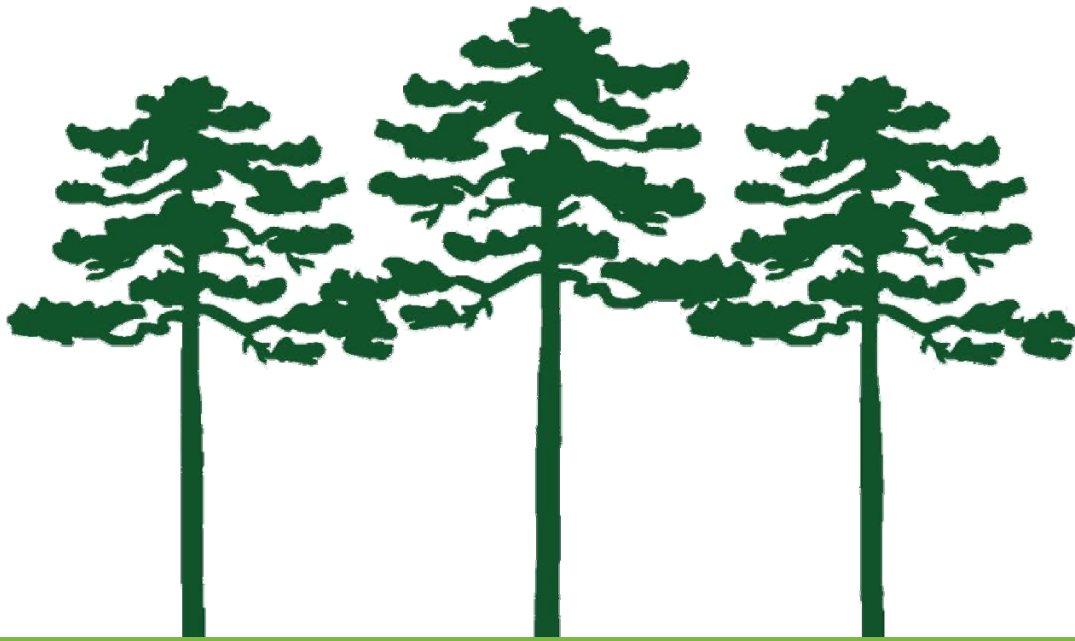




RESTORE Act Application



Florida Department of Agriculture and Consumer Services
Florida Forest Service





FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

COMMISSIONER ADAM H. PUTNAM

April 15, 2013

Ms. Theresa R. Sena
U.S. Department of Commerce
Gulf Coast Ecosystem Restoration Task Force
Woodrow Wilson Center, G1-1, Mail Code 1101 R
1300 Pennsylvania Avenue
Washington, DC 20460

Ms. Sena:

April 20, 2010, the Gulf of Mexico suffered the onslaught of its worst manmade disaster in modern history with the Deepwater Horizon gushing oil unabated into the gulf waters for 87 days. A massive response ensued in an effort to protect marine life, beaches, estuaries, and coastal economies devastated by the millions of gallons of oil. The state of Florida, and more particular its coastal communities, will see continued impacts from the spill well into the future. The state is now in a position to mitigate some of that damage. The RESTORE Act of 2012 specifically directs 80 percent of Clean Water Act civil penalties resulting from the oil spill to restoration of the Gulf Coast environment and local economies. This could mean as much as \$10-20 billion. The Act distributes resources fairly and equitably to the affected Gulf Coast states, allowing them to launch immediate recovery efforts.

In response to the recovery efforts, the Florida Department of Agriculture and Consumer Services, Florida Forest Service, is requesting consideration and approval of funding for a suite of projects that will assist in the restoration and enhancement of the riverine watershed areas directly affecting water quality and quantity entering the Gulf of Mexico and its related estuaries. These terrestrial improvements are paramount if the marine life and coastal areas of the state are to be returned to a productive state of equilibrium and afford future resilience to unforeseen challenges.

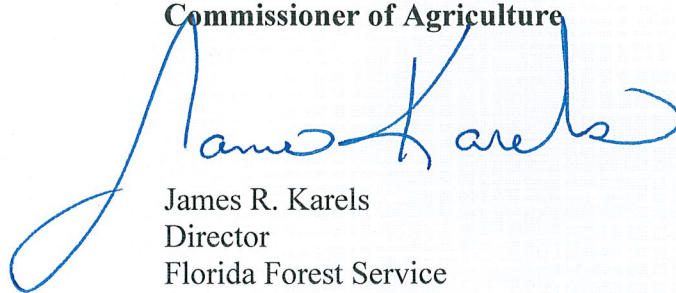
The projects presented here are of four categories, 1) Reforestation, 2) Hydrological restoration, 3) Silt and sedimentation remediation along with 4) A recommendation to follow through on Florida Forever land acquisition projects that directly impact the Gulf of Mexico.

Ms. Theresa R. Sena
U.S. Department of Commerce
April 15, 2013
Page Two

The health and vigor of the environmental resources, beaches and coastal economies of gems such as Escambia Bay, Blackwater Bay, Apalachicola Bay, Apalachee Bay, and their related estuaries are dependent on conservation, and land management practices occurring on our watersheds, rivers, and drains. We sincerely hope that you look favorably on the approval and funding of these projects.

Sincerely,

Adam H. Putnam
Commissioner of Agriculture



James R. Karels
Director
Florida Forest Service

JRK/jb/vr

cc: Gulf Coast Ecosystem Restoration Task Force

Matt Joyner, Federal/State Relations Director, Florida Department of Agriculture & Consumer Services
Rachel Jacobson, Acting Assistant Secretary, Fish and Wildlife and Parks, Department of the Interior
Monica Medina, Principal Deputy Undersecretary, Oceans and Atmosphere, Department of Commerce
Jo-Ellen Darcy, Assistant Secretary of Army (Civil Works), Department of Defense
Harris Sherman, Under Secretary, Natural Resources and Environment, US Department of Agriculture
Ignacia S. Moreno, Assistant Attorney, General Environment and Natural Resources Division, Department of Justice
David Murk, Senior Maritime Safety and Security Advisor, Department of Transportation
Sally Ericsson, Associate Director, Natural Resources Programs, Office of Management and Budget
Nancy Sutley, Chair, Council on Environmental Quality
Steve Fetter, Principal Assistant Director of Environment, Office of Science and Technology Policy
Heather Zichal, Deputy Assistant to the President for Energy and Climate Change, Domestic Policy Council
N. Gunter Guy, Jr., Commissioner, Alabama Department of Conservation and Natural Resources
Mimi A. Drew, Florida Department of Environmental Protection
Garret Graves, Chair of the Coastal Protection and Restoration Authority of Louisiana
Alice Perry, Assistant Director, Mississippi Department of Environmental Quality
Jerry Patterson, Commissioner, Texas General Land Office

Department of Agriculture and Consumer Services, Florida Forest Service RESTORE Act Projects

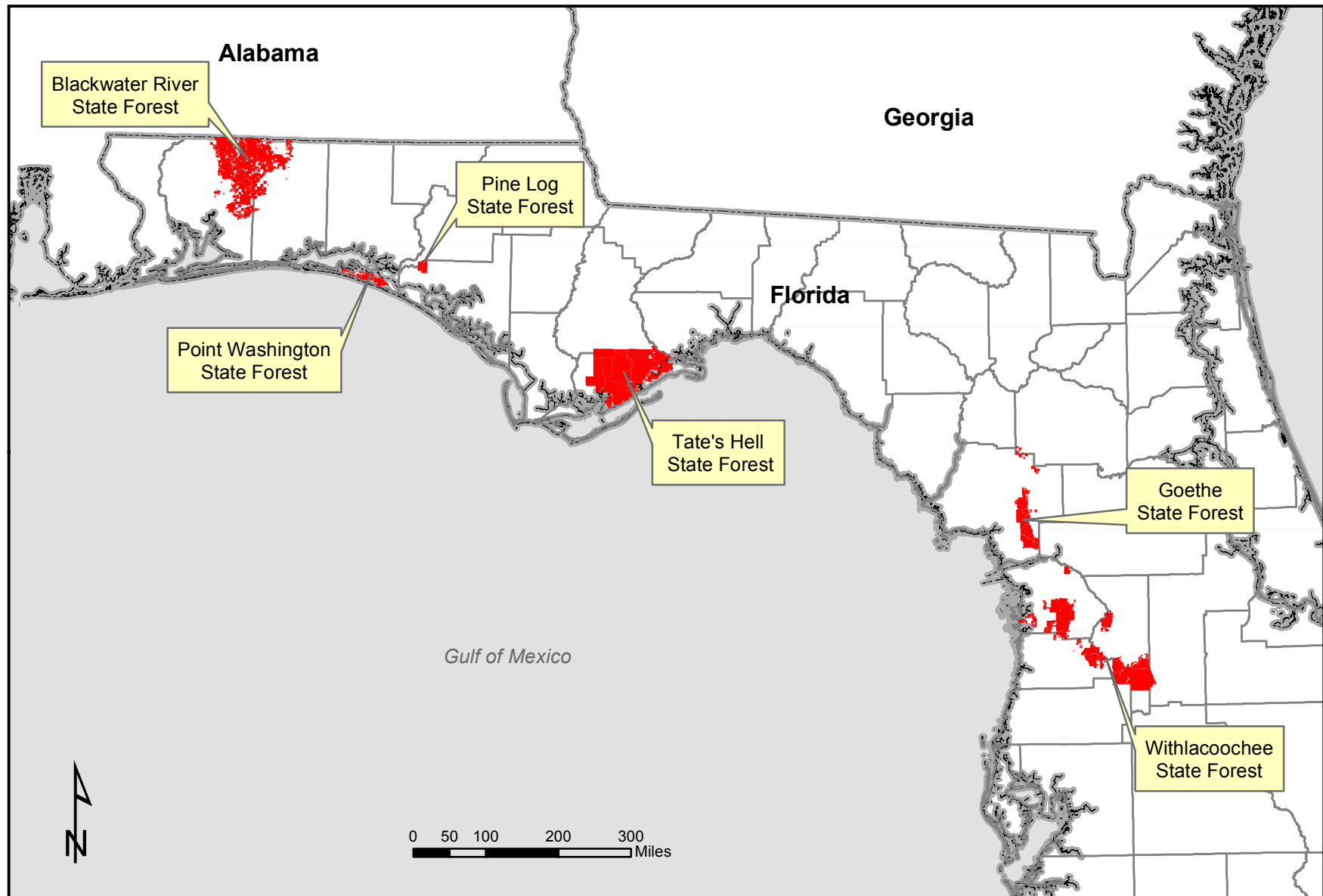




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Reforestation





Reforestation on Florida State Forests

Executive Summary

Reforestation is a vital component in restoring and sustaining Florida's forest ecosystems. Past land uses have left state forest lands with varying degrees of reforestation needs. Natural events such as wildfire or wind events also cause reforestation needs after salvage efforts are completed. Three projects are being presented in this proposal. Mechanical and chemical site preparation, prescribed burning, seedling costs, and labor to plant the seedlings are included in the total cost for each project.

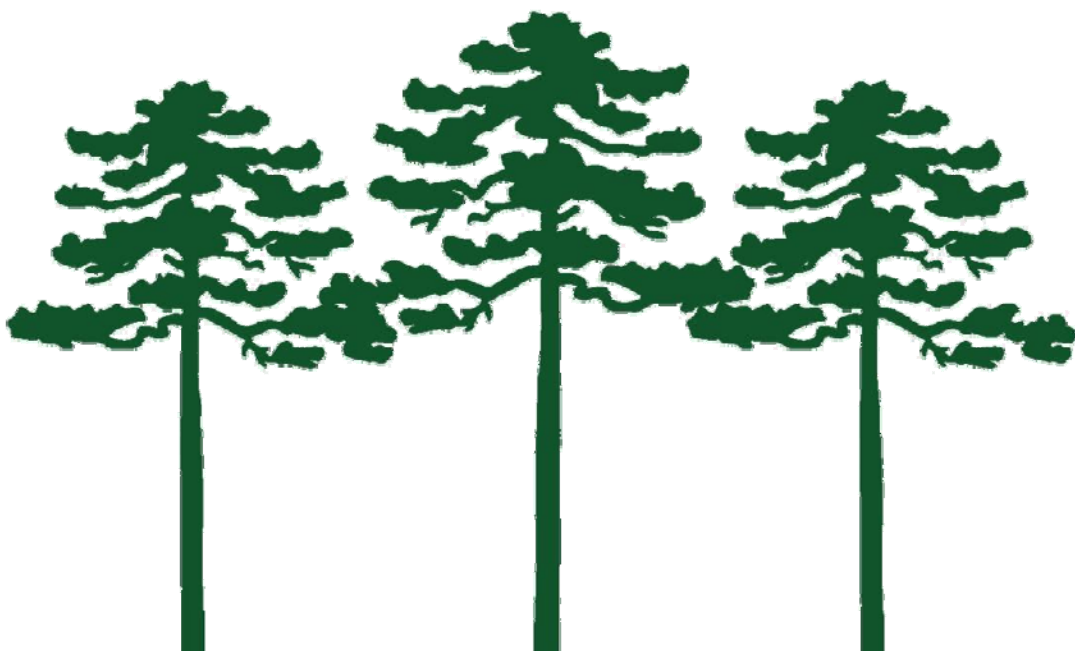
Pine Log and Point Washington State Forests (Bay and Walton Counties, FL) - Reforestation of longleaf pine on these two Florida panhandle forests will reintroduce the once dominant species back into its natural range. Approximately 628 acres will require this work.

Tate's Hell State Forest (Franklin County, FL) – Past land use by the previous forest industry landowners used the Tate's Hell State Forest land primarily for fiber production. Fast growing seedlings were planted with the intent to harvest the trees on short rotations to supply paper mills in the area. Intensive site preparation was practiced along with draining of some areas to facilitate equipment operation and increase tree growth potential. Since the acquisition of this property, forest managers have been replanting previously clearcut sites back to their historical species. Slash and longleaf pine as well as pond cypress are included in this proposal to reestablish native species back into the landscape.

Goethe State Forest and Tate's Hell State Forest (Levy and Franklin Counties, FL) – Goethe and Tate's Hell State Forests are located in two of Florida's gulf coastal counties. Goethe State Forest has endured many wildfires in the last few years and salvage operations of burnt timber have left large, open non-forested areas in need of reforestation activities. Longleaf pine was once the dominant species in the flatwoods areas and this proposal addresses reforestation of approximately 2,035 acres of longleaf pine. Tate's Hell State Forest has large open non-forested areas left by the previous landowner. This proposal addresses reforestation on approximately 2,007 acres.







Point Washington State Forest & Pine Log State Forest Longleaf Reforestation



Project Name:

Point Washington and Pine Log State Forest 2013-2014 Longleaf Reforestation Project

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Daniel Young (PWSF); 850-267-8325; Daniel.Young@freshfromflorida.com; Florida Forest Service

Point Washington State Forest; 5865 Highway 98 East; Santa Rosa Beach, FL 32459

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

See attached maps.

Project Description *(Describe all aspects of the project):*

This project will involve site preparation and reforestation of longleaf pine on approximately 628 acres of cutover state forest land.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*

Site preparation = [628 acres x \$70/acre (chopping)] + [628 acres x \$20/acre (burning)] = \$56,520

Planting = 628 acres x 728 trees per acre = ~ 456,000 trees x \$168 trees/1000 = \$76,608

628 acres x \$50 acre (hand planting labor) = \$31,400

Total estimated cost = \$164,528

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

N/A

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

Over the past 20 years, the Florida Forest Service has successfully restored native longleaf pine across several thousand acres on both of these state forests.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Longleaf pine is a native species, and its restoration provides essential habitat for a large and diverse group of wildlife species, some of which are endangered. Longleaf pine forests also help provide clean air, healthy watersheds, and soil stabilization.



Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

In today's market, the products derived from longleaf pine can be much more valuable than those of other southern pines. Specifically for PWSF and PLSF, the reforestation of this native species provides Floridians with recreational opportunities (hunting, hiking/biking, wildlife viewing, etc.), natural biodiversity, aesthetic appeal, and cultural benefits.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Longleaf pine is highly resistant to pine beetles and fusiform rust, tolerant of drought and wildfire, and generally very wind-firm.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

Our mission as the Florida Forest Service is to protect Florida and its people from the dangers of wildland fire and manage the forest resources through a stewardship ethic to assure they are available for future generations. This reforestation project parallels our mission statement and would greatly benefit our organization, as well as Floridians as a whole.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

All state Silviculture Best Management Practices will be followed as related to the project.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Areas in need of reforestation have been harvested and are currently ready for site preparation followed by planting.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

Several local recreational and nature groups, as well as individual users would approve and support this reforestation project as a means of offering state forest land to the public for multiple-use opportunities.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

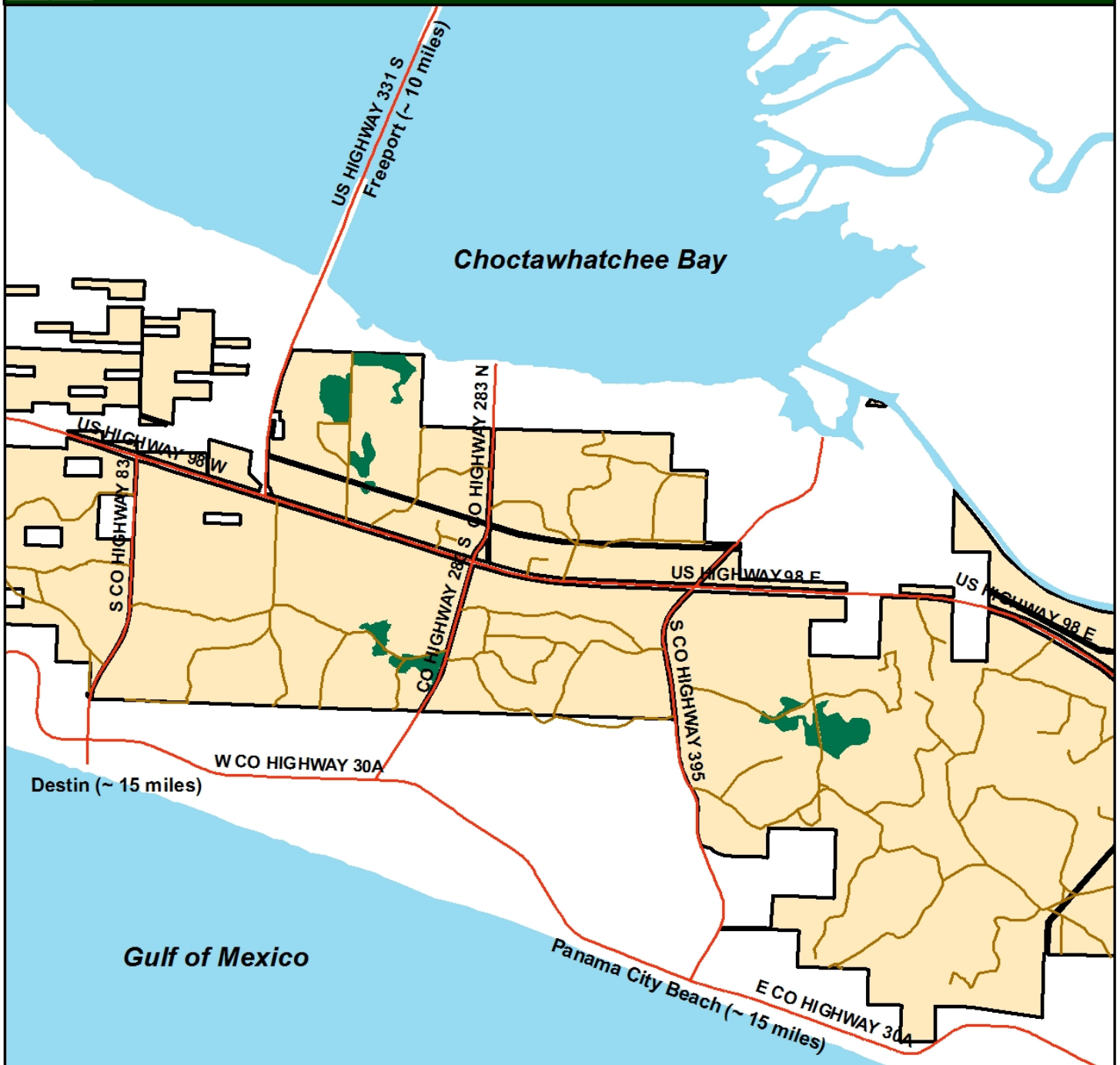
See attached.





Point Washington State Forest 2013-2014 Longleaf Restoration Project

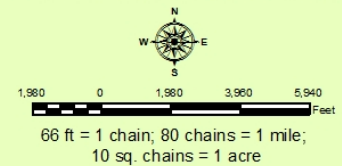
Latitude 30.359 N; Longitude 86.140 W
Walton County, Florida
231 Acres (+/-)



Legend

- Major Roads
- PWSF Roads
- Planting Area
- PWSF Boundary

POINT WASHINGTON STATE FOREST



Map Created By Daniel Young, Forester
Florida Forest Service
February 27, 2013

DISCLAIMER

This map is the product of the Florida Forest Service. No warranties are provided for the data therein, its use, or its interpretation.

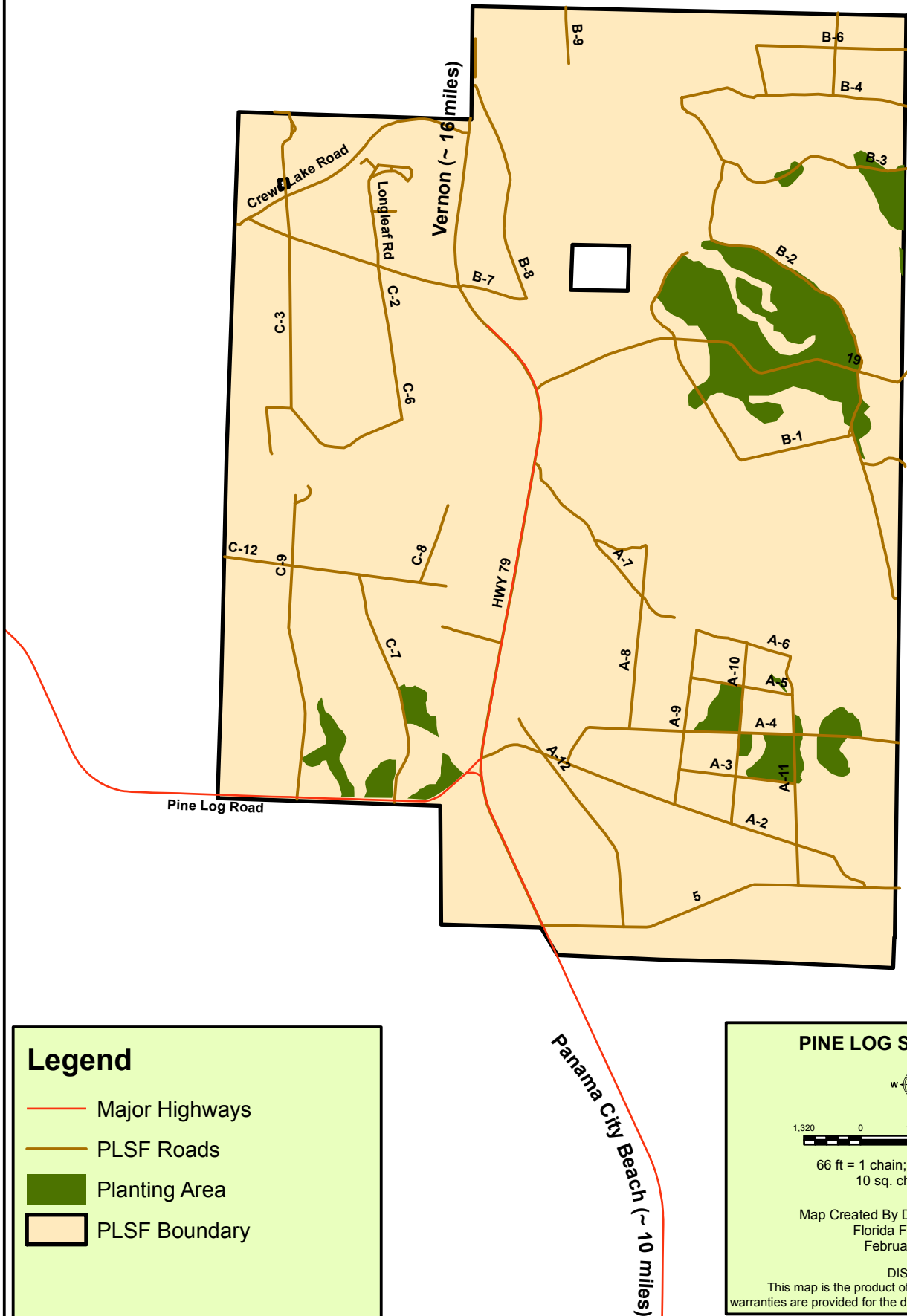




Pine Log State Forest

2013-2014 Restoration Project

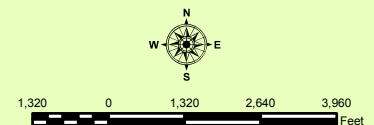
Latitude 30.412 N; Longitude 85.867 W
Bay County, Florida
397 Acres (+/-)



Legend

- Major Highways
- PLSF Roads
- Planting Area
- PLSF Boundary

PINE LOG STATE FOREST



Map Created By Daniel Young, Forester
Florida Forest Service
February 27, 2013

DISCLAIMER
This map is the product of the Florida Forest Service. No warranties are provided for the data therein, its use, or its interpretation.



Cost Appendix Sheet

628 Acres

Cost Item

Cost Estimate

Planning

Contracts

Feasibility

Engineering, Design, Land Rights & Bid Prep

Restoration Plan

Site Visits & Cost of Site Selection

Administration, Overhead, and Indirect

Other

Planning Subtotal:

Contracts-Site Prep Chopping @\$70/ acre \$43,960

Contracts- Site Prep Burning @\$20/ acre \$12,560

Contracts- Planting Labor @\$50/ acre \$31,400

Seedling Costs @\$168/M *456/M \$76,608

Contractual Subtotal: \$164,528

Monitoring

Contracts

Data Collection

Monitoring Administration

Monitoring Subtotal:

Project Cost

Supervision

Subtotal:

Contingency

TOTAL:

Estimated Costs by Year

Year 1

Year 2

Year 3

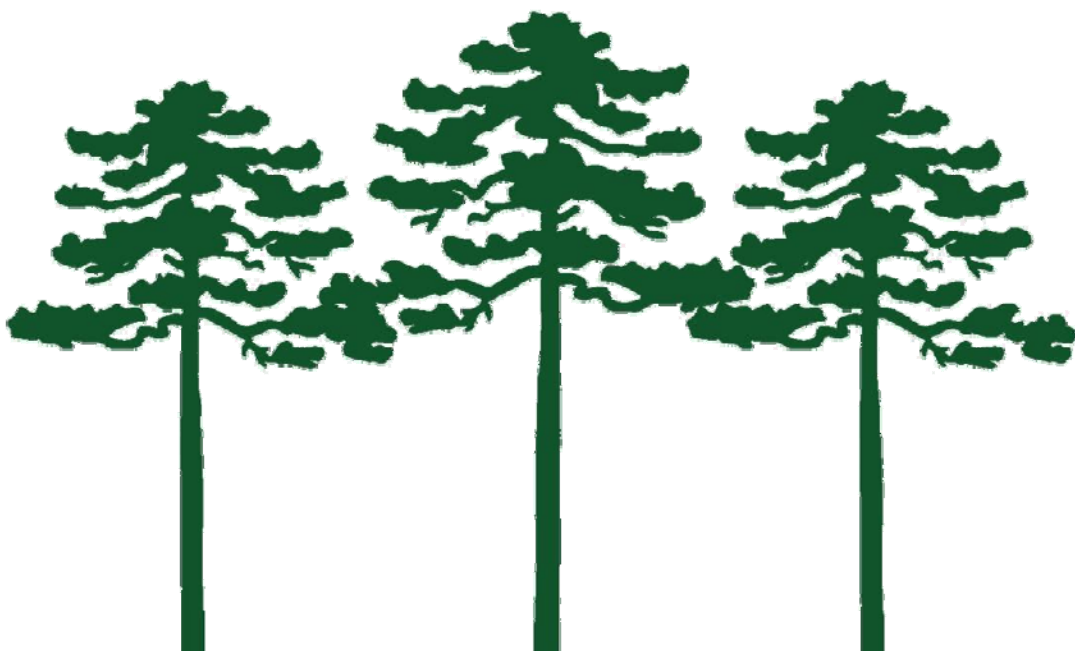
Year 4

Year 5

Year 6







Tate's Hell State Forest Landscape Restoration



Project Name:

Tate's Hell State Forest landscape restoration after previous forest industry clear-cutting

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Forest Supervisor, Tate's Hell State Forest
290 Airport Road Carrabelle, FL 32358, Ph: 850 697 3734 x104, e-mail,
david.morse@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

Tate's Hell State Forest, Franklin, County Florida

Project Description *(Describe all aspects of the project):*

Project delineates clearcut areas on THSF that were logged by forest industry prior to the return of the land to the public domain. This is an effort to restore tree cover to areas on the forest that have lost their original ground and tree cover. The tree species chosen existed on landscape as original forest cover at various densities depending on the historical timeframe.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*

Site prep, seedling purchase, and hand planting for 838 acres of Longleaf pine: \$265,619
Site prep, seedling purchase, and hand planting for 994 acres of slash pine: \$226,304
Site prep, seedling purchase, and hand planting for 283 acres of pond cypress: \$70,142
Sum total for all three species: \$562,065

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

N/A

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

Forester staffing at THSF is adequate to accomplish task

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Clearcuts are subject to greater erosion and in the absence of adequate seed banks will not restore native cover in meaning timeframes to local community. In the multiple-use mandate for THSF, clean water and forest buffer to the salt marshes are significant



environmental benefits. Intact forest cover will dampen the peak runoff of freshwater into the salt marshes, estuary, and bay following storm events in the Gulf.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Forest operations on THSF provide employment to local and regional contractors. Maintaining the visual landscape on THSF improves the recreational prospects for eco-tourism. Long term sustainable timber harvests are an important input to the area economy. Since The Florida Forest Service returns a percentage of the monies generated each year on the forest directly to the school boards of Franklin and Liberty Counties there is a straight line benefit to the school children of the local community.

(Note all of the remainder of revenues generated on THSF goes directly to the State of Florida.)

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The long term forest management of THSF by the Florida Forest Service vs. the short term rotation of a woody crop by forest industry will restore, promote, and sustain greater resiliency in the native landscapes. Management on THSF is done in sync with the Florida Fish and Wildlife Commission and the Northwest Florida Water Management District for the long term sustainability of the bio-diversity and native habitats.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

"The mission of the Florida Forest Service is to protect Florida and its people from the dangers of wildland fire and manage the forest resources through a stewardship ethic to assure they are available for future generations."

This proposal compliments other restoration efforts on THSF by the Florida Forest Service, Fish and Wildlife Commission, and Northwest Florida Water Management District.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

There are no conflicting issues.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Project will begin with the awarding of funding.



Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

The proposal meets or exceeds public acceptance and expectations for THSF.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

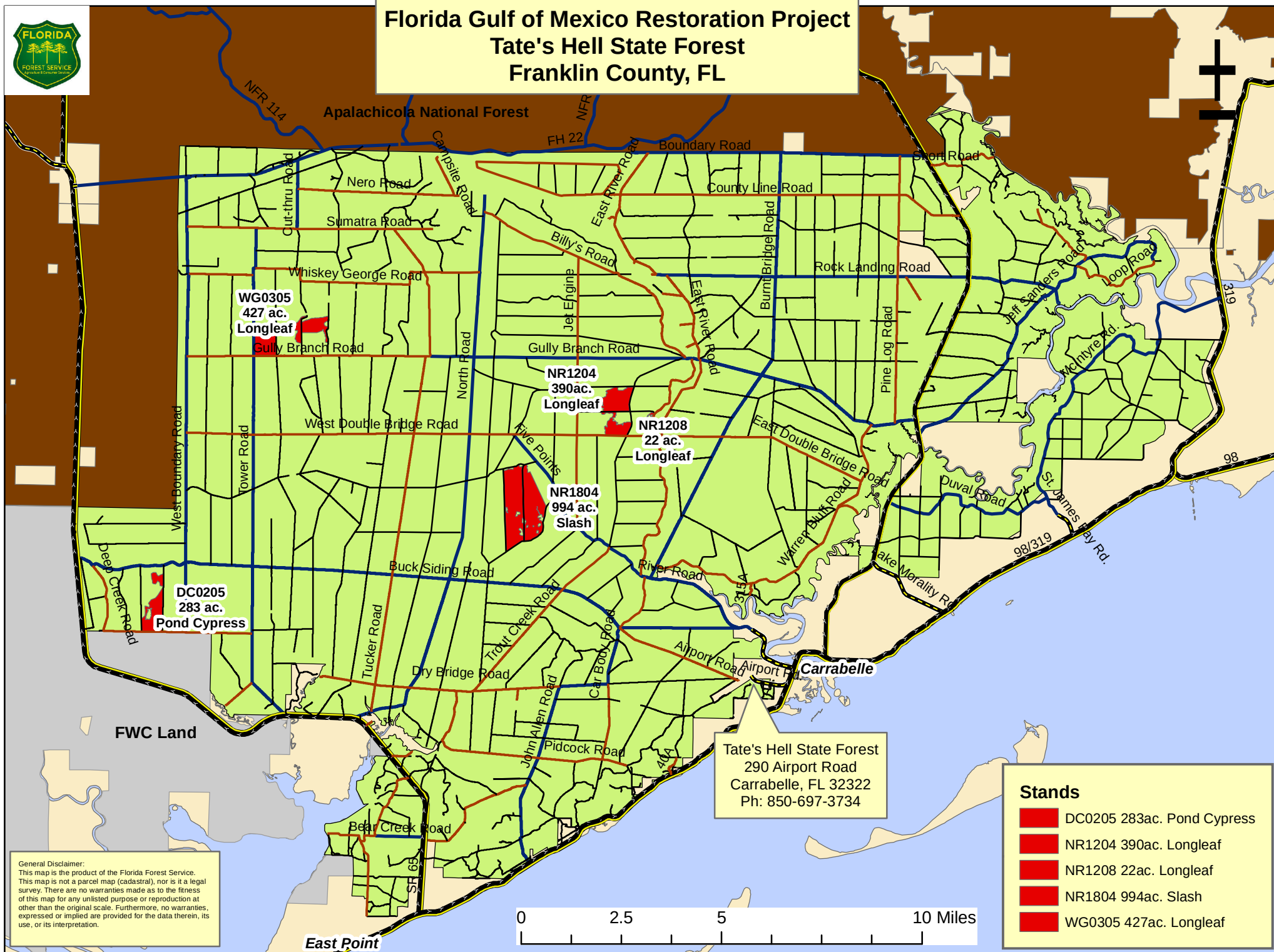
The continuing downward spiral of funding to state agencies means a project of this scale will wither in the wait for approval. If appropriate, any component or percentage of this proposal that merits an award of funding will be 100% better than the current state of nothing.







Florida Gulf of Mexico Restoration Project Tate's Hell State Forest Franklin County, FL



**Florida Gulf of Mexico Restoration Project
Tate's Hell State Forest**

							x seedling cost/1000				
							\$168 LL container				
							\$45 SL bare root	x \$70	x \$75/ac	x \$50/ac	
	Stands	acres	acres	%	x726 tpa	K	\$175 PC bare root	chop & Rx burn	site prep herb.	hand plant	Total
	THSFNR1204	390	838	40	608,388	608	\$102,209	\$58,660	\$62,850	\$41,900	\$265,619
Longleaf	THSFNR1208	22									
	THSFWG0305	427									
Slash	THSFNR1804	994	994	47	721,644	722	\$32,474	\$69,580	\$74,550	\$49,700	\$226,304
Pond Cypress					x 330 tpa						
	THSFDC0205	283	283	13	85,466	85	\$14,957	\$19,810	\$21,225	\$14,150	\$70,142
	Total acres:	2115					\$149,640	\$148,050	\$158,625	\$105,750	\$562,065

Timeline

There is approximately 18 month operational horizon.

Site preparation work is done through the spring and summer to early fall by contract crews.

Prescribed burning as site prep is done in house by staff on THSF.

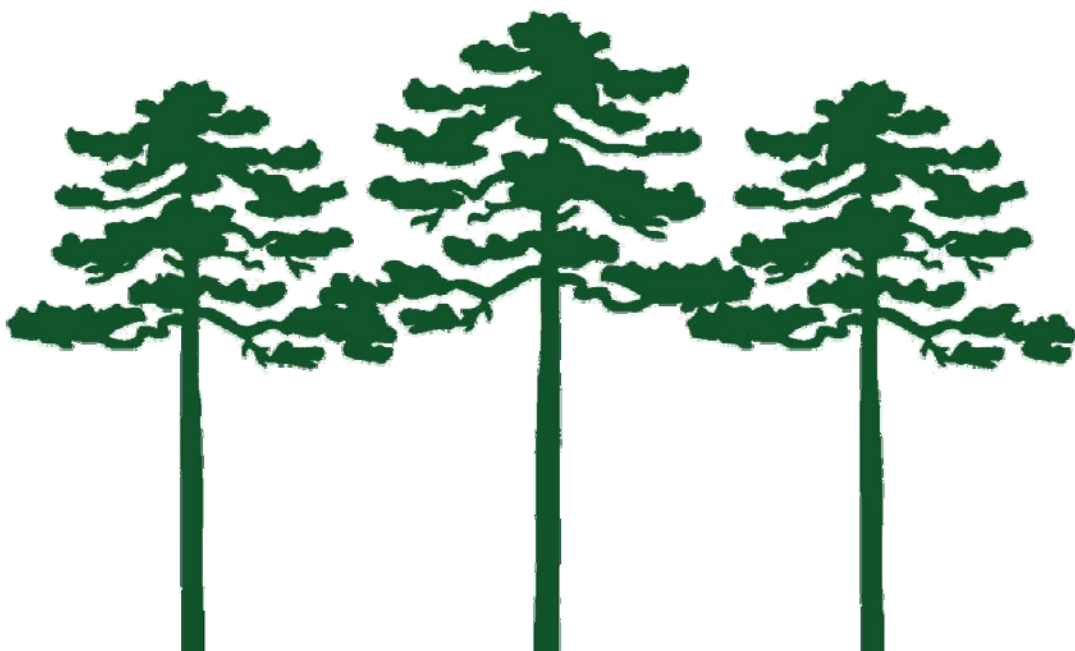
Planting is usually done by contract hand crews Nov to Mar of a given year.

Seedling survival is assessed in the fall following the planting by THSF foresters.

Monitoring of the growth and health of the stand continues indefinitely by THSF foresters.

Administration and monitoring of forest operation contracts is done by THSF foresters.





Gulf Coastal Watershed Reforestation Plan

Florida State Forests



Project Name:

Florida Forest Service Gulf Coastal Watershed Reforestation Plan for Florida State Forests

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

State Lands Silviculturalist

3125 Conner Blvd, Room 271, Tallahassee, FL 32399-1650; Ph. 850-414-9906; email Jimmy.Roberts@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

This project will take place on the Goethe State Forest in Levy County and Tate's Hell State Forest in Franklin County Florida. See attached maps

Project Description *(Describe all aspects of the project):*

This is a reforestation project of slash and longleaf pine on approximately 4,042 acres of state forest land along gulf coastal counties in Florida. The project will include all site preparation and planting activities.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
Estimated cost of this project is \$927,680.00. This includes site preparation (herbicide, chopping and prescribed burning) and planting costs, both seedling and hand planting labor costs. See attached cost appendix sheet.

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

N/A

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

Over 55,000 acres have been reforested in the last ten (10) years on Florida's state forests. The Florida Forest Service has the experience and expertise to develop prescriptions and contracts and to implement these activities to achieve the desired results for this reforestation project.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Longleaf and slash pine are native trees to the Florida gulf coast flatwoods ecosystems. Reforestation of these pine species on Florida's state forests provide essential habitat for



many species of wildlife, including endangered and threatened species. These pine forests also provide clean air, help filtration of watersheds and aid in soil stabilization.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Both longleaf and slash pine are important economic tree species in Florida. Lumber, pulp and veneers come from both of these species of pines and are commercially important in Florida, especially in these rural counties. Forestry operations provide jobs to local and regional contractors performing a variety of work during the management of the state forests. Florida's state forests are working forests managed with sustainability and multiple-use as our primary focus. Social benefits include recreational opportunities, aesthetic appeal and restoration of natural biodiversity to the landscape.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Reforestation of native pine species, especially longleaf pine, benefit the fire dominated pine forests found along the Florida gulf coast, due to their ability to tolerate low to moderate intensity, frequent fires. Prescribed fire attempts to mimic once naturally occurring fires that benefit the longleaf and slash pine forest communities and reduce fuel loading helping prevent or minimize catastrophic wildfire. These native pine species are also resilient to the effects from drought, wind firm in cases of high winds and less susceptible to pine beetle attacks than other southern pine species.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

A part of the Florida Forest Service's mission includes 'manage the forest resource through a stewardship ethic to assure they are available for future generations'. Reforestation of slash and longleaf pine will complement and help to continue meeting this mission using sound forest management practices.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

All state Silviculture Best Management Practices will be followed as related to the project.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

The areas to reforest have been harvested for various reasons and are awaiting site preparation and reforestation activities that can begin immediately, weather permitting.



Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

The many outdoor opportunities available on these state forests will benefit from this reforestation project. Reforestation, especially after events leading to salvage operations or clear-cuts of once forested areas, has been widely accepted and expected by most public user groups of Florida's state forests.

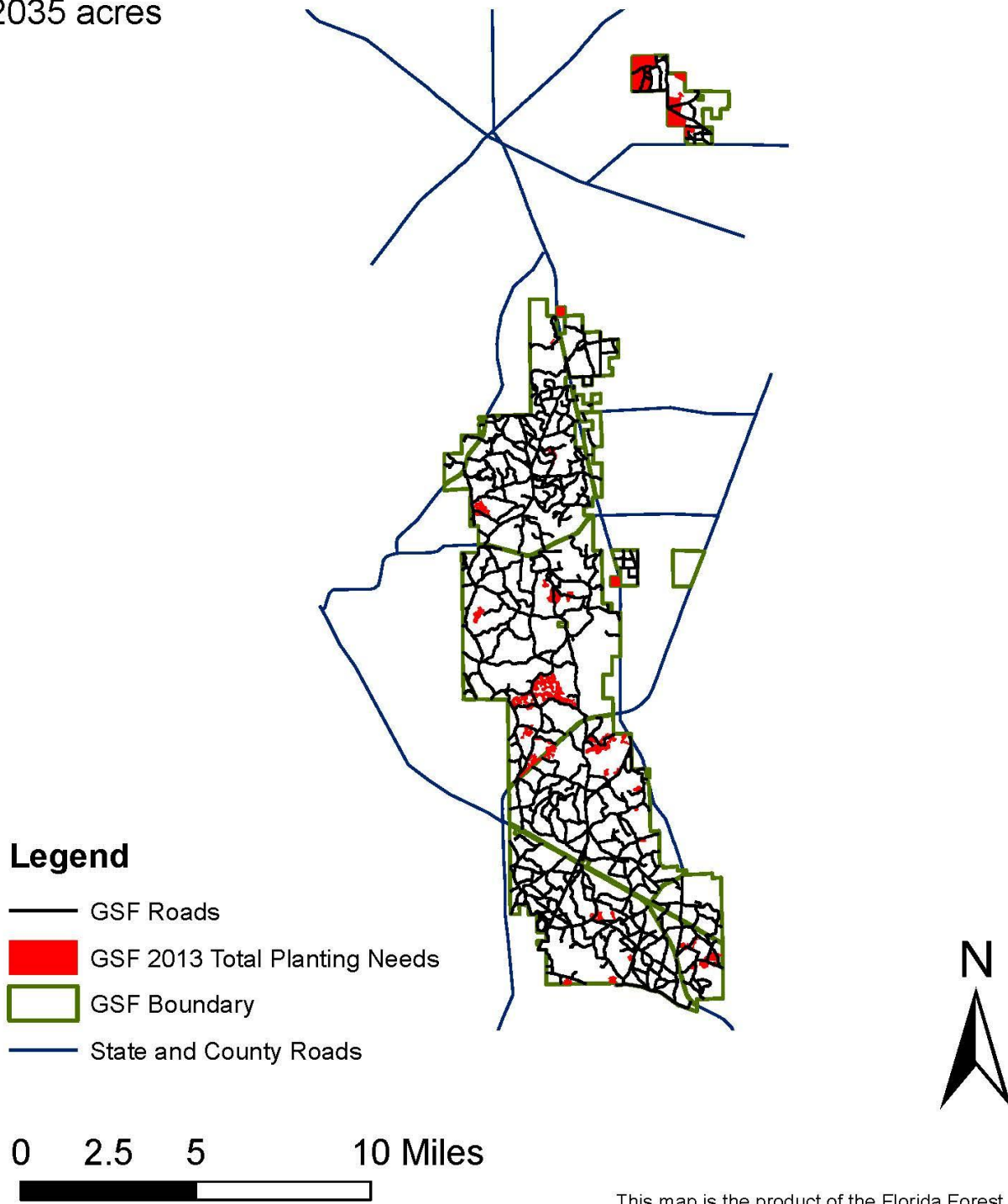
Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

Project could be spread over multiple years.





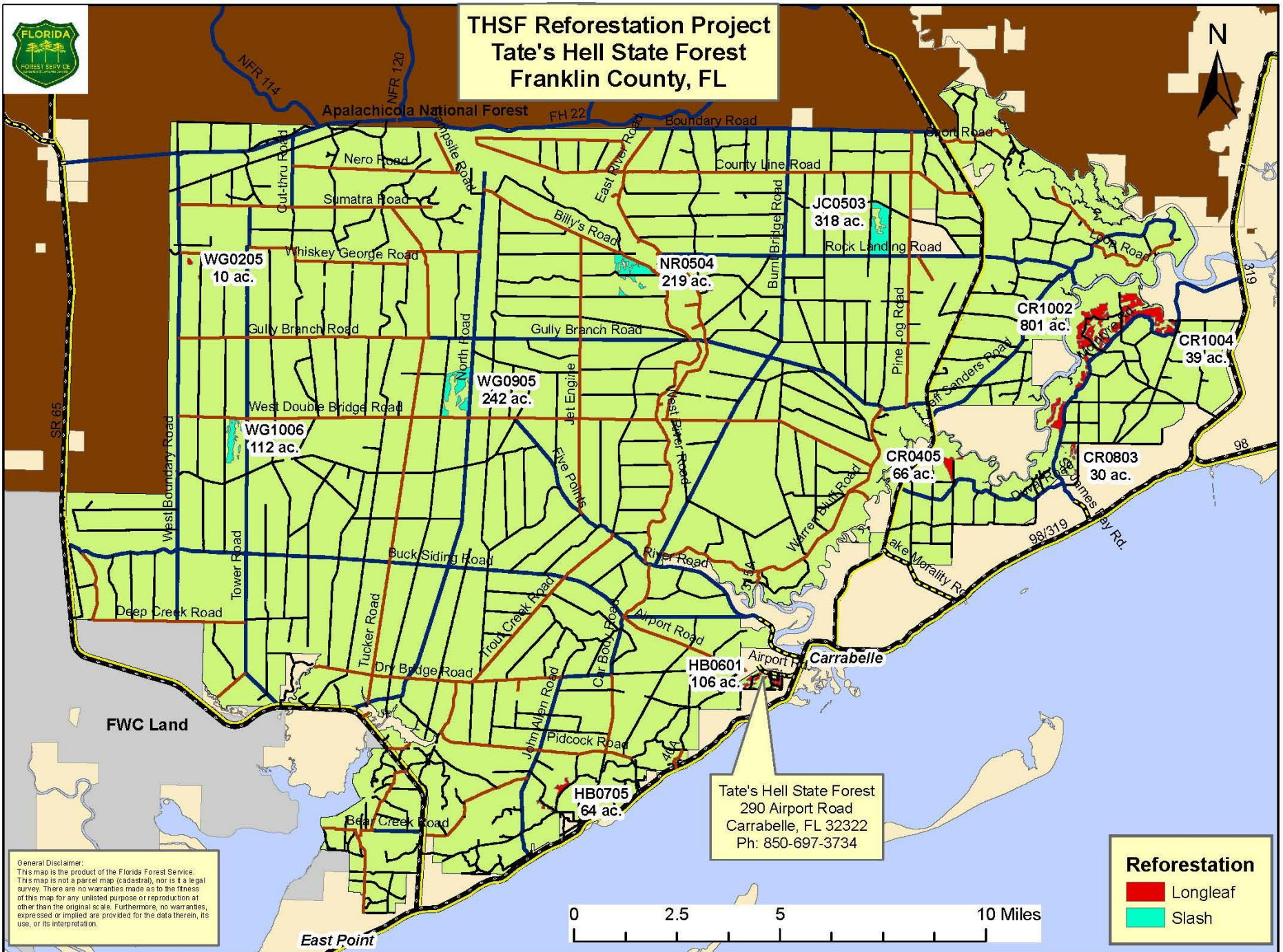
Department of Agriculture
and Consumer Services
Florida Forest Service
Goethe State Forest
2013 Planting Needs
2035 acres



Map By Lyn Kertesz 3-8-2013

This map is the product of the Florida Forest Service. There are no warranties made as to the fitness of this map for any unlisted purpose. Furthermore, no warranties are provided for data therein, its use, or its interpretation.







Cost Appendix Sheet

4,042 acres

Cost Item

Cost Estimate

Planning

Contracts

Feasibility

Engineering, Design, Land Rights & Bid Prep

Restoration Plan

Site Visits & Cost of Site Selection

Administration, Overhead, and Indirect

Other

Planning Subtotal:

Contracts- Site Prep Chopping \$50/acre \$ 202,100

Contracts- Site Prep Burning \$20/acre \$ 80,840

Contracts- Site Prep Herbicide

Cost@\$75/acre

for 2,007 acres \$150,525

Contracts- Planting Labor Cost @\$40/acre \$161,680

Seedling Costs \$356,325

Construction Subtotal: \$951,470

Monitoring

Contracts

Data Collection

Monitoring Administration

Monitoring Subtotal:

Project Cost

Supervision

Subtotal:

Contingency

TOTAL:

Estimated Costs by Year

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6







Hydrological Restoration





Tate's Hell State Forest Hydrologic Restoration

Executive Summary

Tate's Hell State Forest encompasses 202,400 acres of low-lying, poorly drained land located between the Apalachicola and Ochlockonee Rivers. The forest occupies approximately 52% of the land area of Franklin County and a small portion of southern Liberty County (Figure 1). The present day forest was once a wetland-dominated landscape referred to as Tate's Hell Swamp. Tate's Hell Swamp encompassed at least 12 ecological community types including pine flatwoods, wet savannas, dwarf cypress swamps, and sand pine scrub.

The forest has experienced a long history of silvicultural activities. During the 1950s through 1970s, thousands of acres of pine flatwoods and the drier portions of many wetland ecosystems were converted to slash pine plantation. More than 800 miles of roads were constructed and drainage ditches were constructed along most roads to provide road fill and drain nearby wetlands. These large-scale habitat alterations significantly impacted historical ecological communities and altered the magnitude, timing, and quality of surface water runoff discharged from Tate's Hell Swamp to Apalachicola Bay, East Bay, and surrounding waters.

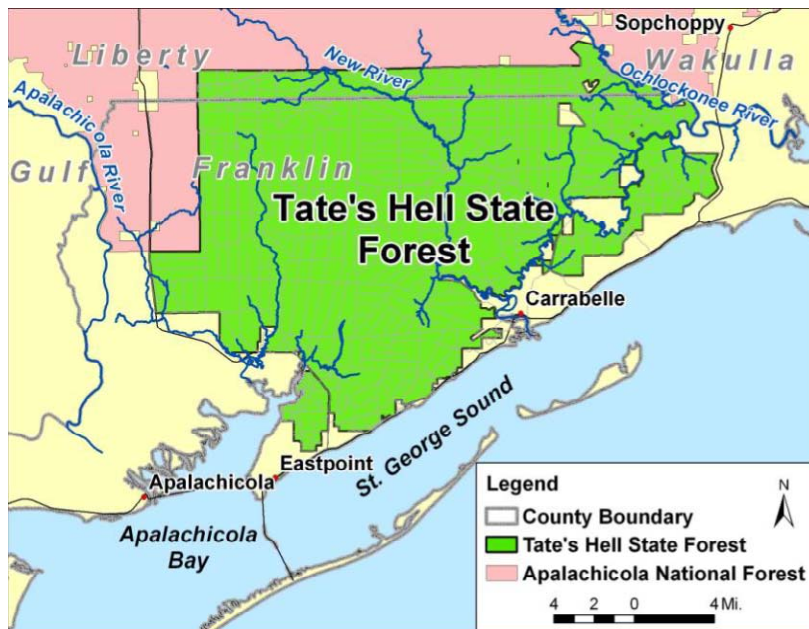


Figure 1. Tate's Hell State Forest

Apalachicola River and Bay system are a high priority for the Surface Water Improvement and Management (SWIM) Program, which was established by the State of Florida in 1987 to reduce watershed degradation and protect natural resources.

The Apalachicola River and Bay system contains one of the most diverse, productive, and economically important estuaries in the United States. The river and bay system have been designated as Outstanding Florida Waters and Apalachicola Bay has been designated as an Aquatic Preserve. East Bay, which receives surface water runoff from the Tate's Hell area, serves as a major nursery for ecologically and commercially important finfish, shellfish and other aquatic organisms. The

In 1994, the state began acquiring land for Tate's Hell State Forest with the goal of restoring historical surface water drainage patterns and ecological communities to improve the timing, magnitude and quality of surface waters discharged from the area to the Apalachicola Bay system. The Northwest Florida Water Management District (District) initiated the land acquisition process with the \$3.5 million purchase of the Glawson tract in 1994. Due to the ecological importance of the East Bay estuary, the acquisition and restoration of Tate's Hell was identified as a priority under the State of Florida's Conservation and Recreation Lands Program.

To date, the land acquired for Tate's Hell State Forest totals approximately 202,400 acres. It is the second largest State Forest and the largest contiguous State Forest in Florida. Tate's Hell is managed as a multi-use area by the Florida Forest Service (formerly known as the Division of Forestry) with cooperation from the Florida Fish and Wildlife Conservation Commission. The overall management goal is to restore, protect, and manage Tate's Hell ecosystems and maintain biological diversity, while integrating public use. The forest is a designated Wildlife Management Area, with opportunities for hunting, camping, fishing, canoeing, hiking, and off-highway vehicle use. The Florida Forest Service continues to manage a large portion of the property for timber production. Pine management activities provide an economic benefit and are aimed at improving forest health.

During the past ten years, a number of hydrologic restoration projects have been implemented at Tate's Hell State Forest by the District, the Florida Forest Service, the Florida Fish and Wildlife Conservation Commission, and other public and private entities. Hydrologic restoration within Tate's Hell State Forest is cost-effective because the land is state-owned, eliminating expensive land acquisition, and the Florida Forest Service performs many of the ongoing management activities such as prescribed burning, exotic species control and long-term roadway and drainage maintenance. The hydrologic restoration activities planned within Tate's Hell State Forest are one of the most significant contributions to the Apalachicola Bay System that can be made in the Florida portion of the Apalachicola-Chattahoochee-Flint River basin.

Recognizing the need for a long-term plan to guide future restoration efforts, the District and the Florida Forest Service began discussing hydrologic restoration goals, sharing data, and working on the development of a Hydrologic Restoration Plan. Hydrologic restoration goals shared by the District and Florida Forest Service include:

- (1) Improving the water quality of surface water flows and runoff discharged to East Bay, Apalachicola Bay, and surrounding waters
- (2) Restoring surface water drainage patterns to more natural conditions
- (3) Enhancing wetland hydrology and function
- (4) Restoring a mix of native ecological communities



The Hydrologic Restoration Plan is comprised of two volumes. Volume I describes the conditions at Tate's Hell State Forest, prioritizes areas for hydrologic restoration, and provides guidelines for environmental monitoring and habitat management of restoration areas. Volume II presents hydrologic restoration plans for the 29 surface water drainage basins identified within Tate's Hell State Forest (Figure 2), provides estimated construction costs associated with the proposed hydrologic improvements, and discusses aspects of project implementation. Both volumes were developed through a cooperative effort with the Florida Forest Service. The plan fulfills Florida Forest Service objectives outlined in the Ten-Year Management Plan for Tate's Hell State Forest (DOF 2007, pp. 5 and 14). Volumes I and II of the Hydrologic Restoration Plan may be found online at: <http://www.nwfwmdwetlands.com/index.php?Page=30>.

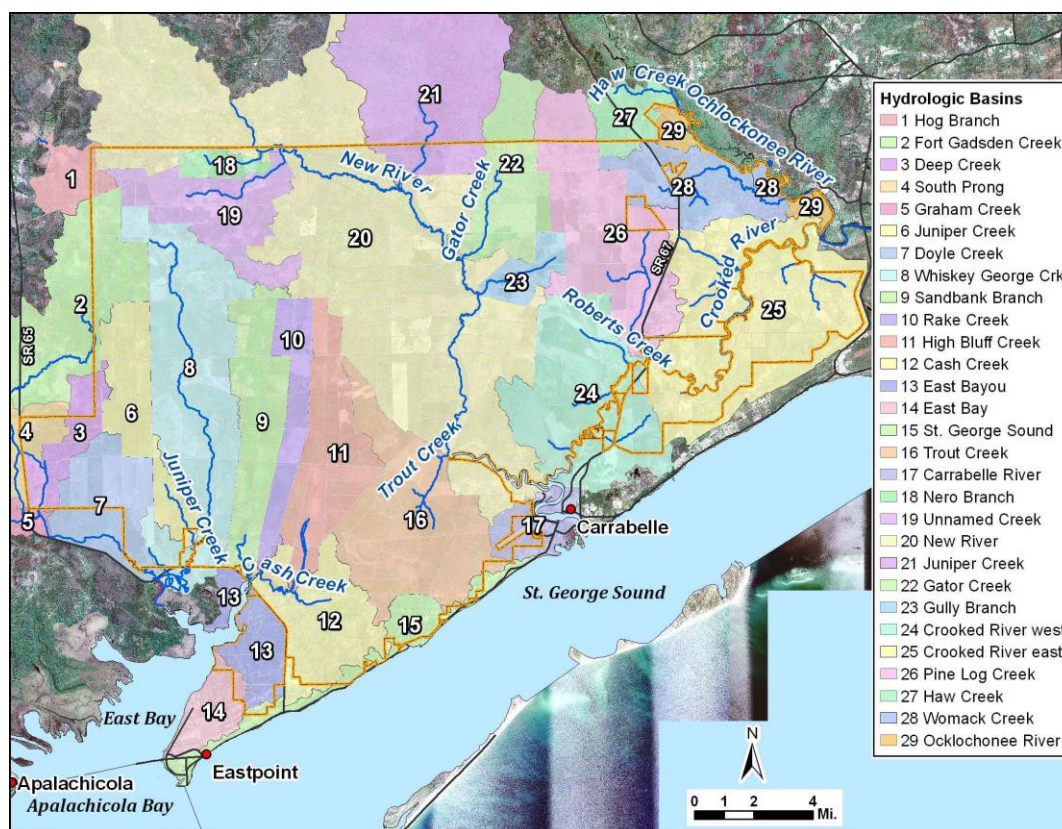


Figure 2. Surface Water Basins Within Tate's Hell State Forest

Areas within Tate's Hell State Forest were prioritized for restoration based on potential water quality benefits to Apalachicola Bay and surrounding waters, the feasibility of restoration, and the distribution of habitats of species of conservation concern. Approximately 25 listed plant and animal species occur within Tate's Hell State Forest including the Red-cockaded Woodpecker and Eastern indigo snake. The highest priority areas for restoration are generally located west of the New River and most discharge surface water to the Apalachicola Bay system.

The development of a hydrologic restoration plan for each surface water drainage basin was based on an extensive review of site data including forest stand attributes,

historical and present-day aerial photography, LiDAR elevation data, road and culvert attributes, recreational facilities, and maps of historical ecological communities.



Figure 3. Low Water Crossing

Restoration plans include proposed locations for hydrologic improvements such as low water crossings, ditch blocks, flashboard risers, and culvert modifications (Figures 3 and 4). Habitat management activities such as shrub removal and prescribed burning are also recommended in many areas.

To accompany the Hydrologic Restoration Plan, a set of GIS (Geographic Information Systems) mapping files have been prepared for use by the District and

the Florida Forest Service. These GIS files show the locations and attributes of the proposed low water crossings, culvert modifications, flashboard risers, ditch blocks and road removals. It is envisioned that the GIS files will be updated annually by the District and the Florida Forest Service as new field data become available.

In all, the 29 basin restoration plans include more than 200 low water crossings, 690 ditch blocks, 300 culvert improvements, 80 flashboard risers, 65 miles of road surfacing for sedimentation and erosion control, and nearly 20 miles of road removals. The estimated construction costs for the proposed hydrologic improvements total nearly \$8 million. Costs for habitat improvements (e.g. prescribed burning, replanting, and shrub reduction) and post-construction monitoring have not been included and will depend on field conditions and permitting requirements encountered when individual projects are implemented. Some habitat management activities, such as prescribed burning, will continue to be performed by the Florida Forest Service.

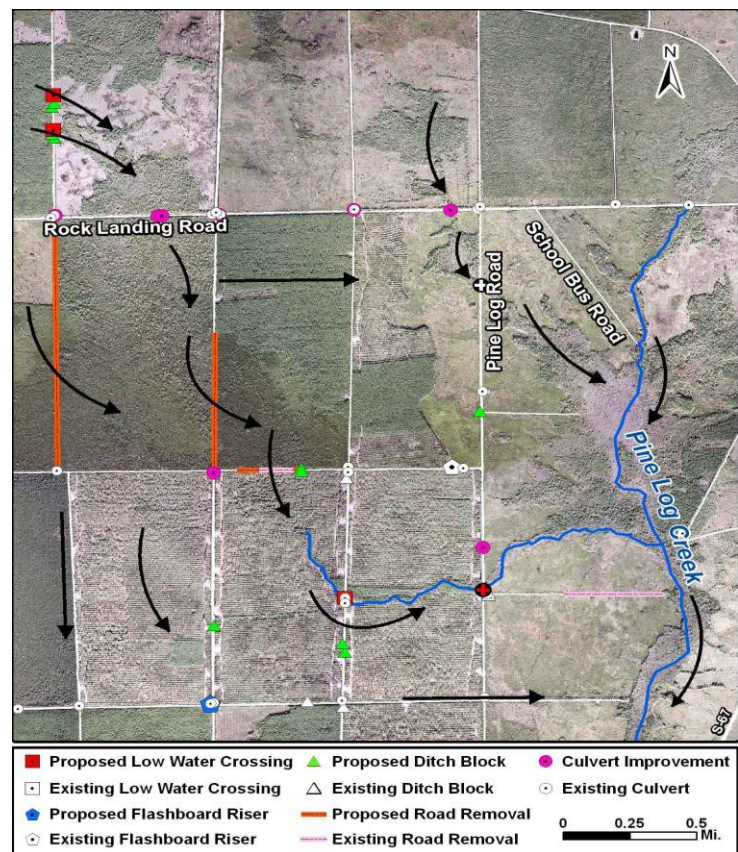


Figure 4. Example Restoration Plan Showing Proposed Hydrologic Improvements and Post-Restoration Drainage Patterns in the Pine Log Creek Basin

Due to the large area encompassed by Tate's Hell State Forest and the extensive degree of hydrologic impacts, restoration is anticipated to be a gradual process with cumulative benefits accruing as hydrologic restoration and habitat management activities are implemented during the next 5 to 20 years or longer. Restoration projects are anticipated to be implemented by the District, Florida Forest Service, and other public and private entities. Potential funding sources include agency budgets, FDOT mitigation funds, and state and federal grants. For projects that are implemented using FDOT mitigation funds, the District would essentially bank credits developed through its regional mitigation plan (found at: nwfwmdwetlands.com). The Florida Forest Service would be required to refrain from using wetland mitigation areas solely for long-term timber production and would closely adhere to prescribed wetland mitigation requirements.

Table 1. Summary of proposed hydrologic improvements and estimated construction costs for Tate's Hell State Forest.

Structure	Unit cost	Total Number	Total Cost
Culvert	\$5,000	320	\$1,313,350
Box culverts/weirs	\$40,000	6	\$240,000
Bridges	\$100,000	8	\$800,000
Ditch block	\$2,550	691	\$1,762,050
Flashboard riser	\$6,000	80	\$480,000
Road Surfacing	\$61,000	63	\$3,843,000
Low water crossing	\$15,000	200	\$3,000,000
Road removal	\$17,000	19.84	\$337,195
			\$11,775,595

The implementation of specific restoration projects will typically involve additional field reviews, final design and permitting, construction activities, and habitat modifications, followed by post-restoration monitoring. Prior to finalizing the design for a particular project, a comprehensive field

review should be performed to assess current site conditions and to confirm the suitability of restoration goals and design details associated with the proposed hydrologic improvements. Prior to applying for state and federal permits, project details will be reviewed with Florida Forest Service to confirm that the proposed hydrologic restoration activities do not pose a conflict with other land management activities.

An adaptive management approach will be used for restoration activities whereby post construction monitoring will be performed to confirm that ecosystem conditions and hydrologic restoration goals are being achieved. If ecosystem conditions are not exhibiting a trend towards desired conditions, restoration projects will be re-evaluated and restoration plans or activities will be revised as needed. It is anticipated that the Hydrologic Restoration Plan will be updated and refined over time based on the result of ongoing monitoring activities.





Project Name:

Tate's Hell State Forest Hydrologic Restoration Project

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Forest Supervisor, Tate's Hell State Forest
290 Airport Road Carrabelle, FL 32358, Ph: 850 697 3734 x104, e-mail,
david.morse@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

Tate's Hell State Forest (THSF), over nineteen watersheds in Franklin and Liberty Counties, Florida

Project Description *(Describe all aspects of the project):*

The proposed hydrologic improvements in Tate's Hell State Forest 200 low water crossings, 691 ditch blocks, 8 bridges, 80 flash board risers, 320 culvert modifications, 8 box culverts/weirs, 63 miles of road surfacing, and up to 20 miles of road removals. Most of the basin is comprised of wetland habitats that drain into the New River and then into the salt marshes and estuary of St. George Sound just offshore of Carrabelle, Florida.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*

\$11,775,595

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

N/A

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):* Work is in line with other hydrologic restoration efforts on THSF by the Northwest Florida Water Management District. The development of a hydrologic restoration plan for each surface water drainage basin was based on an extensive review of site data including forest stand attributes, historical and present-day aerial photography, LiDAR elevation data, road and culvert attributes, recreational facilities, and maps of historical ecological communities. Restoration plans include proposed locations for hydrologic improvements such as low water crossings, ditch blocks, flashboard risers, and culvert modifications.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts*



associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):

There has been little hydrologic restoration in either basin. Proposed restoration activities are aimed at reconnecting the cypress slough system, reconnecting contributing drainage areas to streams and reducing flows in roadside ditches. In the multiple-use mandate for THSF, clean water and forest buffer to the salt marshes are significant environmental benefits.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Forest operations on THSF provide employment to local and regional contractors. Maintaining the visual landscape on THSF improves the recreational prospects for eco-tourism.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The long term forest management of THSF by the Florida Forest Service vs. the short term rotation of a woody crop by forest industry will restore, promote, and sustain greater resiliency in the native landscapes. Management on THSF is done in sync with the Florida Fish and Wildlife Commission and the Northwest Florida Water Management District for the long term sustainability of the bio-diversity and native habitats.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

"The mission of the Florida Forest Service is to protect Florida and its people from the dangers of wildland fire and manage the forest resources through a stewardship ethic to assure they are available for future generations."

This proposal compliments other restoration efforts on THSF by the Florida Forest Service, Fish and Wildlife Commission, and Northwest Florida Water Management District.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

There are no conflicting issues.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Coordination with the Northwest Florida Water Management District will begin with the awarding of funding and lead quickly to the invitation to bid for contracted services.



Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

The proposal meets or exceeds public acceptance and expectations for THSF.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

Additional information on the Tate's Hell State Forest Hydrologic restoration plan is available from the North West Florida Water Management District website:

<http://www.nwfwmd.state.fl.us/>

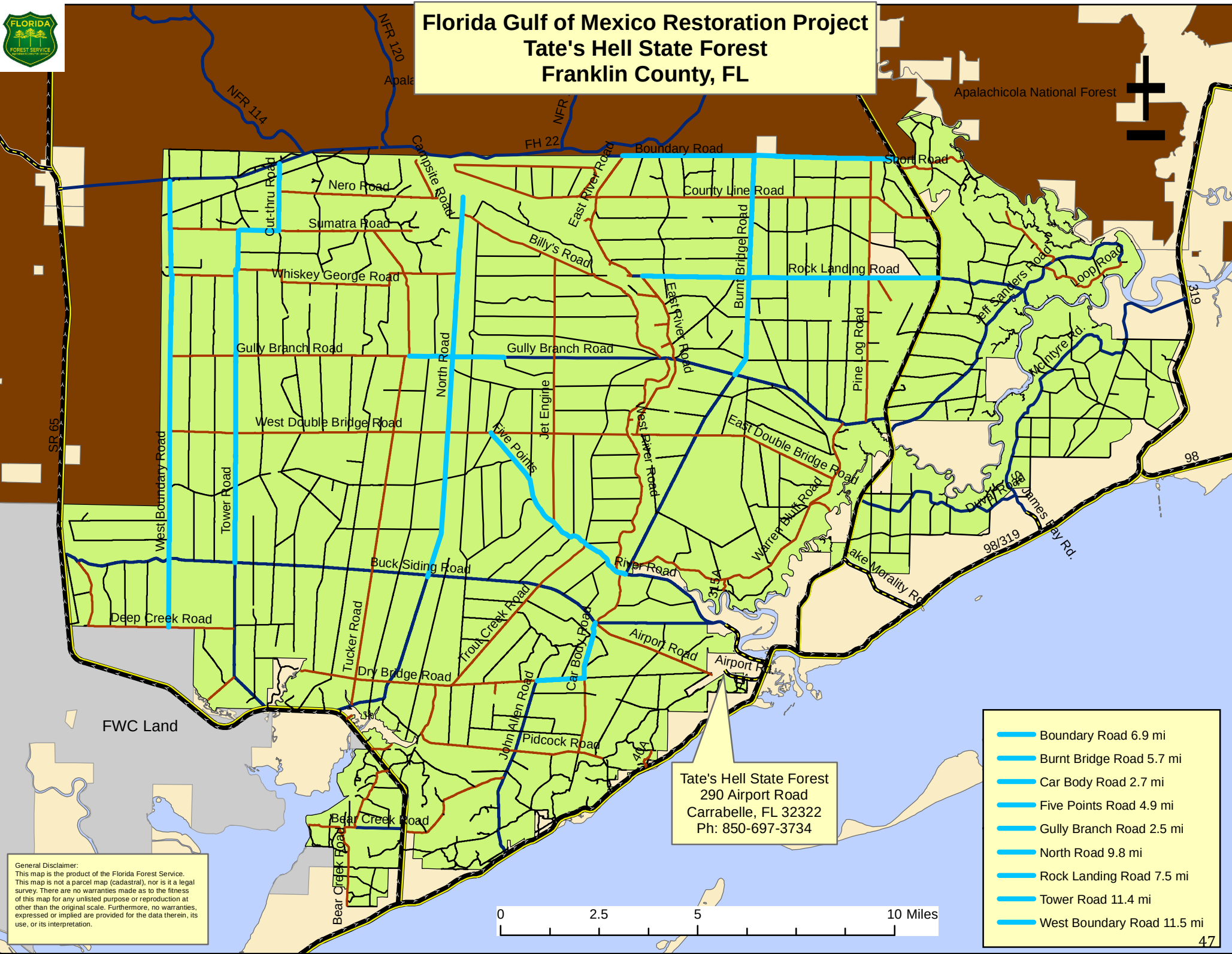






Florida Gulf of Mexico Restoration Project Tate's Hell State Forest Franklin County, FL

Apalachicola National Forest





Cost Appendix Sheet

Cost Item	Cost Estimate
Planning	
Contracts	
Feasibility	\$100,110.00
Engineering, Design, Land Rights & Bid Prep	\$200,215.00
Restoration Plan	completed
Site Visits & Cost of Site Selection	\$66,750.00
Administration, Overhead, and Indirect	
Other	
Planning Subtotal:	\$186,885.00
Construction	
Contracts w/ materials	\$10,041,460.00
Administration &	\$133,500.00
Mobilization/Demobilization	
Other	
Construction Subtotal:	\$10,174,960.00
Monitoring	
Contracts	\$66,750.00
Data Collection	\$133,500.00
Monitoring Administration	\$80,000.00
Other	
Monitoring Subtotal:	\$280,250.00
Project Cost	
Supervision	\$133,500.00
Subtotal:	\$133,500.00
Contingency	\$1,000,000.00
TOTAL:	\$11,775,595.00

Estimated Costs by Year

Year 1	\$2,639,410.00
Year 2	\$2,695,460.00
Year 3	\$3,028,793.00
Year 4	\$2,966,498.00
Year 5	\$389,384.00
Year 6	\$56,050.00





Tate's Hell State Forest Hydrologic Restoration Plan

Volume I



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**Florida Division of Forestry
290 Airport Road, Carrabelle, FL 32322**



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Acknowledgements:

This Hydrologic Restoration Plan is the result of the work and contributions of many individuals. At the Northwest Florida Water Management District, Ron Bartel, Director of the Resource Management Division, supervised this effort and provided oversight during the plan development process. We gratefully acknowledge Linda Chaisson, who participated in many of the field reviews along with Nick Wooten, Duncan Cairns, David Clayton, and John Crowe, who provided valuable guidance and suggestions regarding the plan's content. Robert Lide developed an excellent webpage for the overall project and also provided numerous historical aerial photos of several project areas.

Within the Florida Division of Forestry, Tom Gilpin, Ken Weber, Jeff Vowell, and Kawika Bailey provided supervisory oversight during the development of this plan. Numerous staff from Division of Forestry provided valuable data regarding forest stand attributes, surface water drainage patterns, and existing roads and culverts and participated in a series of monthly meetings to review the proposed hydrologic improvements. The contributions of the following forestry staff are gratefully acknowledged: Jim Lunquest, David Morse, Roy Lima, Victor Rowland, George Serfess,

Ace Haddock, previously with the Florida Division of Forestry, coordinated hydrologic restoration efforts at Tate's Hell State Forest for many years and this plan could not have been developed without his long-term vision, his guidance, and his extensive knowledge of the forest. We also appreciate the contributions of Adam Warwick and Jie Kim at the Florida Fish and Wildlife Conservation Commission who participated in extensive map reviews and provided important information regarding Red-cockaded Woodpeckers and other wildlife species. Carolyn Kindell, at the Floridan Natural Areas Inventory, performed the original interpretation and mapping of historical vegetation communities and provided valuable data regarding documented occurrences of rare and listed plant and animal species.

Primary Authors: Kathleen Coates and Graham Lewis.

Editorial and Contributory Assistance: Christina Coger, Linda Chaisson

Volume I

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Volume II: Basin Restoration Plans 2010 – 2020

Volume II describes the approach used to development hydrologic restoration plans, provides hydrologic restoration plans for the 29 surface water drainage basins in the vicinity of Tate's Hell State Forest, provides estimated construction costs for the proposed hydrologic improvements, discusses implementation of the Hydrologic Restoration Plan and operations and maintenance of structures, and provides a summary and recommendations for both Volume I and Volume II.

Introduction

History

Tate's Hell State Forest encompasses 202,436 acres of low-lying, poorly drained land located between the Apalachicola and Ochlockonee rivers in Franklin and southern Liberty counties (Figure 1). The present day forest was once a wetland-dominated landscape referred to as Tate's Hell Swamp. Tate's Hell Swamp encompassed at least 12 ecological community types including wet prairies, dwarf cypress swamps, Atlantic White Cedar swamps, and mixed forested wetlands (Florida Natural Areas Inventory 1997, 2000). Pine flatwoods and uplands were found at higher topographic elevations and along the remnant coastal ridges. Coastal habitats included fresh and saltwater marshes and sand pine scrub.

The forest has experienced a long history of silvicultural activities and thousands of acres of historical wetlands have been converted to slash pine plantation. In the late 1800s, timber harvesting was a key component of the economy of Franklin County. By the 1920s, there were seven sawmills in the area (Division of Forestry 2007). Tram lines were used to access blocks of old growth longleaf pine (*Pinus palustris*), cypress (*Taxodium* spp.) and Atlantic white cedar (*Chamaecyparis thyoides*) (Division of Forestry 2007). Through the early 1950s, timber production and cattle grazing were the predominant land uses in and around Tate's Hell. Aerial photos from 1953 depict scattered areas of logging activities and reveal that many of the major forest roads were under construction.

During the 1960s and 1970s, extensive areas of pine flatwoods, wetlands, and other habitats were converted to slash pine (*Pinus elliottii*) plantation. A comparison of 1953, 1969, and 1973 aerial photography for Tate's Hell area suggests that many of the 800 miles of unpaved logging roads were constructed during the 1950s and 1960s. Roadside ditches were excavated to provide road fill material and to drain adjacent wetlands. Many pine stands were bedded, planted at high densities, and fertilized with nitrogen and phosphorus. Prior to state acquisition of the property, fire was typically suppressed. These large-scale habitat alterations significantly impacted historical ecological communities and altered the magnitude, timing, and quality of surface water runoff discharged from Tate's Hell Swamp to Apalachicola Bay, East Bay, St. George Sound and surrounding waters.

The Apalachicola River and Bay system contains one of the most diverse, productive, and economically important estuaries in the United States. The river and bay system has been designated as Outstanding Florida Waters and Apalachicola Bay has been designated as an Aquatic Preserve. East Bay, which receives surface water runoff from Tate's Hell, serves as a major nursery for ecologically and commercially important finfish, shellfish and other aquatic organisms. The Apalachicola River and Bay system is a high priority for the Surface Water Improvement and Management (SWIM) Program, which was established by the state in 1987 to reduce watershed degradation and protect natural resources.

In 1994, the State of Florida began acquiring the Tate's Hell property with the goal of restoring historical ecological communities and surface water drainage patterns to improve the quality of surface water discharged to the Apalachicola Bay system and surrounding waters. The Northwest

Florida Water Management District initiated the land acquisition process with the \$3.5 million purchase of the Glawson tract. Due to the ecological importance of the East Bay estuary, the acquisition and restoration of Tate's Hell was identified as a priority under the State of Florida's Conservation and Recreation Lands (CARL) Program.

To date, the land acquired for Tate's Hell State Forest totals 202,436 acres. It is the second largest State Forest and the largest contiguous State Forest in Florida. Tate's Hell is managed as a multi-use area by the Florida Division of Forestry (DOF) with cooperation from the Florida Fish and Wildlife Conservation Commission (FWC). The overall land management goal is to restore, protect, and manage Tate's Hell ecosystems and maintain biological diversity, while integrating public use (DOF 2007). The forest is a designated Wildlife Management Area, with opportunities for hunting, camping, fishing, canoeing, hiking, and off-highway vehicle use.

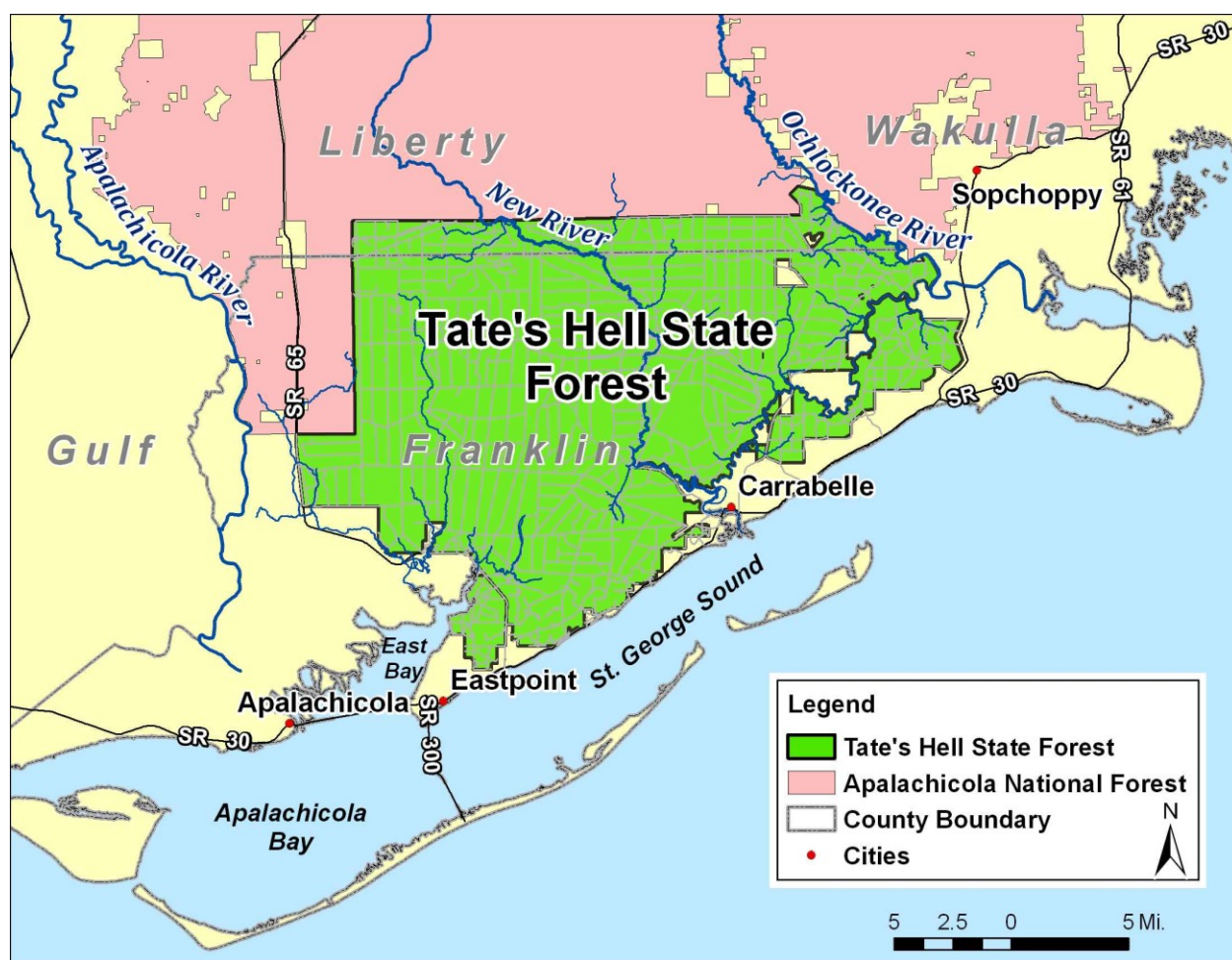


Figure 1. Location of Tate's Hell State Forest

The Division of Forestry continues to manage a large portion of the property for timber production. Pine management activities provide an economic benefit to the state and local community and are aimed at improving forest health. Where soils and topography are suitable, the Division of Forestry has replanted clear-cut areas with long-leaf pine (*Pinus palustris*). The Division of Forestry uses prescribed burns to maintain appropriate fire frequencies, which is critical because

many of the native ecosystems are fire-dependent. The Ten-Year Management Plan for Tate's Hell indicates that the Division of Forestry will shift from managing even-aged pine stands towards uneven aged stands with old growth characteristics (DOF 2007). Natural regeneration rather than replanting is the preferred approach to long-term reforestation.

In addition to pine flatwoods, there are many other ecological communities at Tate's Hell that will benefit from forest management and hydrologic restoration activities. These ecosystems include wet savannas, dwarf cypress swamps, forested wetlands, salt and freshwater marshes, and uplands and coastal scrub. Together, these ecosystems harbor at least 25 state-listed endangered, threatened, or species of special concern including the Red-cockaded Woodpecker (*Picoides borealis*), the frosted flatwoods salamander (*Ambystoma cingulatum*), and the Florida black bear (*Ursus americanus floridanus*), and plants such as the spoon-leaved sundew (*Drosera intermedia*), white-top pitcher-plant (*Sarracenia leucophylla*), and yellow fringeless orchid (*Platanthera integra*).

Hydrologic Restoration Goals

The Northwest Florida Water Management District (NFWFMD or District) shares the Division of Forestry's goals of restoring and protecting the ecosystems of Tate's Hell State Forest, with a particular emphasis on hydrologic restoration. The overall goals of hydrologic restoration are to:

- (1) Improve the water quality of surface water flows and runoff discharged to East Bay, Apalachicola Bay, and surrounding waters
- (2) Restore historical surface water drainage patterns
- (3) Enhance wetland hydrology and function
- (4) Restore a mix of native ecological communities

During the past ten years, nearly a dozen hydrologic restoration projects have been implemented within Tate's Hell State Forest by the NFWFMD, the DOF, the FWC, and other public and private entities. Existing projects are scattered across the site and target a variety of ecological community types. Past hydrologic restoration activities have included:

- removing forest roads and adjacent ditches
- installing hardened low water road crossings
- installing ditch blocks and flashboard risers
- installing bridges
- modifying culverts
- reducing the density of undesirable shrub or tree species
- replanting native groundcover and tree species
- controlling exotic and invasive plants
- restoring appropriate fire regimes using prescribed burns

Due to the large size of Tate's Hell and the extensive degree of impacts, restoration of historical ecological communities and surface water drainage patterns is anticipated to be a gradual process

with cumulative benefits accruing as hydrologic restoration and ecosystem management activities are implemented during the next several decades.

