A Species Action Plan for the
Suwannee Cooter
Pseudemys concinna suwanniensis

Final Draft
November 1, 2013

Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600
Visit us at MyFWC.com

SUWANNEE COOTER ACTION PLAN TEAM

Team Leader: William M. Turner, Division of Habitat and Species Conservation (formerly)

Team Members: Dale R. Jackson, Ph.D., Division of Habitat and Species Conservation
Jen M. Williams, Ph.D., Division of Hunting and Game Management

Acknowledgements: Laura Barrett, Division of Habitat and Species Conservation
Brian Beneke, Fish and Wildlife Research Institute
Claire Sunquist Blunden, Office of Policy and Accountability
Brie Ochoa, Division of Habitat and Species Conservation
Mary Ann Poole, Division of Habitat and Species Conservation

Cover photograph of adult female Suwannee cooter on nesting foray at Edward Ball Wakulla Springs State Park, Wakulla County, Florida. Photograph by Dale R. Jackson.

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EXECUTIVE SUMMARY

The Suwannee cooter (*Pseudemys concinna suwanniensis*) is a moderately large river turtle and the largest member of the family Emydidae in the United States. Generally considered a subspecies of the more widespread river cooter, the Suwannee cooter inhabits Gulf coastal rivers from the central Panhandle (Ochlockonee River and eastward) into the peninsula as far south as the Alafia River (Tampa Bay region). Principal threats include the combined effects of human take (now unlawful), water pollution, riverine habitat degradation (impoundment, channel dredging, snag removal, siltation), impacts with motorized boats, and predation (turtles and nests). The Suwannee cooter is currently listed as a Species of Special Concern by the Florida Fish and Wildlife Conservation Commission (FWC), and its take is prohibited by FWC rules. A 2011 biological assessment determined that the species does not meet recently adopted criteria for continued listing. Upon implementation of the Imperiled Species Management Plan and associated rule amendment to Chapter 68A-27, Florida Administrative Code (F.A.C.), the Suwanee cooter will no longer be listed as a Species of Special Concern. Staff of the FWC, with stakeholder assistance, developed this plan to guide recovery of the species to prevent the need for relisting in the future.

Objectives of the plan are to maintain the current extent of occurrence of the species in Florida and to maintain or increase population sizes in each river where it naturally occurs. Major strategies for achieving these objectives are to maintain the current regulatory protections; maintain or enhance the water quality, water quantity, and habitat characteristics of occupied rivers, including nearby nesting habitats; identify and protect private lands bordering inhabited rivers and streams; minimize incidental take resulting from fishing, boating, and other activities; educate the public and law enforcement personnel about the species and rules concerning its protection; encourage land managers to consider the species' welfare and requirements in all management activities on their lands; and support research that will increase knowledge about the species and facilitate its conservation. Successful management of the Suwannee cooter through implementation of this plan will require cooperation among local, state, and federal governmental agencies; non-governmental organizations; development and industrial interests; private landowners; academic institutions; and the public.

This plan details the actions necessary to improve the conservation status of the Suwannee cooter. A summary of this plan will be included in the Imperiled Species Management Plan (ISMP), in satisfaction of the management plan requirements in Chapter 68A-27, F.A.C., Rules Relating to Endangered or Threatened Species. The ISMP will address comprehensive management needs for 60 of Florida's imperiled species and will include an implementation plan; rule recommendations; permitting standards and exempt activities; anticipated economic, ecological, and social impacts; projected costs of implementation and identification of funding sources; and a revision schedule. The imperiled species management planning process relies heavily on stakeholder input and partner support. This level of involvement and support is also critical to the successful implementation of the ISMP. Any significant changes to this plan will be made with the continued involvement of stakeholders.

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GLOSSARY OF TERMS AND ACRONYMS

Area of Occupancy: The area within its extent of occurrence (see Extent of Occurrence), which is occupied by a taxon, excluding cases of vagrancy. This reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats (as defined by the International Union for Conservation of Nature [IUCN]).

BMPs: Best Management Practices. Generally, BMPs represent methods, measures or practices that are developed, selected, or approved by various agencies to protect, enhance, and preserve natural resources including wildlife habitat. They include, but are not limited to, engineering, conservation, and management practices for mining, agriculture, silviculture, and other land uses, that are designed to conserve water quality and quantity, soil and associated nutrients, and to simultaneously control nonpoint and point-source pollution and other impacts to natural resources including aquatic and terrestrial wildlife habitat.

BRG: Biological Review Group, a group of taxa experts convened to assess the biological status of species using criteria specified in Rule 68A-27.001, Florida Administrative Code, which were adopted from the Guidelines for Application of the International Union for Conservation of Nature Red List Criteria at Regional Levels (Version 3.0) and Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1).

BSR: Biological status review report, the summary of the biological review group's findings. Includes a Florida Fish and Wildlife Conservation Commission (FWC) staff recommendation on whether or not the species status meets the listing criteria in Rule 68A-27-001, Florida Administrative Code. These criteria, based on the IUCN criteria and IUCN guidelines, are used to help decide if a species should be added or removed from the Florida Endangered or Threatened Species List. In addition, FWC staff may provide within the report a biologically justified opinion that differs from the criteria-based finding.

Carapace: Upper portion of a turtle's shell.

DEP: Florida Department of Environmental Protection

EPA: United States Environmental Protection Agency

ERP: Environmental Resource Permit Program

Extent of Occurrence: The geographic area encompassing all observations of individuals of a species, including intervening areas of unoccupied habitat. Synonymous with range. See also Area of Occupancy (as defined by IUCN).

F.A.C.: Florida Administrative Code. The Department of State's Administrative Code, Register and Laws Section, is the filing point for rules promulgated by state regulatory agencies. Agency rulemaking is governed by Chapter 120, Florida Statutes, the Administrative Procedures Act. Rules are published in the Florida Administrative Code.

FNAI: Florida Natural Areas Inventory

Forage: To search for or acquire food.

Fragmentation (of habitat): A process of environmental change, commonly caused by human-related land conversion, where once connected habitats become divided into separate fragments.

FWC: Florida Fish and Wildlife Conservation Commission, the state agency constitutionally mandated to protect and manage Florida's native fish and wildlife species.

FWRI: The Florida Fish and Wildlife Research Institute, the fish and wildlife research branch of the FWC.

F.S.: Florida Statutes

GIS: Geographic Information System

Habitat: The area used for any part of the life cycle of a species (including foraging, breeding, and sheltering).

HCP: Habitat Conservation Plan

Head-starting: Raising neonates (hatchlings) to a sufficient size in captivity to reduce the likelihood of predation or other form of mortality after the young are released into the wild. This is a common wildlife management technique for species that receive little to no parental care and which are subject to high levels of early juvenile mortality.

ISMP: Imperiled Species Management Plan

Incidental Take (as defined in Rule 68A-27.001(5), F.A.C.): Any taking otherwise prohibited, if such taking is incidental to, and not the purpose of the carrying out of an otherwise lawful activity.

Lentic: Relatively still waters not affected by current or tide.

Lotic: Actively moving water, such as streams, springs, and river systems.

NWFWMD: Northwest Florida Water Management District

OFW: Outstanding Florida Water; see Rule 62-302.700, F.A.C.

Population: The total number of individuals of the taxon. Population numbers are expressed as numbers of mature individuals only (as defined by IUCN).

Plastron: Lower portion of a turtle's shell.

Predation: Killing or destruction by a predator.

Riparian: The zone or area at the interface between a river or stream and terrestrial habitat, from the water's edge to the upland edge of the floodplain.

Scientific Collection Permit: A permit issued for activities that include salvage, voucher, bird banding, wildlife possession, or special purpose. Applications must demonstrate a scientific or educational benefit for the species and must identify the purpose, scope, objective, methodology, location, and duration of the project.

SRWMD: Suwannee River Water Management District

Subspecies: A geographic race of a species that typically is distinguishable from related races by physical characteristics such as color pattern and size.

SWFWMD: Southwest Florida Water Management District

Take: Defined in Rule 68A-27.001(4), F.A.C. "To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct."

INTRODUCTION

Biological Background

The Suwannee cooter (*Pseudemys concinna suwanniensis*) is a moderately large river turtle (females to 43 cm [17 in] shell length, males somewhat smaller) with yellow to cream head stripes and a mostly black carapace (upper portion of shell) commonly characterized by faint, reversed C-shaped to concentric (rather than straight) yellow lines (see Cover Photo); these lines tend to be more pronounced in juveniles (Figure 1). The plastron (lower portion of shell) is yellow-orange and typically bears black pigment, from a few bands to a complex pattern, along the seams (Figure 2).

Figure 1. Juvenile Suwannee cooter from the Wakulla River. Wakulla County, Florida. Photograph © Ghislaine C. Guyot.

The Suwannee cooter is a subspecies of the widespread river cooter (*Pseudemys concinna*), which occurs in all southeastern United States. It inhabits Gulf coastal rivers from the central Panhandle (Ochlockonee River and eastward) into the peninsula as far south as the Alafia River (Tampa Bay region) (Figure 3; see also Jackson 2006 and Krysko et al. 2011). Although many authors suggested that the Suwannee cooter was separated from other river cooters in the Florida Panhandle by a substantial disjunction across several small river systems, Jackson's field surveys showed this not to be the case, disproving the main reason some considered Suwannee cooters to represent a unique species (see the review in Jackson 1999).

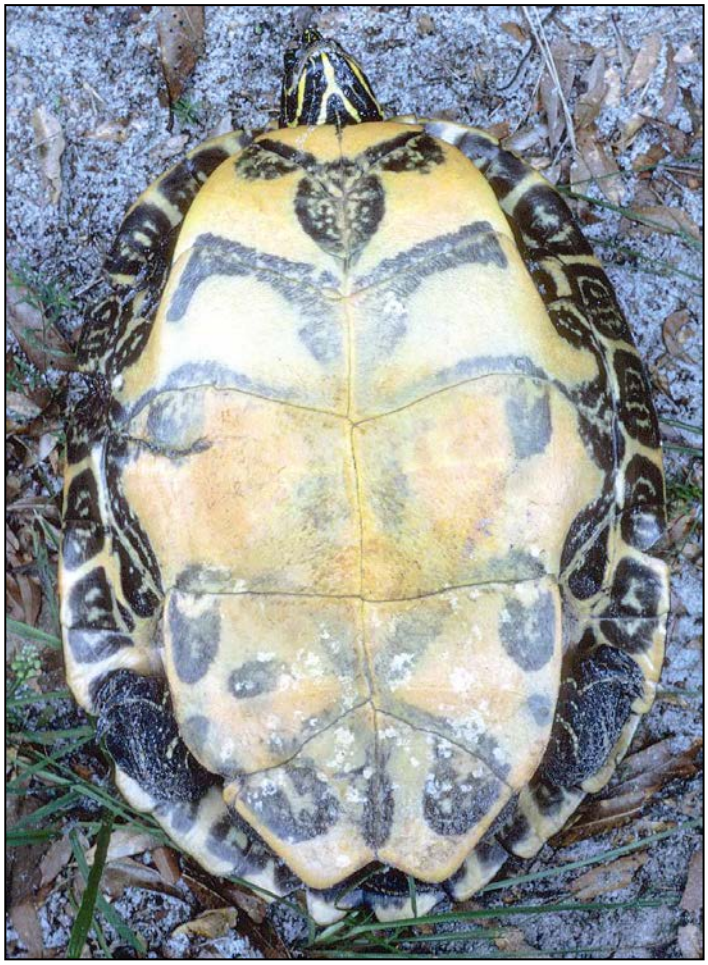

Figure 2. Plastron of adult female Suwannee cooter from the Wakulla River. Wakulla County, Florida. Photograph © Dale R. Jackson.

Suwannee cooters are restricted to rivers, large streams, and associated permanent freshwater habitats, including impoundments. Key habitat features are moderate current, aquatic vegetation, and appropriate structures for basking (Jackson 2006). Suwannee cooters feed on a wide diversity of aquatic plants and algae (Allen 1938, Marchand 1942, Carr 1952, Lagueux et al. 1995, Bjorndal et al. 1997). Females require 10 to 15 years to mature, but life expectancy may exceed 30 years. The nesting season extends from late March to early August, during which each adult female may lay as many as 4 to 5 clutches of 8 to 27 eggs; however, few nests survive predation (Jackson and Walker 1997). With adequate protection, populations can achieve very high local densities and biomasses that give the species an important role in ecosystem stability and structure (Jackson and Walker 1997). Additional information is available in Jackson (2006).

