Partnership for Wetland Restoration and Public Use: A Case Study

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Abstract: The T. M. Goodwin Waterfowl Management Area (WMA) is a 1,566-ha freshwater wetland restoration project developed by the Florida Game and Fresh Water Fish Commission (Commission) in east central Florida. The land was historically floodplain marsh, but was drained beginning in the 1950s and thereafter managed as improved pasture for cattle production. The St. Johns River Water Management District (District) purchased the land in 1988 for $6.3 million, and leased it to the Commission to restore wetland habitat and provide public recreation. Based on conceptual input from the Commission, the District prepared engineering design and project construction plans. The Commission, Ducks Unlimited, and the North American Wetlands Conservation Council provided $1,340,500 to restore and enhance wetland habitat for waterfowl and other wetland wildlife, develop the WMA's office and maintenance facilities, and purchase management equipment. Project development resulted in the establishment of 10 wetland management units on one-half of the WMA, where moist-soil wetland management techniques are implemented to restore native wetland plant communities and control exotic vegetation. The remainder of the WMA serves as a semi-permanently flooded marsh. Open to the public year-round, the WMA provides activities such as waterfowl hunting, hiking, biking, and birdwatching. Future activities will include bank and small boat fishing from a stocked 37-ha lake.

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The T. M. Goodwin Waterfowl Management Area (WMA), located in southern Brevard County, Florida (Fig. 1), is a 1,566-ha wetland restoration project developed in the upper St. Johns River basin by the Florida Game and Fresh Water Fish Commission (Commission). In 1988, the St. Johns River Water Management District (District) paid $6.3 million for the land with state Save Our Rivers funds (Save Our

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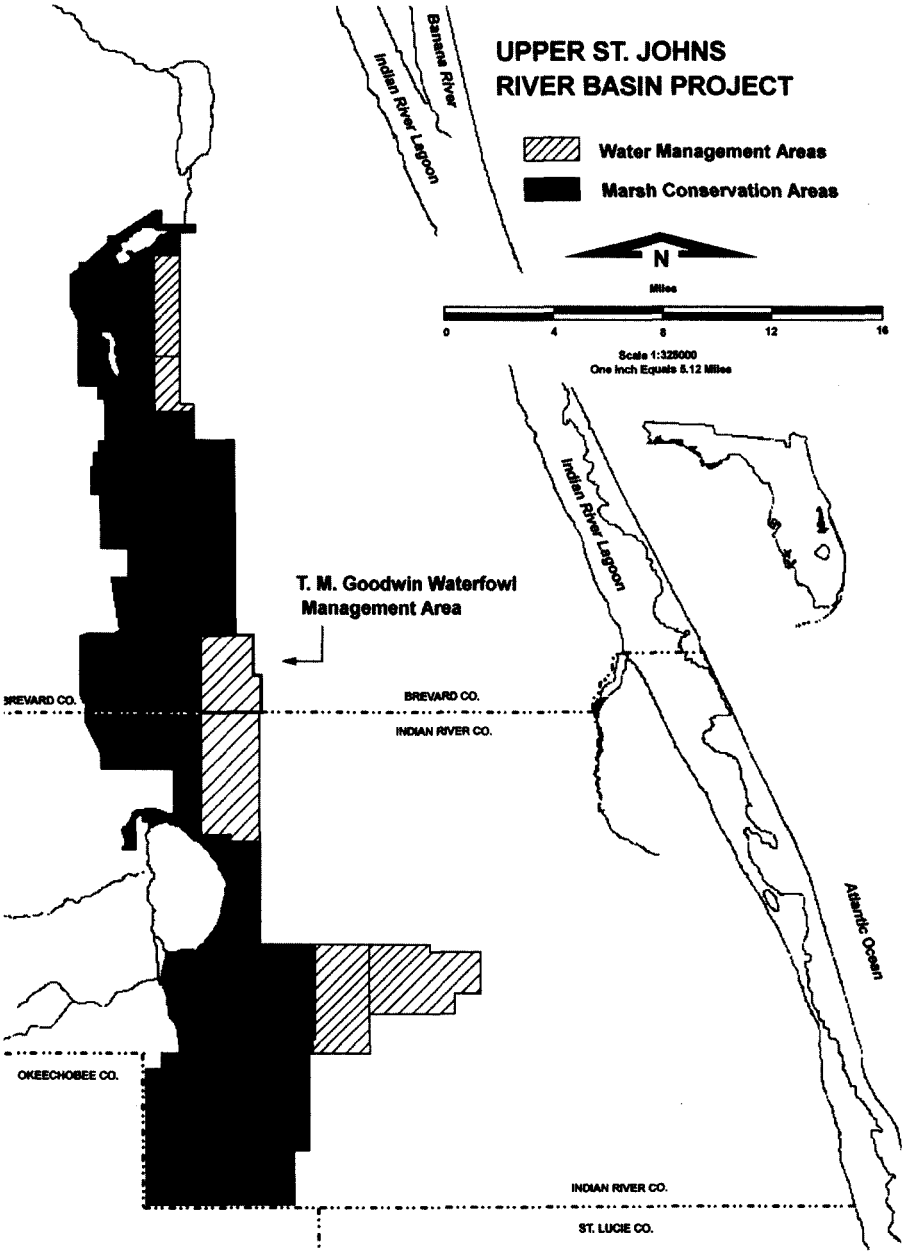