Plan Objectives

To date, wetland restoration has been implemented largely on an *ad hoc* basis. The NFWFMD and the Division of Forestry recognized the need for a comprehensive plan to guide future restoration efforts and in 2007 began discussing goals and priorities, sharing data, and working on the development of a ten-year Hydrologic Restoration Plan.

The objectives of the Hydrologic Restoration Plan are to:

- (1) Prioritize areas within Tate's Hell State Forest for hydrologic restoration
- (2) Develop hydrologic restoration plans for each surface water drainage basin, including locations for proposed hydrologic improvements and estimates of construction costs
- (3) Develop guidelines for environmental monitoring and long-term management of restoration areas
- (4) Improve interagency communication and coordination related to hydrologic restoration activities

The Hydrologic Restoration Plan provides a blueprint for future restoration activities. The *Ten-Year Resource Management Plan for the Tate's Hell State Forest* (DOF 2007) and the *Vegetation Management Guidelines for the Tate's Hell State Forest* (DOF and Florida Natural Areas Inventory 2001) provided the starting point for the development of the Hydrologic Restoration Plan. The Division of Forestry and NFWFMD recognize that the hydrologic restoration at Tate's Hell will be an incremental and adaptive process that will continue over the next several decades. Restoration priorities, basin-specific hydrologic restoration plans, and monitoring and management guidelines are anticipated to be reviewed and revised as site conditions and land management priorities change over time. To enable future plan revisions to be made in an efficient manner, two secondary objectives of the planning process were to: (1) develop a set of GIS files containing information pertinent to restoration activities that can be maintained and periodically updated by the NFWFMD and the Division of Forestry, and (2) improve interagency coordination regarding hydrologic restoration and data collection and maintenance.

Plan Contents

The Hydrologic Restoration Plan for Tate's Hell State Forest is comprised of two volumes. Volume I provides a description of Tate's Hell State Forest, prioritizes areas for hydrologic restoration activities, and provides guidelines for environmental monitoring and management of restoration areas. Volume II presents the hydrologic restoration plans for each surface water drainage basin, provides planning level costs for the proposed hydrologic improvements, and gives recommendations for project implementation and long-term operations and maintenance.

Description of Tate's Hell State Forest

Tate's Hell State Forest encompasses 202,400 acres of poorly drained land in Franklin and southern Liberty counties between the Apalachicola and Ochlockonee rivers (Figure 1). The property extends approximately 17 miles inland from the coast. The present day forest was once a wetland-dominated landscape referred to as Tate's Hell Swamp. During the 1960s through the early 1980s, extensive areas of wetlands and pine flatwoods were converted to dense stands of slash pine plantation. At the same time, more than 800 miles of unpaved roads were constructed. Drainage ditches were excavated along most roads to provide road fill material and drain nearby wetlands. The property was purchased by the State of Florida with the goal of restoring historical ecological communities and surface water drainage patterns in order to improve the quality of surface water runoff discharged from the area to East Bay, Apalachicola Bay, and surrounding waters.

Climate

Tate's Hell State Forest has a humid subtropical climate with long, warm, and wet summers and mild winters. Table 1 summarizes average monthly precipitation recorded at Tate's Hell State Forest during 1995-2010. Inland from the coast, annual precipitation totals about 58 inches of which about 28.5 inches, or 49%, usually occurs during the summer rainy season, from June through September. About 20 inches of rainfall occurs during the winter rainy season, from late December through April. May, October and November are typically the driest months. Annual rainfall is slightly less near the coast and averages approximately 56 inches per year. Monthly average daily temperatures recorded in nearby Apalachicola, FL range from 55⁰F to 60⁰F during the winter months of December through February and average about 80⁰F during the summer. Spring and fall are moderate, with average temperatures generally in the 60s and 70s.

Table 1. Average Monthly Total Rainfall at Tate's Hell State Forest, Station 430, 1995 – 2010

Month	Total Precipitation (in)
January	3.31
February	4.23
March	4.91
April	3.05
May	2.26
June	6.59
July	7.32
August	7.28
September	7.26
October	4.31
November	3.28
December	4.49
Total	58.29

Topography and Soils

The topography of Tate's Hell State Forest is characterized low-lying river corridors, tidal marshes, and a series of remnant coastal ridges. Land surface elevations range from sea level to approximately 50 ft NAVD 88 along some of the remnant sand dune ridges (Figure 2). Most elevations are less than 36 ft NAVD 88.

Although more than 40 unique soil types occur within the forest, four groups account for the majority of the soils (Figure 3). In order of prevalence, these are: (1) Scranton - Rutlege, (2) Plummer-Surrency-Pelham, (3) Meadowbrook-Tooles-Harbeson, and (4) Pamlico-Pickney-Maurepas. All are poorly drained hydric soils.

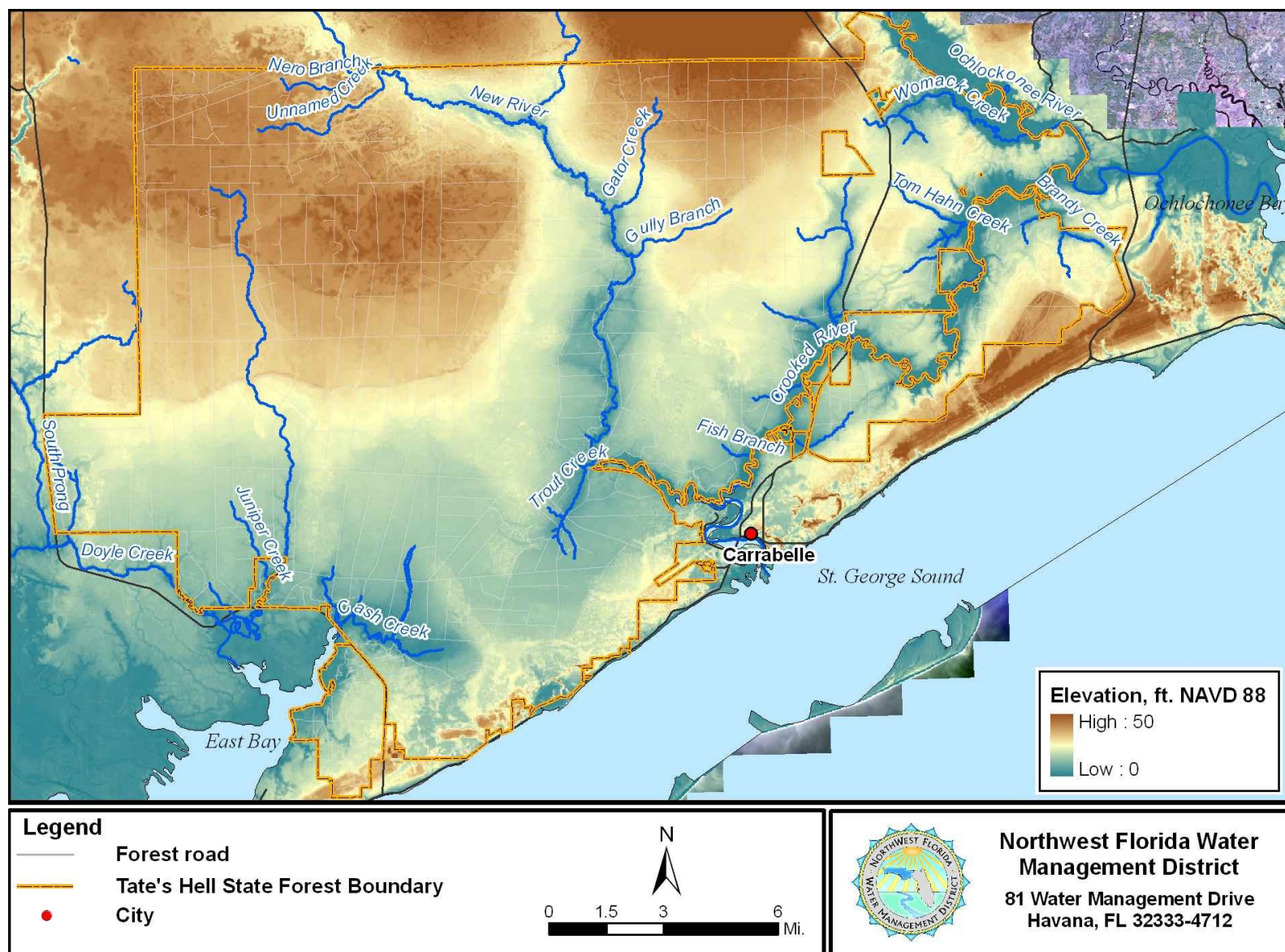


Figure 2. Topography Within Tate's Hell State Forest Derived from LiDAR Elevation Data

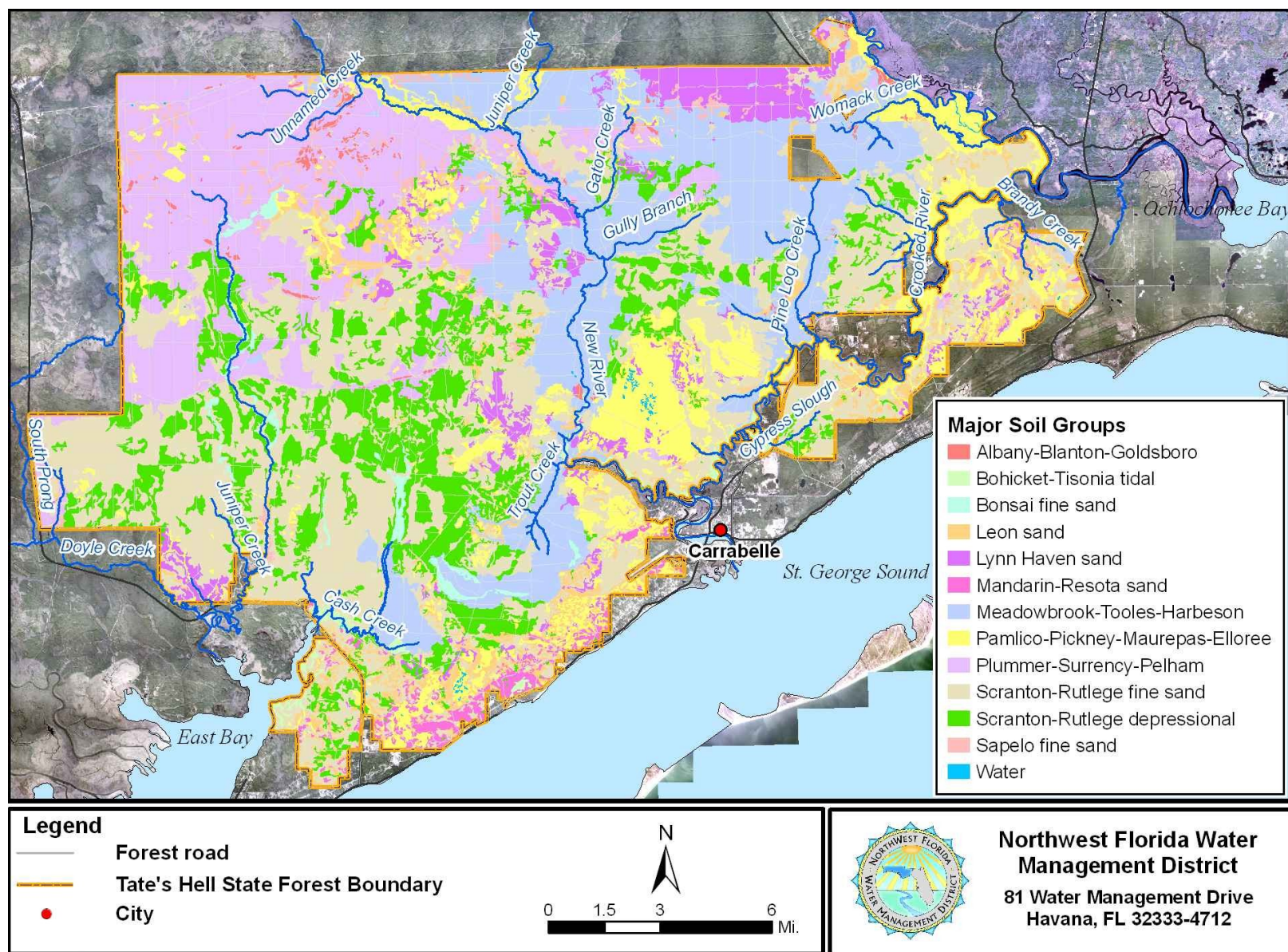


Figure 3. Major Soil Groupings Within Tate's Hell State Forest (SCS 1994)

Hydrogeology

Tate's Hell State Forest is geographically situated within the Apalachicola Embayment region of the Florida panhandle. In order of increasing depth, the hydrogeologic units that comprise the ground water flow system under Tate's Hell State Forest are the Surficial Aquifer, the Intermediate System, and the Floridan Aquifer System.

The Surficial Aquifer consists of undifferentiated sands and clays which are typically unconfined with the exception of areas under semi-confined conditions produced by local sandy clay layers. Ground water from the Surficial Aquifer tends to be less mineralized than water from the underlying systems due to its relatively young age, and therefore has not allowed dissolution from geologic material. In Franklin County, the only known consumptive use of the Surficial Aquifer is on the barrier islands, where wells yielding up to 50 gpm are utilized for landscape irrigation. Discharge from the surficial aquifer contributes to the baseflow of local streams within Tate's Hell State Forest.

The Intermediate System is mainly a confining unit that consists of soft, fossiliferous limestone overlain by a thin layer of sandy clay and clayey sand. The Intermediate System is thickest in the western part of the forest and thins toward the north and the east where it can be less than 50 feet thick. As the Intermediate System thins, leakage across it increases and causes it to function as a semi-confining unit to the Floridan Aquifer below.

The Floridan Aquifer is a sequence of carbonate sediments ranging in thickness from about 1,800 feet in the extreme western portion of the forest to more than 2,800 feet in southern portion and along the coast. Floridan Aquifer transmissivity under Tate's Hell is variable and highest in the eastern part of Franklin County. This higher transmissivity is the result of the southernmost extension of the Woodville Karst Plain into the eastern parts of the forest. Geographically, the Woodville Karst Plain is an area of active recharge, flow, and dissolution into the Floridan Aquifer, and these processes result in higher aquifer transmissivities. Northwest Florida Water Management Test wells in the eastern part of Tate's Hell State Forest yield transmissivities of 20,000 to 40,000 feet squared per day (ft^2/d) in the Floridan Aquifer.

Surface Water Hydrology

Stream basins

Figure 4 is a map of the surface water drainage basins in the vicinity of Tate's Hell State Forest. These 29 basins can be grouped into those that discharge to the Ochlockonee River, those that discharge to St. George Sound, and those that discharge to East Bay and the Apalachicola River and Bay system. The area of Tate's Hell State Forest located east of SR 67 is comprised of the Womack Creek basin, part of the Haw Creek basin, and the eastern portion of the Crooked River basin, all of which drain east to the Ochlockonee River. However, when the Ochlockonee River is at flood stage, the Crooked River instead receives water from the Ochlockonee River and flows to the west. Brandy Creek is a small tributary to the Crooked River.

West of SR 67, surface water runoff from the Pine Log Creek basin drains south to the Crooked River. Except for periods when the Ocklockonee River is at flood stage, this reach of the Crooked River generally flows west and merges with the New River to form the Carrabelle River. The divide between easterly and westerly flow in the Crooked River is generally located near or just to the east of the SR 67 bridge. Smaller tributaries to the western reach of the Crooked River include Fish Branch, Sunday Rollaway Creek, and Roberts Creek.

The New River basin is the largest watershed in Tate's Hell State Forest. The entire basin encompasses more than 110,000 acres and extends north of the Tate's Hell property. Tributary basins to the New River include Juniper Creek (northeast of the New River), Gator Creek, Gully Branch, Trout Creek, Nero Branch, and an Unnamed Creek. The New River merges with the Crooked River to form the Carrabelle River and discharges into St. George Sound. Southwest of the Carrabelle River, runoff from some coastal areas of Tate's Hell State Forest discharges directly into St. George Sound.

West of the New River, the High Bluff Creek, Rake Creek, and Sandbank Branch drainage basins discharge into Cash Creek. Cash Creek, in turn, discharges into the East Bayou of East Bay. South of SR 65, portions of the Tate's Hell State Forest drain directly into East Bayou, East Bay, and St. George Sound.

The Whiskey George Creek basin is the largest watershed west of the New River. Whiskey George Creek flows south more than 20 miles and discharges into the West Bayou of East Bay. Tributaries to Whiskey George Creek include Juniper Creek and Doyle Creek. Farther west, surface water from the South Prong, Deep Creek, Graham Creek, and Fort Gadsden Creek basins flows west and eventually discharges to the Apalachicola River.

Local Flow Patterns

Prior to the construction of roads and ditches and the conversion of native habitats to slash pine plantation, surface water runoff filtered through natural wetland habitats prior to discharging to local streams and rivers. For example, surface water runoff from hydric pine flatwoods likely flowed through wet savannas and cypress flats before discharging to the mixed forested wetlands and cypress sloughs located along the stream corridors. In the upper portions of some surface water basins, the historic stream channels were poorly defined. Instead, surface water runoff flowed downstream through a series of one or more large, interconnected basin swamps or cypress sloughs. Historical surface water drainage patterns were critical for maintaining appropriate hydroperiods across a suite of wetland community types. Appropriate wetland hydroperiods support native wetland vegetation and wetland-dependent wildlife such as wading birds and flatwoods salamanders.

The construction of more than 800 miles of forest roads and adjacent ditches has significantly altered local surface water drainage patterns across the present-day Tate's Hell State Forest. During the past few decades, more than 600 culverts also have been installed across the forest roads to alleviate flooding and control the flow of water in roadside ditches. Many slash pine stands

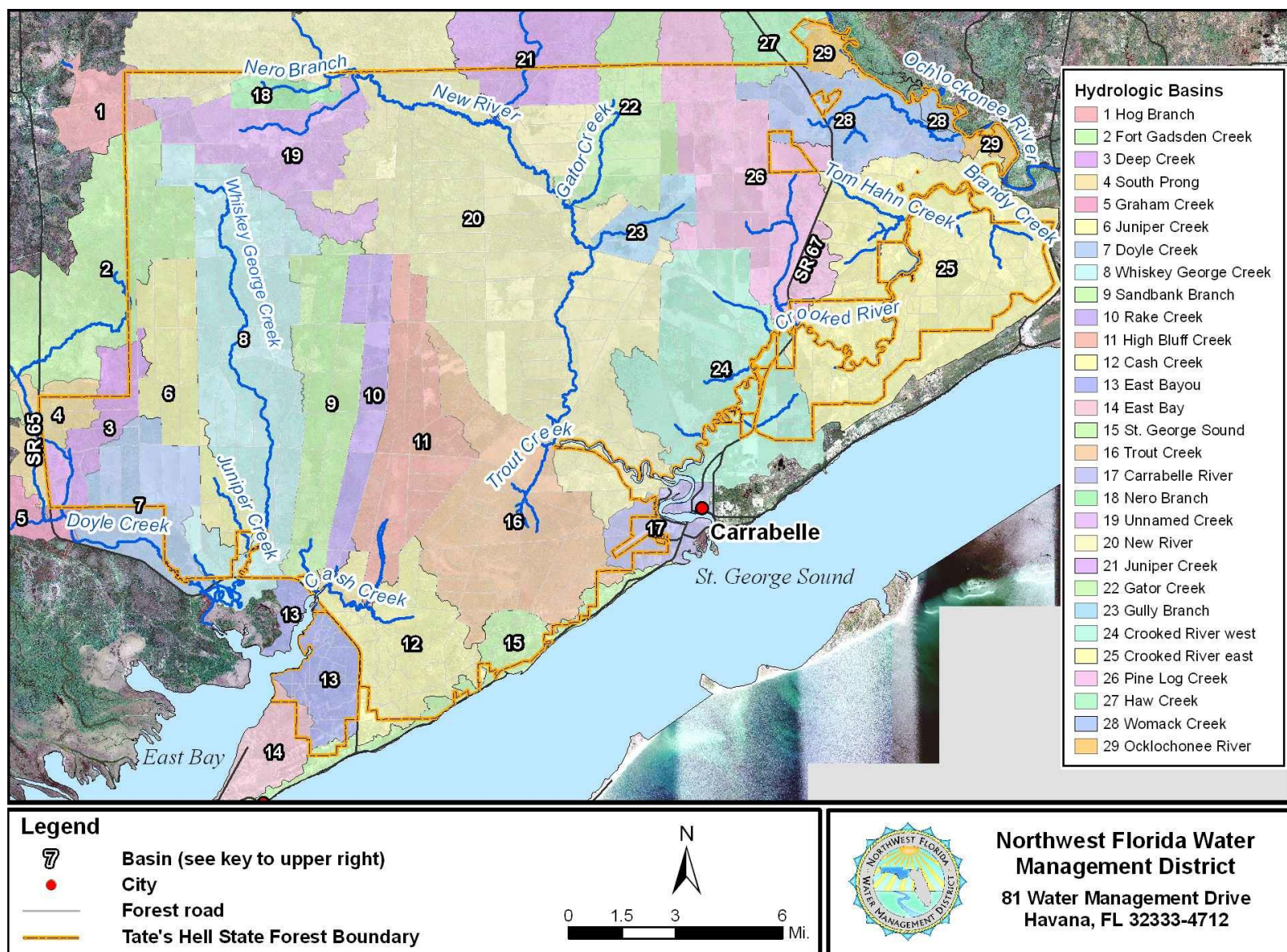


Figure 4. Surface Water Drainage Basins Within Tate's Hell State Forest

were bedded, creating alternating rows of low hills and valleys that disrupted small-scale surface water drainage patterns.

The construction of roads and ditches, together with extensive habitat alterations and the prevalence of poorly drained soils and relatively flat topography, have contributed to the complexity of current surface water drainage patterns. Figure 4 depicts the surface water basins within Tate's Hell State Forest. Many of these basin boundaries are approximate. Basin boundaries were revised using 2007 LiDAR elevation data, 1953 historical aerial photography, and observed flow directions in roadside ditches and culverts. However, flow directions were not available for all culverts and ditches. Furthermore, the available data suggest that the flow direction in some ditches may vary in response to hydrologic conditions. As a result, surface water runoff within the roadside ditches may flow across delineated basin boundaries at some locations. At other locations, forest roads may prevent surface water runoff from adhering to historical flow paths. Basin boundaries will likely change over time as hydrologic improvements (e.g low water crossings, culverts, etc) are implemented to restore historical flow patterns.

Lakes, Ponds, and Wetlands

There are no natural lakes within Tate's Hell State Forest. There are, however, a number of borrow pit ponds scattered across the property, particularly along forest road 22 and SR 67. Ephemeral ponds may be found within remnant wet savannas as well as other wetlands. Some of the deeper cypress sloughs and forested wetlands may contain water year-round. A description of the various wetland types and their distribution within Tate's Hell State Forest is provided in the next section.

Ecological Communities

Staff from the Florida Natural Areas Inventory delineated 14 historical ecological communities (plus open water and cleared areas) within Tate's Hell State Forest based on a review of 1953 aerial photography, soils maps, field data, and other information (FNAI 1997, 2000). Table 2 summarizes the acreage within each group. Figure 5 shows the distribution of historical communities across the landscape. Note that historical ecological communities within Tate's Hell State Forest were delineated during 1997-2000 and reflect the total land area owned by the state at that time.

Table 2. Ecological Groups Within Tate's Hell State Forest

Ecological Community	Acres	D r y
Sand pine scrub	1,848	T o t a l
Mesic flatwoods	27,469	
Wet / mesic flatwoods (grassy)	8,254	
Wet / mesic flatwoods (shrubby)	13,805	
Wet savanna – pine flatwoods mosaic	49,903	
Wet savanna	19,860	
Wet savanna – swamp mosaic	617	
Wet savanna – cypress flats	11,445	
Shrub wetland	4,145	
Basin swamp (Atlantic White Cedar)	750	
Basin swamp / shrub / mixed forested wetland	44,605	
Mixed forested wetland	3,749	
Deciduous forested wetland	7,618	
Marsh	2,525	
Open water	9	W e t
Cleared	230	
TOTAL	196,832	

Table 2 summarizes the acreage within each group. Figure 5 shows the distribution of historical communities across the landscape. Note that historical ecological communities within Tate's Hell State Forest were delineated during 1997-2000 and reflect the total land area owned by the state at that time.

In all, wetland habitats comprised more than 45% of

the historical land cover within Tate's Hell State Forest. Pine flatwoods accounted for 25 % and pine flatwood – wetland mosaics account for another 25%. A description of the major historical ecological groups, based largely on the previous FNAI studies (FNAI 1997 and 2000) and a brief description of current land cover conditions is given below.

Sand pine scrub

Sand pine scrub occurs on well-drained soils along remnant coastal dune ridges. Sand pine (*Pinus clausa choctawhatchee*) is the dominant native canopy species. Shrubs include myrtle oak (*Quercus myrtifolia*), sand live oak (*Quercus geminata*), saw palmetto (*Serenoa repens*), and Florida rosemary (*Ceratiola ericoides*). There are relatively few groundcover plants but lichens are common. It is thought that patchy fires occurred relatively infrequently (every 50 to 100 years) in this habitat (FNAI 2000). Some areas of historical sand pine scrub have been harvested and replanted in slash pine or sand pine but most areas are relatively undisturbed. The High Bluff Coastal Hiking Trail, located within Tate's Hell State Forest along U.S. Hwy 98, winds through an area of relatively undisturbed sand pine scrub. Areas delineated as historical sand pine scrub also include several narrow strips of shoreline and beach located between U.S. Hwy 98 and St. George Sound.

Mesic flatwoods

Mesic flatwoods occur on moderately-drained sandy soils. Natural mesic flatwoods have an open canopy of longleaf pine, a sparse mid-story, and a dense low groundcover that typically includes wiregrass (*Aristida stricta*), Florida dropseed (*Sporobolus floridanus*) bracken fern (*Pteridium aquilinum*), saw palmetto, and other low shrubs and grasses (FNAI 2000). The recommended fire return interval is every three to four years. In Tate's Hell State Forest, most areas of historical mesic flatwoods were converted to dense stands of slash pine plantation. In recent years, the Division of Forestry has thinned or cleared some of these areas and replanted them with longleaf pine. However, trees have been replanted at relatively high densities (> 200 trees per acre).

Wet/mesic flatwoods

Wet / mesic flatwoods were grouped together in areas where hydrological differences could not be inferred from historical photographs (FNAI 2000). Wet flatwoods differ from mesic flatwoods in that they occur on poorly drained soils. Natural wet flatwoods have a widely spaced canopy of slash pine, pond pine (*Pinus serotina*) or longleaf pine and a grassy or shrubby understory. Common shrubs include titi (*Cliftonia monophylla* and *Cyrilla racemiflora*), sweet gallberry (*Ilex coriacea*), bitter gallberry (*Ilex gabra*), and St. John's wort (*Hypericum* spp.). Groundcover species include wiregrass, beakrushes (*Rhynchospora* spp.), panic grasses (*Panicum* spp.), nutrushes (*Sceleria* spp.), and sundews (*Drosera* spp.) Natural fire frequencies vary with position in the landscape but prescribed fires are recommended every two to four years. Most areas of native wet and mesic flatwoods within Tate's Hell have been converted to dense stands of planted pine. Where fire was suppressed historically, titi shrubs have invaded and created a dense mid-story.

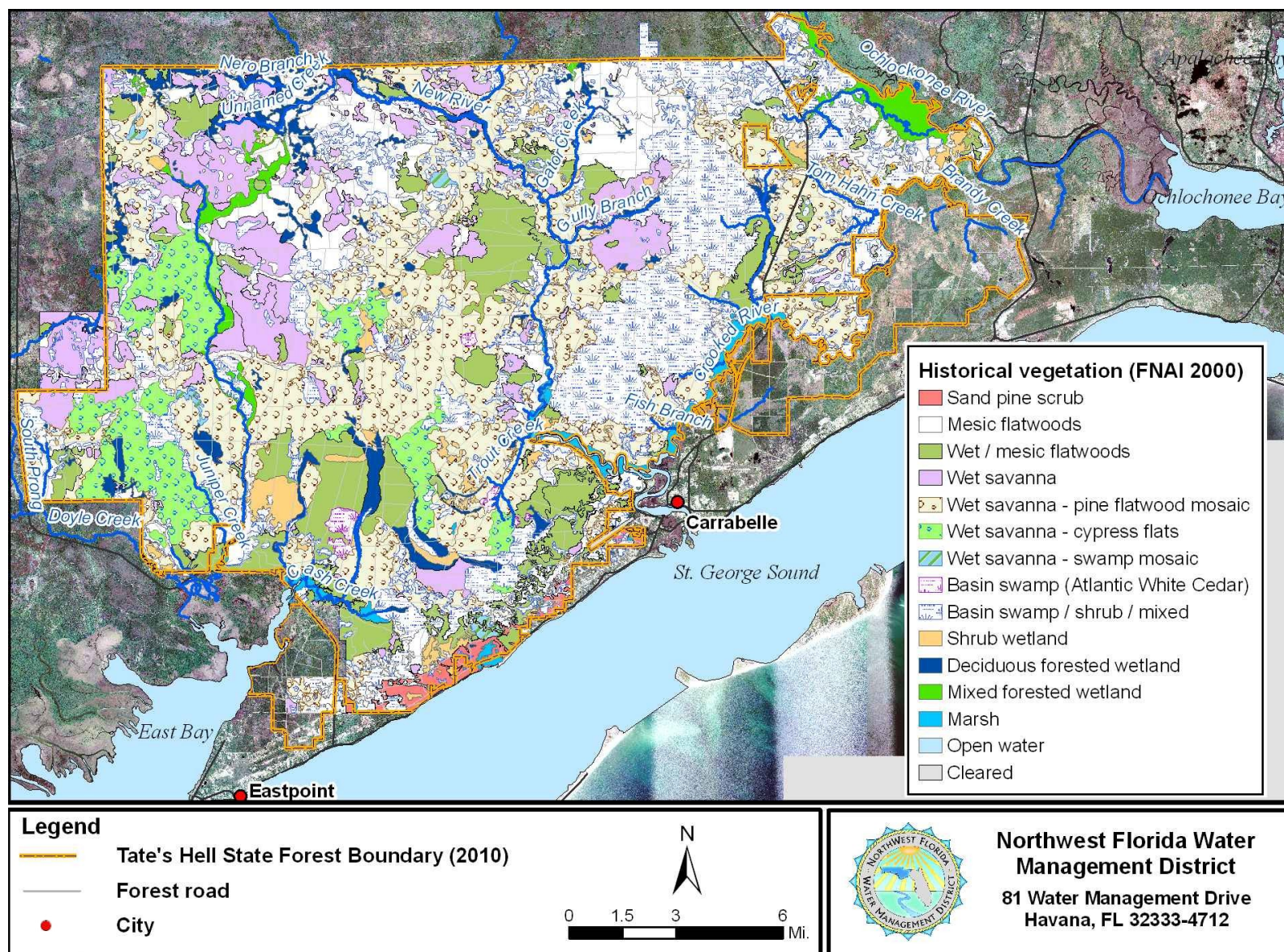


Figure 5. Historical Ecological Community Types Within Tate's Hell State Forest

Wet savannas

Wet savannas (also called wet prairies) occur on poorly drained soils in relatively low topographic areas and represent ecotones between wet flatwoods and deciduous or mixed forested wetlands. Wet savannas are open areas with few trees and are dominated by grasses, sedges, forbs, and low shrubs. These areas are seasonally saturated and may have ponded water for short periods of time. In addition to wiregrass, beakrushes, nutrushes, yellow-eyed grasses (*Xyris* spp.), and St. John's wort, wet savannas often contain rare or uncommon plants such as insectivorous pitcher plants (*Sarracenia* spp.), dew –threads (*Drosera tracyi*), and grass-pink orchids (*Calopogon* spp.).

Most historical wet savannas within Tate's Hell State Forest have been converted to slash pine plantation. Ruts from logging equipment may have altered local drainage patterns. Often, hardwoods and titi shrubs have encroached due to past fire suppression. The Division of Forestry has begun restoring historical savannas by thinning planted pines and shrubs and conducting prescribed burns to restore and maintain a fire frequency of every one to four years. The District, Division of Forestry, and other entities have restored wetland hydrology in several large savanna areas by removing logging roads and adjacent ditches, and installing ditch blocks, hardened low water crossings, and flashboard risers to restore historical surface water drainage patterns.

Wet savanna – cypress flats

This community type was proposed by FNAI (2000) specifically for Tate's Hell State Forest to describe savanna habitats with widely-spaced pond cypress (*Taxodium ascendens*) and slash pine combined with a midstory of shrubs and smaller cypress (Figure 6). The wetland communities occur on poorly drained soils. Groundcover vegetation is typical of wet savannas. Wet savanna – cypress flats can be considered to be a transitional habitat between wet savannas and deciduous forested wetlands (e.g. cypress swamp or sloughs). The greater abundance of trees and shrubs, as



Figure 6. Wet Savanna - Cypress Flats

compared to a wet savanna, is thought to be due to a lower fire frequency and a longer hydroperiod. These areas can become dominated by titi and other shrubs when fire is excluded for long periods of time. The optimal fire frequency is unknown but thought to be approximately every five to ten years (DOF and FNAI 2001).

Although many wet savanna-cypress flats have

been planted in pines, this habitat is unsuitable for long-term timber production and many of these areas are now being restored. In the Doyle Creek basin, the NFWMD restored a large area of wet savanna - cypress flats by removing more than three miles of forest roads and adjacent ditches and installing several hardened low water road crossings to re-establish surface water drainage patterns.

Basin swamps / shrub wetlands / mixed forested wetlands

This grouping is a mix of wetland types that were combined due to the difficulty in distinguishing forested vegetation types from historical photographs (FNAI 2000). Vegetation groups include mixed pond cypress - titi forests, black gum (*Nyssa biflora*) - bay forests, slash pine - cypress - bay swamps, Atlantic White Cedar swamps, shrub wetlands, and other mixtures of canopy trees and shrubs. Basin swamps, shrub wetlands, and mixed forested wetlands occur on poorly drained soils, in depressional features or areas of low topography, and typically have standing water present for a portion of each year. Fire return intervals range from somewhat frequent (< 10 years) in shrub wetlands to infrequent (20 years or longer) in riverine forested wetlands. Although many of these wetland areas were not converted to pine plantation, past fire suppression has resulted in dense overgrown vegetation in many areas.

Atlantic white cedar swamps are a subset of basin swamps. Historical areas of Atlantic white cedar swamp were mapped primarily in the vicinity of the Trout Creek and High Bluff Creek basins. However, large swamps dominated by Atlantic white cedar can also be found in the Fort Gadsden Creek basin and the Sandbank Branch basin. Although some areas of Atlantic white cedar were converted to slash pine plantation, many of these areas were left relatively intact. Titi, bays, pines, and pond cypress may also be present in these densely forested wetlands.

Shrub wetlands

Shrub wetlands dominated by black titi (*Cliftonia monophylla*), white titi (*Cyrilla racemiflora*) and gallberry are a naturally occurring habitat type in Tate's Hell State Forest. Additionally, wet savannas and wet savanna - cypress flats that are not maintained by periodic fires may transition to shrub wetlands over time (Ewel 1990). As with other wetlands, shrub wetlands and bogs tend to occur on poorly drained saturated soils. Some shrub wetlands have been converted to slash pine plantation but large areas of remnant shrub wetlands exist, particularly east of SR 67. Due to past fire suppression, many of these areas are very overgrown. The estimated fire frequency in shrub wetlands is once every 10 to 20 years (Ewel 1990).

Deciduous forested wetlands

Deciduous forested wetlands include cypress sloughs, dwarf cypress swamps, riverine bald cypress (*Taxodium distichum*) swamps, and smaller forested wetlands having canopies of pond cypress, red maple (*Acer rubrum*), tulip tree, (*Liriodendron tulipifera*) or black gum. Deciduous forested wetlands should have standing water present for several months during each year. Fire occurs relatively infrequently, perhaps every 15 to 20 years (FNAI 2000). Although some deciduous forested wetlands were logged, clear-cut, and replanted during past decades, most of these areas were too wet

for timber production. However, in most areas the wetland hydrology has been altered by the construction of nearby roads and drainage ditches.

The dwarf cypress swamps are a unique type of deciduous forested wetland (Figure 7). The trees that comprise these swamps appear similar to the „hat rack’ cypress found in the Florida Everglades. Dwarf cypress trees are thought to have developed their diminutive stature due to slow development in poor soil conditions. Although they typically reach a height of only 15 feet, many of these trees are more than 300 years old (DOF 2007).



Figure 7. Dwarf Cypress Swamp

Marshes

Fresh and brackish water marshes are present along the lower reaches of several rivers and streams including the New River, Carrabelle River, Crooked River, Whiskey George Creek, and Cash Creek. In addition, there are also several isolated freshwater marshes within Tate’s Hell State Forest. Vegetation in riverine marshes typically is comprised of monotypic stands of saw grass (*Cladium jamaicense*) and black needle rush (*Juncus roemerianus*) and in more saline areas, vegetation is often composed of a fringe of salt cordgrass (*Spartina alterniflora*) in deeper areas with black needle rush occurring at slightly higher elevations. Isolated freshwater marshes typically contain sedges, grasses, rushes, floating aquatics and herbaceous plants. Marshes generally have water present year-round although water levels may fluctuate with tidal or seasonal rainfall cycles. Fire occasionally occurs in marshes. The fire frequency is typically a function of the adjacent habitat type (FNAI 2010).



Figure 8. Frosted Flatwoods Salamander

Wildlife

The diverse ecological communities of Tate’s Hell State Forest serve as habitats for many species of conservation concern including Red-cockaded Woodpeckers, gopher tortoises (*Gopherus polyphemus*), Apalachicola kingsnakes (*Lampropeltis getula meansi*), and Florida black bears. The Red-cockaded Woodpecker (RCW) is a federally-listed endangered species that typically inhabits wet and mesic flatwoods. Tate’s Hell State Forest supports more than 30 RCW clusters. The forest provides

important habitat for the RCW and is part of the East Gulf Coastal Plain Recovery Unit identified in the U.S. Fish and Wildlife Service Red-cockaded Woodpecker Recovery Plan (USFWS 2003).

Eastern indigo snakes (*Drymarchon corais couperi*) and Bachman's Sparrows (*Aimophila aestivalis*) have also been observed within the forest (FNAI data 2008 and A. Warwick 2010, pers. comm.). Historically, the forest provided habitat for the frosted flatwoods salamander (*Ambystoma cingulatum*) but it is unknown if any individuals remain.

More common animals include White-tailed deer (*Odocoileus virginianus*), Eastern wild turkey (*Meleagris gallopavo silvestris*), raccoons (*Procyon lotor*), coyotes (*Canis latrans*), river otters (*Lutra canadensis*), and other small mammals. The wetlands and roadside ditches support a number of reptile and amphibian species, including the Florida Cottonmouth (*Agkistrodon piscivorus conanti*), the American Alligator (*Alligator mississippiensis*), and lesser known species such as the eel-like two-toed amphiuma (*Amphiuma means*).

Together with the Apalachicola National Forest and associated wildlife management areas, Tate's Hell State Forest has been designated an Important Bird Area by the National Audubon Society. The forest supports significant breeding populations of Swallow-tailed Kites and Red-cockaded Woodpeckers (National Audubon Society 2010). Breeding Bird Atlas data suggest that nearly 90 species breed in the vicinity of Tate's Hell State Forest. Many additional bird species use the forest habitats during the spring and fall migratory seasons.

The entire forest has been designated as a Wildlife Management Area and hunted species are regulated by the Florida Fish and Wildlife Conservation Commission.

Recreation

Tate's Hell State Forest offers numerous recreational opportunities including camping, hiking, hunting, kayaking, boating, and fishing. There are approximately 30 primitive campsites located within the forest, many of which are located along the New River or other waterways. A concrete boat launch facility is located at the Cash Creek Day Use Area. Other launch sites for smaller boats, canoes, and kayaks are located throughout the forest. Portions of Tate's Hell State Forest are included in the Florida Circumnavigational Saltwater Paddling Trail.

There are hiking opportunities along the extensive system of forest roads. Additionally, the High Bluff Coastal Trail provides an opportunity to see unique coastal scrub habitat. A few miles to the north, the Ralph G. Kendrick Boardwalk provides an educational kiosk and an observation platform over a dwarf cypress swamp. Tate's Hell State Forest is also one of the sites included in the Great Florida Birding Trail. Off-Highway Vehicle (OHV) Trails have been designated on more than 150 miles of forest roads. The OHV system at Tate's Hell State Forest was the first trail system created under the T. Mark Schmidt Off-Highway Vehicle Safety and Recreation Act of 2002. This act provides the public with additional opportunities to ride off-highway vehicles on public lands.

Archeological Sites

As of 2007, 36 archeological sites had been recorded at Tate's Hell State Forest (DOF 2007). Sites that date back to the early settlement period include old home sites, bridge ruins, and cattle dipping vats. Several aboriginal archeological sites are located along the coast. Shell middens and scattered ceramics have been found throughout the forest. The Division of Forestry coordinates with the Division of Historical Resources regarding the protection and management of all archeological sites.

Land Management

The Division of Forestry manages Tate's Hell State Forest as a multi-use site for the purposes of habitat restoration and protection, wildlife management, public recreation and silvicultural management. As a result, Division of Forestry staff engages in a broad range of land management activities including road maintenance, monitoring of plant and animal populations, and habitat management activities such as tree thinning, prescribed burning, shrub reduction, and invasive species control. The *10-Year Management Plan for the Tate's Hell State Forest* identifies five principal land management goals and describes action-oriented objectives and associated performance measures (DOF 2007). These goals and objectives provide an excellent overview of the land management activities within Tate's Hell State Forest and are described below.

1. Restore, maintain, and protect all native ecosystems, insuring the long-term viability of populations and species considered rare, threatened, endangered, or of special concern.

The Division of Forestry's management objectives include increasing the proportion of prescribed burns conducted during the growing season versus the dormant season, updating the fire management plan, developing and implementing a non-native invasive species control plan, maintaining forest boundaries, conducting inventories to identify the presence and distributions of listed plant and animal species, monitoring photo plots of sensitive areas, mapping environmentally sensitive communities, and sustaining and improving monitoring programs for Red-cockaded Woodpeckers, gopher tortoises, and rare plants.

2. Encourage and enhance multiple-use management, including human use, in a manner that is agreeable with other long-term goals, especially protection of native ecosystems.

The Division of Forestry's management objectives include updating the Outdoor Recreation Plan, developing and continually updating a Road Management Plan, conducting liaison group meetings twice a year, conducting an activity or media promotion for State Forest Awareness Month, and pursuing additional revenue-generating opportunities through forest product sales, recreation fees, or leases.

3. Practice sustainable forest management utilizing sound silvicultural techniques.

Management objectives include conducting forest inventory updates each year, updating and implementing the Silvicultural Management Plan (comprised of the reforestation plan, forest inventory, harvest plan, and prescribed burn plan); completing reforestation of all cut-over areas with appropriate species at densities suitable to the site; conducting timber harvests in a manner that maintains appropriate stand densities, improves forest health, regenerates cutover stands, salvages wood following natural disasters, and minimizes ground disturbance; evaluating the effectiveness of reforestation / restoration projects and developing recommendations for additional activities on sites where warranted; and implementing the prescribed burn plan to reduce fuel loads, promote restoration, and maintain native community structure.

4. Protect known archeological and historical resources.

Division of Forestry management objectives including training additional personnel as archaeological monitors, updating the “Environmentally Sensitive Areas” map in the Fire Management Plan, and informing crews of archaeological sites where heavy equipment should be avoided.

5. Restore, maintain, and protect hydrologic functions related to the quality and quantity of water resources and the health of associated wetland and aquatic natural communities.

Division of Forestry management objectives include conducting inspections to determine the need for installation or replacement of culverts or hardened low water crossings, rehabilitating fire-lines to reduce channeling of water, developing and implementing hydrologic restoration plans for watersheds that have been damaged by past management activities, and investigating and recruiting sources of funding and cooperative projects with other agencies for hydrologic restoration.

In all, the Division of Forest staff manage 202,400 acres and maintain more than 800 miles of unpaved roads, more than 600 drainage culverts, 150 miles of OHV trails, and approximately 30 campsites, and conduct habitat management and restoration activities (e.g. tree thinning, prescribed burning, replanting, hydrologic restoration) to enhance and maintain the diverse historical ecological communities found within Tate’s Hell State Forest.

Prioritization of Areas for Hydrologic Restoration

Overview

To prioritize areas for hydrologic restoration, Tate's Hell State Forest was divided into 19 restoration tracts (Figure 9). The boundaries of these restoration tracts were developed in GIS and are based on a combination of factors including surface water basin boundaries, existing roads, and the forest management units used by the Division of Forestry. Three criteria were used to prioritize these tracts for hydrologic restoration:

- Surface Water Quality Benefits
- Habitats for Species of Conservation Concern
- Feasibility of Restoration.

Criteria were assigned numeric scores ranging from 0 to 24, with 24 being the highest value. Each of the criteria is described below.

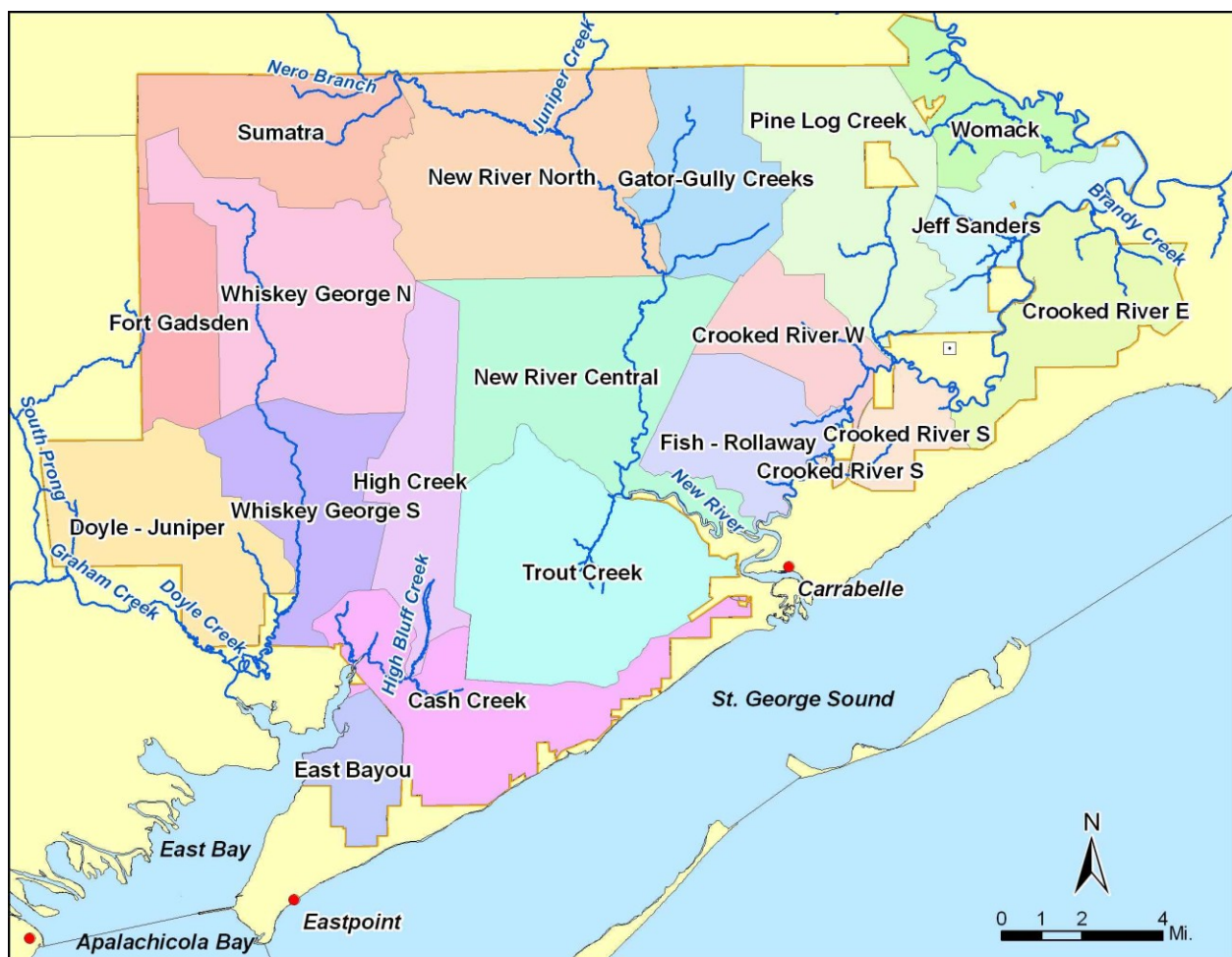


Figure 9. Restoration Tracts

Surface Water Quality Benefits

Restoration tracts were prioritized based on the potential water quality benefits anticipated to result from enhanced wetland treatment and attenuation of surface water runoff following hydrologic restoration activities. Scoring is based on the proximity of surface water discharges from each restoration tract to Apalachicola Bay, East Bay, and surrounding waters. Apalachicola Bay, East Bay, and the tributaries to East Bay are classified as Class II waters having designated uses of shellfish propagation and harvesting. Tributaries to East Bay include Cash Creek, Whiskey George Creek, Doyle Creek, Juniper Creek, Rake Creek, and High Bluff Creek. All other rivers and streams within Tate's Hell State Forest are Class III waters with designated uses of recreation and the propagation and maintenance of healthy fish and wildlife populations.

The restoration tracts were grouped into four scoring tiers (Table 3). Because water quality improvement is the primary goal of hydrologic restoration activities, scores for this criterion were given the greatest weight and range from zero to 24. Because of the nursery functions (i.e., enhanced feeding, shelter and refuge from predation) provided by East Bay and Apalachicola Bay, restoration tracts that discharge surface water runoff to these water bodies were given the highest scores. East Bay, St. Vincent Sound and areas near the mouth of the Apalachicola River support nearly 70% of the fishes and large invertebrates collected throughout the estuary. The highest water quality benefit scores reflect potential water quality improvements to these critical nursery areas.

Tracts that discharge surface waters to the New River, and ultimately to St. George Sound, represent the second tier. Tracts that discharge surface water to the Crooked River, where the Crooked River generally flows west towards the Carrabelle River and St. George Sound, comprise the third tier. The direction of flow in the Crooked River west of the confluence with Pine Log Creek varies in response to upstream discharges and may be either east or west depending on conditions. For this analysis we have assumed that runoff generated in the Pine Log Creek basin flows west after discharging to the Crooked River. Tracts that discharge surface water to the Ochlockonee River basin comprise the fourth tier, including areas where the Crooked River flows to the east.

Table 3. Scoring for Surface Water Quality Benefits

Score	Description	Applicable Restoration Tracts
24	Runoff discharges to East Bay or Apalachicola Bay.	Fort Gadsden, Whiskey George North and South, Doyle-Juniper, High Bluff Creek, Cash Creek, and East Bayou
18	Runoff discharges to the St. George Sound.	Sumatra, New River North and Central, Gator-Gully, and Trout Creek
12	Runoff discharges to the Crooked River and flows west towards the Carrabelle River and St. George Sound.	Pine Log Creek, Crooked River South, Crooked River West, and Fish-Rollaway
6	Runoff discharges to the Ochlockonee River Basin.	Crooked River East, Jeff Sanders, and Womack Creek

Habitats for Species of Conservation Concern

The approach used to prioritize habitats of species of conservation concern for restoration is similar to that used in the Florida Forever program to prioritize lands for acquisition and is based on the occurrences and associated habitats of state or federally listed plant and animal species. The prioritization of habitats for hydrologic restoration focused on species found in wetlands and pine flatwoods habitats.

Twenty-five listed plant and animal species (Table 4) that are associated with wetland and pine flatwood habitats have been documented within Tate's Hell State Forest. Staff from the Florida Areas Natural Inventory previously developed habitat maps for 11 of these 25 species in support of the Florida Forever program (FNAI 2007). The 11 species for which habitat maps were available are shown in Appendix A and include animals such as the flatwoods salamander (*Ambystoma cingulatum*) and Red-cockaded Woodpecker (*Picoides borealis*) and plants such as Godfrey's Butterwort (*Pinguicula ionantha*) and White Birds-in-a-Nest (*Macbridea alba*). New habitat maps were created for the 14 remaining species, all of which were plants. FNAI data on reported occurrences provided the basis for the habitat maps. Note that an element occurrence in the FNAI database may represent a local population (e.g. 100 plants) rather than an individual plant.

To create the maps, a 400-m buffer was applied to each FNAI element occurrence point. This buffer radius is identical to that used for plants in the Florida Forever analysis (FNAI 2007). All polygons of suitable habitat that intersect the buffer were identified and combined to create a single

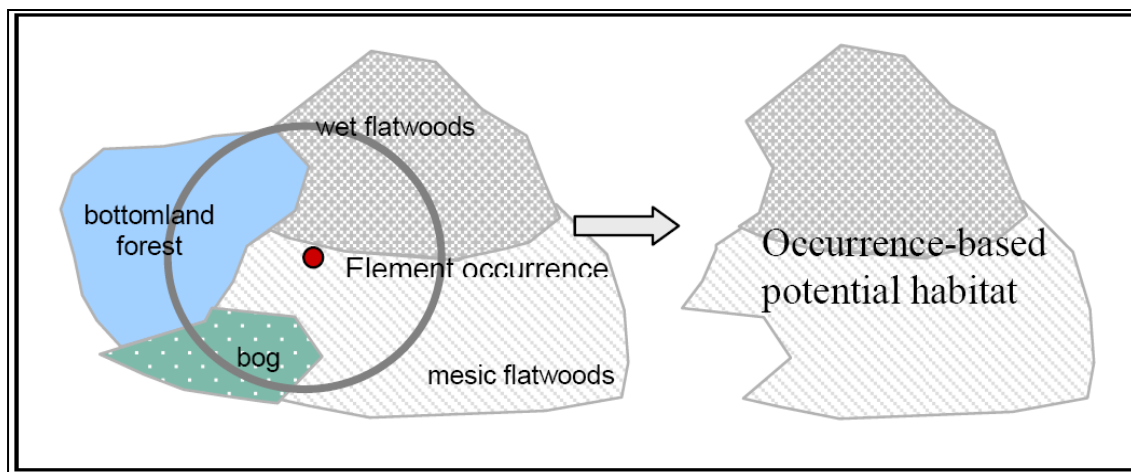


Figure 10. Development of Habitat Maps (FNAI 2007)

habitat polygon. Habitat polygons may extend outward from the buffer. Figure 10 illustrates this process for a hypothetical species found in wet and mesic flatwoods. Suitable habitats for each species were based on information contained in the USF Online Atlas of Florida Vascular Plants, NatureServe species accounts, and information in the FNAI database.

For each of the 25 species, the amount of habitat within each of the 19 restoration tracts was calculated. Each species was assigned a weight ranging from 0 to 12, based the level of conservation concern. The state listing status (endangered, threatened or Species of Special Concern) and the NatureServe sub-national status (S1 = critically imperiled, S2 = imperiled, S3 = vulnerable) were used to assigned species weights (Table 4). For each species, the area of habitat within each restoration tract was multiplied by the species weight. These values were then summed for each restoration tract. Because the restoration tracts vary in size, the summed values were normalized by dividing the sum by the total area of each restoration tract. The resultant values were grouped into classes and assigned scores using natural breaks in the data. The results are provided in Table 5. Note that the GIS boundaries for Tate's Hell State Forest are approximate. As a result, the total area of the restoration tracts slightly exceeds the actual 202,437 acre forest.

Table 4. Weights Assigned to Listed Species Documented at Tate's Hell

Common Name	Assigned Weight	State Status	Nature-Serve Status	Federal Status
Animals				
Eastern indigo snake	6	Threatened	S3	T
Frosted Flatwoods salamander	9	SSC	S2	T
Florida black bear	9	Threatened	S2	-
Red-cockaded Woodpecker	9	SSC	S2	E
Plants				
Apalachicola dragon-head	6	Threatened	S3	-
Carolina grass-of-Parnassus	9	Endangered	S2	-
Chapman's crownbeard	6	Threatened	S3	-
Curtis' loosestrife	12	Endangered	S1	-
Florida bear-grass	6	Threatened	S3	-
Florida skullcap	9	Endangered	S2	T
Godfrey's butterwort	9	Endangered	S2	T
Hummingbird flower	9	Endangered	S2	-
Large-leaved grass-of-parnassus	9	Endangered	S2	-
Panhandle spiderlily	9	Endangered	S2	-
Pine-woods bluestem	6	Threatened	S3	-
Small-flowered meadowbeauty	9	Endangered	S2	-
Southern milkweed	9	Threatened	S2	-
Spoon-leaved sundew	6	Threatened	S3	-
Thick-leaved water-willow	9	Endangered	S3	-
West's flax	9	Endangered	S2	-
White birds-in-a-nest	9	Endangered	S2	T
White-flowered wild petunia	9	Endangered	S2	-
White-top Pitcherplant	9	Endangered	S3	-
Wiregrass gentian	9	Endangered	S3	-
Yellow fringeless orchid	9	Endangered	S3	-

Source: NatureServe 2010. Federal status: T = threatened; E = Endangered

Table 5. Habitat Restoration Priority Scores

Tract	Normalized Sum	Assigned Score
Sumatra	17.2	12
Pine Log Creek	16.6	11
Crooked River South	15.0	10
Crooked River West	14.2	9
Crooked River East	13.1	8
New River North	12.3	7
Cash Creek	11.8	6
New River Central	11.6	6
Gator-Gully Creeks	11.2	6
Fish – Rollaway	10.8	6
Doyle – Juniper	10.5	6
Fort Gadsden	9.7	5
Jeff Sanders	9.6	5
Whiskey George North	9.4	5
East Bayou	9.2	5
High Bluff Creek	8.8	4
Trout Creek	8.1	3
Whiskey George South	7.7	2
Womack	5.0	1

Feasibility of Restoration

The scoring for the feasibility of restoration is based broadly on the degree of similarity between historical and current vegetation conditions. In general, areas where the current and historical conditions are similar are likely to have fewer hydrologic impacts and be more easily restored than areas where differences between historical and current conditions are large. Prior to assigning scores for the feasibility of restoration, it was first necessary to establish the current vegetation

conditions within Tate's Hell State Forest. To accomplish this, unique habitat polygons were delineated using GIS. Each polygon was then assigned attributes that reflect the current and historical vegetation conditions. For each habitat polygon, the likelihood of long-term timber management was determined and categorized as either perpetual, short-term, or none based on the recommendations in the *Vegetation Management Guidelines* (DOF and FNAI 2001). The details of these analyses are provided in Appendix B.

Although there is a wide range of conditions across Tate's Hell State Forest due to the high degree of site disturbance as well as natural variability, the ecological communities were grouped into general vegetation categories for the purpose of assigning restoration feasibility scores. The vegetation categories, their associated attributes, and the assigned restoration feasibility scores are given in Table 6. Individual habitat polygon scores were used to compute area-weighted average scores for each restoration tract. The results are given in Table 7.

Table 6. Scoring Approach for the Feasibility of Restoration

Current Vegetation	Attributes and Scoring Rationale	Score
Wetlands with a natural tree canopy	Former wetlands retaining a natural wetland canopy. These areas are not planted in pines. These areas may achieve desired habitat conditions following hydrologic restoration.	12
Low density planted pines (Wet / mesic flatwoods or wet savanna – pine flatwood mosaic)	Former wetlands that have been planted in pines but are proposed to be hydrologically restored and will not be managed perpetually for timber production. The pine density is less than 200 TPA and the BA is less than 60 ft ² /ac. These areas may require both hydrologic improvements and natural recruitment of wetland trees.	10
Cleared forested wetlands	Clear-cut wetlands whose historical ecological community is unsuitable for timber production. These areas will likely require both hydrologic improvements and planting or natural recruitment of wetland trees.	8
Medium density planted pines (Wet / mesic flatwoods)	Former wetlands that have been planted in pines, are proposed to be hydrologically restored, and will not be managed perpetually for timber production. The BA is between 61 and 80 ft ² /acre or the tree density is between 200 and 300 TPA. These areas will likely require hydrologic improvements and one or more harvests (thinning) of pines.	8
High density planted pines (Wet / mesic flatwoods)	Former wetlands that have been planted in pines, are proposed to be hydrologically restored, and will not be managed perpetually for timber production. Tree density is greater than 300 TPA or the basal area is greater than 80 ft ² /acre or the density and basal area are unknown. These areas will likely require both hydrologic improvements and two or more harvests (thinning) of pines.	6
Isolated wetlands surrounded by pine flatwoods	Wetlands smaller than 10 acres where the current or historical ecological community is wetter than a pine flatwoods ecosystem. Because the surrounding pine flatwoods areas will be managed for timber production, the feasibility of hydrologic restoration is low.	6
Former wetlands with a titi canopy	The dominant forest cover is titi. These areas will be difficult and costly to restore due to the proliferation of this invasive native shrub. Historical shrub wetlands, wet savanna – cypress flats, and basin swamp/ shrub / mixed forested wetlands are excluded from this scoring category because these communities may have a natural titi component.	4
Pine flatwoods proposed for long-term timber production and other uplands	This category includes pine flatwoods that will be managed perpetually for timber production, along with roads, sand pine scrub, open water, and upland areas where hydrologic restoration is not needed.	0

BA = basal area

TPA = trees per acre

Table 7. Feasibility Scores by Tract

Tract	Total Acreage	Total Score	Area- weighted Average Score
Cash Creek	12,731	63,505	4.99
Crooked River East	9,463	42,518	4.49
Crooked River South	3,546	8,354	2.36
Crooked River West	6,187	49,510	8.00
Doyle – Juniper	12,809	92,246	7.20
East Bayou	3,863	15,118	3.91
Fish – Rollaway	7,859	68,791	8.75
Fort Gadsden	6,604	60,184	9.11
Gator-Gully Creeks	9,209	44,191	4.80
High Bluff Creek	8,758	32,299	3.69
Jeff Sanders	6,834	33,810	4.95
New River Central	17,865	51,995	2.91
New River North	20,193	85,728	4.25
Pine Log Creek	14,604	75,369	5.16
Sumatra	10,857	76,153	7.01
Trout Creek	17,925	93,408	5.21
Whiskey George North	16,938	113,781	6.72
Whiskey George South	10,522	43,350	4.12
Womack	5,818	46,156	7.93

Results

Table 8 summarizes the individual criteria scores and the total scores for each of the 19 restoration tracts. The total maximum score is 48. Based on the total scores, restoration tracts were assigned an overall priority for hydrologic restoration. The priority groups are high, medium, and low. The results are mapped on Figure 11. The top-ranked tract is the Fort Gadsden tract. Other high priority areas include the Doyle-Juniper, Sumatra, Whiskey George North, Cash Creek, East Bayou, and High Creek areas.

This prioritization of areas for hydrologic restoration is based on current conditions and available data. Much of the information on current vegetation conditions (forest cover, trees per acre, etc.) is based on inventories conducted in 2000 and 2001. As a result, it is recommended that the prioritization of areas for restoration be updated periodically as site conditions change and as new data becomes available.

Table 8. Prioritization Results

Restoration Tract	Area (acres)	Water Quality Benefits (0 to 24)	Species of Conservation Concern (0 to 12)	Restoration Feasibility (0 to 12)	Total Score (0 to 48)	Rank	Priority
Fort Gadsden	6,622	24	5	9.11	38.11	1	High
Doyle - Juniper	12,855	24	6	7.20	37.20	2	High
Sumatra	11,082	24	12	7.01	37.01	3	High
Whiskey George North	17,077	24	5	6.72	35.72	4	High
Cash Creek	12,823	24	6	4.99	34.99	5	High
East Bayou	3,870	24	5	3.91	32.91	6	High
High Creek	9,004	24	4	3.69	31.69	7	High
Whiskey George South	10,591	24	2	4.12	30.12	8	High
New River North	20,647	18	7	4.25	29.25	9	Medium
Crooked River West	6,213	12	9	8.00	29.00	10	Medium
Gator-Gully Creeks	9,265	18	6	4.80	28.80	11	Medium
Pine Log Creek	14,807	12	11	5.16	28.16	12	Medium
New River Central	18,411	18	6	2.91	26.91	13	Medium
Fish - Rollaway	7,902	12	6	8.75	26.75	14	Medium
Trout Creek	18,288	18	3	5.21	26.21	15	Medium
Crooked River South	3,553	12	10	2.36	24.36	16	Low
Crooked River East	9,468	6	8	4.49	18.49	17	Low
Jeff Sanders	6,904	6	5	4.95	15.95	18	Low
Womack	5,863	6	1	7.93	14.93	19	Low
Total	205,245						

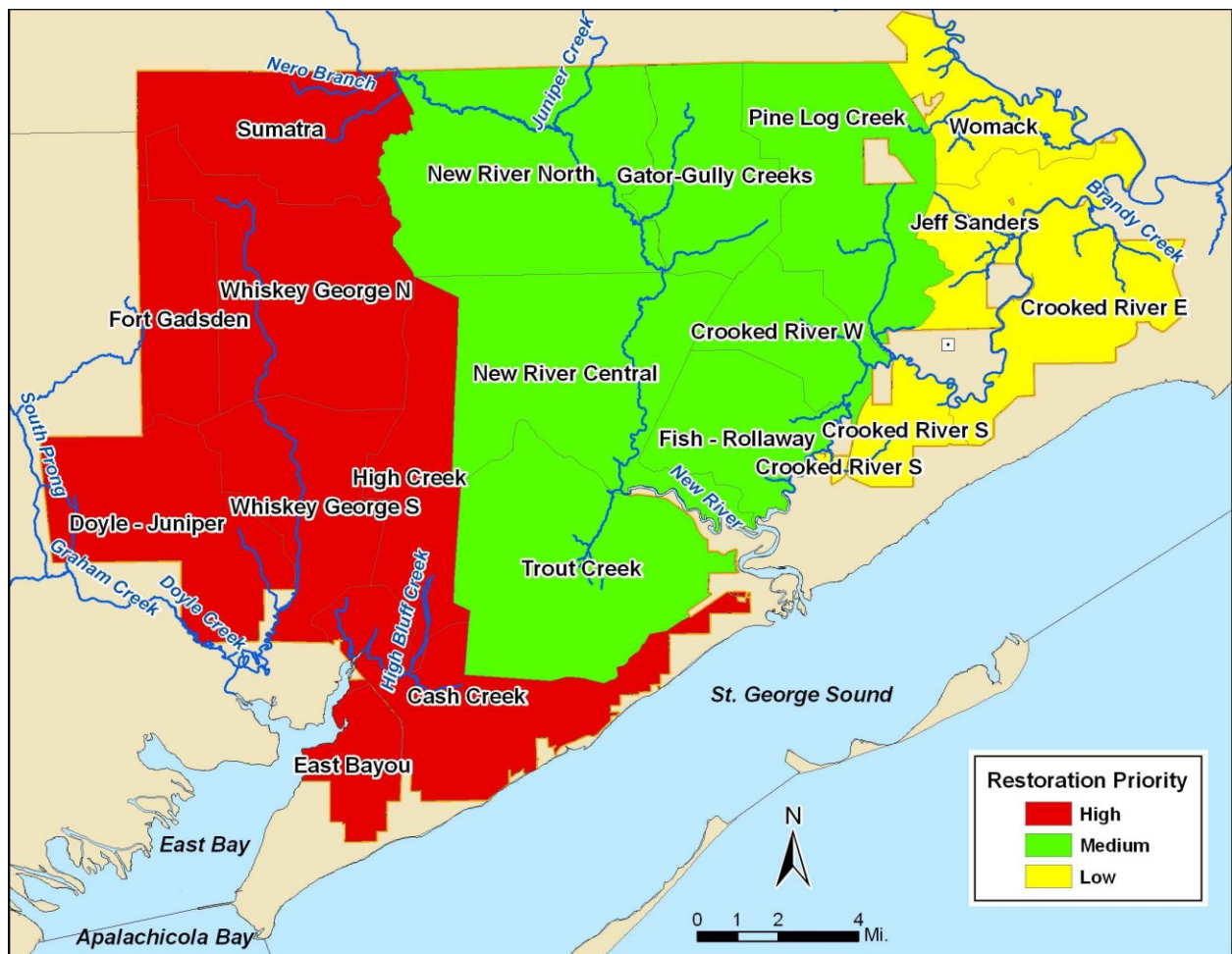


Figure 11. Landscape Scale Prioritization Results

Environmental Monitoring Guidelines

Due to the extensive area of Tate's Hell State Forest, the large number of proposed restoration projects, and limited financial resources and field personnel, it is unlikely that extensive environmental monitoring will be conducted for all restoration projects. However, monitoring should be performed at a subset of representative projects to quantify the success of restoration efforts. Information gained through environmental monitoring activities can lead to enhancements in habitat management and the design and operation of hydrologic structures and ultimately can improve future restoration activities.

Environmental monitoring activities have varied among the restoration projects previously implemented at Tate's Hell due to differences in project goals, site features, permitting requirements, agency resources, and other factors. For future environmental monitoring, it is recommended that a consistent approach be used to facilitate comparisons among restored areas and to enable the cumulative effects of restoration activities to be more easily evaluated.

The methodology contained in the District's Umbrella, Watershed-based Regional Mitigation Plan (UWRMP) (found at <http://www.nwfwmdwetlands.com/index.php>) provides the basis for the environmental monitoring guidelines outline below (NFWFMD 2009). The UWRMP includes a joint agreement between the District and the U.S. Army Corps of Engineers (Corps) that provides a framework for the mitigation of unavoidable wetland impacts caused by Florida Department of Transportation projects. The Tate's Hell property is identified as a location for FDOT wetland mitigation within the UWRMP. The use of the UWRMP environmental monitoring approach will ensure consistency among wetland restoration projects both within Tate's Hell State Forest and throughout the NFWFMD. Some additional recommendations specific to Tate's Hell State Forest are provided to enhance our understanding of hydrologic and ecologic processes and to facilitate long-term adaptive management of restoration areas.

Restoration Goals

Restoration goals, target ecosystems, and success criteria should be specified for each area where environmental monitoring will be performed. Restoration goals typically include descriptions of target ecosystems and desired habitat conditions to be achieved following hydrologic restoration and habitat management activities. In most cases, the target ecosystem will be the historical ecological community as delineated by the FNAI (FNAI 1997 and 2000). Other ecological communities may be selected as target communities in some cases, particularly when it is not feasible to return to pre-1960 conditions.

Current conditions may constrain the degree of restoration that can be attained in some areas. The more than 800 miles of unpaved roads and adjacent ditches have created large-scale hydrologic and ecologic impacts across Tate's Hell. It will not be feasible to remove most of these roads

because they are needed by the Division of Forestry to provide access for public recreation and land management activities. Additionally, past land clearing and logging activities have removed many old growth trees, impacting forest regeneration processes and altering tree species community composition. Where fertilization and bedding of pine stands has occurred, soil conditions and microtopography also have been altered. These changes have influenced the natural trajectories of wetland development and may not be reversible in some restoration areas.

A good example of wetlands for which restoration opportunities may be constrained are former deciduous forested wetlands (e.g. cypress wetlands) that have been cleared, drained, and replanted in pines. In areas where it is not feasible to restore the historical ecological community, a target community with a slightly shorter hydroperiod or slightly different vegetation composition could be proposed. For example, perhaps it would be feasible to restore the deciduous forested wetland to a wet savanna – cypress flats community. Project managers should carefully review current site conditions and constraints prior to establishing restoration goals and success criteria for individual project areas.

Success Criteria

Success criteria should consist of a set of quantitative and qualitative measures for evaluating restoration success. At a minimum, success criteria should include a list of desired vegetation and hydrologic attributes appropriate for the target ecosystems. Success criteria could also include project milestones such as the completion of specific hydrologic restoration and land management activities. Example activities might include the installation of hydrologic improvements; the completion of shrub reduction, pine thinning, groundcover or canopy revegetation; or the completion of prescribed burns. Recommended success criteria for hydrologic restoration projects are shown in Table 9. These are based on criteria contained in the UWRMP, with criteria added to address hydrology and wildlife within Tate’s Hell State Forest.

Functional Assessments

Functional assessments of wetland condition are required for hydrologic restoration projects implemented for compensatory mitigation under Section 404 of the Clean Water Act. Because hydrologic restoration activities at Tate’s Hell are anticipated to be funded by a variety of mechanisms, including but not limited to compensatory mitigation, functional assessments are not addressed in this document. When functional assessments are needed, such assessments will be performed by the appropriate entities during the permitting process. However, to promote consistency in environmental monitoring and to provide data that may ultimately be useful for evaluating the cumulative success of hydrologic restoration activities across Tate’s Hell State Forest, the District recommends that functional assessments be performed using the Unified Mitigation Assessment Method (UMAM), as recommended in the UWRMP (NFWFMD 2009).

Table 9. Recommended Success Criteria for Hydrologic Restoration Projects

Vegetation • Desired species showing evidence of increasing frequency or abundance (list specific herbaceous, shrub, and tree species) • Minimum percent cover for specific cover classes (open water, bare ground, shrub layer, etc.) • Minimum percent cover for key plant species (e.g. <i>Taxodium</i> spp., <i>Pinus</i> spp. , <i>Aristida</i>, etc.) • Maximum percent cover for invasive exotic species (1%) and nuisance native species (5%) (exceptions made for titi in some areas) • Increase in plant species diversity • Species richness appropriate for target community • Minimum survival rates for planted vegetation (typically between 75% and 100%) • Type and total coverage of tree, shrub, and herbaceous species appropriate for target community • Appropriate tree densities or basal areas for selected species • Evidence of recruitment, regeneration, or reproduction (flowering, fruiting, and seed production)
Hydrology • Measured wetland hydroperiod is appropriate for the target community • Evidence of re-establishment of historical surface water drainage patterns • Wetland vegetation is indicative of appropriate hydroperiod conditions • Improvements in wetland water levels or hydroperiods are indicated by long-term monitoring data
Wildlife • Evidence of wildlife usage by appropriate species, including invertebrates, fish, herpetofauna, birds, and mammals • Evidence of successful reproduction of wildlife species
Management Actions • Timely completion of hydrologic restoration activities • Prescribed burning completed at appropriate fire return intervals • Timely completion of tree thinning, replanting, shrub reduction or exotic species control • Successful and timely operation of flashboard risers

Monitoring Protocols for Hydrology, Vegetation, and Wildlife

The monitoring protocols described below are based on those in the UWRMP (NWFWMMD 2009). Additional recommendations are provided for monitoring wetland hydrology and wildlife usage of restoration areas. It is recommended that monitoring be conducted for a minimum of five to ten years following initial hydrologic restoration activities to ensure that success criteria are achieved and are sustained over time.

Hydrology

Hydrologic conditions affect physical, biological, and chemical processes in wetlands including nutrient cycling, sedimentation, primary productivity, and plant and animal species composition. As a result, hydrology may be the single most important factor that determines the establishment and maintenance of wetland processes and vegetation (Mitsch and Gosselink 2000). Hydrology can be quantified by monitoring wetland hydroperiods. The hydroperiod refers to the seasonal pattern of water level depth, duration, and area. Hydroperiods are typically reported as the number of days or months within a year that standing water is present in a wetland. When hydroperiod data are combined with wetland bathymetry data, the area and frequency of inundation can also be estimated. Elsewhere in Florida, hydroperiods for cypress wetlands are estimated to range from six to ten months (USFWS 1999), whereas hydroperiods for wet savannas may be three months or less (Duever 1997). Data regarding wetland hydroperiods, water table fluctuations near wetlands and wetland-water table interactions are lacking in northwest Florida.

To evaluate the success of hydrologic restoration efforts, wetland water levels and hydroperiods should be monitored at a subset of restored sites. Preferably, sites would include not only restored wetlands but also reference wetlands without hydrologic impacts. For example, water levels could be measured at restored wet savannas within Tate's Hell State Forest and at reference wet savannas located in the Apalachicola National Forest. Proximal reference sites not only provide a basis for the evaluation of restoration success but can also function as control sites that can help to distinguish between water level changes due to natural rainfall variability and hydrologic restoration activities.



Figure 12. Wetland Staff Gage

To monitor wetland water levels, staff gages should be installed near the deepest portion of each wetland and wetland water levels should be measured at twice each month. Because fluctuations in wetland water levels due to rainfall are large, data should be collected for multiple years so that long-term average conditions can be assessed.

Increasing the frequency of water level measurements to weekly or daily would greatly improve the accuracy of hydroperiod estimates.

Little is known regarding the seasonal dynamics of wetland-water table interactions in northwest Florida. Wetlands may provide a source of water or act as discharge areas for the underlying surficial aquifer. Many wetlands elsewhere in Florida seasonally alternate between recharge and

discharge conditions. Seasonal dynamics vary among wetland types and hydrogeologic settings. To improve our understanding of wetland-water table interactions in Northwest Florida, a shallow surficial aquifer monitoring well or piezometer could also be installed at the wetland edge and surficial aquifer water levels could be monitored at the same frequency as wetland stage.

Streamflow or stream stage data may also be useful for evaluating the success of hydrologic restoration efforts, particularly in areas where hardened low water crossings, bridges, or culverts are installed to restore historical streamflow patterns.

Vegetation

It is recommended that a baseline vegetation assessment be performed in the vicinity of the proposed hydrologic improvements prior to initiating construction activities or habitat improvements. Following the completion of all restoration activities, vegetation should be monitored annually for the first five years and then at least once every five years thereafter. Baseline vegetation monitoring and annual monitoring for the first five years are anticipated to be conducted by the entity implementing the restoration project. Long-term monitoring activities are anticipated to be performed as part of cooperative, periodic site-wide assessments conducted by the Division of Forestry and the NFWFMD.

To minimize observer bias associated with differences in plant phenologies, vegetation assessments at a particular site should be performed at the same time each year. If the post-restoration target ecological communities are wet savannas, wet savanna-pine flatwoods, and wet savanna-cypress flats, the vegetation assessments should be performed during the spring growing season (e.g May) when pitcher plants (*Sarracenia* spp.) and other wet prairie species are in flower. For other wetland types including forested wetlands, basin swamps, shrub wetlands, and freshwater marshes, the vegetation assessments should be performed during the fall growing season (e.g September).

To quantify land cover types and plant species composition, transects should be established using the field protocols specified in the UWRMP (NFWFMD 2009). If more than one target community type is proposed, a stratified sampling approach is recommended where at least one transect is established for each community type. Ideally, the starting point of each transect should be randomly selected. Transects should be marked using iron rebar and the GPS coordinates should be recorded.

The belt transect technique is recommended for annual monitoring of the forest canopy during the first five years following hydrologic restoration activities (NFWFMD 2009). Within each belt transect, tree species, stem densities and heights should be recorded along with evidence of seed production or natural recruitment. For long-term monitoring of the tree canopy, continued monitoring of the established belt transects, use of forest inventory data, or aerial photo

interpretation of canopy conditions could be used. If aerial photo interpretation is used, ground-truthing is highly recommended.

Pedestrian surveys of vegetation should be conducted during the annual monitoring event using the UWRMP protocol. Information recorded regarding the dominant plant species, the health and reproductive status of vegetation, and the presence or spread of nuisance or exotic species can provide additional insight regarding the success of restoration efforts (NFWFMD 2009). A pedestrian survey should be performed for each target community type.

Wildlife

With the exception of the Red-cockaded Woodpecker and perhaps the gopher tortoise, the abundance and spatial distribution of most animal species at Tate's Hell are not well understood. Unfortunately, quantitative wildlife surveys are labor intensive and cost-prohibitive for most hydrologic restoration projects. However, incidental observations of wildlife and wildlife sign could and should be recorded during annual vegetation assessments. Incidental wildlife observations can provide an indication that desired habitat conditions are being achieved. If funding becomes available for additional wildlife monitoring, the Division of Forestry, the NFWFMD, and the FWC should work cooperatively to develop and implement monitoring programs for additional species of conservation concern.

Habitat Management

Habitat management activities associated with hydrologic restoration projects should generally follow the Vegetation Management Guidelines established for Tate's Hell State Forest (DOF and FNAI 2001), which are incorporated by reference into the *Ten-year Management Plan* (Division of Forestry 2007). The guidelines include recommended fire frequencies and hydroperiods for each ecological community type as well as recommendations for silvicultural management activities. The guidelines also specify which areas are suitable and unsuitable for long-term timber production. A brief summary of the guidelines for prescribed burning and silvicultural management are provided below. The need for additional habitat management activities such as shrub reduction, invasive species control, and replanting of native tree or groundcover species should be evaluated on a case by case basis.

Prescribed Burning

Because most of the historical plant communities within Tate's Hell State Forest are fire-adapted, the continued use of prescribed fire by the Division of Forestry to maintain vegetation conditions and promote regeneration is perhaps the most important habitat management technique. Table 10 summarizes the recommended burn frequencies for the historical ecological communities in order from most frequent to least frequent. Lightning season burns (April through June) are most effective at reducing hardwood competition in pine flatwoods habitats (DOF and FNAI 2001). Lightning season burns are also required for seed production and regeneration of many ground cover plants. Sites with heavy fuel loads may require tree thinning or a series of dormant season

Table 10. Burn Intervals for Ecological Communities at Tate's Hell State Forest

Ecological Community	Burn Frequency (years)
Wet savannas and wet savanna-swamp mosaics	1 - 4
Wet/mesic flatwoods (grassy)	2 - 4
Wet savanna -pine flatwoods mosaic	2 - 4
Wet/mesic flatwoods (shrubby)	3 - 5
Wet savanna - cypress flats	5 - 10
Shrub wetlands	10-20
Deciduous forested wetlands	15 - 20
Basin swamp / shrub / mixed forested wetlands	Variable (25 Avg.)
Sand pine scrub	20-80
Basin swamp - Atlantic white cedar	50 - 100
Mixed forested wetlands and marshes	Varies with adjacent habitats

Source: FNAI 2000 and DOF 2007

burns prior to implementing lightning season burns. Once an area reaches desired habitat conditions, varying the seasons and frequency of burns (within listed guidelines) will enhance plant diversity (DOF and FNAI 2001).

Silvicultural Management

Silvicultural management includes tree thinning and harvesting, reforestation of harvested or clear-cut areas, and conversion from even-aged to uneven-aged stands. Silvicultural management activities conducted at hydrologic restoration sites should be based on the historical or target

Table 11. Suitability of Historical Ecological Communities for Timber Production

Ecological Community	Suitable for Timber Production?	Silvicultural Recommendations
Sand pine scrub	No	• Maintain native scrub habitat
Wet/mesic flatwoods (grassy)	Yes	• Convert to uneven-aged management • Maintain a mixture of slash and longleaf pine • Maintain basal area of 30 to 60 ft²/ac • Retain existing longleaf pines as seed source
Wet/mesic flatwoods (shrubby)	Yes	• Convert to uneven-aged management • Maintain basal area of 55 to 75 ft²/ac • Retain existing longleaf pines as seed source
Wet savanna	No	• Thin pines to densities of zero to 15 trees per acre • Conduct frequent prescribed burns • No reforestation of pines
Wet savanna-swamp mosaic	No	• Thin pines to densities of zero to 15 trees per acre • Thin during dry periods or use specialized equipment • No reforestation of pines
Wet savanna - pine flatwoods mosaic	Flatwoods only	See Wet Savannas and Wet / Mesic Flatwoods
Wet savanna - cypress flats	No	• Thin planted pines to 5 to 20 trees per acre • Thin during dry periods or use specialized equipment • Retain remnant cypress and flat-topped pines
Shrub wetlands	No	• No thinning or replanting
Basin swamp / shrub wetlands / mixed forested wetlands	No	Drier areas only: • Thin slash pines and retain longleaf • Convert to uneven-aged management
Basin swamp - Atlantic white cedar	No	• Harvests of pines may be acceptable if damage to ecosystem can be minimized • Further research is needed
Deciduous forested wetlands, mixed forested wetlands, and marshes	No	• No thinning, harvesting, or planting of pines

ecological community type and be consistent with the *Vegetation Management Guidelines* (DOF and FNAI 2001) and the *10-Year Management Plan* (DOF 2007). Table 11 indicates the suitability of each community type for long-term timber production and lists some of the long-term management recommendations developed by the DOF and FNAI. The suitability of areas for timber production may change as natural surface water drainage patterns are restored and site conditions change over time.

Areas containing clusters of the endangered Red-Cockaded Woodpecker merit special consideration. These habitats should be managed consistent with the state's Red-cockaded Woodpecker Management Plan (FWC 2003) and the U.S. Fish and Wildlife Service Recovery Plan (USFWS 2003). Appropriate forest structure for RCWs includes large pines, low densities of small and medium pines, a sparse hardwood mid-story, and an abundant and diverse herbaceous groundcover (USFWS 2003). Areas containing RCW clusters should be burned every one to three years during the growing season to maintain an open forest structure and prevent mid-story encroachment (FWC 2003). Shrub or mid-story reduction may be needed to provide optimal foraging habitat. Cavity trees, dead and dying snags and older pines should not be harvested. Human disturbances should be minimized and no activities should be conducted within 200 feet of any cavity tree during the April – July nesting season (FWC 2003).