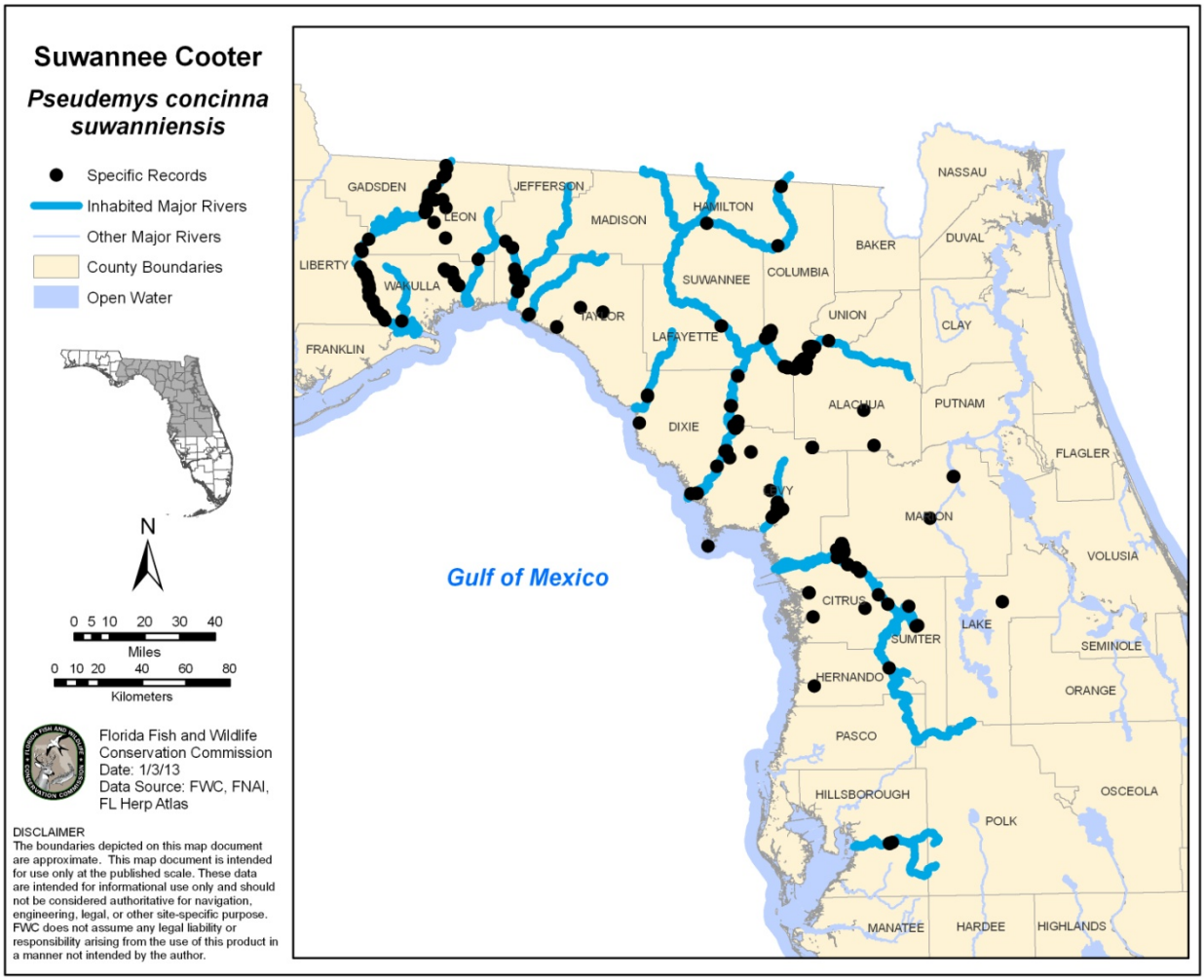

Figure 3. Distribution and recorded observations of the Suwannee cooter in Florida. Specific localities from Krysko et al. (2011) as supplemented by data in the Florida Natural Areas Inventory element occurrence database.

Conservation History

Due to past threats and suspected declines the Florida Fish and Wildlife Conservation Commission (FWC) enacted a series of protective measures during the past 3 decades. Chronologically, the most significant were listing the Suwannee cooter as Threatened in 1975 and as a Species of Special Concern in 1979, limiting possession to 2 individuals, and closing the principal nesting season (15 April to 31 July) to take. Taking any freshwater turtle by shooting with firearms hadd been prohibited since 1974. In 2009, the FWC ultimately prohibited all take of the species (as well as of other cooters, *Pseudemys* spp., because of similarity of appearance [Rule 68A-25.002, Florida Administrative Code]) after receiving petitions and information about significant increases in collection pressure on turtles. To facilitate compliance with the prohibition of take from the wild, pet owners who possessed Suwannee cooters before 20 July

2009 are required to obtain a Class III Personal Pet License to keep their turtles; they are only allowed to possess two because of the prior possession limit.

Because 2 Florida river systems (Suwannee and Ochlockonee) with Suwannee cooter populations drain from Georgia, regulations in that state affect Florida populations. The State of Georgia does not list either the Suwannee cooter or eastern river cooter (*P. c. concinna*) under its Endangered Wildlife Act of 1973 (391-4-10-.08). Until recently, commercial take of non-listed turtles was allowed. However, in January 2012, the Georgia Department of Natural Resources adopted its first regulations to restrict commercial harvest of all freshwater turtle species. Nonetheless, the limits allow a harvester to take as many as 10 river cooters (including Suwannee cooters) annually. State and local regulations addressing water quality of Georgia streams and rivers likewise are important to protecting habitat of Suwannee cooters downstream in Florida.

Although not directed solely toward the species, conservation of the Suwannee cooter has been enhanced greatly by decades of extensive effort to protect lands within its Florida range. As a result, state, local, and federal agencies, as well as private organizations, have acquired much of the land bordering rivers inhabited by these turtles often in efforts to protect wetlands (see Habitat Conservation and Management), although threats to water quality and quantity still remain.

Threats and Recommended Listing Status

Threats to the Suwannee cooter include take (for food [Figures 4 and 5; Heinrich et al. 2010] and pets; now unlawful), pollution, riverine habitat alteration (impoundment, channel dredging, snag removal, siltation), impacts with motorized boats (Figure 6; Heinrich et al. 2012; documented subsequently to preparation of the Biological Status Review [BSR]), and predation (of turtles and eggs, chiefly by raccoons [*Procyon lotor*], fish crows [*Corvus ossifragus*], and feral hogs [*Sus scrofa*]).

Figure 4. Remains of some of the 164 butchered Suwannee cooters. Collected from a rural dumpsite discovered in 2004 near Cedar Key, Levy County, Florida (Heinrich et al. 2010). Photograph Timothy J. Walsh.

In 2010, FWC directed staff to evaluate the status of all state-listed species that had not undergone a status review in the past decade. To address this charge, staff conducted a literature review and solicited information from the public on the status of the Suwannee cooter. The FWC convened a biological review group (BRG) of experts on the Suwannee cooter to assess the biological status of the species by using criteria specified in Rule 68A-27.001, Florida Administrative Code (F.A.C.). This rule includes a requirement for BRGs to follow the Guidelines for Application of the International Union for Conservation of Nature (IUCN) Red List Criteria at Regional Levels (Version 3.0) and Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1). Staff from FWC developed an initial draft of a BSR, which included the BRG's findings and a preliminary listing recommendation from staff. The draft was sent out for peer review, and the reviewers' input was incorporated into a final report.

The BRG found that the Suwannee cooter did not meet any criterion for listing. Based on the literature review, information received from the public, the BRG findings, and peer reviewer input, FWC staff recommended the subspecies be removed from the list of species of special concern (Rule Ch. 68A-27.005, F.A.C.). One of the potential threats identified by the BRG was direct take of the species by people for consumption or as pets. The BRG considered the recently adopted protective measures (in 2009) sufficient to eliminate this threat.

CONSERVATION GOAL AND OBJECTIVES

Goal

To ensure that the conservation status of the Suwannee cooter remains the same or is improved so that it does not warrant listing on the Florida Endangered and Threatened Species List.

Objectives

I. Maintain the current distribution in perpetuity or increase the distribution of the Suwannee cooter in Florida.

Rationale

The Suwannee cooter has a distribution broad enough that it does not meet listing criteria. This distribution should be maintained to avoid having to relist the species. Although there may be unknown factors limiting the distribution of the Suwannee cooter, the availability of quality habitat is currently thought to be the most important. Suwannee cooters thrive in unpolluted blackwater, alluvial, or spring-fed lotic ecosystems with abundant aquatic vegetation, basking sites, and banks that allow access to nearby nesting sites. Suwannee cooters are also found in impoundments. Aquatic vegetation and algae are important forage for most life history stages of Suwannee cooters; optimally, the aquatic plants should be native to mimic historic conditions.

II. Maintain or increase the current population of Suwannee cooters in Florida.

Rationale

The current population of the Suwannee cooter in Florida was estimated to be >10,000 by the Suwannee Cooter BRG and is sufficient to warrant delisting of the species if the population is stable. For the population to remain stable, the population needs to have habitat of sufficient quality and quantity, successful recruitment of turtles into the population, and only sustainable levels of take from the population. This plan proposes to protect important habitats (including nesting habitats), continue protections from take, and recommends the development of a monitoring strategy that will allow populations trends to be measured to inform adaptive management of the species.

CONSERVATION ACTIONS

The following sections describe the conservation actions that will make the greatest contribution toward achieving the conservation objectives. Actions are grouped by category (e.g., Habitat Conservation and Management, Population Management). The Conservation Action Table (Table 2) provides information on action priority, urgency, potential funding sources, likely effectiveness, identified partners, and leads for implementation.

To achieve the goal of maintaining or improving the conservation status of the Suwannee cooter entails a dual approach. First, actions need to be taken or maintained to prevent excessive removal of individuals from existing populations. Second, as for all wildlife, it is essential to protect the species' habitat from loss or degradation. Education and enforcement are vital for increasing regulatory compliance and promoting public support for the conservation of the Suwannee cooters. This section elaborates on actions that will address and supplement this approach to facilitate achievement of this plan's goal.

Habitat Conservation and Management

Habitat Conservation (Landscape Protection)

Within their range, Suwannee cooters inhabit most rivers (excluding the Hillsborough) above tidal influences that are sufficiently broad enough to support ample aquatic vegetation for forage and sunny sites for basking. In addition to their aquatic habitat, cooters require well-drained upland soils that receive moderate to high solar exposure for nesting. Such sites are only 1 to 2 m (3.3 to 6.6 ft) above and within 1 km (0.62 m) of the floodplain (usually much less; Jackson and Walker 1997).

Action 1 Identify and preserve areas important for Suwannee cooter conservation.

River floodplains and adjacent uplands need to be protected to maintain Suwannee cooter distributions (Objective I) and populations (Objective II). Purchasing river floodplains and adjacent uplands (river bottoms themselves already are under state jurisdiction) is a durable long-term solution; less-than-fee-simple protection may suffice if appropriate and perpetual measures can be ensured. This has been accomplished with great success across the cooter's range and has involved programs at the federal, state, local, and private (non-governmental organizations) levels. However, numerous remaining opportunities exist that could be pursued pending the availability of additional funding. Conservation lands along rivers and streams inhabited by or upstream of areas supporting Suwannee cooters need to be identified. In conjunction, private lands suitable for conservation measures (e.g., conservation easement) that complement conservation lands need to identified. These lands should conserved or acquired as feasible. This action will entail identifying landowners willing to participate.

A geographic information system (GIS) review of the Managed Areas Database of the Florida Natural Areas Inventory (FNAI) was conducted to evaluate specifically, on a drainage- by-drainage and tract-by-tract basis, the extent of protected lands along rivers and streams inhabited by Suwannee cooters in Florida. The review also noted managing agencies and organizations for all such tracts so that they could be considered as potential partners in the implementation of this

plan. Similarly, the FNAI Site Database was examined to determine formal land protection projects under consideration through various programs, chiefly the State's current Florida Forever program (funding subject to annual appropriation by the Florida Legislature.

Appendix 1 identifies waterfront lands that have been protected along each river inhabited by Suwannee cooters. Appendix 2 identifies additional important lands (projects) that have been proposed but which have not yet been protected. Clearly, conservation of Suwannee cooters would be enhanced substantially by protection of the acreage, and especially river frontage that is identified in the projects in Appendix 2. Protection of additional privately owned river and stream frontage lands not highlighted in Appendices 1 or 2 would likewise be beneficial. If not available for fee-simple (acquisition) or less-than-fee-simple protection (e.g., conservation easement), the adoption of best management practices (BMPs) would be valuable to protect habitat quality.

A review of maps and supporting data summarized in Appendices 1 and 2 yields the following perspectives by river drainage.

Ochlockonee River.— Substantial tracts of land protected, especially from Lake Talquin to Ochlockonee Bay; more land protection needed, especially above Lake Talquin to Georgia line. These tracts extend into Georgia, where it receives lesser protection and is subject to water quality degradation.

Sopchoppy River.— Most of the Suwannee cooter habitat is protected by federal lands, but a gap in protection of several miles exists on both sides of the town of Sopchoppy.