Figure 1. Location of the T. M. Goodwin Waterfowl Management Area in relation to the upper St. Johns River basin project in east-central Florida.

Rivers Act; Fla. Statutes, Chap. 81–33, 1981) and subsequently leased it to the Commission for development and management as a public waterfowl management area. Goals for the WMA are to restore and enhance wetland habitat for waterfowl and other wetland wildlife and provide public recreational opportunities.

The District prepared the engineering design plan for the development of the WMA. The Commission, Ducks Unlimited through their Matching Aid to Restore States Habitat (MARSH) program, and the North American Wetlands Conservation Council provided development funds. This paper chronicles the key elements to a successful wetland restoration project: partnership, funding, design and management, and public use benefits.

We thank Ducks Unlimited, the District, North American Wetlands Conservation Council, and the Commission for their cooperation and support and those individuals and private contractors who assisted with planning and project development. A special thanks to F. E. Linn for his editorial comments and J. E. Albury, R. R. Bielefeld, and R. C. Brust who provided helpful reviews.

Background

Historically, the upper St. Johns River basin consisted of nearly 161,878 ha of floodplain wetlands, primarily in Brevard and Indian River counties in east central Florida. By 1983, however, conversion to agricultural land uses and urbanization reduced the total floodplain acreage by 62% (Miller et al. 1996, Sterling and Padera 1996). In Brevard County alone, 82% of the floodplain wetlands were drained (M. Sterling, pers. commun.). The WMA occupies an area that was diked and drained beginning in the 1950s, and by the mid 1970s approximately 95% of the wetlands were drained. As recently as 1987, the area was managed as improved pasture, supporting about 2,000 head of cattle. These largely unregulated developments destroyed valuable wetlands, decreased water supply, increased flood peaks, and created critical water quality problems (Campbell et al. 1984). Declines in waterfowl, wading birds, and game fish correspondingly occurred (Chamberlain 1960, Cox et al. 1981, Lowe et al. 1984).

In 1986, the U.S. Army Corps of Engineers and the District adopted a formal plan to reverse environmental degradation in the upper St. Johns River basin. This plan, known as the upper St. Johns River basin project, represents a "semi-structural" approach to manage the river and floodplain wetlands as a natural ecosystem (Sterling and Padera 1996). The main components of this effort included floodplain preservation and restoration through land acquisition and construction of agricultural irrigation and stormwater retention areas within the floodplain (Fig. 1). The project now includes more than 50,587 ha acquired by the District.