Exotic and Invasive Species (including titi)

During construction activities, specifications for erosion control should clearly specify that Bahia grass (*Paspalum notatum*), which is considered an invasive plant, not be used for seeding and mulching. Subsequent to construction, the control of exotic and invasive species should be performed by the entity responsible for the hydrologic restoration project in cooperation with the Division of Forestry. In some cases, the Division of Forestry may assume responsibility for the management of exotic and invasive species. Typically, restoration goals will specify that invasive exotic species be maintained at less than 1% cover. This may require the use of herbicides (subject to Division of Forestry approval), prescribed burning, manual vegetation removal, or some combination of these actions.

Although shrub wetlands were a part of the natural historical landscape within Tate's Hell State Forest, titi shrubs have invaded many other historical ecological communities as a result of past fire suppression. Some areas where titi has invaded have essentially become large monocultures with little groundcover and few other canopy species. Titi shrub reduction will be needed in many areas to restore appropriate vegetation conditions. The reduction of titi shrubs can be accomplished with mechanical removal followed by a series of prescribed burns. In some cases, replanting of native wetland vegetation may be needed.

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Appendices

Appendix A. List of species for which habitat maps were developed by the FNAI and the NFWMD

Table A.1 Species for which habitat maps were developed by the FNAI

Common Name	Scientific Name
Curtis's Loosestrife	<i>Lythrum curtissii</i>
Eastern Indigo Snake	<i>Drymarchon couperi</i>
Flatwoods Salamander	<i>Ambystoma cingulatum</i>
Florida Black Bear	<i>Ursus americanus floridanus</i>
Florida Skullcap	<i>Scutellaria floridana</i>
Godfrey's Butterwort	<i>Pinguicula ionantha</i>
Panhandle Spiderlily	<i>Hymenocallis henryae</i>
Red-cockaded Woodpecker	<i>Picoides borealis</i>
West's Flax	<i>Linum westii</i>
White Birds-in-a-nest	<i>Macbridea alba</i>
White-flowered Wild Petunia	<i>Ruellia noctiflora</i>

Table A.2 Species for which habitats maps were developed by the NFWMD

Common Name	Scientific Name
Apalachicola Dragon-head	<i>Physostegia godfreyi</i>
Carolina Grass-of-Parnassus	<i>Parnassia caroliniana</i>
Chapman's Crownbeard	<i>Verbesina chapmanii</i>
Florida Beargrass	<i>Nolina atopocarpa</i>
Hummingbird flower	<i>Macranthera flammea</i>
Large-leaved Grass-of-Parnassus	<i>Parnassia grandifolia</i>
Pine-woods Bluestem	<i>Andropogon arctatus</i>
Small-flowered Meadowbeauty	<i>Rhexia parviflora</i>
Southern Milkweed	<i>Asclepias viridula</i>
Spoon-leaved Sundew	<i>Drosera intermedia</i>
Thick-leaved Water-willow	<i>Justicia crassifolia</i>
White-top Pitcherplant	<i>Sarracenia leucophylla</i>
Wiregrass Gentian	<i>Gentiana pennelliana</i>
Yellow Fringeless Orchid	<i>Platanthera integra</i>

Appendix B. Supporting GIS Analyses

Delineation of Habitat Polygons

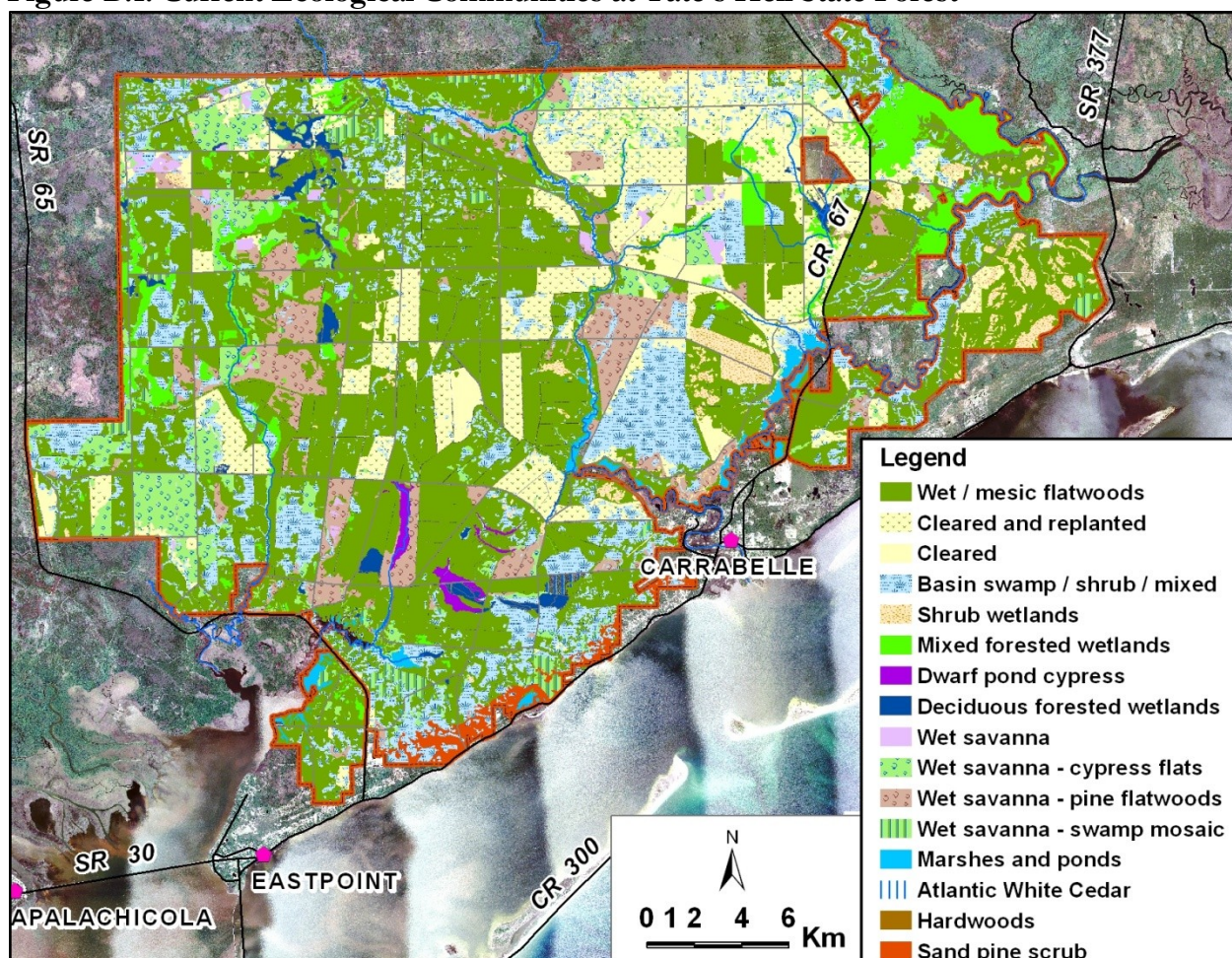
The GIS shapefile for each restoration tract contains many smaller polygons, each with unique habitat attributes. A GIS shapefile named “stand_pl” was obtained from the Division of Forestry and contained data for each forestry management unit including the forest cover, groundcover, age structure and timber size class. For some management units, the tree density and basal area also were available. The shapefile of stand management data was combined with a shapefile of the historical ecological communities delineated by FNAI (FNAI 2000). The result was a shapefile containing nearly 21,200 polygons. The attribute table contains data regarding both historical and the current vegetation conditions. Attributes include the historical ecological community type delineated by FNAI and the forest cover (e.g. slash pine, hardwoods), groundcover (where available), and origin (planted, natural, or clear-cut) and other data provided by the Division of Forestry. For areas planted in pines, the tree density, basal area, mean diameter, age structure, size class, and year planted may also be available.

Polygons greater than 0.1 acres in area comprise more than 98% of the total area of Tate’s Hell. To reduce computational effort in subsequent GIS analyses, the polygons smaller than 0.1 acres were deleted. The resultant shapefile contains approximately 14,000 habitat polygons.

Aerial Photo Interpretation of Current Vegetation

The FNAI classification system was used to classify the current ecological communities within each of the 14,000 habitat polygons that comprise Tate’s Hell State Forest (FNAI 2000). Additional categories were added for roads, buildings, and borrow pits. The determination of the current ecological community type was based largely on the review of available GIS data in combination with field verification of selected areas. The following data were reviewed: aerial photography (1953, 2004, and 2007), color-infrared aerial photography (2004), forest stand attributes (DOF 2007), National Wetlands Inventory maps, and soils maps. LiDAR data had not yet been received by the District when this analysis was performed in late 2007. Aerial photography was reviewed for all polygons greater than 10 acres in size (88% of Tate’s Hell State Forest). For polygons less than 10 acres in size, the current ecological community generally was assigned based on forest stand attributes (canopy species, groundcover, etc.). The results are shown on Figure B.1. Although forest stand data and aerial photography can generally provide a reasonable approximation of canopy conditions, shrub cover and groundcover conditions are often largely unknown. Thus, an area that appears to be wet flatwoods community from aerial photography may in fact be an overgrown wet savanna. As a result, this map should continue to be reviewed and updated based on the results of future forest stand inventories and ongoing field verification.

Figure B.1. Current Ecological Communities at Tate's Hell State Forest



Classification of the Likelihood of Long-term Timber Management

The Vegetation Management Guidelines (DOF and FNAI 2001) and available GIS data were used to classify the likely degree of long-term timber management for each habitat polygon as either: (1) short-term timber management, (2) perpetual management for timber production, or (3) no timber management, except for prescribed burning. In the context of wetland restoration, short-term refers to a planning horizon that may range from five to 20 years or more. Many of the areas targeted for hydrologic restoration are currently planted in pines, frequently at tree densities that exceed appropriate or desirable canopy conditions. Such areas may require two or more cycles of tree thinning along with multiple prescribed burns over a 10 to 20 year period before desired pine densities and basal areas can be achieved. Thus, the Division of Forestry will use silvicultural management practices, such as harvesting and burning, as “short-term” restoration tools. In some clear-cut areas, plants have been recently replanted at high densities (720 TPA). The Division of Forestry has used this approach in some areas because planting pine seedlings at a high density in clear-cut areas and then thinning to desirable densities over time may minimize invasion by titi shrubs (Ace Haddock, personal communication).

The Vegetation Management Guidelines specify that wet and mesic flatwoods will be managed perpetually for timber production along with the drier portions of wet savanna - pine flatwood mosaics, wet savanna - swamp mosaics, and basin swamps (DOF and FNAI 2001). Forest stand data and aerial photography were used to distinguish between wetter and drier areas. (LiDAR data had not yet been received by the District when this analysis was performed in late 2007). Areas planted in longleaf pine and designated as mesic flatwoods by the Division of Forestry were presumed to be drier areas that will be managed perpetually for timber production. Areas designated by the Division of Forestry as bogs, basin swamps, bottomland forest, and wet prairies, were presumed to be wet areas that are unsuitable for timber production. The likelihood of long-term timber management was interpreted for each of the 14,000 habitat polygons as indicated below. The resultant map is shown as Figure B.2.

Perpetual pine management for timber production

Includes:

- All historical wet and mesic flatwoods, excluding isolated wetlands occurring within these ecosystems.
- The drier portions of the historical wet savanna – pine flatwoods mosaics, wet savanna – swamp mosaics, and basin swamp/shrub/mixed wetlands.
- Historical sand pine scrub areas that have been planted in slash or longleaf pines, excluding isolated wetlands occurring within these ecosystems.

Short-term pine management

Includes:

- Historical wetland types that are unsuitable for timber production and have a high need for hydrologic restoration but that are currently planted in pines with a basal area greater than 60 ft²/ac. or a density of more than 200 TPA.
- Areas of historical sand pine scrub included in the 5-year Harvest Plan. (DOF 2007)

No pine management (except for prescribed burning)

Includes:

- Areas with a natural tree canopy that have not been planted and were not proposed to be planted in pines in the 5-Year Reforestation Plan (DOF 2008).

Timber management may change in some areas as conditions become wetter following hydrologic restoration activities. Market conditions and timber prices also will affect future timber management activities.

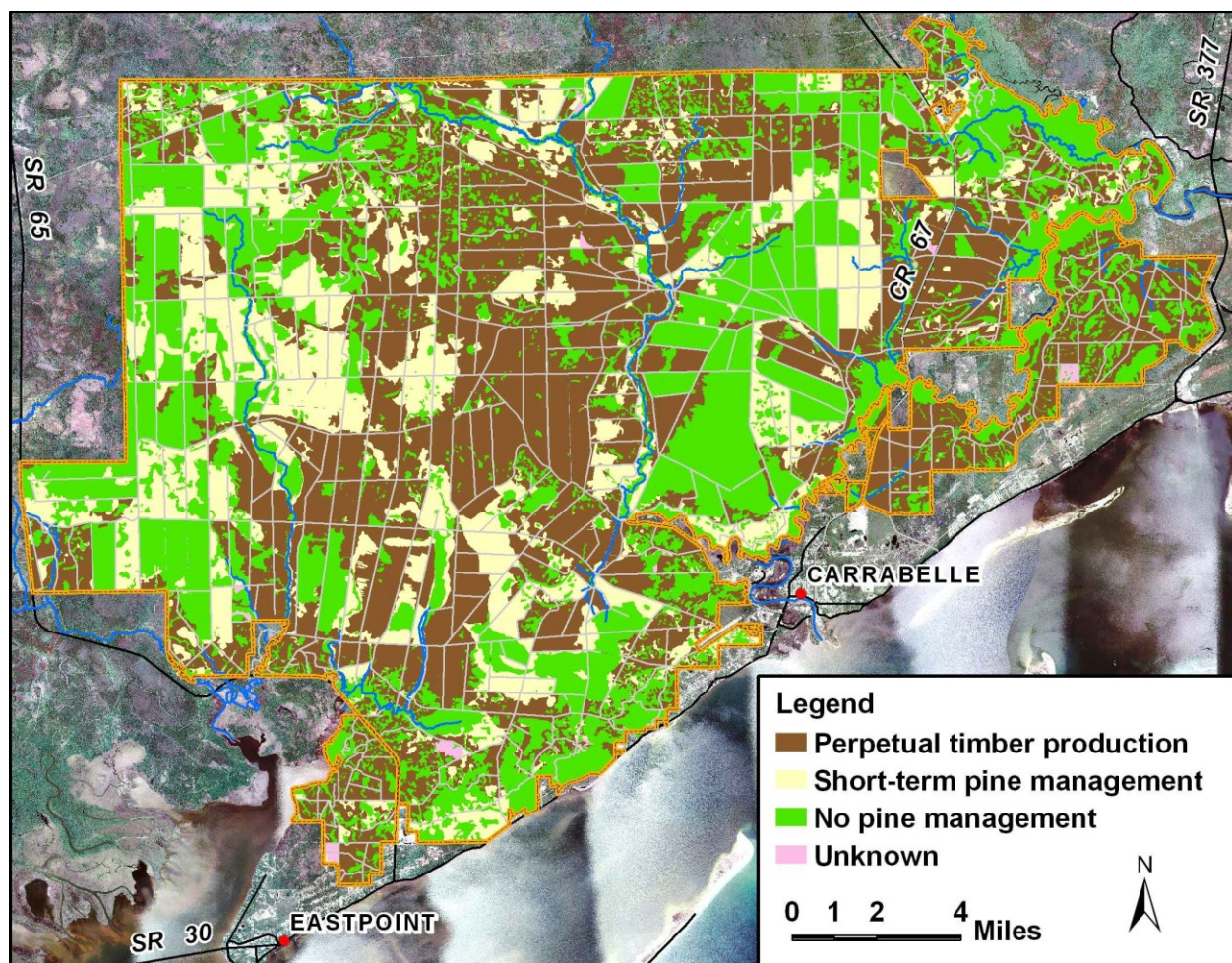


Figure A.2. Silvicultural Management



Tate's Hell State Forest Hydrologic Restoration Plan

Volume II: Basin Restoration Plans 2010 - 2020



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Overview

In this volume, hydrologic restoration plans are presented for each of the 29 surface water drainage basins located in Tate's Hell State Forest. Restoration plans include a description of the historical ecological communities types and current conditions within each basin, a description of the proposed hydrologic improvements needed to restore historical surface water drainage patterns, estimated construction costs for the proposed improvements, and recommendations for habitat enhancements such as pine thinning, prescribed burning, and shrub reduction. For each surface water basin, the hydrologic restoration plan includes three figures: (1) the type and distribution of historical ecological communities together with the proposed hydrologic improvements, (2) current land cover conditions, proposed hydrologic improvements, and anticipated post-restoration drainage patterns, and (3) LiDAR elevation data (topography), proposed hydrologic improvements, and anticipated post-restoration drainage patterns. Proposed hydrologic improvements include road removals, low water crossings, bridges, box culverts, ditch blocks, flashboard risers, and culvert modifications.

Preliminary field reconnaissance of the proposed hydrologic improvements has been performed in most basins. However, due to the large area encompassed by Tate's Hell State Forest and the number of proposed hydrologic improvements (>1,200), it was not possible to field verify every location. Additionally, site conditions are anticipated to change over time in response to hydrologic restoration and Division of Forestry land management activities. As a result, additional engineering design, permitting, topographic surveys, and other tasks may be needed prior to initiating construction activities or habitat improvements associated with hydrologic restoration projects. It is strongly recommended that a detailed field reconnaissance be performed in each project area prior to finalizing the design and construction plans. During the field reconnaissance, the dimensions, materials and other specifications can be determined for proposed structures (e.g. culverts, low water crossings, and flashboard risers). Additional engineering design and analysis will be required for bridges.

The historical vegetation maps delineated by the Florida Natural Areas Inventory (FNAI 1997 and 2000) serve as a guideline for desired future habitat conditions and in most cases, target ecological conditions will be based on the historical ecological communities. In some areas, however, the ecological community type that is achievable may differ from the historical ecological community delineated by FNAI due to site-specific conditions or constraints. It is recommended that baseline ecological conditions be reviewed in the field and that target ecological community types be specified prior to finalizing the restoration goals and completing the engineering design and construction plans for specific hydrologic restoration projects.

Due to the large size of Tate's Hell State Forest and the extensive degree of hydrologic impacts, restoration is anticipated to be a gradual and incremental process. Hydrologic and habitat improvements will accrue over time as restoration and land management activities continue to be

implemented during the next five to 20 years or more. To date, approximately a dozen wetland restoration projects have been implemented within Tate's Hell State Forest by various public agencies and private entities. Future restoration activities will build upon these efforts.

Approach used to Develop Hydrologic Restoration Plans

The development of hydrologic restoration plans involved several steps. First, a GIS-based review and analysis of each basin was performed by NFWFMD staff. Based on the GIS-based review, strategies were developed to restore historical surface water drainage patterns to the greatest extent possible in light of current site conditions. The locations of potential hydrologic improvements such as low water crossings, ditch blocks, flashboard risers, and culvert modifications were identified. Field reviews were conducted to check most road removal and low water crossing locations. The locations of some ditch blocks, flashboard risers, and culverts were also verified in the field. Based on the findings of the field reviews, appropriate revisions were made to the basin restoration plans.

Preliminary hydrologic restoration plans for each basin were then reviewed with the Division of Forestry. Forestry staff has extensive knowledge of past and current site conditions, existing and planned recreational sites, road access needs, firebreak locations, and timber management activities. Forestry staff made certain that hydrologic restoration activities would not adversely impact other uses of the property. Following discussions with Forestry staff, the preliminary hydrologic restoration plans were revised and final plans were created for each basin.

Recommended Hydrologic Improvements

NFWFMD staff reviewed the following data during the initial GIS-based review: (1) Aerial photography for 1953, 2004, and 2007, (2) hydrologic basin boundaries (3) 2007 LiDAR elevation data, (4) Vegetation Management Guidelines for the Tate's Hell State Forest (DOF and FNAI 2001), (5) 2000-2001 forest stand inventory data, (6) historical ecological communities delineated by the Florida Natural Areas Inventory (FNAI 1997 and 2000), (7) locations of Red-cockaded Woodpecker clusters, (8) road attributes, (9) culvert attributes, and (10) locations of OHV trails, primitive campsites, and other recreational facilities.

Hydrologic basin boundaries obtained from the Natural Resources Conservation Service were revised based on the 2007 LiDAR elevation data obtained for Franklin County and Liberty County. Because of the extensive network of ditches and the large number of existing culverts (more than 800), surface water flows can be conveyed across topographic basin boundaries. As a result, the basin boundaries may need to be further refined as additional data regarding surface water drainage patterns become available.

Additional factors considered when recommending locations for specific types of hydrologic improvements are discussed below.

Road Removals

Road removals involve using bulldozers or other heavy equipment to excavate and recontour a segment of a dirt logging road to match the adjacent natural grade. The excavated road material is used to fill in adjacent drainage ditches. Road removals have been proposed in selected areas where existing roads bisect existing or former wetlands and streams and where roads have altered natural surface water drainage patterns. Road removals were generally limited to areas where both sides of the road are unsuitable for long-term timber management and where pines are currently absent or

will be thinned within the next five to ten years. Due to the Division of Forestry's need to maintain vehicle access across Tate's Hell State Forest, road removals have not been proposed on primary or secondary roads, the blue OHV trail, or roads leading directly to campsites.



Figure 1. Road removal footprint following one year of vegetation regrowth.



Figure 2. Low water crossing

Low Water Crossings

Low water crossings have been proposed in areas where it is desirable to maintain road access while also restoring surface water flows in streams or wetlands. The construction of a low water crossing involves lowering a segment of the road to match the natural wetland or stream grade. A geotextile topped with coarse aggregate material is placed in the center of the crossing to enable vehicle

access while also allowing water to flow perpendicular to the travel lane. Rock aprons are installed on either side of the travel lane to prevent erosion of the crossing. Locations for low water crossings were identified by reviewing locations where streams and wetlands are bisected by roads.

Road attributes and LiDAR land surface elevations were also reviewed. In some instances, existing culverts are proposed to be replaced with low water crossings to increase conveyance capacity and restore channel morphometry. Due to the need to maintain year-round vehicle access, low water crossings have generally not been proposed on primary roads or roads leading directly to campsites.

Ditch Blocks and Flashboard Risers

Ditch blocks and flashboard risers are proposed where it is desirable to reduce, redirect, or prevent surface water flow in roadside ditches. Ditch blocks also may be used to restore local topographic features or to prevent ditch flow across hydrologic basins. The construction of a ditch block involves placing fill material in a ditch, compacting the material, and seeding and mulching the ditch block top surface and side slopes with native grasses to prevent erosion. Ditch blocks are generally constructed using onsite soil materials such as road fill excavated during the construction of low water crossings.



Figure 3. Earthen ditch block

Flashboard risers can be thought of as a culvert with an adjustable weir structure. Flashboard risers offer more flexibility than ditch blocks because boards can be added or removed to regulate surface water flow in response to hydrologic conditions and land management needs. Flashboard risers may be preferable to ditch blocks in areas where it is desirable to maintain the ability to convey flows through ditches under certain conditions.



Figure 4. Recently installed culvert

Culvert Modifications

Culverts modifications include the installation of new culverts and the replacement or removal of existing culverts. The evaluation of recommended culvert modifications focused on adding culverts to re-connect contributing drainage areas and removing culverts that transfer water across historical basin

boundaries. Some but not all of the more than 800 existing culverts were examined in the field. There are likely numerous culverts in need of replacement that are not included in the hydrologic restoration plans.

Bridges and Box Culverts

Several locations for box culverts and small bridges also have been proposed. Bridges may be proposed in areas where the existing culverts have insufficient capacity to convey streamflows or where it is desirable to restore a more natural stream channel. Box culverts may be proposed in lieu of bridges for smaller stream crossings or for wetland sloughs.

Construction Cost Estimates

Estimates of construction costs are provided for the recommended hydrologic improvements in each surface water basin. The total construction cost reflects the sum of the costs of individual improvements rounded to the nearest ten thousand dollars. Unit costs for hydrologic improvements are based on bids received in 2009 for restoration activities at Tate's Hell State Forest (Table 1). Unit costs reflect the sum of labor and materials. Because unit costs reflect average values, actual construction costs will differ due to differences in pipe sizes and the dimensions of low water crossings and ditch blocks. Labor and materials costs fluctuate from year to year due to changes in

Table 1. Unit costs for hydrologic improvements (2009 dollars)

Hydrologic Improvement	Unit	Unit Cost
Low water crossing	Each	\$15,000
Road removal	Per mile	\$17,000
Culvert installation	Each	\$5,000
Culvert removal	Each	\$450
Flashboard riser	Each	\$6,000
Ditch block	Each	\$2550
Box culvert / weir	Each	\$40,000
Bridge	Each	\$100,000

market conditions. Costs for associated habitat improvements (e.g. prescribed burning, replanting, and shrub reduction) have not been included. Some of these activities are conducted by the Division of Forestry. Additionally, it is difficult to determine the habitat improvements needed for a particular project as it will depend on the site conditions encountered immediately prior to project implementation. For these reasons, costs should be viewed as planning level estimates.

Grouping of Surface Water Drainage Basins

Figure 5 is a map of the surface water drainage basins in the vicinity of Tate's Hell State Forest. Due the large number of basins, some smaller basins in the same geographic area have been grouped together for the purpose of presenting the hydrologic restoration plans. Hydrologic restoration plans are presented for 15 basins or groups of basins.

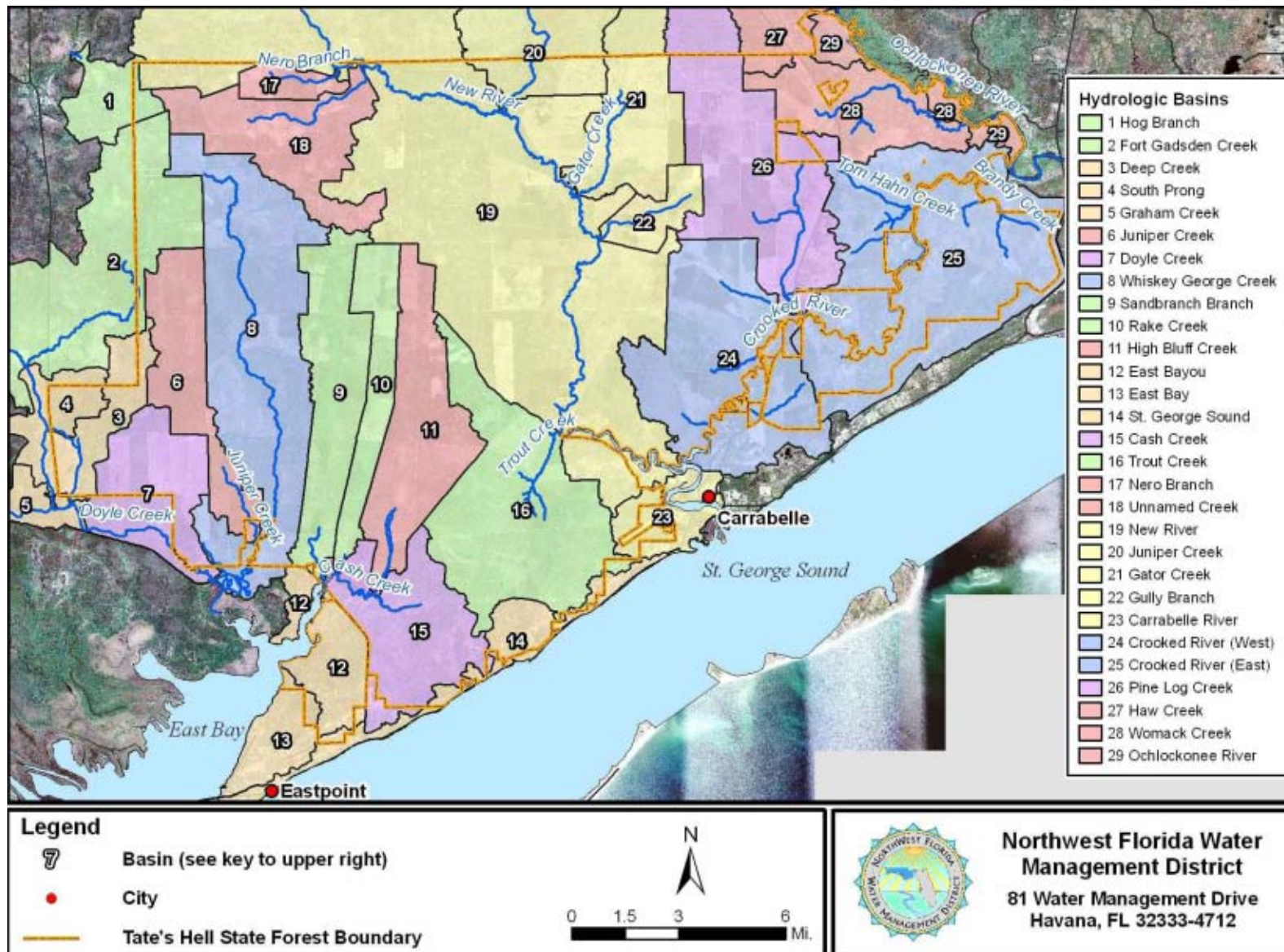


Figure 5. Surface water basins grouping used to present the hydrologic restoration plans.

Hydrologic Restoration Plans

Hog Branch and Fort Gadsden Creek

Restoration Priority: High

Basin Area: 18,349 acres (including areas outside Tate's Hell)

Description: Approximately one-third of the Fort Gadsden Creek drainage basin lies within Tate's Hell State Forest. Historical ecological communities in this basin included cypress flats, basin swamps, and wet savanna pine-flatwood mosaics, with cypress strands comprising the stream corridor (Figures 6 and 7). The general direction of surface water flow in the basin is to the south and west.

The majority of the 2,900 acre Hog Branch basin lies within the Apalachicola National Forest. Only about 450 acres lie within Tate's Hell State Forest. Hog Branch drains into Black Creek which then flows into Rowlett Creek and eventually to the Apalachicola River. The historical ecological communities in the portion of the Hog Branch basin within Tate's Hell consisted mostly of mesic flatwoods. A former 12-acre cypress wetland is now bisected by West Boundary Road.

Similar to other basins, the road construction and conversion to pine plantation that occurred in this area during the 1960s and 1970s significantly altered natural habitats and disrupted surface water drainage patterns. Most of the former wet savannas and natural pine flatwoods were converted to dense stands of planted slash pines. Many historical basin swamps now have a very dense tree canopy that may include pockets of planted pines. Because of the surface water drainage alterations, some habitats are likely wetter than they were historically. Additionally, some areas that now drain towards the south likely drained towards the west prior to the construction of West Boundary Road. As noted previously, the boundary between the Fort Gadsden Creek and Juniper Creek basins is not well-defined, particularly in the vicinity of West Boundary Road.

Restoration activities in the Fort Gadsden Creek basin include the removal of road segments and adjacent ditches in the northern corner of the basin as part of the Whiskey George Savannas Restoration Project implemented by the NFWFMD in 2009. A low water crossing was also constructed as part of this project to reconnect a historical cypress slough. An existing low water crossing is located farther downstream. Post construction monitoring conducted during the spring of 2010 indicates the low water crossings are conveying surface water flows and that wetland vegetation has begun colonizing the road removal areas.

2010 – 2020 Hydrologic Restoration Plan: Future restoration activities are aimed at decreasing surface water flows in the roadside ditches and re-establishing historical surface water drainage

patterns. Because West Boundary Road is a primary road, installing additional low water crossings or removing segments of this road has not been recommended. However, five new culverts are proposed across West Boundary Road to improve hydrologic connectivity and enhance the conveyance of surface water flows towards the west (Figures 6 through 11).

North of Gully Branch Road, three low water crossings and a 0.46-mile segment of road removal are proposed to restore natural drainage patterns and reconnect a series of forested basins swamps (Figures 6 and 8). Because some of these low water crossings will reconnect relatively shallow wetland systems, they may only contain water during high rainfall periods. South of Gully Branch Road, three culverts are proposed across West Boundary Road to reconnect a cypress wetland system that has been severed by the road (Figures 7 and 9). A flashboard riser will reduce southerly flow in the large ditch on the west side of West Boundary Road. In total, 11 ditch blocks are proposed to be constructed in association with the proposed culverts and low water crossings.

Because much of the vegetation is very dense throughout this basin, two or more cycles of pine thinning will be needed in most areas to achieve appropriate tree densities. Titi shrub reduction is also needed throughout much of the basin. Most of the existing road network is anticipated to be maintained through 2020 to facilitate tree thinning, prescribed burning and shrub reduction activities. As pines are thinned to appropriate densities, additional road removals should be considered.

Due to the wet conditions throughout much of this basin, relatively few areas are suitable for long-term timber production. However, the proposed hydrologic improvements will restore more natural surface water drainage patterns and may improve conditions for planted pines.

Estimated Construction Cost for Hydrologic Improvements: \$ 140,000

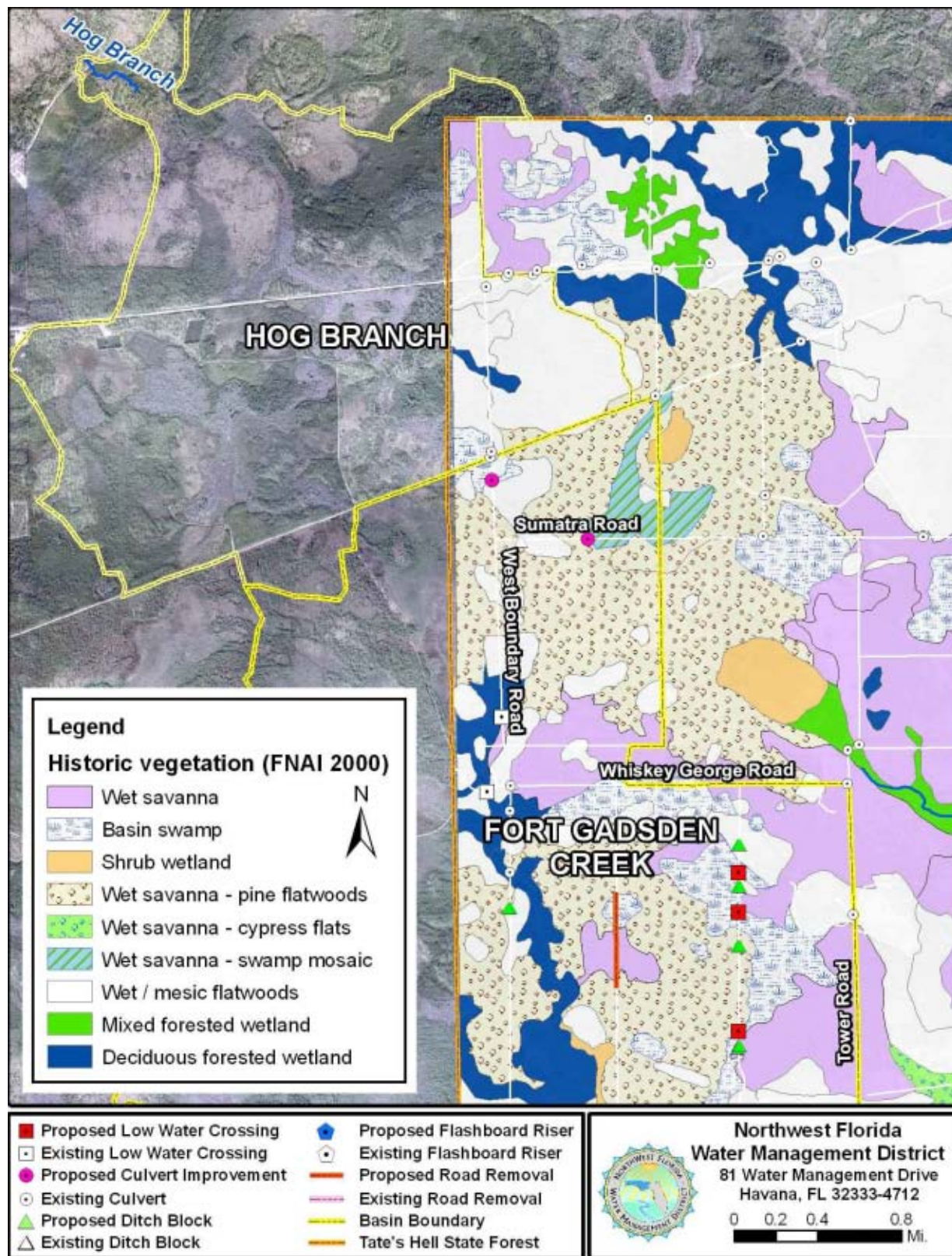


Figure 6. Historical ecological communities and proposed hydrologic improvements in the Hog Branch basin and the northern portion of the Fort Gadsden Creek basin.

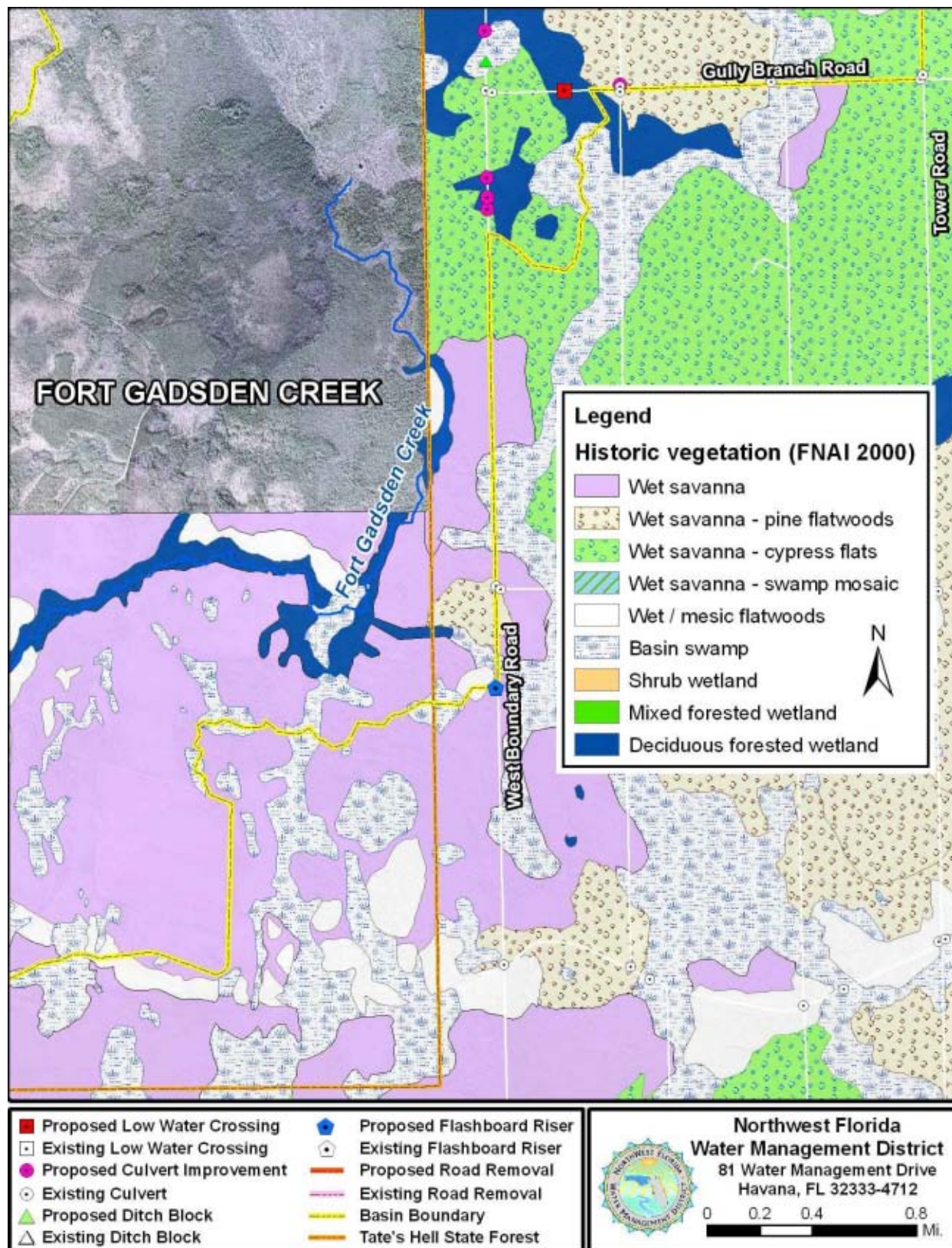


Figure 7. Historical ecological communities and proposed hydrologic improvements in the southern portion of the Fort Gadsden Creek basin

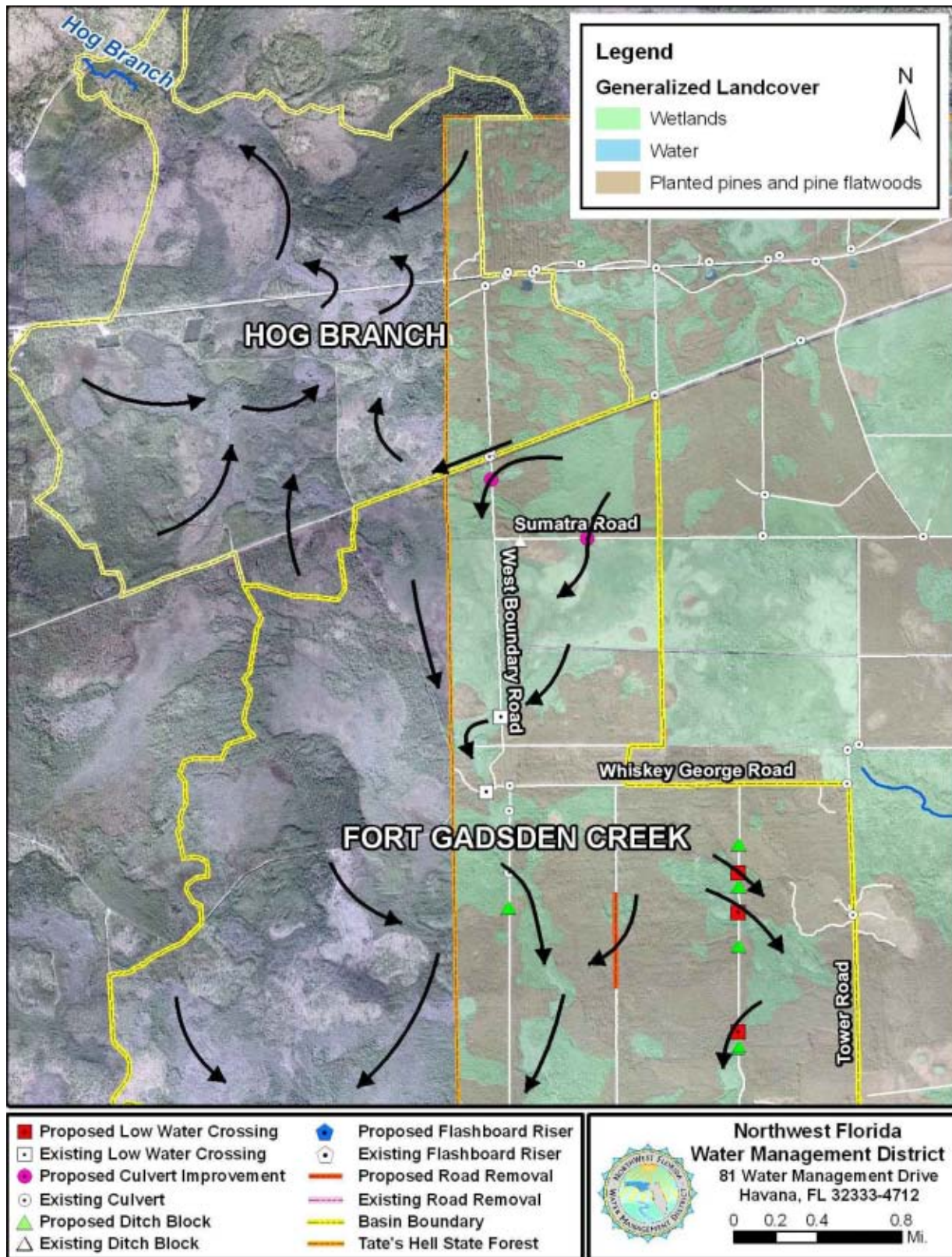


Figure 8. Proposed hydrologic improvements and post-restoration drainage patterns in the Hog Branch basin and the northern portion of the Fort Gadsden Creek basin.

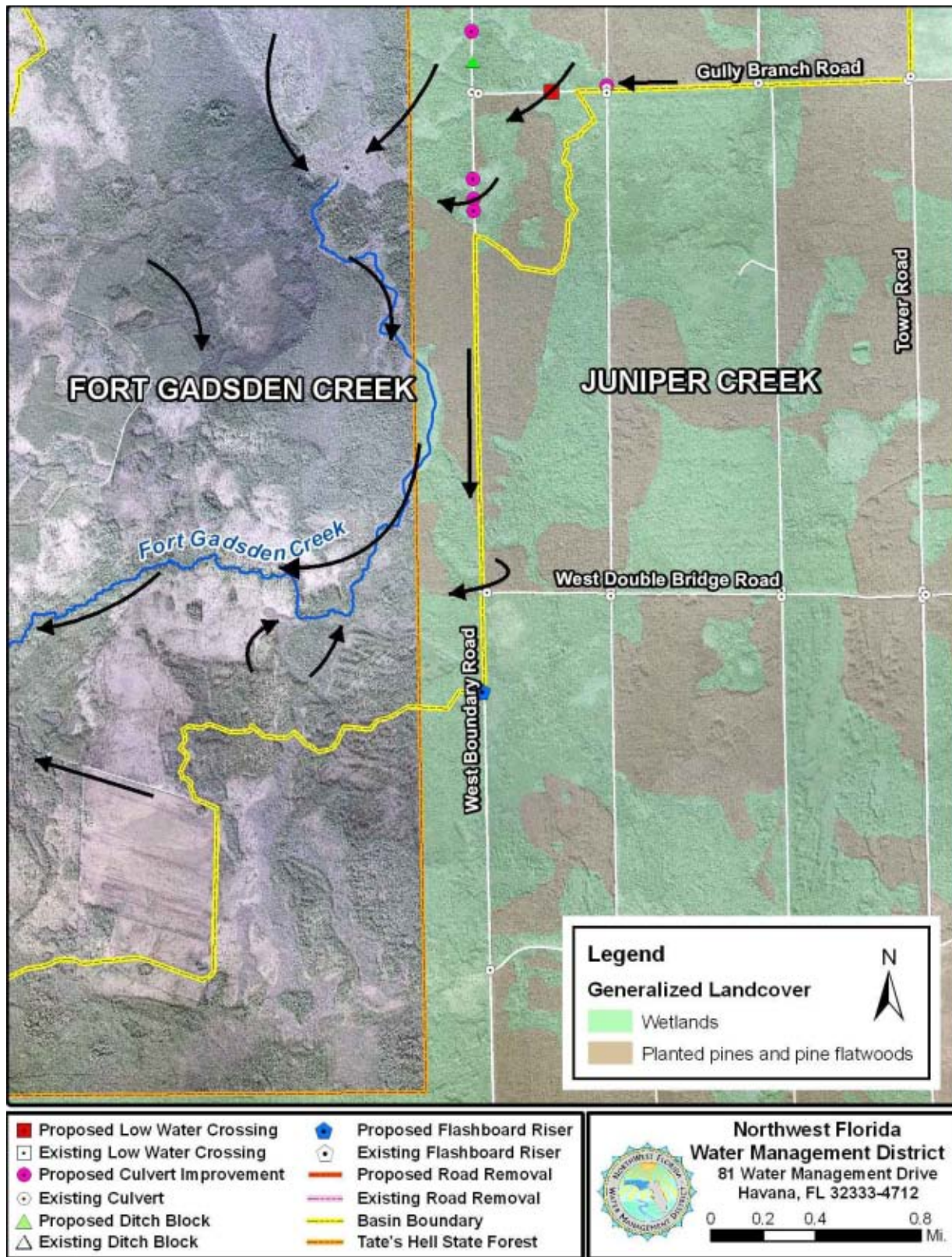


Figure 9. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Fort Gadsden Creek basin

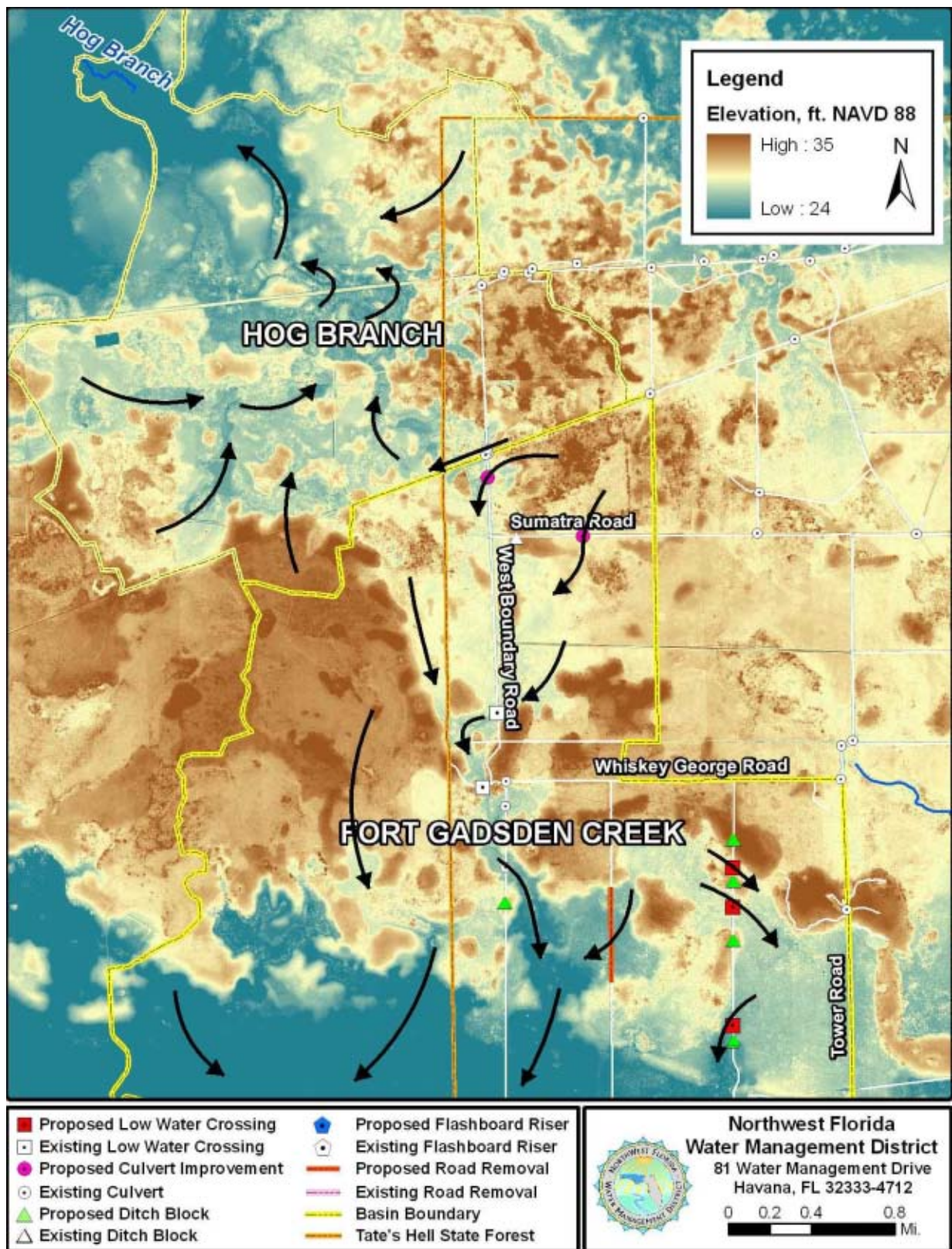


Figure 10. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the Hog Branch basin and the northern portion of the Fort Gadsden Creek basin.

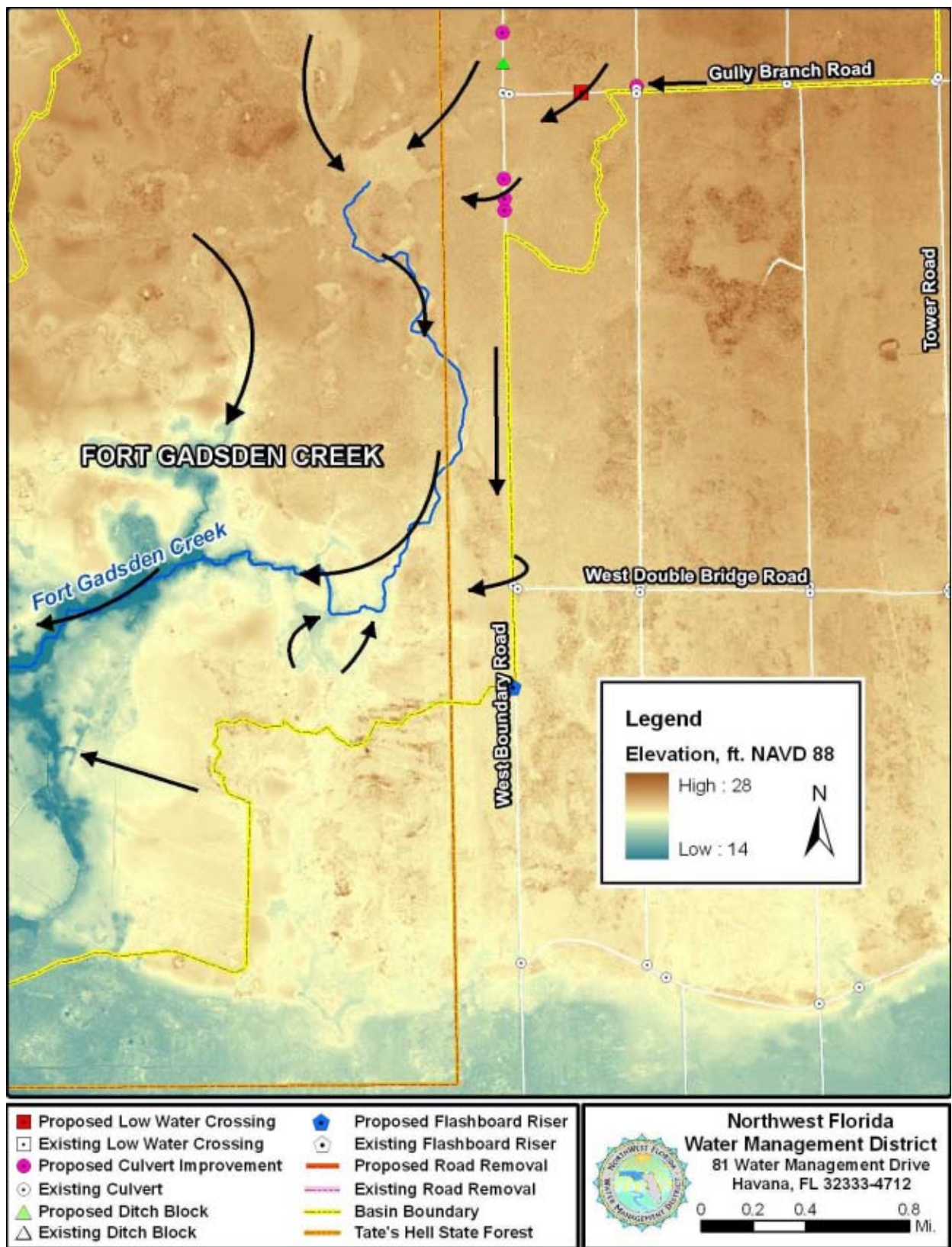


Figure 11. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Fort Gadsden Creek basin.

Deep Creek, Graham Creek, and the South Prong Basins

Restoration Priority: High

Basin Area: 8,600 acres (three basins combined, including areas outside Tate's Hell)

Description: Prior to the conversion of native habitats to pine plantation, surface water runoff in these basins flowed west and south across wet savannas, basin swamps, and pine flatwoods before eventually discharging to Deep Creek, Graham Creek, and the South Prong (Figure 12). Deep Creek and the South Prong flow into Graham Creek, which then flows west to the Apalachicola River. Both Graham Creek and the South Prong are tidally influenced. As a result, the basin boundaries, flow directions, and flow velocities may vary with time depending on tidal conditions.

The construction of the network of dirt logging roads and adjacent ditches during the 1960s and 1970s altered surface water drainage patterns and impacted natural ecological communities. Today, much of the runoff is conveyed to large ditches located on Deep Creek Road, West Boundary Road, Buck Siding Road. There have been few hydrologic restoration improvements in these three basins. Existing water control structures include a bridge across Deep Creek, a small low water crossing on Deep Creek Road, and numerous culverts. There is also a flashboard riser on the northwest corner of the West Boundary Road and North Loop Road; however, it is not known whether this structure has been operated in recent years.

2010 – 2020 Hydrologic Restoration Plan: The proposed hydrologic restoration activities will re-establish hydrologic connections, reduce ditch flow, and restore more natural surface water drainage patterns. Proposed improvements include three low water crossings along the Loop Road in the Deep Creek and South Prong basins (Figures 12 through 14). This road is frequently overtopped with water and the proposed crossings will restore natural flow patterns between wetlands while maintaining vehicle access. Three ditch blocks should be installed in conjunction with the low water crossings to direct water towards the crossings and prevent the water from bypassing the crossings and continuing to flow downstream in ditches. Additionally, three new culverts are proposed in the Deep Creek basin to reconnect contributing drainage areas to the creek.

Recommended habitat improvements include shrub (e.g. titi) reduction in the area immediately east of Deep Creek. Pine thinning should be continued in all three basins to restore appropriate tree densities in historical wetlands that were converted to pine plantation. Areas best suited for long-term timber production consist of the wet and mesic flatwoods located south of Buck Siding road. The Division of Forestry should continue with the prescribed burning activities at appropriate intervals to maintain optimal habitat conditions.

Estimated Construction Cost for Hydrologic Improvements: \$70,000

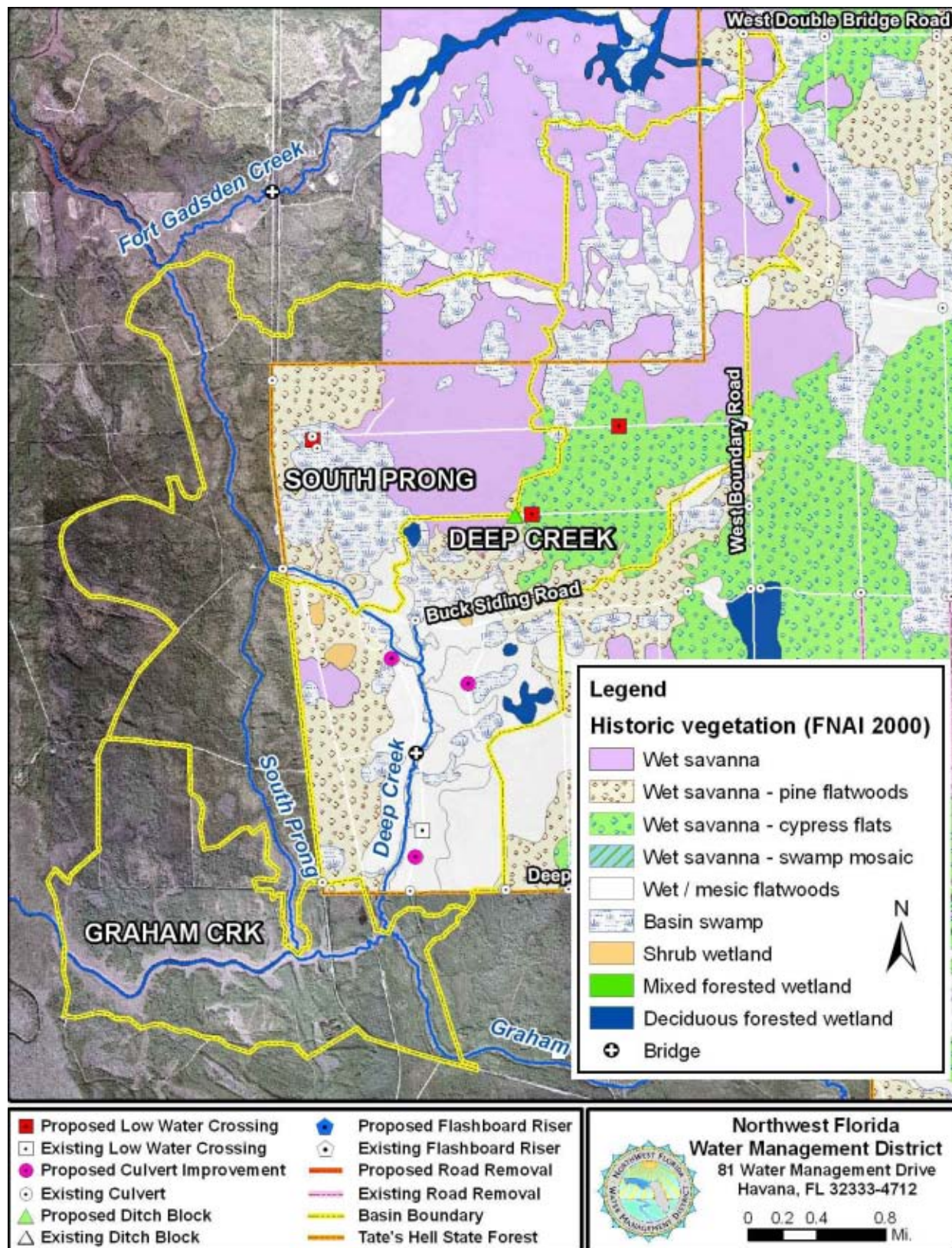


Figure 12. Historical ecological communities and proposed hydrologic improvements in the South Prong, Deep Creek, and Graham Creek basins

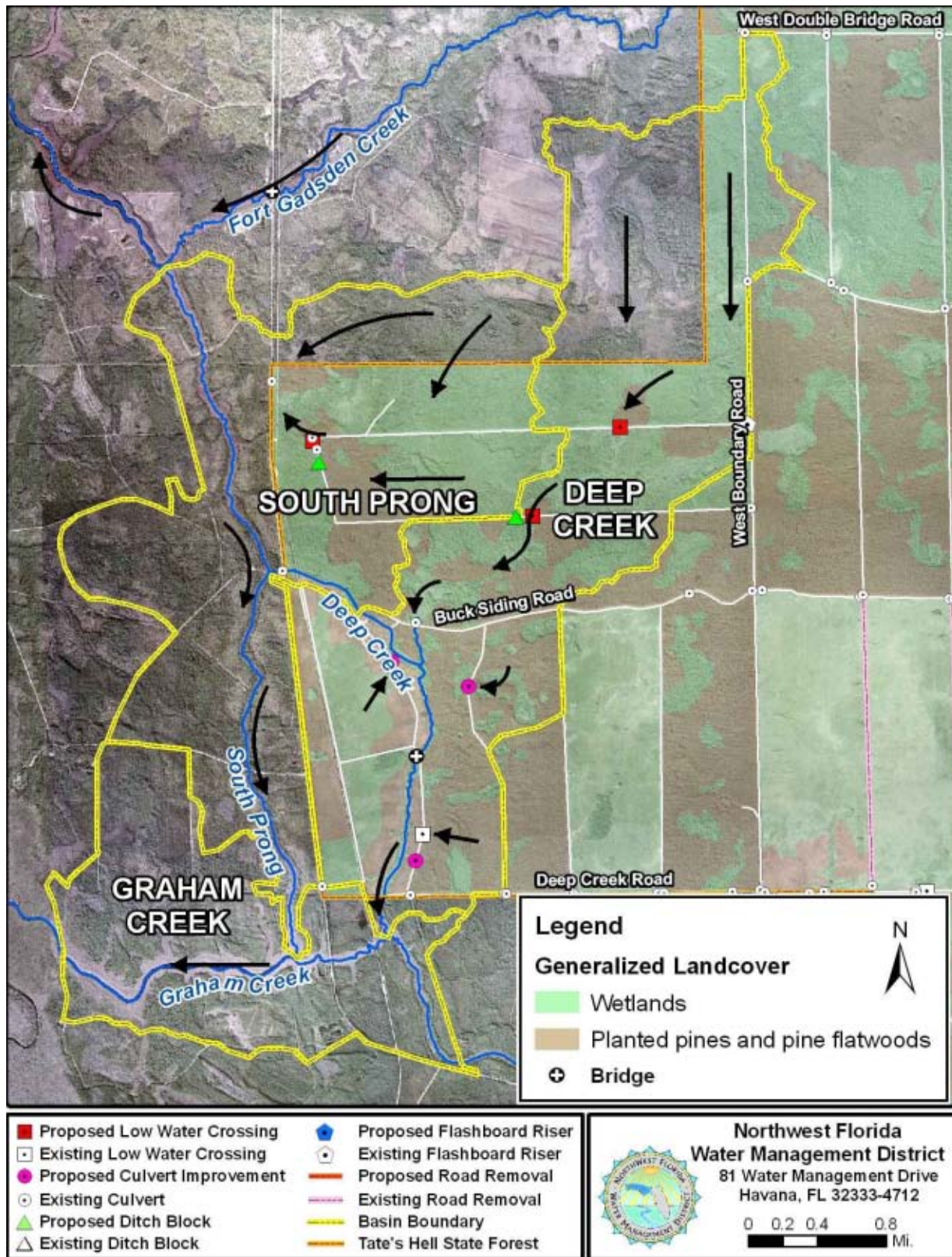


Figure 13. Proposed hydrologic restoration activities, current landcover, and post-restoration drainage patterns in the South Prong, Deep Creek, and Graham Creek basins

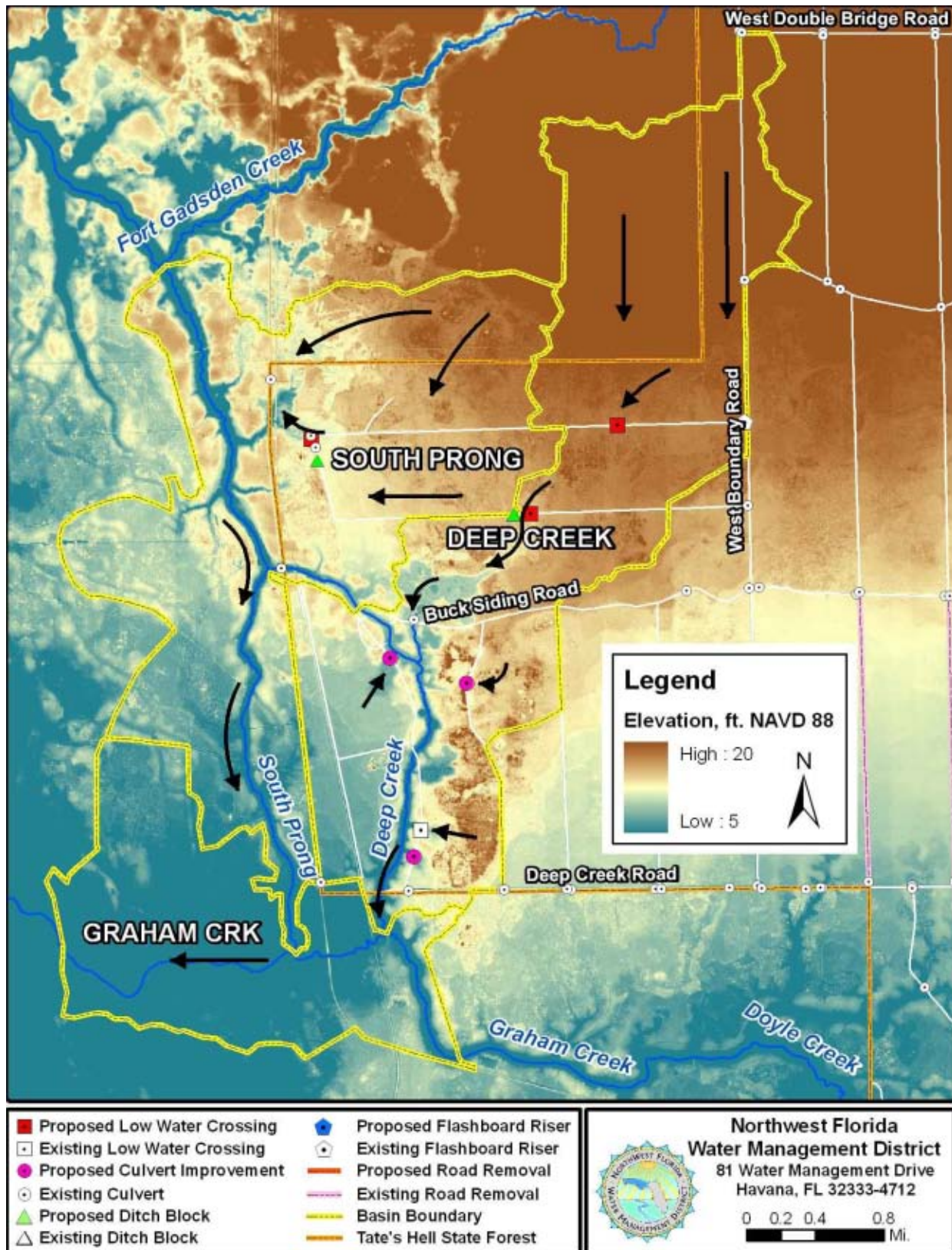


Figure 14. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the South Prong, Deep Creek, and Graham Creek basins.

Doyle Creek

Restoration Priority: High

Basin Area: 7,300 acres

Description: Doyle Creek flows south and east and discharges to Whiskey George Creek, which subsequently flows into the West Bayou of East Bay. Because East Bay serves as the primary nursery area for the Apalachicola Bay system, basins which discharge surface water runoff into East Bay are a high priority for hydrologic restoration. Surface water runoff generated within the Doyle Creek basin currently flows to large drainage ditches located along West Boundary Road, Buck Siding Road and Deep Creek Road. Surface water runoff generally flows east and south in the basin and eventually discharges towards the creek through several large culverts and a low water crossing on Deep Creek Road.

Historically, the Doyle Creek drainage basin was comprised mostly of wet savanna – cypress flats, deciduous forested wetlands, and wet savanna pine flatwood mosaic (Figure 15). The wet savanna-cypress flats habitat is described by the Florida Natural Areas Inventory as having widely spaced cypress and slash pines with an abundant woody and herbaceous understory (FNAI 2000). It can be thought of as transitional community between wet savanna and cypress swamp (FNAI 2000). The extensive network of logging roads and ditches was constructed during the 1960s and 1970s and most of the basin was converted to slash pine plantation. The planted pines located between West Boundary Road and Tower Road were clearcut by the Division of Forestry during 1998 and 1999 and the area was chopped and burned as the first phase of restoration in this basin.

The historical surface water drainage patterns in this basin have been largely restored. In 2005, the NFWFMD installed three low water crossings and restored more than 1,700 acres of wet savanna and cypress flats by removing 3.4 miles of logging roads and adjacent ditches (Figure 16). The former road footprints were planted with cypress seedlings and wiregrass. The Florida Fish and Wildlife Conservation Commission (FWC) also installed several low water crossings south of Tate's Hell State Forest to restore historical surface water drainage patterns in the Doyle Creek basin.

2010 – 2020 Hydrologic Restoration Plan: The proposed additional hydrologic improvements include three flashboard risers, three culverts, and three ditch blocks (Figure 15 through 17). The flashboard risers are intended to reduce the easterly flow of water in the large ditch on the north side of Deep Creek Road. The new culverts will reconnect and redirect ditch flow towards historical wetland sloughs and basin swamps that drain to Doyle Creek. The ditch blocks will reduce ditch flows and increase surface water flow through a proposed culvert and an existing low water crossing.

A road closure is proposed in the southern portion of the basin immediately to the west of Doyle Creek Road. The existing road is at natural grade and has no adjacent ditches. Once the road

is closed to vehicle access, it is anticipated that wetland vegetation will naturally recolonize the road footprint. There is also a 0.4-mile segment of road proposed for removal north of Deep Creek Road. This road removal will help to restore a former wet savanna – cypress flats wetland community. An additional road removal is proposed by the FWC on their property to the south.

There are relatively few areas suitable for pine management within this basin. They generally consist of scattered mesic flatwoods and the drier portions of wet savanna – pine flatwoods mosaics. The maintenance of an appropriate fire regime through prescribed burning will be necessary to restore and maintain historical ecological communities, particularly the wet savanna – cypress flats and wet savannas.

Estimated Construction Cost for Hydrologic Improvements: \$50,000; excludes hydrologic improvements on the FWC property.

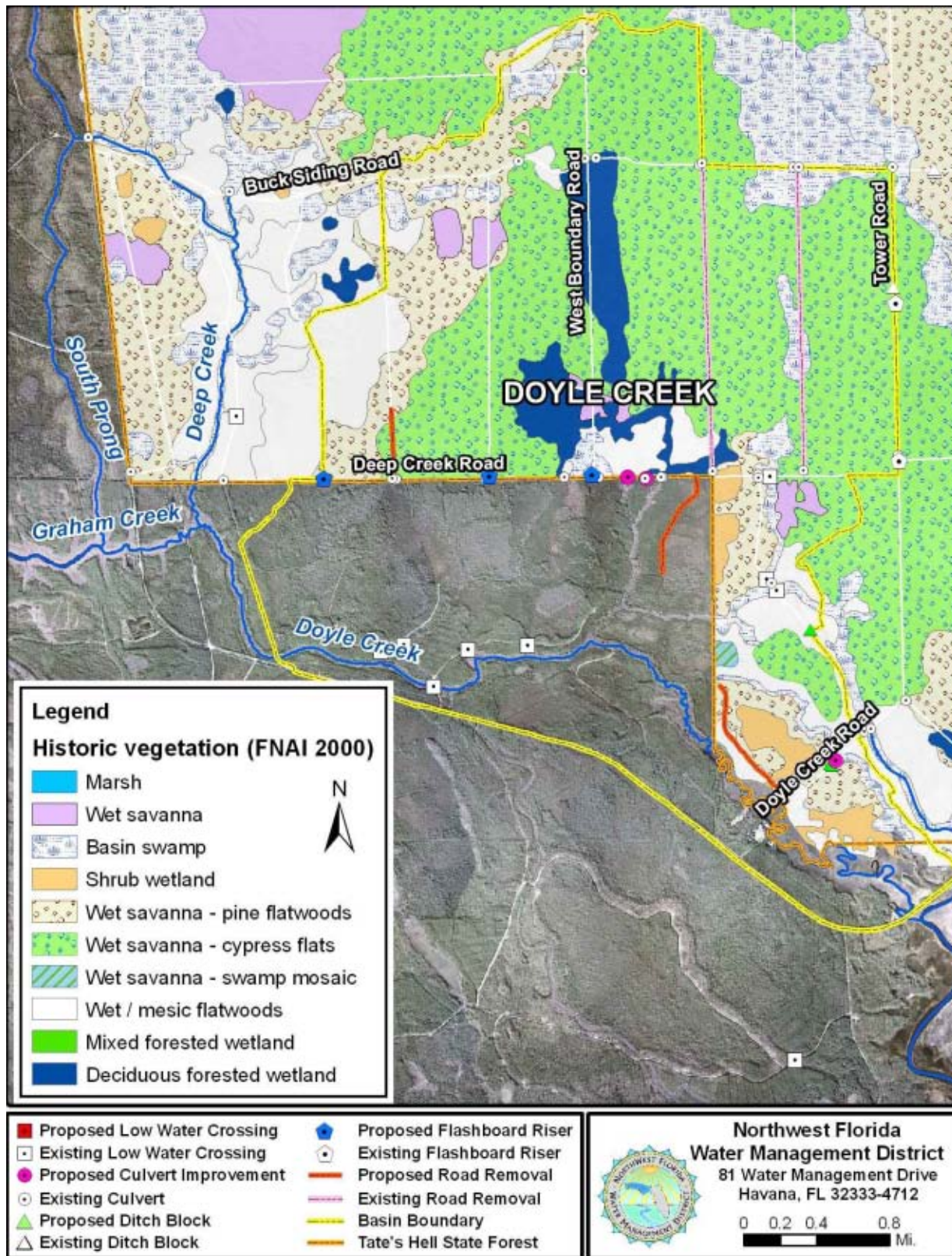


Figure 15. Historical ecological communities and proposed hydrologic improvements in the Doyle Creek basin

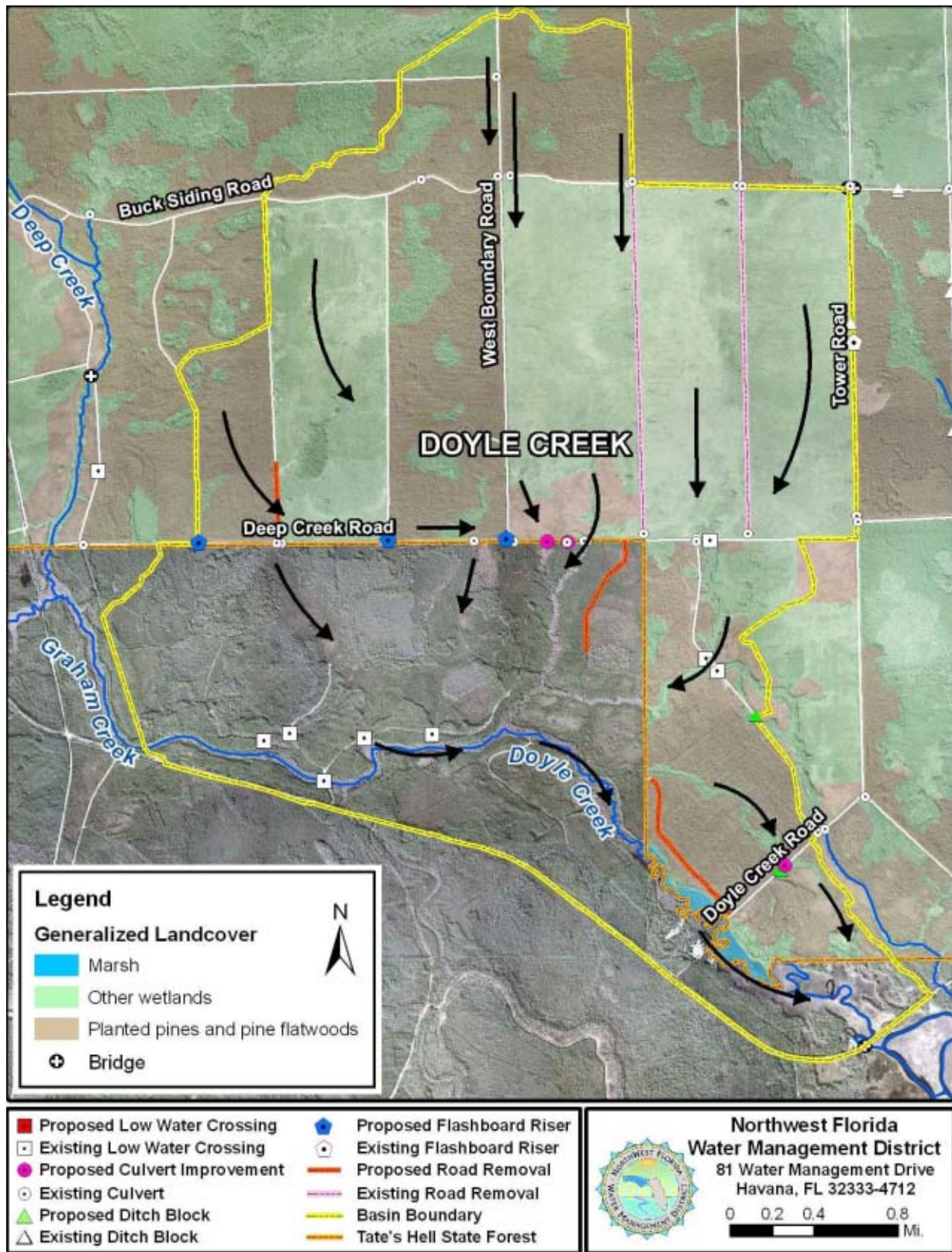


Figure 16. Proposed hydrologic restoration activities, current landcover, and post-restoration drainage patterns in the Doyle Creek basin

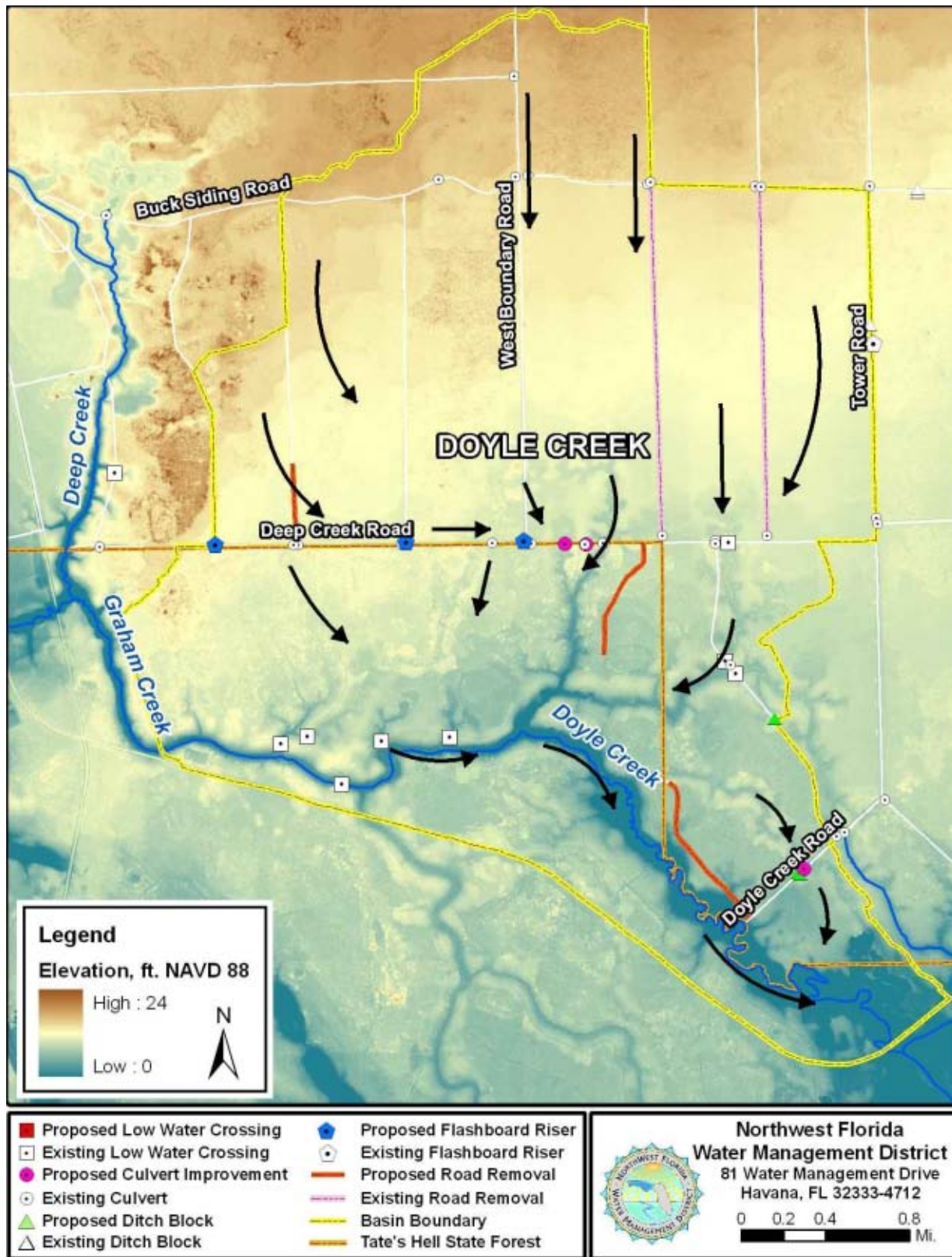


Figure 17. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the Doyle Creek basin

Juniper Creek

Restoration Priority: High

Basin Area: 6,800 acres

Description: There are two streams named Juniper Creek within Tate's Hell State Forest. This Juniper Creek basin is located southwest of Whiskey George Creek. This basin is a long and relatively narrow watershed totaling approximately 6,800 acres. At the southern end of the watershed, Juniper Creek flows into Whiskey George Creek, which then flows into the West Bayou of East Bay.

Historical ecological communities were comprised of basin swamps and wet savanna – cypress flats, with scattered pine flatwoods and savannas (Figures 18 and 19). The headwaters of Juniper Creek are formed by a series of wetlands and basin swamps located north of Buck Siding Road. Today, most of the basin consists of densely planted pines and basin swamps, with some mixed forested wetlands located north of Evans Lake Tram Road (Figures 20 and 21). The basin swamps located north of Buck Siding Road have a dense forest canopy comprised primarily of bays, Atlantic white cedar and titi mixed with planted pines and scattered cypress trees.

The basin divide between the Juniper Creek and Fort Gadsden Creek basins is not well-defined. Natural drainage patterns have been altered by the construction of West Boundary Road. Some of the surface water runoff that currently flows south along West Boundary Road probably once flowed west towards Fort Gadsden Creek. However, because West Boundary Road is classified as a primary road that is needed for year-round access for forest management and recreational activities, installing low water crossings or removing segments of this road to restore surface water drainage towards the west has not been recommended.