St. Marks-Wakulla River.— Significant protected lands exist in some key areas, especially Edward Ball Wakulla Springs State Park. There are additional lands that could be protected, including but not limited to lands identified in Appendix 2 along both the Wakulla and St. Marks rivers. This plan recommends considering additional projects along lower St. Marks River within Wakulla County.

Aucilla-Wacissa River.— An extensive system of protected lands borders most of these 2 rivers, but there remain some privately owned stretches that could provide a conservation benefit for Suwannee cooters along both rivers.

Econfina River.— Most, but not all, of the portion of the river inhabited by Suwannee cooters is bounded by managed areas. However, additional land protection is needed upstream to protect downstream water quality.

Fenholloway River.— Very little land is protected along this river (where the species may have been extirpated), and none along Spring Creek, the site where Suwannee cooters were documented in the 1960s (Jackson and Ewert 1998).

Steinhatchee River.— Much of the land along the river upstream of the Steinhatchee developed area is bordered by water management district lands. However,

additional protection of some of the undeveloped inholdings/outparcels associated with the Lower Steinhatchee Conservation Area below U.S. Highway 98 would be beneficial, as would protection of land around the river's headwaters.

Suwannee River.— Conservation lands managed by a multitude of agencies line much of this river system, although protection of additional lands to fill the gaps would offer greater long-term protection of water quality. More protected lands are especially needed within the upper Santa Fe River system, including along the New River and Olustee Creek.

Waccasassa River.— Much of the lower and upper portions of the river system are protected, but the middle 50 to 60% is unprotected. The spring-fed Wekiva River tributary, known to support Suwannee cooters, is an important part of the range of the Suwannee cooter and should be protected to conserve Suwannee cooters and their habitat.

Withlacoochee River.— A large percentage of the river is bordered by managed areas, although unprotected private holdings remain. The Rainbow River, which is partly bordered by managed areas, is important to Suwannee cooters and requires further protection.

Homosassa River.— Very little protected land borders the upper half of river, which is the portion most likely used by Suwannee cooters; greater protection needed.

Alafia River.— Much of the land along and upstream of Fish Hawk Creek, including the North and South prongs, is bordered by managed areas. Much more protection is needed downstream of Fish Hawk Creek. Because headwaters of this system arise in the phosphate-mining district of Polk County and eastern Hillsborough County, water quality is an issue in this drainage.

The GIS review utilizing FNAI's database reveals that extensive tracts of land along the rivers inhabited by Suwannee cooters have been protected by numerous agencies and organizations (Appendix 1), all of which are potential partners for fulfilling this plan. These partners include 2 federal agencies, 8 state agencies (1 with 3 divisions), 7 local government agencies, and 2 private organizations (Table 1). Because of their vital role as partners, special note is made of the water management districts following Table 1. In addition, because some of the rivers inhabited by this species emanate from Georgia, it is imperative that this state be considered as a partner as well, as it has an important role in determining the quality of water that reaches Florida. FWC should communicate with each potential partner about its role in protecting Suwannee cooters and their habitat and provide copies of this plan to all appropriate offices and personnel.

Table 1. Some agencies and organizations responsible for managing protected lands within Florida along rivers inhabited by Suwannee cooters. Compiled from Appendix 1.

Federal	State	Local	Private
U.S. Department of Agriculture: U.S. Forest Service	Florida Department of Agriculture and Consumer Services: Florida Forest Service	Alachua County	Tall Timbers Research, Inc.
U.S. Department of the Interior: U.S. Fish and Wildlife Service	Florida Department of Corrections: PRIDE Enterprises	Gilchrist County	The Nature Conservancy
	Florida Department of Environmental Protection: ●Division of Recreation and Parks ●Division of Water Resource Management ●Office of Greenways and Trails	Hernando County	
	Florida Fish and Wildlife Conservation Commission	Hillsborough County	
	Northwest Florida Water Management District	Leon County Parks and Recreation Department	
	Southwest Florida Water Management District	Levy County Parks and Recreation	
	Suwannee River Water Management District	Pasco County	
	University of Florida	Wakulla County	

Habitat Management

Action 2 Maintain natural physiographic and structural integrity of streams and rivers within the Suwannee cooter's Florida range to protect Suwannee cooter populations and their current extent of occurrence.

Habitat management for Suwannee cooters should focus on maintaining physiographic, structural, chemical, and biotic characteristics of natural, free-flowing rivers and streams as well as their floodplains and adjacent uplands. This species requires abundant emergent structures, chiefly woody snags (both live and dead) but also limestone rocks, to fulfill their basking requirements. Basking is essential for assimilation of food, shedding shell scutes, growth, and presumably elimination of algae and ectoparasites (principally leeches). Removal of potential basking sites from any riparian stretches inhabited by the species is thus detrimental to its conservation. For nesting, it is likewise imperative to maintain all moderate to high sandy beaches, natural berms, and uplands extending at least 250 m (820 ft) beyond the floodplain (Jackson and Walker 1997). Channel dredging does not typically occur in most rivers within the range of Suwannee cooters. However, it is important to note negative effects of this activity to ensure that they are considered in future riverine management. These effects include removal of significant numbers of snags and live woody vegetation, alteration of flow regime and hydrology, disruption of nesting sites, and introduction of hydrocarbons and other pollutants into the water. Therefore, dredging is considered deleterious to conservation of the species, and if it must occur should be subject to stringent regulatory oversight to limit these types of environmental disruption.

Although the Suwannee cooter is a riverine species, it is known to survive in at least some impounded stretches of rivers and streams (chiefly Lake Talquin on the Ochlockonee River and Lake Rousseau on the Withlacoochee River). Management of rivers and streams as free-flowing waters best matches the natural conditions in which the species evolved and thrives. Large dams may also serve as barriers to movement fragmenting populations. Studies have documented a variety of negative impacts on freshwater riverine turtles caused by impoundment; these impacts include increases in disease occurrence as well as changes in growth, diet, and reproductive patterns (Thomas 1993, Herrington 1994, Lovich et al. 1996, Tucker et al. 2012). Impounding rivers or streams within the Florida range of the Suwannee cooter should be discouraged because of the potential for these impacts.

Action 3 Identify and protect Suwannee cooter nesting sites throughout the turtle's Florida range.

In situations where sites may have included open pineland habitats, the use of prescribed fire may be necessary to prevent hardwood encroachment that could lead to loss of insolation (exposure to sun’s rays for treatment). Surprisingly for an aquatic turtle, the use of prescribed fire may be a key management tool for its conservation. In the only population where nesting has been studied extensively (the Wakulla River; Jackson and Walker 1997), females selected un-canopied sites in uplands near the floodplain but sufficiently high to avoid flooding. These sites included the shoulders of an un-canopied woods road, a grassy former food plot, and other grassy areas surrounding various buildings. Following introduction of prescribed fire, some females nested in sparse pine woods that have relatively high sun exposure. Turtles invariably avoided nesting beneath a complete hardwood canopy. In sites where pine-dominated uplands lie above or near river floodplains, the standard use of prescribed fire to limit hardwood encroachment is considered to be compatible with and likely important to Suwannee cooter conservation. More open nesting sites are far more likely to produce female offspring than are more shaded sites, based on the mechanism of temperature-dependent sex determination that

operates in this species (Jackson and Walker 1997). It may be appropriate for any management program for this species to include monitoring of known nesting sites for potentially deleterious levels of hardwood encroachment. Because nesting can begin as early as late March, and hatchlings may delay emergence, overwintering until the spring following nesting (Jackson 1994), off-road vehicles should be prohibited from known nesting areas year-round to prevent disruption of nesting and to protect developing nests.

Action 4 Maintain or enhance water quality in all river and stream systems occupied by Suwannee cooters. This action requires management of riparian and streamside zones as well as regulations and enforcement sufficient to prevent or severely limit pollution and sedimentation from all sources. Efforts should ensure maintenance and health of native aquatic flora important for Suwannee cooter forage.

Like all aquatic species, conservation of Suwannee cooters depends on maintaining high-quality waters. Because the species is herbivorous, it requires waters with sufficient quality and clarity to support growth of native plants. It is likely that this turtle's extirpation from the Fenholloway River was a response to the decline in aquatic plants that must have accompanied the extreme darkening and contamination of the river's waters from industrial effluent (Jackson and Ewert 1998, Jackson 2006).

In Florida, several federal and state regulatory agencies work together to maintain quality aquatic habitats. The U.S. Environmental Protection Agency (EPA), Florida Department of Environmental Protection (DEP), U.S. Army Corps of Engineers (ACOE), and the 5 water management districts monitor and regulate water quality and quantity (e.g., minimum flows and levels [MFLs]) to maintain healthy conditions for aquatic plants, fish, and other wildlife. FWC's Aquatic Habitat Enhancement and Restoration section conducts and supports enhancement projects to improve habitats for fish and other wildlife. The combined regulatory and habitat management functions of these agencies should facilitate maintenance of the Suwannee cooter's principal aquatic habitats in Florida in perpetuity. One state program bears specific mention here—Outstanding Florida Waters (OFW). Although one of the principal actions recommended in this Species Action Plan to protect the Suwannee cooter is to secure remaining private lands bordering rivers and streams inhabited by the species, complete fulfillment is unlikely for economic reasons. System-wide benefits can still be achieved, however, by designation of entire rivers as OFWs, defined per the following paragraph.

Outstanding Florida Waters.—Section 403.061(27), Florida Statutes (F.S.), grants DEP the power to establish rules that provide for a special category of waterbodies within the state, to be referred to as OFW, which are considered worthy of special protection because of their natural attributes. Such designation empowers the DEP and the appropriate water management district(s) to ensure that activities and proposed projects will not lower existing ambient water quality of the OFWs.

Appendix 3 provides additional details about regulatory significance and types of discharges affected, as well as a statewide list of OFWs. Appendix 3 provides additional details about regulatory significance and types of discharges affected, as well as a statewide list of OFWs. The

following rivers or river systems inhabited by the Suwannee cooter are designated as OFWs: Ochlockonee, Aucilla–Waccasissa, St. Marks–Wakulla, Suwannee–Santa Fe, Withlacoochee–Rainbow, Homosassa, and Silver rivers.

Riparian and Streamside Zone Management.—The riparian zone is influenced by its proximity to freshwater rivers and streams including alluvial streams, blackwater streams, seepage streams, and spring-run streams. Riparian zones in Florida include both banks and floodplain, which support such habitats as floodplain swamps, bottomland forest, hydric hammock, and alluvial forest. Functional riparian zones reduce siltation and pollution as well as the risk of flooding. Riparian zones provide nutrients, vegetative cover, and detritus to riverine systems, all of which are critical to populations of Suwannee cooters and other wildlife.

Riparian zones are best protected when secured (through acquisition or easement) along with adjacent uplands, as recommended above. Additionally, the Florida Department of Agriculture and Consumer Services (DOACS) developed a set of BMPs that can extend water quality protections to private and public lands (and downstream from those lands). The BMPs specify measures to reduce or eliminate inputs of sediments, nutrients, logging debris, and chemicals, as well as to prevent unnatural temperature fluctuations. The silvicultural BMP (DOACS 2011) identifies Special Management Zones with widths of 10.7 to 91.4 m (35 to 300 ft) based on the size and type of waterbody, soil type, and slope of the site. BMPs have the potential to benefit a far greater range of wildlife than just Suwannee cooters.

Minimum Flows and Levels (MFLs).— MFLs are established for lakes, streams, rivers, wetlands, springs and aquifers in order to prevent significant harm to the water resources or ecology of an area resulting from permitted water withdrawals. Establishing MFLs is a requirement of the State Legislature under s. 373.042, F.S.. MFLs identify a range of water flows and/or levels above which water might be permitted for consumptive use. The Northwest Florida Water Management District (NWFWMD) is initiating development of MFLs in most of the river systems that contain the Suwannee cooter. The Suwannee River Water Management District (SRWMD) is scheduled to address the Aucilla/Wacissa Rivers MFLs in 2014 and 2016. As part of the Monitoring and Research, information that is gathered regarding specific habitat and water quality needs of the Suwannee cooter will be provided to the NWFWMD, SRWMD, and Southwest Florida Water Management District for consideration while they develop their 5-year priority lists and timeframes for MFL plan development and in the actual development of individual MFLs in waterbodies containing Suwannee cooter.

Invasive Species

Action 5 Identify the occurrence of any exotic species within the historic range that may affect the habitat, including forage, of Suwannee cooters and determine whether these species have significant effects on Suwannee cooter populations.

There is insufficient evidence to suggest that any invasive animal species has a substantial deleterious effect on the Suwannee cooter. However, imported red fire ants (*Solenopsis invicta*) and wild hogs both have the potential to prey on turtle eggs and hatchlings. Jackson and Walker

(1997) recorded fire ants in some Suwannee cooter nests along the Wakulla River, and the presence of near-term embryonic skeletons within some eggs suggested that this represented predation rather than scavenging. Where nests can be located, particularly on conservation lands, they should be monitored for predation by both of these invasive species and the species should be controlled appropriately.

