specific information about the ecological significance of hammocks.

Georgia's marsh hammocks are under increasing development pressure. Because of this pressure, the Georgia Department of Natural Resources (DNR) established a Coastal Marsh Hammock Advisory Council and a stakeholder group to review issues associated with the development of marsh hammocks in coastal Georgia. Specifically, the Council was charged with: identifying the ecological importance of marsh hammocks; evaluating the impact of continued development of coastal marsh hammocks; and, recommending a range of solutions to mitigate the effects of development of coastal marsh hammocks.

The Council identified a critical need to obtain information on the ecological communities of marsh hammocks:

> At the present time, we know little about the ecological communities and individual organisms (e.g., birds, reptiles, mammals, insects, plants) that are characteristic of marsh hammocks. This information is fundamental to any attempt to manage back-barrier environments. Until we know the importance of these habitats to biota, we cannot seek an acceptable balance between conservation and development.

The Southern Environmental Law Center addressed this need in part by conducting an inventory of a sample group of publicly-owned marsh hammocks in the coastal marshlands of Georgia. Three surveys were conducted with a group of volunteer scientists in the fall of 2001, spring of 2002 and fall of 2002. Our work has revealed that, because of their varying locations, sizes, and origins, marsh hammocks exhibit widely diverse characteristics. As a result, it is not

possible to make generalized statements about the terrestrial communities they support. In fact, many hammocks include a complex of upland and wetland habitats. Only through additional investigation can we gain a sound understanding of marsh hammocks and their role in Georgia's marshland ecosystem. This understanding is essential to marshland and hammock protection and conservation.

SURVEY METHODS

The objective of the surveys is to collect, analyze, and publish information about the ecological communities and individual species found on marsh hammocks. During 2001, SELC worked closely with the Georgia Conservancy to determine the best way to gather scientific information about the ecological importance of marsh hammocks. We determined that we could achieve the most cost-effective and comprehensive study of the biological characteristics of hammocks and their relationship to the marsh ecosystem through an intensive biological inventory study or "bioblast." In a bioblast, a group of scientists takes a biological snapshot of an area, listing kinds, commonness, and locations of all of the flora and fauna found during a given time period. This methodology is currently being used by the US Geological Survey to characterize the biological status of the Shenandoah National Park, Blue Ridge Parkway, and other areas.

SELC conducted the first marsh hammock bio-inventory in October 2001 with a group of volunteer scientists. The hammocks surveyed included a diverse group of publicly-owned hammocks in the northern and central regions of the coast. In June of 2002, we conducted a survey that focused on the use of hammocks by nesting birds. Approximately 40 scientists from the University of Georgia, U.S. Fish and Wildlife Service, Georgia Department of Natural Resources, conservation organizations, and other agencies and institutions assisted in the June survey. Local citizens, conservation organizations, and commercial fishermen provided boat transportation. In addition to the volunteer scientists, fishermen and local citizens, we worked in partnership with the Georgia Conservancy, who arranged a film crew to record the bio-inventory process for a public education video. In September 2002, we conducted the third full-scale bio-inventory during the fall bird migration season.

Site Selection Procedure

Bioblast volunteer scientists sampled hammocks that were selected using a methodology that yields a range of hammocks of different sizes, shapes, and origins (man-made v. natural). We identified the hammocks using aerial photography, USGS topographic maps, local county fishing maps, and GIS. The sample set contained all publicly owned marsh hammocks. Within this set, we grouped the hammocks into categories of large (> 50 acres), medium (10-50 acres) and small (<10 acres) hammocks. Hammocks were further categorized by northern and central coastal Georgia regions.

From these categories, SELC project leaders selected a sample of hammocks of varying origins from each category. For the June and September 2002 bio-inventories, SELC assembled four teams of scientists. At a minimum, each team included scientists from the major disciplines of interest: 1) botanists, experienced with local vegetation; 2) field ornithologists; and, 3) trained naturalists who could identify evidence of mammal usage. In June, our teams included scientists from each of the three specialties listed above as well as a hydrologist who investigated groundwater availability and wetland scientists who noted soil characteristics. For the survey conducted in the fall of 2002, an archeologist also participated in the inventory.

Field Surveys

To gain access to the hammocks, we engaged small boats with licensed captains at local marinas and public dock facilities to transport scientists to and from the hammocks. The protocol was for the teams to collect data over a two to three day period. The average number of observers per hammock was fairly consistent among surveys (fall 2001 = 5, spring 2002 = 7, and fall 2002 = 6). Team members generally spent between 1 to 3 hours on each hammock, collecting the data on standardized data sheets. On these forms, the survey participants listed the species they identified and observed, and made notations about such things as species commonness, behavior, and unusual characteristics. They also noted general information, such as time of day and weather conditions. In the fall of 2002, we designated one team to record specific data gathered along a perpendicular line transect on each hammock. Within a one meter swath on either side of the transect, we recorded all species observed, tree diameters, and vegetation height.

Data Analysis and Publication

Following each inventory, data were compiled and evaluated to determine if there were patterns of similarity among hammocks within similar regions, size ranges and common origins. SELC plans to

prepare a comprehensive report with the marsh hammock data that lists all species observed and illustrates trends. This publication will include a qualitative description of the relationship of marsh hammocks to the coastal marsh ecosystem. Natural resource management agencies and conservation organizations that have expressed a critical need for such information may use it for public education and conservation planning. SELC will make the report publicly available. The publication may help those involved in hammock conservation evaluate the impacts of hammock development and identify solutions to mitigate those impacts.