2010 – 2020 Hydrologic Restoration Plan: Proposed hydrologic improvements in the Juniper Creek basin include the installation of ten low water crossings and associated ditch blocks to reconnect the series of basin swamps and forested wetlands that comprised the historical stream channel (Figures 18 through 23). A 0.4-mile road segment that bisects one of these basin swamps is proposed for removal (Figure 19). Four new culverts are proposed to restore surface water drainage patterns to the east across Tower Road (three 24-in culverts) and to the south across Buck Siding Road (one 36-in culvert) (Figures 19, 21, and 23). There are two existing bridges at the intersection of the Tower Road and Buck Siding Road that currently convey water to the south. The proposed culverts across Tower Road and Buck Siding Road are intended to restore southerly flows in the former stream channel that is located immediately east of this intersection.

In the southern portion of the Juniper Creek basin, the Franklin County School Board implemented a wetland restoration project to satisfy mitigation requirements for offsite construction activities. Their project involved the removal of a short section of road, and the installation of a low

water crossing, a flashboard riser, and several ditch blocks (see existing structures in southern portion of the basin). Additional hydrologic improvements proposed in this area include a low water crossing and two associated ditch blocks, which will reconnect a basin swamp to the stream corridor (Figures 19, 21, and 23).

Recommended habitat improvements include shrub (titi) reduction and the continued thinning of densely planted pines east of Tower Road and north of Evans Lake Tram Road. Prescribed burning will continue to be required to maintain historical ecological communities. Flatwoods areas suitable for pine management are scattered throughout the basin. Some areas that are currently too wet for long-term pine production may become suitable following hydrologic improvements that restore historical surface water drainage patterns.

Estimated Construction Cost for Hydrologic Improvements: \$230,000

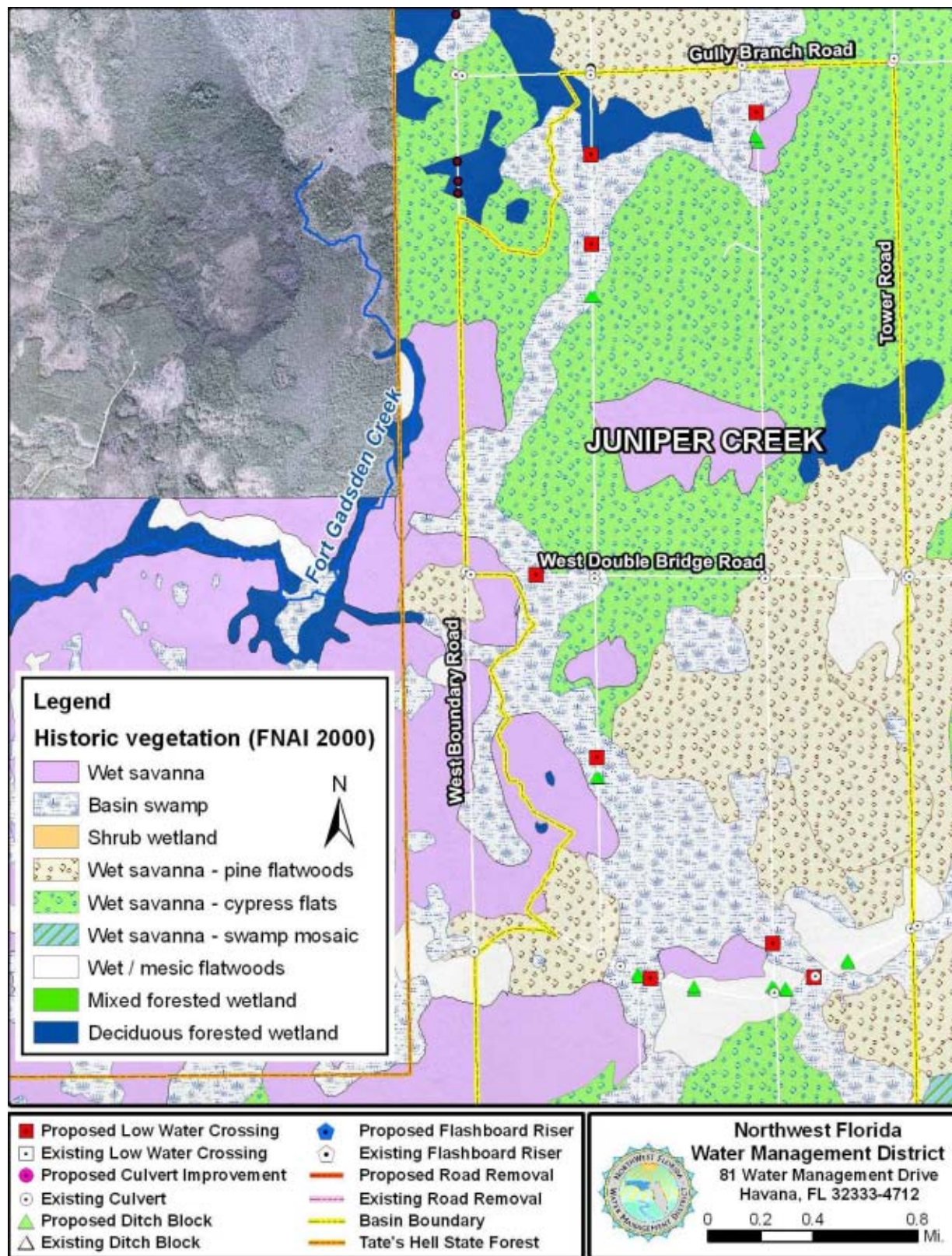


Figure 18. Historical ecological communities and proposed hydrologic improvements in the northern portion of the Juniper Creek basin

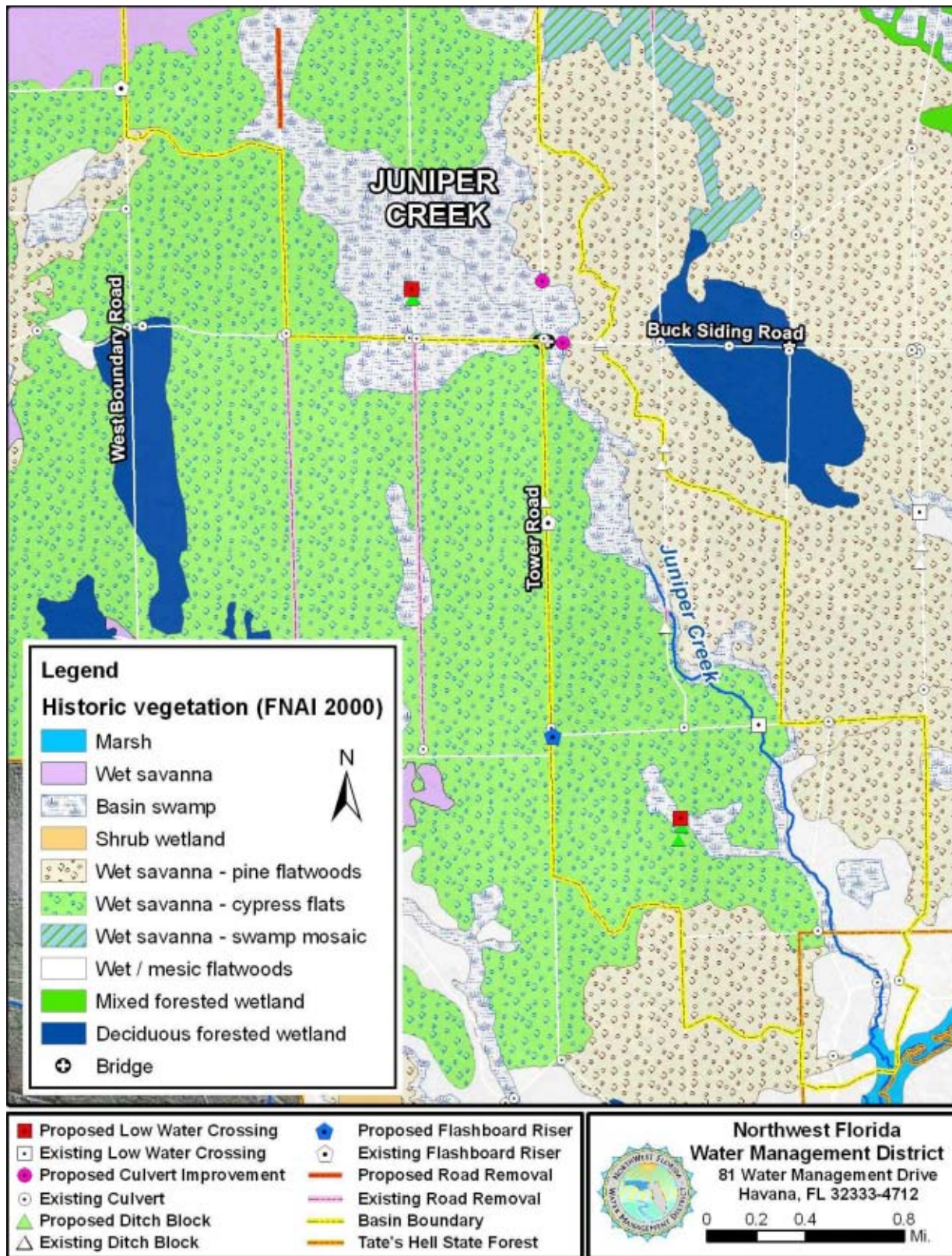


Figure 19. Historical ecological communities and proposed hydrologic improvements in the southern portion of the Juniper Creek basin

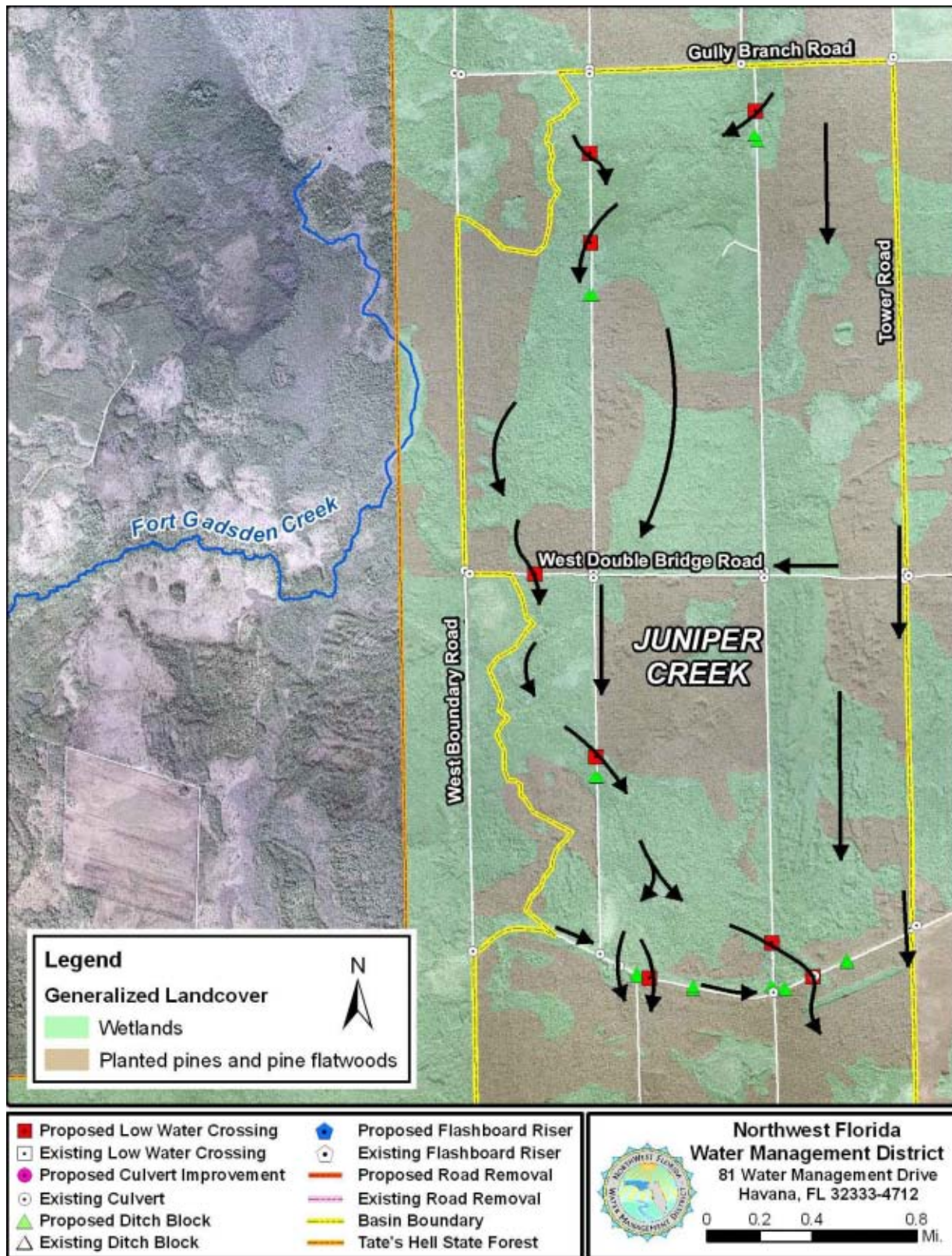


Figure 20. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Juniper Creek basin

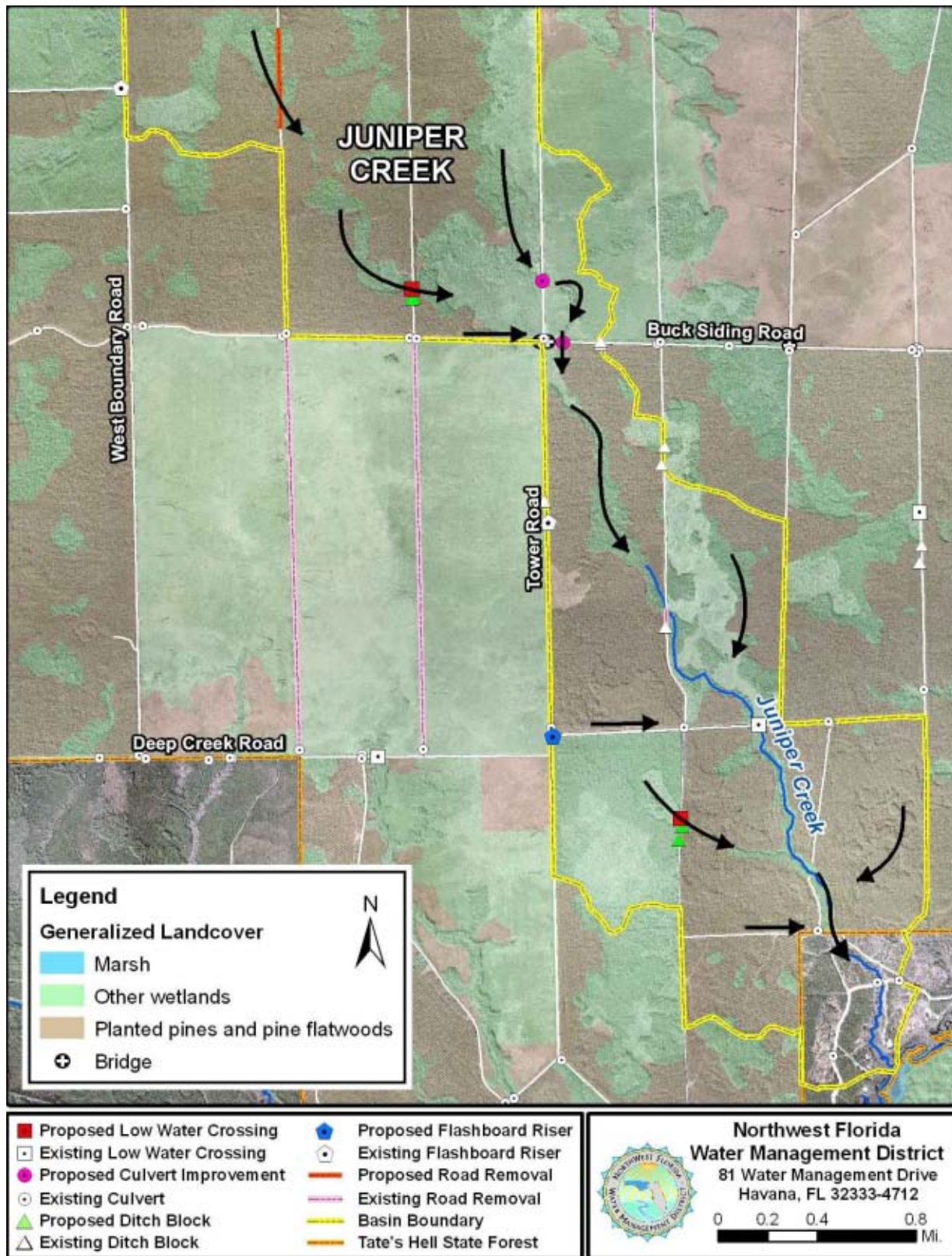


Figure 21. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Juniper Creek basin

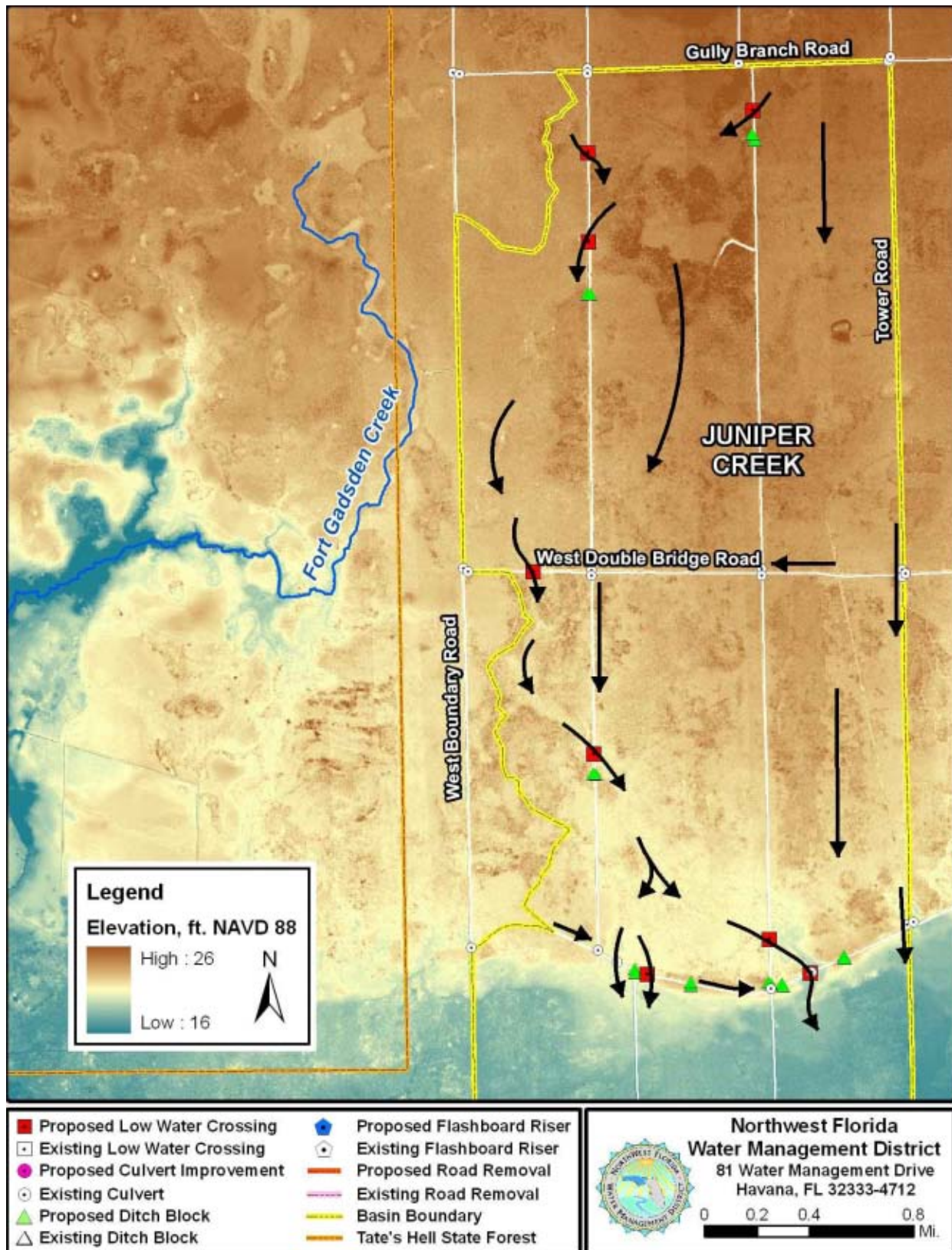


Figure 22. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Juniper Creek basin

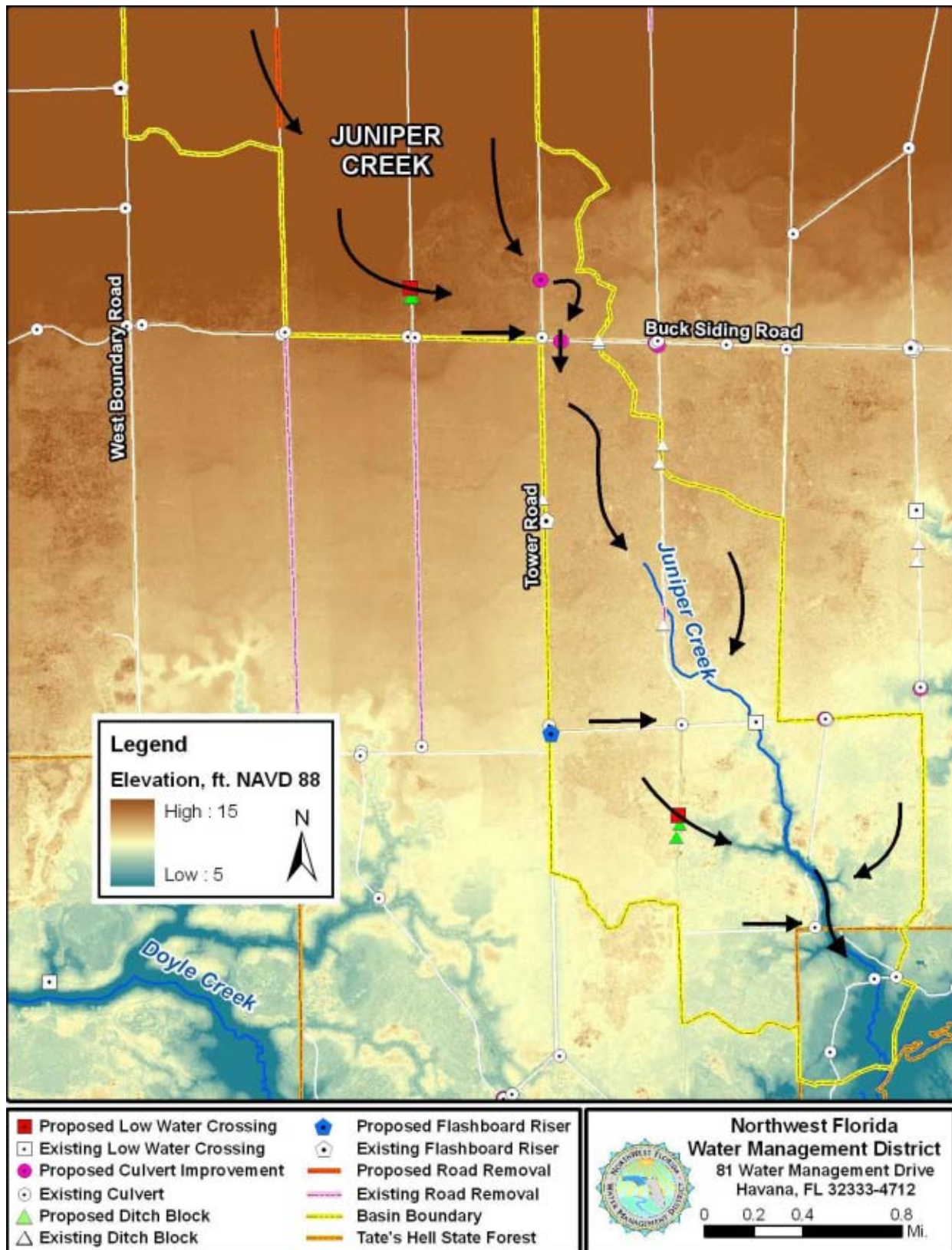


Figure 23. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Juniper Creek basin

Whiskey George Creek Basin

Restoration Priority: High

Basin Area: 19,900 acres

Description: Whiskey George Creek is one of the longest streams in the Tate's Hell State Forest with a total length of nearly 22 miles. Whiskey George Creek flows south, merges with Juniper Creek, Doyle Creek, and another small tributary and then discharges into the West Bayou of East Bay. Because East Bay serves as the primary nursery area for the Apalachicola Bay system, Whiskey George Creek and its tributary basins are a high priority for hydrologic restoration.

Historically, Whiskey George Creek was fed by local surface water runoff that flowed through wet savannas and basin swamps before discharging toward the stream. The stream corridor was comprised of cypress sloughs and mixed forested wetlands (Figures 24 and 25). The network of roads and ditches constructed during the 1960s and 1970s severed wetland connections, altered surface water drainage patterns, and impacted wetland functions. Many historical wet savannas were converted to slash pine plantation. The amount of remnant wetland vegetation remaining under the planted pines varies. Some planted pines have been bedded and fertilized and these soil alternations have further impacted drainage patterns and native plant communities.

Today, much of the surface water runoff discharges to Whiskey George Creek via large drainage ditches located along Tower Road, Gully Branch Road, West Double Bridge Road, Buck Siding Road, and Dry Bridge Road. A primary goal of restoration activities is to reduce the flow of water in these roadside drainage ditches and increase natural sheet flow through existing and remnant wetland systems.

Several hydrologic restoration projects have been implemented in the Whiskey George Creek basin. The Big Slough Restoration Project was implemented by the NFWFMD in 1998. The project, located north of Gully Branch Road, involved reconnecting a large cypress slough system to the creek by removing road segments and installing several low water crossings and ditch blocks. In 2009, the NFWFMD implemented the Whiskey George Savannas Restoration Project which involved two separate project areas. In the northernmost part of the basin, the large shrub wetland that once comprised the headwaters of Whiskey George Creek was reconnected to the stream by removing nearly three miles of dirt logging roads and installing two new culverts and a low water crossing (Figures 24 and 27). South of West Double Bridge Road, historical surface water drainage patterns in a wet savanna – pine flatwoods mosaic were restored by removing an additional three miles of logging roads and installing four low water crossings, several ditch blocks, and three culverts (Figures 25 and 28). Post-construction monitoring conducted during the spring of 2010 indicates the low water crossings are conveying surface water flows and that wetland vegetation has begun recolonizing the road removal areas. The ditch blocks are functioning well but some additional fill will be needed to repair minor erosion of ditch block side slopes.

An additional low water stream crossing and associated ditch blocks were constructed south of Buck Siding Road as part of a separate wetland mitigation project implemented by Superholdings LLC (Figures 26 and 29). To date, restoration activities in the Whiskey George Creek basin have involved the installation of 10 low water crossings, the removal of more than six miles of dirt logging roads and adjacent ditches, and the installation of numerous ditch blocks and culverts. To improve habitat conditions, the Division of Forestry is reducing pine densities in historical wetland habitats and is conducting prescribed burns to maintain appropriate fire frequencies.

2010 – 2020 Hydrologic Restoration Plan: Although a significant amount of hydrologic restoration has been accomplished in the Whiskey George Creek basin, many additional opportunities remain. Future hydrologic improvements will build and expand on previous efforts. Proposed improvements include 12 low water crossings, two flashboard risers, approximately 23 ditch blocks, 20 culvert modifications, and two segments of road removal (Figures 24 through 32). The proposed low water crossings are wetland crossings rather than stream crossings and will likely only contain water intermittently. Some of the proposed low water crossing locations will reconnect former wetlands that are currently planted in pines. As a result, surface water flow paths may not be readily visible on the aerial photography. However, flow paths can generally be discerned from either the LiDAR elevation data or the 1953 black-and-white aerial photography. Water has been observed flowing across the road at several of the proposed low water crossing locations.

The proposed ditch blocks will reduce the flow in roadside ditches or reroute ditch flow towards low water crossings or culverts. Ditch blocks will also restore local topographic features and prevent surface water flow across hydrologic basin divides. Two flashboard risers are proposed to be installed in the northern portion of the basin in the large drainage ditch adjacent to Tower Road. Flashboard risers, rather than permanent ditch blocks, have been proposed because the Division of Forestry needs to maintain the ability to convey surface water flows in these ditches under extremely wet conditions or in advance of pine harvesting operations.

Culvert modifications located throughout the Whiskey George Creek basin include seven new culverts, three culvert removals, and four culvert replacements. Culverts have been proposed in lieu of low water crossings on primary roads such as Tower Road and Buck Siding Road where year-round vehicle access is needed. The new culverts will reconnect contributing drainage areas and increase the conveyance capacity. Additional road fill will be needed in some areas to achieve sufficient cover depths (18”) over the culvert pipes.

There are two road segments proposed for removal that total approximately 0.6 miles. However, the pines adjacent to these road segments must be first thinned or harvested. Accordingly, these road segments will not likely be removed until after 2015.

Recommended habitat improvements include shrub (titi) reduction north of Gully Branch Road and in the area between Tower Road and Whiskey George Creek and south of Evans Lake Tram Road. Pine thinning is needed in many areas. Areas suitable for long-term timber production

consist primarily of mesic flatwoods located in the northern part of the basin and the drier portions of pine flatwood mosaics located in the southern part of the basin.

Estimated Construction Cost for Hydrologic Improvements: \$ 320,000

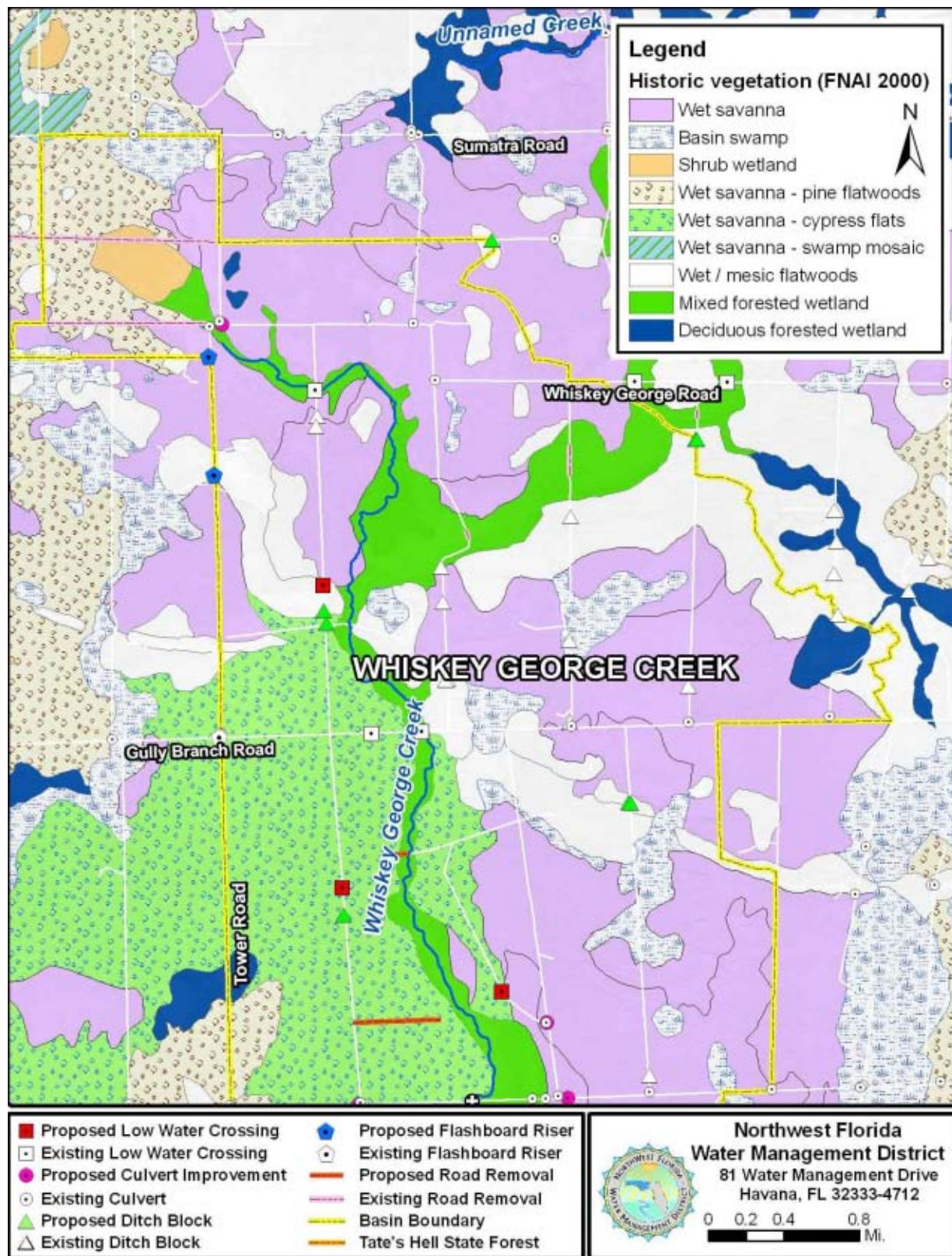


Figure 24. Historical ecological communities and proposed hydrologic improvements in the northern portion of the Whiskey George Creek basin

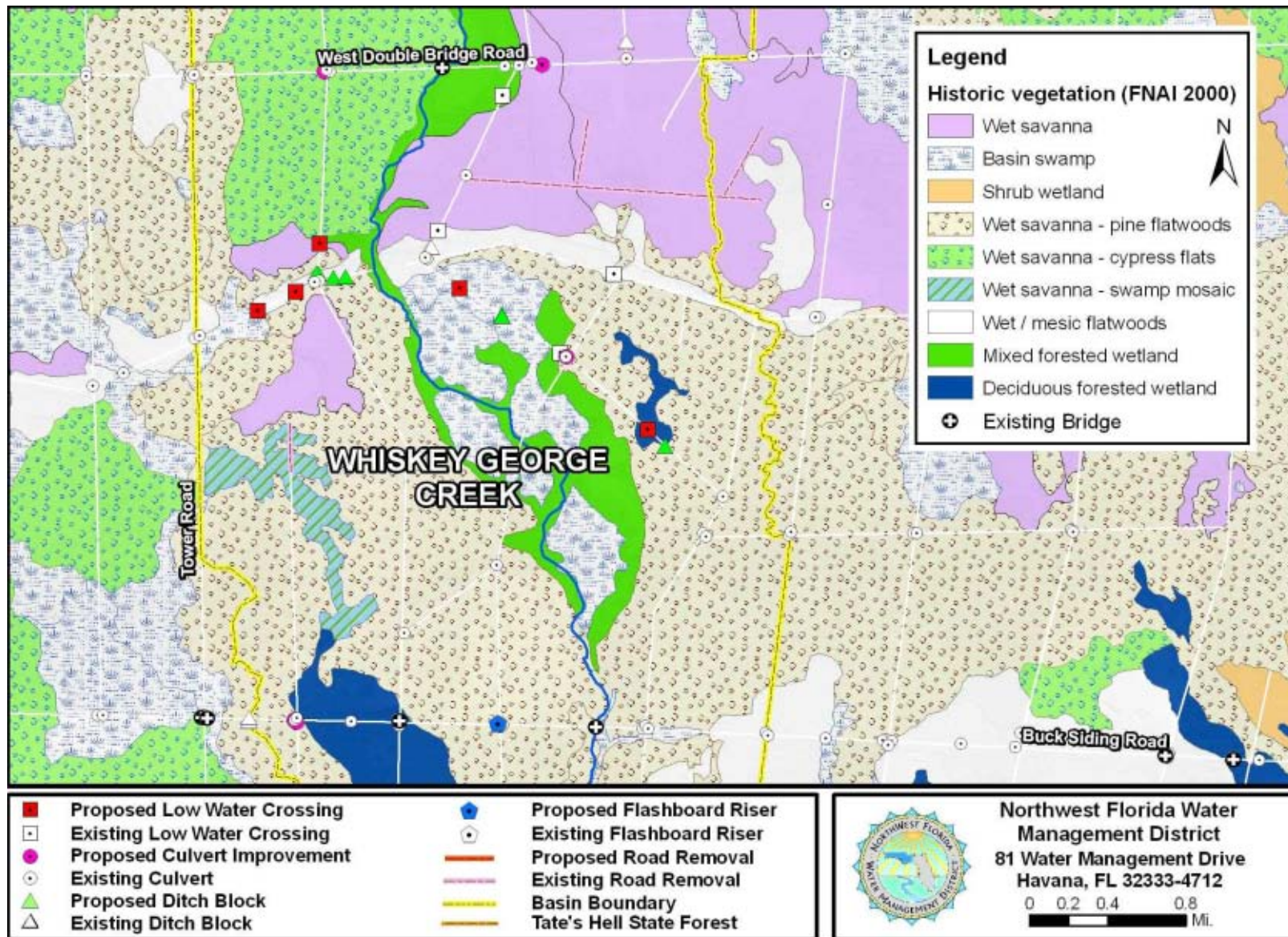


Figure 25. Historical ecological communities and proposed hydrologic improvements in the central portion of the Whiskey George Creek basin

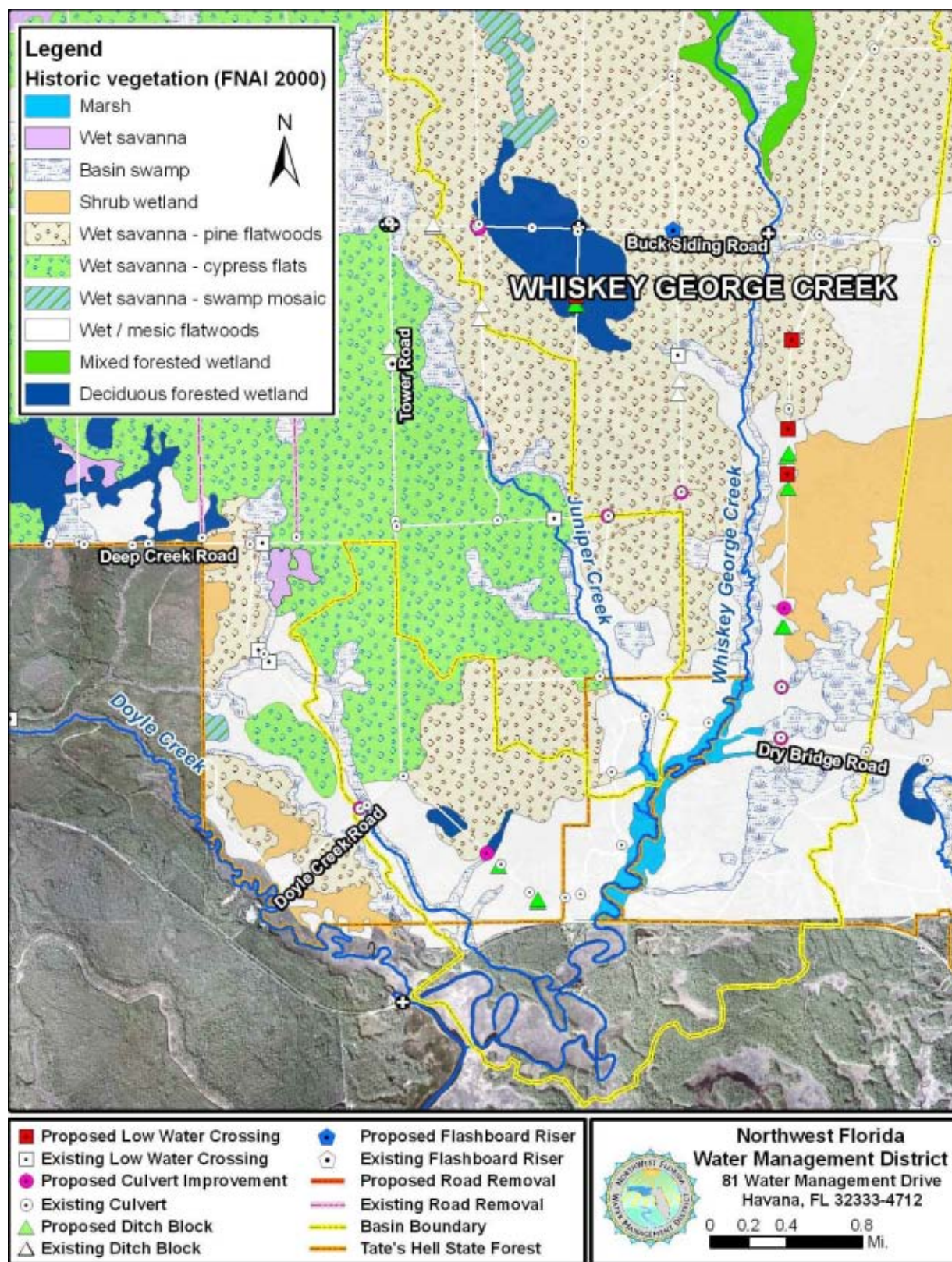


Figure 26. Historical ecological communities and proposed hydrologic improvements in the southern portion of the Whiskey George Creek basin

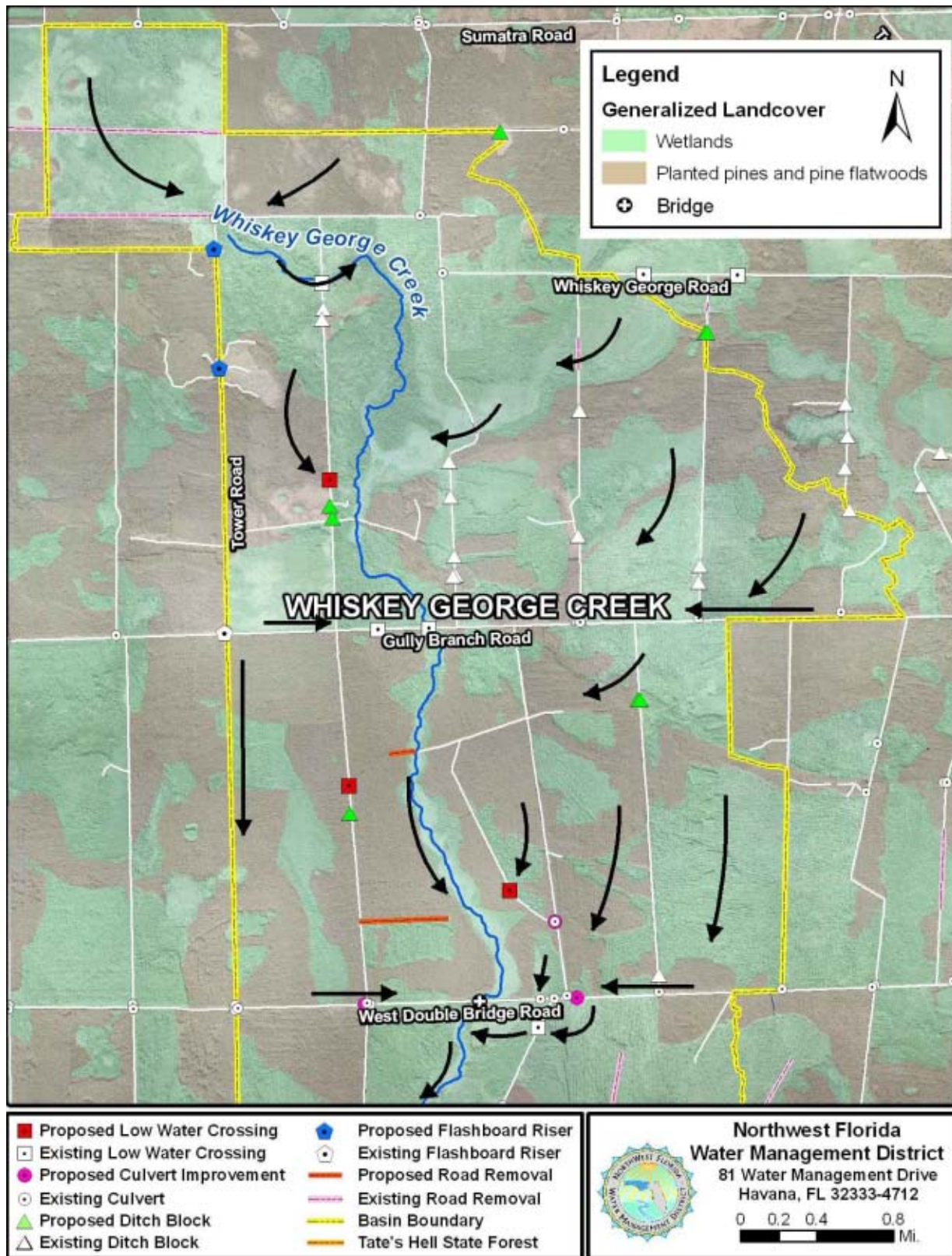


Figure 27. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Whiskey George Creek basin

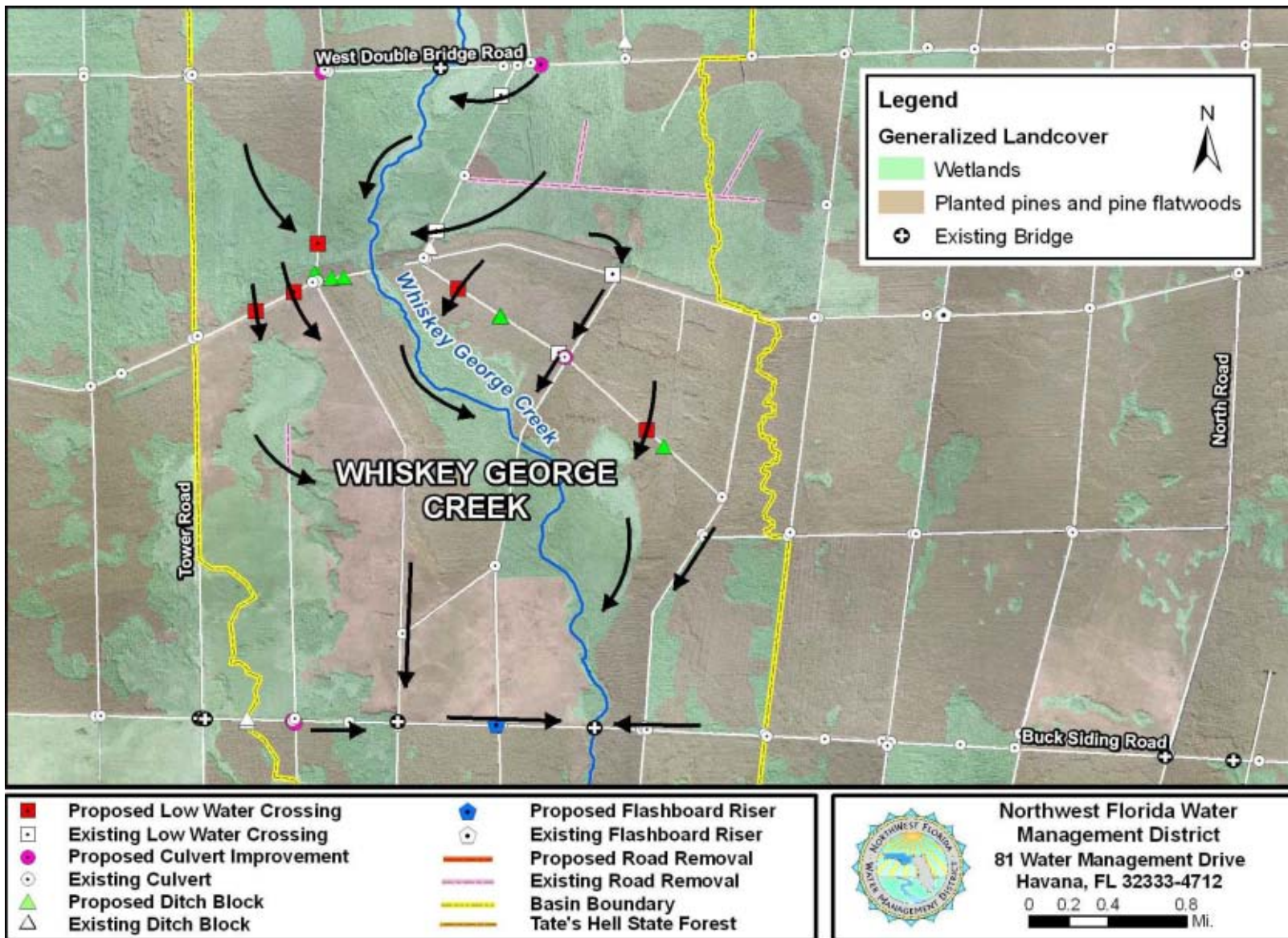


Figure 28. Proposed hydrologic improvements and post-restoration drainage patterns in the central portion of the Whiskey George Creek basin

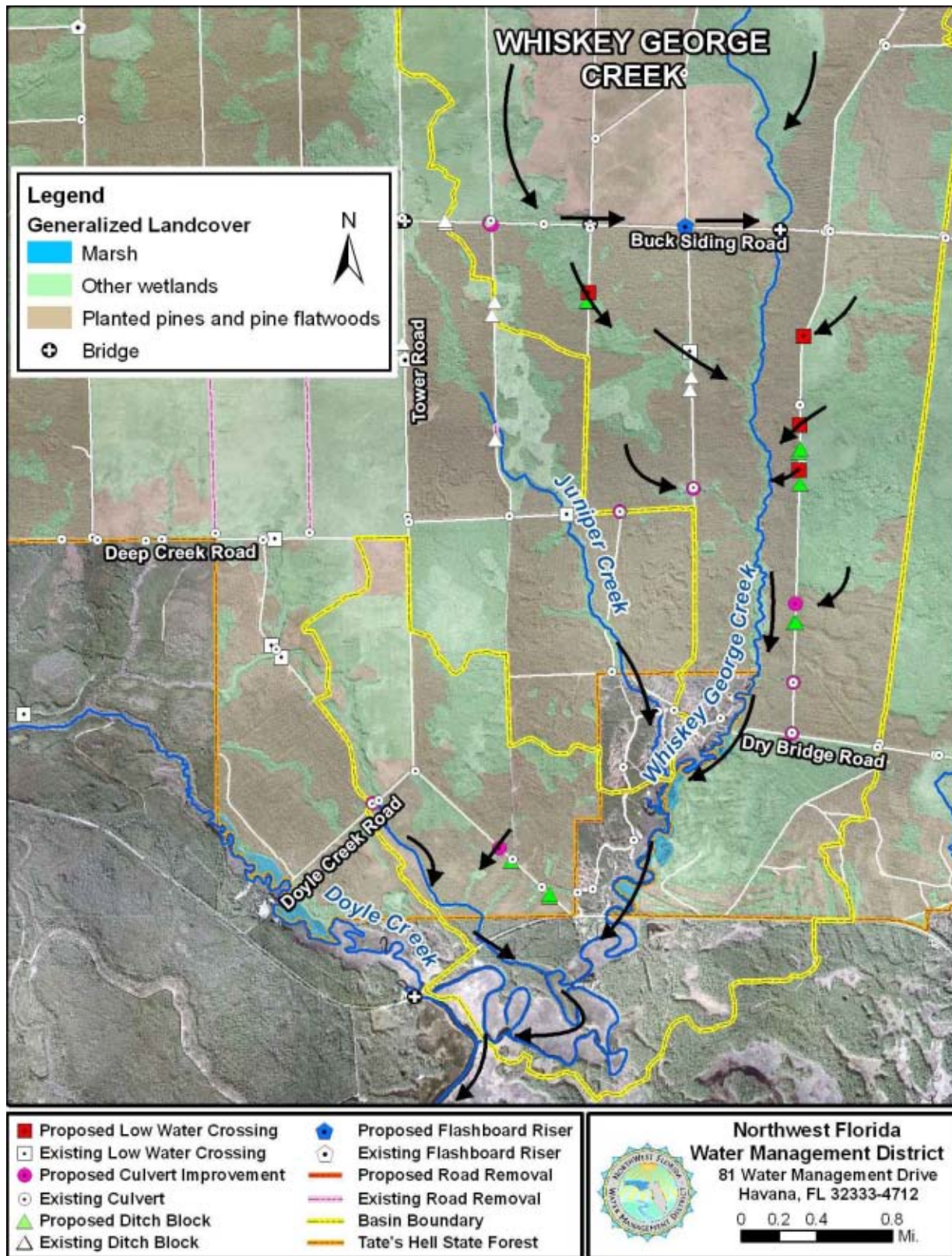


Figure 29. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Whiskey George Creek basin

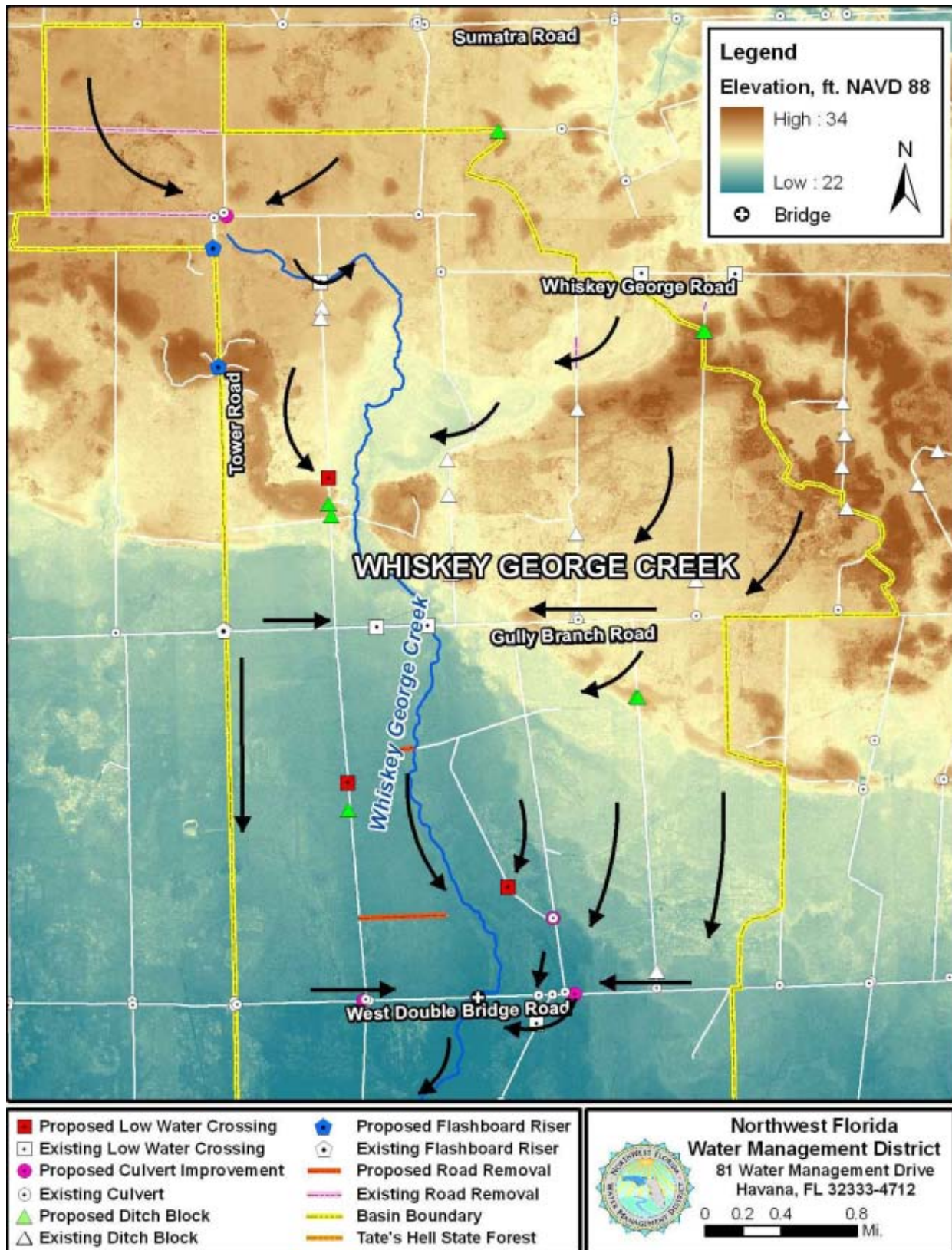


Figure 30. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Whiskey George Creek basin.

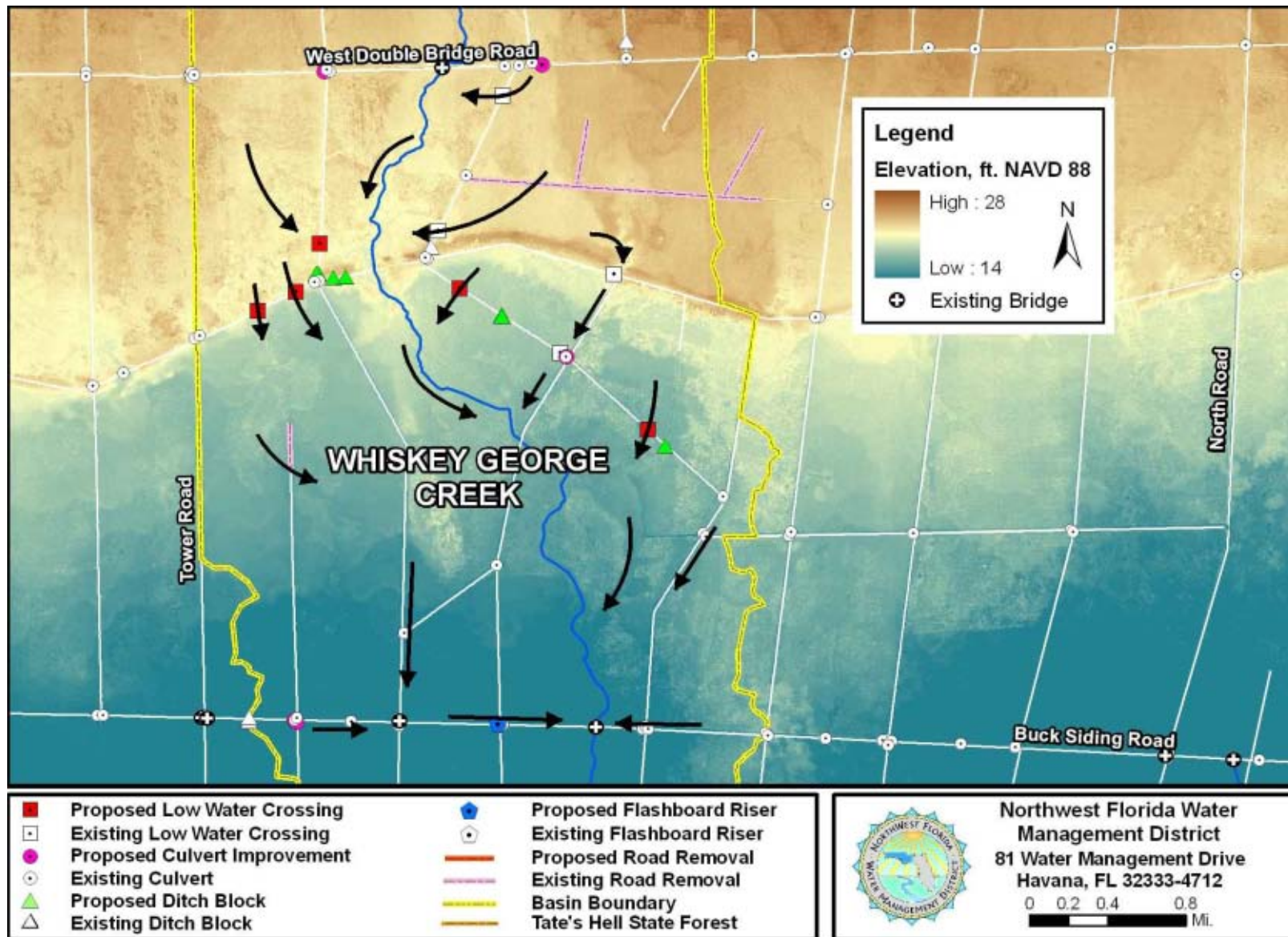


Figure 31. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the central portion of the Whiskey George Creek basin.

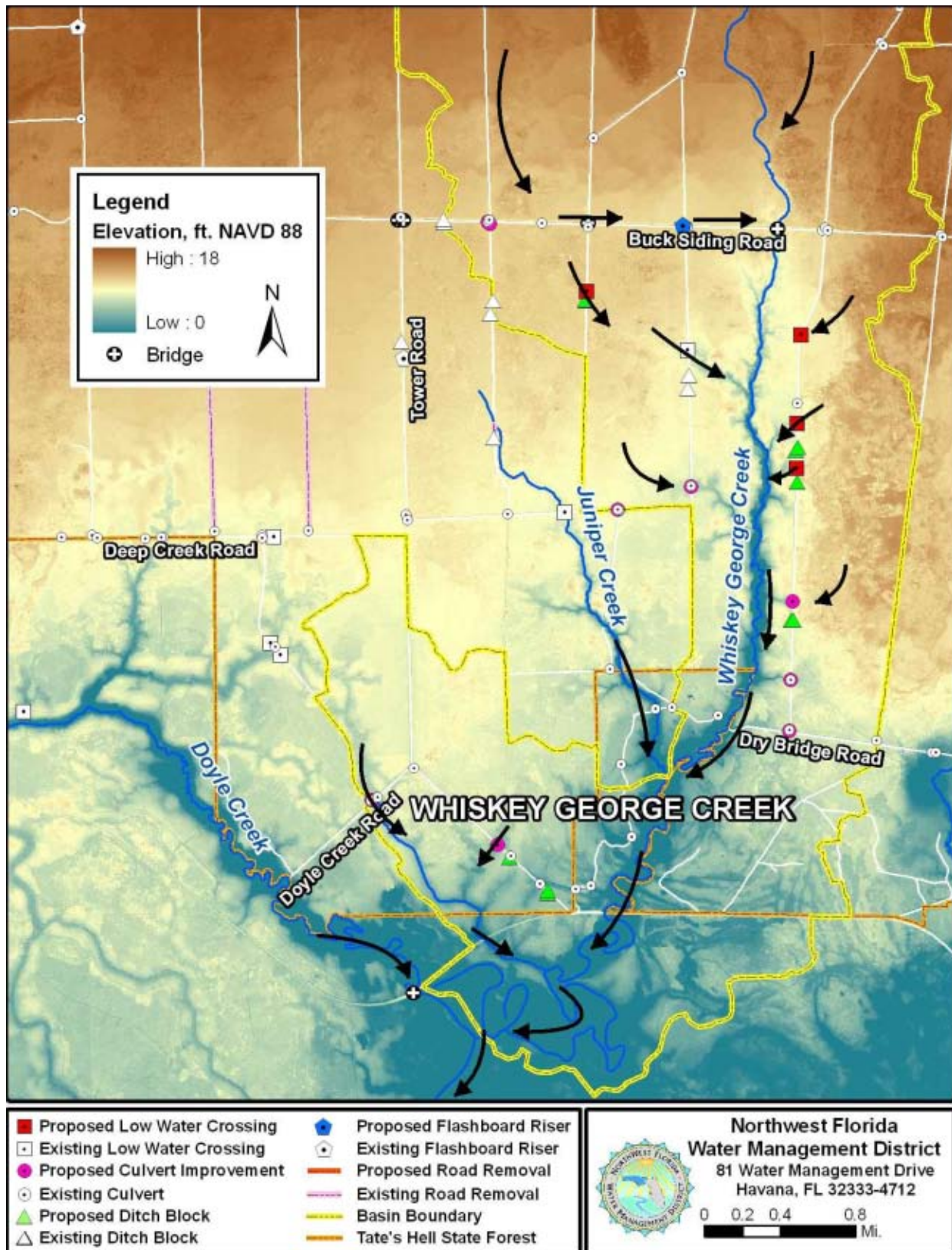


Figure 32. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Whiskey George Creek basin.

East Bayou and portions of the East Bay and St. George Sound Basins

Restoration Priority: High

Basin Area: 7,500 acres (East Bay and East Bayou) and 4,900 acres (St. George Sound)

Description: Because the East Bayou and East Bay basins discharge directly into East Bay, which serves as the primary nursery area for the Apalachicola Bay system, they are a high priority for hydrologic restoration activities. Historical ecological communities were delineated for only a portion of these basins and include mesic flatwoods, basin swamps, and wet savanna pine flatwood mosaics (Figure 33). Other ecological communities present include coastal marshes, wet flatwoods, and sand pine scrub. The LiDAR elevation data (Figure 35) clearly shows the coastal ridge that forms the boundary between the East Bayou and St. George Sound watersheds.

There has been relatively little hydrologic restoration in this area. There is one low crossing that was installed by the Division of Forestry along Bear Creek Road. To the south of Tate's Hell Forest, there are two additional low water crossings. Most of the roads in this area are very sandy and are at or below the natural grade. Because the roads are below natural grade, they may act as shallow ditches and convey surface water runoff during periods of high rainfall. There are numerous road sections that are difficult to access or are impassable during very wet weather.

In addition to the relatively poor road conditions, there has also been extensive ditching in this area. Several of the large drainage ditches that convey water east towards the bay are visible on the 1953 aerial photographs indicating that they were constructed more than five decades ago.

2010 – 2020 Hydrologic Restoration Plan: Proposed restoration activities are aimed at improving wetland and stream road crossings, restoring historical drainage patterns, and reducing flow in some of the ditches. In the East Bayou basin, nine low water crossings and nine culvert modifications are proposed as well as 17 ditch blocks (Figure 34). Two flashboard risers are also recommended for consideration to reduce flow in one of the larger drainage ditches. The existing roads will need to be improved and built up in the vicinity of most of the proposed culverts to achieve sufficient cover depth to support the weight of logging trucks and other vehicles.

In the western portion of the St. George Sound basin, one low water crossing, two new culverts and a culvert replacement, and four ditch blocks are proposed to restore drainage south towards the coast. However, further evaluation of these improvements is recommended prior to implementation to ensure that there is sufficient conveyance capacity downstream in the Eastpoint area.

Estimated Construction Cost for Hydrologic Improvements: \$ 280,000

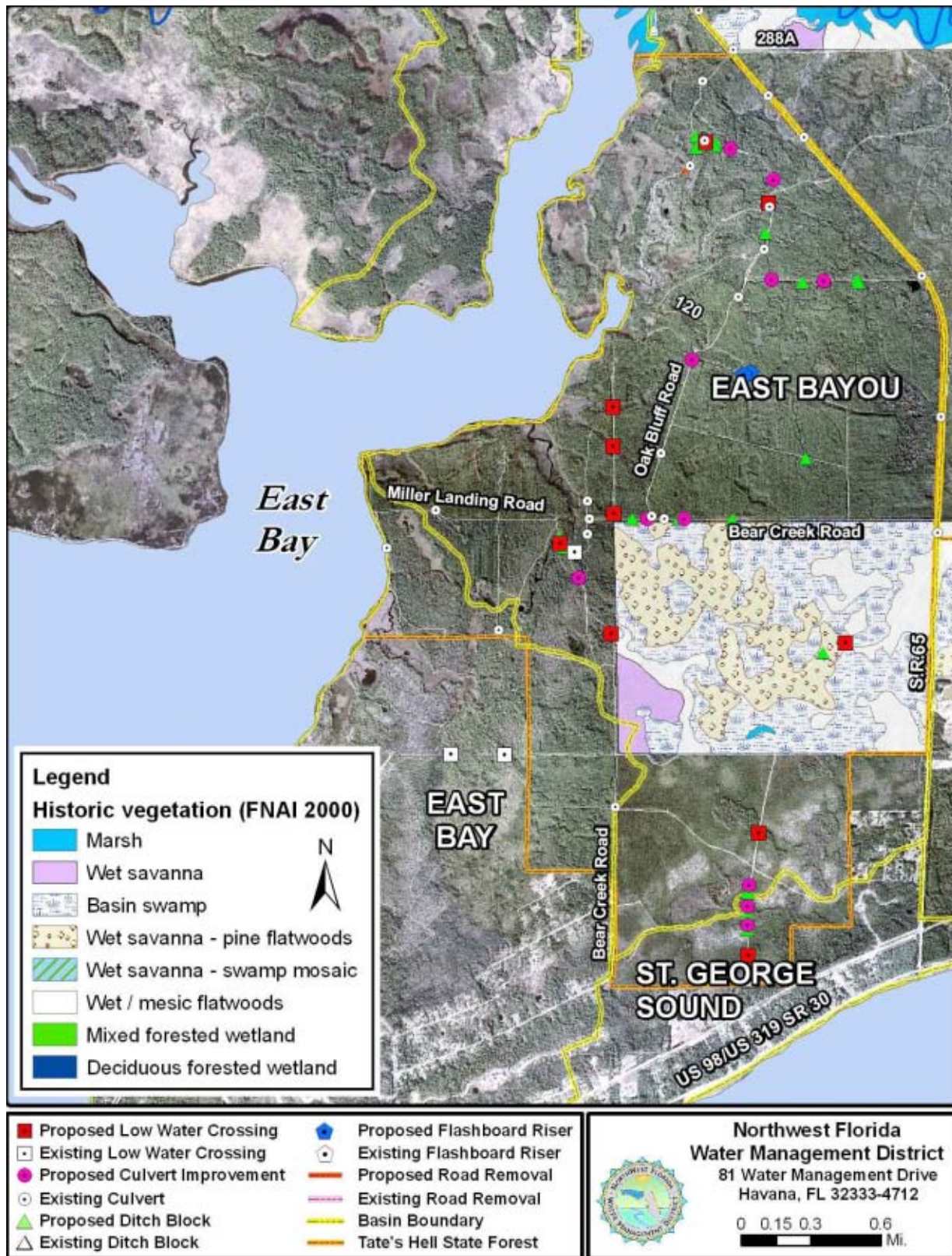


Figure 33. Historical ecological communities and proposed hydrologic improvements in the East Bayou, East Bay, and western St. George Sound basins.

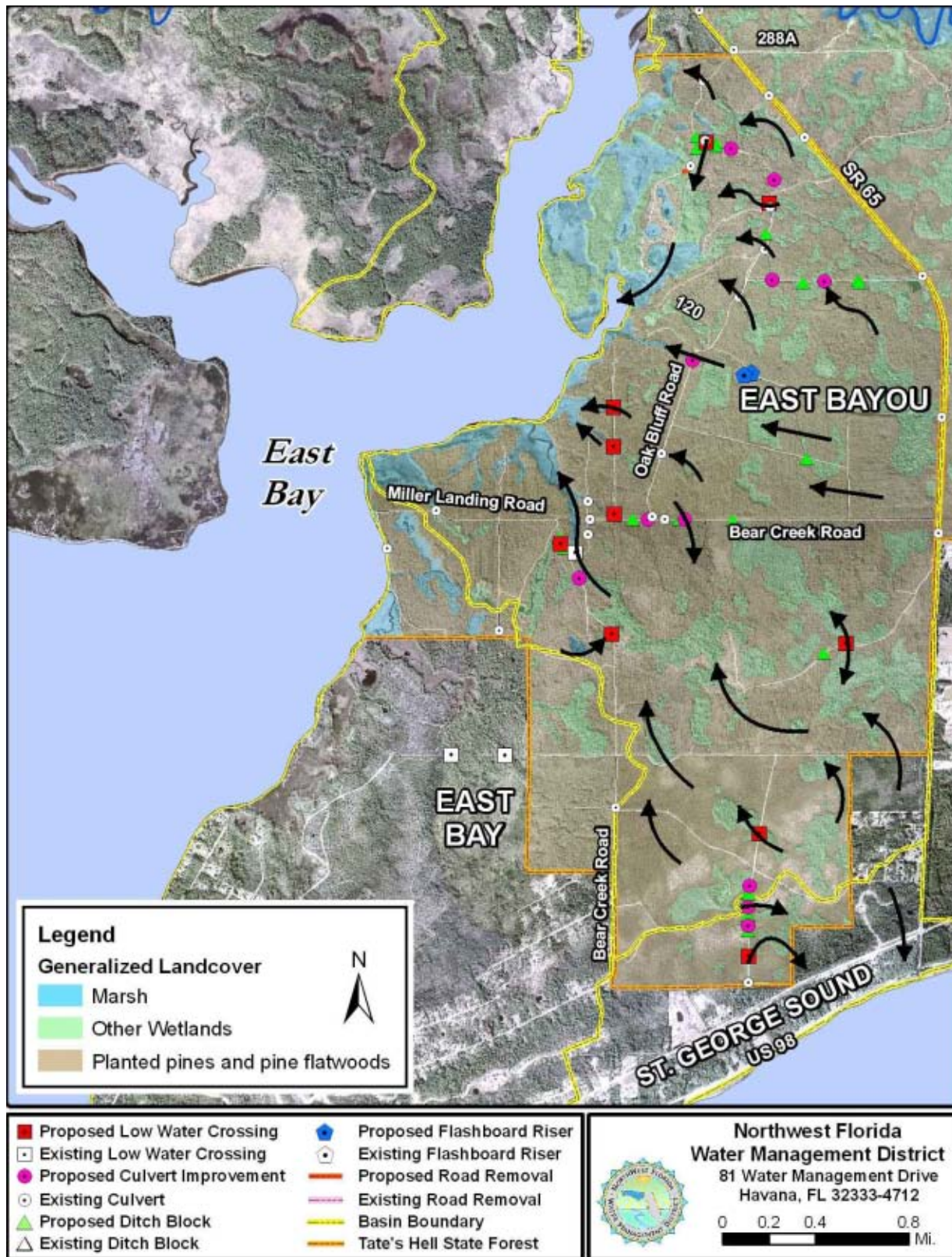


Figure 34. Proposed hydrologic improvements and post-restoration drainage patterns in the East Bayou, East Bay and western St. George Sound basins.

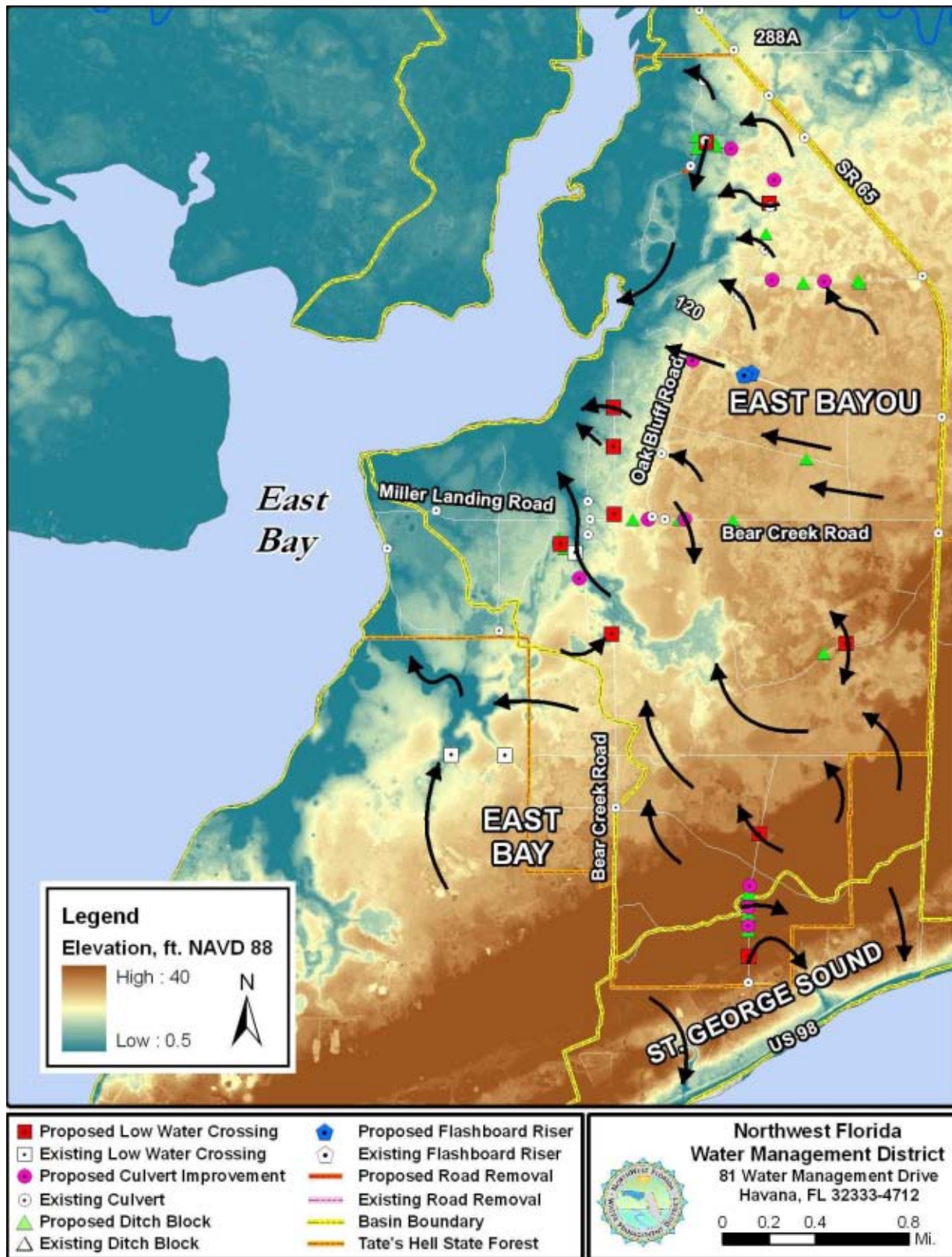


Figure 35. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the East Bayou, East Bay, and western St. George Sound basins.

Cash Creek and Eastern St. George Sound Basins

Restoration Priority: High

Basin Area: 8,800 acres (Cash Creek) and 4,900 acres (St. George Sound basin)

Description: Surface water runoff in the Cash Creek basin flows generally north and west through a series of interconnected basin swamps and discharges to Cash Creek and the surrounding marshes. Cash Creek then flows west where it receives inflows from High Bluff Creek, Rake Creek, and Sandbank Branch Creek prior to discharging to the East Bayou of East Bay (Figure 38). Due to the importance of East Bay as a nursery area for the Apalachicola Bay system, Cash Creek and other tributary basins are high priorities for restoration.

Yent Bayou is a large marsh area located in the eastern portion of the St. George Sound basin (Figure 37). The general direction of surface water flow in this basin is toward the coast. A large drainage canal and berm bisect the marshes of Yent Bayou. The drainage canal extends inland more than a mile and was cut through remnant coastal ridges. This canal has significantly altered local drainage patterns in this area.

Historical ecological communities in the Cash Creek and Yent Bayou areas included mesic flatwoods, marshes, and numerous interconnected basin swamps, with sand pine scrub communities located along the coastal ridges (Figures 36 and 37). Many of the smaller dirt logging roads in this area are one-lane roads that are at or near natural grade. Many of these roads either do not have adjacent roadside ditches or the ditches are very shallow. Some of these roads are “non-system” roads that are not maintained by the Division of Forestry and may be used as hiking trails. During periods of heavy rainfall, some of the roads may be overtopped with water in low areas.

2010 – 2020 Hydrologic Restoration Plan: Hydrologic improvements in the Cash Creek basin are aimed at restoring historical drainage patterns and improving stream and wetland road crossings. In the northern portion of the Cash Creek basin, four low water crossings along Road 36 are proposed to improve water quality, reconnect wetlands, and restore surface water drainage to north (Figures 36, 38 and 40). Two flashboard risers are needed to reduce flow in roadside ditches and prevent flow across the basin boundary (northernmost riser). Along Road 42, a new low water crossing, two culverts, and several ditch blocks will enhance surface water drainage south towards Cash Creek. Two culvert replacements and five new culverts are also proposed in the northern part of the basin. Several ditch blocks are recommended to be installed to restore local topographic divides.

In the southern portion of the Cash Creek basin, recommended improvements include installation of a small bridge and four new culverts on Road Camp Road to improve surface water drainage to the north (Figures 37, 39, and 41). Six low water crossings are proposed along Road 32 to reconnect basin swamps, restore historical surface water drainage to the north, and improve water

quality. A 0.25 mi. road segment that extends into a basin swamp is proposed to be removed. A number of ditch blocks also are proposed in conjunction with the culverts and low water crossings.

In the Yent Bayou area, two low water crossings are proposed to reconnect historical wetland areas and restore surface water drainage patterns (Figures 37, 39, and 41). Three flashboard risers are proposed to be constructed to reduce flow in the large drainage canal; however field verification is needed to confirm the feasibility of these proposed improvements. Ditch blocks would be preferable to flashboard risers if they are feasible. However, the drainage canal is relatively deep (~5 ft or more) and may be tidally influenced. A culvert replacement is also needed on Road 73.

Estimated Construction Cost for Hydrologic Improvements: \$ 530,000

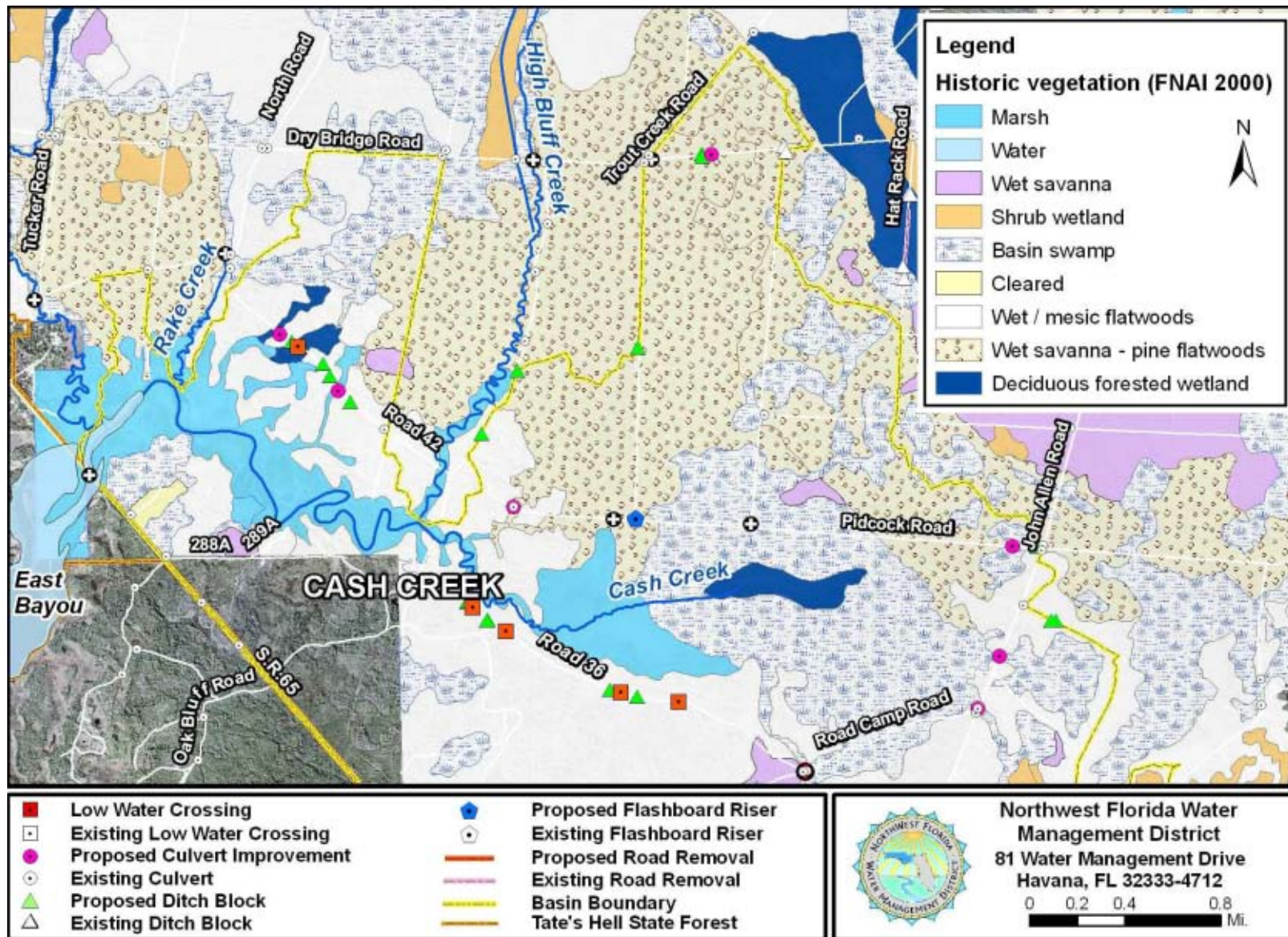


Figure 36. Historical ecological communities and proposed hydrologic improvements in the northern portion of the Cash Creek basin.