Invasive aquatic plants may affect Suwannee cooter populations. These turtles will feed upon Brazilian elodea (*Egeria densa*) (Lagueux et al. 1995), but the harsher aspect of hydrilla (*Hydrilla verticillata*) may make it much less palatable to the Suwannee cooter, although other *Pseudemys* spp. readily consumes the plant. Extremely dense growth forms of these plants displace native plants on which cooters naturally forage. Open-water behaviors such as swimming, courtship, and escape from potential predators may also be hindered. Management should focus on reducing or eliminating these invasive species. All such activities should be coordinated through the FWC's Invasive Plant Management and Aquatic Habitat Enhancement and Restoration sections.

Population Management

Action 6 Institute and maintain appropriate measures to reduce predation where high levels of predation (on nests or turtles) are documented, especially on managed conservation lands. Addressing this action may include various means of predator control and various forms of habitat management.

Predation is a natural limiting factor for all turtle populations, with nest predation eclipsing all other sources in terms of number of mortalities. Two of the chief predators of nests and nesting females in Florida—the raccoon and fish crow—are species whose populations may be at unnaturally high levels because they can supplement their diets with garbage and can live in close association with people (Ewert et al. 2006, Jackson 2006). Both of these species can devastate nesting success of Suwannee cooters, especially at sites where nesting opportunities are restricted as a result of human land use modifications (e.g., Edward Ball Wakulla Springs State Park, Wakulla County; Jackson and Walker 1997). In such cases, a variety of management actions can be employed to reduce predation of nests and nesting females. Raccoon-removal programs have proven successful for other species of turtle (Christiansen and Gallaway 1984), but need to be repeated regularly to remain effective.

Habitat management can enhance or restore nest site conditions and increase the area available for nesting, which reduces successful searching by predators. By example, natural nesting sites can be reduced or lost as a result of hardwood encroachment in fire maintained habitats, such as sandhill or upland pine forest, that can closely approach many Suwannee cooter-inhabited rivers. Regular use of prescribed fire can limit hardwood encroachment and restore greater solar exposure at ground level, as preferred by cooters. Because the species is characterized by temperature-dependent sex determination (Jackson and Walker 1997), this has the additional benefit of ensuring that more female hatchlings are produced at the population level. At Edward Ball Wakulla Springs State Park, for example, reintroduction of fire has freed at least a segment of the cooter population from nesting along a linear road searched actively by crows and

raccoons alike, and allowed females to disperse nests across a larger, less predictable landscape. This and other parks have also attempted to reduce populations of such nest predators by replacing open or lidded garbage containers with predator-resistant models, thereby reducing an additional food source that can otherwise enhance their populations (see Invasive Species regarding fire ants and wild hogs as potential nest predators). In situations where habitat management is difficult and nest predation high, nests can be caged (Jackson and Walker 1997) and monitored, with hatchlings released in the littoral zone. This option can be labor intensive but might be a viable way for residents of riverfront property who want to participate in species conservation, although a permit would be required (see Rules and Permitting Intent).

Within the aquatic system, small post-hatchling turtles are typically subject to predation by a variety of native predators, including mammals, birds, alligators, and even fish (Suarez et al. 2011). While head-starting provides a tool to reduce this predation (Haskell et al. 1996), it can be costly and time consuming, and should be reserved for situations in which local populations have been extirpated or extremely reduced in size and for which restoration potential exists (see Fenholloway River below).

Action 7 Restore populations of Suwannee cooters to the Fenholloway River, Taylor County.

Although the current distribution of the Suwannee cooter is sufficient to warrant delisting, the distribution could be increased by restoring the Fenholloway River and reintroducing Suwannee cooters. Having an additional location could provide more security from extinction for the Suwannee cooter. Specific management efforts would be needed to enhance or restore the Fenholloway River population of Suwannee cooters. The species occurred in this system in the 1960s but was most likely extirpated by pollution associated with the establishment of an industrial pulp mill (Jackson 2006). Conservation efforts have been proposed for at least 2 decades to restore water and habitat quality of the river, but thus far results have been insufficient. Should restoration ever succeed, including reestablishment of aquatic vegetation, then efforts to reestablish Suwannee cooters in the system would be appropriate. This likely would entail relocation of cooters from nearby rivers. Although the most appropriate sources in terms of geographic proximity might be the Econfina or Steinhatchee rivers, the populations in those rivers are relatively small. In contrast, the Suwannee River system supports a much larger population that could be tapped with relatively little effect. However, in light of the deep genetic differences recently documented between Suwannee River and other populations of alligator snapping turtles (*Macrochelys temminckii*; Roman et al. 1999), genetic comparisons should be made among populations of Suwannee cooters from the Suwannee and other rivers to ensure that no such differences exist within this cooter lineage to determine the best source population.

Monitoring and Research

Distributional Surveys

Action 8 Survey and monitor Suwannee cooter microdistribution, including upstream and downstream extents of habitation in all branches, within known stream drainages known or suspected to be occupied by Suwannee cooters.

There remain questions about the occurrence of Suwannee cooters in some of the rivers on both sides of Tampa. Carr (1937) suggested that *Pseudemys* in two small rivers north of Tampa, the Crystal and Weeki Wachee Rivers, were intergrades of Suwannee cooters with Florida cooters, which is unlikely. The status of Suwannee cooters in the Alafia River, the only river south of Tampa believed to have supported the species, is enigmatic. David Lee (unpublished data provided to D. Jackson in 1999) noted that he collected many Suwannee cooters in the vicinity of Lithia Springs in the early 1960s, but by the mid-1960s the population had declined precipitously in conjunction with habitat degradation. Field surveys are sorely needed to determine whether Suwannee cooters inhabit these three rivers. Survey techniques are addressed in the following section. Detailed records of occurrence should be provided to the FNAI and the Florida Museum of Natural History.

Population Size and Demography

Action 9 Develop an effective survey and monitoring plan for Suwannee cooter population size and demography at appropriate intervals at selected locations.

Although difficult (i.e., resource- and time-consuming) to obtain, data documenting population size and demography would provide a powerful tool to measure management success as well as to identify threats and population changes. The biological review of the Suwannee cooter assumed that the population was stable, but there are few data to substantiate this assumption. This is not an unusual situation with regards to freshwater turtles. The methods for monitoring these species are often time consuming and difficult. Statistical design of survey methodology is sorely needed to focus the sampling, ensure that statistically significant data are collected, and set the proper limitations of such sampling. Issues that need to be addressed include frequency, timing, and special considerations. Development of a statistically rigorous monitoring scheme for Suwannee cooters is needed because without information on population trends, the effectiveness of the conservation actions in these plan cannot be determined and neither can the stability of Suwannee cooter populations. Without a sound monitoring program, conservation of this species will remain uncertain. Below are detailed various methods that may be employed; it appears likely that a robust monitoring program will require a variety of methods.

Standard methods for determining population size and demography of aquatic turtle populations can be time and labor intensive. Trapping and hand-capture may take years to produce robust results. Herbivorous turtles, like Suwannee cooters, are not attracted to simple baited hoop traps, but can be trapped by using encounter nets or basking traps. Long lead nets (e.g., fyke nets) can greatly increase trapping success. However, lead nets can be difficult to deploy in some areas

due to current, debris, and boat traffic. Some large species, such as alligators, alligator snapping turtles, and sturgeon, may damage nets or become entangled and drown. Checking nets frequently reduces the likelihood of these species drowning. Basking traps can be effective for cooters (Jackson 1999, Fields et al. 2003, Farrell et al. 2009) but are time consumptive to construct, transport, erect, and monitor (although very useful in long-term studies). On the other hand, visual basking surveys can be done more quickly and provide a means to garner some information for turtles that often bask; however, the resulting data may at best provide only cursory perspectives on presence, relative abundance, and demography. Their use is also limited to periods of warm, sunny weather.

As an example of the difficulty inherent in deriving population data from basking surveys, Lovich et al. (2011) summarize data for *Graptemys ernsti*, the Escambia map turtle, which inhabits a few rivers in the western Florida Panhandle. An intensive multi-year study by Shealy (1976) in the Conecuh (Escambia) River estimated population density of 1 turtle per 3 to 4 m (9.8 to 13.1 ft) of river (= 250 to 333 turtles per km). Yet multiple basking surveys of that and adjacent rivers have yielded basking densities of 0.4 to 12.3 turtles per river km. These results suggest that basking surveys, even when conducted by experts, may miss 95 to >99% of turtles locally present. Furthermore, it is well known that basking surveys may be skewed toward one or more demographic groups. Neonates are often overlooked or undercounted, as sometimes are adult females, which may be more wary as a result of greater levels of past harassment.

Multi-year monitoring of known nesting sites (for nests or nesting females) potentially can provide important clues to any population trends that may be occurring locally. However, this again can require extensive time and, hence, fiscal resources. The Suwannee cooter nesting season lasts as long as 4 months, with each female nesting multiple times (Jackson and Walker 1997). Females may retain eggs while awaiting the best nesting conditions (i.e., rain, which can be unpredictable). Unless destroyed by predators, nests can be difficult to identify. Relying upon counts of depredated nests may also be misleading in that it may relate to predator density rather than nest density. There may also be difficulty in positively identifying species from eggshell remains if multiple turtle species occur locally. Nest site surveys may be able to provide presence-absence data but only very limited population and demographic insight.

Disease and Mortality

Action 10 Investigate mass mortality events of Suwannee cooters.

Unusually high levels of mortality of Suwannee cooters can have dramatic impacts to Suwannee cooter populations. Such mortality should be documented and investigated. These events can occur naturally as a result of predation (Jackson and Walker 1997 for Suwannee cooter by raccoons), but unexplained events warrant immediate investigation. Any sign of disease in multiple animals within a local population of Suwannee cooters is a matter of concern and should be investigated and monitored. Capture of specimens and their examination by qualified veterinarians is advisable. Precaution should be taken when handling and transporting specimens to reduce risk of cross-contamination. Wild populations from which diseased specimens are

observed or sampled should be closely monitored to determine whether such disease is isolated or appears to be spreading within the population.

Action 11 Research the effects of impoundments on Suwannee cooters.

Two rivers inhabited by Suwannee cooters in Florida are impounded (Lake Talquin on the Ochlockonee and Lake Rousseau on the Withlacoochee), as is another that supports populations assigned to the adjacent subspecies, *P. c. concinna* (Lake Seminole on the Apalachicola). Little is known of the status and viability of river cooters in these impoundments (observations conducted around 2003 by D. Jackson suggested potential abundance in Lake Talquin), and whether and where they reproduce. Determining whether the species nests and recruits successfully in such situations, or whether these habitats represent ecological dead-ends, merits specific research. Data from existing impoundments would be especially useful to evaluate the potential effects additional impoundments may have on this species. In 2012, one such proposal on a Georgia tributary of the Ochlockonee River (Tired Creek, just north of Florida) had received approval from the ACOE as well as local government. If any new impoundment is to be built (contrary to recommendations in this plan) within the range of this species, research should be conducted before and after construction to compare turtle populations, microhabitat use, demography, movements, survival, reproduction, and interactions with populations downstream of dams.

Systematics and Taxonomy

Action 12 Conduct additional taxonomic studies with a substantial genetic and molecular component to examine the relationship between *P. c. concinna* and *P. c. suwanniensis*, especially across the Panhandle of Florida.

Figure 5. An undisturbed pile of river cooter carcasses in Eastpoint, Franklin County, Florida, dump in 1990. Photograph © Dale R. Jackson.

Although Suwannee cooters are currently accepted as a subspecies of the river cooter (Turtle Taxonomy Working Group 2011), a better knowledge of the relationships of the Suwannee cooter to other *Pseudemys* spp. would benefit conservation of the Suwannee cooter. Research should focus on examining the relationship between *P. c. concinna* and *P. c. suwanniensis*, especially across the Panhandle of Florida. This likely would entail examination of

additional *Pseudemys* taxa, including *P. floridana*. Further, as noted in Population Management, deep genetic differences have been documented recently among populations from different north Florida rivers for another riverine turtle that broadly co-occurs with the Suwannee cooter—the alligator snapping turtle (*Macrochelys temminckii*; Roman et al. 1999). In light of this consideration, genetic comparisons should be made among populations of Suwannee cooters from all inhabited rivers to determine whether any such differences exist within this cooter lineage.

Rule and Permitting Intent

Action 13 Maintain current rules that prohibit take (including eggs) and possession of river cooters (*P. concinna*, including Suwannee cooter) except as authorized by FWC permit.

In 2009, the FWC ultimately prohibited all take of the species (as well as of other cooters, *Pseudemys* spp., because of similarity of appearance; Rule 68A-25.002, F.A.C.) after receiving petitions and information about significant increases in collection pressure on turtles. During the Biological Status Review, one of the significant threats identified was the threat of direct take of Suwannee cooters for food or pets.