The WMA represents one of the many tracts purchased by the District in the upper St. Johns River basin. The primary purpose for acquiring this tract is to provide approximately 14.8 million m^3 of stormwater retention to reduce freshwater discharge into the brackish coastal marshes of the Indian River Lagoon. Hydrologic models developed for the upper St. Johns River basin indicate the WMA, also known

as the C-54 Retention Area, would be needed for stormwater retention once every 10 to 12 years. As a secondary purpose, the District leased this land to the Commission to restore and enhance wetland habitat and establish a public waterfowl management area. In May 1991, the District executed a 30-year, non-fee renewable lease agreement assigning full management authority to the Commission for developing and managing the WMA. This partnership was expanded to include Ducks Unlimited and the North American Wetlands Conservation Council, which provided financial assistance.

Project Funding

Ducks Unlimited provided $461,500 of MARSH funds to assist with development of the WMA. Under the MARSH program, Ducks Unlimited makes available 7.5% of the funds it raises in Florida on an annual basis to develop and enhance wetlands within the state. Ducks Unlimited MARSH funds were equally matched by the Commission providing a total of $923,000. These funds were appropriated over a 5-year period (Table 1). The annual appropriation amounts varied between years to ensure that additional MARSH funds would remain available on an annual basis for developing other potential MARSH projects.

An additional $417,500 of development funds were secured from the North American Wetlands Conservation Council under the North American Wetlands Conservation Act (North Am. Wetlands Conserv. Act; Public Law 101–233 13 Dec 1989). Like Ducks Unlimited MARSH, the North American Wetlands Conservation Act provides up to 50% federal matching funds to encourage partnerships among public agencies and other interests to 1) protect, restore, enhance, and manage wetlands of critical importance to waterfowl and other fish and wildlife in North America; 2) maintain current or improved distribution of migratory bird populations; and 3) sustain an abundance of waterfowl and other migratory birds consistent with the goals of the North American Waterfowl Management Plan (Graziano and Cross 1993, Beck 1994).

We submitted 5 North American Wetlands Conservation Council grant proposals, 1 each year during the 5-year development period. The amount of funds requested

Table 1. Funds allocated for development of the T. M. Goodwin Waterfowl Management Area, Brevard County, Fla.

	Dollars Allocated By			
Year	DU MARSH[a]	Commission[b]	NAWCA[c]	Total
1990	$100,000	$100,000	$100,000	$300,000
1991	84,500	84,500	84,500	253,500
1992	77,000	77,000	138,000	292,000
1993	105,000	105,000		210,000
1994	95,000	95,000	95,000	285,000
Total	$461,500	$461,500	$417,500	$1,340,500

a. DU MARSH—Ducks Unlimited Matching Aid to Restore States Habitat.

b. Commission—Florida Game and Fresh Water Fish Commission.

c. NAWCA—North American Wetlands Conservation Act.

in each grant proposal was less than 50% of the combined funds from Ducks Unlimited MARSH and the Commission. Because the WMA is situated within a waterfowl habitat area of major concern (as identified in the North American Waterfowl Management Plan), this enhanced our ability to successfully compete for grant funds. Four of the 5 grant proposals were approved, providing a total development budget of $1,340,500 (Table 1).

Project Design and Management

The Commission contracted with the District to prepare the engineering design and project construction plan based on the Commission's Design and Operational Criteria for developing the WMA (S. Rockwood, unpubl. info., Fla. Game and Fresh Water Fish Comm.). Because the WMA also serves as a stormwater retention area, the engineering design plan included provisions to accommodate periodic inundation and minimize infrastructure damage that may occur from these events.

This design plan (F. Niemczenia, unpubl. info., St. Johns River Water Manage. Dist.) included modifying the existing drainage system on the southern one-half of the WMA by renovating 30 km of existing canals and levees (spoil banks), installing 24 water control structures, and constructing a pump station. These modifications and improvements cost approximately $900,000 and resulted in the establishment of 10 wetland management units averaging 61 ha each (Fig. 2). The northern one-half of the WMA was designed to store water for managing the wetland management units. The remaining funds were used to construct the WMA's office and maintenance facilities, purchase farm equipment (i.e., 2 tractors, an extended reach backhoe, an offset disc, a bat-wing mower, an all-terrain vehicle, and a 4×4 truck), and pay for personnel and administrative costs.