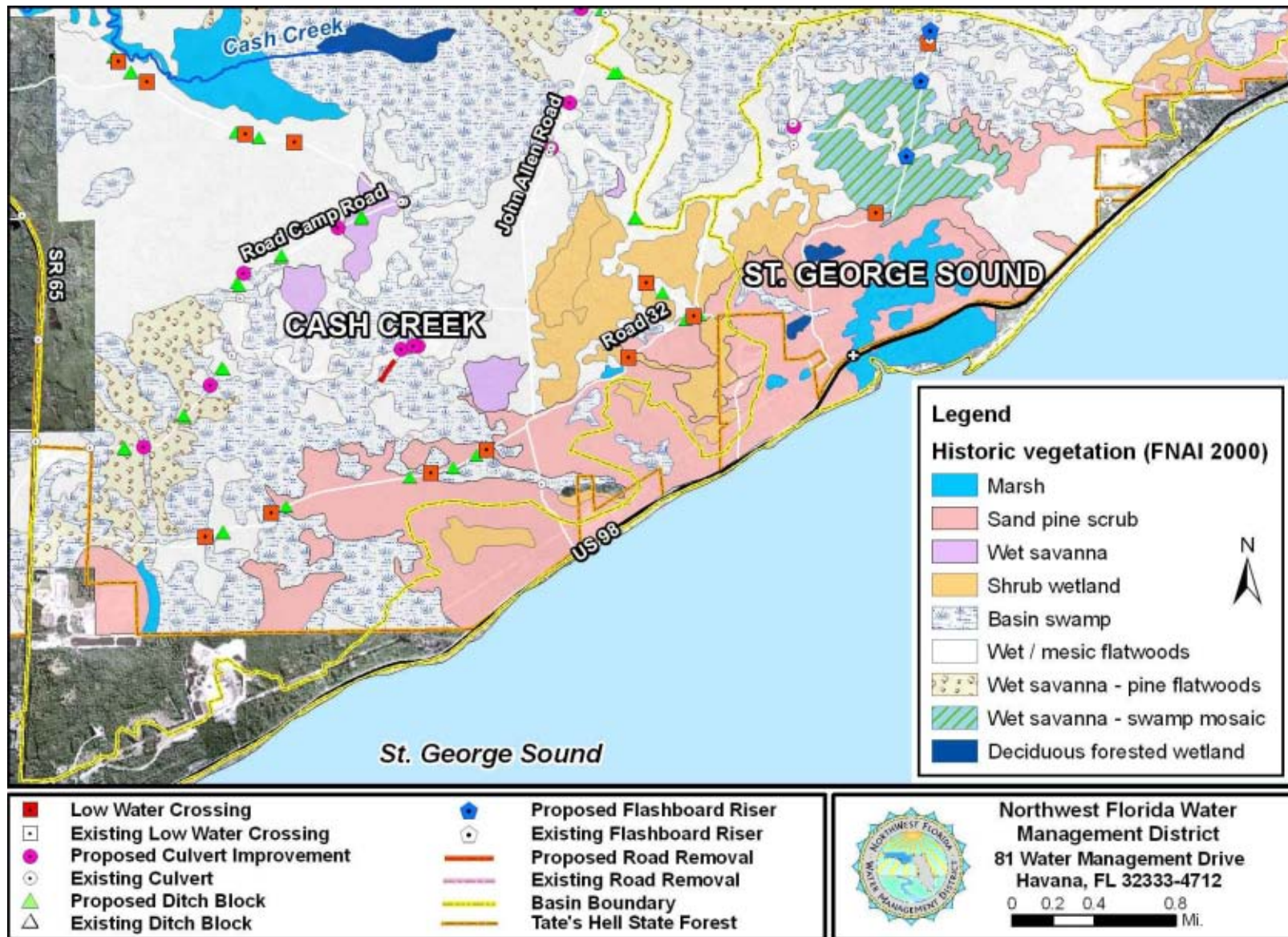


Figure 37. Historical ecological communities and proposed hydrologic improvements in the southern portion of the Cash Creek basin and the eastern St. George Sound basin.

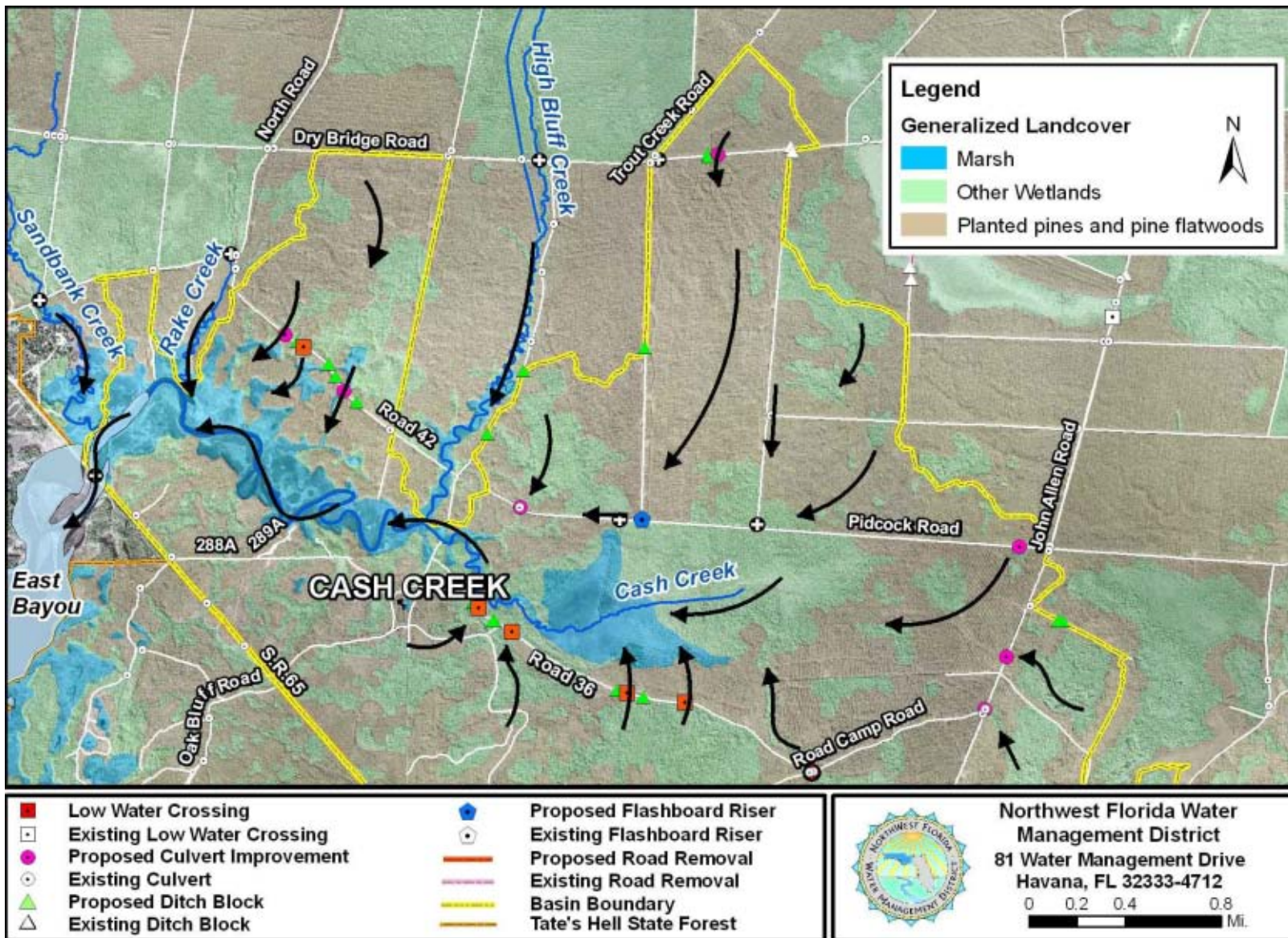


Figure 38. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Cash Creek basin.

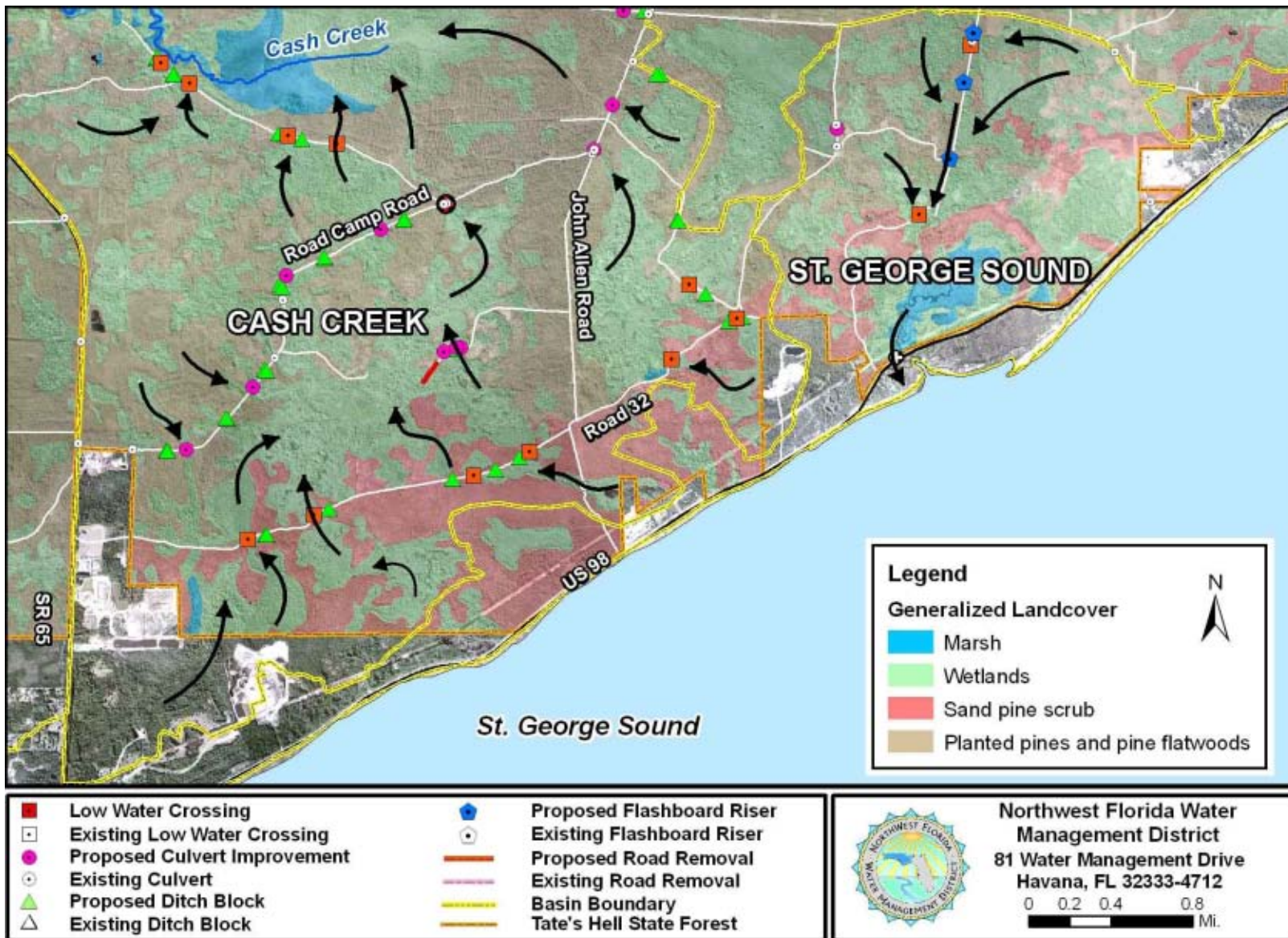


Figure 39. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Cash Creek basin and the eastern St. George Sound basin.

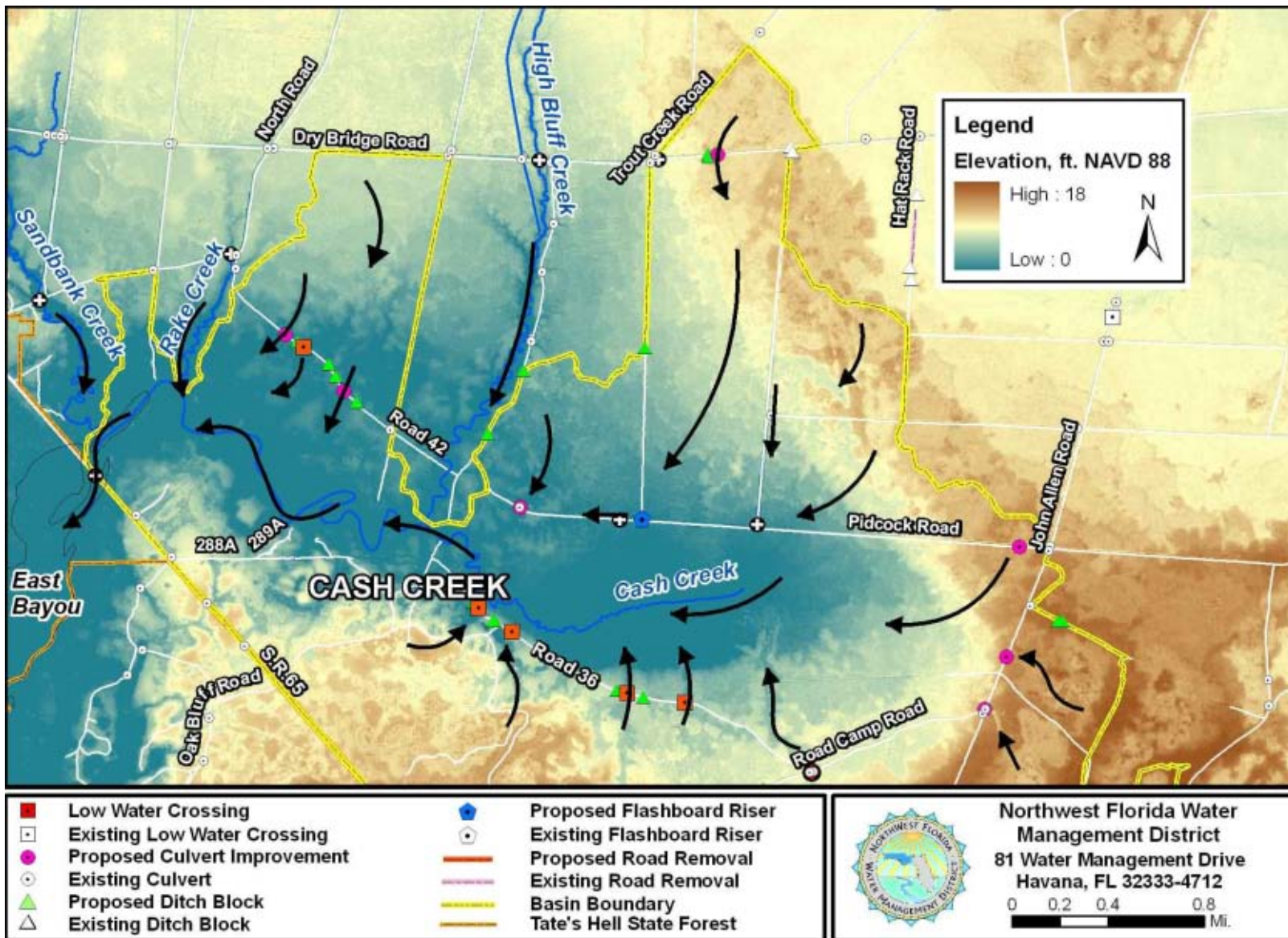


Figure 40. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Cash Creek basin.

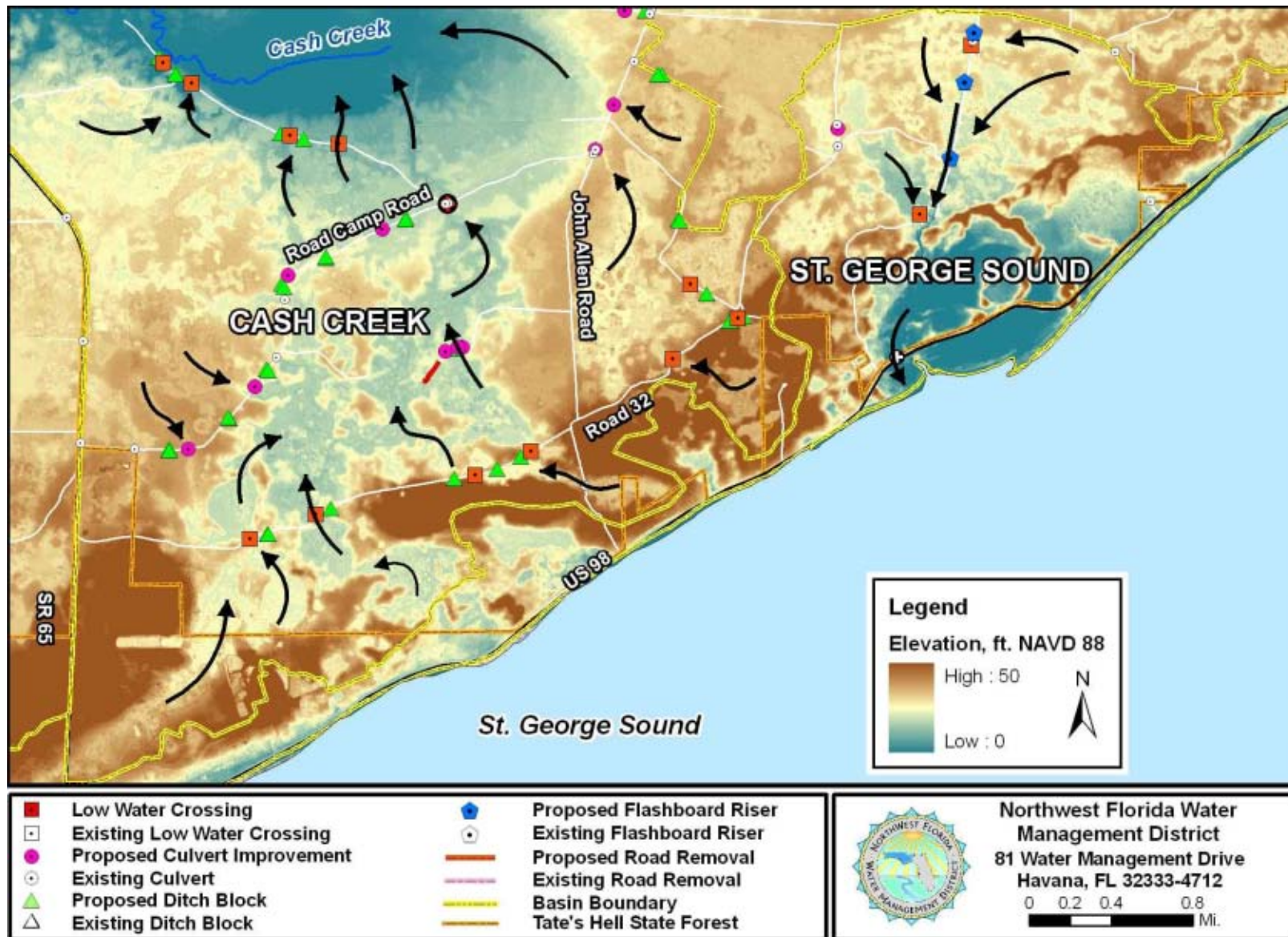


Figure 41. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Cash Creek basin and the eastern St. George Sound basin.

Sandbank Branch Creek and Rake Creek Basins

Restoration Priority: High

Basin Areas: 8,600 acres (Sandbank Branch) and 4,800 acres (Rake Creek)

Description: The Sandbank Branch and Rake Creek basins are relatively large, parallel drainage basins that drain to the south and discharge into Cash Creek. In the northern and much of the southern half of both basins, there is no defined stream channel. Historically, surface water runoff in these basins flowed south through a series of basin swamps, wet savannas, and cypress flats (Figure 42). In the southernmost portion of each basin, there was a relatively short stream channel that received inflow from the upstream wetlands prior to discharging to Cash Creek (Figure 43). Surface water drainage in both of these basins has been significantly altered by the construction of roads and large ditches.

Sandbank Branch

North of West Double Bridge Road in the Sandbank Branch Basin, a large remnant basin swamp continues to convey surface water runoff towards the south where it flows through an existing low water crossing on West Double Bridge Road (Figure 44). South of West Double Bridge Road, much of the surface water runoff is now conveyed south in roadside ditches, particularly the large ditches adjacent to Tucker Road (Figures 44 and 45).

Between Buck Siding Road and Dry Bridge Road, a large cypress slough marked the last of a series of interconnected wetlands that once drained south to the Sandbank Branch stream (Figures 43 and 45). The slough is now considerably smaller in size and the northern half has been planted in pines. The Sandbank Branch stream channel originates at the southern end of this slough system on the north side of Dry Bridge Road. Streamflow is conveyed south across Dry Bridge Road through two culverts. From here, a portion of the water is conveyed south into another large cypress slough and the remainder flows into the ditch on the west side of Tucker Road. From the slough, the Sandbank Branch stream flows south where it merges with the Tucker Road drainage ditch. Sandbank Branch then flows south across North Road, through an estuarine marsh and into Cash Creek.

Some minor hydrologic restoration activities have been performed in the Sandbank Branch basin. A small low water crossing was installed on West Double Bridge Road. A 0.4-mile road segment north of West Double Bridge Road was removed and restored to natural grade by the NFWFMD in 2009 to restore an Atlantic white cedar swamp (Figure 44). South of West Double Bridge Road near the western edge of the basin, several road segments were removed by the NFWFMD as part of the Whiskey George Savannas restoration project in 2009.

Rake Creek

The surface water drainage basin for Rake Creek has been significantly altered by the construction of roads and ditches and currently extends farther north than it did historically. The 1953 aerial photography and historical vegetation map (FNAI 2001) suggest that the area north of Buck Siding Road previously drained east towards High Bluff Creek (Figure 42). However, most of the surface water runoff from this area is now conveyed south in the large drainage ditch adjacent to North Road. The ditch discharges into Rake Creek south of Dry Bridge Road. However, there are two culverts at the intersection of North Road and Buck Siding Road that may continue to convey some of the surface water runoff east into the High Bluff Creek basin.

2010 – 2020 Hydrologic Restoration Plan: Future hydrologic improvements are aimed at reducing flow in ditches, re-establishing hydrologic connections, enhancing wetland hydroperiods, and restoring historical surface water drainage patterns.

Sandbank Branch

In the northern portion of the Sandbank Branch basin, two low water crossings and six culverts are proposed to restore more natural surface water drainage patterns. To reduce the flow in roadside ditches and restore natural drainage divides, 11 flashboard risers and six ditch blocks are also proposed (Figures 42, 44, and 46).

In the southern portion of the basin, five new culverts are proposed to enhance southerly flow and three culvert removals are proposed to reduce surface water flow across basin boundaries. Two additional culverts are proposed to be removed on Dry Bridge Road and replaced with a low water crossing (Figures 43, 45, and 47). A relatively long low water crossing will be needed because a large section of the road is periodically flooded during wet conditions. Six flashboard risers are proposed to decrease flow in roadside ditches and reduce flow across basin boundaries. Five ditch blocks will redirect runoff towards new low water crossings and culverts, restore local topographic divides, and reduce surface water flow across basin boundaries.

On Tucker Road about 0.6 miles north of Dry Bridge road, a box culvert is proposed where the former cypress slough would have crossed the road (yellow octagon on Figures 43, 45, and 47). A flashboard riser is proposed at the road intersection located immediately to the south to help retain water in the former slough and reduce flow in the ditch.

There are no road removals proposed in the Sandbank Branch basin at this time. However, logging roads should be considered for removal following future tree thinning and habitat restoration activities.

Rake Creek

In the northern portion of the Rake Creek basin, four low water crossings are proposed to restore surface water drainage patterns and flow between historical wetland areas (Figures 42, 44,

and 46). Seven ditch blocks will redirect flow towards the new low water crossings and restore local topographic divides. A new culvert will convey surface water runoff south across Buck Siding Road. Two new culverts are also proposed to convey surface water runoff across Dry Bridge Road and provide a hydrologic connection between wetlands on the north and south sides of the road (Figures 43, 45, and 47). South of Dry Bridge Road, an existing culvert that brings water into Rake Creek from the east is proposed to be replaced with a larger box culvert (yellow octagon on Figures 43, 45, and 47).

Estimated Construction Cost for Hydrologic Improvements: \$ 430,000

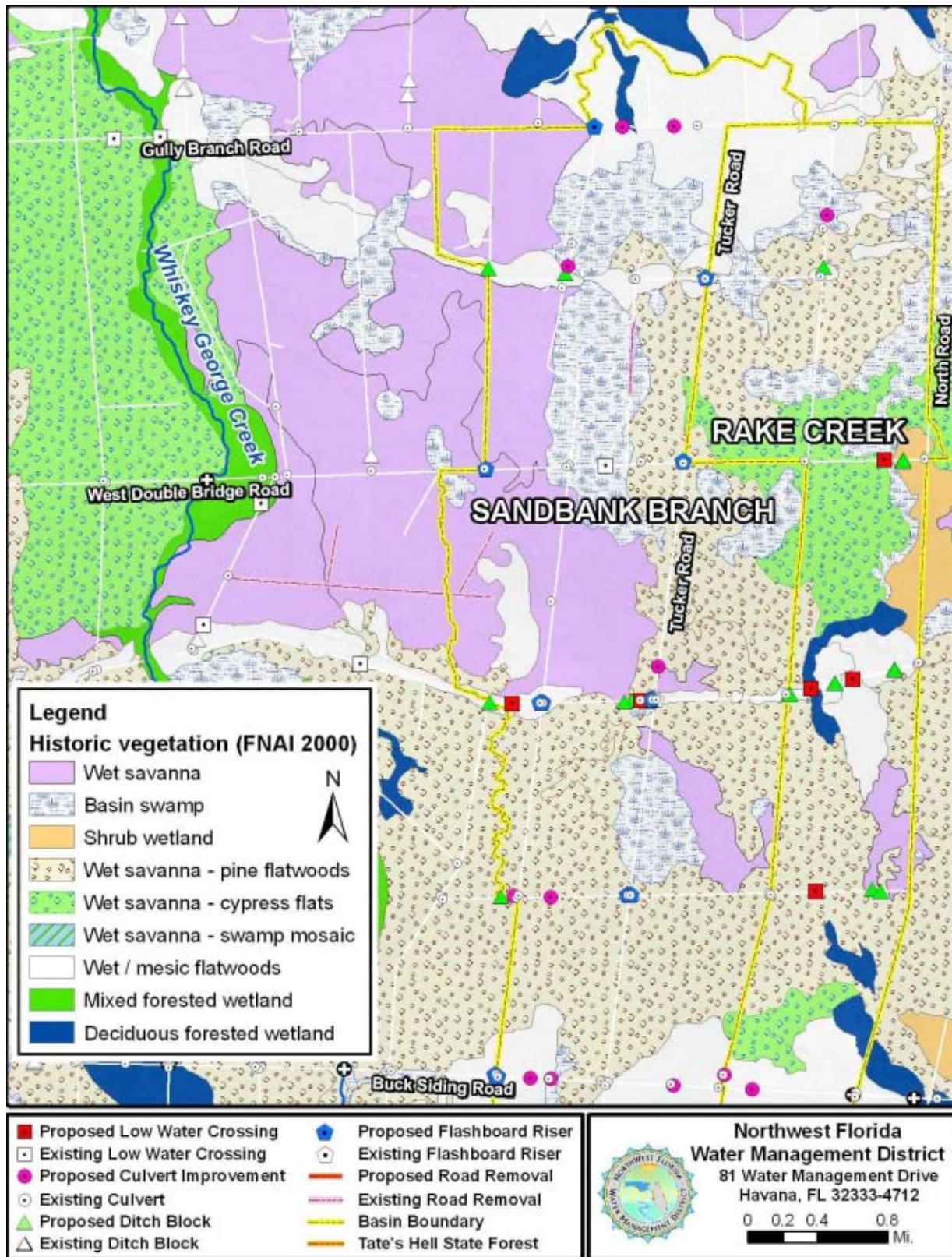


Figure 42. Historical ecological communities and proposed hydrologic improvements in the northern portion of the Sandbank Branch and Rake Creek basins.

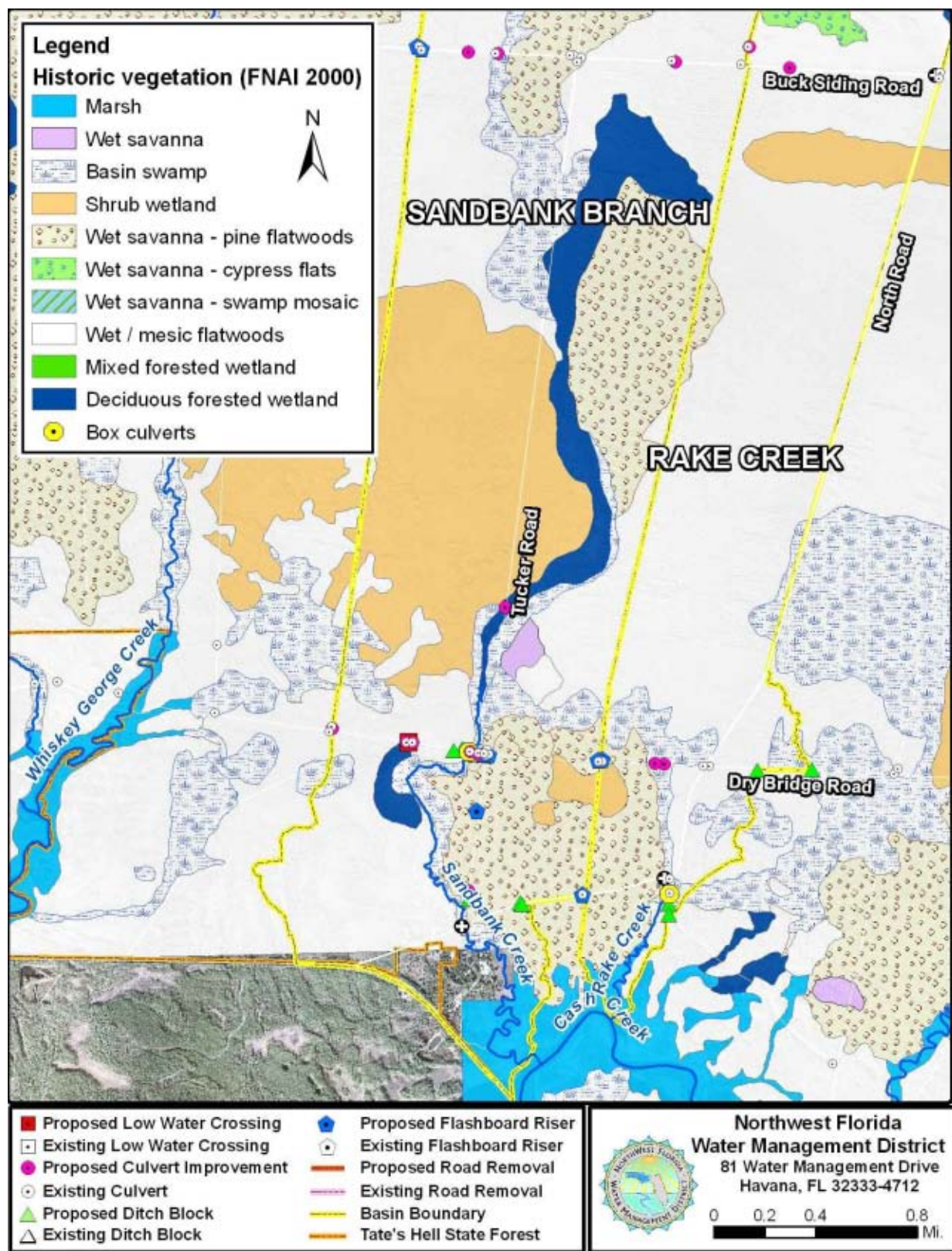


Figure 43. Historical ecological communities and proposed hydrologic improvements in the southern portion of the Sandbank Branch and Rake Creek basins.

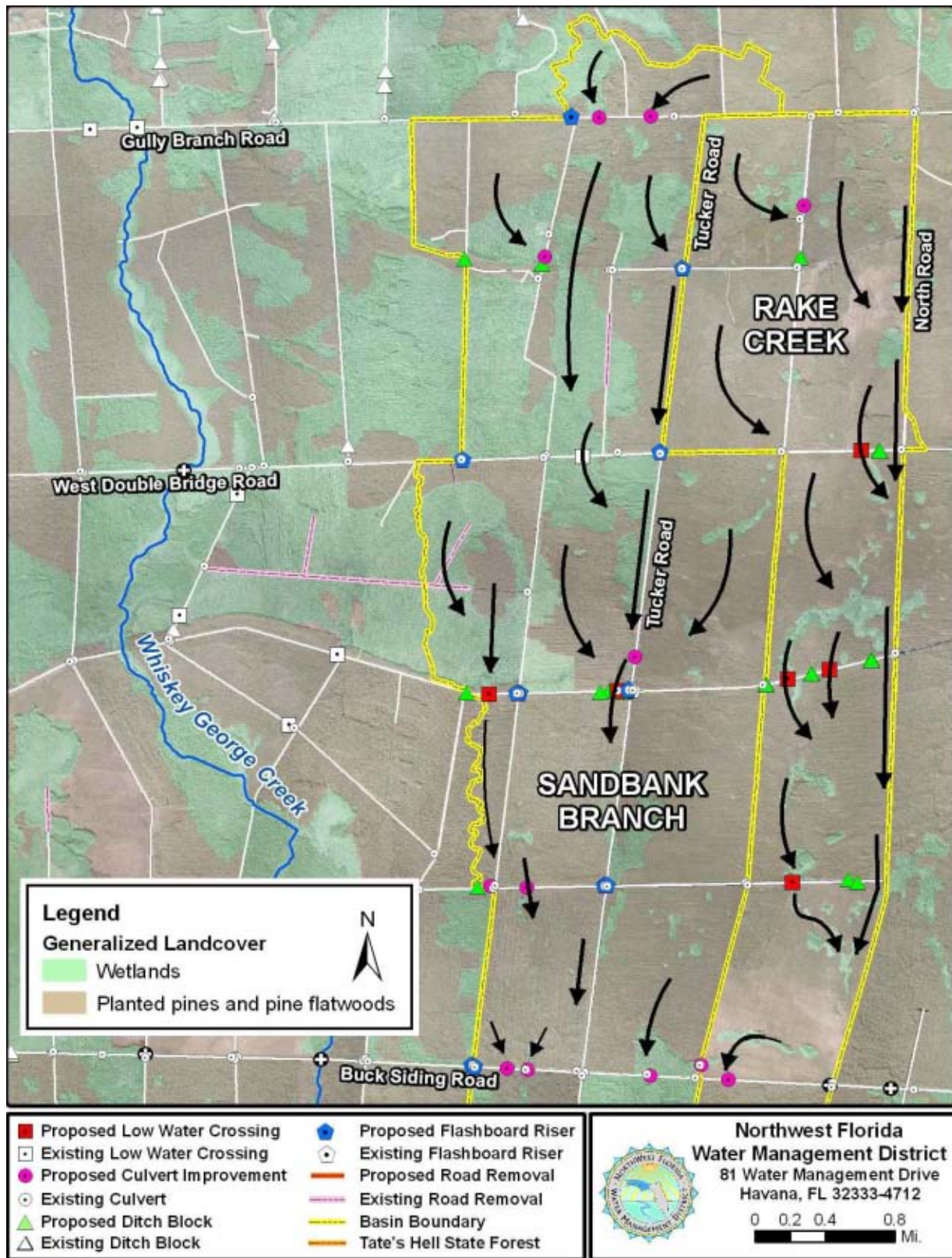


Figure 44. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Sandbank Branch and Rake Creek basins.

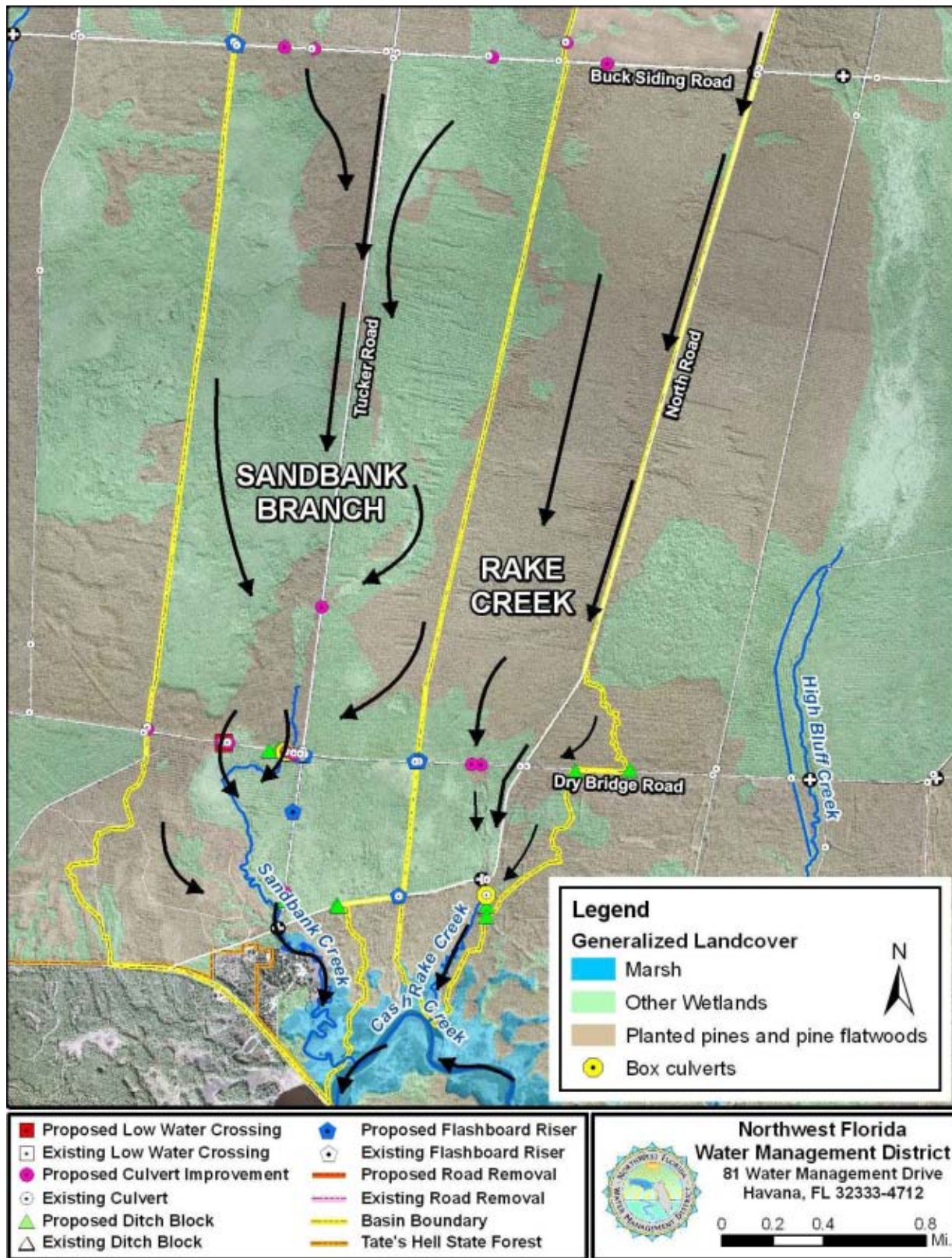


Figure 45. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Sandbank Branch and Rake Creek basins.

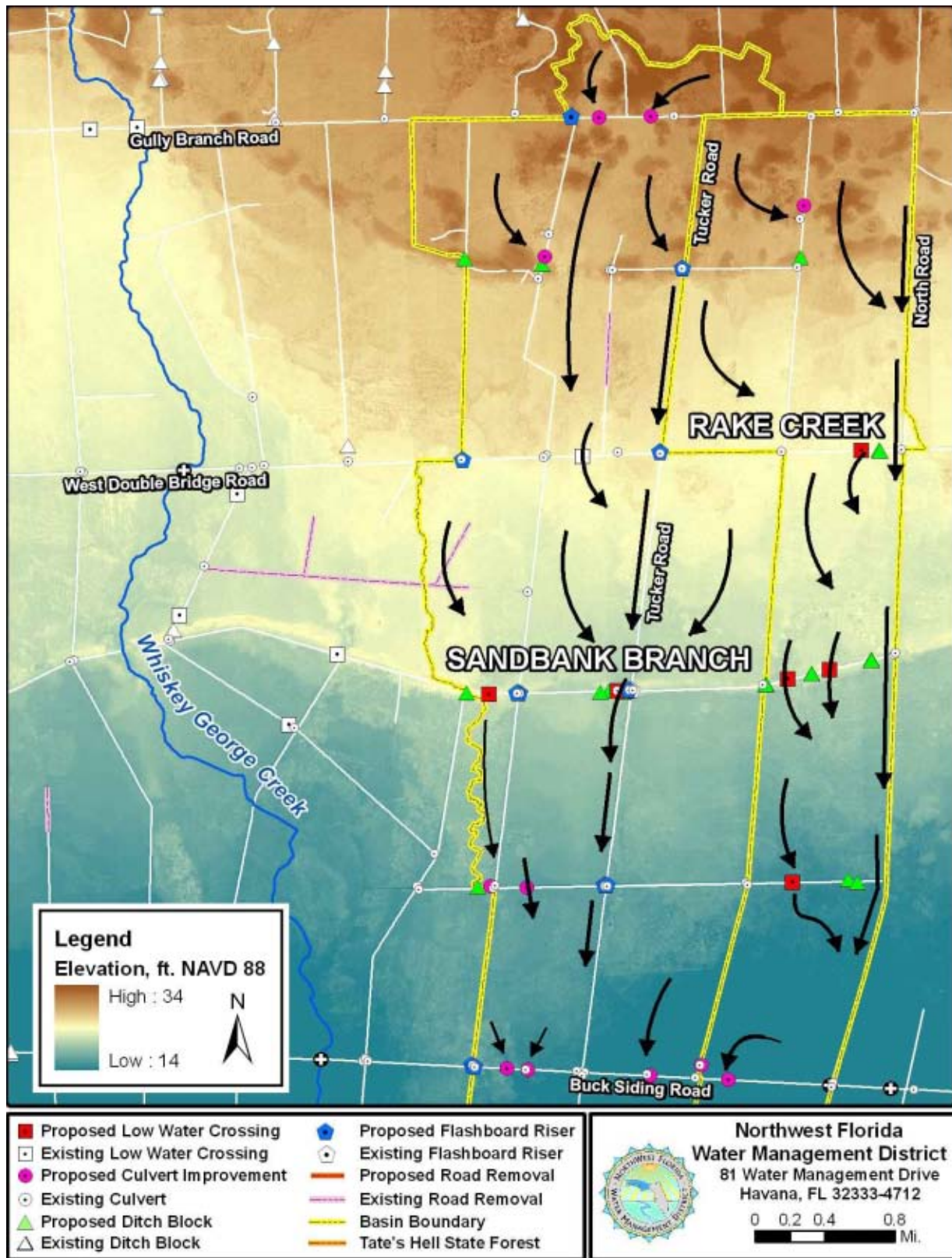


Figure 46. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Sandbank Branch and Rake Creek basins.

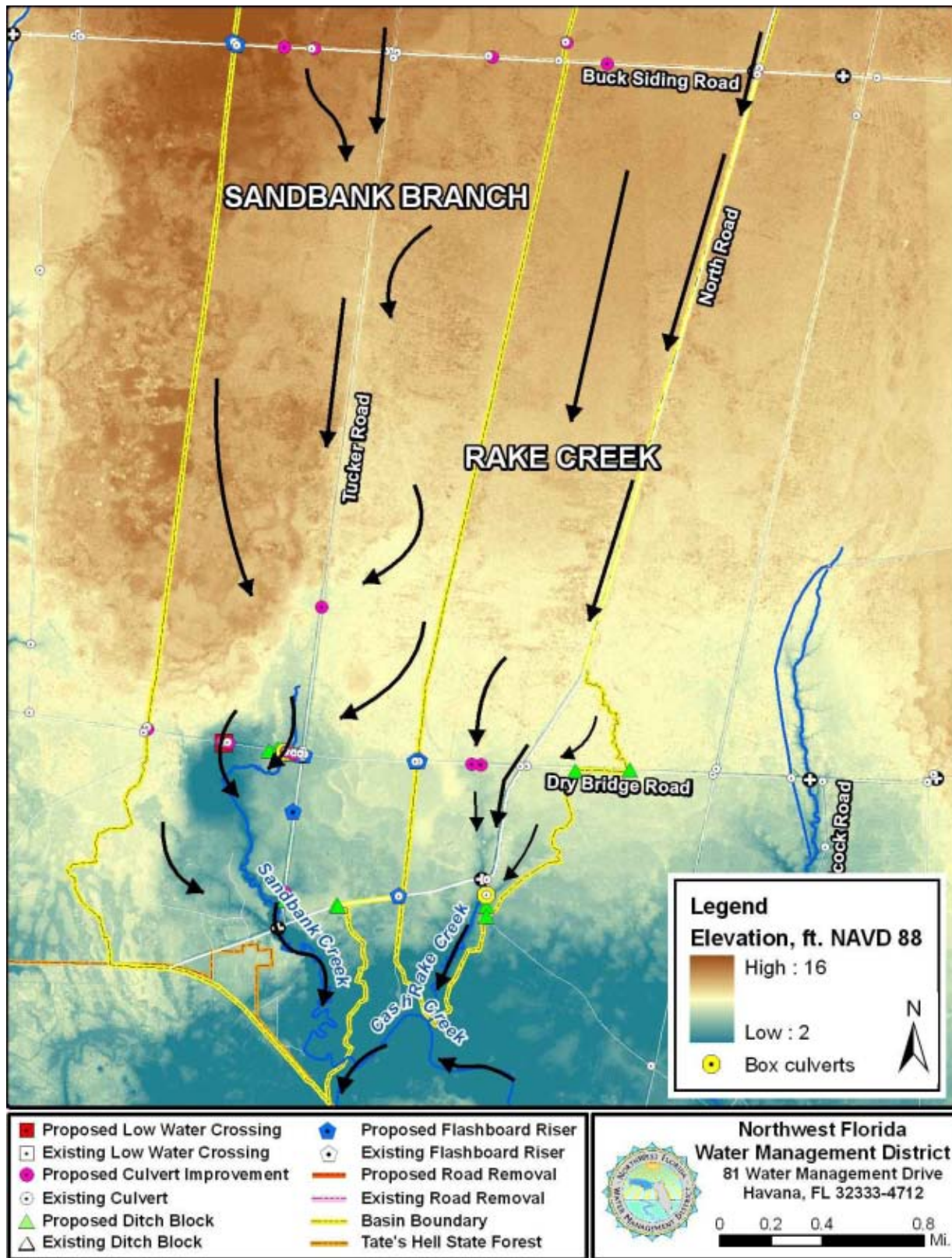


Figure 47. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Sandbank Branch and Rake Creek basins.

High Bluff Creek Basin

Restoration Priority: High

Basin Area: 9,500 acres

Description: The High Bluff Creek basin is a long and relatively narrow watershed located east of Whiskey George Creek. In the northern portion of the basin, surface water historically drained in a southerly direction through a series of scattered wetlands, eventually flowing into a large cypress wetland near the present day intersection of North Road and Buck Siding Road (Figures 48 through 51). From the cypress wetland, High Bluff Creek flows south and eventually discharges into Cash Creek. Immediately north of Dry Bridge Road, a large drainage ditch conveys water parallel to the creek (Figure 51). The ditch flows into High Bluff Creek on the south side of Dry Bridge Road. In the lower portion of the basin, the stream and adjacent basin swamp transitions into a marsh (Figures 49 and 51). The stream meanders through the marsh before discharging into Cash Creek.

The 1953 aerial photography indicates that Dry Bridge Road, Trout Creek Road, and Buck Siding Road existed and North Road had been partially constructed. The construction of these and subsequent roads and the conversion of wetland habitats to pine plantation significantly altered drainage patterns and ecological communities in the basin. Only scattered wetlands remain north of Buck Siding Road (Figure 50). Much of the surface water runoff is now conveyed through drainage ditches along North Road, West Double Bridge Road, Buck Siding Road, and Dry Bridge Road and in the large ditch that parallels the creek in the southern part of the basin.

2010 – 2020 Hydrologic Restoration Plan: Proposed hydrologic improvements will reduce ditch flow, redirect surface water runoff towards former wetlands areas and High Bluff Creek, and improve wetland hydrology. In the northern portion of the basin, six flashboard risers will reduce ditch flow across basin boundaries (Figures 48, 50, and 52). A new culvert on West Double Bridge Road will reconnect a former wetland (Figure 48) and enable surface water runoff to flow south at this location. The two low water crossings and associated ditch blocks will restore flow through a former basin swamp system (Figures 48 and 50). An existing culvert will be removed when the low water crossings are installed (e.g. culvert modification). Farther to the south, a proposed new culvert will enable surface water runoff to flow to the southwest across a logging road (Figure 50).

In the southern portion of the basin, a 0.5 mile road segment located north of Buck Siding Road is proposed for removal once the pines are thinned (Figures 49, 51, and 53). Although this area is now planted in pines, the historical vegetation map indicates that this was formerly a shrub wetland. Immediately south of the road removal, an existing culvert is proposed to be replaced with a long low water crossing. Two ditch blocks will direct surface water flow through the crossing and prevent water from continuing to flow south in the ditch.

Four new culverts and two culvert removals are proposed in the southern portion of the basin to facilitate surface water flow west towards High Bluff Creek and restore historical basin boundaries (Figures 49, 51, and 53). Six flashboard risers and multiple additional ditch blocks will also help to restore historical surface water drainage patterns. Although it would be desirable to fill the large canal that parallels High Bluff Creek, the cost of the fill material and associated earth moving activities would be very high. It may be possible instead to remove part of the berm on the eastern side of the canal to reestablish a more natural flow path for water to drain towards High Bluff Creek. Removing planted pines to restore the large cypress slough located on both sides of Buck Siding Road also should be considered.

Estimated Construction Cost for Hydrologic Improvements: \$ 220,000

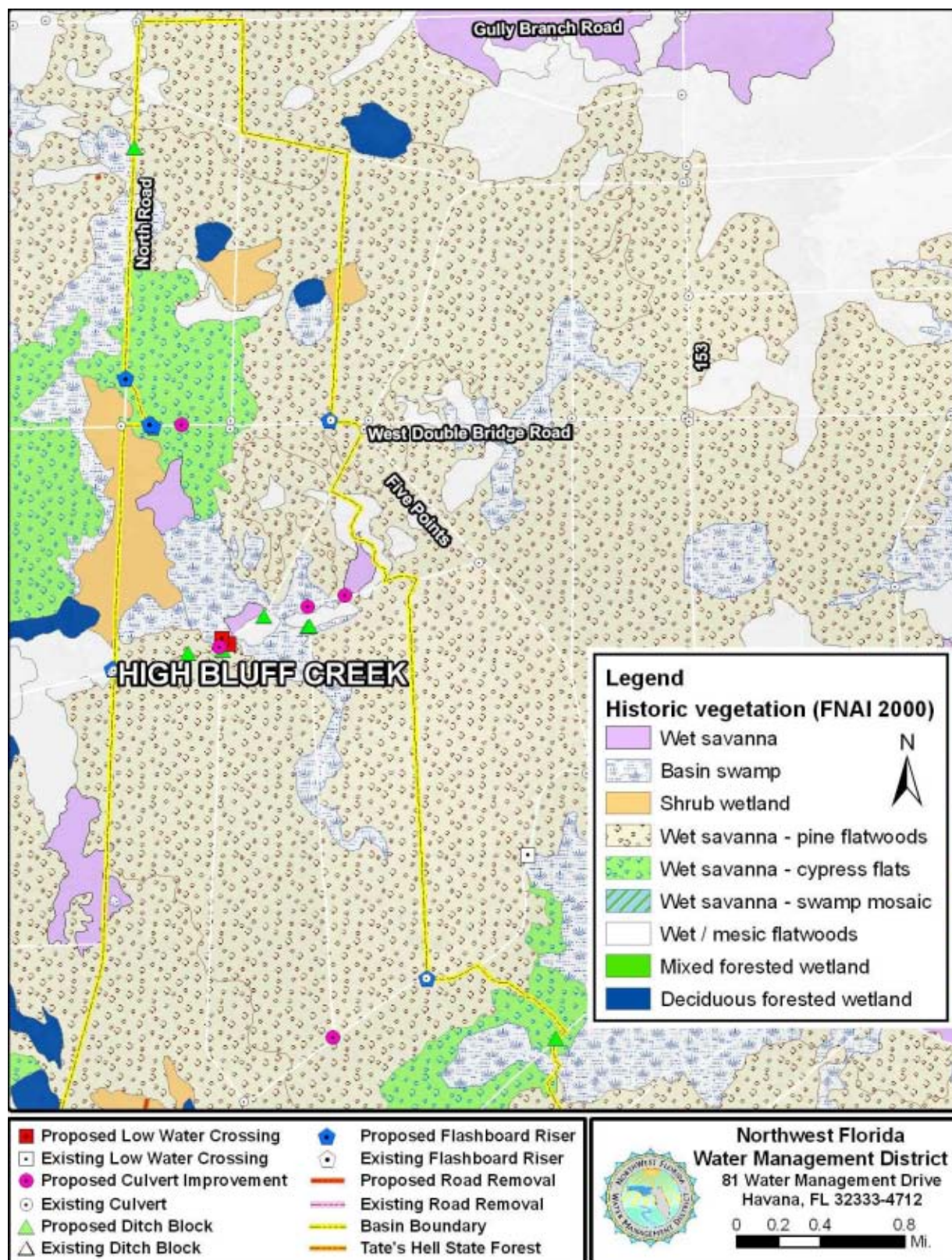


Figure 48. Historical ecological communities and proposed hydrologic improvements in the northern portion of the High Bluff Creek basin.

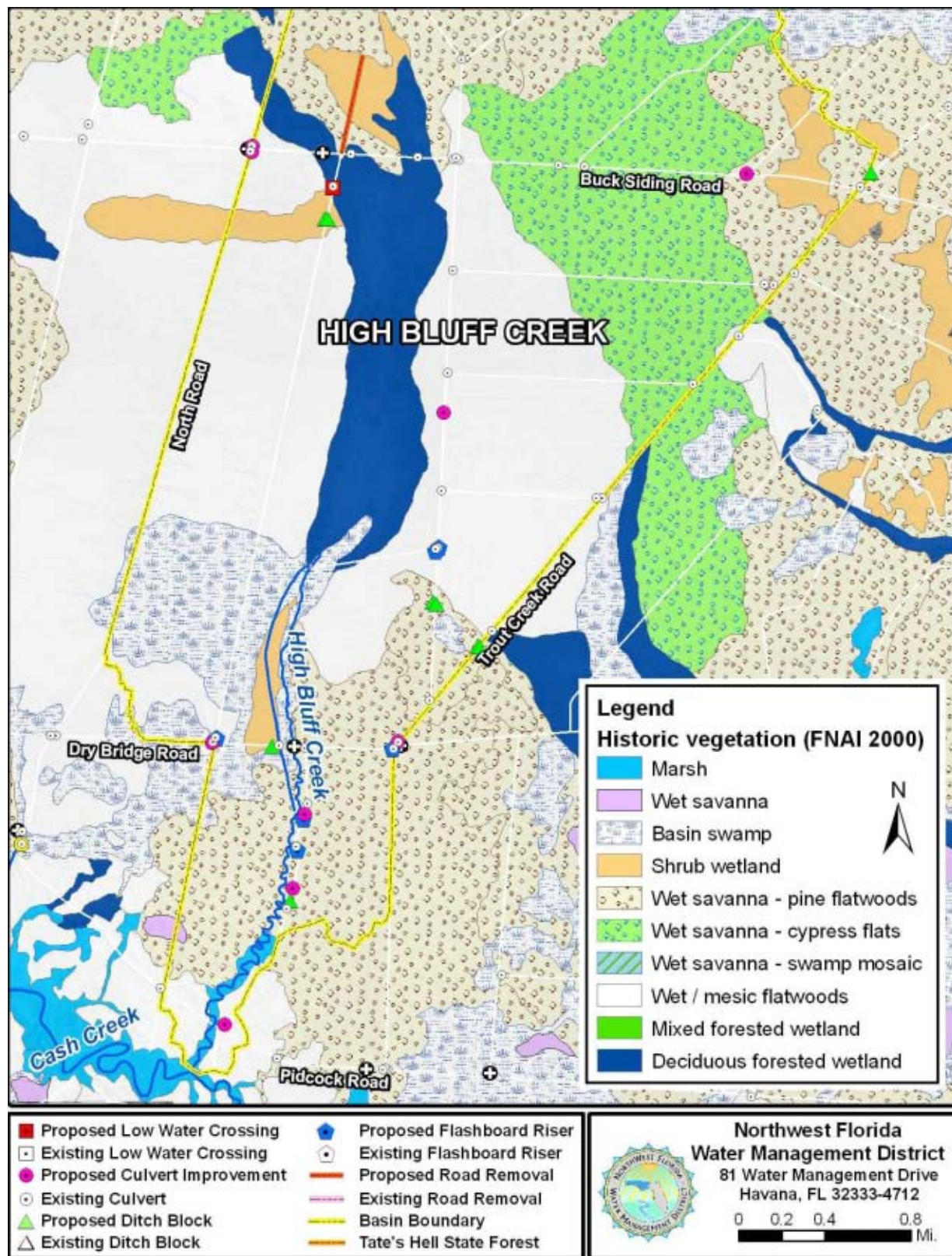


Figure 49. Historical ecological communities and proposed hydrologic improvements in the southern portion of the High Bluff Creek basin.

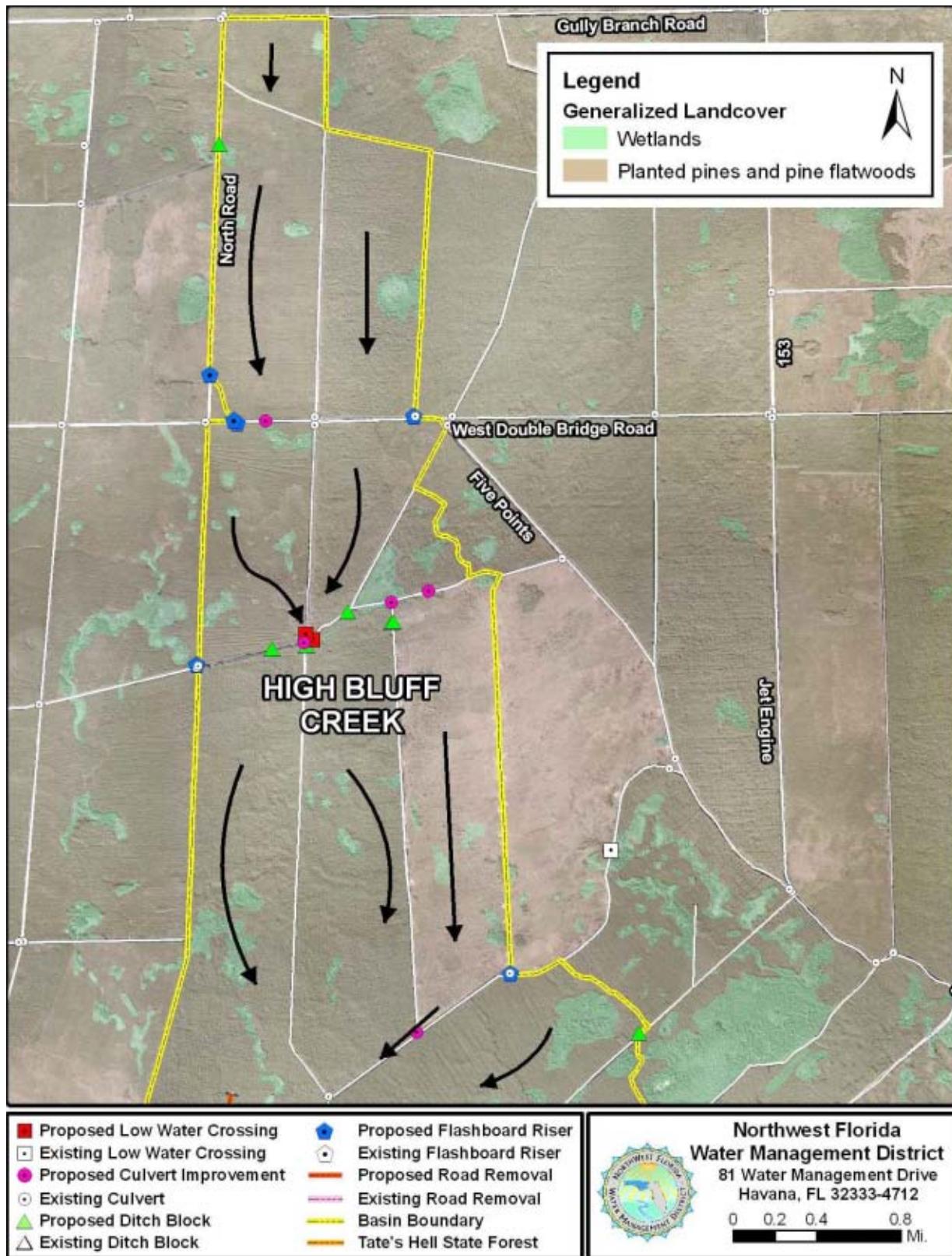


Figure 50. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the High Bluff Creek basin.

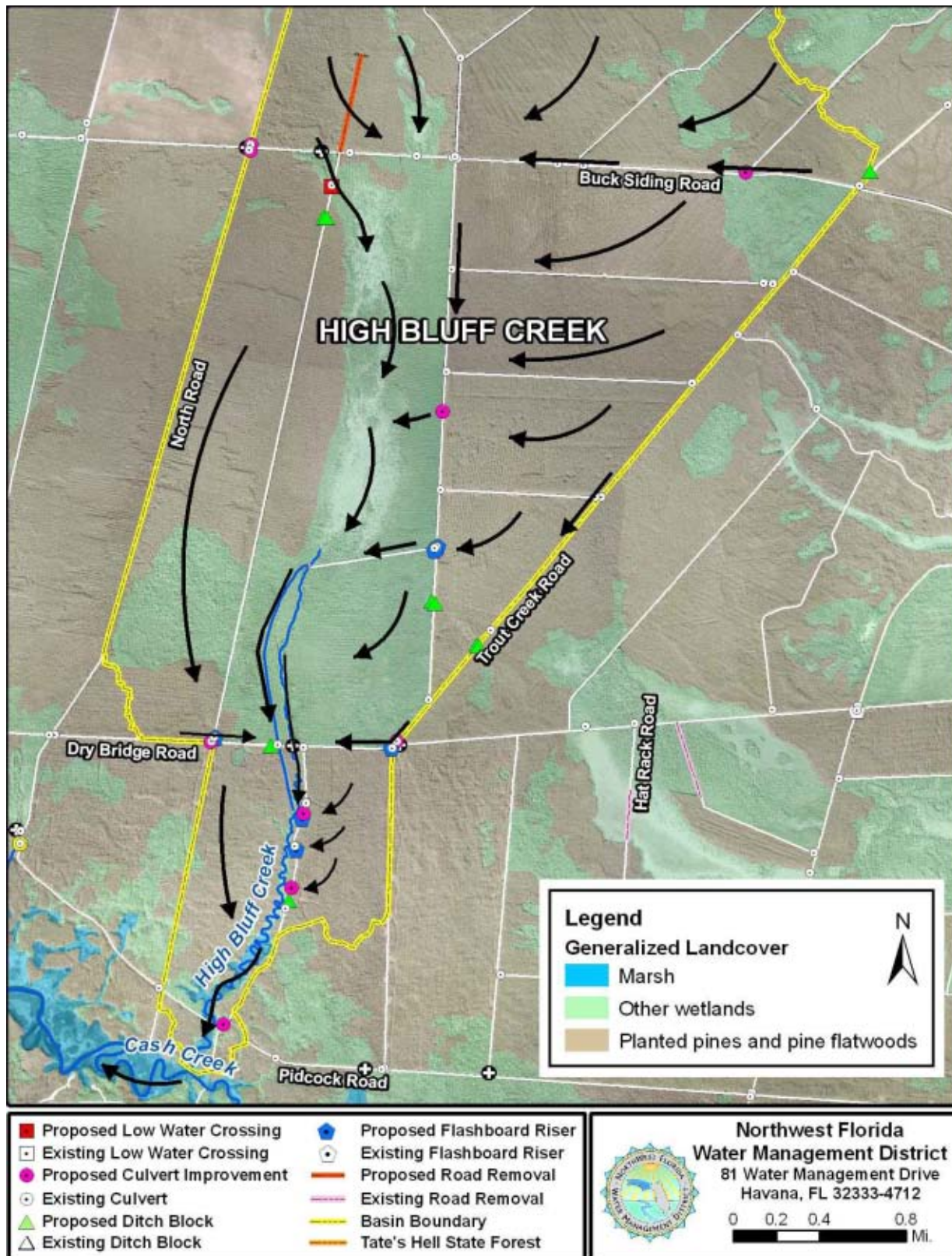


Figure 51. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the High Bluff Creek basin.

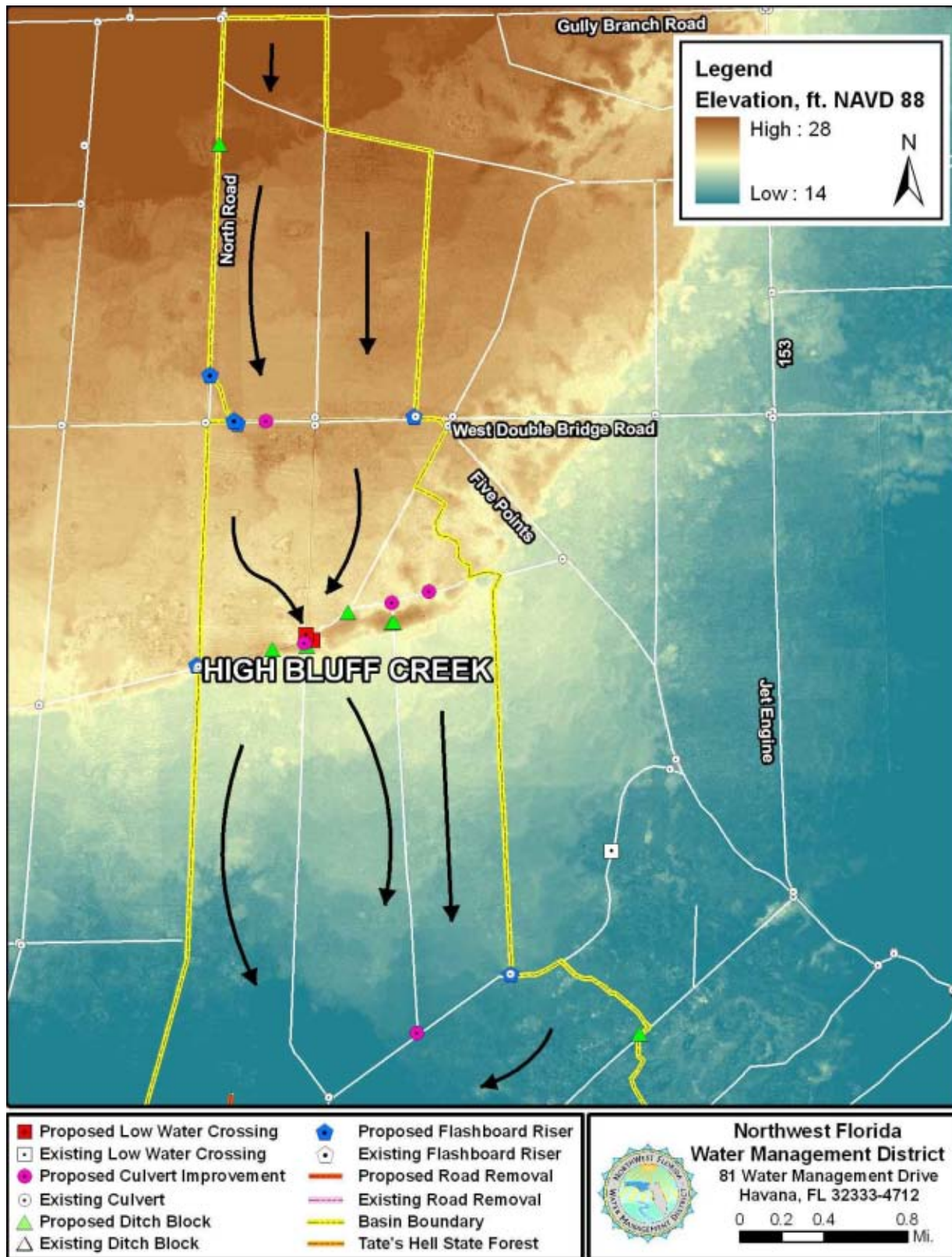


Figure 52. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the High Bluff Creek basin.

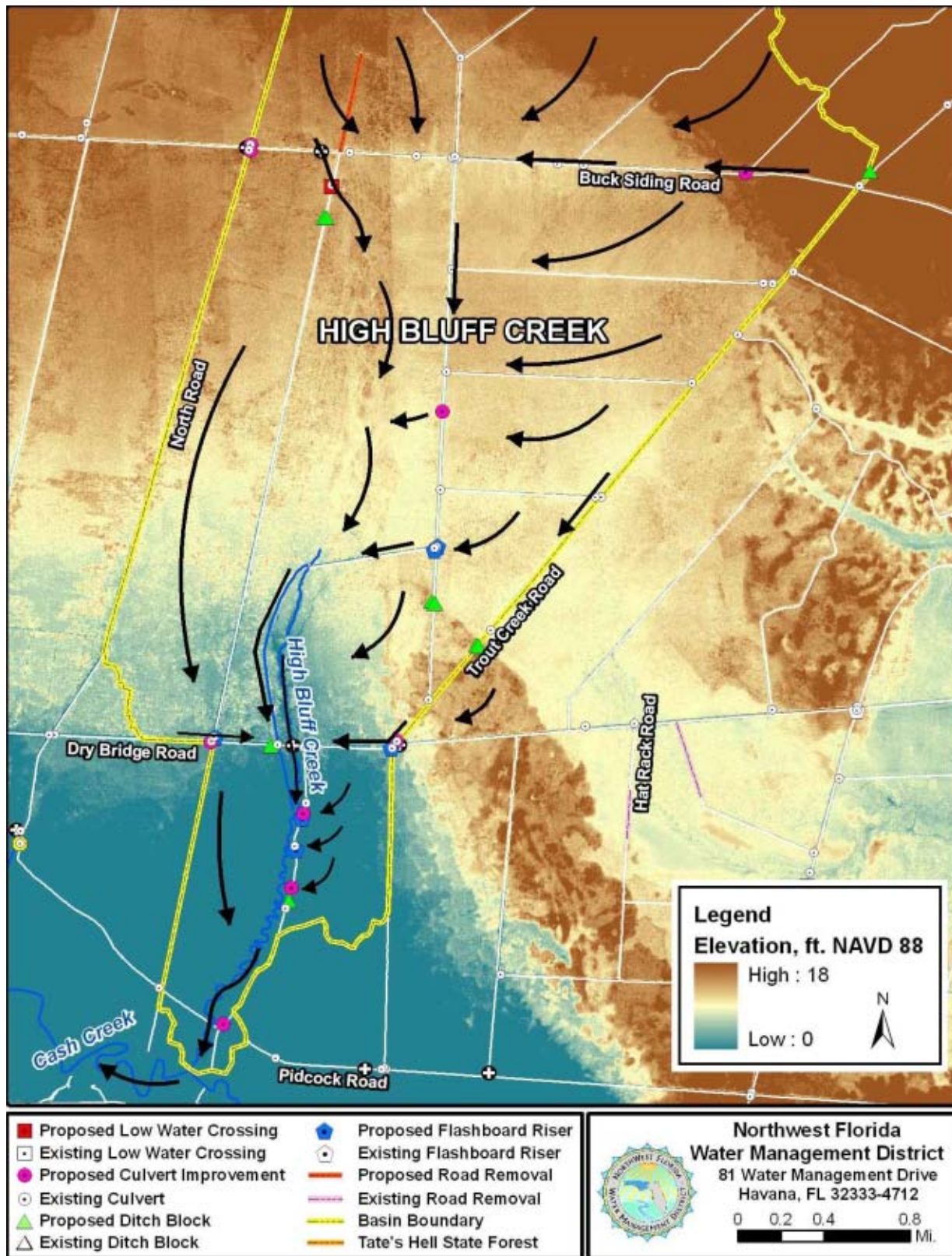


Figure 53. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the High Bluff Creek basin.

Trout Creek

Restoration Priority: Medium

Basin Area: 15,100 acres

Description: The Trout Creek watershed is located in the central portion of Tate's Hell State Forest. The crescent-shaped dwarf cypress swamps are a distinguishing characteristic of this basin (Figures 54 and 55). In the northern and western portions of the basin, surface water runoff historically collected in basin swamps, shrub wetlands, and dwarf cypress swamps before draining to the north towards Trout Creek and its tributaries (Figure 54). In the southern portion of the basin, surface water runoff flowed north through a series of interconnected basin swamps (Figure 55). Trout Creek flows north and drains into the New River.

By 1953, Trout Creek Road, Buck Siding Road, Jet Engine Road, and Carbody Road had already been constructed. Despite the extensive road network that has been present for more than 50 years, the dwarf cypress swamps are largely intact, although some have been bisected by roads. In the northern portion of the basin, portions of many of the former shrub wetlands and wet savanna pine flatwoods habitats have been converted to pine plantation (Figures 54 and 56). Roadside ditches now convey most of the surface water runoff towards Trout Creek. In the southern portion of the basin, most of the surface water runoff still flows through the network of basin swamps (Figures 55 and 57). The logging roads in the southern portion of the basin are frequently sandy and narrow. Many of these roads are at or near natural grade and relatively few have roadside ditches. During periods of high water, sections of these roads can be overtopped with water.

The first restoration project implemented in Tate's Hell State Forest by the NFWFMD was the Dwarf Cypress / Trout Creek Restoration Project. The project involved removing a 0.24-mile section of road that bisected a dwarf cypress swamp and installing several ditch blocks and three new culverts in the western portion of the basin (Figures 55 and 57). There is now a short boardwalk and educational kiosk at the northern end of the former roadway, which is located south of Dry Bridge Road and west of Carbody Road.

A second wetland restoration project was implemented in the vicinity of Dry Bridge Road and Carbody Road by Carrabelle Ventures in 2006. The project included the removal of approximately 2,000 feet of logging roads and the installation of a flashboard riser, several ditch blocks, and multiple culverts to restore natural surface water drainage towards the creek (Figures 55 and 57).

2010 – 2020 Hydrologic Restoration Plan: Future restoration activities will build on previous efforts to restore historical surface water drainage patterns and enhance wetland hydrology. In the northern portion of the basin (Figures 54, 56, and 58), nine low water crossings, together with 15 culverts and numerous ditch blocks, will restore surface water flow through historical wetland

systems and towards Trout Creek. To improve the conveyance and stream channel habitat, three existing culverts that convey stream flow across roads are proposed to be replaced with small bridges or box culverts. Two road segments are proposed to be removed and recontoured to natural grade. One segment, approximately 300 ft in length, bisects the western end of a dwarf cypress swamp. The other segment, approximately 2900 ft in length, parallels Airport Road (Figures 54, 56, and 58).

In the southern portion of the basin (Figures 55, 57, and 59), an existing low water crossing on John Allen Road is proposed to be improved and relocated about 150 ft. north of its current location. The low water crossing provides a hydrologic connection for a dwarf cypress swamp that is bisected by the road. In the southeast portion of the basin, eight additional low water crossings and associated ditch blocks are proposed to be constructed to restore hydrologic surface water flow paths between and among historical basin swamps (Figures 55, 57, and 59). These crossings will also improve vehicle access as many of these roads are likely overtopped with water during periods of high rainfall. Several new culverts are proposed to be installed to improve drainage through historical basin swamps bisected by Dry Bridge Road. Three sections of forest roads, totaling 1.9 miles are proposed to be taken out of service and restored to natural grade. One of these road sections bisects a former wet savanna, one bisects a dwarf cypress swamp, and the third bisects a basin swamp that has a mixed tree canopy of cypress, slash pine, and titi (Figure 55).

In all, a total of 19 low water crossings, two flashboard risers, 33 culvert modifications, 79 ditch blocks, and 1.95 miles of road removal are proposed in the Trout Creek basin.

Estimated Construction Cost for Hydrologic Improvements: \$ 970,000

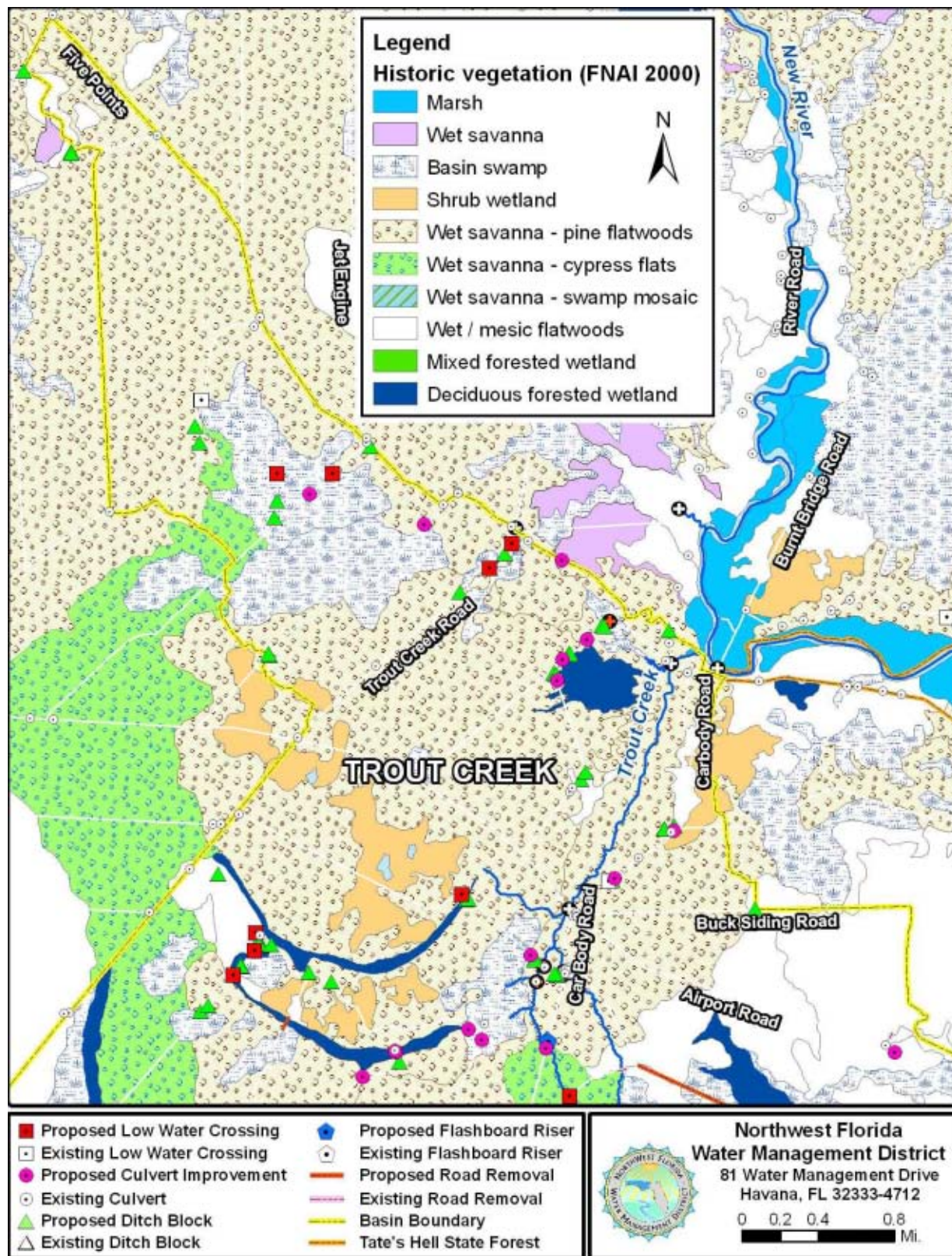


Figure 54. Historical ecological communities and proposed hydrologic improvements in the northern portion of the Trout Creek basin.

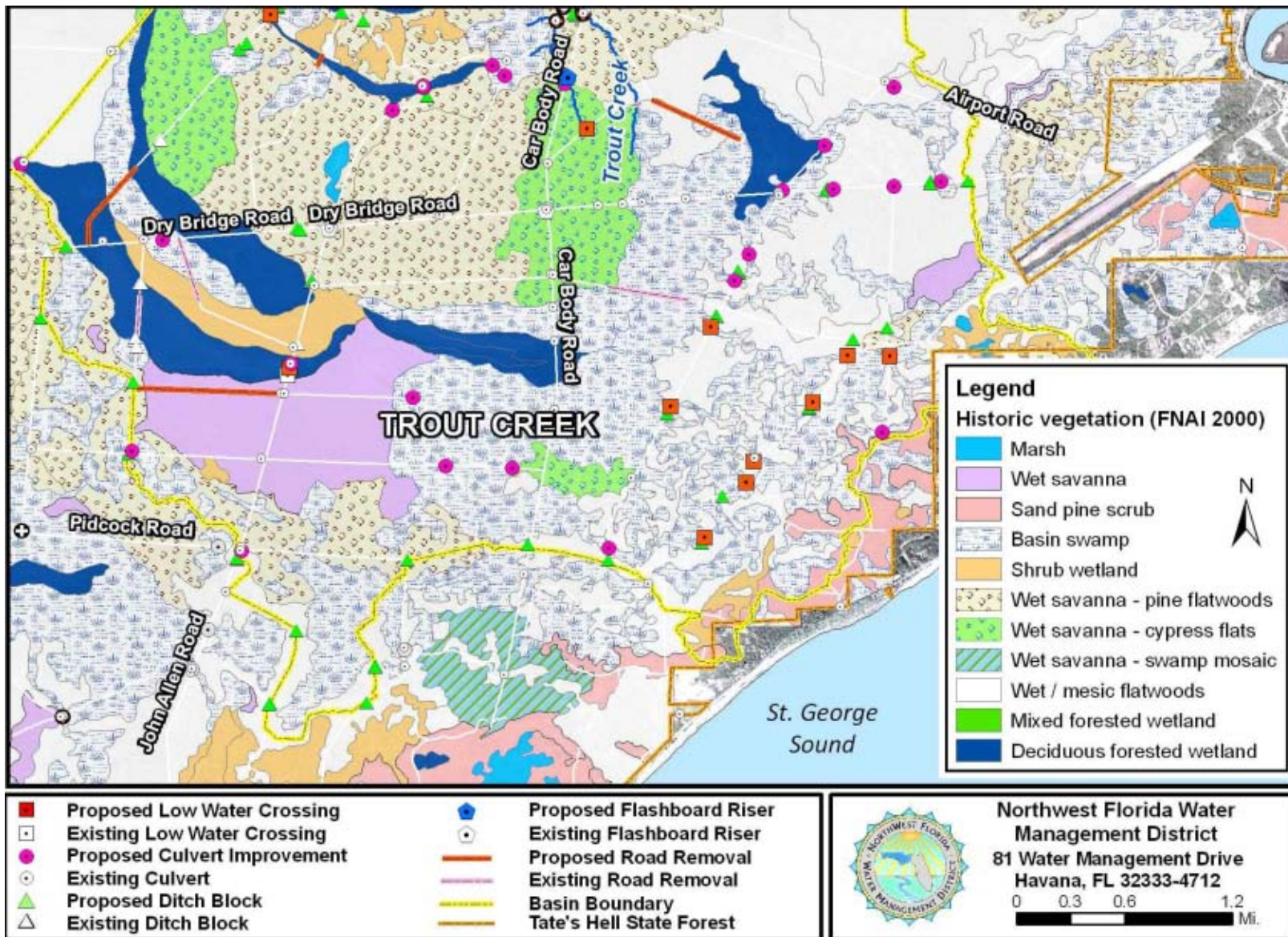


Figure 55. Historical ecological communities and proposed hydrologic improvements in the southern portion of the Trout Creek basin.