Scientific study is an endeavor that can attempt to produce results that are otherwise unobtainable. Requests for Scientific Collecting Permits to allow such take, as authorized under Rule 68A-9.002, F.A.C., must be carefully evaluated by FWC on a case-by-case basis. The FWC may find it useful to establish a committee of external experts for consultation and to provide recommendations. Evaluators must first consider whether non-take options are available to address the proposed objectives in lieu of take. Non-lethal take to obtain samples (e.g., blood or tissue), followed by release, should be favored. An additional important factor to consider is whether a proposed level of permanent or lethal take may offer future conservation benefit to the species. For species of conservation concern, such as the Suwannee cooter, take should be limited to the lowest number of individuals necessary to achieve the stated objectives, as well as to life stages that have the least impact on recruitment into the adult population (e.g., eggs or hatchlings rather than adult females). Local population sizes should also be considered, with large populations better able to withstand low levels of take than smaller ones.

Action 14 Regulate trotlines (including bush hooks) within habitats occupied by this turtle to prevent incidental mortality.

The use of untended hooks for fishing should be regulated within habitats occupied by Suwannee cooters, as turtles snagged by these hooks are unable to surface and drown. If not possible, requiring that such devices are checked frequently may reduce turtle mortality.

Action 15 Determine the best means of reducing injuries to Suwannee cooters by motorized vehicles.

Impacts with motorized boats recently have been documented as a previously unappreciated threat to the species (and likely other aquatic turtles that swim near the surface) (Figure 6;

Heinrich et al. 2012). Turtles almost invariably dive toward the bottom to escape oncoming boats; available escape time is reduced with increasing boat speed, making deadly impacts far more likely from faster boats. Slower boat speeds could decrease turtle mortality by reducing the injurious effects of impacts, as well as by allowing turtles a greater response time to avoid impacts. Surveys to determine relative abundance of Suwannee cooters can help to identify stretches of streams and rivers where low speed zones would be most beneficial.

Although automobiles can be a significant source of mortality for freshwater turtle populations, especially in association with overland movements during drought as well as nesting forays, this does not seem to be the case for any of Florida's riverine turtles. Only isolated reports of such mortality exist for Suwannee cooters. Unless specific sites of regular road mortality are identified in the future, there is little need for active measures such as installing barriers or constructing culverts to limit or direct turtle movements.

Figure 6. Example of boat-related mortality of female *P. c. suwanniensis.* Wacissa River, Jefferson Co., Florida (13 April 2000). Photograph by Matthew J. Aresco.

Law Enforcement

Action 16 Publish freshwater turtle rules in FWC fishing rulebooks, both in hard copy and online.

Public awareness is a very important aspect of rule compliance. Since the 2009 rule changes, the FWC has published the freshwater turtle rules in the fishing handbooks and online and can be expected to do so for the foreseeable future.

Action 17 Train law enforcement officers from FWC and other agencies in turtle identification and regulations to ensure enforcement and compliance.

The FWC's Division of Law Enforcement, in conjunction with federal, state, and local partners, is responsible for enforcing Florida's wildlife and fisheries laws. FWC biologists will educate law enforcement officers through the development, circulation, and interpretation identification tools, and distribution maps. In turn, one of the most important components of the enforcement strategy is ensuring compliance through public education. The FWC law enforcement officers understand the importance of explaining wildlife laws to the public to avoid unintentional violations.

FWC law enforcement officers actively pursue and recommend prosecution for those individuals who intentionally violate wildlife laws. FWC law enforcement officers also educate the public on how to identify and report violations. The FWC Division of Law Enforcement administers the Wildlife Alert program, which receives information via a toll-free number (1-888-404-3922) that is answered 24 hours a day, 7 days a week. Cash rewards are offered to callers who provide information about any illegal activity that result in an arrest. Callers may remain anonymous and are not required to testify in court.

In light of state rules prohibiting take of this species, it is critical that all law enforcement officers, including those from agencies besides FWC, be knowledgeable about freshwater turtles to the extent that they are aware of species for which take is prohibited. Although ideally every officer would be fully able to identify such species, FWC rules have simplified the problem of potentially confusing species by closing take to most such species. An officer needs simply to be able to recognize a map turtle (*Graptemys*), cooter (*Pseudemys*), or snapping turtle (*Macrochelys, Chelydra*). These enforcement policies also protect listed species from accidental take by individuals who may not correctly identify the species. Since at least 2010, the FWC Reptile and Amphibian Taxa Coordinator has conducted local training programs for FWC Law Enforcement personnel; training focuses on turtle identification (all Florida species) and an overview of pertinent rules. Such programs must continue on a regular basis, given personnel turnover as well as occasional rule changes; they should also be offered on a statewide basis, and if feasible, expanded to include law enforcement officers from other agencies. In conjunction, law enforcement staff should also be encouraged to watch for and report potential threats that they may observe in the field to this and other species.

Incentives and Influencing

Influencing

The FWC offers conservation planning services to local governments during growth management plan amendments as well as during consideration of plan amendments and

associated development proposals. County growth management plans and land development regulations are among the opportunities for FWC to inform and influence land and water uses that are relevant to the conservation of Florida's fish and wildlife, including state-listed species. Appendix 1 identifies rivers important to Suwannee cooter conservation. The BSR and this plan identify the threats to the Suwannee cooter that have warranted state listing, as well as specific permitting recommendations that specify means to avoid, minimize, or mitigate activities associated with the threats to the Suwannee cooters.

In order to promote an understanding of technical assistance and incentives available to landowners, FWC typically provides information to local governments regarding species management plans, permitting options and incentive programs that are available to applicants, developers, and landowners, as well as the general public. FWC is working to develop comprehensive conservation measures to address the Suwannee cooter and its habitat needs. However, a county may not require as a condition of processing a development permit that an applicant obtain a permit or approval from any other state or federal agency unless the agency has issued a notice of intent to deny the federal or state permit before the county action on the local development permit.

The FWC's Landowner Assistance Program advances species conservation objectives through public–private conservation partnerships. These programs are voluntary and some offer financial assistance to landowners implementing conservation plans. Participation in any of these incentive programs would provide opportunities to collect and share information about species and habitat on private lands.

Incentive Programs

The FWC currently utilizes several programs that promote conservation by providing technical and financial assistance to private landowners. FWC partners with other state and federal agencies to administer the Forest Stewardship Program, Wildlife Habitat Incentives Program, Wetlands Reserve Program, Environmental Quality Incentives Program, Partners for Fish and Wildlife Program, and the Cooperative Conservation Blueprint. These programs are voluntary and some may provide financial incentives, depending on annual appropriation, for wildlife conservation and/or habitat management on private lands. Florida also provides tax incentives including property tax exemptions for landowners that place a perpetual conservation easement on their land. Additional incentives may include exemption from permits for activities that enhance wildlife activities such as mowing, roller-chopping, and tree stand thinning, as long as they are not a precursor to development. Any number of these incentive programs may be applicable for protecting the riparian habitat and water quality in the river identified in Appendix 2.

The Habitat Conservation Plan (HCP) concept was originally developed as a required piece of the application for a federal Incidental Take Permit. Incidental Take Permits authorize the take, as defined in the federal Endangered Species Act, of listed species incidental to a lawful activity. The intent of the HCP is to make sure the effects of issuing a take permit are adequately minimized or mitigated. While it may not be practical to develop individual HCPs for many of

the state listed fish species, FWC is investigating the potential for the development of a "watershed based HCP" for multiple aquatic species that are state- or federally listed in the basins containing the Suwannee cooter.

Conservation banking is another program available to private landowners interested in habitat conservation. Conservation banking for listed species is comparable to mitigation banking in that lands are permanently protected and can be used to offset development related adverse impacts to wildlife resources, including habitats. FWC may consider developing or supporting a conservation banking program for species in the same "watersheds" as the Suwannee cooter.

Education and Outreach

Action 18 Develop education and outreach materials for local governments, state and federal agencies, landowners, and the general public to inform them of Suwannee cooter habitat needs and conservation measures that can benefit the species. In conjunction, develop and maintain information for the agency's web site and other social media outlets that contains educational, scientific, legal, and permitting information for all species and recognized subspecies of Florida freshwater turtles.

Turtles are popular with most members of the general public, especially those who recreate within Florida's natural ecosystems. As such, any materials or activities that provide educational information about turtles, including the Suwannee cooter, to those who use or visit waters inhabited by this species are likely to be appreciated, and in turn generate support for turtle conservation.

Given the number of public lands that provide access to rivers within this species' range, opportunities for public education abound. Kiosks, museum and aquarium displays, signage, brochures, and even special tour activities can focus on or at least include information about the species, including its limited distribution and threats to its existence. To date, relatively few public land units have capitalized on this opportunity (an exception being the river tours at Edward Ball Wakulla Springs State Park). One way to address this may be for the FWC to offer information, expertise, simple publications (pamphlets and brochures), and even direct assistance to land management agencies throughout the species' Florida range.

Action 19 Install educational kiosks and regulatory signage at boat ramps and other sites where the public is likely to access Suwannee cooter habitat.

Although staff from FWC and other agencies give presentations and provide outreach opportunities, this role could be expanded with greater agency encouragement and allocation of additional resources, even to the point of hiring personnel specifically to coordinate and conduct such activities. Additional opportunities to disseminate information about imperiled freshwater turtles exist in schools, zoos, environmental centers, and at special events (e.g., wildlife festivals).

Most hunters and anglers are knowledgeable about regulations pertaining to birds, mammals, and fishes; this is less true for reptiles and amphibians. Although freshwater turtle rules have been added to the annual FWC fishing regulations (a practice that should be continued), many members of the public remain unaware of FWC rules that limit or prohibit take of freshwater turtles, including the Suwannee cooter. The FWC has posted some but far too few waterways. It is recommended that signage be posted and maintained (replaced as needed) at most public boat ramps along watercourses inhabited by this species. Supplementing this with educational kiosks at the more heavily used access points would be valuable in generating understanding and support, rather than resentment, for these important regulations.

Action 20 Provide or enhance Suwannee cooter viewing opportunities (e.g., basking sites), particularly on conservation lands that are visited by the public for wildlife appreciation values.

Although many conservation lands border rivers inhabited by Suwannee cooters (Appendix 1), few members of the non-boating public actually observe the species in its natural environment. Provision of readily viewable basking sites, either through construction (Farrell et al. 2009) or movement of natural treefall materials, may rectify this and enhance visitors' appreciation for this and other species of turtles. Although initially turtles may be shy, most become acclimated to being observed from a safe distance.

Coordination with Other Entities

Throughout this plan are noted entities that have important roles to play in management of this species and its habitat. Principals, with some of their key roles, include but are not limited to the following:

- DEP: water quality (including OFWs) and land protection
- DOACS: BMPs
- FWC Invasive Plant Management section: Invasive plants
- FNAI: data management, species distribution and occurrence
- EPA: water quality
- ACOE: stream flow, impoundments
- Water management districts (Northwest Florida Water Management District [NWFWMD], Suwannee River Water Management District [SRWMD], Southwest Florida Water Management District [SWFWMD]): river and floodplain protection
  All pertinent land management entities (see Table 1): habitat protection, education

Water Management Districts

Of the many agencies identified as potential partners in this plan, the role of the state's water management districts is integral to protecting habitat and the quality of water in rivers inhabited by this species. Details about the districts' roles and resources are available in their Strategic Plans or Annual Reports as well as on their web sites, which are regularly updated. In total, the five districts of the state have secured vast tracts of land that are key to protecting freshwater habitats; this includes hundreds of miles of frontage along rivers used by turtles of conservation concern. Although previously the Districts' network operated discrete programs for land

acquisition (e.g., Save Our Rivers), most land acquisition is now done through the state's Florida Forever program; nonetheless, the SWFWMD still identifies lands beyond this. In large part because of budget constraints, funding for the Florida Forever program has been substantially reduced since the 2008–2009 fiscal year. Without continuation or new bond funds appropriated, future land acquisitions by the districts will be severely limited, with potential negative effects upon habitat vital to the conservation of Suwannee cooters. The following are synoptic summaries of the water management districts that are especially pertinent to this Species Action Plan.

NWFWMD.–The District encompasses most of Panhandle Florida, from the Perdido River to the St. Marks River. It currently protects >89,000 ha (>221,000 ac) and actively owns and manages >85,00 ha (>210,000 ac) of lands. These lands include extensive floodplains, a major Floridan Aquifer recharge area, and estuarine salt marshes. District lands protect fish and wildlife, natural water resource systems, water quality, recharge, and other wetland and floodplain functions. All NWFWMD lands are open to public access and enjoyment. Currently, although it has identified additional lands warranting greater protection, the NWFWMD does not maintain a separate list for land acquisition projects, but instead relies upon the Florida Forever Work Plan (Tyler Macmillan, NWFWMD, personal communication). Three of the NWFWMD's 4 divisions—Resource Management, Land Management and Acquisition, and Resource Regulation—are directly involved in activities integral to the conservation of riverine turtles (NWFWMD 2011).