Manipulation of water level within each wetland management unit is the primary management tool to restore native wetland plant communities. Moist soil conditions created during the growing season promote the establishment of native seed producing wetland plants such as panic grasses (*Panicum* spp.), smartweeds (*Polygonum* spp.), coast cockspur (*Echinochloa walteri*), and sedges (*Cyperaceae*) (Johnson and Montalbano 1989). The timing, speed and length of drawdowns, and subsequent reflooding influence the species of plants that respond and grow in moist-soil conditions (Fredrickson 1991, Fredrickson and Taylor 1982). Varying manipulations among the wetland management units promote specific types of plant growth, provide diverse habitat, and result in favorable conditions for a variety of wetland wildlife.

In addition to water level manipulations, soil disturbance (light disking) and controlled burns are conducted to promote seed germination, increased food plant production, create and/or maintain openings, and discourage woody plant production (Fredrickson and Taylor 1982, Weller 1987, Johnson and Montalbano 1989). Undesirable plants such as willows (*Salix*. spp.) (*Typha* spp.), water hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*), and others may be controlled through burning, herbicide application, or mechanical manipulations (i.e., disking or roller chopping).

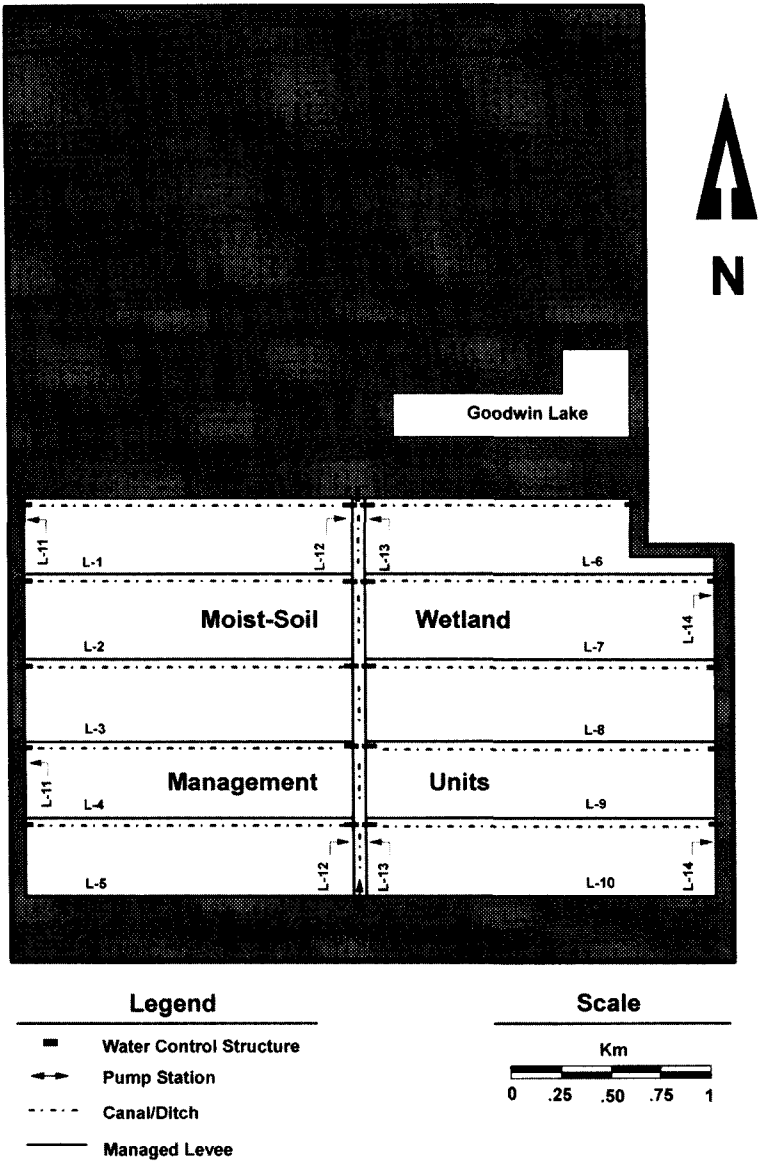

Figure 2. Map of the T. M. Goodwin Waterfowl Management Area, Brevard County, Florida.