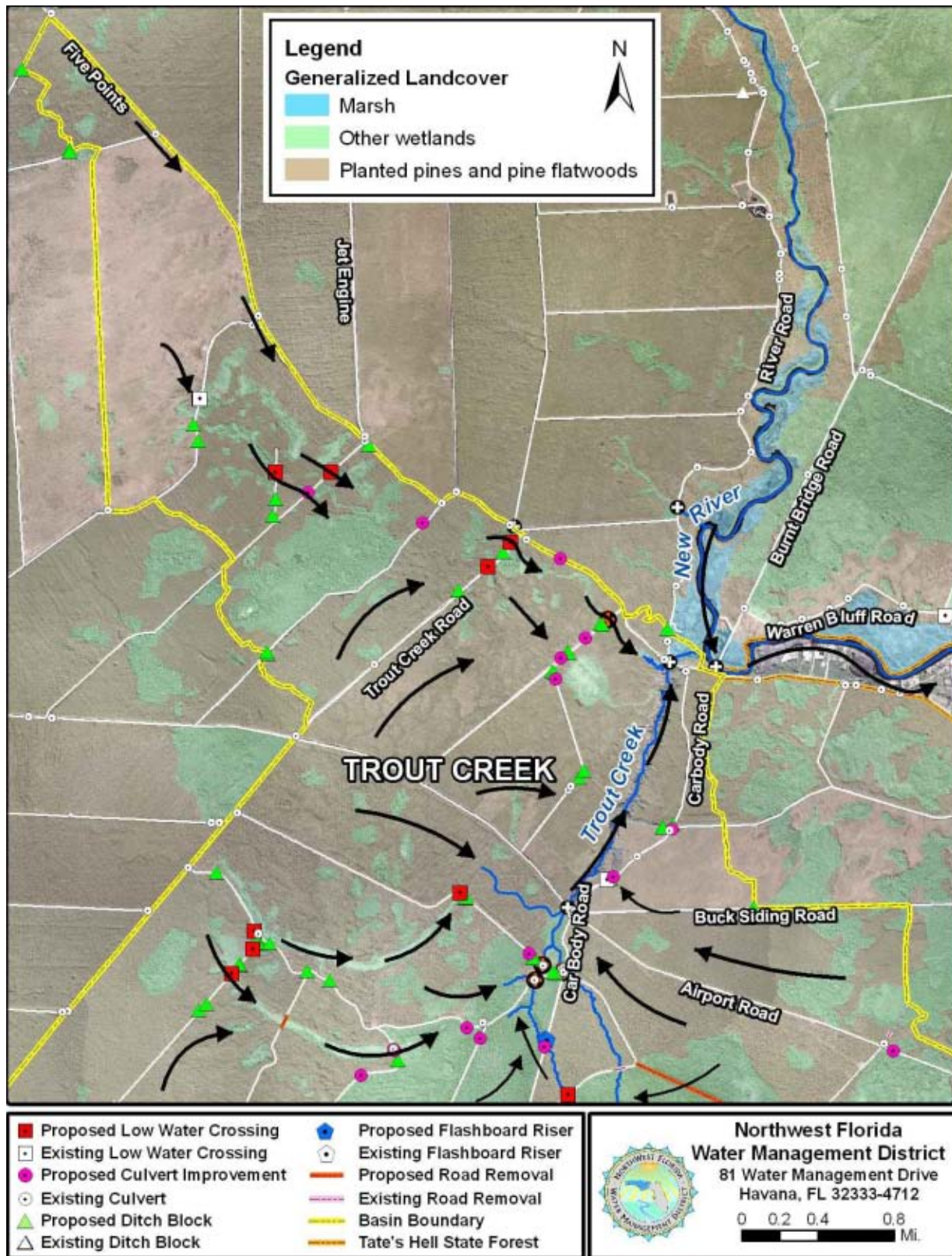


Figure 56. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Trout Creek basin.

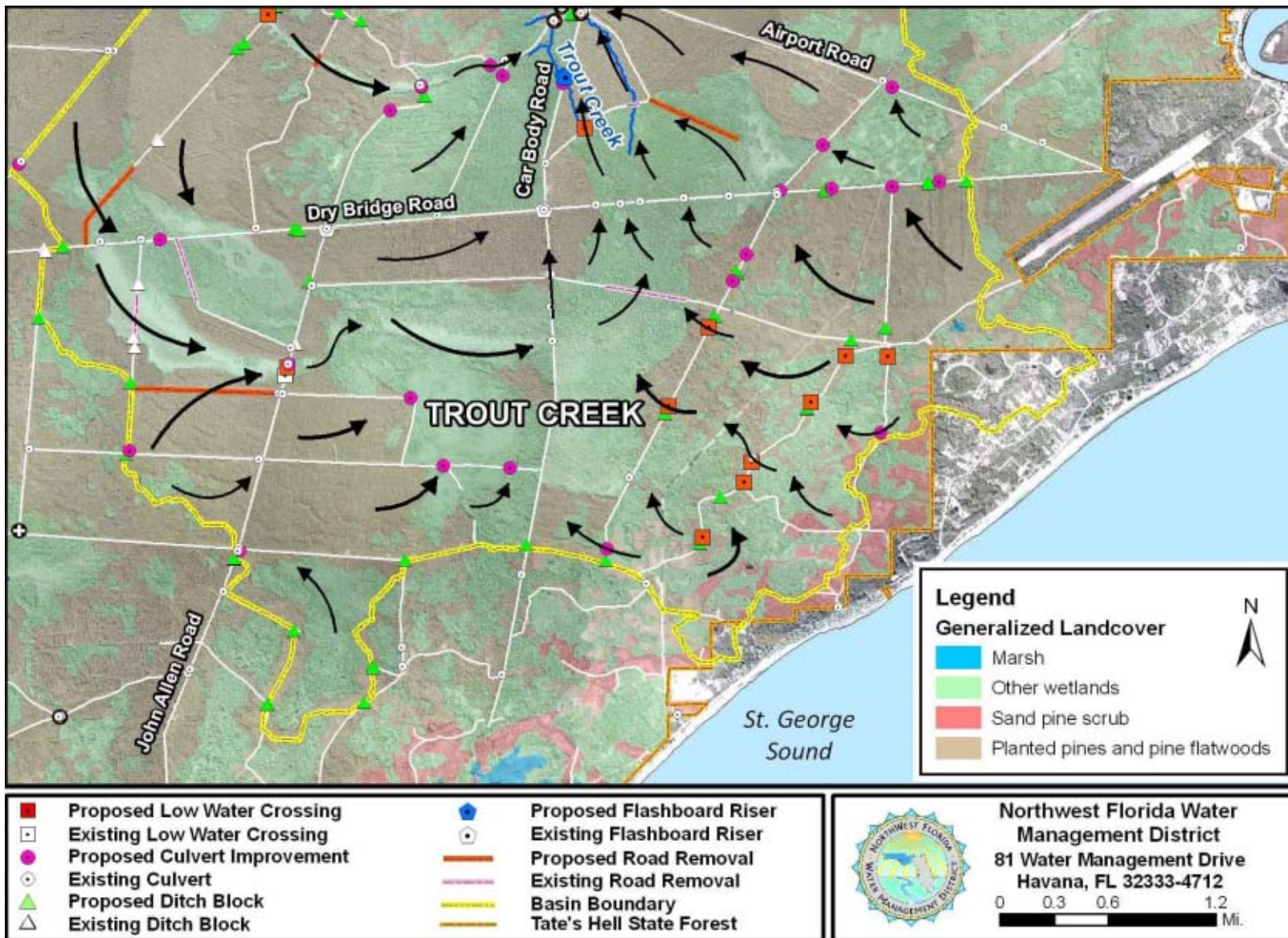


Figure 57. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Trout Creek basin

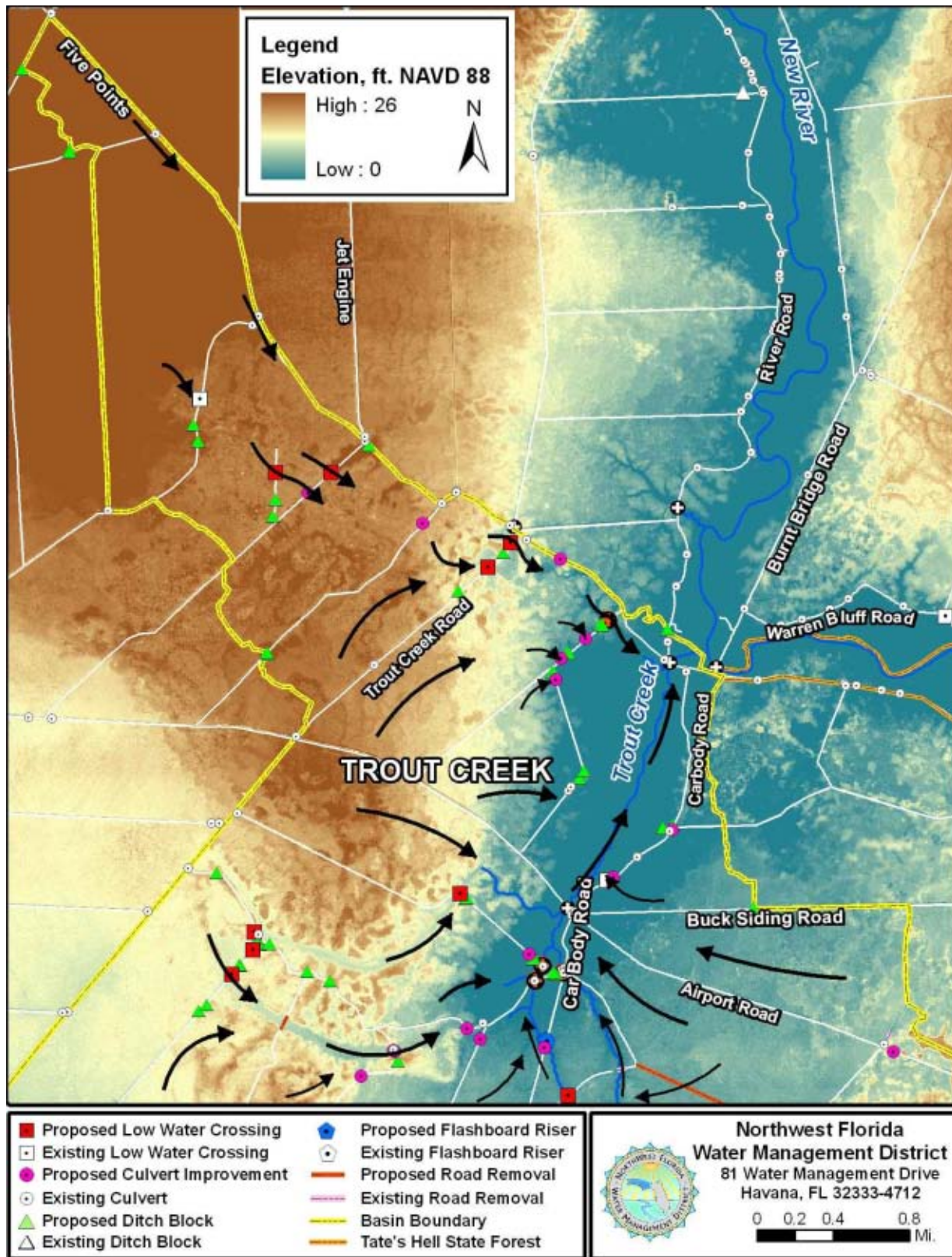


Figure 58. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Trout Creek basin.

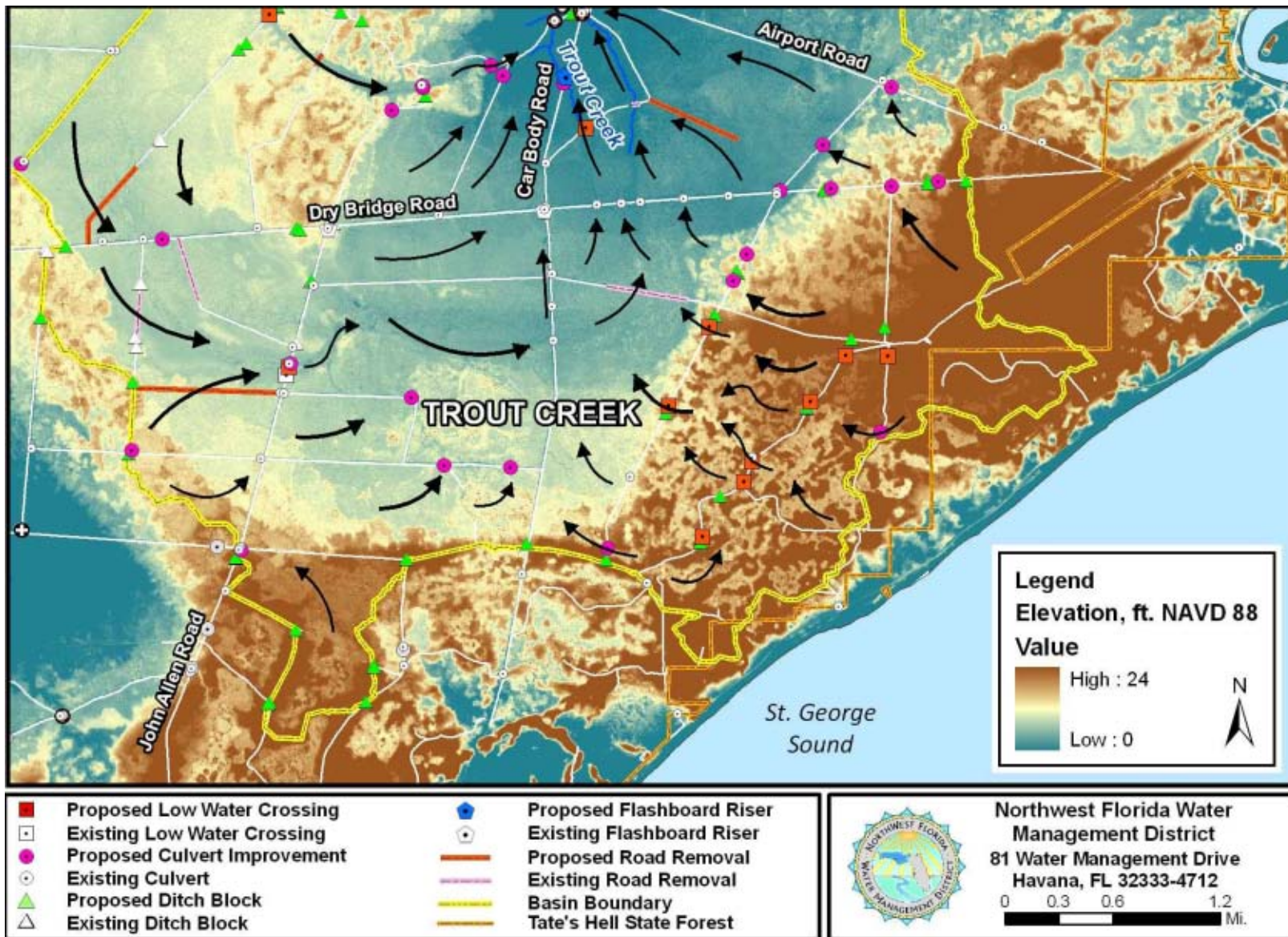


Figure 59. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Trout Creek basin

Nero Branch and Unnamed Creek Basins

Restoration Priority: High

Basin Area: 10,000 acres (both basins)

Description: This area is comprised of the Nero Branch and Unnamed Creek drainage basins located in the northwest region Tate's Hell State Forest (Figures 60 and 61). A small section of the New River basin is also included in this hydrologic restoration plan.

This Unnamed Creek drainage basin totals approximately 8,400 acres and is located entirely within Tate's Hell State Forest. Surface water runoff generally flows to the northeast where the creek drains into the New River. The historical vegetation consisted of large interconnected wetland systems surrounded by areas of wet savanna and mesic flatwoods. Road construction during the 1960s and 1970s altered surface water drainage patterns and bisected many of the wetland systems. The former wet savannas were converted to pine plantation. A large ditch on the north side of Sumatra Road now conveys much of the surface water runoff. Sections of the Unnamed Creek have been channelized.

The Nero Branch drainage basin encompasses approximately 1,500 acres and is located almost entirely within Tate's Hell State Forest. Historically, Nero Branch consisted of a series of interconnected cypress sloughs that drained east into the New River. Surrounding habitats consisted of wet savannas and mesic flatwoods. Sometime after 1953, a large ditch was excavated through the cypress sloughs. Nero Branch is now channelized along most of its length and the surrounding wetland habitats have been bisected by logging roads.

There has been little hydrologic restoration in either basin. In 1998, two low water crossings and several ditch blocks were installed in the southern portion of the Unnamed Creek basin as part of the Big Slough Restoration Project. A road segment in the northwest corner of the Unnamed Creek basin has been removed from service by the Division of Forestry and is no longer maintained. Shrubs have recolonized the roadway. However, the road has not been recontoured and the adjacent roadside ditches are still present.

2010 – 2020 Hydrologic Restoration Plans: Proposed restoration activities are aimed at reconnecting the cypress slough system, reconnecting contributing drainage areas to streams, and reducing flows in roadside ditches (see Figures 60 through 65).

In the section of the New River basin shown in the northwest corner of Figures 60, 62, and 64, three low water crossings are proposed along with a new large diameter (48-in) culvert. These improvements will reconnect this subarea of the drainage basin to the larger New River basin located to the north and east.

In the Unnamed Creek basin, several road segments are proposed to be removed (1.8 miles total) west of Cut-thru Road and the adjacent ditches are proposed to be filled to restore a 770-acre area (Figures 60, 62, and 64). Historically, this area was a mosaic of wet savanna, mesic flatwoods, and basin swamp habitats. Remnant wet savanna vegetation is evident along the edges of the roads.

In the northwest corner of this area, a low water crossing and two associated ditch blocks will restore surface water flows into a former deciduous forested wetland. The southern half of this wetland was mapped as mesic flatwoods by FNAI (2000) but the 1953 aerial photography suggests that this was a wetland. Water has been observed flowing across the road at this location. In the southeast corner of this area, three 24-in diameter culverts are proposed to reconnect a large deciduous forested wetland located on the south end of Cut-thru Road. A low water crossing would be preferable; however Cut-thru Road is a primary road that is needed for year-round vehicle access. The elevation of Cut-thru Road is close to the natural grade and additional fill material will be needed to build up the road and achieve 18" of cover over the proposed culvert pipes. North of the proposed culverts, two ditch blocks are recommended to be installed to prevent ditch flow to the north. Farther west in the basin, two culverts are in poor condition and need to be replaced.

Along Zig Zag Road, which is located immediately east of Cut-thru Road, the culvert that conveys the Unnamed Creek across the road should be replaced with a low water crossing to restore a shallow and broad stream channel (Figures 60, 62, and 64). Ditch blocks should be installed to facilitate flow through this crossing. Toward the southern end of Zig Zag Road, a low water crossing and new culvert are needed to restore surface water drainage toward the east. The southernmost culvert (across Road 56) should be removed or relocated to the bend in the road (about 0.3 miles to the east). There is a remnant ditch that begins at the southern end of Zig Zag road (Figures 61, 63, and 65) and extends east into a cypress wetland. It is recommended that several ditch blocks be installed to reduce the flow of water in this ditch and restore historical surface water drainage patterns.

On the eastern end of Sumatra Road, a series of culverts are proposed to restore surface water flow to and within this large cypress slough system (Figures 61, 63, and 65). It would be preferable to remove this section of road; however it is a secondary road that is needed for forest management activities. Slightly to the west, an existing culvert on Sumatra Road is proposed to be replaced with a low water crossing. West of the low water crossing, a culvert replacement, a new culvert, and a small bridge are proposed to restore the conveyance of surface water flows into this large wetland system. There is a large ditch that was excavated through the wetland south of the proposed bridge.

Between Sumatra Road and Nero Road, three low water crossings are proposed to reconnect a large deciduous forested wetland system (Figures 61, 63, and 65). At the eastern end of Nero Road, a new culvert and a culvert replacement are proposed to reconnect a former basin swamp. An existing culvert on Nero Road is proposed to be replaced with a small bridge. The culvert does not have sufficient conveyance capacity and the road is eroding in this area. Farther west, a second

small bridge is proposed to reconnect the historical channel of the Unnamed Creek. Currently the historical stream channel is severed by the road and the stream flow is conveyed east in a large roadside ditch and then to the north through an existing culvert.

In the southeast corner of the Unnamed Creek basin (Figures 61, 63, and 65), two low water crossings are proposed to reconnect a large cypress slough system south of Whiskey George Road. A low water crossing is also recommended on Tucker Road to enable surface water runoff to be conveyed to the east. Several additional ditch blocks are proposed throughout the Unnamed Creek basin to restore local topographic features and drainage divides.

In the western portion of the Nero Branch basin (Figures 61, 63, and 65), a low water crossing and associated ditch blocks are proposed to be constructed to restore surface water flow paths through a former wetland system. On the northern edge of the basin, an existing culvert is proposed to be removed to prevent surface water runoff from flowing across the basin boundary.

Estimated Construction Cost for Hydrologic Improvements: \$ 750,000

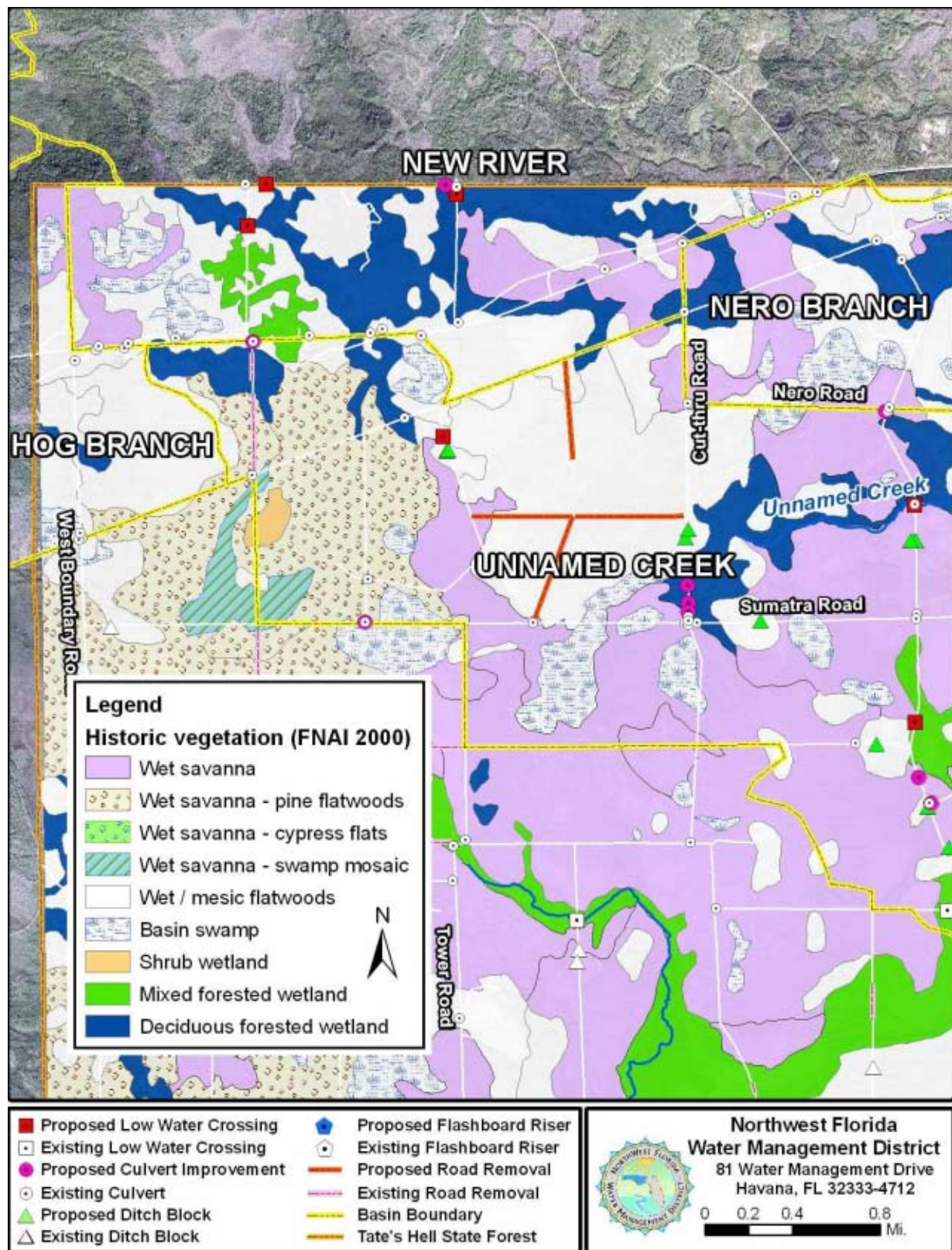


Figure 60. Historical ecological communities and proposed hydrologic improvements in the western portions of the Nero Branch and Unnamed Creek basins

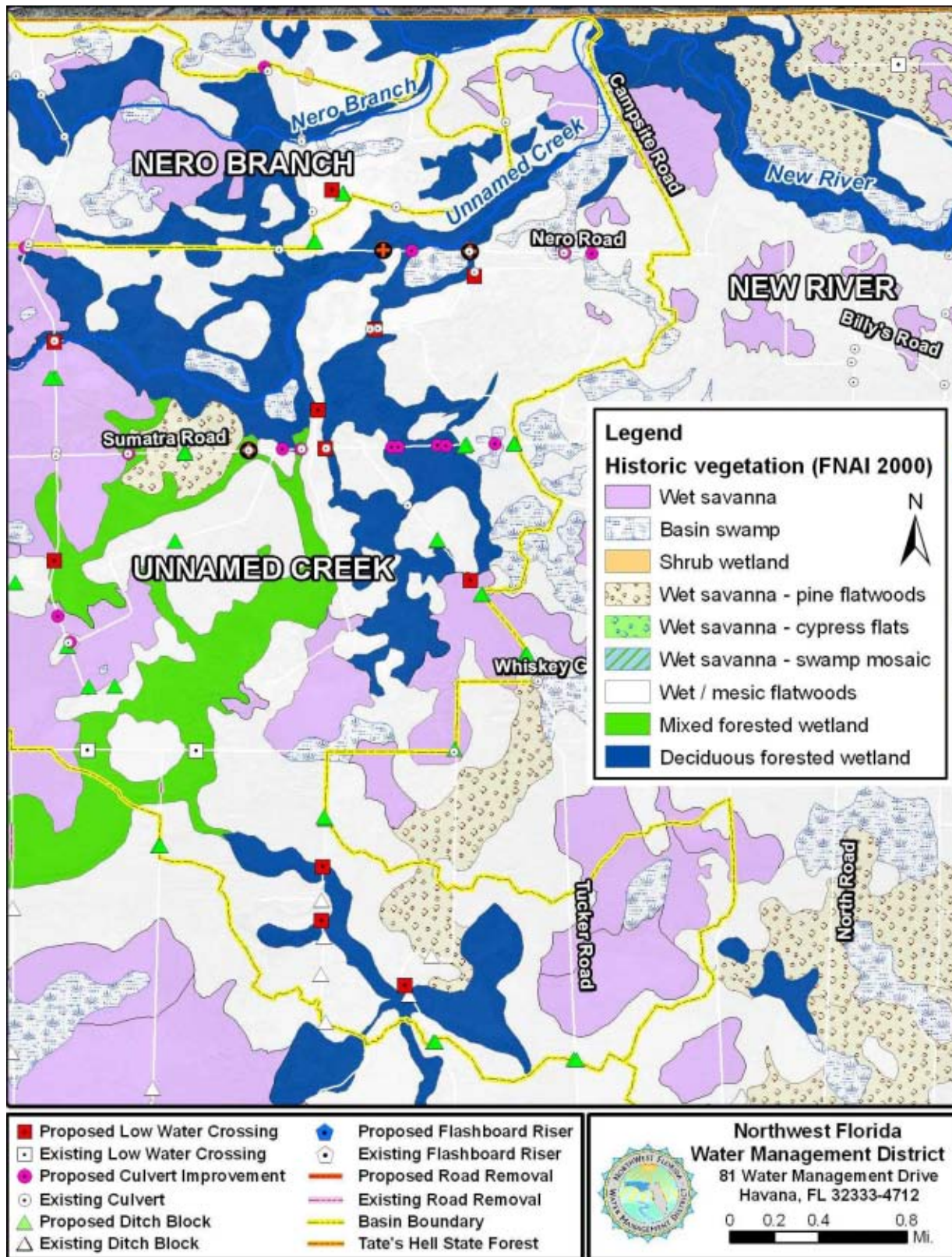


Figure 61. Historical ecological communities and proposed hydrologic improvements in eastern portions of the Nero Branch and Unnamed Creek basins

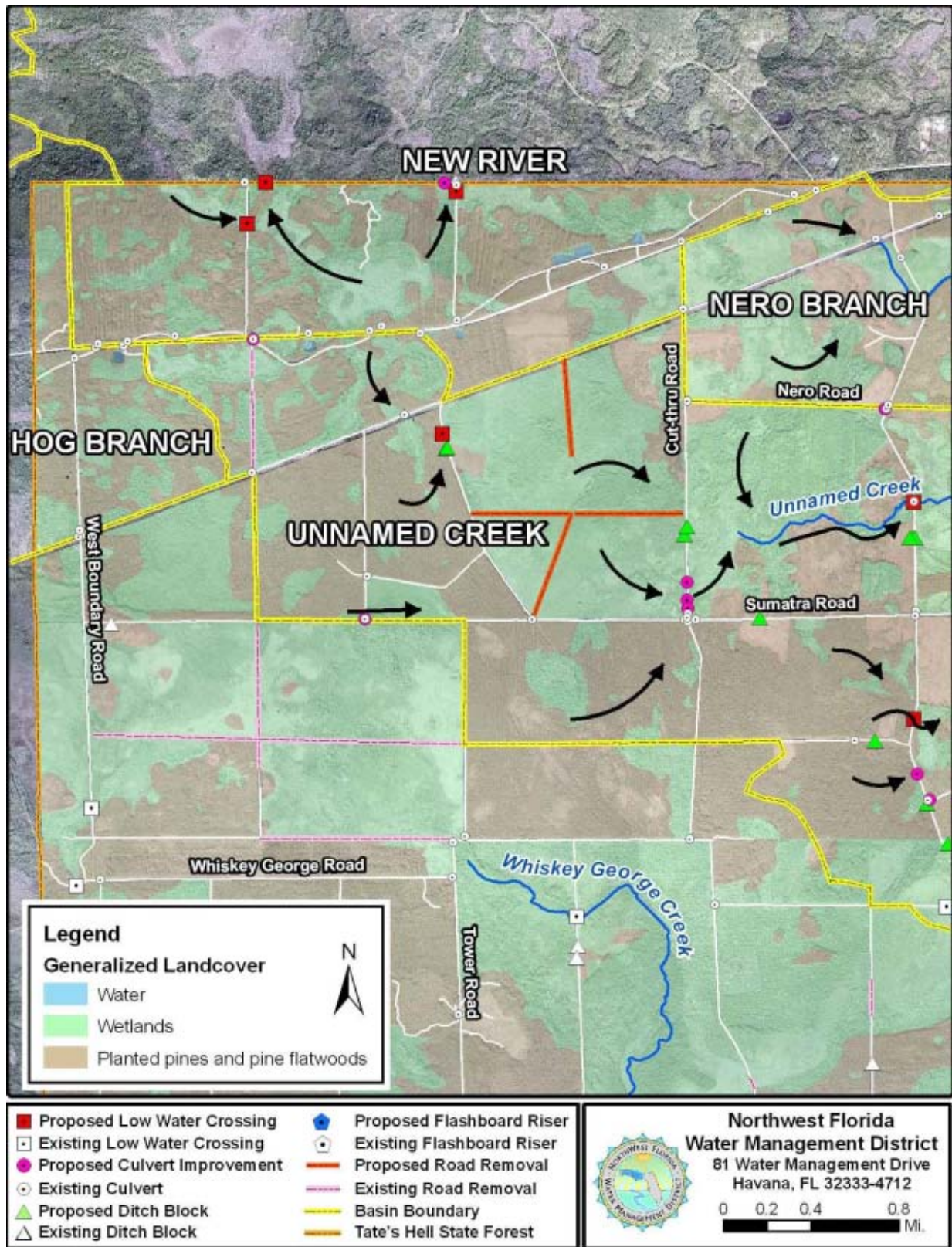


Figure 62. Proposed hydrologic restoration activities, current landcover, and post-restoration drainage patterns in the western portions of the Nero Branch and Unnamed Creek basins.

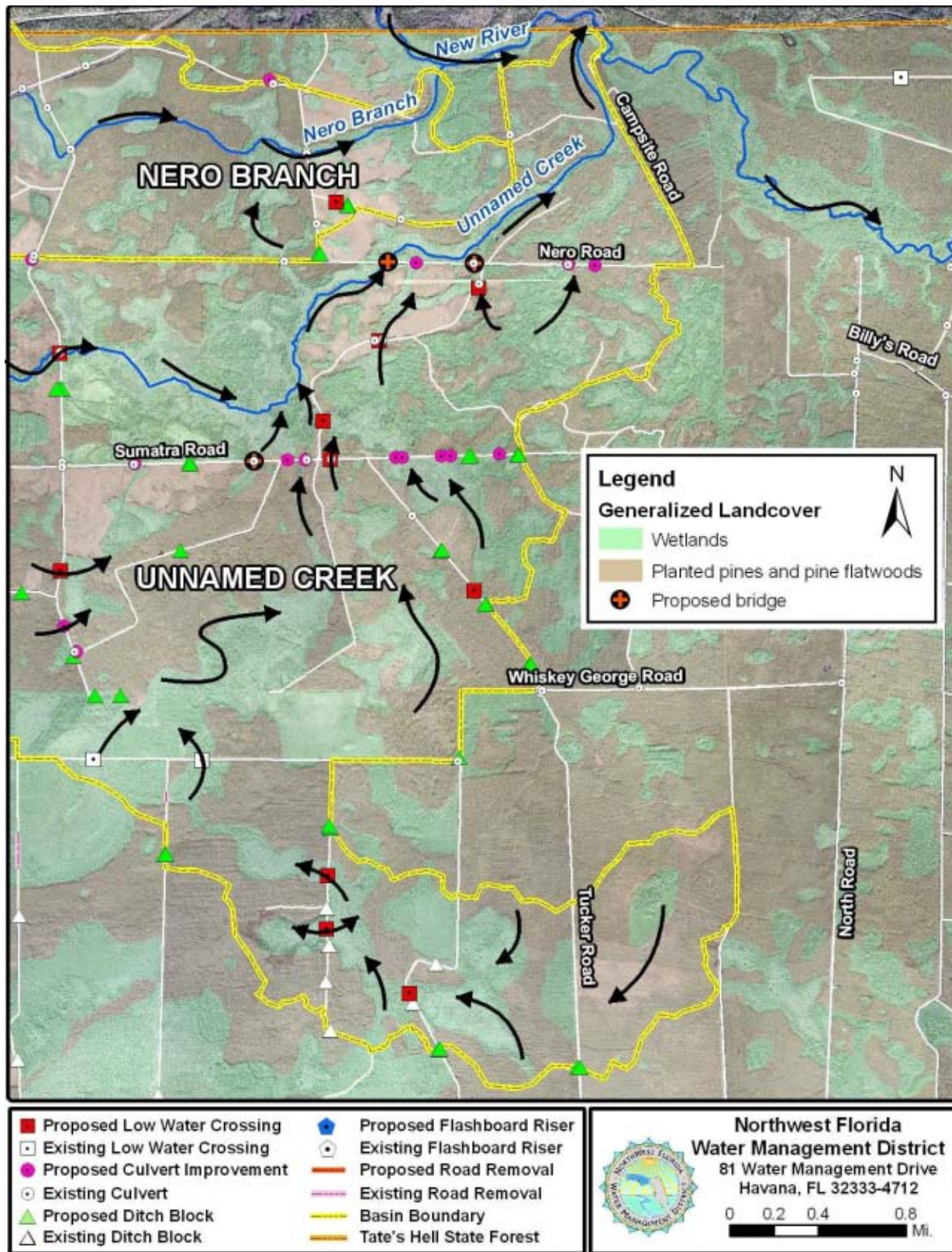


Figure 63. Proposed hydrologic restoration activities, current landcover, and post-restoration drainage patterns in the eastern portions of the Nero Branch and Unnamed Creek basins.

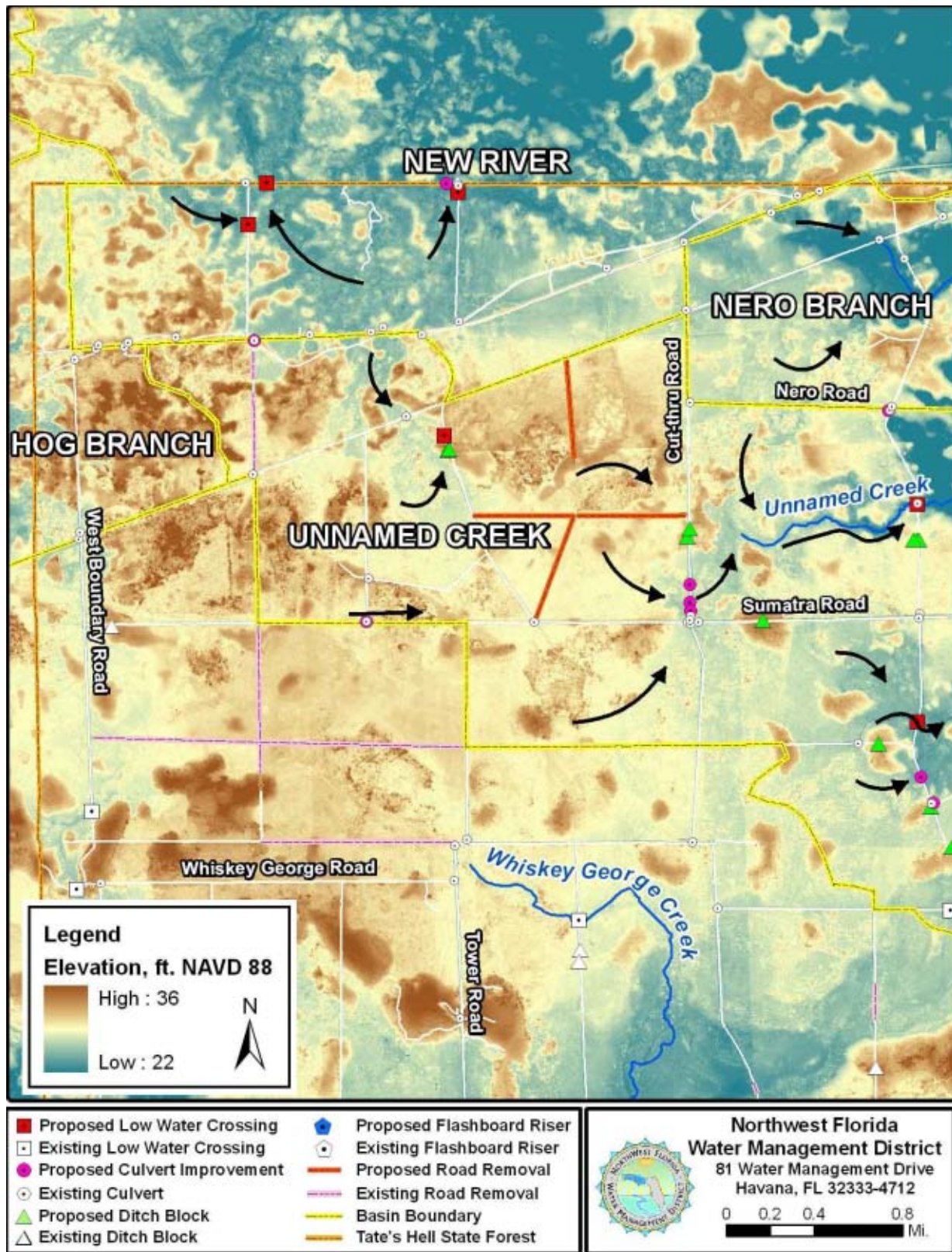


Figure 64. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the western portion of the Nero Branch and Unnamed Creek basins.

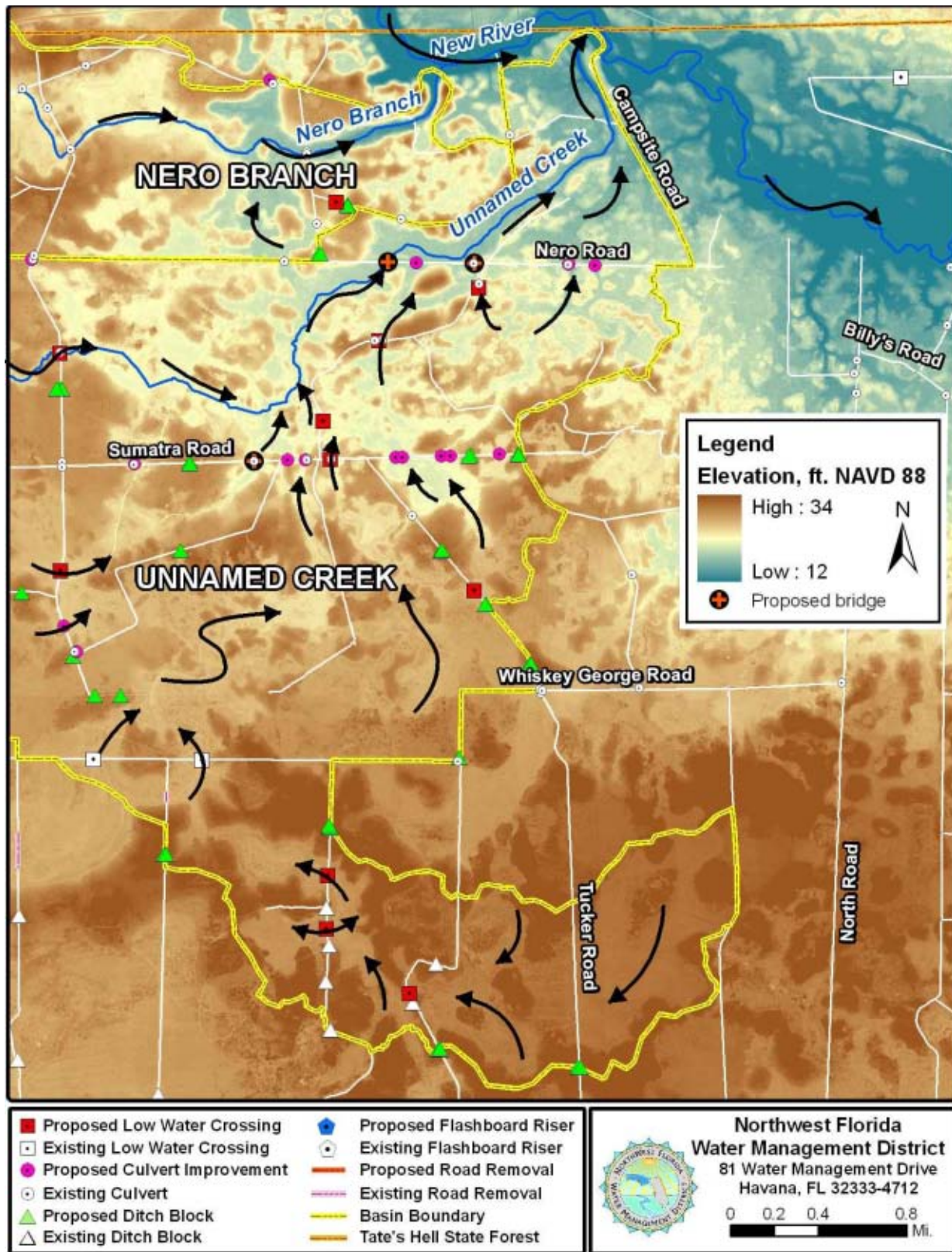


Figure 65. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the eastern portion of the Unnamed Creek, Hog Branch, Nero Branch, and Unnamed Stream basins.

New River Basin

Restoration Priority: Medium

Basin Area: More than 110,000 acres (including the Juniper Creek, Gator Creek and Gully Branch subbasins)

Description: The New River basin encompasses more than 170 square miles and is the largest watershed in the Tate's Hell State Forest. The New River flows south and merges with the Crooked River to form the Carrabelle River. The Carrabelle River flows into St. George Sound. Tributaries to the New River include Juniper Creek, Nero Branch, Unnamed Creek, Gator Creek, Gully Branch, and Trout Creek. Historical ecological communities in the watershed include mesic and wet flatwoods, basin swamps, wet savannas, and scattered cypress wetlands. Much of native habitat has been converted to pine plantation. Approximately 37,350 acres in the northern part of the basin were previously owned by Profundus Holdings Inc. and were acquired by the State of Florida in 2003.

2010 – 2020 Hydrologic Restoration Plan: Due to the large size of this watershed, separate maps and restoration plans are presented for the northwest, northeast, central, and southern portions of the New River watershed. The northeast portion of the watershed includes the Juniper Creek, Gator Creek, and Gully Branch subbasins.

Northwest New River Basin

In the northwest portion of the watershed, six low water crossings, several culverts, and associated ditch blocks are proposed to restore surface water flow through a former cypress slough located north of the river in the vicinity of County Line Road (Figures 66 through 68). South of the river, a series of low water crossings and ditch blocks are proposed along Billy's Road and Road 120. Road 120 is at or below the natural grade and portions of the road are overtopped with water during large storm events.

A short segment of road is proposed for removal south of Billy's Road to enable surface water runoff to flow to the north. Although the historical vegetation along this road segment was delineated by FNAI (2000) as mesic flatwoods, this is currently a very wet area. Several flashboard risers are proposed to decrease flow in the large ditches that convey water to the north along North Road.

To the west of Tucker Road, a low water crossing is proposed to reestablish historical surface water drainage patterns and rehydrate a former wetland that was converted to pine plantation. East of the intersection of Whiskey George Road and North Road, four additional low water crossings, a culvert, and several ditch blocks are proposed to restore historical surface water flow patterns among wetlands. Finally, there is a series of flashboard risers and culverts proposed along Jet

Engine Road (Figures 67 and 68) to reduce north-south ditch flow and enable surface water runoff to flow towards the east.

Northeast New River Basin

The northeast portion of the New River watershed includes the Juniper Creek, Gator Creek, and Gully Branch subbasins as well as areas that discharge surface water runoff directly to the New River (Figures 69, 70, and 71). In the Juniper Creek subbasin, three low water crossings and associated ditch blocks are proposed to facilitate surface water runoff towards the creek. Near the eastern boundary of the Juniper Creek basin, an additional low water crossing is proposed to restore surface water flow in a wetland that has been bisected by the road.

Between the Juniper Creek and Gator Creek basins is an area where surface water runoff flows directly to the New River (Figures 69, 70, and 71). To enhance surface water drainage among wetlands and restore historical surface water flow patterns towards the New River, two flashboard risers, three low water crossings, three new culverts, three culvert replacements (along River Road), and numerous ditch blocks are proposed in this area.

In the Gator Creek and Gully Branch subbasins, a large-scale hydrologic restoration project was implemented by the NFWMD in 2000. The project included the construction of two bridges, four low water crossings, one flashboard riser, 21 ditch blocks and the removal of approximately 0.5 miles of logging roads. Future restoration opportunities in the Gator Creek include the installation of two new low water crossings, a culvert, and several ditch blocks to restore hydrologic connections in the upper portion of the basin (Figures 69, 70, and 71). Several ditch blocks are proposed along County Line Road to redirect flow through the series existing culverts that convey Gator Creek flow to the south. A short segment of road (470 ft.) that bisects a forested wetland is also proposed for removal in this area.

Further south in the Gator Creek basin, two new ditch blocks are proposed to facilitate surface water flow through an existing low water crossing. In the central portion of the Gator Creek basin, two new low water crossings and associated ditch blocks are proposed to restore historical flow patterns through remnant wetland systems. Along Rock Landing Road, two large diameter culverts and a road removal are proposed to reconnect the northern and southern halves of a large forested wetland system. A low water crossing is also proposed to reconnect the eastern tip of this forested wetland, which is bisected by a road. To the west of this wetland, four new culverts and several ditch blocks are proposed.

In the Gully Branch basin (Figures 69 through 74), approximately 3.1 miles of logging roads are proposed for removal that bisect historical wet savannas or basin swamps. Some of these roads are no longer used or maintained by the Division of Forestry. To restore natural drainage patterns, the roadbeds should be recontoured to match natural grade and the adjacent ditches should be filled

where feasible. Two low water crossings and associated ditch blocks are proposed in the upper Gully Branch basin to restore surface water drainage towards the creek.

On the western side of the New River just north of Gully Branch Road and east of Jet Engine Road (Figures 69, 70, and 71), three culvert improvements, two low water crossings, and two flashboard risers are also proposed to increase surface water conveyance along the southernmost section of Billy's Road.

Central New River Basin

On the western side of the New River south of Gully Bridge Road, the historical ecological communities were comprised primarily of wet savanna – pine flatwood mosaics, with large areas of mesic flatwoods and wet savannas. Closer to the New River, there were also scattered basin swamps (Figures 72, 73, and 74). Proposed hydrologic improvements include the construction of six low water crossings and associated ditch blocks to restore historical surface water drainage patterns towards basin swamps. As mentioned previously, several flashboard risers are proposed along Jet Engine Road to decrease north-south flows in the large roadside ditches. Several new culverts are also proposed to facilitate surface water runoff to flow towards the east. Between Gully Branch Road and West Double Bridge Road, 1.4 miles of logging roads that bisect existing wetland systems are proposed to be removed and restored to natural grade. Although some of these segments are shown as being located in historical mesic flatwoods (Figure 72), a review of site conditions and topography indicates that wetlands are present in these areas (Figure 73).

On the east side of the New River to the east of Burnt Bridge Road, there is a 3,500-acre basin swamp referred to as Pickett Bay (Figure 72). A portion of the swamp drains towards the New River while the remainder drains towards the southeast. To restore historical surface water drainage patterns in the area draining towards the New River, nine new culverts are proposed along Burnt Bridge Road, River Road, and East Double Bridge Road. A low water crossing and a t-shaped road removal are proposed southwest of East Double Bridge Road to restore surface water flow through historical basin swamps and towards the river (Figures 72 through 74).

Southern New River Basin (including part of the Carrabelle River basin)

This area includes the southernmost reach of the New River and a small portion of the Carrabelle River Basin (Figures 75 through 77). Between Jet Engine Road and Burnt Bridge Road on the west of the New River, a low water crossing, three culverts, and several ditch blocks are proposed to restore easterly surface water flow towards the river. North of the river in the vicinity of Warren Bluff Road, six low water crossings and associated ditch blocks are proposed to facilitate southerly flow. A flashboard riser is also proposed in this area. South of the river toward Buck Siding Road, an additional low water crossing is proposed to restore historical surface water drainage through a large basin swamp. There are no hydrologic improvements proposed in the Carrabelle River basin.

In total, hydrologic improvements in the New River basin include 60 low water crossings, 29 flashboard risers, 55 new or replacement culverts, 13 culvert removals, 189 ditch blocks, one bridge, and approximately 7 miles of road removals.

Estimated Construction Cost for Hydrologic Improvements: Approximately \$ 1,940,000

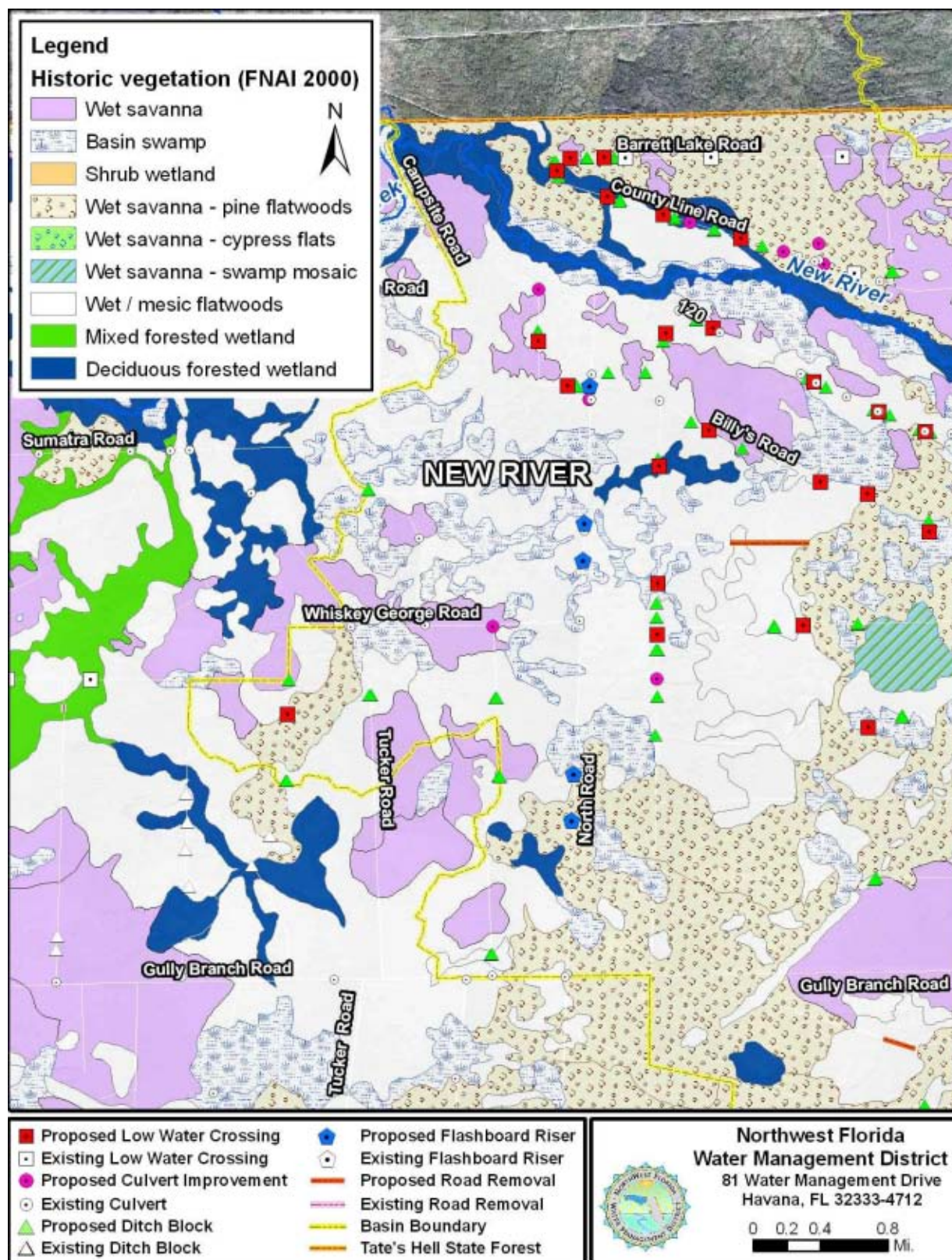


Figure 66. Historical ecological communities and proposed hydrologic improvements in the northwest portion of the New River basin

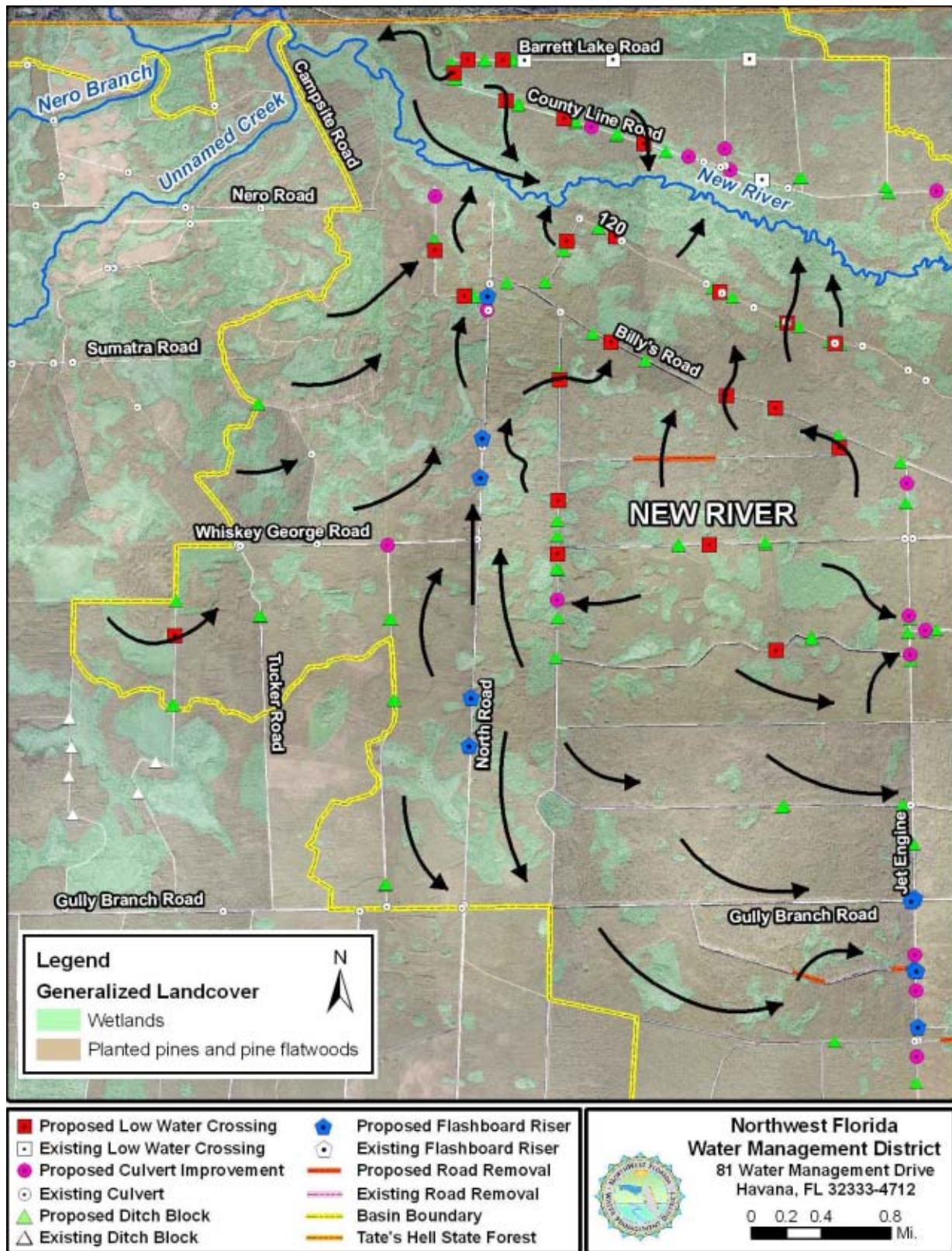


Figure 67. Proposed hydrologic improvements and post-restoration drainage patterns in the northwest portion of the New River basin

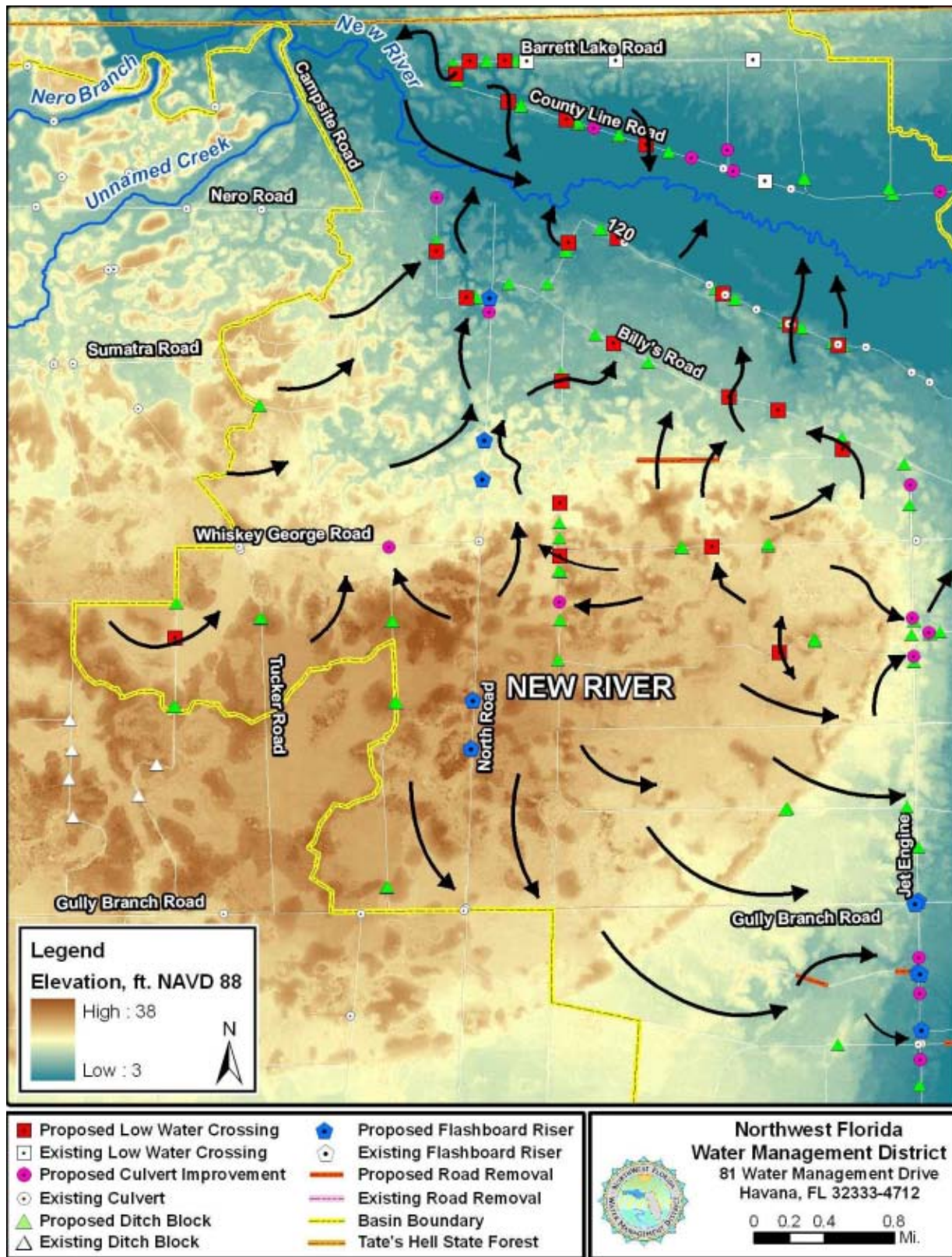


Figure 68. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northwest portion of the New River basin.

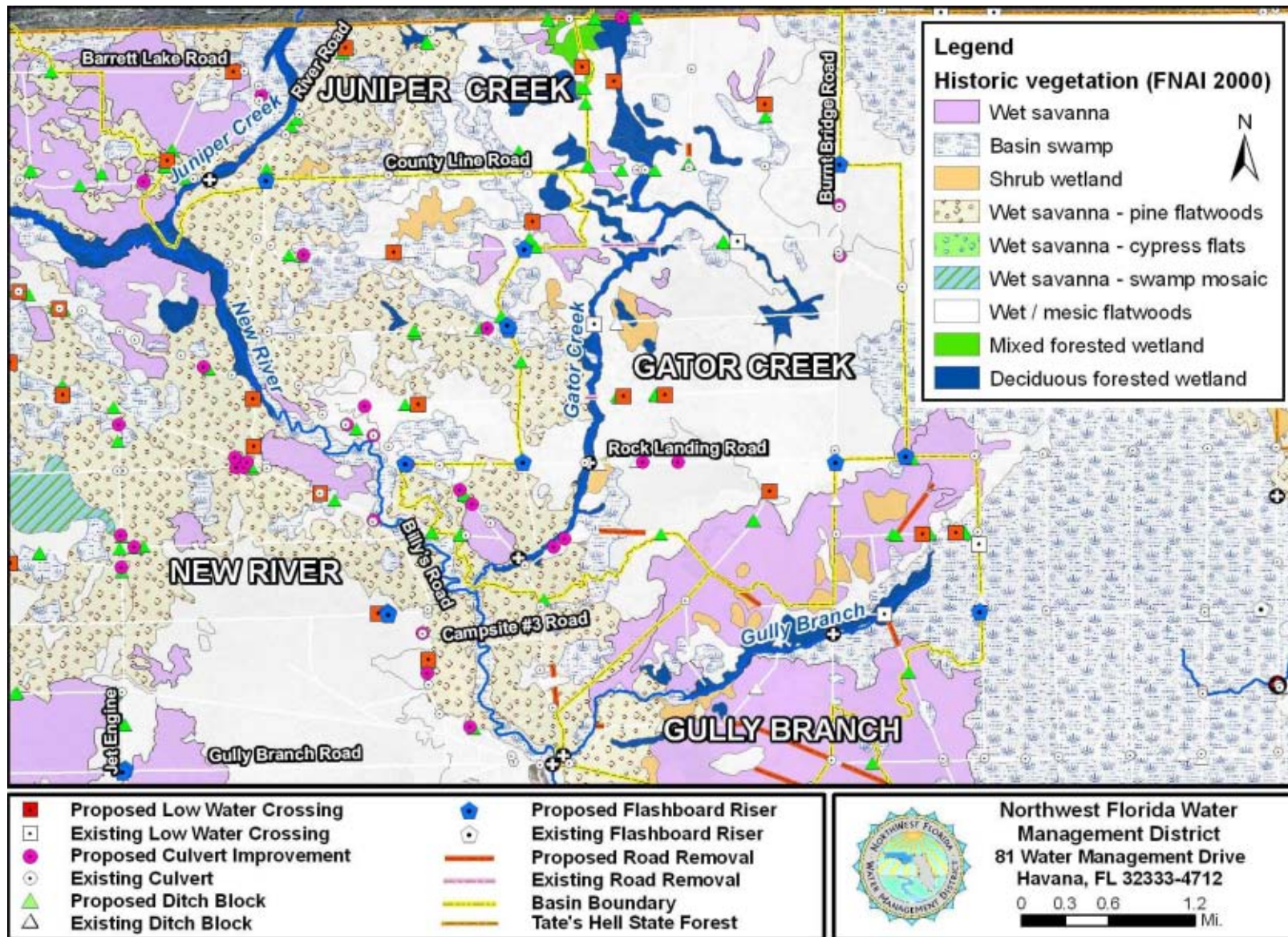


Figure 69. Historical ecological communities and proposed hydrologic improvements in the northeast portion of the New River basin

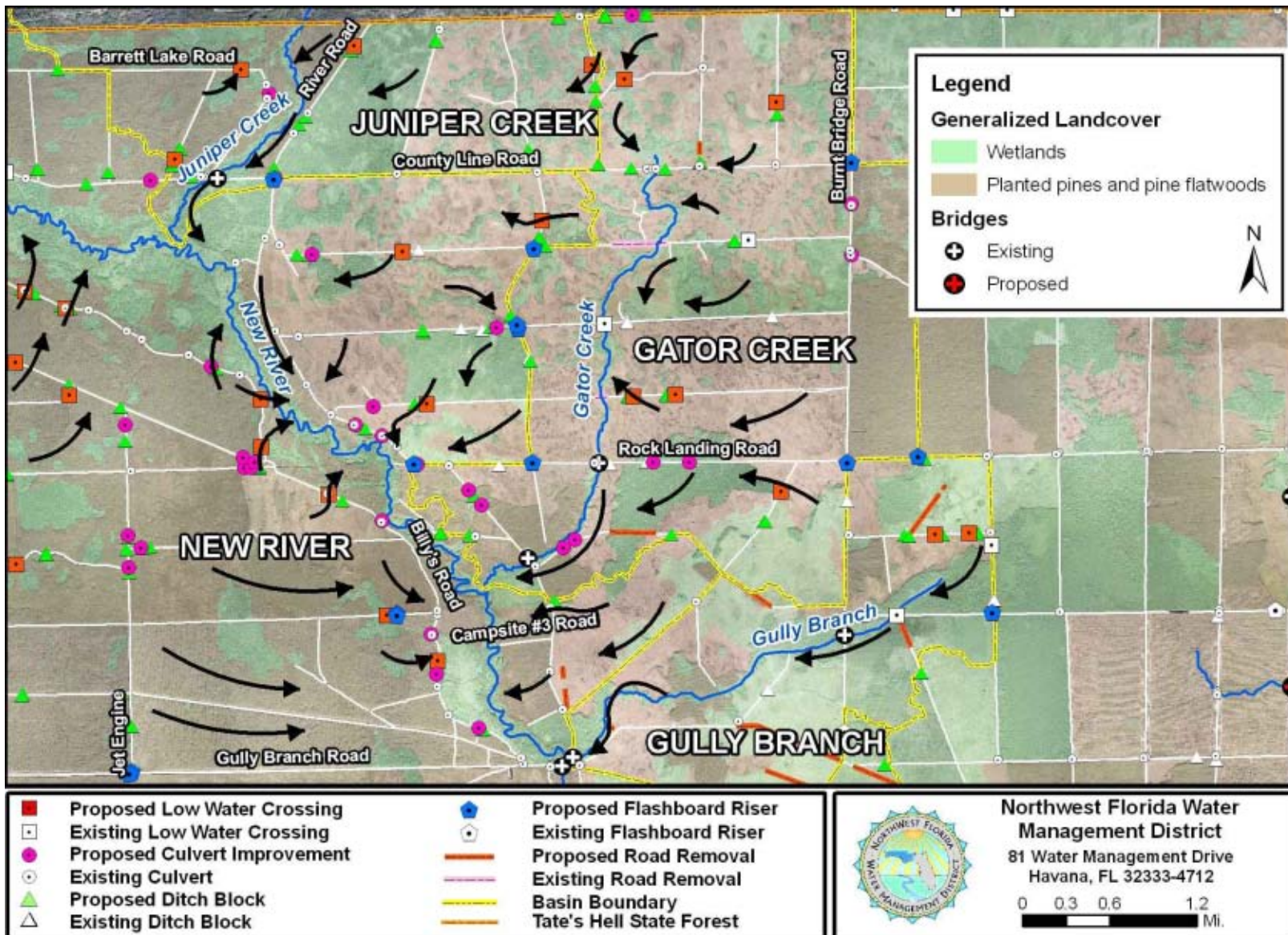


Figure 70. Proposed hydrologic improvements and post-restoration drainage patterns in the northeast portion of the New River basin

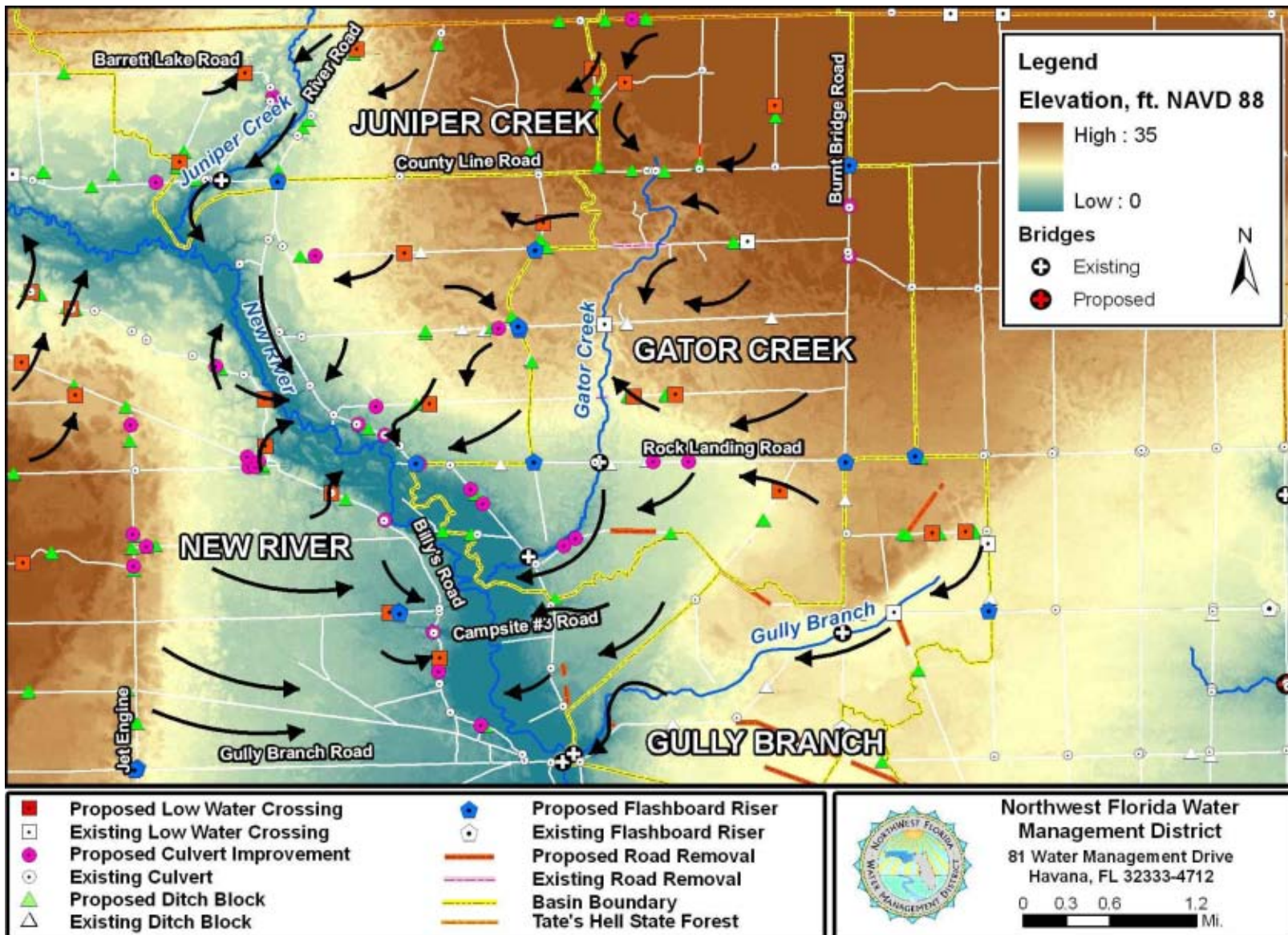


Figure 71. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northeast portion of the New River basin

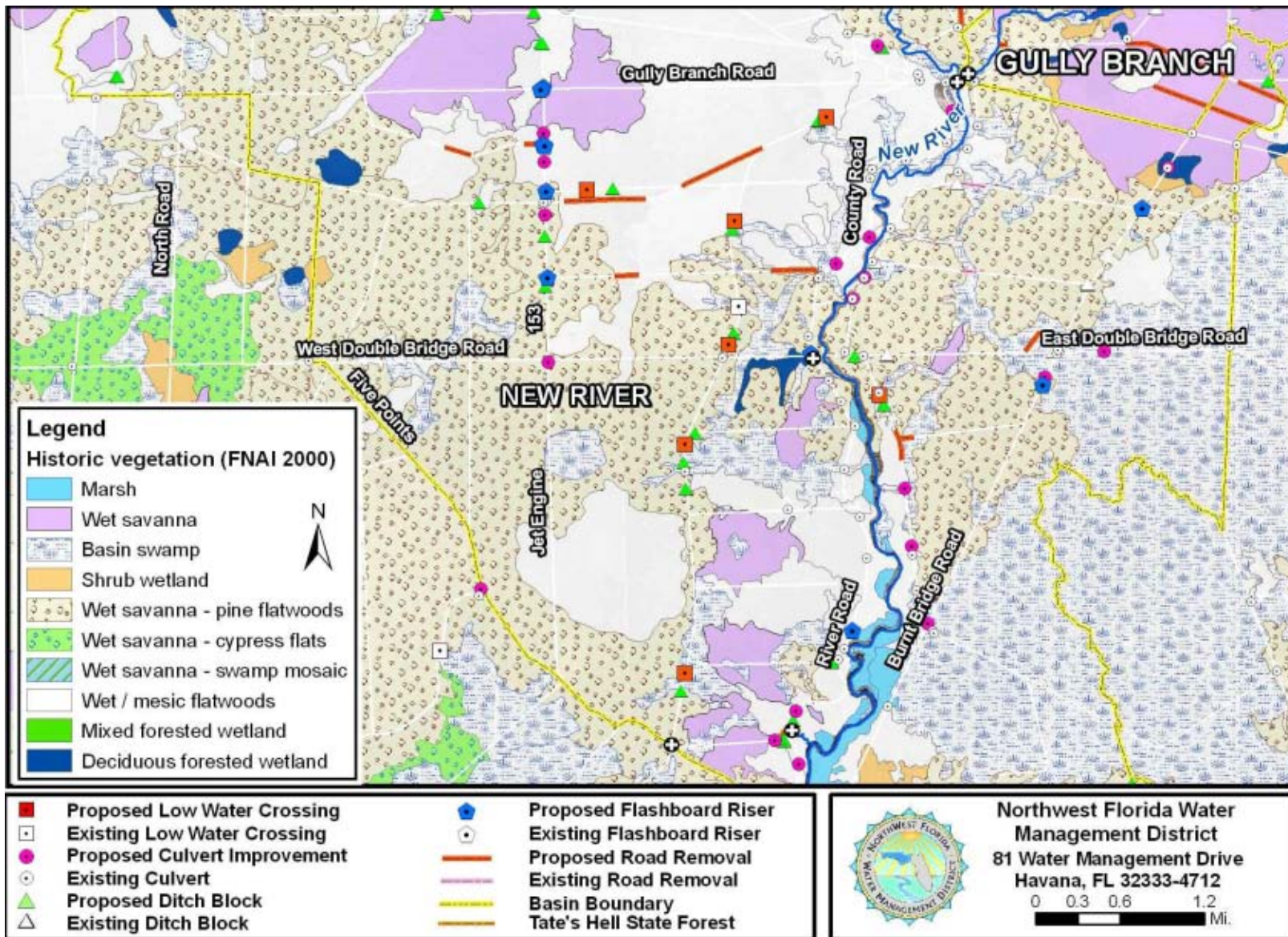


Figure 72. Historical ecological communities and proposed hydrologic improvements in the central portion of the New River basin

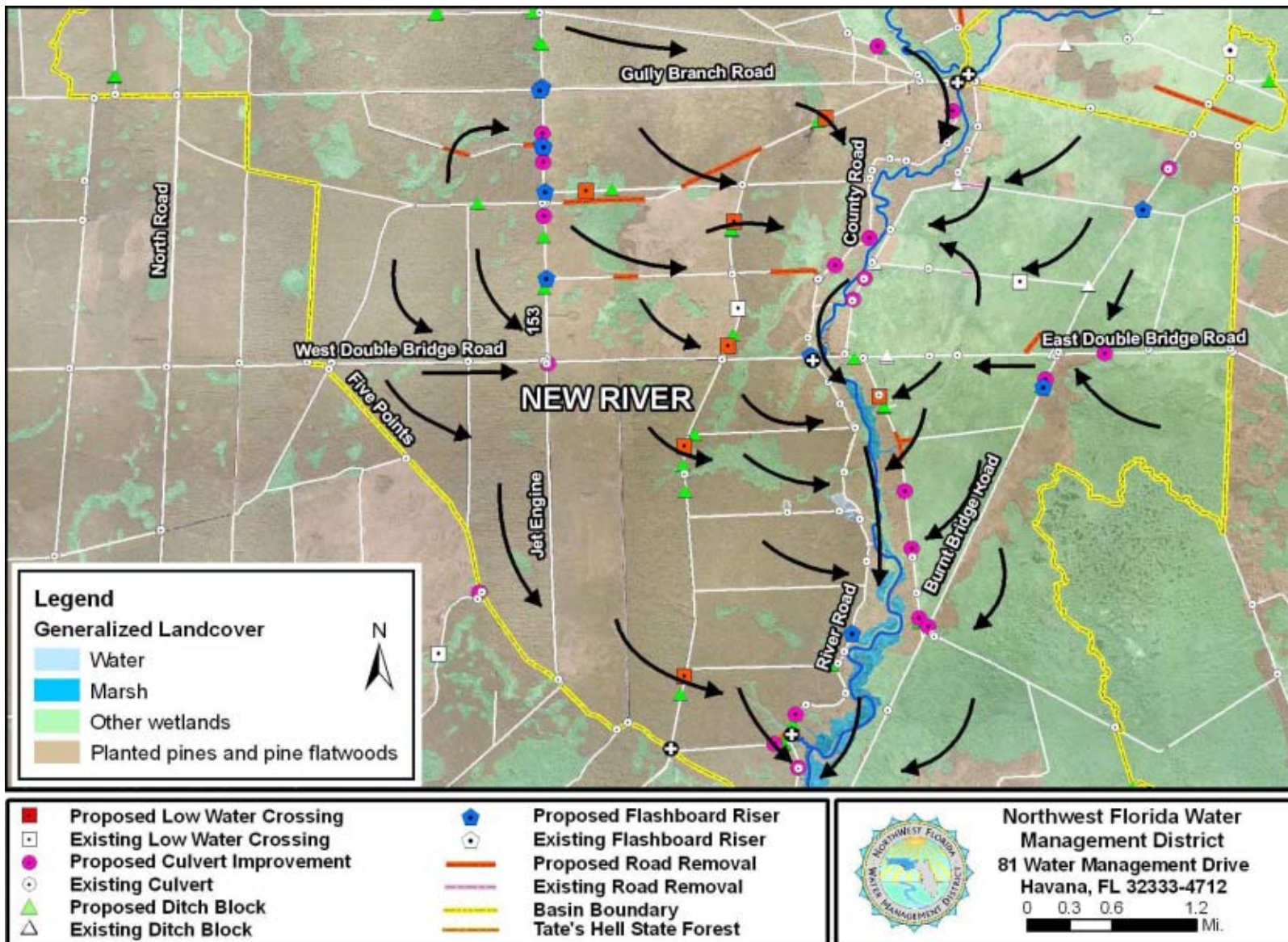


Figure 73. Proposed hydrologic improvements and post-restoration drainage patterns in the central portion of the New River basin

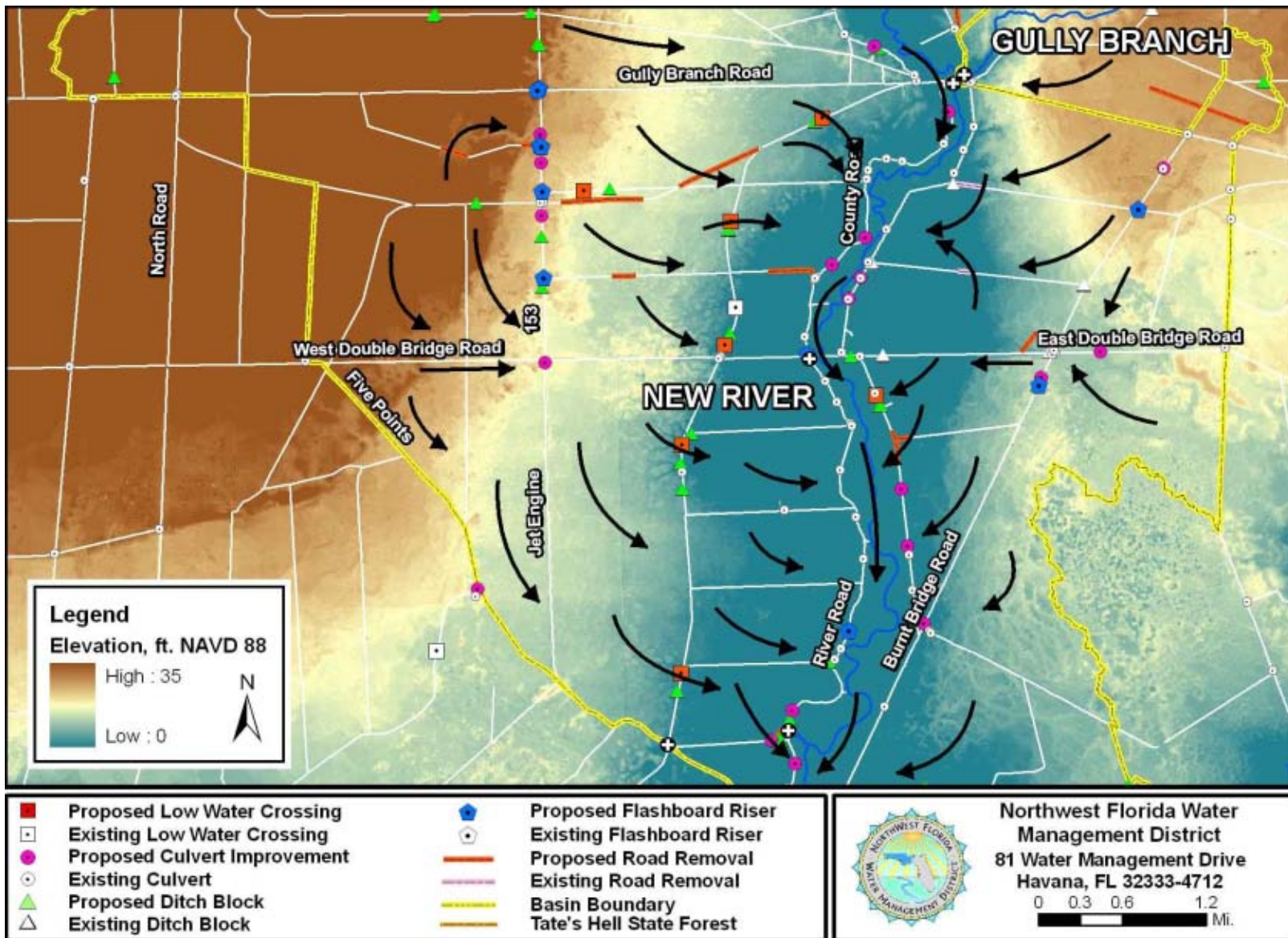


Figure 74. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the central portion of the New River basin

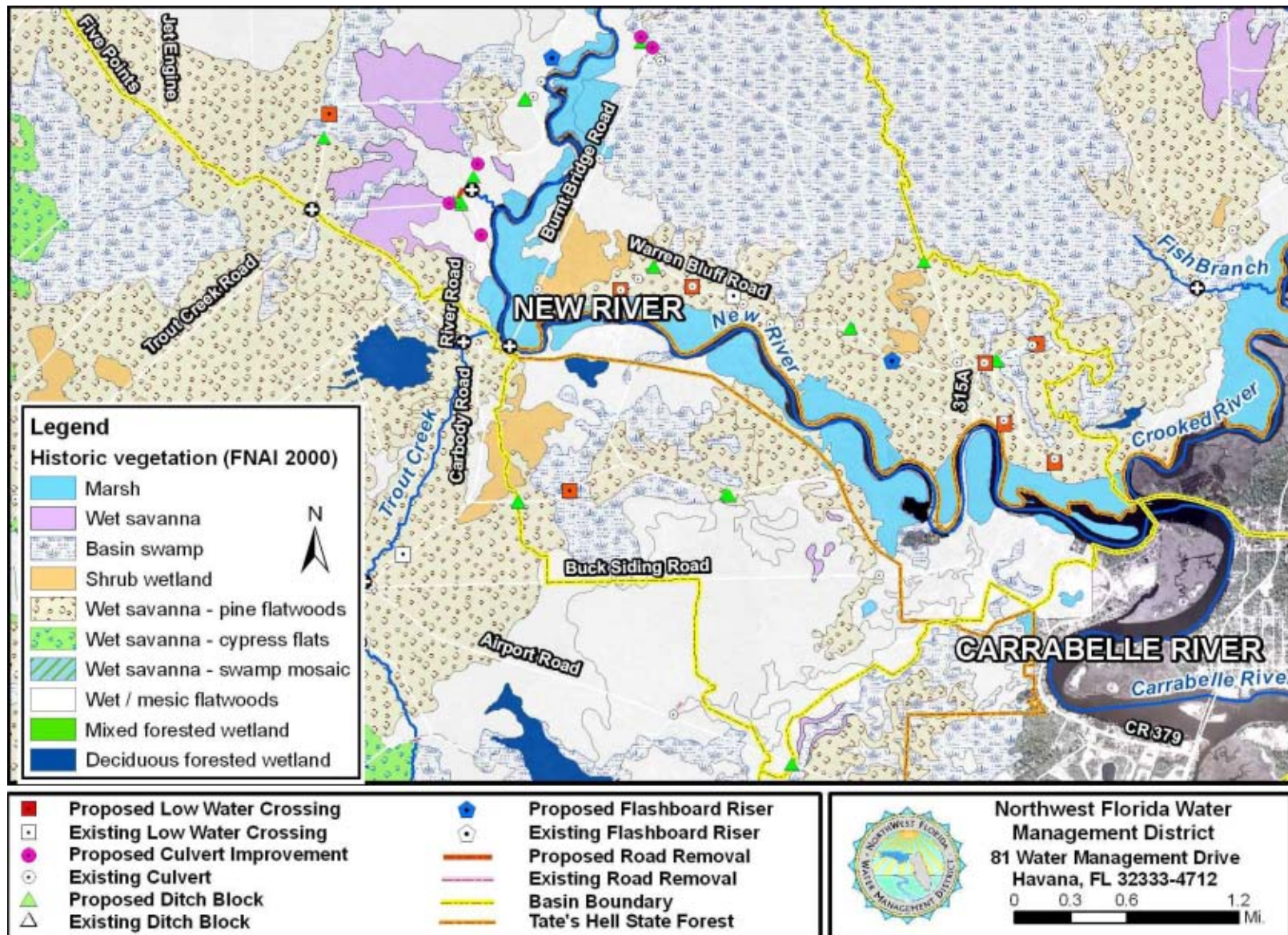


Figure 75. Historical ecological communities and proposed hydrologic improvements in the southern portion of the New River basin

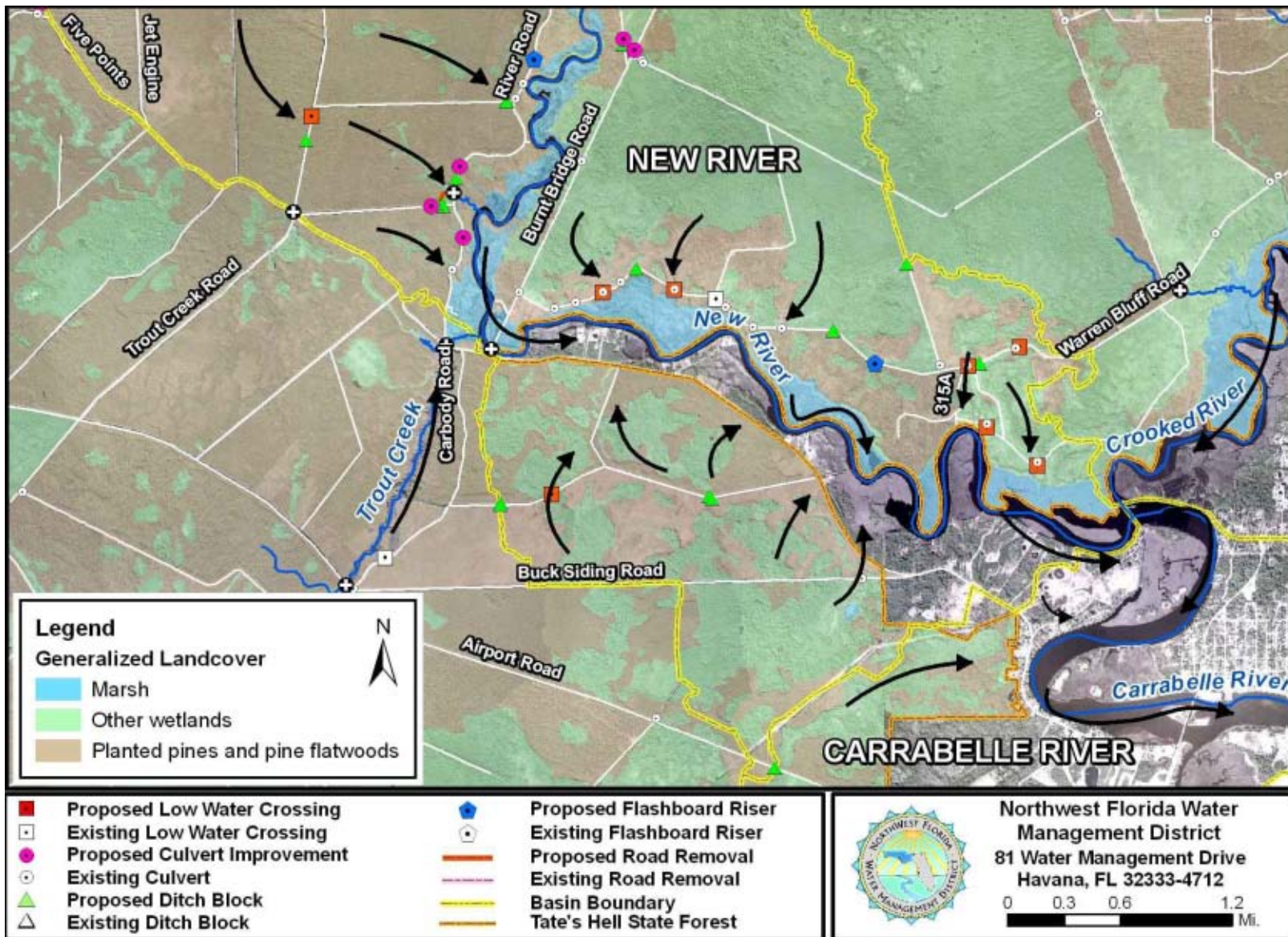


Figure 76. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the New River basin

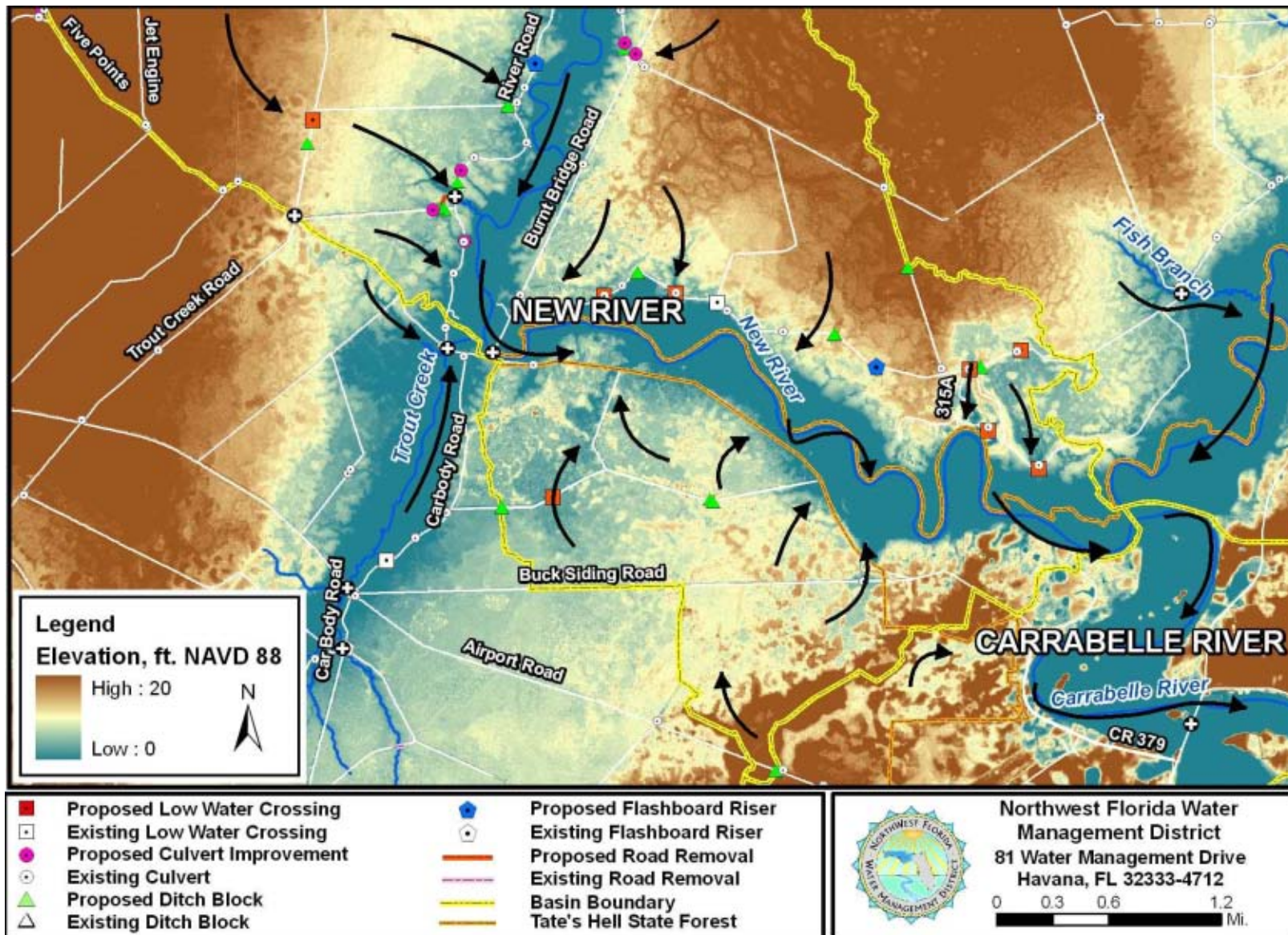


Figure 77. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the New River basin

Crooked River

Restoration Priority: Medium / Low

Basin Area: 40,200 acres

Description: The Crooked River basin is one of the largest watersheds in the Tate's Hell State Forest. The watershed is situated in the eastern half of the forest in a low-lying area between the Ochlockonee and New Rivers. Most of the time, part of the stream flow in the Crooked River is conveyed east towards the Ochlockonee River while the remaining flow is conveyed to the west. To the west, the Crooked River merges with the New River to form the Carrabelle River, which discharges to St. George Sound. Because the Crooked River is tidally influenced at both ends, the divide between easterly and westerly flow varies with time. The divide between easterly and westerly flow in the Crooked River is located in the area where the Crooked River crosses SR 67 or perhaps just slightly east of this location. However, when the Ochlockonee River is at flood stage, it releases streamflow to the Crooked River and the Crooked River flows west along its entire length.