SRWMD.– The management of rivers from the Aucilla to the Waccasassa is a key part of the SRWMD's overall mission. Principal goals are to minimize flood impacts, protect water quality, and preserve natural communities. To facilitate meeting these goals, a SRWMD priority is the acquisition of lands within the 100-year floodplain of the Suwannee River, its tributaries, and other rivers. As of 2011, the SRWMD owned or controlled roughly 554 km (344 mi) of riverfront property; > 40% of land protection has been achieved using less-than-fee (conservation easement) measures. Currently, although it has identified additional lands warranting greater protection, the SRWMD does not maintain a separate list for land acquisition projects but relies upon the Florida Forever Work Plan (Terry Demott, SRWMD, personal communication). The SRWMD participates in the Excellence in Land Management Program, which encompasses water management and nonstructural flood protection, public access and use, habitat management, and hydrologic restoration (SRWMD 2011).

SWFWMD.–This district encompasses Gulf Coast rivers from the Withlacoochee River southward to the Peace River. As of September 2011, the SWFWMD had acquired 180 ha (445,303 ac) of land (23.5% less-than-fee) to protect rivers and freshwater bodies within its jurisdiction. Many but not all of these lands are important to the conservation of Suwannee cooters. Approximately 95% of SWFWMD properties have an approved management plan that addresses habitat and water quality protection among a multitude of goals (SWFWMD 2012). Besides being a proposed acquisition partner for a number of projects with the Florida Forever program, the SWFWMD has identified additional private lands that it hopes to acquire, either fee simple or less-than-fee. These include substantial frontage along the Withlacoochee River (SWFWMD 2012).

Table 2. Suwannee Cooter (*Pseudemys concinna suwanniensis*) Conservation Action Table

NOTE: An explanation of acronyms used is below the table.

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
1,2	2	1	Identify and preserve areas important for Suwannee cooter conservation.	Habitat Conservation & Mgmt	EXPANDED	NO	NO	TBD	Legislature, Grant, Unknown	HSC - WHM, SCP	1) Florida Department of Environmental Protection through its administration of the Florida Forever program; 2) Northwest Florida and Suwannee River Water Management Districts; 3) Florida Natural Areas Inventory	Some progress likely, but 100% success is improbable.	Practical, but insufficient funding is likely to become available to complete the task. Relationships exist but limited by budgetary constrains.	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages) and existence of substantial network of protected lands already
1,2	1	2	Maintain natural physiographic and structural integrity of streams and rivers within the Suwannee cooter's Florida range to protect Suwannee cooter populations and their current extent of occurrence.	Habitat Consv & Mgmt, Population Mgmt	ONGOING	NO	NO	TBD	Existing budgets	HSC	Likely would entail a multi-agency approach including water management districts, the U.S. Army Corps of Engineers, and Florida Department of Environmental Protection	Likely to continue comments, but success is unlikely given competing uses.	Commenting is practical, but other parts are practical only if partners consider them so. Relationships exist.	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages) and substantial but unquantified statewide population size
1,2	2	3	Identify and protect Suwannee cooter nesting sites throughout the turtle's Florida range.	Habitat Consv & Mgmt, Population Mgmt, Monitoring & Research	NEW	YES	NO	$25-50k	Grant	FWRI, HSC	All managing agencies that supervise appropriate sites; see Tables 1 and 3 within plan. Also universities and others.	Likely	Practical, feasible	No, not critical to Suwannee cooter's immediate survival but nonetheless potentially important to maintaining robust populations
1,2	1	4	Maintain or enhance water quality in all river and stream systems occupied by Suwannee cooters. This action requires management of riparian and streamside zones as well as regulations and enforcement sufficient to prevent or severely limit pollution and sedimentation from all sources. Efforts should ensure maintenance and health of native aquatic flora important for Suwannee cooter forage.	Habitat Consv & Mgmt	EXPANDED	NO	NO	TBD	Unknown	HSC	1) Florida Department of Environmental Protection ; 2) Northwest and Suwannee River Water Management Districts; 3) U.S. Environmental Protection Agency; 4) Florida Forest Service; 5) Private Landowners	Likely	Feasible but will take commitment and cooperation	No, not critical to Suwannee cooter's immediate survival but could become so if habitat severely degraded
1,2	3	5	Identify the occurrence of any exotic species within the historic range that may affect the habitat, including forage, of Suwannee cooters and determine whether these species have significant effects on Suwannee cooter populations.	Habitat Consv & Mgmt, Population Mgmt, Monitoring & Research	EXPANDED	YES	YES	TBD	Existing budgets	FWC Invasive Plant Management and Aquatic Habitat Enhancement and Restoration sections	Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Services, Northwest Florida and Suwannee River Water Management Districts	Likely	Practical	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages) and substantial but unquantified statewide population size
2	3	6	Institute and maintain appropriate measures to reduce predation where high levels of predation (on nests or turtles) are documented, especially on managed conservation lands. Addressing this action may include various means of predator control and various forms of habitat management.	Population Mgmt, Monitoring & Research, Habitat Conservation & Mgmt	NEW	NO	NO	TBD	Existing budgets, Grant, Unknown	HSC - WHM, SCP, LAP, CPS	All managing agencies that supervise appropriate sites; see Tables 1 and 2 in the plan	Likely	Practical	No, not critical to Suwannee cooter's immediate survival given current distribution and possibly substantial but unquantified statewide population size
1	4	7	Restore populations of Suwannee cooters to the Fenholloway River, Taylor County.	Habitat Consv & Mgmt, Population Mgmt	NEW	YES	YES	TBD	Existing budgets, Grant, Unknown	HSC - SCP	Not Yet Identified	Uncertain	Habitat restoration, including reestablishment of native aquatic vegetation, is problematic in Fenholloway River as long as paper mill still operates in Perry. If this can be accomplished, however, then population restoration is feasible and highly desirable.	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages) and substantial but unquantified statewide population size
1,2	2	8	Survey and monitor Suwannee cooter microdistribution, including upstream and downstream extents of habitation in all branches, within known stream drainages known or suspected to be occupied by Suwannee cooters.	Monitoring & Research	NEW	YES	YES	TBD	Existing budgets, Grant, Unknown	HSC - SCP, FWRI	Florida Natural Areas Inventory (part of Florida State University), other universities, others	Highly likely	Highly feasible	No, not critical to Suwannee cooter's immediate survival given already known moderately widespread FL distribution (multiple drainages)
1,2	3	9	Develop an effective survey and monitoring plan for Suwannee cooter population size and demography at appropriate intervals at selected locations.	Monitoring & Research, Population Mgmt	NEW	YES	YES	TBD	Existing budgets, Grant, Unknown	HSC - SCP, FWRI	Universities would be appropriate partners in this effort if they can provide long-term commitment.	Likely	Difficult (see plan text), but nonetheless worth attempting	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages), substantial but unquantified statewide population size, and current rules prohibiting take.

Table 2. Suwannee Cooter (*Pseudemys concinna suwanniensis*) Conservation Action Table

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
1	2	10	Investigate mass mortality events of Suwannee cooters.	Monitoring & Research	NEW	YES	YES	TBD	Existing budgets, Grant, Unknown	FWRI, HSC	All managing agencies that supervise appropriate sites; see Tables 1 and 3 within plan.	Likely	Highly feasible	No, not critical to Suwannee cooter's immediate survival but nonetheless potentially important to maintaining robust populations, and could become critical if epidemic disease became established.
1,2	4	11	Research the effects of impoundments on Suwannee cooters.	Monitoring & Research	EXPANDED	YES	YES	TBD	Existing budgets, Grant, Unknown	FWRI, HSC	Universities would be appropriate partners in this effort . B. Shaffer's lab at UCLA may be currently conducting related studies.	Likely that genetic comparison may help to resolve relationships and determine whether Suwannee cooter deserves full species recognition (likely to refute)	Sufficient techniques exist to make this research practical.	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages) and current rules prohibiting take
1,2	1	12	Conduct additional taxonomic studies with a substantial genetic/molecular component to examine the relationship between P. c. concinna and P. c. suwanniensis, especially across the Florida Panhandle.	Protections & Permitting, Population Mgmt	ONGOING	YES	NO	TBD	Grants, Unknown	FWRI, HSC	Universities would be appropriate partners in this effort . B. Shaffer's lab at UCLA may be currently conducting related studies.	100% likely	Fully practical, already being done	Not critical to Suwannee cooter's immediate survival but could become so if regulations relaxed too far or if disease were introduced
2	3	13	Maintain current rules that prohibit take (including eggs) and possession of river cooters (P. concinna, including Suwannee cooter) except as authorized by FWC permit.	Protections & Permitting, Population Mgmt	ONGOING	YES	YES	TBD	Existing budgets	Law Enforcement	Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Services, Northwest Florida and Suwannee River Water Management Districts, commercial pet trade	Likely	Practical	No, not critical to Suwannee cooter's immediate survival but nonetheless potentially important to maintaining robust populations
2	2	14	Regulate trotlines (including bush hooks) within habitats occupied by this turtle to prevent incidental mortality.	Protections & Permitting, Population Mgmt	EXPANDED	YES	NO	TBD	Existing budgets, Grant, Unknown	HSC, Law Enforcement	Posting and enforcement would entail cooperation of various state and federal agencies, including water management districts and all agencies managing appropriate conservation lands.	Likely	Practical though likely to meet with some public resistance	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages) and substantial but unquantified statewide population size
1,2	2	15	Determine the best means of reducing injuries to Suwannee cooters by motorized vehicles.	Education & Outreach, Law Enforcement	ONGOING	YES	NO	TBD	Existing budgets, Grant, Unknown	HSC, FWRI	FDOT	Highly likely	Highly feasible	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages), substantial but unquantified statewide population size, and current rules prohibiting take
1,2	2	16	Publish freshwater turtle rules annually in FWC fishing rulebooks, both in hard copy and online.	Law Enforcement	EXPANDED	YES	YES	TBD	Existing budgets, Grant, Unknown	HSC, FFM		Highly likely	Highly feasible	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages), substantial but unquantified statewide population size, and current rules prohibiting take
1,2	3	17	Train law enforcement officers from FWC and other agencies in turtle identification and regulations to ensure enforcement and compliance.	Law Enforcement, Education & Outreach	NEW	YES	YES	$0-25k	Existing Budgets	HSC, Law Enforcement	All managing agencies that supervise appropriate sites; see Table 3 within plan.	Highly likely	Highly feasible	No, not critical to Suwannee cooter's immediate survival given moderately widespread FL distribution (multiple drainages), substantial but unquantified statewide population size, and current rules prohibiting take
2	5	18	Develop education and outreach materials for local governments, state and federal agencies, landowners, and the general public to inform them of Suwannee cooter habitat needs and conservation measures that can benefit the species. In conjunction, develop and maintain a information for the agency's web site and other social media outlets that contains educational, scientific, legal, and permitting information for all species and recognized subspecies of Florida freshwater turtles.	Education & Outreach	EXPANDED	NO	YES	TBD	Existing Budgets, Grant	HSC, OPAWVS, OCR	All managing agencies that supervise appropriate sites; see Tables 1 and 3 within plan.	Likely	Practical	No, not critical to Suwannee cooter's immediate survival given current distribution and possibly substantial but unquantified statewide population size

Table 2. Suwannee Cooter (*Pseudemys concinna suwanniensis*) Conservation Action Table

Objective(s) Addressed	Team Assigned Priority Level	Action Item Number	Action Items	Conservation Action Category	Ongoing, Expanded or New Effort?	Authority	Man Power	Estimated Cost To Implement	Funding Source(s)	Lead for Implementation: FWC Program(s) and/or Section(s)	External partners	Likely Effectiveness	Feasibility	Urgent?
2	5	19	Install educational kiosks and regulatory signage at boat ramps and other sites where the public is likely to access Suwannee cooter habitat.	Education & Outreach	NEW	YES	YES	$0-25k	Existing budgets	HSC, OCR, OPAWVS	DEP	Likely	Practical and readily achievable	No, not critical to Suwannee cooter's immediate survival given current distribution and possibly substantial but unquantified statewide population size
2	5	20	Provide or enhance Suwannee cooter viewing opportunities (e.g., basking sites), particularly on conservation lands that are visited by the public for wildlife appreciation values.	Education & Outreach	NEW	NO	NO	TBD	TBD	OPAWVS, HSC	DEP	Marginal	Could be done, but practicality would depend on DEP	No, not critical to Suwannee cooter's immediate survival given current distribution and possibly substantial but unquantified statewide population size

Acronyms used in this table:

CPS:	Conservation Planning Services, a Section of the Florida Fish and Wildlife Conservation Commission's Division of Habitat and Species Conservation
DEP:	Florida Department of Environmental Protection
FDOT:	Florida Department of Transportation
FWC:	Florida Fish and Wildlife Conservation Commission
FWRI:	Fish and Wildlife Research Institute, the research branch of the Florida Fish and Wildlife Conservation Commission
HSC:	Habitat and Species Conservation, a Division of the Florida Fish and Wildlife Conservation Commission
LAP:	Landowner Assistance Program
OCR:	Office of Community Relations, administered by the Florida Fish and Wildlife Conservation Commission
OPAWVS:	Office of Public Access and Wildlife Viewing Services, administered by the Florida Fish and Wildlife Conservation Commission
SCP:	Species Conservation Planning, a Section of the Florida Fish and Wildlife Conservation Commission's Division of Habitat and Species Conservation
TBD:	To be determined
WHM:	Wildlife and Habitat Management, a Section of the Florida Fish and Wildlife Conservation Commission's Division of Habitat and Species Conservation

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APPENDICES

Appendix 1. Conservation lands (managed areas) within Florida along rivers inhabited by Suwannee cooters.