The final SELC publication will also be a resource for land trusts and other land conservation organizations in setting their priorities for land acquisition efforts. It is hard to predict how much of the nearly 17,000 acres of hammocks may become the subject of permanent protection plans – both public and private – but the data in this report can play an important role in whatever protections are achieved. While not directed at privately owned hammocks, the bio-inventories will nevertheless uncover important information about the characteristics of hammocks in different regions of the coast. This information can be used to help target acquisition resources in areas where, for example, hammocks are revealed to provide a heightened role in bird migration. In these ways, the results of this project are anticipated to support all three aspects of hammock conservation: acquisition, management, and data generation.

In conjunction with the Georgia Coastal Resources Division (CRD), SELC will incorporate bioblast data into the state's GIS hammock database. CRD has offered to attach bioblast data attributes to their GIS coverage and make it available electronically through the State's GIS Clearinghouse. Interested GIS users/researchers will be able to access information about the species present on marsh hammocks, as well as view photographs of the hammocks taken during the bio-inventory.

RESULTS

A total of 23 marsh hammocks were inventoried as part of the three surveys. The hammocks ranged in size from 0.5 to 375 acres with 16 of the 23 hammocks under 40 acres in size. Three of the smallest hammocks were of man-made origin (dredge spoil islands). On all hammocks 203 plant species were observed. There appears to be some correlation between hammock size and diversity of plants with the strongest relationship at smallest hammock sizes. Hammocks of less than 5 acres (n = 7) had an average of 20 plant species. Hammocks larger than 5 acres (n = 15) had an average of 50 plant species. Hammocks between 10 and 50 acres (n = 8) and hammocks larger than 50 acres (n = 7) had similar average numbers of plant species (48 and 52, respectively).

The total number of bird species observed was 144 and included song birds, raptors, shore and wading birds. In addition, the threatened and endangered Painted Bunting and Wood Stork were observed on hammocks. The diversity of bird species appears to increase with hammock size until a threshold of 5 acres is reached. Beyond this size, bird species diversity appears unrelated to further increases in hammock size. Hammocks of less than 5 acres (n = 8) had an average of 9 bird species while hammocks greater than 10 acres (n = 15) had an average of 32 bird species observed.

In addition, the diversity of bird species appears to be associated with time of year (migration v. non-migration). The fall 2002 survey was conducted September 17th, 18th and 19th during the fall migration season. A greater number of bird species were observed on all hammocks during this time than during each of the previous surveys. A cumulative total of 58 and 59 bird species were counted on all of the hammocks during the fall 2001 and the spring 2002 surveys respectively. By contrast, a cumulative total of 77 bird species were observed during the fall 2002 migration season. However, only hammocks larger than 10 acres in size were surveyed in the fall of 2002, thereby contributing in part to the greater average bird diversity. Considering only hammocks greater than 10 acres in size, more bird species were observed on average (29, n = 10) during the fall 2002 migration period than during the fall 2001 and spring surveys (17 and 21, n = 5 and 9, respectively).

CONCLUSION

This project fits into the larger program of hammock conservation efforts being led by CRD. As mentioned above, CRD has recently completed a GIS database of marsh hammocks that includes information such as ownership and origin. The information generated during bioblast will be an important compliment to the GIS data. This tool can help decision-makers gain a better understanding of the resource and the implications for distinctions drawn among hammocks in devising hammock conservation strategies. Proposals for hammock protection currently being considered by the DNR marsh hammocks

stakeholder group include prohibiting bridge access to smaller hammocks and focusing acquisition efforts on larger hammocks. As we continue to gather information about hammocks and the important role they play in the ecology of Georgia's coastal marshlands, it is our hope that our increased understanding will enable us to become better stewards of this valuable resource.

ACKNOWLEDGEMENTS

The authors and SELC wish to express their sincere thanks to the volunteers who participated in bioblast and enthusiastically withstood the physical demands of hammock surveying. We greatly appreciate the partnership of the Georgia Conservancy and the Altamaha Riverkeeper who together, made this undertaking possible. We especially thank the boat captains, Mike Neele of Bull River Marina, Robert DeWitt, John Crawford, Bing Phillips, Greg Masson, Aimee Gaddis, Robert Overman, and James Holland. Thanks to the organizations that permitted their staff to participate including the University of Georgia, Georgia Marine Extension Service, Georgia Department of Natural Resources, Georgia Coastal Land Trust, US Fish and Wildlife Service, and Oatland Island Education Center.

SELECTED REFERENCES

Partners in Flight, *South Atlantic Coastal Plain Bird Conservation Plan*, http://www.blm.gov/wildlife/pl_03sum.htm.

Report of the Coastal Marsh Hammocks Advisory Council, Georgia Department of Natural Resources, March 2002. Available online at http://www.state.ga.us/dnr/coastal.

Blue Ridge Parkway Bioblitz, http://www.mp1-pwrc.usgs.gov/blitz/blue/blue99.html; http://www.im.nbs.gov/blitz.html