Due to the large watershed area, separate sets of maps have been created for the eastern and western portions of the Crooked River basin. Note that the historical ecological communities were not delineated for all areas of the watershed within Tate's Hell State Forest. Aerial photography is shown as the background in the areas where the historical ecological communities were not mapped.

Eastern Crooked River basin

The eastern portion of the Crooked River includes the stream reach bordered by the confluence of Pine Log Creek on the west and the Ochlockonee River on the east (Figures 78, 79, 82, 83, 86, and 87). The direction of flow is generally towards the east except during periods when the Ochlockonee River is at flood stage. In addition to Pine Log Creek, other tributary streams include Brandy Creek and Tom Hahn Creek. Culverts have been installed along Jeff Sanders Road, Crooked River Road and McIntyre Road but there haven't been any other hydrologic improvements in this area.

Historical ecological communities were comprised of basin swamps, shrub wetlands, wet savanna – pine flatwoods mosaics, and mesic flatwoods (Figures 78 and 79). There are also some small wet savannas. Although some of the historical basin swamps have been converted to pine plantation, many basin swamps and shrub wetlands remain. Most of these wetlands are dominated by titi shrubs. Between the basin swamps, the soils are generally sandy. Although there are scattered stands of older slash pine plantation, many areas have been harvested or cleared and replanted in longleaf pine during the 1990s.

Western Crooked River basin

The western portion of the Crooked River basin includes the tributaries of Roberts Creek, Sunday Rollaway Creek, Cypress Slough, and Fish Branch (Figures 80, 81, 84, 85, 88, and 89). A large basin swamp (Pickett Bay) is the predominant feature in this area. Marshes exist along the lower sections of the Crooked River. Other historical plant communities included wet savannas, mesic flatwoods and wet savanna pine flatwood mosaics (Figures 80 and 81). Most historical pine flatwoods communities and wet savannas have been converted to planted pines. Except for culverts and several small low water crossings in the vicinity of Cypress Slough (Figure 85), no hydrologic improvements have been made in this area.

2010 – 2020 Hydrologic Restoration Plan: Proposed hydrologic restoration activities in the Crooked River watershed are aimed at restoring historical surface water flow patterns through wetlands, redirecting surface water runoff towards tributary streams and reducing flow in roadside ditches.

Eastern Crooked River basin

In the eastern portion of the basin north of the Crooked River, several culvert replacements are recommended on Jeff Sanders Road and additional new culverts are needed on Loop Road (Figures 82 and 86). South of the Crooked River, in the vicinity of Brandy Creek, three low water crossings and associated ditch blocks are recommended to reconnect wetlands and restore the natural drainage patterns towards the streams. Southwest of Brandy Creek, a short segment of road bisecting a wetland is proposed for removal. Northwest of McIntyre Road, three new low water crossings and two culverts are proposed to restore surface water drainage towards the Crooked River (Figures 82 and 86).

Further south in the eastern portion of the Crooked River basin (Figures 83 and 87), four new culverts and two culvert replacements are proposed. Ditch blocks are recommended to be installed in conjunction with some of culverts to direct flow into the adjacent wetlands. Without the ditch blocks, water would continue to flow in the ditches because the bottom of the ditch is lower than the natural wetland grade. Farther to the southwest, two box culverts (yellow octagons on figures) are proposed to convey surface water through large wetland sloughs and towards a small tributary of the Crooked River (Figures 83 and 87). Six low water crossings and associated ditch blocks are also proposed in this area to restore the historical surface water drainage patterns among these wetland systems.

Western Crooked River basin

In the western portion of the Crooked River basin north of Warren Bluff Road, numerous culverts are proposed to facilitate surface water runoff towards the Crooked River and Roberts Creek (Figures 84 and 88). There are approximately 2.5 miles of proposed road removals also shown on the figures. These roads are no longer maintained by the Division of Forestry but the remnant roadbeds and ditches inhibit southeasterly flow towards the Crooked River. Where

feasible, these remnant roadbeds should be lowered to match the natural wetland grade and the roadside ditches should be filled.

Sunday Rollaway Creek has been bisected by roads 319A and 320A (Figures 84 and 88). Two low water crossings and associated ditch blocks are proposed to reconnect the former stream channel on the west side of Warren Bluff Road. A new culvert is also proposed to reconnect an adjacent wetland. Two box culverts (yellow octagons on figures) are proposed to replace the existing culverts that convey the streamflow in Sunday Rollaway Creek across Warren Bluff Road and Road 319A. Box culverts will help to restore a more natural stream channel and increase the conveyance capacity to support the additional flows that may result from the proposed upstream hydrologic improvements. Ditch blocks are recommended in conjunction with the box culverts to prevent surface water from short-circuiting the stream channel and flowing into the Crooked River via the roadside drainage ditches. West of Sunday Rollaway Creek, a section of road removal and a low water crossing are recommended to restore the historical surface water drainage patterns from a former basin swamp towards Sunday Rollaway Creek.

South of Sunday Rollaway Creek, several new culverts, three low water crossings, and associated ditch blocks are proposed to restore natural drainage to Fish Branch (Figures 85 and 89). Lastly, a low water crossing is proposed south of Fish Creek to reconnect a wetland slough to the Crooked River. The LiDAR elevation data suggests that surface water may already be crossing the road at this location.

In all, hydrologic improvements proposed in the Crooked River basin include 27 low water crossings, four flashboard risers, 3.5 miles of road removals, 41 new and replacement culverts, 12 culvert removals, and 138 ditch blocks.

Estimated Construction Cost for Hydrologic Improvements: \$ 1,200,000

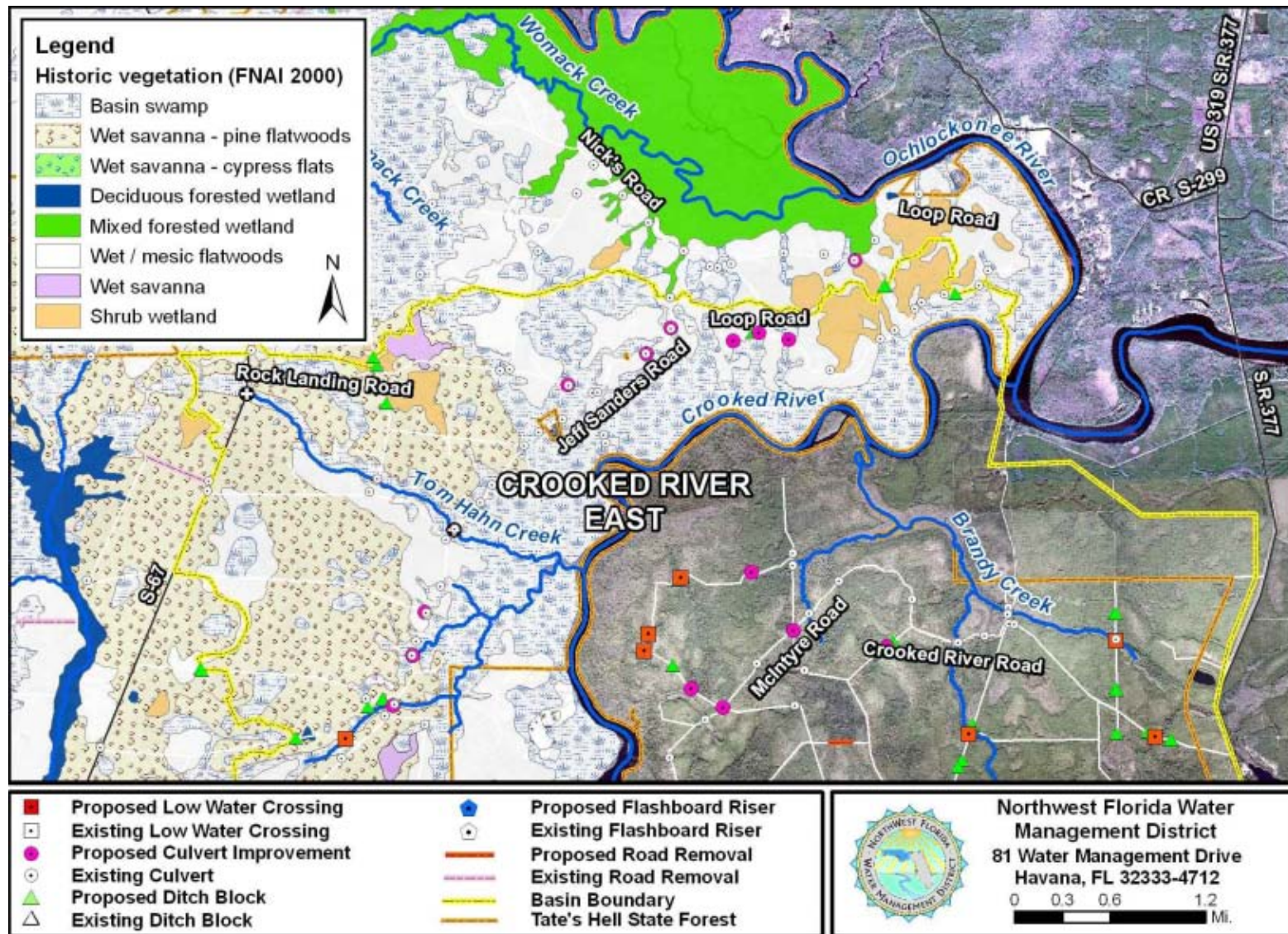


Figure 78. Historical ecological communities and proposed hydrologic improvements in the northern portion of the eastern Crooked River basin

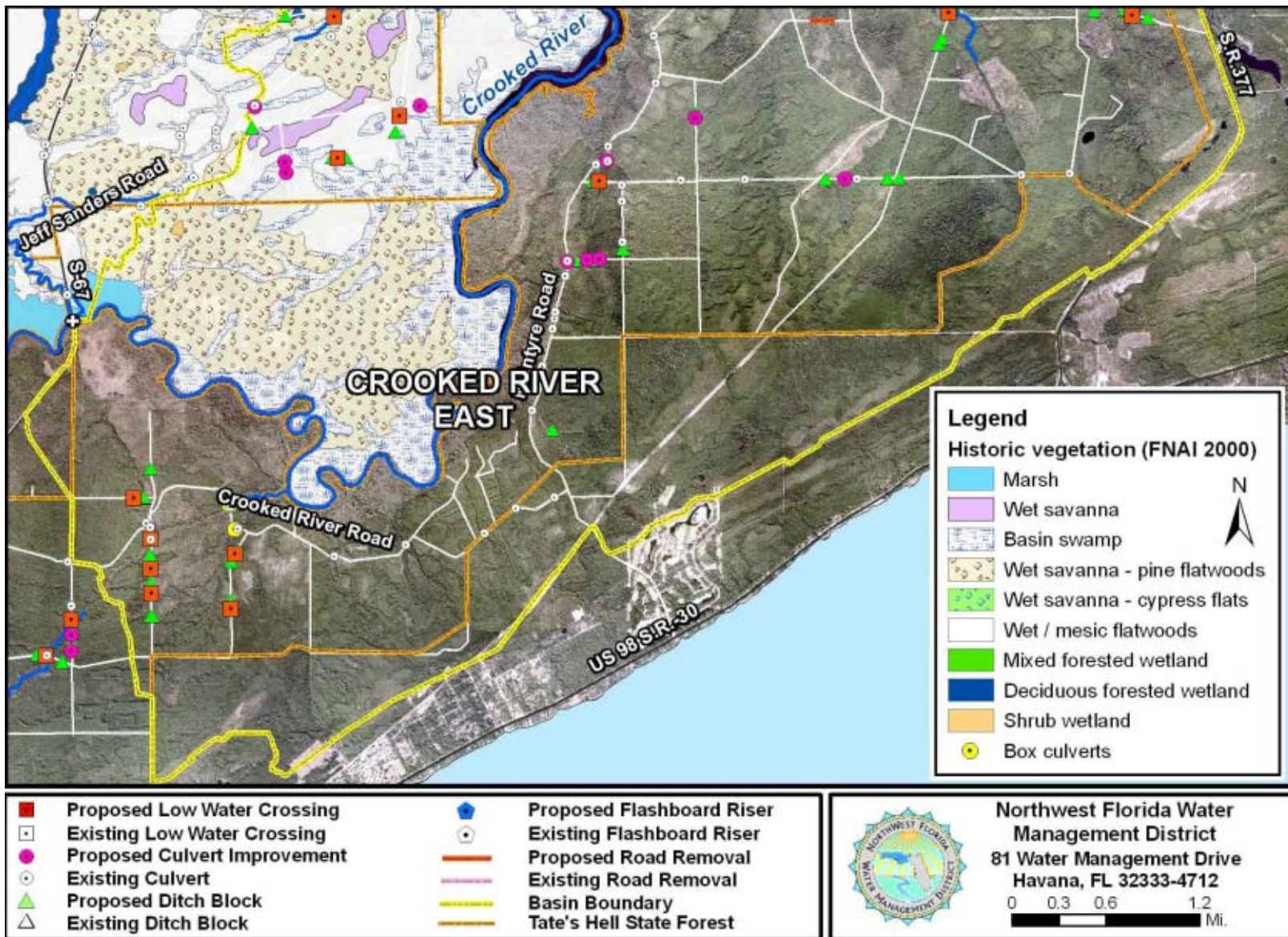


Figure 79. Historical ecological communities and proposed hydrologic improvements in the southern portion of the eastern Crooked River basin

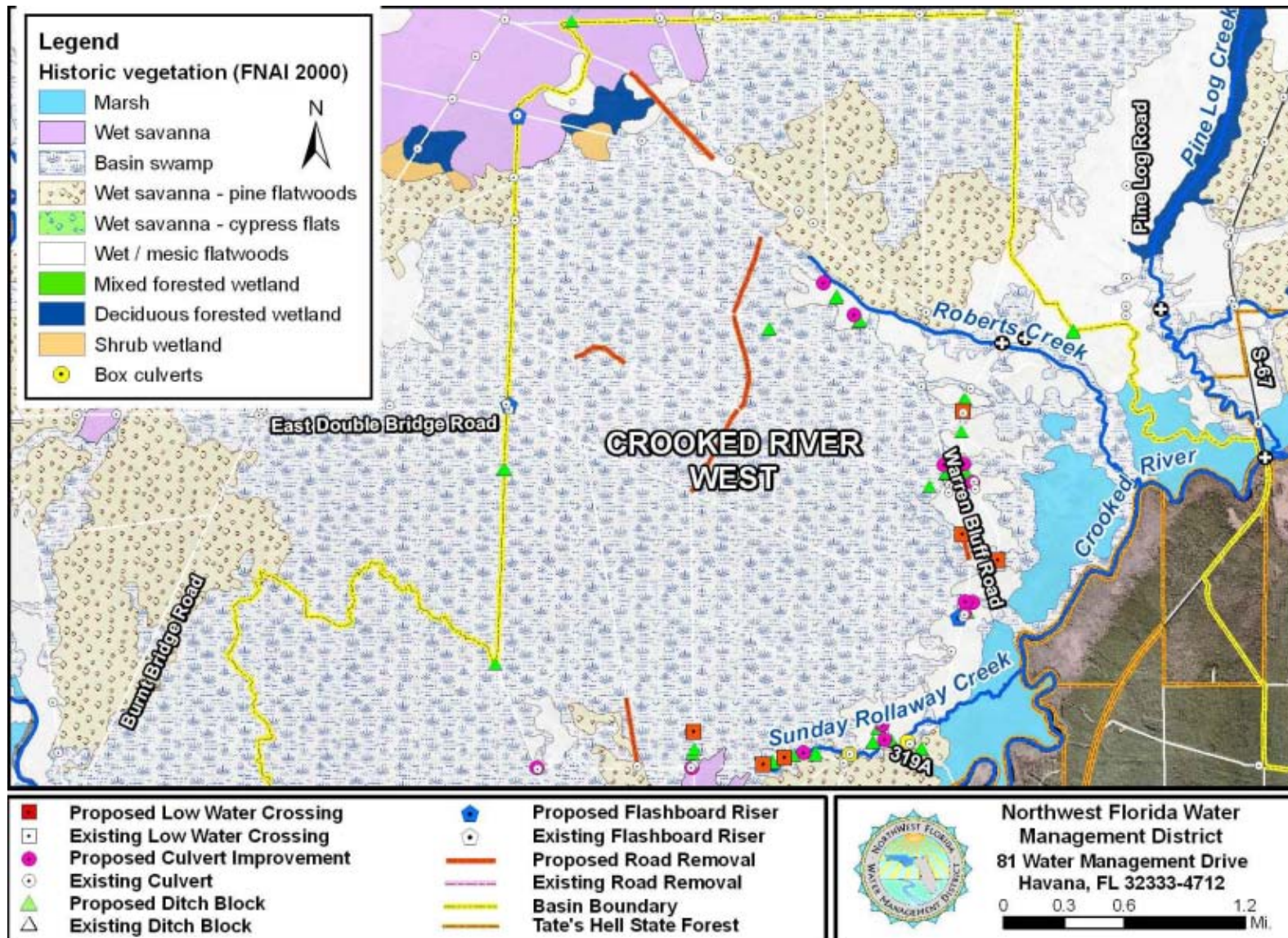


Figure 80. Historical ecological communities and proposed hydrologic improvements in the northern portion of the western Crooked River basin.

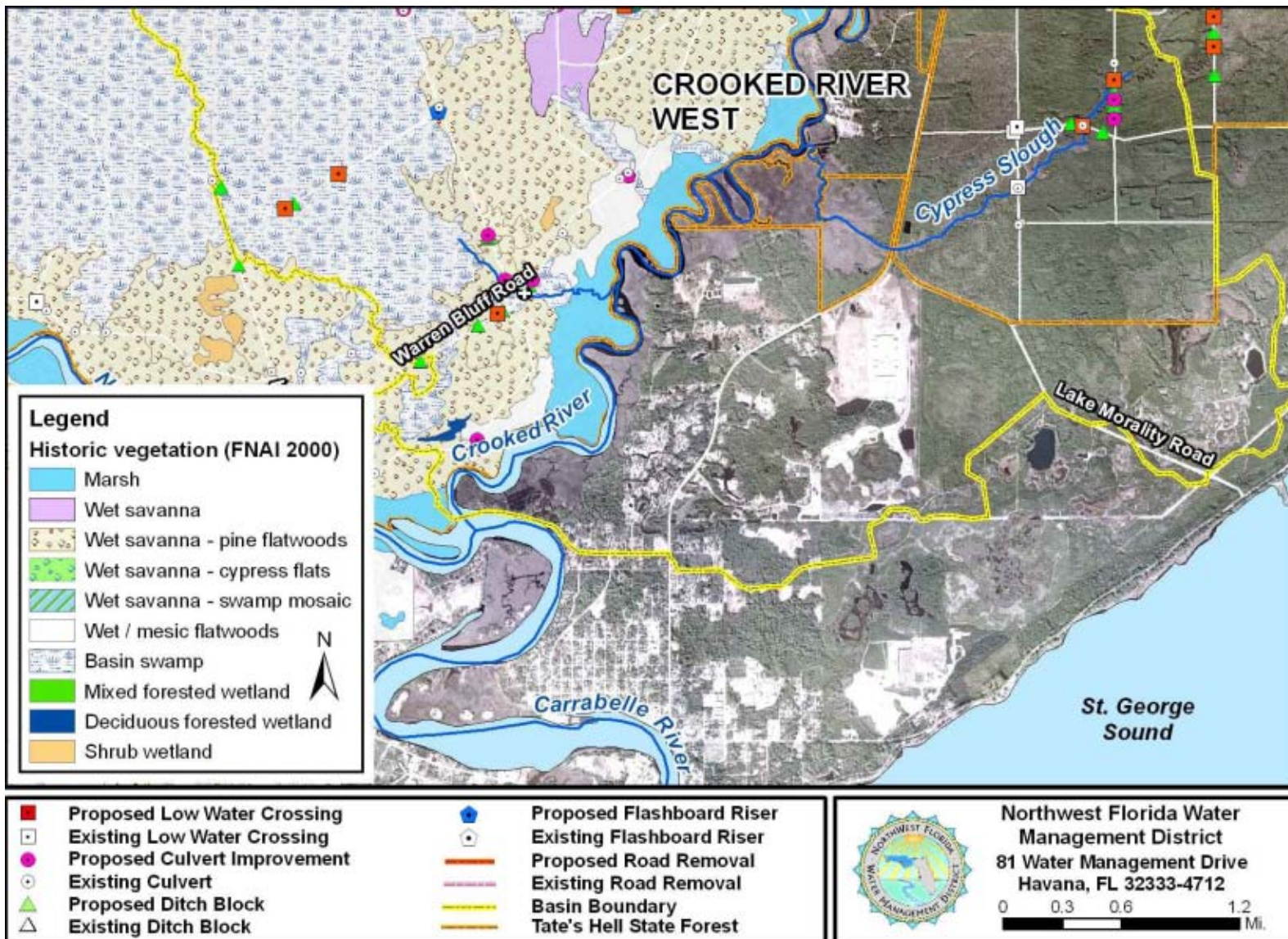


Figure 81. Historical ecological communities and proposed hydrologic improvements in the southern portion of the western Crooked River basin.

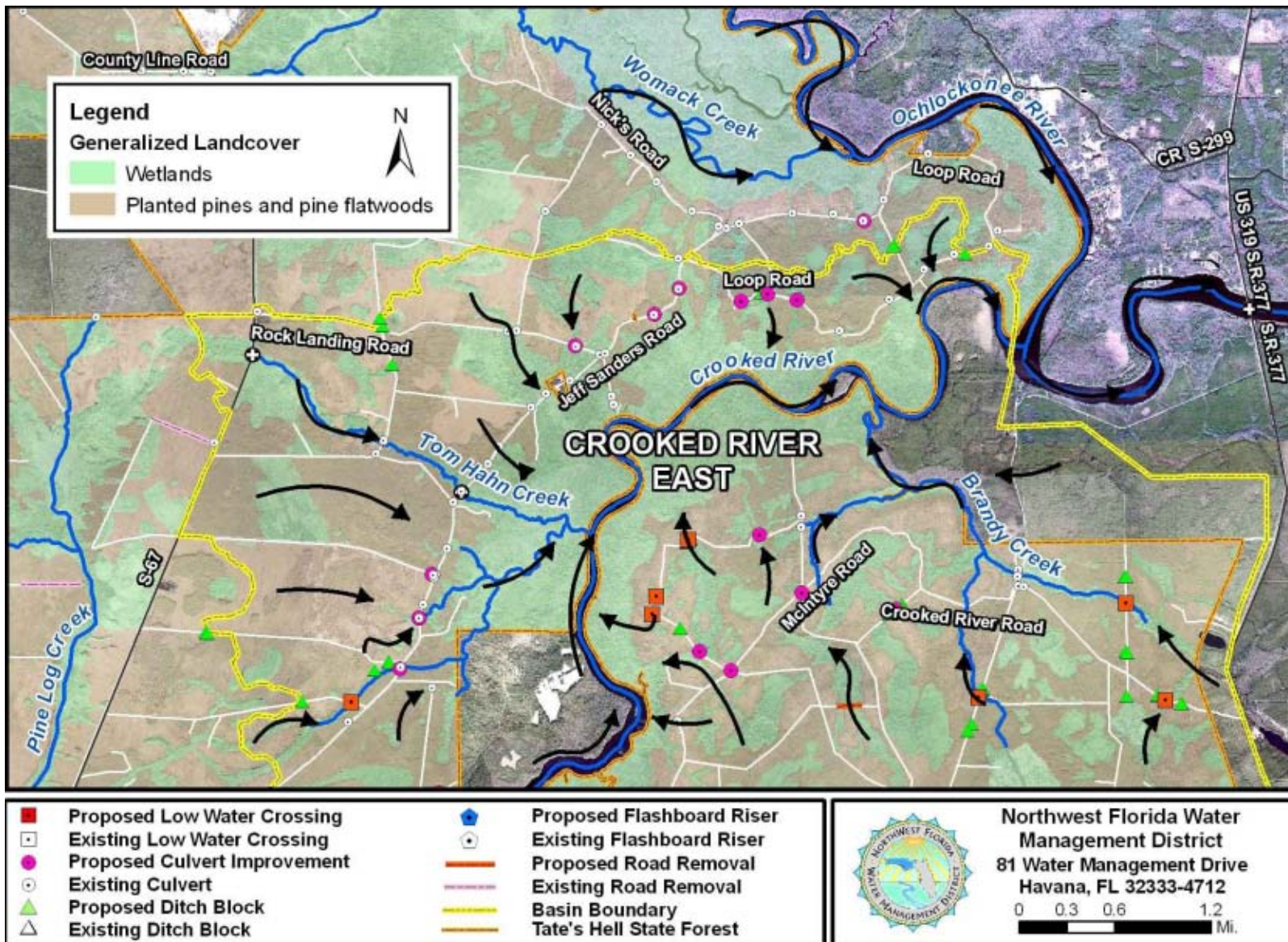


Figure 82. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the eastern Crooked River basin.

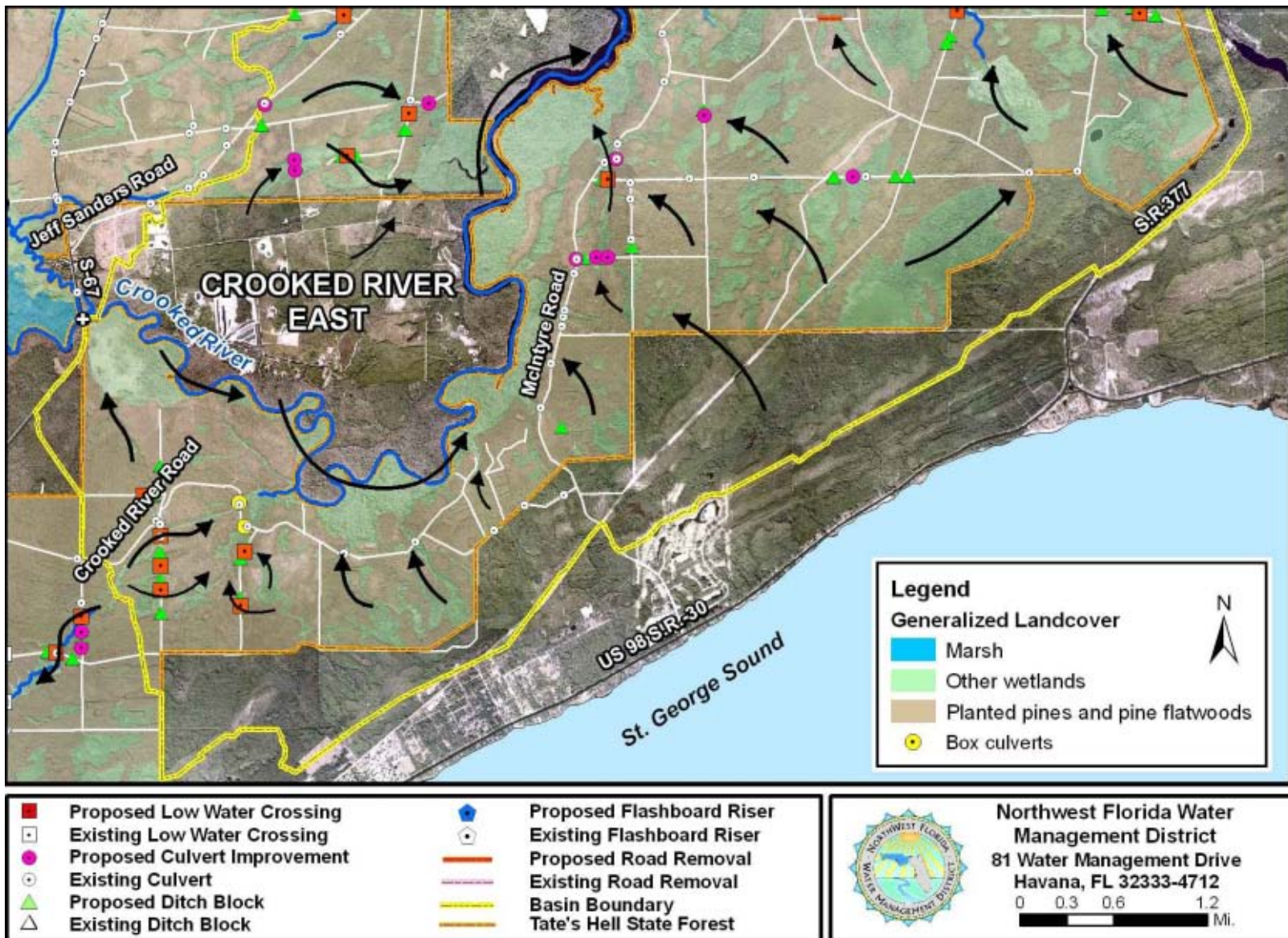


Figure 83. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the eastern Crooked River basin.

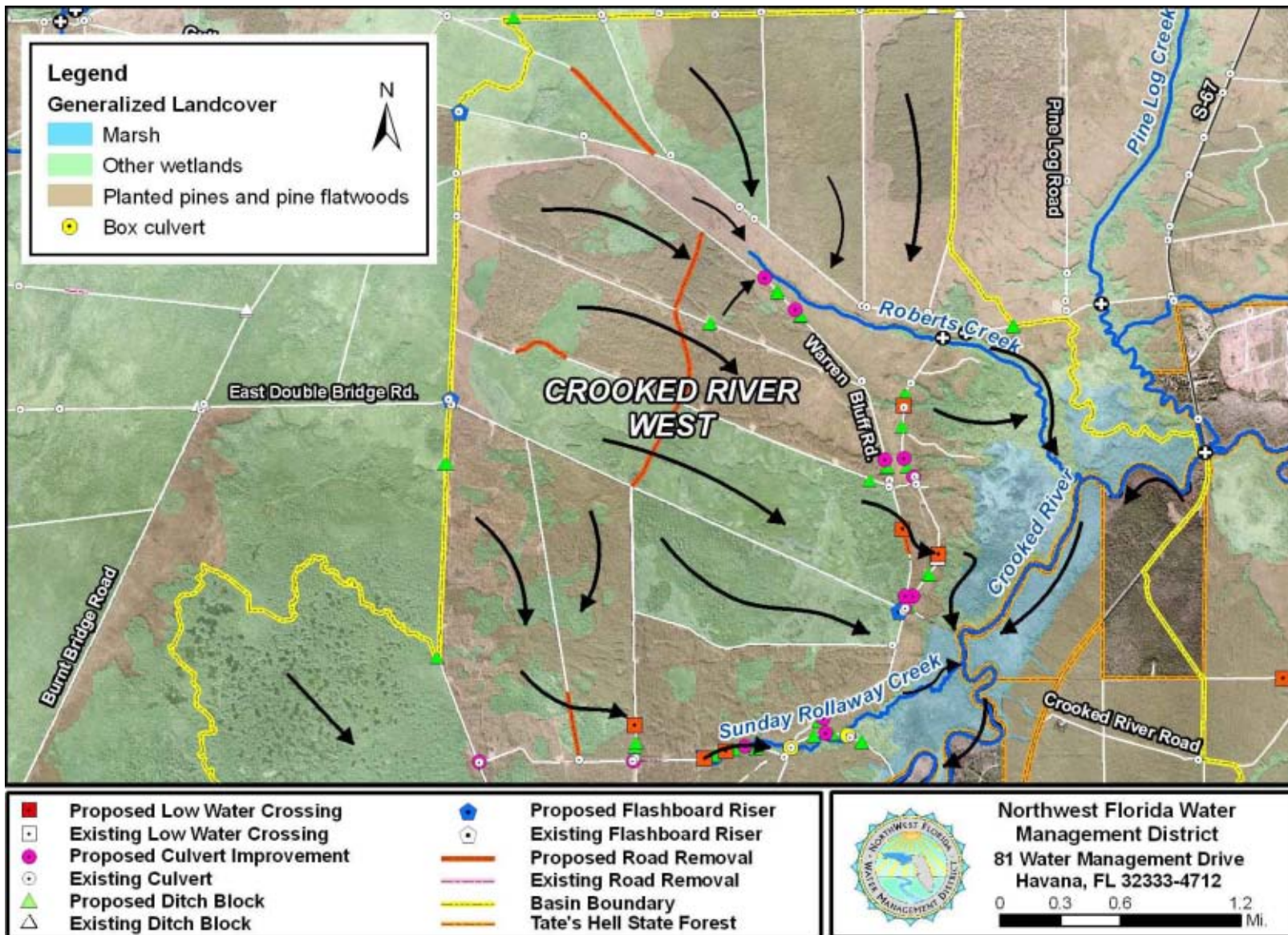


Figure 84. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the western Crooked River basin.

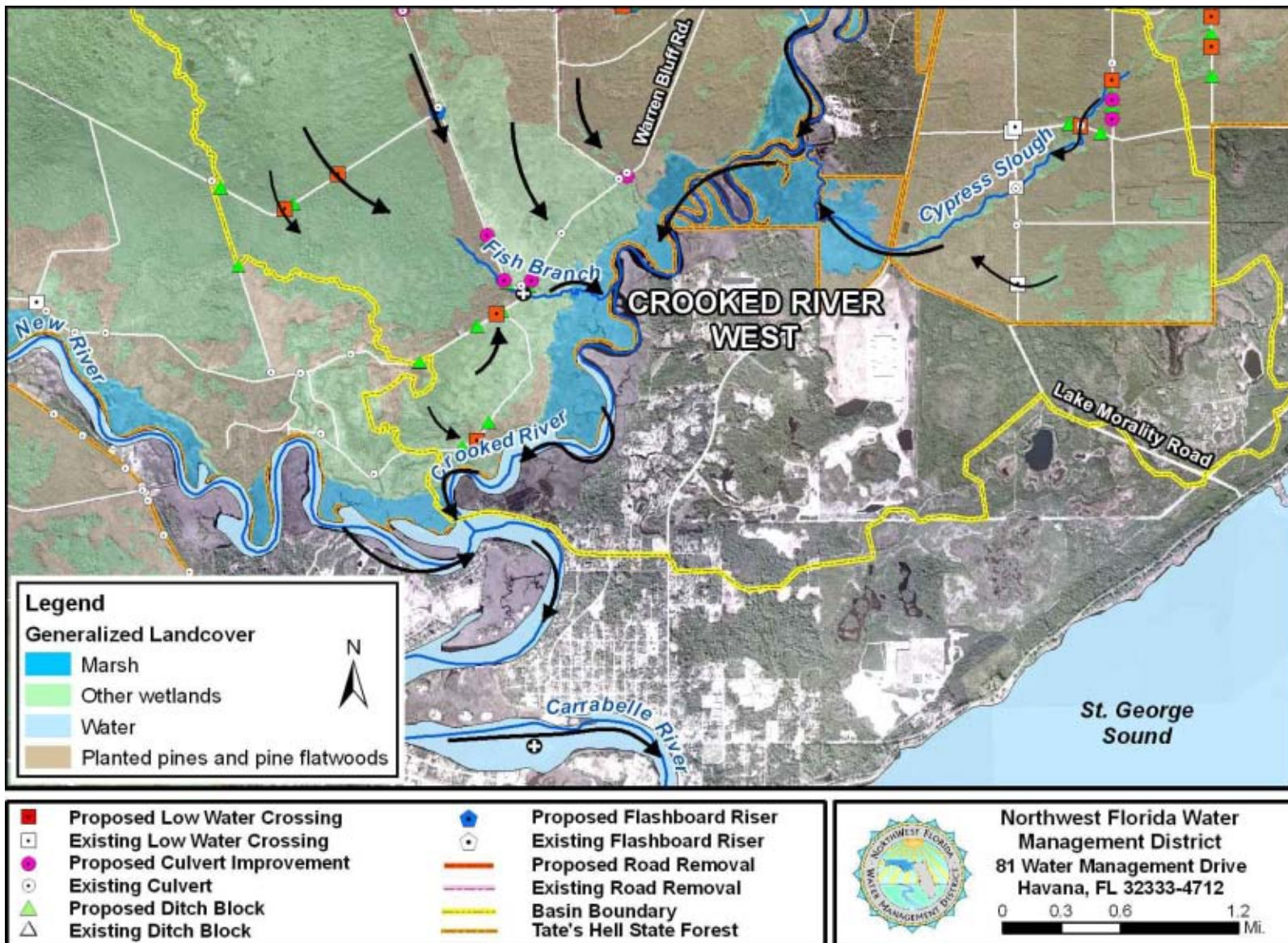


Figure 85. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the western Crooked River basin.

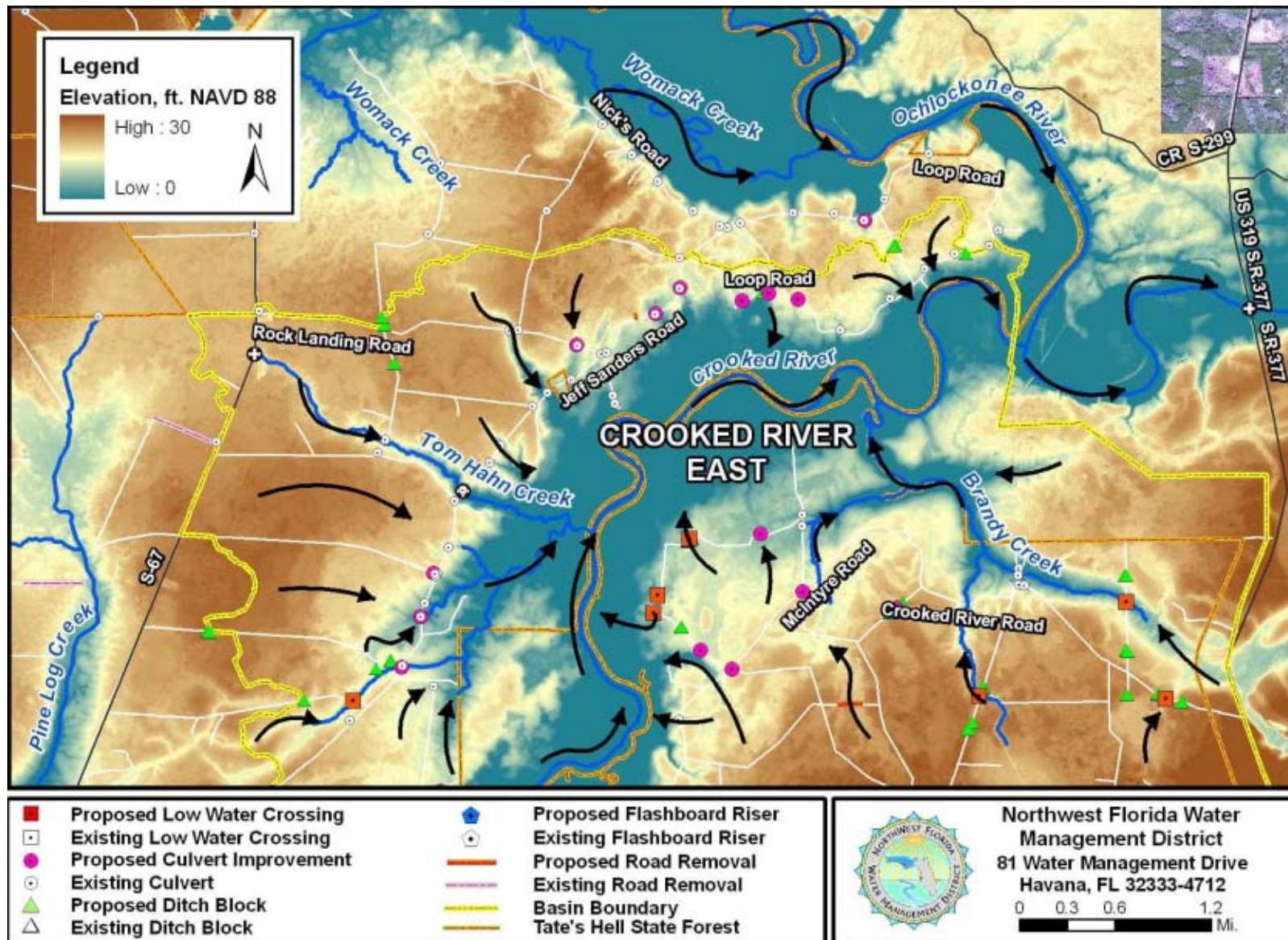


Figure 86. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the eastern Crooked River basin.

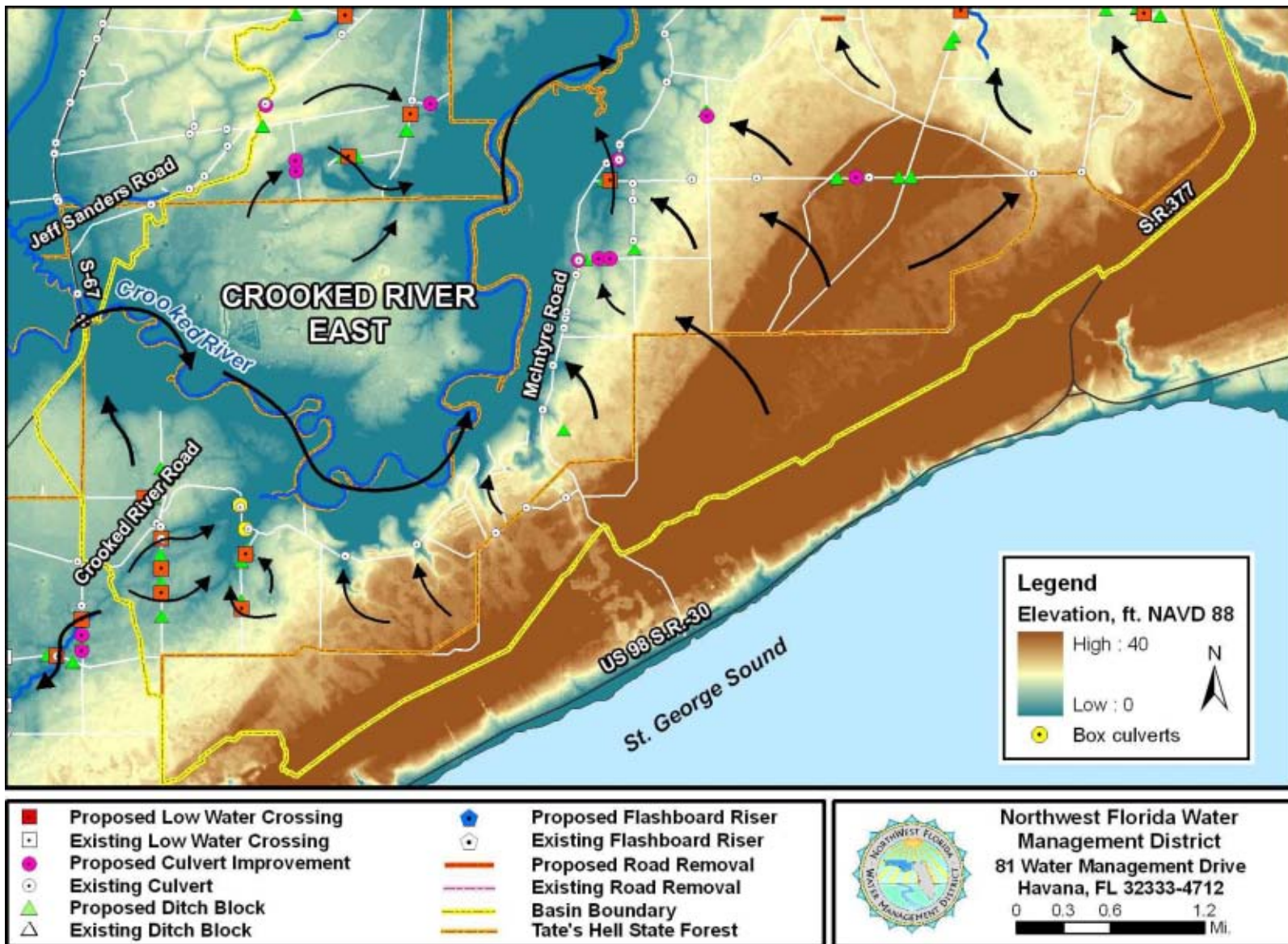


Figure 87. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the eastern Crooked River basin.

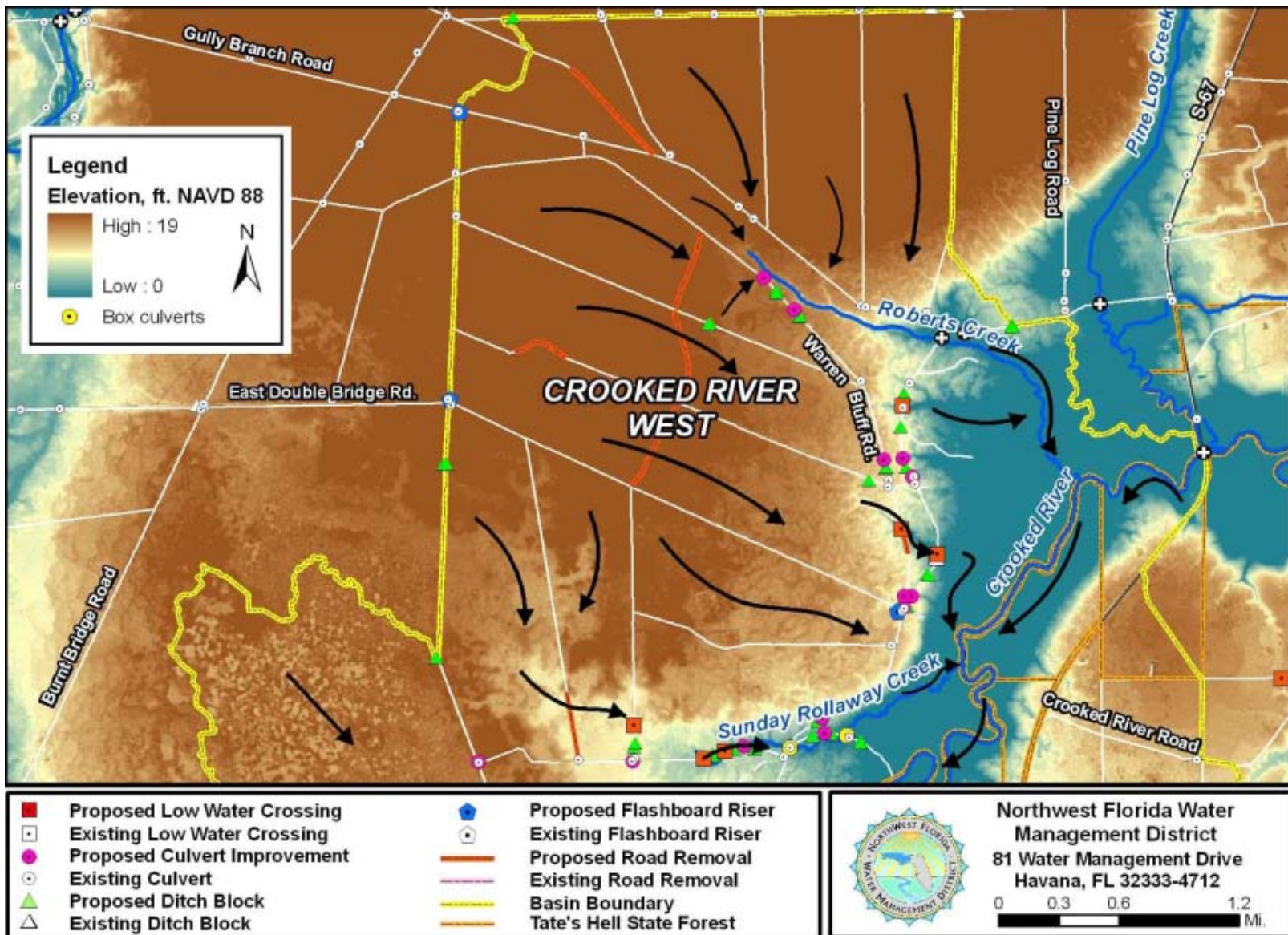


Figure 88. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the western Crooked River basin.

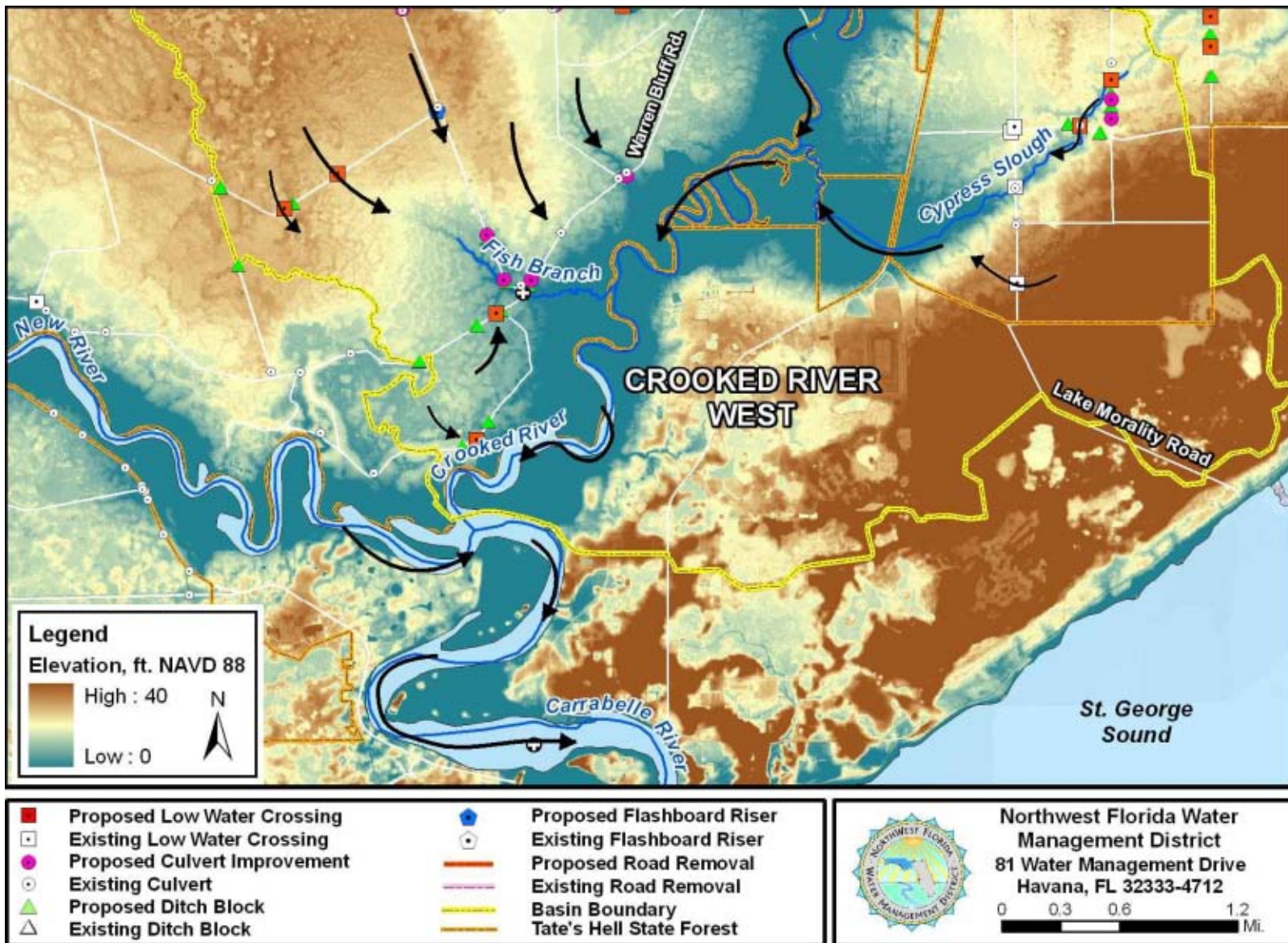


Figure 89. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the western Crooked River basin.

Pine Log Creek Basin

Restoration Priority: Medium

Basin Area: 15,300 acres

Description: The Pine Log Creek drainage basin comprises 15,300 acres on the east side of Tate's Hell State Forest. Pine Log Creek flows south and discharges to the Crooked River. Although most of the basin is located west of Highway 67, a portion of the basin is located east of Highway 67 and west of Jeff Sanders Road.

The 1953 black and white aerial photography shows that the central portion of the basin, located between Rock Landing and Gully Branch roads, was once a vast, low-lying basin swamp (Figures 90 and 93). The construction of dirt logging roads and conversion of the basin swamp to pine plantation has significantly altered the landscape and surface water drainage patterns. Today, surface water runoff flows into large ditches on County Line Road, Road 152 (immediately south of County Line Rd), and Pine Log Road before flowing through bridges and culverts and eventually discharging to Pine Log Creek.

The only previous hydrologic restoration effort was the Pine Log Lakes project, which was implemented by a private entity to fulfill wetland mitigation requirements associated with offsite activities. The project involved removing a short section of Fish Kill Road, installing a flashboard riser and several ditch blocks and culverts (see existing structures Figure 92). Unfortunately, the flashboard riser is not effective because the large volume of flow in the ditch has created a new channel that bypasses the riser and flows into the ditch on the eastern side. The road removal, which was intended to enable water to surface water runoff to flow south towards Pine Log Creek, is of limited effectiveness because the ditch on the northern side of the road segment was left intact and therefore water continues to flow east in the ditch. Additionally, the planted pines south of the road removal area appear to have been bedded and the topography modified. Rather than flowing south across the road removal area as intended, surface water runoff flows continues to flow east in the ditch and then flows south through a culvert near the intersection with Pine Log Road.

2010 – 2020 Hydrologic Restoration Plan: The objectives of the hydrologic restoration activities are to restore portions of the former basin swamp, reduce surface water flow in roadside ditches, and increase the flow through natural wetland systems towards Pine Log Creek.

Two segments of road totaling 1.1 miles are proposed to be removed to reconnect former wetland habitats and facilitate sheet flow north of County Line Road (Figures 90, 91, and 92). Further south, three north-south oriented road segments totaling 1.9 miles are proposed for removal as part of the restoration of the former large basin swamp. The timing of the road removals will depend on when the Division of Forestry is able to harvest the remaining timber in the adjacent areas. Additional short segments of Fish Kill Road are proposed for removal on either side of the

existing section of road removed as part of the Pine Log Lakes mitigation project. The proposed ditch blocks at the eastern end of the Fish Kill Road removal segment will prevent the easterly flow of water in the roadside ditches and facilitate natural drainage to the south towards Pine Log Creek. The low water crossings proposed north of Fish Kill Road are wetland crossings rather than stream crossings and may only contain water intermittently. Culverts are proposed to reconnect contributing drainage areas along Rock Landing Road, Pine Log Road, and several smaller roads.

A new bridge is proposed to replace two existing large culverts where Pine Log Creek crosses Pine Log Road (Figures 90, 91, and 92). The road is eroding at this location and the new bridge will increase the conveyance capacity and allow a more natural stream channel to become reestablished. West of the bridge along the creek, a long low water crossing is proposed to replace a series of three small culverts. These culverts were installed as part of the Pine Log Lakes mitigation project; however a low water crossing would facilitate a more natural flow regime at this location. The remnant Pine Log Creek stream channel is shallow wide, and braided in the vicinity of these three culverts.

In the southeastern portion of the Pine Log Creek basin, three low water crossings and associated ditch blocks are proposed in lieu of the existing culverts to increase conveyance capacity and facilitate the restoration of natural channel morphometry in these interconnected basin swamps (Figures 94, 95, and 96). An additional culvert is proposed in the southern portion of the basin on the western side of Pine Log Creek. A flashboard riser and a culvert removal are proposed to reduce ditch flow across the basin boundary.

In all, the proposed hydrologic improvements encompass the removal of three miles of dirt logging roads and adjacent ditches and the installation of nine low water crossings, one flashboard riser, 19 culverts, and 23 ditch blocks.

Estimated Construction Cost for Hydrologic Improvements: \$ 425,000

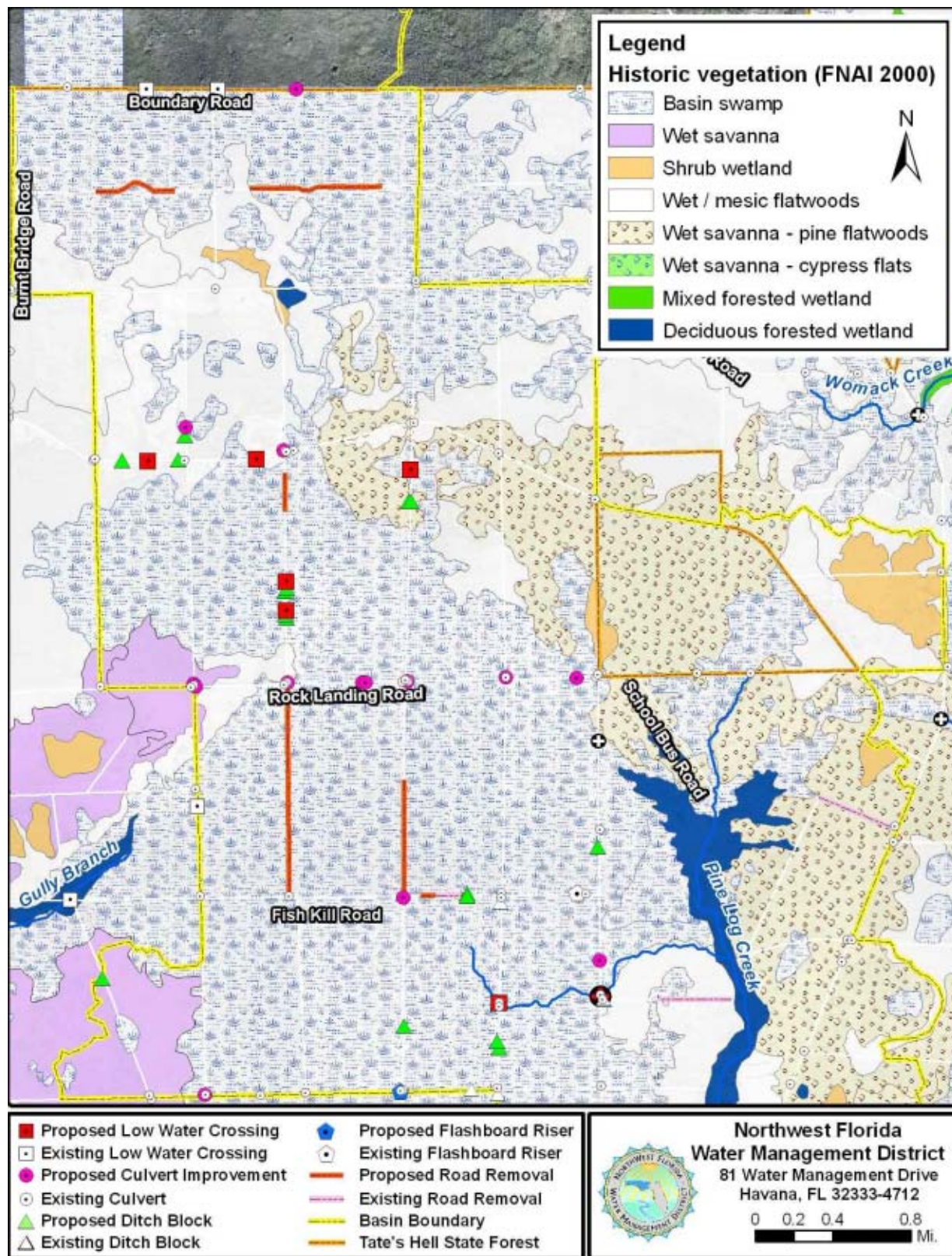


Figure 90. Historical ecological communities and proposed hydrologic improvements in the northern portion of the Pine Log Creek basin.

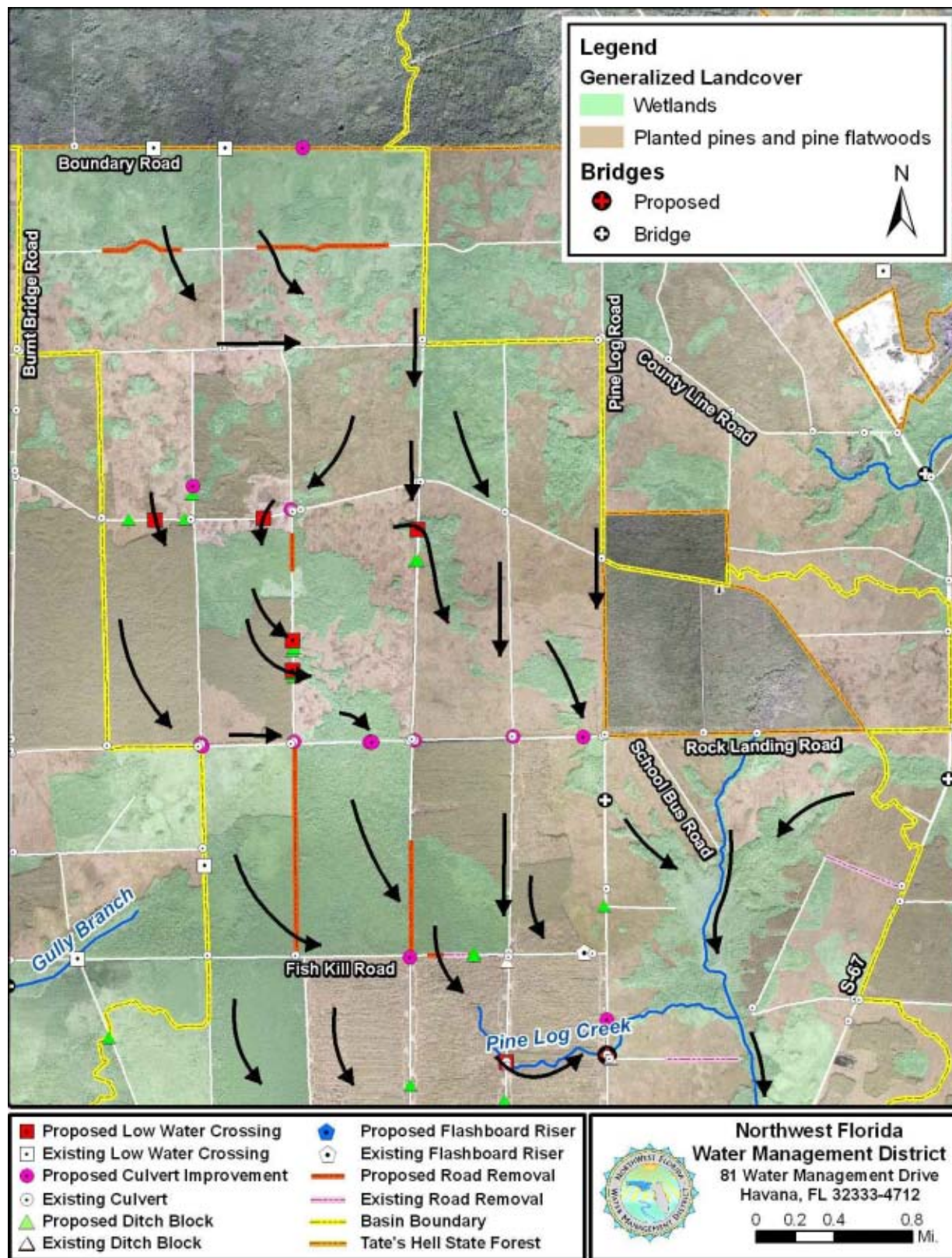


Figure 91. Proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Pine Log Creek basin.

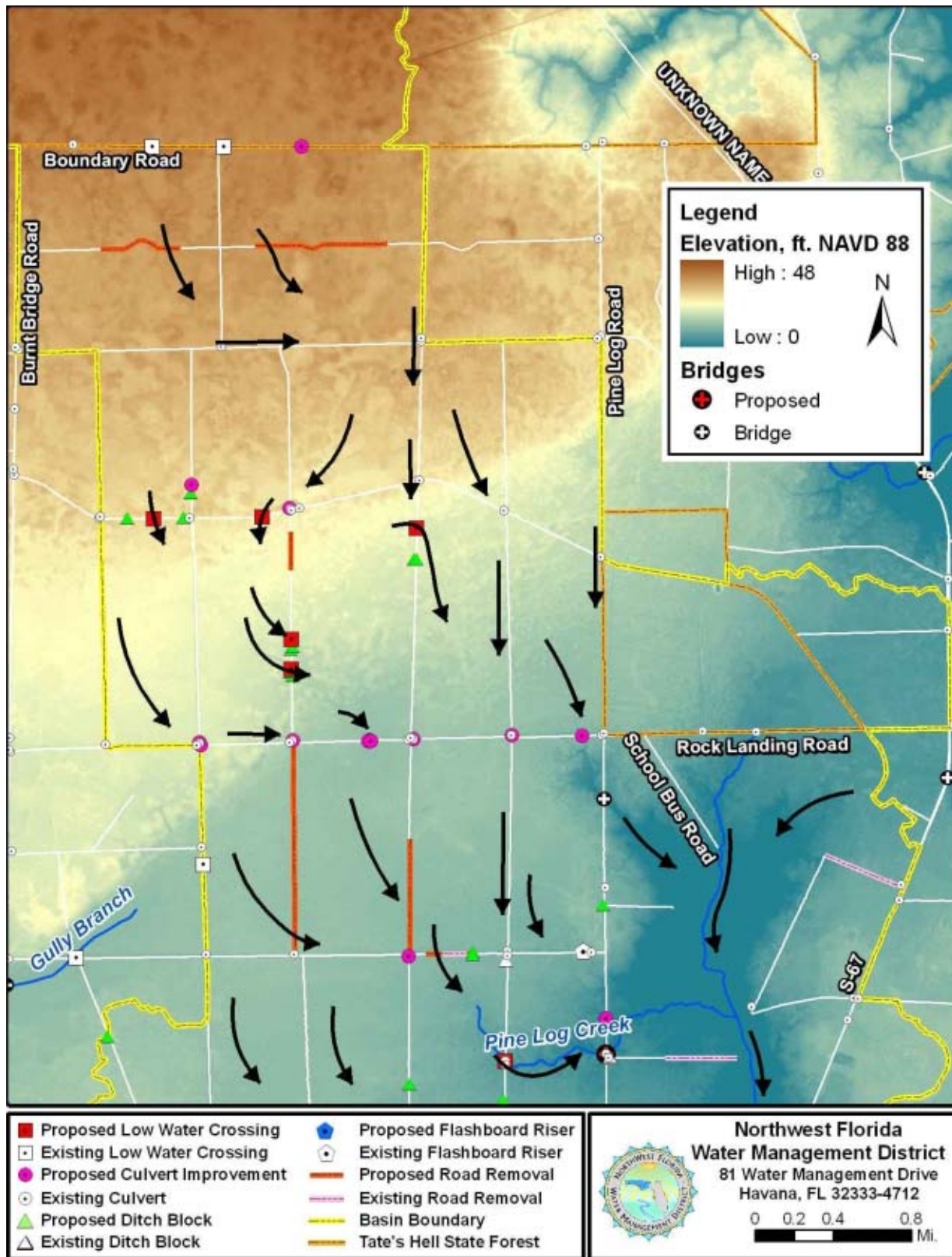


Figure 92. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the northern portion of the Pine Log Creek basin.

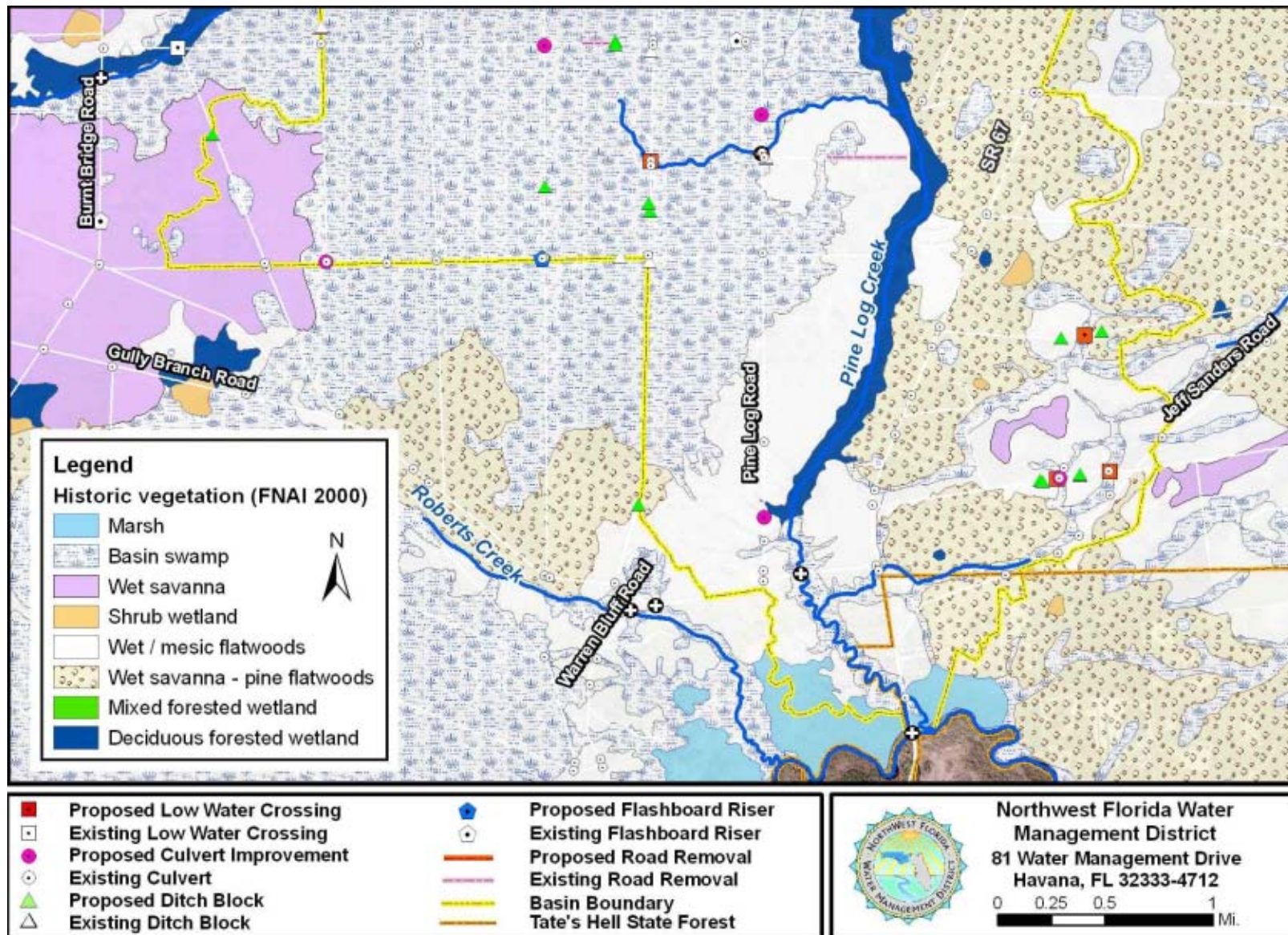


Figure 93. Historical ecological communities and proposed hydrologic improvements in the southern portion of the Pine Log Creek basin.

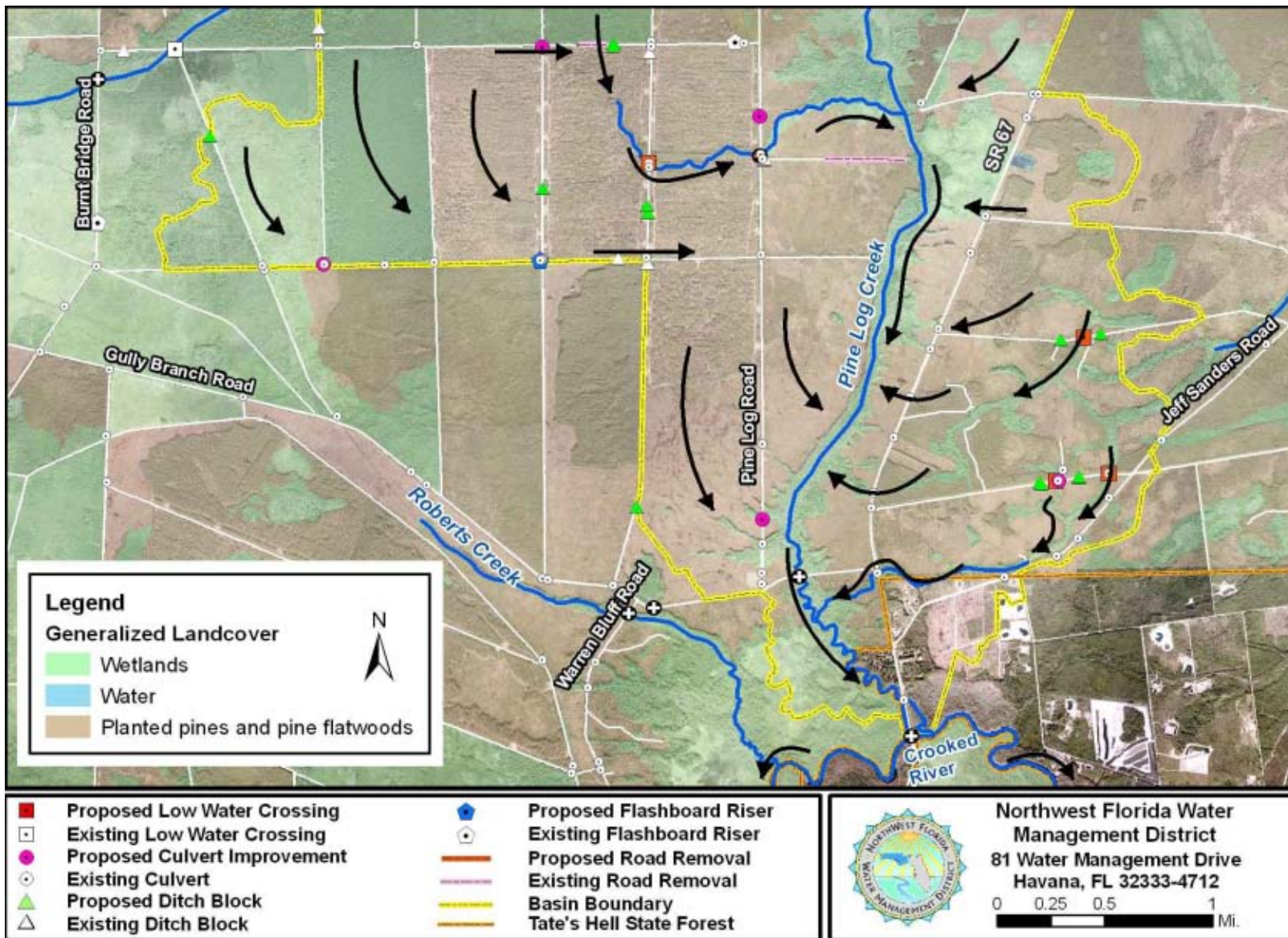


Figure 94. Proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Pine Log Creek basin.