Rivers are arranged from west to east in the Panhandle, then southward in the peninsula. Managed areas within a drainage are arranged in ascending order upstream beginning at the mouth. Some units may lie upstream of stretches used by Suwannee cooters but are nonetheless crucial because of their roles in protecting downstream water quality. Ownership is presented as federal (F), state (S), local (L), or private (P). The information is based on March 2012 data from the Florida Natural Areas Inventory.

Abbreviations:

ANF	Apalachicola National Forest
CA	Conservation Area
CE	Conservation Easement
DOACS: FFS	Florida Forest Service, Florida Department of Agriculture and Consumer Services
DEP: DRP	Division of Recreation and Parks, Florida Department of Environmental Protection
DEP: DWRM	Division of Water Resource Management, Florida Department of Environmental Protection
DEP: OGT	Office of Greenways and Trails, Florida Department of Environmental Protection
DOC	Florida Department of Corrections
FWC	Florida Fish and Wildlife Conservation Commission
MA	Management Area
NF	National Forest
NWFWMD	Northwest FL Water Management District
NWR	National Wildlife Refuge
PRIDE	Prison Rehabilitative Industries and Diversified Enterprises
SCRA	State Conservation and Recreation Area
SF	State Forest
SP	State Park
SRWMD	Suwannee River Water Management District
SWFWMD	Southwest Florida Water Management District
TNC	The Nature Conservancy
TTRI	Tall Timbers Research, Inc.
USDA: USFS	U.S. Forest Service, U.S. Department of Agriculture
USDI: USFWS	U.S. Fish and Wildlife Service, U.S. Department of the Interior
WEA	Wildlife and Environmental Area
WMA	Wildlife Management Area

Drainage	Managed Area	Ownership	Managing Agency	Comments
Ochlockonee	St. Marks NWR	F	USDI: USFWS	lower river
-	Ochlockonee River SP	S	DEP: DRP	lower river
-	Tate's Hell SF	S	DOACS: FFS	lower river
-	ANF	F	USDA: USFS	lower half of river in Florida
-	Davidson/Hosford CE	P	NWFWMD	across from ANF; small
-	Shuler CE	P	NWFWMD	across from ANF; small
-	Lake Talquin SF	S	DOACS: FFS	Lake Talquin
-	Lake Talquin SP	S	DEP: DRP	Lake Talquin
-	Joe Budd WMA	S	FWC	Lake Talquin
-	Coastal Forest Resources CE	P	NWFWMD	above Lake Talquin
-	River Ridge Plantation CE	P	TTRI	near the Georgia border
Sopchoppy	St. Marks NWR	F	USDI: USFWS	lower river
-	Apalachicola NF	F	USDA: USFS	ca. upper 60% of river
St. Marks-Wakulla	St. Marks NWR	F	USDI: USFWS	St. Marks and lower Wakulla rivers
-	Edward Ball Wakulla Springs SP	S	DEP: DRP	Wakulla River
-	Wakulla SF	S	DOACS: FFS	not on Wakulla River, but sinks and spring run drain to aquifer and river
-	Gerrell CE	P	NWFWMD	St. Marks River; small
-	Natural Bridge Battlefield Historic SP	S	DEP: DRP	St. Marks River; small
-	St. Marks River SP	S	DEP: DRP	St. Marks River
-	L. Kirk Edwards WEA	S	FWC	St. Marks River

Drainage	Managed Area	Ownership	Managing Agency	Comments
-	St. Marks Headwaters	L	Leon County Parks and Recreation Deptartment	St. Marks River
Aucilla-Wacissa	St. Marks NWR	F	USDI: USFWS	Aucilla River
-	Big Bend WMA	S	FWC	Aucilla River
-	Aucilla WMA	S	FWC	Wacissa River (mostly) and Aucilla River
-	Middle Aucilla CA	S	SRWMD	Aucilla River
-	Mount Gilead CE	P	SRWMD	Aucilla River
-	Whit Foster CE	P	SRWMD	Aucilla River
-	Moore CE	P	SRWMD	Aucilla River
-	Davidson CE	P	SRWMD	Aucilla River
-	Donald Bailey	P	SRWMD	Aucilla River
-	Ragans CE	P	SRWMD	Aucilla River
-	Upper Aucilla CA	S	SRWMD	Aucilla River
-	Robert Feagin CE	P	SRWMD	Aucilla River
-	Geraldine Livingston Foundation CE	P	SRWMD	Aucilla River
-	Pinckney Hill Plantation CE	P	TTRI	Aucilla River
Econfina	Big Bend WMA	S	FWC	lower river
-	Econfina River SP	S	DEP: DRP	lower river
-	Econfina CA	S	SRWMD	most of river
Fenholloway[1]	Big Bend WMA	S	FWC	lowermost river
-	Fenholloway CA	S	SRWMD	Small
Steinhatchee	Lower Steinhatchee CA	S	SRWMD	lower river
-	Upper Steinhatchee CA	S	SRWMD	upper river
Suwannee	Lower Suwannee NWR	F	USDI: USFWS	many km of lower river
-	Fowlers Bluff CA	S	SRWMD	only 250 m frontage; lower river
-	Manatee Springs SP	S	DEP: DRP	

Drainage	Managed Area	Ownership	Managing Agency	Comments
-	Yellow Jacket CA	S	SRWMD	near Manatee, Fanning Springs SPs
-	Andrews WMA	S	FWC	
-	Fanning Springs SP	S	DEP: DRP	
-	Wannee CA	S	SRWMD	upstream of Fanning Springs SP
-	Log Landing CA	S	SRWMD	upstream of Fanning Springs SP
-	Hart Springs Park	L	Gilchrist County	Suwannee River
-	Rock Bluff CA	S	SRWMD	Suwannee River
-	Hatchbend CA	S	SRWMD	Suwannee River
-	Stuarts Landing CA	S	SRWMD	Suwannee River
-	Grady CA	S	SRWMD	Suwannee River
-	Little River CA	S	SRWMD	Suwannee River
-	Troy Spring CA	S	SRWMD	Suwannee River
-	Jackson CE (SRWMD)	P	SRWMD	Suwannee River
-	Ace Ranch	P	SRWMD	Suwannee River
-	Peacock Springs CA	S	SRWMD	Suwannee River
-	Peacock Springs SP	S	DEP: DRP	Suwannee River
-	Lafayette Blue Springs SP	S	DEP: DRP	Suwannee River
-	Charles Spring CA	S	SRWMD	Suwannee River
-	Suwannee River SP	S	DEP: DRP	Suwannee and Withlacoochee rivers
-	Twin Rivers SF	S	DOACS: FFS	Suwannee and Withlacoochee rivers
-	Madison Blue Spring	S	DEP: DRP	Withlacoochee River
-	Withlacoochee West CA	S	SRWMD	Withlacoochee River
-	Withlacoochee East CA	S	SRWMD	Withlacoochee River at the Georgia state line
-	Warner/Harrell CE	P	SRWMD	Suwannee River
-	Suwannee River SP Connector	F	USDA: USFS	Suwannee River; small

Drainage	Managed Area	Ownership	Managing Agency	Comments
-	Donaldson Tract	F	USDA: USFS	Suwannee River; small
-	Suwannee River SP CA	S	SRWMD	Suwannee River
-	Lower Alapaha CA	S	SRWMD	Alapaha and Suwannee rivers
-	Upper Alapaha CA	S	SRWMD	Alapaha River
-	Upper Alapaha CE	P	SRWMD	Alapaha River
-	Holton Creek CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Fort Union CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Florida Youth Ranches CE	P	SRWMD	Suwannee River upstream of Alapaha
-	Sanders CE	P	SRWMD	Suwannee River upstream of Alapaha
-	Camp Branch CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Woods Ferry CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Suwannee River Farms MA	F	USDA: USFS	Suwannee River upstream of Alapaha; small tracts
-	Swift Creek CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Suwannee Valley CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Stephen Foster Folk Culture Center SP	S	DEP: DRP	Suwannee River upstream of Alapaha
-	Big Shoals CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Big Shoals SP	S	DEP: DRP	Suwannee River upstream of Alapaha
-	Deep Creek CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Deep Creek Plantation CE	S	SRWMD	Suwannee River upstream of Alapaha
-	Bay Creek CA	S	SRWMD	Suwannee River upstream of Alapaha

Drainage	Managed Area	Ownership	Managing Agency	Comments
-	Belmont CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Benton CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Cypress Creek CA	S	SRWMD	Suwannee River upstream of Alapaha
-	Russell Carter CE	P	SRWMD	Suwannee River upstream of Alapaha to state line
-	Osceola NF	F	USDA: USFS	Deep Creek headwaters
-	Ichetucknee CA	S	SRWMD	Santa Fe River
-	Santa Fe River: Ratcliffe Tract	P	TNC	Santa Fe River
-	Ichetucknee Springs SP	S	DEP: DRP	Ichetucknee River
-	Fort White Mitigation Park WEA	S	FWC	Santa Fe River
-	Santa Fe Springs CA	S	SRWMD	Santa Fe River
-	Poe Springs Park	L	Alachua County	Santa Fe River
-	River Rise State Park	S	DEP: DRP	Santa Fe River
-	McCall Park	L	Alachua County	Santa Fe River
-	Camp Kulaqua CE	P	Alachua County	Santa Fe River
-	O'Leno State Park	S	DEP: DRP	Santa Fe River
-	Bonnet Lake CE	P	SRWMD	Santa Fe River
-	Santa Fe River – Odum	L	Alachua County	Santa Fe River
-	Santa Fe River Ranch	S	University of Florida	Santa Fe River
-	Pareners Branch CA	S	SRWMD	Santa Fe River
-	New River CE	P	SRWMD	Santa Fe River
-	Graham CA	S	SRWMD	Santa Fe River
-	Monteocha Creek CE	P	SRWMD	Santa Fe River
-	Santa Fe River – AP&E	L	Alachua County	Santa Fe River
-	Santa Fe Swamp CA	S	SRWMD	Santa Fe River headwaters

Drainage	Managed Area	Ownership	Managing Agency	Comments
-	Palatka-to-Lake Butler State Trail	S	DEP: OGT	Crosses New River
-	Raiford WMA	S	DOC/PRIDE	New River
Waccasassa	Waccasassa Bay Preserve SP	S	DEP:DRP	Cow Creek; lowermost river
-	NATC Gulf Hammock CE	S	SRWMD	lower river
-	Lower Waccasassa CA	S	SRWMD	on Wekiva River; small
-	Goethe SF	S	DOACS: FFS	headwaters of Wekiva River
-	Upper Waccasassa CA	S	SRWMD	upper river
-	Devil's Hammock	L	Levy County Parks and Recreation	upper river
Withlacoochee	Marjorie Harris Carr Cross FL Greenway SCRA	S	DEP: OGT	river altered by dams, canal
-	Rainbow Springs SP	S	DEP: DRP	Rainbow River on east bank only
-	Halpata Tastanaki Preserve	S	SWFWMD	upstream of Rainbow River
-	Gum Slough CE	S	SWFWMD	
-	Potts Preserve	S	SWFWMD	
-	Half Moon WMA	S	FWC	
-	Flying Eagle Ranch	S	SWFWMD	
-	Panasoffkee/Outlet Tract	S	SWFWMD	
-	Lake Panasoffkee	S	SWFWMD	
-	Withlacoochee SF	S	DOACS: FFS	large
-	Cypress Lakes Preserve	L	Hernando County	small
-	Withlacoochee River Park	L	Pasco County	small
-	SWFWMD Green Swamp CE	P	SWFWMD	
-	Green Swamp	S	SWFWMD	Headwaters; big
-	Little Gator Creek WEA	S	FWC	small

Drainage	Managed Area	Ownership	Managing Agency	Comments
Homosassa	Ellie Schiller Homosassa Springs Wildlife State Park	S	DEP: DRP	at head spring; small
-	Crystal River Preserve SP	S	DEP: DRP	disjunct pieces of river frontage and floodplain
-	Chassahowitzka NWR	F	USDI: USFWS	lower river, possibly downstream of cooters
Alafia	Alafia Scrub Preserve	L	Hillsborough County	ca. 200 m frontage; small
-	Bell Creek Preserve	L	Hillsborough County	Bell Creek
-	Rhodine Scrub	L	Hillsborough County	Bell Creek
-	Triple Creek Nature Preserve	L	Hillsborough County	Bell Creek
-	Balm-Boyette Scrub	S	Hillsborough County	Bell Creek
-	Fish Hawk Creek Preserve	L	Hillsborough County	>5 km (>3 mi) frontage below Lithia Springs
-	Alafia River Corridor	S	Hillsborough County	many km frontage on both prongs and Fish Hawk Creek
-	Lithia Springs Park	P	Hillsborough County	ca. 2 km (ca. 1.2 mi) frontage
-	Boy Scout	L	Hillsborough County	floodplain + ca. 2 km frontage
-	Aldeman's Ford Preserve	S/L	Hillsborough County	>5 km frontage just below junction of North and South prongs
-	Aldeman's Ford park	L	Hillsborough County	several km at junction of North and South prongs
-	Alafia River Corridor (SWFWMD)	P	SWFWMD	small tracts on North Prong

Drainage	Managed Area	Ownership	Managing Agency	Comments
-	Alafia Reserve	S	SWFWMD	ca. 5 km on North Prong and Poley Creek
-	North Prong Alafia River	S	DEP: DWRM	North Prong
-	English Creek	L	Hillsborough County	North Prong tributary
-	Alafia River SP	S	DEP: DRP	many km on South Prong
-	South Prong Alafia River	S	DEP: DWRM	South Prong headwater
Silver[2]	Silver River SP	S	DEP: DRP	all but headspring watershed

[1] The Fenholloway River population may have been extirpated as a result of hydrological degradation associated with a pulp mill. If so, population restoration is an appropriate long-term goal.