The northern one-half of the WMA is managed as a semi-permanent flooded marsh with water depths ≥0.67m. These conditions promote the growth of submersed and floating-leaved plants. Management activities focus on encouraging the growth and production of important food plants, such as white waterlily (*Nymphaea odorata*), water shield (*Brasenia schreberi*), southern naiad (*Najas guadalupensis*), and water-celery (*Vallisneria americana*) (Chabreck et al. 1989). Periodic drawdowns will be conducted to promote and enhance wetland habitat values.

Public Use Benefits

On 1 December 1995, the WMA opened to the public, and remains open year-round from 1 hour before sunrise until 1 hour after sunset, except on hunt days. Access within the area is limited to walking, biking, horseback riding, and boating (motors ≤10 horsepower).

Waterfowl hunting, the WMA's most popular activity, accounts for approximately 75% of the total annual visitor use (J. Albury and S. Rockwood, unpubl. data, Fla. Game and Fresh Water Fish Comm.). Morning-only waterfowl hunts are permitted on Tuesdays and Saturdays with a daily quota of 65 hunters. During the 1995–96, 1996–97, and 1997–98 waterfowl seasons, 2,238 hunter trips were recorded during 52 days of hunting ($\bar{x}$ = 43.04 hunter trips/day). Hunter success averaged 2.4 ducks/hunter (5,340 ducks bagged). Approximately 95% of the ducks bagged were blue-winged teal (*Anas discors*), Florida mottled ducks (*A. fulvigula fulvigula*), and green-winged teal (*A. crecca*). The remainder included species such as northern pintail (*A. acuta*), ring-necked ducks (*Aythya collaris*), fulvous whistling ducks (*Dendrocygna bicolor*), American wigeon (*A. americana*), and northern shovelers (*A. clypeata*).

Other popular WMA activities include birding, hiking, biking, and observing/scouting. From December 1995 to November 1996, members of the Florida Audubon Society conducted 13 birding trips (averaging 3.5 hours/trip) on the WMA. A total of 102 avian species were observed, averaging about 49 species per trip. Examples of species observed included crested caracara (*Caracara plancus audubonii*), snail kite (*Rostrhamus sociabilis*), swallow-tailed kite (*Elanoides forficatus forficatus*), peregrine falcon (*Falco peregrinus*), roseate spoonbill (*Ajaia ajaja*), American bittern (*Botaurus lentigenosus*), least bittern (*Ixobrychus exilis exilis*), black-necked stilt (*Himantopus mexicanus mexicanus*), and wood stork (*Mycteria americana*).

To provide bank and small boat fishing opportunities, the Commission is currently stocking largemouth bass (*Micropterus salmoides*) in Goodwin Lake, a 37-ha borrow pit in the east-central portion of the WMA (Fig. 2). Since March 1997, approximately 1,000 phase 2 (10- to 18-cm fingerling) largemouth bass have been successfully released. Plans include stocking an additional 1,000 largemouth bass during spring 1998.

Considerable public interest in developing environmental educational opportunities on the WMA has been generated. During the past year, the WMA, in cooperation

with the Environmental Learning Center (a non-profit educational institution in Indian River County), hosted several outdoor workshops. Future plans include efforts to increase environmental awareness by continuing to offer outdoor workshops and constructing interpretative facilities (i.e., outdoor kiosks, self-guided interpretive trails, and observation towers).

Conclusion

Restoration of the WMA can be attributed to the District's willingness to provide a 30-year, non-fee lease for the land, and the financial support provided by the North American Wetlands Conservation Council, Ducks Unlimited, and the Commission. This partnership resulted in 1,566 ha of restored wetlands and provided the necessary resources to ensure the long-term management of wetland habitat. The success of the WMA can be measured both ecologically and economically in that the WMA provides valuable wetland habitat for a variety of wetland wildlife species, including several threatened and endangered species, increased flood protection, improved water quality, and numerous public recreational opportunities.

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