[2] The Silver River population is believed to stem from human introduction, most likely from the former Ross Allen's Reptile Institute.

Appendix 2. Private lands within Florida identified as land conservation projects or targets in need of protection along rivers inhabited by Suwannee cooters.

Rivers are arranged from west to east in the Panhandle, then southward in the peninsula. Projects within a drainage are arranged in ascending order upstream beginning at the mouth. Some units may lie upstream of stretches used by Suwannee cooters but are nonetheless crucial because of their roles in protecting downstream water quality. Information based on March 2012 data from the Florida Natural Areas Inventory.

Abbreviations:

FF	Florida Forever (2012 data)
NWFWMD	Northwest Florida Water Management District (2008 data; not formal projects)
SRWMD	Suwannee River Water Management District (2011 data; not formal projects)
SWFWMD	Southwest Florida Water Management District (2011 data)

Drainage	Project Name	Program	Comments
Ochlockonee	St. Joe Timberland: Tate's Hell/Carabelle Tract	FF	
-	undesignated	NWFWMD	middle river, west bank, across from Apalachicola National Forest
-	undesignated	NWFWMD	upper river
-	Ayavalla Plantation	FF	less-than-fee
	Ochlockonee River Conservation Area	FF	less-than-fee
Sopchoppy	none		
St. Marks-Wakulla	undesignated	NWFWMD	various tracts along lower and upper Aucilla River, lower Wakulla River
-	St. Joe Timberland: Wakulla Springs Protection Zone	FF	
-	Wakulla Springs Protection Zone	FF	
-	Florida's First Magnitude Springs	FF	
-	St. Joe Timberland: Florida's First Magnitude Springs	FF	
-	Upper St. Marks River Corridor	FF	
Aucilla-Wacissa	Wacissa/Aucilla River Sinks	FF	
-	Chris & Christine Layman	SRWMD	Aucilla River

Drainage	Project Name	Program	Comments
-	William & Susan Floyd	SRWMD	Aucilla River
-	Bradley & Linda Cooley	SRWMD	Aucilla River
-	Aucilla A	SRWMD	Aucilla River, multiple disjunct tracts
-	St. Joe Timberland: Wacissa/Aucilla River Sinks	FF	
Econfina	St. Joe Timberland: Wacissa/Aucilla River Sinks	FF	
-	San Pedro Bay	FF	headwaters
Fenholloway[1]	none		
Steinhatchee	none		
Suwannee	Lower Suwannee J, I, G, F, E, D, C, A	SRWMD	mainstem, disjunct tracts
-	Florida's First Magnitude Springs	FF	vicinity of several springs
-	George & Sharon Nyman	SRWMD	mainstem
-	Rock Bluff Springs LLC	SRWMD	mainstem
-	Grady & Honor Hatzog	SRWMD	mainstem
-	Middle Suwannee J, I, H, F, E, D, B, A	SRWMD	mainstem, disjunct tracts
-	Suwannee County Preservation	FF	Suwannee River across from Twin Rivers SF
-	Upper Suwannee F, E, C, B, A	SRWMD	upper Suwannee
-	Pinhook Swamp	FF	upper Suwannee
-	Withlacoochee F, E, D, C, B	SRWMD	disjunct tracts, Withlacoochee River
-	Alapaha A, C, D	SRWMD	Alapaha River
-	Ichetucknee Trace	FF	Ichetucknee River springshed (Santa Fe)
-	Raiford to Osceola Greenway	FF	Olustee Creek and New River headwaters (Santa Fe)
-	Lake Santa Fe	FF	Santa Fe River headwaters
Waccasassa	Waccasassa A	SRWMD	headwaters
Withlacoochee	Florida Springs Coastal Greenway	FF, SWFWMD	
-	South Goethe	FF, SWFWMD	
-	Rainbow River Conservation Corridor	FF	Important for cooter
-	Halpata Tastanaki Preserve	SWFWMD	

Drainage	Project Name	Program	Comments
-	Withlacoochee River Corridor	SWFWMD	substantial frontage joining large, disjunct tracts of Withlacoochee State Forest
-	Southeastern Bat Maternity Caves	FF, SWFWMD	small stretch within preceding
-	Green Swamp/Withlacoochee River Headwaters	FF	headwaters
-	Additional Withlacoochee River frontage lands	SWFWMD	multiple tracts; see Figure 3 in SWFWMD 2012
Homosassa	Florida Springs Coastal Greenway	FF, SWFWMD	substantial portion of lower half of river
Alafia	Tampa Bay Estuarine Ecosystem	SWFWMD	near mouth
-	Alafia River Corridor	SWFWMD	nearly all remaining private frontage on middle-upper mainstem, North Prong, and South Prong
Silver[2]	Florida's First Magnitude Springs	FF	not on river, aims to protect springshed

[1]The Fenholloway River population may have been extirpated as a result of hydrological degradation associated with a pulp mill. If so, population restoration is an appropriate long-term goal.

[2] The Silver River population is believed to stem from human introduction, most likely from the former Ross Allen's Reptile Institute.

Appendix 3. Factsheet about Outstanding Florida Waters (OFWs).
Source: http://www.dep.state.fl.us/water/wqssp/ofwfs.htm#designation

Authority:
Section 403.061(27), Florida Statutes (F.S.), grants the Department of Environmental Protection (DEP) the power to establish rules that provide for a special category of waterbodies within the state, to be referred to as "Outstanding Florida Waters" (OFW), which shall be worthy of special protection because of their natural attributes.

Implementing Agency:
DEP is the agency that designates a waterbody as an OFW; however, each OFW must be approved by an arm of DEP known as the Environmental Regulation Commission (ERC). The ERC is a 7-member citizens' body appointed by the Governor.

Regulatory Significance:
Projects regulated by DEP or a water management district and which are proposed within an OFW must not lower existing ambient water quality, which is defined for purposes of an OFW designation as the water quality at the time of OFW designation or the year before applying for a permit, whichever water quality is better. In general, DEP cannot issue permits for *direct* discharges to OFWs that would lower ambient (existing) water quality. In most cases, this deters new wastewater discharges directly into an OFW and requires increased treatment for stormwater discharging directly into an OFW. DEP also may not issue permits for *indirect* discharges that would significantly degrade a nearby waterbody designated as an OFW.
In addition, activities or discharges within an OFW, or which significantly degrade an OFW, must meet a more stringent public interest test. The activity or discharge must be "clearly in the public interest." For example, activities requiring an Environmental Resource Permit (ERP), such as dredging or filling within a wetland or other surface water or construction/operation of a stormwater system, must be clearly in the public interest instead of merely not contrary to the public interest.

In determining whether an activity or discharge that requires an ERP permit is not contrary to the public interest or is clearly in the public interest, DEP or the a WMD must consider and balance the following factors:

1. Whether the activity will adversely affect the public health, safety, welfare or the property of others;
2. Whether the activity will adversely affect the conservation of fish and wildlife, including Endangered or Threatened species, or their habitats;
3. Whether the activity will adversely affect navigation or the flow of water or cause harmful erosion or shoaling;
4. Whether the activity will adversely affect the fishing or recreational values or marine productivity in the vicinity of the activity;
5. Whether the activity will be of a temporary or permanent nature;
6. Whether the activity will adversely affect or will enhance significant historical and archaeological resources under the provisions of s. 267.061, F.S.; and
7. The current condition and relative value of functions being performed by areas affected by the proposed activity.

See Chapter 373.414(1)(a), F.S. (2010).

Activities or Discharges Not Affected by an OFW Designation:

- Permitted activities or discharges existing on the date of designation and activities with a complete application on the date of designation, which are "grandfathered."
- Activities not regulated by DEP for water quality protection purposes, such as fishing regulations, setback ordinances, restrictions on boat motor types, and boat speeds.
- Restoration of seawalls at previous locations.
- Construction of non-commercial boat docks, on pilings, of less than 500 square feet.
- Temporary lowering of water quality during construction activities (with special restrictions).
- Activities to allow or enhance public use, or to maintain pre-existing activities (with certain safeguards required by Rule 62-4.242(2)(b), Florida Administrative Code [F.A.C.]).

List of OFWs

A complete listing of Outstanding Florida Waters is provided in Rule 62-302.700 (9), F.A.C. OFWs generally include surface waters in the following areas:

National Parks
National Wildlife Refuges
National Seashores
National Preserves
National Marine Sanctuaries and Estuarine Research Reserves
National Forests (certain waters)
State Parks and Recreation Areas
State Preserves and Reserves
State Ornamental Gardens and Botanical Sites
Environmentally Endangered Lands Program, Conservation and Recreational Lands Program, and Save Our Coast Program Acquisitions
State Aquatic Preserves
Scenic and Wild Rivers (both National and State)
"Special Waters"

"Special Waters" OFWs include 41 of Florida's 1700 rivers, several lakes and lake chains, several estuarine areas, and the Florida Keys:

Waterbody	Waterbody
Apalachicola River	Myakka River (lower part)
Aucilla River	Ochlockonee River
Blackwater River	Oklawaha River
Butler Chain of Lakes	Orange Lake, River Styx, and Cross Creek
Chassahowitzka River System	Perdido River
Chipola River	Rainbow River

Waterbody	
Choctawhatchee River	St. Marks River
Clermont Chain of Lakes	Santa Fe River System
Crooked Lake	Sarasota Bay Estuarine System
Crystal River	Shoal River
Econlockhatchee River System	Silver River
Estero Bay Tributaries	Spruce Creek
Florida Keys	Suwannee River
Hillsborough River	Tomoka River
Homosassa River System	Wacissa River
Kingsley Lake & Black Creek (North Fork)	Wakulla River
Lake Disston	Weeki Wachee Riverine System
Lake Powell	Wekiva River
Lemon Bay Estuarine System	Wiggins Pass Estuarine System
Little Manatee River	Withlacoochee Riverine and Lake System
Lochloosa Lake	

Note: The rule language describing the above “Special Water” OFWs is more detailed. For further information, refer to Rule 62-302.700(9)(i), F.A.C.

Requirements for "Special Water" OFW Designation:

1. Rulemaking procedures pursuant to Chapter 120, F.S., must be followed;
2. At least 1 fact-finding workshop must be held in the affected area;
3. All local county or municipal governments and state legislators whose districts or jurisdictions include all or part of a water body proposed for Special Water designation must be notified at least 60 days prior to the workshop in writing by the Secretary of DEP;
4. A prominent public notice must be placed in a newspaper of general circulation in the area of the proposed Special Water at least 60 days prior to the workshop;
5. An economic impact analysis, consistent with Chapter 120, F.S., must be prepared that provides a general analysis of the effect of OFW designation on local growth and real estate development, including such factors as impacts on planned or potential residential, industrial, agricultural or other development or expansion; and
6. The ERC may designate a water of the state as a Special Water after making a finding that the waters are of exceptional recreational or ecological significance and a finding that the environmental, social, and economic benefits of the designation outweigh the environmental, social, and economic costs (Rule 62-302.700(5), F.A.C.).

For More Information, Contact:
Department of Environmental Protection, Standards and Assessment Section at (850) 245-8064 or view the Water Quality Standards website.