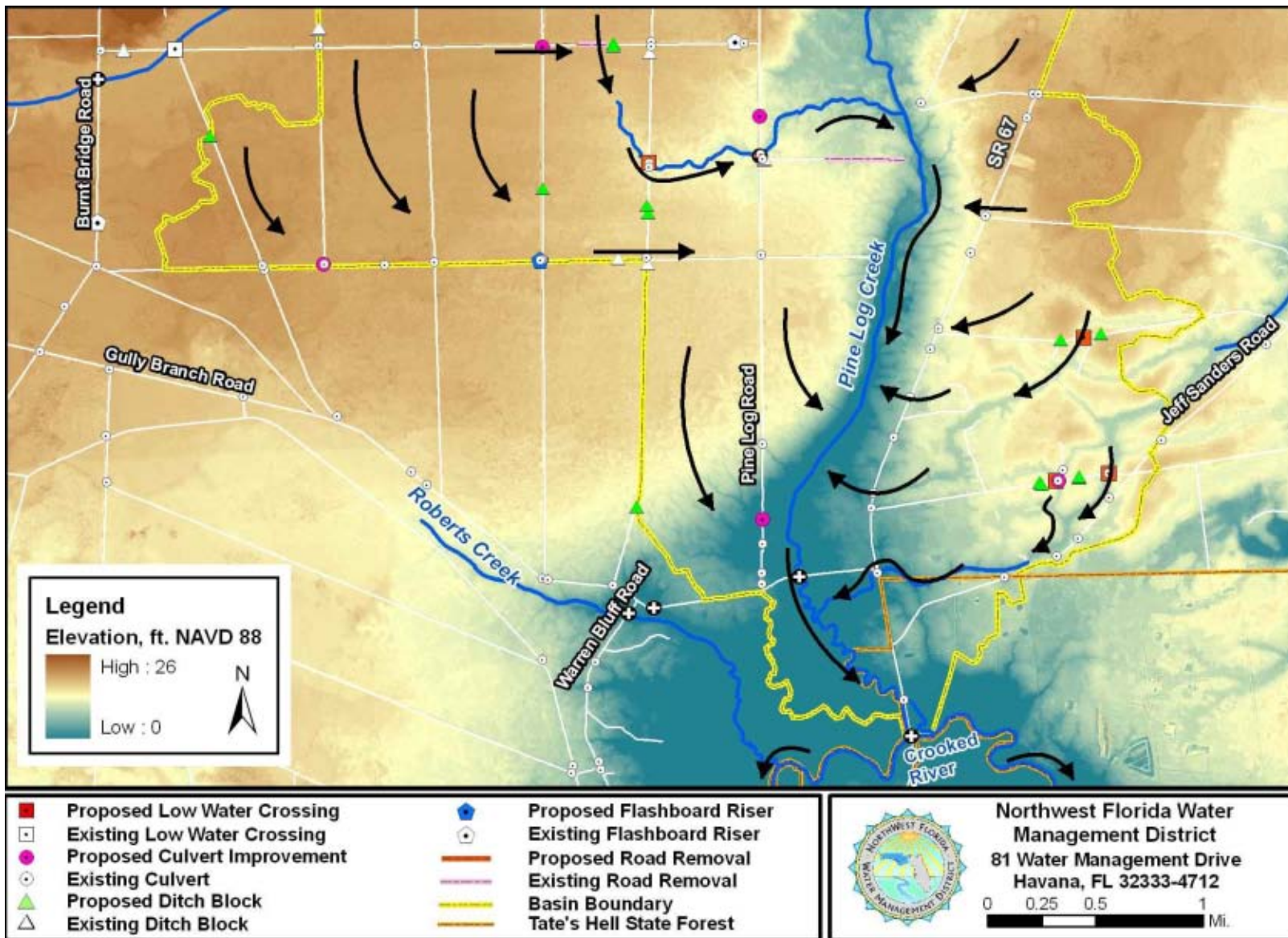


Figure 95. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the southern portion of the Pine Log Creek basin.

Womack Creek, Haw Creek, and the Ochlockonee River Basins

Restoration Priority: Low

Basin Area: Womack Creek: 6,700 acres; Haw Creek: 3,200 acres; and portion of the Ochlockonee River basin within the Tate's Hell State Forest: 2,200 acres

Description: The Womack Creek area comprises the northeast corner of Tate's Hell State Forest and includes portions of the Haw Creek and Ochlockonee River basins. Womack Creek and Haw Creek are both tributaries to the Ochlockonee River. The Ochlockonee River flows east and discharges to Ochlockonee Bay, which is located between Apalachee Bay and St. George Sound.

Historically, this area was comprised largely of basin swamps and mixed forested wetlands with scattered areas of shrub wetlands and mesic flatwoods (Figures 96 and 97). Today, mixed forested wetlands continue to comprise the floodplains of Womack Creek and the Ochlockonee River. Many basin swamps remain although they are heavily dominated by titi, particularly to the east of SR 67. The former mesic flatwoods and some drier basin swamp areas have been converted to pine plantation. Beginning in about 1997, the Division of Forestry began restoring longleaf pine in many of these areas.

In 2005, the NFWFMD initiated the Womack Creek Mitigation Project. The project restored approximately 20 acres of mixed hardwood forest and 50 acres of hydric pine flatwoods. Restoration activities included mechanical removing and roller-chopping of invasive shrubs, prescribed burning, and planting of wiregrass plugs. Additional planting of mixed hardwoods is scheduled for the winter of 2010 / 2011. Post construction monitoring suggests that the site is trending towards desired vegetation conditions.

2010 – 2020 Hydrologic Restoration Plan: Future restoration activities will restore historical surface water drainage patterns by reconnecting basin swamps and other wetlands, and restoring surface water drainage towards the creeks. West of SR 67, a culvert and two ditch blocks are proposed within the Haw Creek basin to restore flows in a basin swamp that once conveyed water north towards the creek (Figures 96, 98, and 100). The basin swamp has been bisected by Pine Log Road. Once the culvert is installed, surface water flows from this basin swamp system will be able to flow north towards Haw Creek through an existing culvert located on Boundary Road.

Within the Womack Creek basin, several new culverts and ditch blocks are proposed west of SR 67 to enhance surface water drainage towards the creek (Figures 98 and 100). Three flashboard risers are proposed along County Line Road to reduce ditch flow to the south (at Pine Log Road) and slow the flow of water in the large drainage ditch on the north side of the road.

East of SR 67, a culvert replacement and three ditch blocks are proposed north of Log Cabin Road to enhance surface water flows in the Ochlockonee River basin (Figures 98, and 100). Between Log Cabin Road and Womack Creek, four low water crossings and associated ditch blocks are proposed to restore drainage patterns within a basin swamp and mixed forested wetland system.

Southeast of Womack Creek, three additional low water crossings, two culverts, and associated ditch blocks are proposed to restore northerly flow through wetlands that drain towards Womack Creek's smaller tributary streams (Figures 99, and 101). A number of additional ditch blocks are proposed in the southeast portion of the Womack Creek basin to separate flow between culverts and to restore natural topographic features and local surface water drainage divides.

In all, the proposed hydrologic improvements in the Haw Creek and Womack Creek basins include seven low water crossings, three flashboard risers, 18 culvert improvements and 53 ditch blocks.

Estimated Construction Cost for Hydrologic Improvements: \$ 350,000

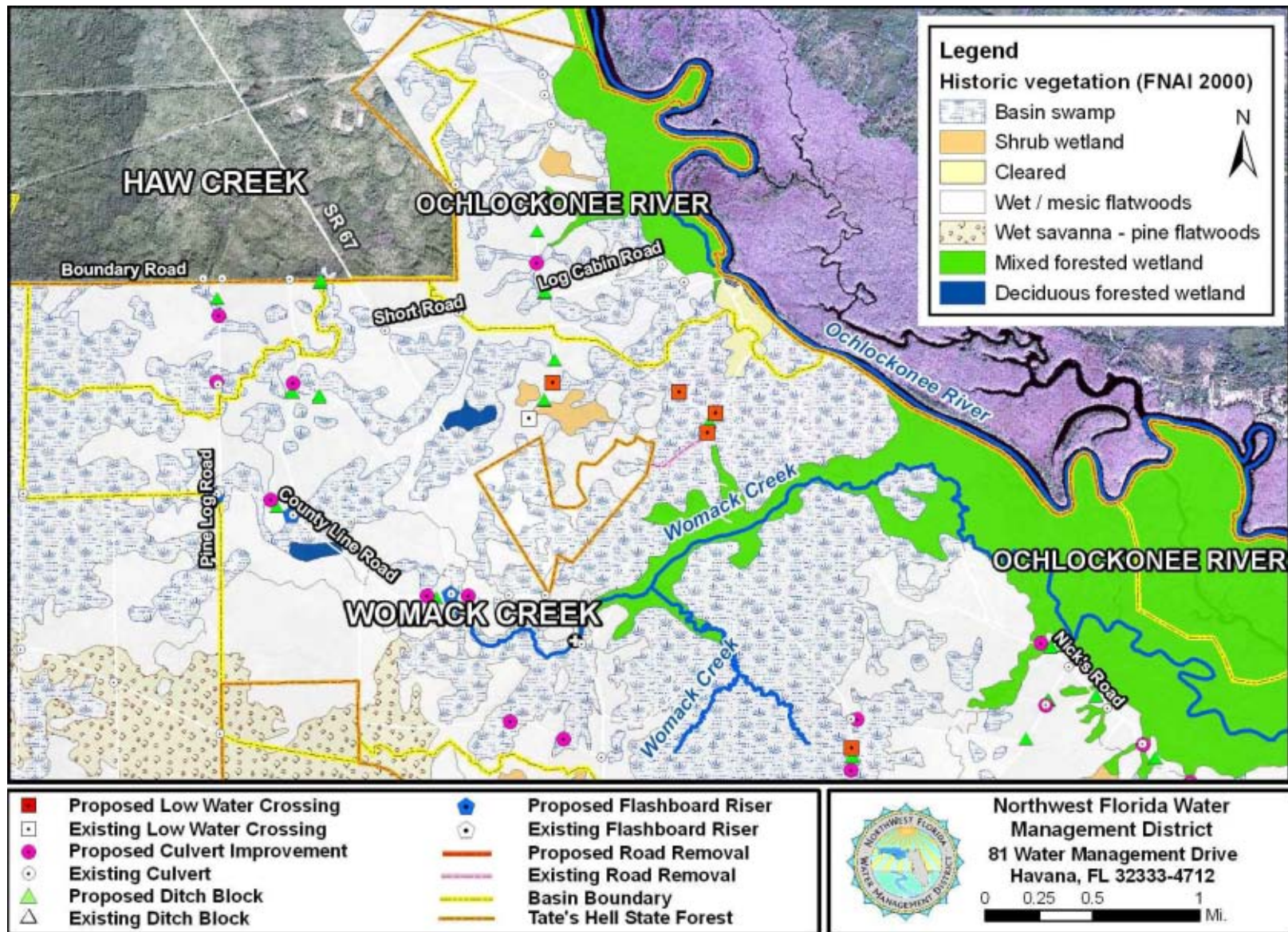


Figure 96. Historical ecological communities and proposed hydrologic improvements in the western portion of the Womack Creek, Haw Creek, and Ochlockonee River basin.

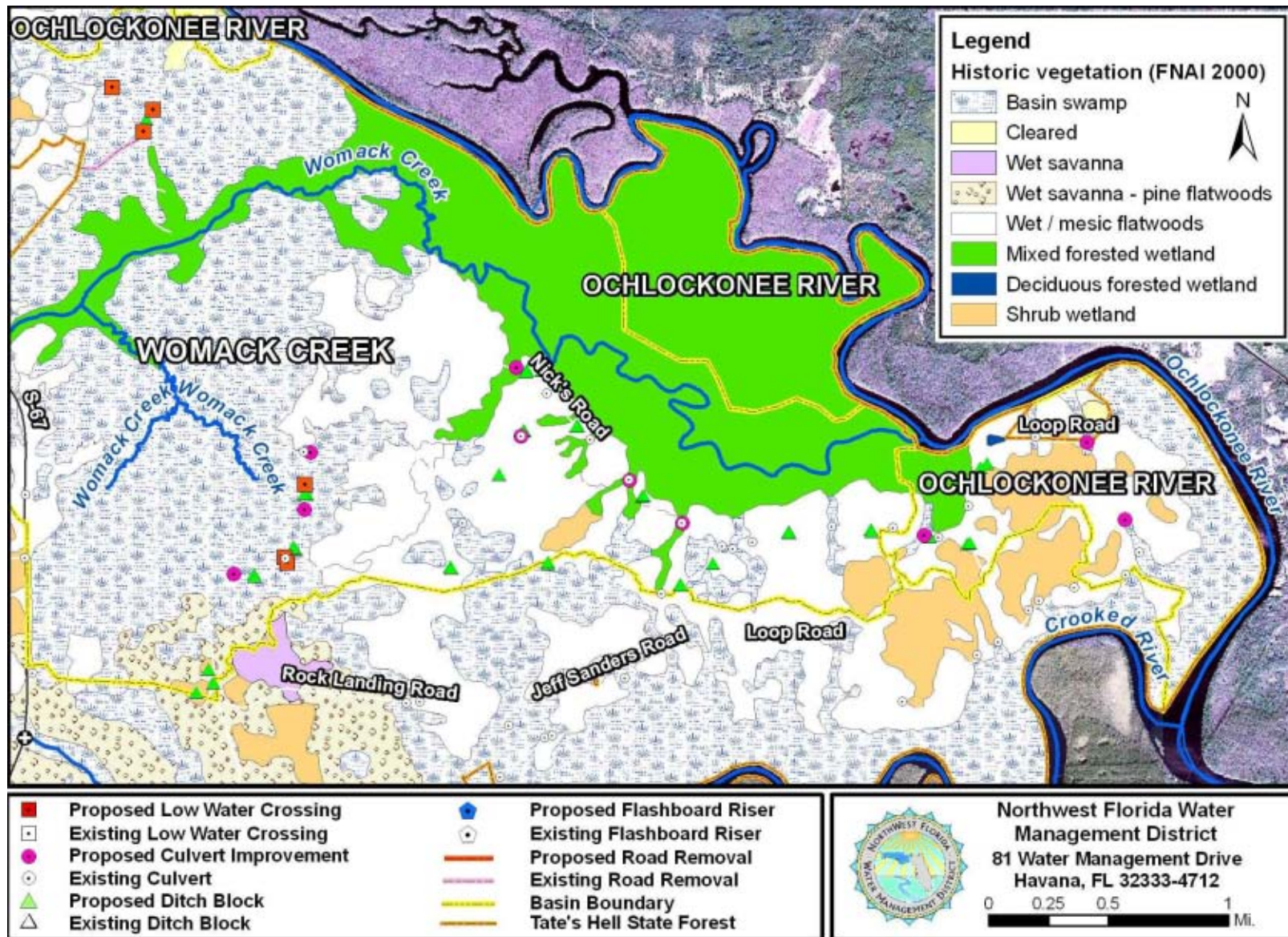


Figure 97. Historical ecological communities and proposed hydrologic improvements in the eastern portion of the Womack Creek, Haw Creek, and Ochlockonee River basin

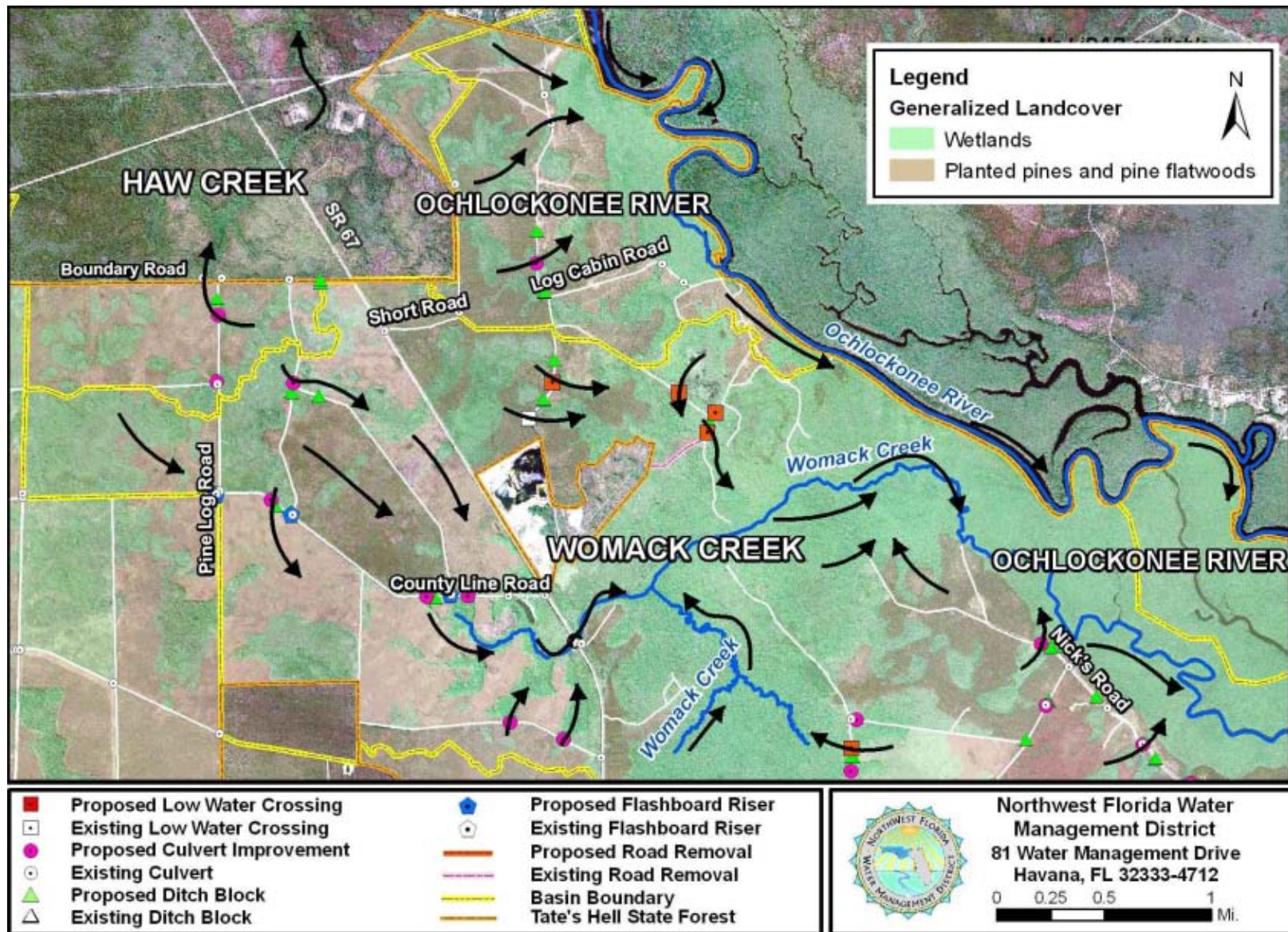


Figure 98. Proposed hydrologic improvements and post-restoration drainage patterns in the western portion of the Womack Creek, Haw Creek, and Ochlockonee River basins.

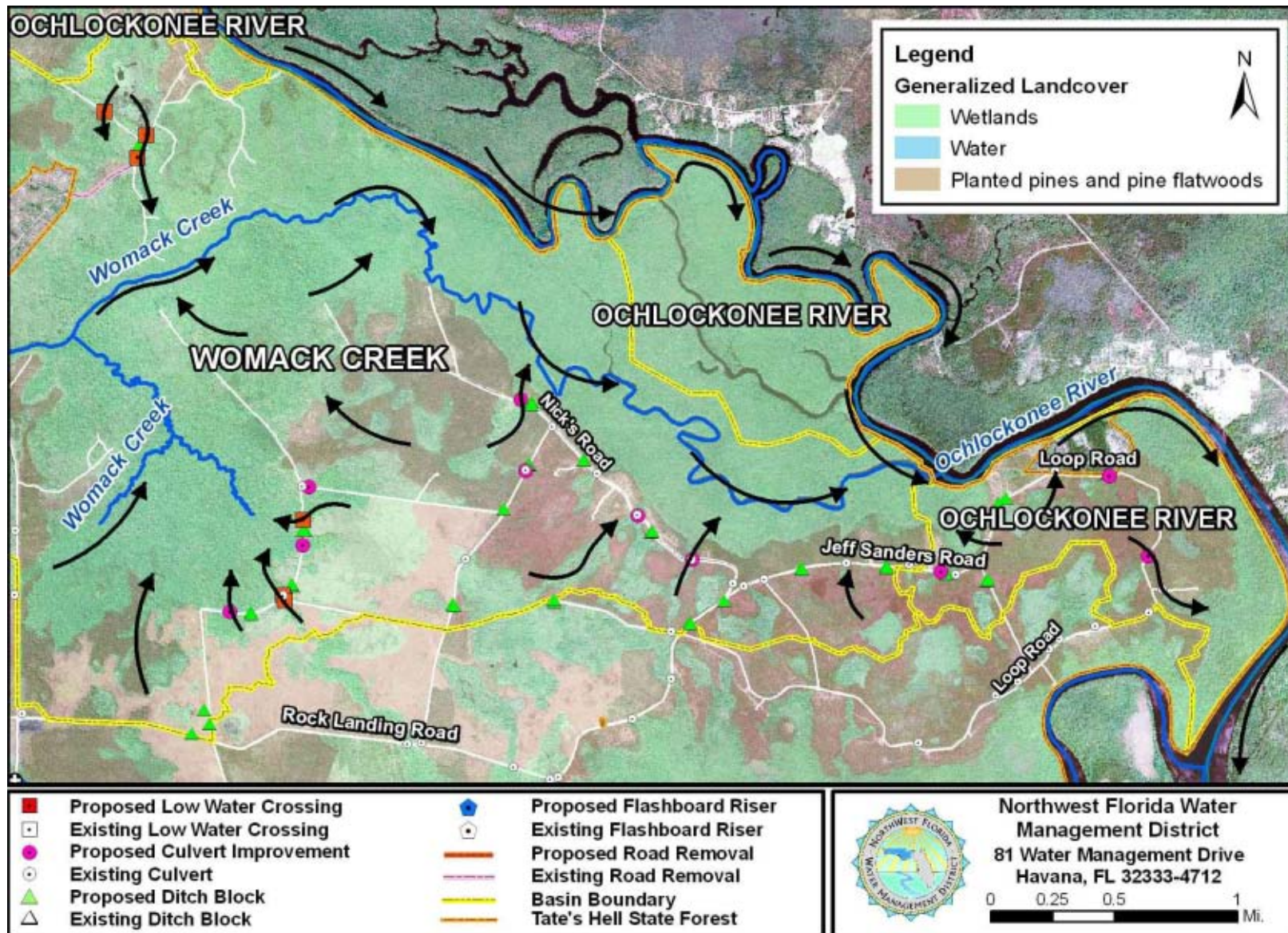


Figure 99. Proposed hydrologic improvements and post-restoration drainage patterns in the eastern portion of the Womack Creek, Haw Creek, and Ochlockonee River basins.

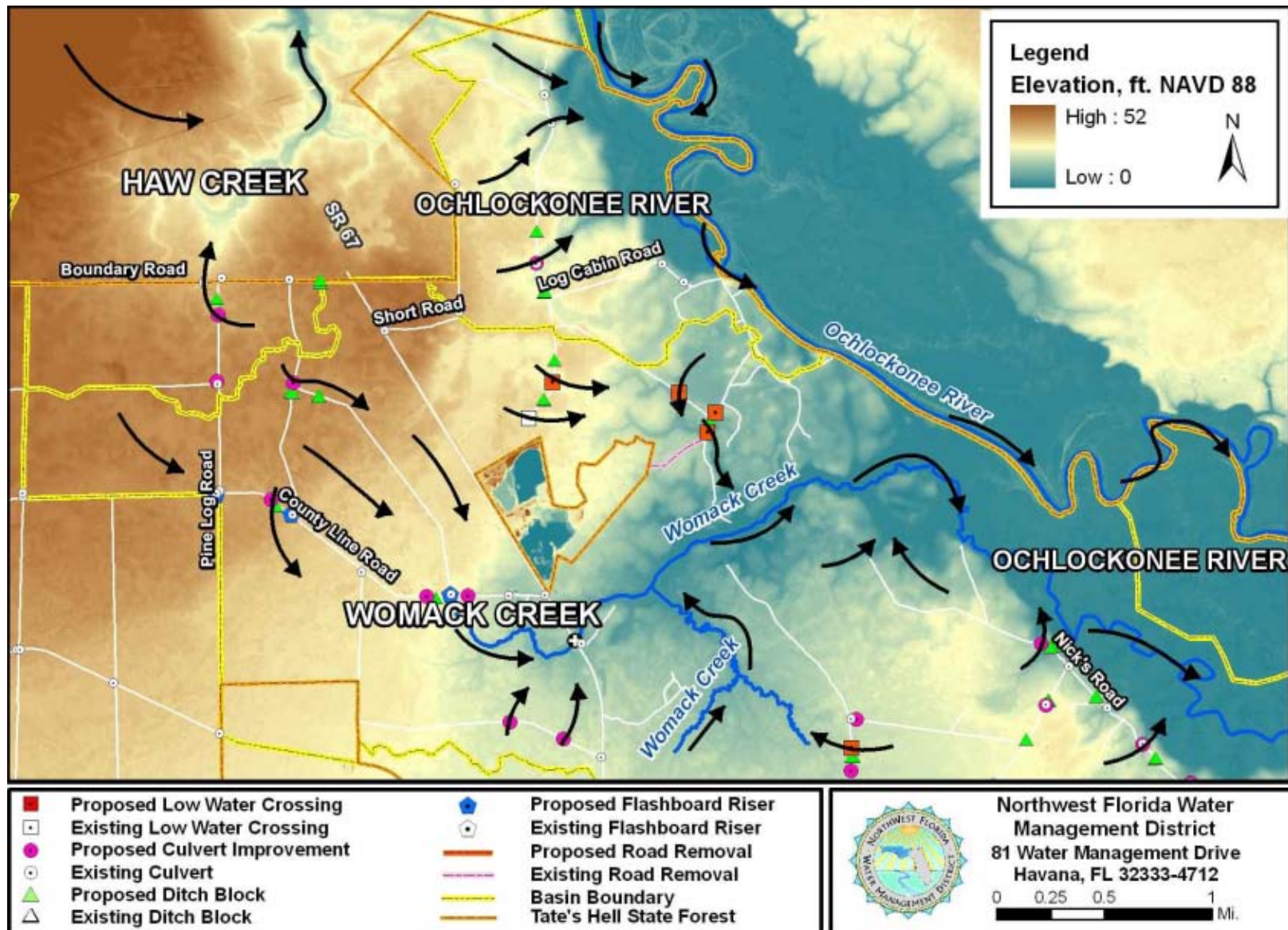


Figure 100. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the western portion of the Womack Creek, Haw Creek, and Ochlockonee River basins.

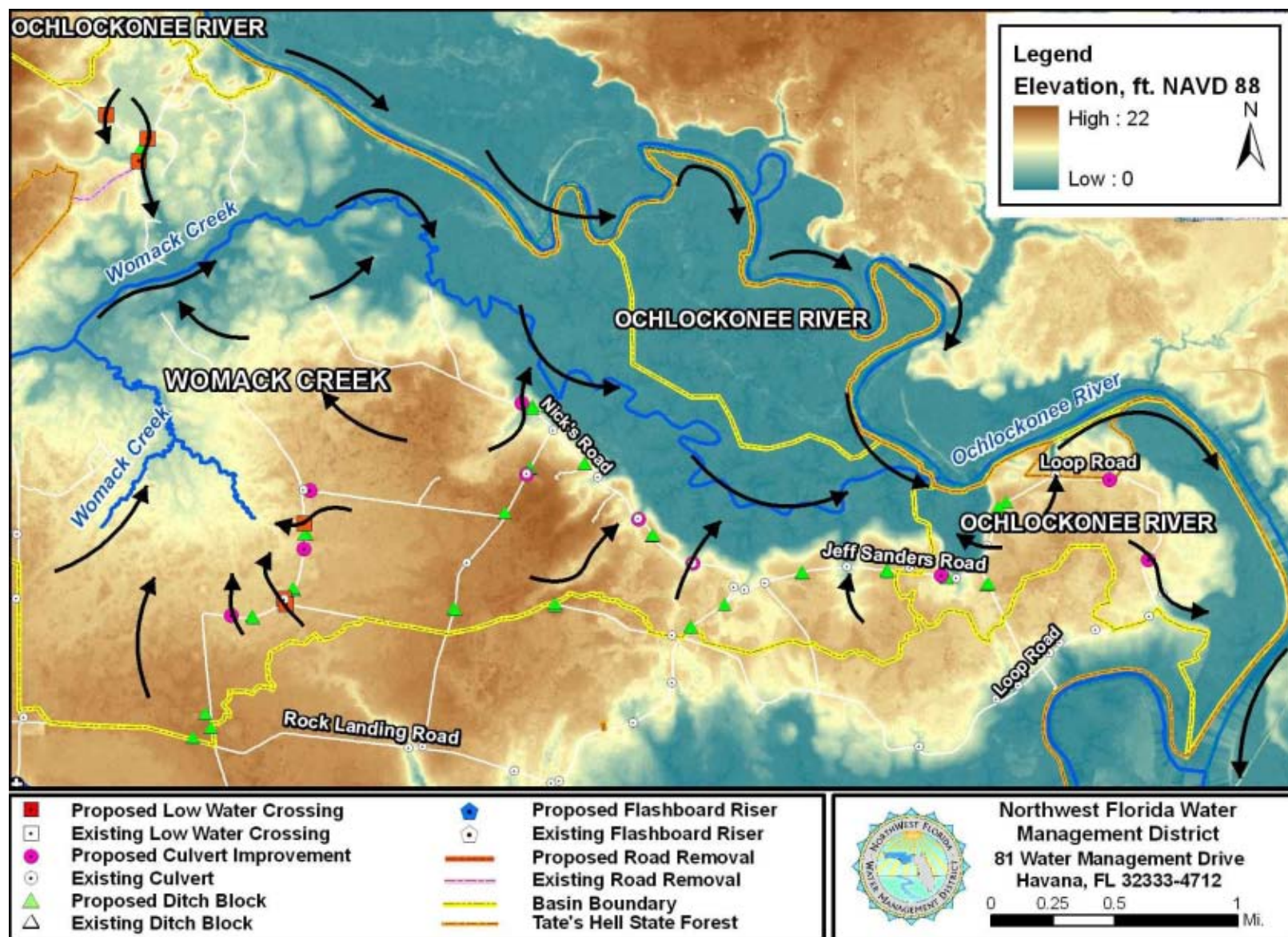


Figure 101. LiDAR elevation data, proposed hydrologic improvements and post-restoration drainage patterns in the eastern portion of the Womack Creek, Haw Creek, and Ochlockonee River basins.

Implementation of Hydrologic Restoration Plans

This Hydrologic Restoration Plan is intended to provide a blueprint for future restoration activities at Tate's Hell State Forest during the 2010 – 2020 timeframe. Hydrologic restoration plans and preliminary estimates of construction costs are provided for the 29 watersheds within Tate's Hell State Forest.

To accompany this Hydrologic Restoration Plan document, a set of GIS shapefiles have been prepared for use by the Division of Forestry and the NFWFMD. These GIS shapefiles show the locations and attributes of the proposed low water crossings, culvert modifications, flashboard risers, ditch blocks and road removals. Because the GIS environment allows the user to zoom in and overlay various data layers and forest management plans, these shapefiles are anticipated to be used as the basis for the planning and implementation of restoration projects within Tate's Hell State Forest. It is recommended that these shapefiles be updated periodically as new field data become available or as site conditions or timber management plans change. It is envisioned that the GIS files that comprise the Hydrologic Restoration Plan will be updated annually by the NFWFMD and the Division of Forestry similar to the annual updates of the harvesting plan, prescribed burn plan, and other forest management plans.

Project Implementation

The implementation of specific restoration projects will typically involve additional field reviews, final design and permitting, construction, habitat modifications, and post-restoration monitoring. Prior to finalizing the design for a particular project, a comprehensive field review should be performed to assess current site conditions and confirm the suitability and design details of the proposed hydrologic improvements. Prior to applying for state and federal permits, the project details should be reviewed with Division of Forestry staff to confirm that the proposed hydrologic restoration activities do not pose a conflict with other current land management activities.

Due to the large number of listed species present within Tate's Hell State Forest, maps of species occurrences, including locations of Red-cockaded Woodpecker (RCW) clusters, should be reviewed prior to project construction. If RCW clusters occur within the project vicinity, the Division of Forestry biologist or FWC personnel should be consulted. Hydrologic improvements should be reviewed to confirm that they do not adversely affect RCW nesting or foraging habitat. Construction activities are prohibited within 200 feet of any RCW cavity tree during the April through July nesting season.

Construction activities, particularly road removals and low water crossings, should be scheduled to occur during the dry season whenever possible. Under wet weather and high water table conditions, it can be difficult for heavy equipment to excavate soils in many areas of Tate's Hell State Forest, particularly in the vicinity of current or historical wetlands. Appropriate erosion and sedimentation control procedures should be followed to minimize construction impacts to ditches,

adjacent wetlands, and downstream waters. Seeding and mulching bare soils, such as the top and sides of ditch blocks, is recommended. However, seed and mulch materials should not contain any invasive species. For example, Bahia grass should not be used for any seeding or mulching activities.

It is recommended that road removal areas be replanted with wiregrass or appropriate tree species. In most cases, native groundcover vegetation will also recolonize the former road footprint. Appropriate signage, guardrails and water depth indicators should be installed in conjunction with low water crossings to facilitate appropriate vehicle access.

It is recommended that the Division of Forestry continue to manage restored habitats using prescribed burning, tree thinning and exotic and invasive species control in a manner that is consistent with the Vegetation Management Guidelines document (Division of Forestry and FNAI 2001). Where reforestation is needed, it is recommended that trees be planted at naturally occurring tree densities or only slightly higher. Slash pines appear to be very resilient even in wet areas and replanting restoration project areas, such as historical wet savannas, at high pine densities (> 200 trees per acre) can lead to an unnaturally dense tree canopy over time.

Post-construction monitoring of environmental conditions should be performed to ensure that restoration projects are achieving the desired results. Volume I of this Hydrologic Restoration Plan provides guidelines for environmental monitoring of restoration areas.

Operation and Maintenance

Water control structures such as culverts, ditch blocks, flashboard risers and weirs should be inspected annually and after significant storm events, pine harvesting operations, and prescribed burns. Following each inspection, any maintenance or repair needs should be documented and reported to the Division of Forestry, the NFWFMD, or other responsible entity. Large-scale disturbances to the restoration project areas should be documented. Example disturbances include natural wildfires, excessive flooding, damage by wild hogs, the spread of invasive or exotic species and human activities such as trash dumping and unauthorized vehicle access.

Flashboard risers are the only type of operable structure associated with the hydrologic restoration projects outlined in this plan. There are currently only about 10 flashboard risers in Tate's Hell State Forest. It is unknown how frequently these structures have been operated. Approximately 80 additional flashboard risers have been proposed. Although not all of the flashboard risers will be installed immediately, the total number of flashboard risers may exceed 20 to 30 within the next five years. To optimize the hydrologic benefits that can be achieved with flashboard risers, it is recommended an operations plan be developed. The operations plan for the flashboard risers should provide criteria, guidelines, and schedules for installing and removing boards to retain and release water. Monitoring of ditch water levels at a subset of locations is recommended to provide information that can be used to improve the design and operation of flashboard risers over time.

Adaptive Management

Post-construction monitoring of environmental conditions and hydrologic structures should be performed at Tate's Hell State Forest to ensure that desired ecosystem conditions are achieved and restoration goals are met. There are many uncertainties inherent in the restoration process and many reasons why actual ecosystem conditions may differ from those set forth as restoration goals. An adaptive management approach recognizes that uncertainties exist and provides the flexibility to take corrective actions to address them (Figure 102). An adaptive management approach to wetland



Figure 102. Adaptive management (NOAA 2008)

restoration is advocated by many agencies and organizations (ACOE 2008, NOAA 2008, Ramsar Convention 2008, Clewell et al. 2005, Diefenderfer and Thom 2003). Under adaptive management, if ecosystem conditions are not exhibiting a trend towards desired conditions, restoration goals and activities are re-evaluated and restoration plans are revised as needed. Revisions might include changes in habitat management practices (e.g. prescribed burning, replanting, thinning of pines) or modifications to hydrologic improvements. It is recommended that hydrologic restoration sites be re-evaluated at least annually for the first five years following initial construction activities and at least every five years thereafter.

It is anticipated that the Hydrologic Restoration Plan will be periodically updated or revised and presented to the District Government Board for approval. The plan may be revised in response to ongoing environmental monitoring activities, changes in Division of Forestry land management practices, issues related to environmental permitting, or for other reasons.

Funding

The hydrologic restoration plans for the 29 surface water drainage basins include nearly 20 miles of road removals, and more than 300 culvert improvements, 200 low water crossings, 690 ditch

Table 2. Summary of proposed hydrologic improvements and estimated construction costs for Tate's Hell State Forest.

Structure	Unit cost	Total Number	Total Cost
Culvert modifications	\$5,000	320	\$1,313,350
Box culverts / weirs	\$40,000	6	\$240,000
Bridges	\$100,000	8	\$800,000
Ditch block	\$2,550	691	\$1,762,050
Flashboard riser	\$6,000	80	\$480,000
Low water crossing	\$15,000	200	\$3,000,000
Road removal	\$17,000	19.84	\$337,195
			\$7,932,595

blocks, and 80 flashboard risers (Table 2). The estimated construction costs for these proposed hydrologic improvements total nearly \$8 million. It is anticipated that

restoration activities will be implemented by the NFWFMD, the Division of Forestry, the FWC, and other public and private entities. Potential sources of funding include agency budgets, FDOT mitigation funds, private funds, and state and federal grants.

Summary and Recommendations

A long history of silviculture and the large-scale conversion of native habitats to slash pine plantation have significantly altered the former landscape of Tate's Hell State Forest. Prior to the mid 1950s, this area was a wetland-dominated landscape referred to as Tate's Hell Swamp. More than 12 unique ecological community types were present ranging from wet savannas to coastal marshes (FNAI 1997 and 200). During the 1960s and 1970s, native wet and mesic flatwoods and the drier portions of many wetland ecosystems were converted to intensively managed slash pine plantation. More than 800 miles of roads were constructed and drainage ditches were constructed along most roads to provide road fill and drain nearby wetlands. Pines were planted in dense stands, bedded, fertilized, and fire was typically suppressed. These widespread habitat alterations impacted ecological communities and wetland functions, and altered the magnitude and timing of surface water runoff discharged from the area to Apalachicola Bay, East Bay, and surrounding waters.

In 1994, the State of Florida began acquiring land for Tate's Hell State Forest with the goal of restoring historical surface water drainage patterns and ecological communities to improve the timing, magnitude and quality of surface waters discharged from the area to the Apalachicola Bay system. Today the forest encompasses more than 202,000 acres and is managed as a multi-use area by the Florida Division of Forestry with cooperation from the Florida Fish and Wildlife Conservation Commission. Although habitat and hydrologic restoration are the primary land management goals, the forest is also used for recreational activities such as hunting and kayaking, and historical pine flatwoods continue to be managed for timber production.

During the past ten years, a number of hydrologic restoration projects have been implemented at Tate's Hell State Forest by the NFWFMD, the Florida Division of Forestry, the Florida Fish and Wildlife Conservation Commission, and other public and private entities. Recognizing the need for a long-term plan to guide future restoration efforts, the NFWFMD and the Division of Forestry began discussing hydrologic restoration goals, sharing data, and working on the plan development. These two volumes represent the culmination of that effort.

Hydrologic restoration goals shared by the NFWFMD and Division of Forestry include:

- (1) Improving the water quality of surface water flows and runoff discharged to East Bay, Apalachicola Bay, and surrounding waters
- (2) Restoring historical surface water drainage patterns
- (3) Enhancing wetland hydrology and function
- (4) Restoring a mix of native ecological communities

Volume I of the Hydrologic Restoration Plan describes the site conditions at Tate's Hell State Forest, prioritizes areas for restoration and provides guidelines for environmental monitoring and habitat management at hydrologic restoration sites. Volume II presents hydrologic restoration

plans for the 29 surface water drainage basins in Tate's Hell State Forest, provides estimated construction costs for the proposed improvements, and discusses aspects of project implementation. The accompanying set of GIS shapefiles prepared for the Division of Forestry shows the locations and attributes of the proposed low water crossings, culvert modifications, flashboard risers, ditch blocks and road removals. It is recommended that these shapefiles be updated annually by the NFWFMD and the Division of Forestry as new data become available or as site conditions change.

Areas within Tate's Hell State Forest were prioritized for restoration based on potential water quality benefits, the feasibility of restoration, and the distribution of habitats of species of conservation concern. Approximately 25 listed plant and animal species occur within Tate's Hell State Forest including the Red-cockaded Woodpecker and Eastern indigo snake, and plants such as Curtis' loosestrife and white-birds-in-a-nest. The highest priority areas for restoration are generally located on the western side of the forest. High priority areas include the Fort Gadsden Creek basin, the Sumatra area, and the Doyle Creek, Juniper Creek, Whiskey George Creek, and Cash Creek basins.

The development of a hydrologic restoration plan for each surface water drainage basin was based on an extensive review of site data including forest stand attributes, historical and present-day aerial photography, LiDAR elevation data, road and culvert attributes, recreational facilities, and maps of historical ecological communities. Based on the initial data review, strategies were developed to restore historical drainage patterns to the greatest extent feasible given current site conditions and constraints. To restore historical surface water drainage patterns, hydrologic improvements such as low water crossings, ditch blocks, flashboard risers, and culvert modifications have been proposed along with habitat modifications such as shrub removal and prescribed burning.

In total, the 29 basin plans include nearly 20 miles of road removal, and more than 300 culvert improvements, 200 low water crossings, 690 ditch blocks, and 80 flashboard risers. The estimated construction costs for these proposed hydrologic improvements total nearly \$8 million. Costs reflect the sum of labor and materials associated with construction activities and are based on bids received for restoration projects in 2009. Costs for site preparation (e.g. roller-chopping or burning) and habitat improvements (e.g. replanting, pine thinning and shrub reduction) have not been included as many of these activities may be conducted by the Division of Forestry.

Due to the large size of Tate's Hell and the extensive degree of hydrologic impacts, restoration is anticipated to be a gradual process with cumulative benefits accruing as hydrologic restoration and habitat management activities are implemented during the next several decades. Restoration projects are anticipated to be implemented by Division of Forestry, NFWFMD, and other public and private entities. Potential funding sources include agency budgets, FDOT mitigation funds, and state and federal grants. For projects that are implemented using FDOT funds, the Division of Forestry would be required to refrain from using wetland mitigation areas solely for long-term timber production and would closely adhere to prescribed wetland mitigation requirements.

An adaptive management approach will be followed for hydrologic restoration whereby post construction monitoring will be performed to confirm that ecosystem conditions and hydrologic goals are being achieved. If ecosystem conditions are not exhibiting a trend towards desired conditions, restoration actions and goals will be re-evaluated and restoration plans or activities will be revised as needed. It is anticipated that the Hydrologic Restoration Plan will be periodically updated and presented to the District Government Board for approval. The plan may be revised in response to ongoing environmental monitoring activities, changes in Division of Forestry land management practices, issues related to environmental permitting, or for other reasons.

References

Florida Natural Areas Inventory, 2000. *Historical Vegetation of Tate's Hell State Forest*.

ACOE 2008, NOAA 2008,

Clewell, A., J. Rieger, and J. Munro. 2005. *Guidelines for Developing and Managing Ecological Restoration Projects, 2nd Edition*. www.ser.org and Tucson: Society for Ecological Restoration International.

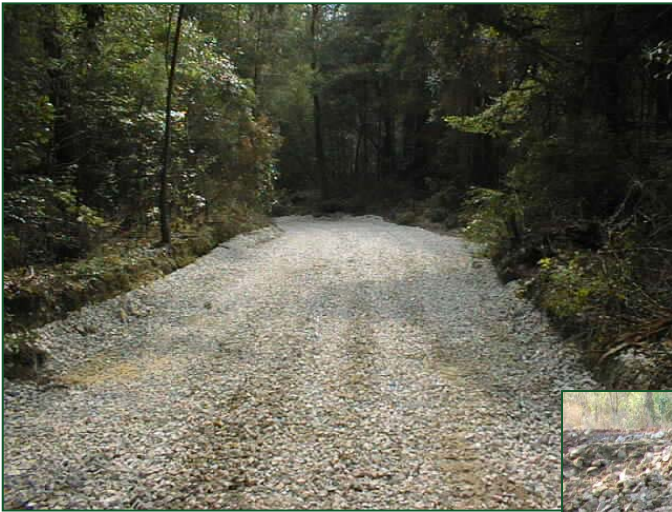
Diefenderfer, H.L., and R.M. Thom. 2003. *Systematic Approach to Coastal Ecosystem Restoration*. Prepared for: NOAA Coastal Services Center. Charleston, SC. by Battelle Marine Sciences Laboratory. Sequim, WA. Accessed 8/19/08.
<http://www.csc.noaa.gov/coastal/expert/pdf/systematic.pdf>

Division of Forestry. 2007. *Ten-year Resource Management Plan for the Tate's Hell State Forest, Franklin and Liberty counties*.

Division of Forestry and Florida Natural Areas Inventory. 2001. *Vegetation Management Guidelines: Tate's Hell State Forest*.

The Ramsar Convention on Wetlands, accessed 8/19/08.
http://www.ramsar.org/strp/strp_rest_principles.htm





Sedimentation Reduction/Elimination





Sedimentation Reduction/Elimination

Executive Summary

The following projects provide an opportunity to address erosion and sedimentation issues on existing infrastructure on state forests. Improvement of roads, bridges and low water crossings will help to protect, restore and maintain the quality and natural functions of Florida land, water and wetlands ecosystems.

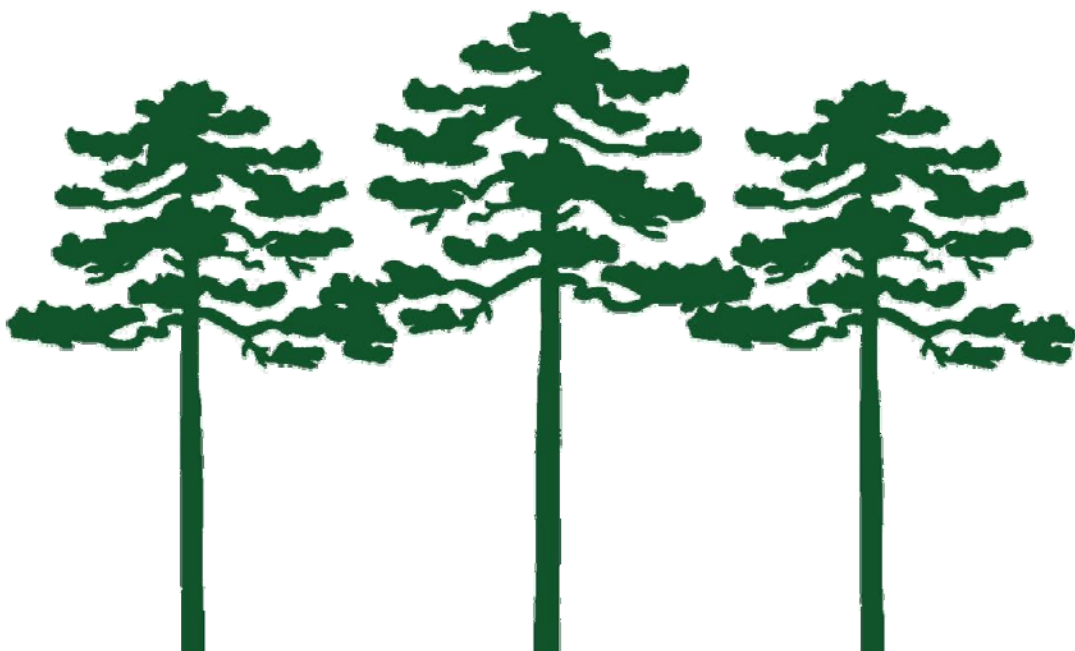
The proposed projects include:

- Replacement of open deck bridges, adding pavement and rock to roads, sloping of gully and steephead walls, berming and terracing for flow control and planting native vegetation to reduce significant sedimentation into streams, creeks and Blackwater River.
- To cap 15 miles of existing open forest roads with Florida Department of Transportation grade lime rock to stop the continued erosion of sand into the Waccasassa Bay Watershed.
- To improve approximately 24 miles of the primary and secondary road system in the Richloam Tract of the Withlacoochee State Forest by hardening with limerock and/or shell material to stabilize these roads, to bring roads that are currently below grade back up to grade or slightly above, and installation of culverts and low water crossings to facilitate or restore normal flows where needed.
- Replacement of the existing 45 year old Flag Ford Bridge with a larger foot span of 200 feet (current bridge is 150 foot span) to accommodate water flow underneath, as the current bridge restricts the tributary during high water events.

The estimated cost for all of the following sedimentation reduction/elimination projects is \$23,278,649.







Goethe State Forest 2013 Road Restoration



Project Name:

Goethe State Forest/2013 Road Restoration Project

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Bobby Cahal, Forestry Supervisor II, Goethe State Forest 9110 SE County Road 337
Dunnellon, FL. 34431 352-465-8568 Bobby.Cahal@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

See Attached Map

Project Description *(Describe all aspects of the project):*

The objective of this project is to cap 15 miles of existing open forest roads with Florida Department of Transportation grade lime rock to stop the continued erosion of sand into the Waccasassa Bay Watershed.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
\$555,000

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The primary objective of this proposal is to abate the threat of sedimentation caused by rutting of forest roads during wet seasons along road corridors into tributaries of Cow Creek located in the Waccasassa Bay Watershed.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

This project would provide an opportunity to address eroding of open forest roads which has been actively eroding since acquisition in 1994. Land use changes, tropical storms, and the nature of the sandy soils have accelerated conditions causing sedimentation at this site. The site is of biological importance due to its convergence into Cow Creek, Waccasassa Bay and finally into the Gulf of Mexico.



Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Access will be made easier to this part of Goethe State Forest. Access will benefit recreational users including hikers, bikers and equestrians, hunters, loggers and wildfire response. Part of the area is set aside for use by handicapped hunters.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

This proposal compliments other restoration efforts on GSF by the Florida Forest Service.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

Project will benefit the Goethe State Forest 10-year Management Plan.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

This project complies with all regulations.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Roads are graded on a regular basis and project will be ready to implement once the bidding for road materials is completed

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

This project could provide easier access to this area of Goethe State Forest by multiple use user groups.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

See attached map.





**Florida Department of Agriculture
and Consumer Services
Florida Forest Service
Goethe State Forest
2013 Road Restoration Project
15 miles**



Legend

— 2013 Road Improvements

CLASS

— Primary

— Secondary

- - - Service

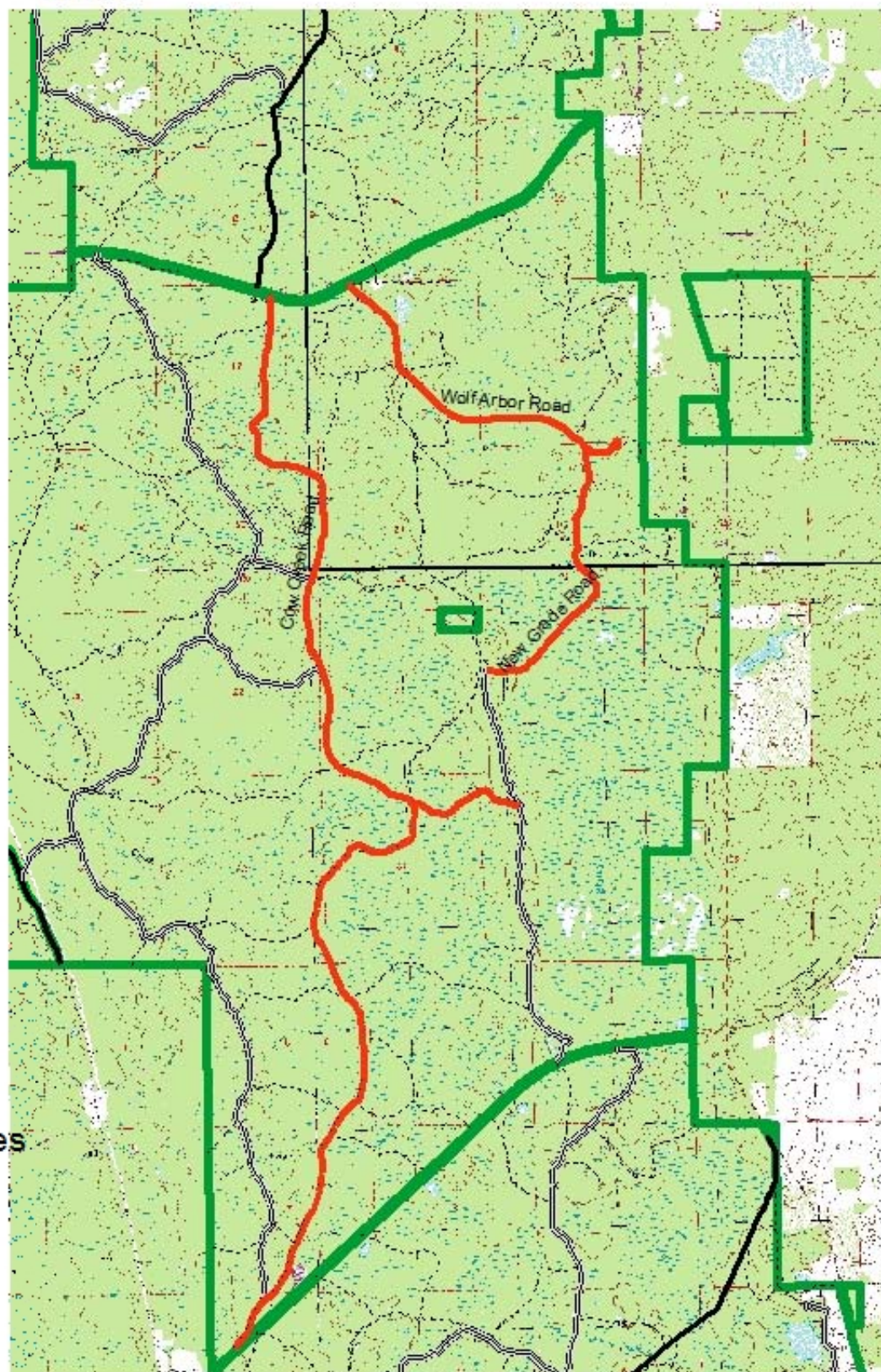
— GSF Boundary

This map is the product of the Florida Forest Service. There are no warranties made as to the fitness of this map for any unlisted purpose. Furthermore, no warranties are provided for data therein, its use, or its interpretation.

0 1 2 Miles



Created by: RRC
Date: March 6, 2013



Cost Appendix Sheet

Goethe State Forest/ 2013 Road Restoration Project

Cost Item

Cost Estimate

Planning

Contracts
Feasibility
Engineering, Design, Land Rights, & Bid Prep
Restoration Plan
Site Visits & Cost of Site Selection
Administration, Overhead, and Indirect
Other

Planning Subtotal:

Construction

Contracts \$450,000.00
Administration &
Mobilization/Demobilization \$105,000.00
Other

Construction Subtotal: \$550,000.00

Monitoring

Contracts
Data Collection
Monitoring Administration
Other

Monitoring Subtotal:

Project Cost

Supervision

Subtotal:

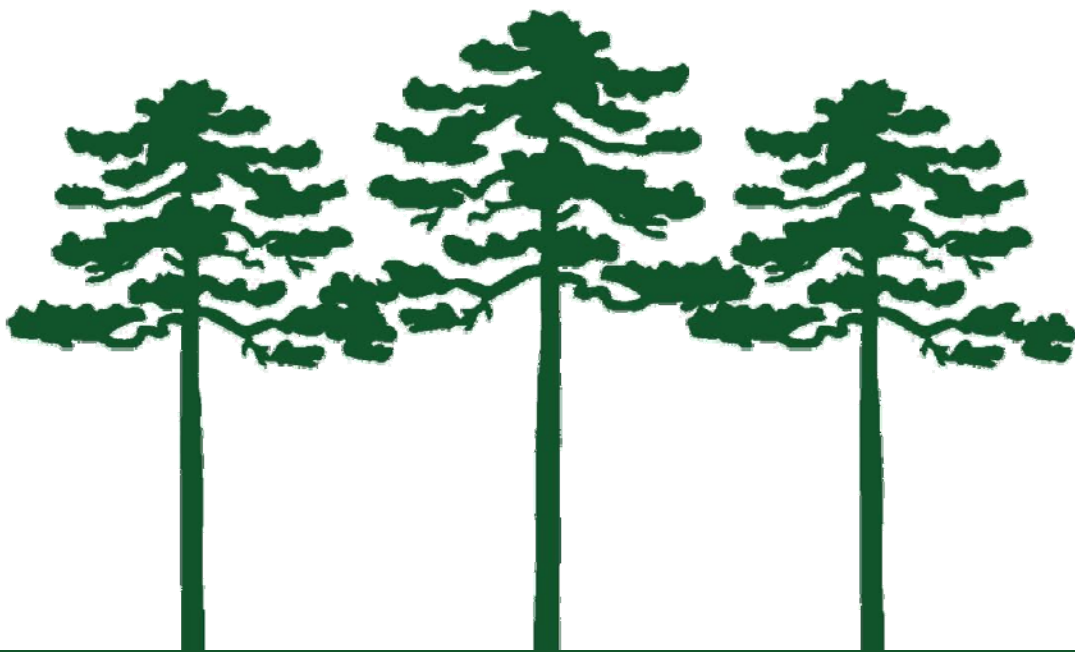
Contingency

Total: \$550,000.00

Estimated Costs by Year

Year1 \$550,000.00
Year2
Year3
Year4
Year5
Year6





Withlacoochee State Forest Richloam Road System Improvement



Project Name:

Richloam Road System Improvement

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Michael Penn, Resource Administrator, Withlacoochee Forestry Center; 15019 Broad Street, Brooksville FL 34601; 352.754.6777 x117; michael.penn@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

Richloam Tract, Withlacoochee State Forest, Sumter County, FL, Withlacoochee River Watershed.

Project Description *(Describe all aspects of the project):*

This series of projects will be to improve approximately 24 miles of the primary and secondary road system in the Richloam Tract of the Withlacoochee State Forest by hardening with limerock and/or shell material to stabilize these roads (See map). These projects will also include replacing old or damaged culverts and adding new culverts or low water crossings as necessary. The road work will be completed by Florida Forest Service personnel. This project will take place over three years, completing approximately eight miles per year. This is a continuation of a series of projects that have been ongoing for many years. The map shows portions that have been completed or partially completed as funding has become available.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*

The estimated the cost to complete the remaining project of 24 miles is \$840,000. This is based on an average cost of \$35,000 per mile to harden and improve a State Forest road. These costs are based on average costs from past projects. These costs include cost for limerock/shell, fuel costs for hauling the road material, maintenance on equipment, and cost of culverts and other road materials (geotextile, geoweb, rip rap, etc...). Private contractors may be used to haul road material.

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

The roads that have already been improved have been funded from a variety of sources but mostly coming from FFS budgets from past years. Culverts and low water crossings have been added to the area using Florida Department of Transportation mitigation funds and the work overseen by the Department of Environmental Protection. All road work will be done using FFS personnel.



Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

This project, or series of projects do not involve in special technologies other than the use of typical road building/maintenance equipment (Dozers, road graders, dump trucks, track hoes, and vibrating compactors). Past experience in this type of work have shown that improving these roads has greatly facilitated public access to the area, reduced erosion, and helped to re-establish normal water flow.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The area in question takes in a large portion of the headwaters of the Withlacoochee River. In many instances, normal sheet flow has been interrupted by the road system which was established many years ago. This project will bring roads that are currently below grade back up to grade or slightly above to restore sheet flow. Water handling structures such as culverts and low water crossings will be installed to facilitate or restore normal flows where needed. The environmental benefits from implementing these series of projects are numerous. This series of projects will greatly enhance the ability of various forest users to safely access the area which in turn will greatly reduce erosion resulting in less sedimentation into the Withlacoochee river. In addition, the completion of these projects will enhance the FFS ability to prescribe burn the area by providing a logical road infrastructure to work off of. This will result in the ability to safely burn more acres which will result in more acres being returned to a desired burn rotation more quickly.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The Richloam Tract of the Withlacoochee State Forest is managed for multiple use. Hunting, silvicultural activities, and grazing are the primary activities within this area. These activities all require a certain level of access. In addition, improved access will make it easier to effectively find and suppress wildfires that periodically occur in this area causing lost revenue and value to the timber resource. Economic benefits of these projects also include lower logging costs, reduced road maintenance, and higher recreational value and visitation to the area.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Once the project is complete, the area should be less susceptible to damaging effects from hurricanes and major rain events.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does*



or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):

The Florida Department of Environmental Protection has been implementing a hydrologic restoration project just to the North of these proposed projects known as the Baird Tract Restoration. This project involves establishing a series of ditch plugs and culverts/low water crossings in the area to restore the hydro-period in the swamps. The proposed projects will complement these activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

All Federal, State and local laws will be followed during the implementation of these projects.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

The current road system is already in place so implementation can begin as soon as funding is available.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

There is no known opposition to the improvement of these roads.

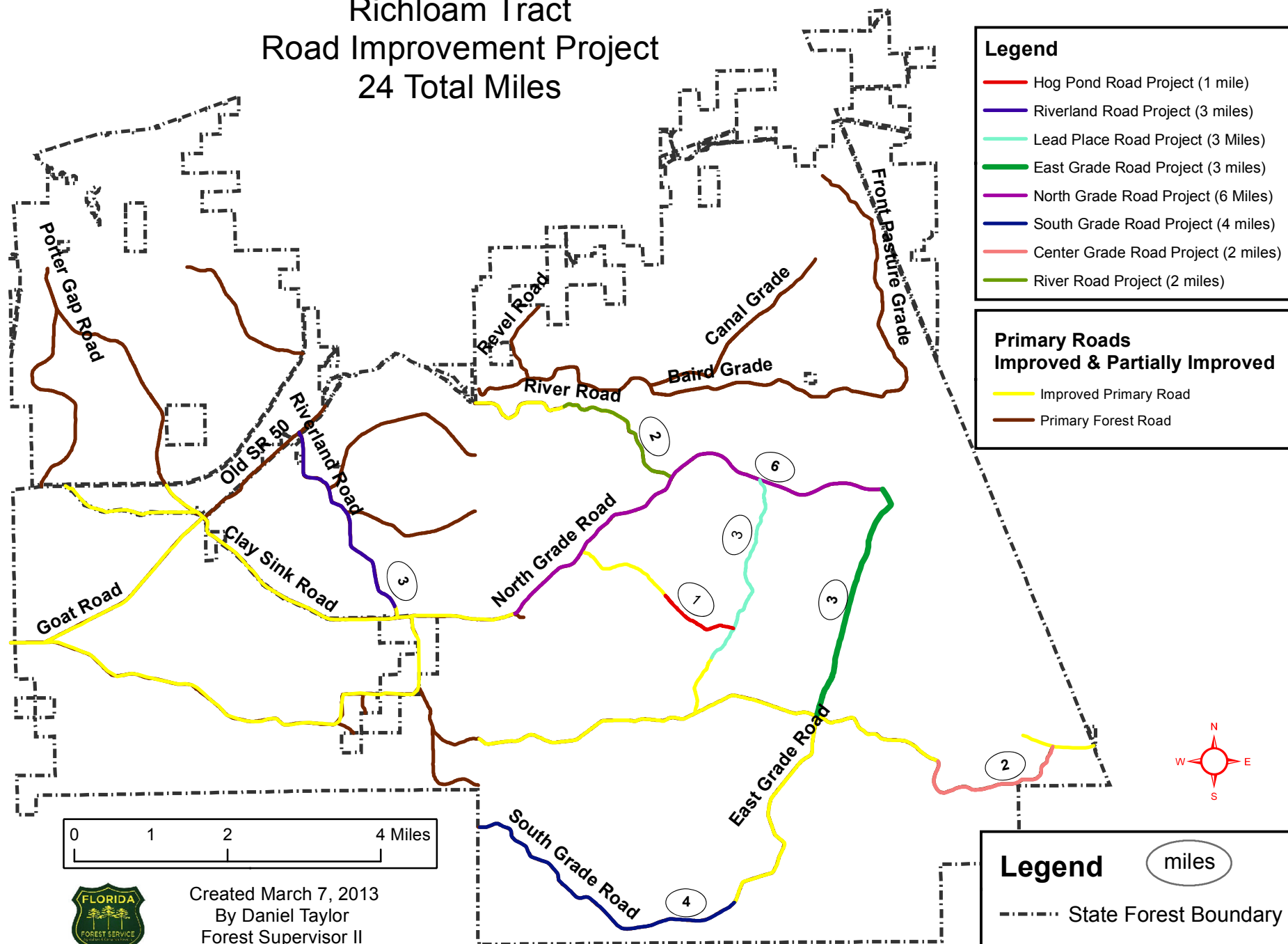
Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

See attached map.





Withlacoochee State Forest Richloam Tract Road Improvement Project 24 Total Miles



Created March 7, 2013
By Daniel Taylor
Forest Supervisor II



Cost Appendix Sheet

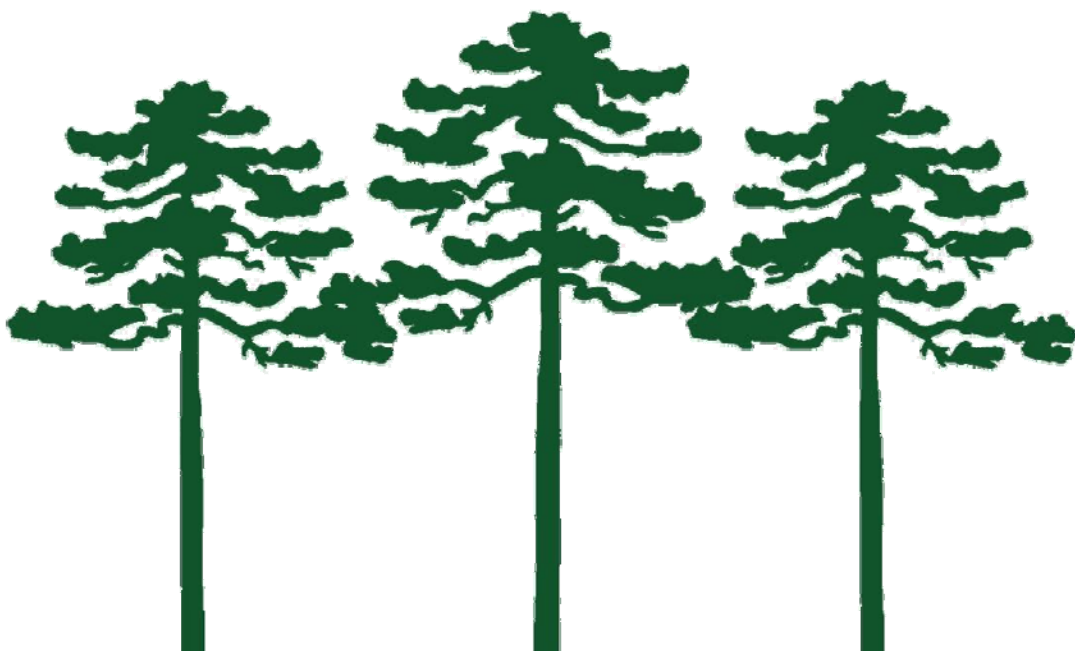
Cost Item	Cost Estimate
Planning	
Contracts	
Feasibility	
Engineering, Design, Land Rights & Bid Prep	
Restoration Plan	
Site Visits & Cost of Site Selection	
Administration, Overhead, and Indirect	
Other	
Planning Subtotal:	
Construction	
Contracts	
Administration & Mobilization/Demobilization	
Other	
Construction Subtotal:	
Monitoring	
Contracts	
Data Collection	
Monitoring Administration	
Other	
Monitoring Subtotal:	
Project Cost	
Supervision	
Subtotal:	
Contingency	
TOTAL:	

Estimated Costs by Year

Year 1	\$280,000
Year 2	\$280,000
Year 3	\$280,000
Year 4	
Year 5	
Year 6	







Withlacoochee State Forest Flag Ford Bridge Replacement



Project Name:

Flag Ford Bridge Replacement

Contact Information (Include at least one name, phone number, email address, and organization name if applicable):

Michael Penn, Resource Administrator, Withlacoochee Forestry Center; 15019 Broad Street, Brooksville FL 34601; 352.754.6777 x117; michael.penn@freshfromflorida.com

Project Location (Include a map, if possible, and the city, county, longitude/latitude, and watershed):

Richloam Tract, Withlacoochee State Forest, Sumter County, FL, Withlacoochee River Watershed.

28.30.11.00 N 82.01.01.93 W

Project Description (Describe all aspects of the project):

Engineer a new bridge to replace existing Flag Ford Bridge which was originally built in 1968. In addition we plan for the new bridge to be increased to 200 feet (current bridge is 150 foot span) to accommodate water flow underneath as the current bridge restricts the tributary during high water events. This current bridge is in need of replacing in the very near future. DOT inspections have reduced the weight limit to 3 tons and is close to being condemned. This is a major access point into the Richloam Tract of the Withlacoochee State Forest. When this bridge is condemned, access will be severely reduced into the area. Engineering and construction for this project will be contracted out.

Estimated Project Costs (Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):

Rough estimates gained by talking to others that have recently done projects of this type, we estimate the cost to be \$800,000.

Other Funding (Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):

State/Federal Grants]:

None

Technical Feasibility (Describe the technologies involved and any relevant past experience or proven success with similar projects):

This project is technically feasible as is the construction of any bridge. No untried or new technologies are anticipated.



Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Environmental benefits will include an elimination of the restriction in the waterway caused by the current bridge.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

This project will help secure continued access to the State Forest through this major access road. Safety will be improved for hunters, and other recreational forest users. Access for wildland firefighting equipment will make a larger part of the forest accessible for wildfire control.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The current bridge will not likely withstand a major rain or hurricane event and may be condemned by the DOT at any time.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

None

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

All Federal, State and local laws will be followed during the implementation of this project.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Engineering and permitting will have to take place before actual construction of a new bridge.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

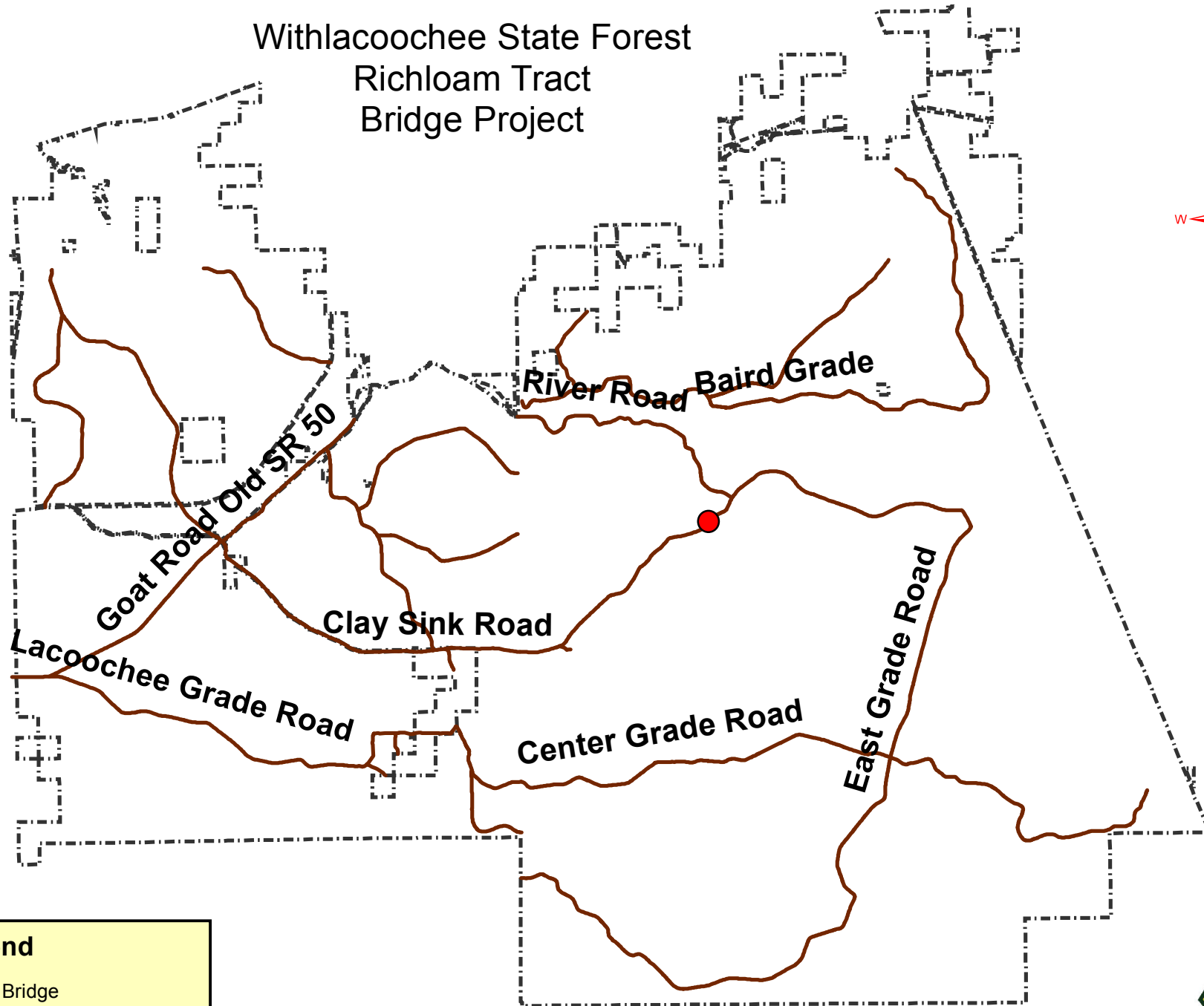
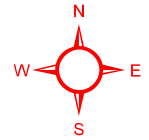
There is no known opposition to this project.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

See attached map.

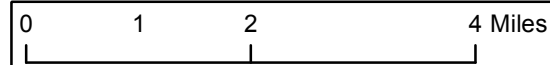


Withlacoochee State Forest
Richloam Tract
Bridge Project



Legend

-  Bridge
-  Primary Forest Roads
-  State Forest Boundary





Cost Appendix Sheet

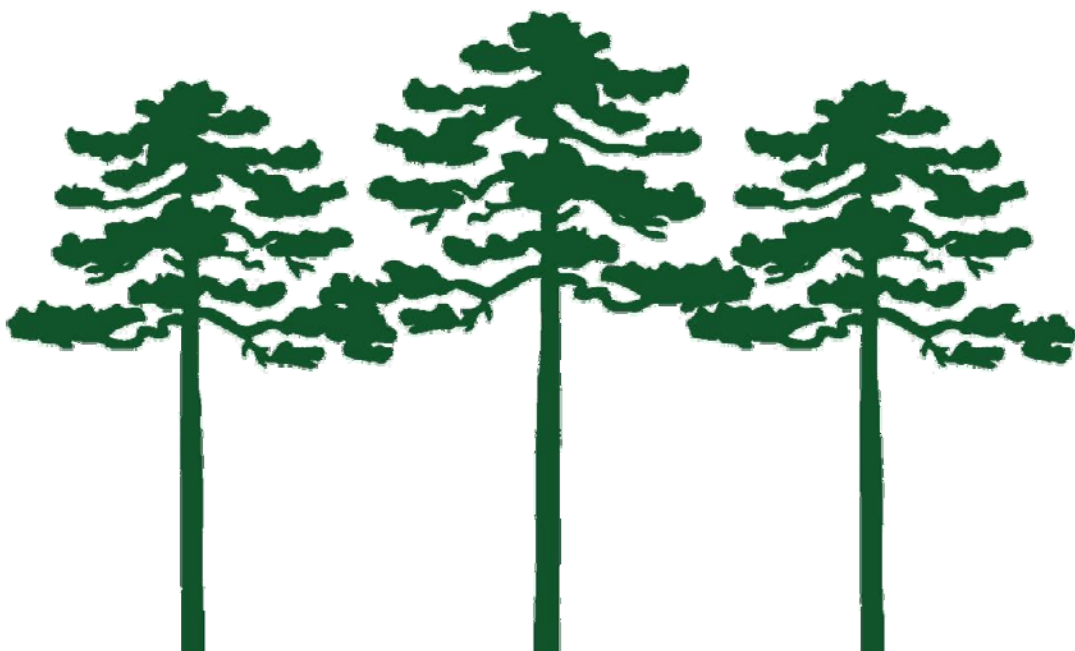
Cost Item	Cost Estimate
Planning	
Contracts	
Feasibility	
Engineering, Design, Land Rights & Bid Prep	\$100,000
Restoration Plan	
Site Visits & Cost of Site Selection	
Administration, Overhead, and Indirect	
Other	
Planning Subtotal:	\$100,000
Construction	
Contracts	\$700,000
Administration &	
Mobilization/Demobilization	
Other	
Construction Subtotal:	\$700,000
Monitoring	
Contracts	
Data Collection	
Monitoring Administration	
Other	
Monitoring Subtotal:	
Project Cost	\$800,000
Supervision	
	Subtotal:
Contingency	
	TOTAL:

Estimated Costs by Year

Year 1	\$100,000
Year 2	\$700,000
Year 3	
Year 4	
Year 5	
Year 6	







Blackwater River State Forest Sedimentation Reduction/Elimination



Blackwater River State Forest

***Sedimentation Reduction/Elimination by Replacement of Open Deck Bridges,
Addition of Pavement or Rock to Roads and Bridge Approaches,
and Restoration or Stabilization of Gullies***

Executive Project Summary

There are areas within the bounds of Blackwater River State Forest (BRSF) that have experienced significant sedimentation into streams, creeks and Blackwater River.

All the tributaries of Blackwater River join together just North of Eglin Air Force Base and East of Naval Air Station Whiting Field and eventually flow into the Gulf of Mexico; therefore, any sediment generated within BRSF becomes part of environmental problems for the Gulf.

Blackwater River watershed is one of the last remaining shifting white sand bottom river systems in its natural state in the world. Sections of the river have been designated as an Outstanding Florida Water and as a Florida Canoe Trail; in fact the area was designated by the Florida Legislature as the State Canoe Capitol. Attendance at Blackwater River State Forest averages nearly 100,000 visitors per year. Each canoe rental business within the forest could book as many as 300 visitors on their busiest days.

The erosion and sediments develop in the following areas of the Forest;

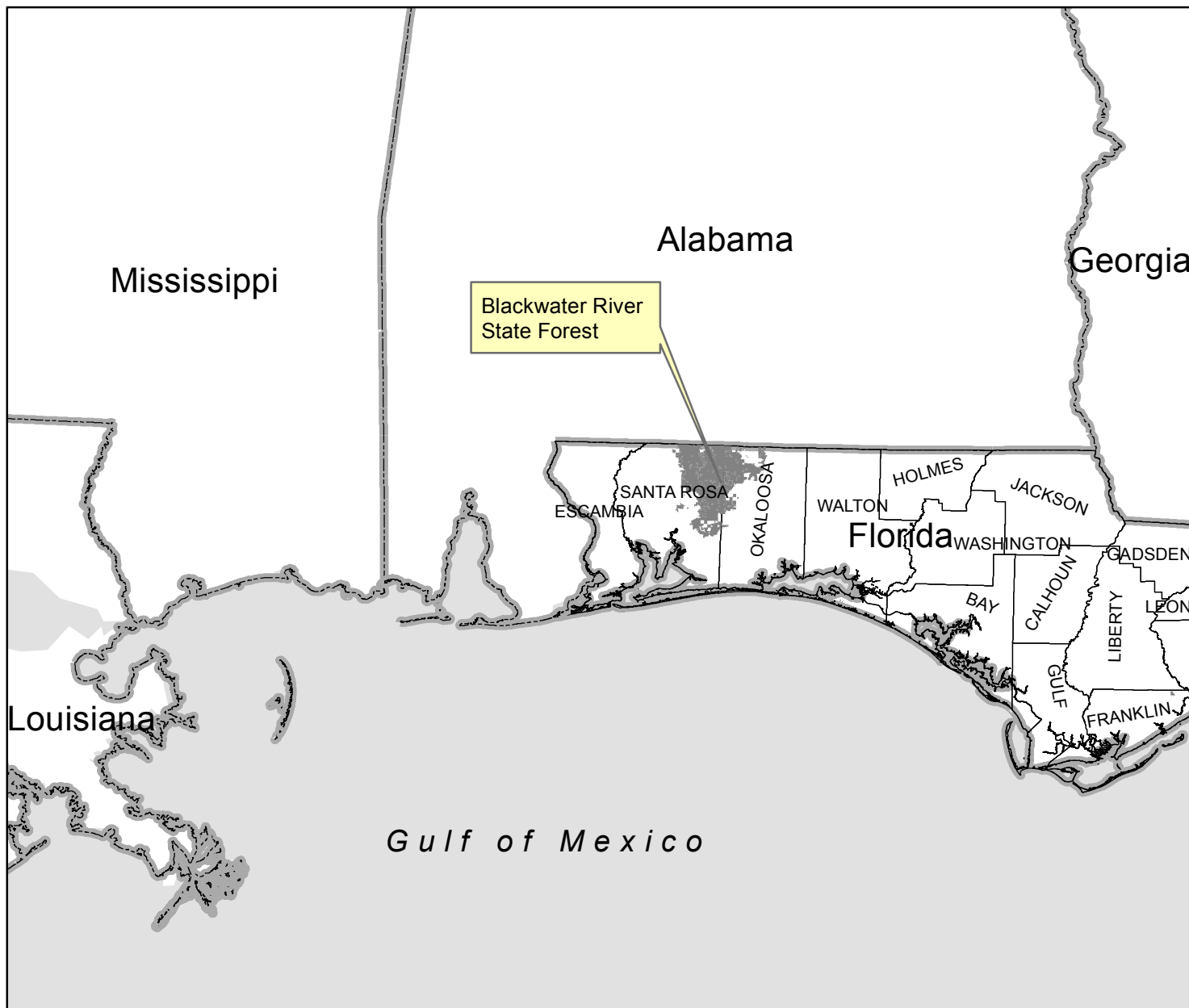
- Open deck bridges in several areas on the forest. These bridges allow sediment carried by vehicles and from the adjacent banks to be deposited into the rivers, creeks, and streams in the watershed.
- Unpaved roads with both sandy soils and those with significant fines contribute to the sediment deposits via open deck bridges, low-water crossings, and culverts.
- Borrow pits that have erosion protection measures that have failed due to heavy rainfall or unauthorized recreational activity.
- Significant erosion generated in a collection basin adjacent to I-10 in Yellow River area known as Julian Mill.
- Tommy Eiland and Penny Creek/Red Wash along steeply sloping dirt roadways that have been previously closed.
- Lower Blackwater River Steepheads and steep sloping roadways that are eroding into the river.

The proposed projects will include replacing open deck bridges, adding pavement and rock to roads, sloping of gully and steephead walls, berming and terracing for flow control and planting native vegetation.

The estimated cost including contingencies to undertake restoration in these areas is \$21,083,649.







0 25 50 75 100 Miles

Central Gulf Coast and the Florida Panhandle





Bridge Replacement Blackwater River State Forest



Project Name:

Bracken Bridge Replacement (584116)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 1.0 miles east of Belandville Road and 8.73 miles north of State Hwy. 4 or 30°58'53"N 86°49'58"W.

Project Description *(Describe all aspects of the project):*

Bracken Bridge is located in Santa Rosa County Florida and crosses Reedy Creek approximately 1.0 miles east of Belandville Road and 8.73 miles north of State Hwy. 4 in Blackwater River State Forest (BRSF). Reedy Creek is a tributary of the Sweetwater Creek which discharges in to the Blackwater River. Blackwater River is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting timber girders and a timber deck. The existing bridge allows sediment carried by vehicles to be deposited into Reedy Creek via cracks in between the timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

Replacing the existing timber bridge will reduce sediment in the Reedy Creek. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane unpaved public road over Reedy Creek on Bracken Road in Santa Rosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. The new bridge will decrease sediment in the Reedy Creek and increase the spacing between support piling from 12 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*

Bracken Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest

The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$220,000.

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Reedy Creek and on into Sweetwater Creek via the openings in the timber deck bridge. In addition, the headwalls of this structure are failing and allowing backfill to enter the channel.

Furthermore, the new bridge would clear span the creek verses 12' between the existing pile bents. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Bracken Road which is unpaved.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

Due to the location of this bridge there will be a detour during construction. With the need for services and recreation access during hunting season, the project should be scheduled to be completed prior to hunting season.

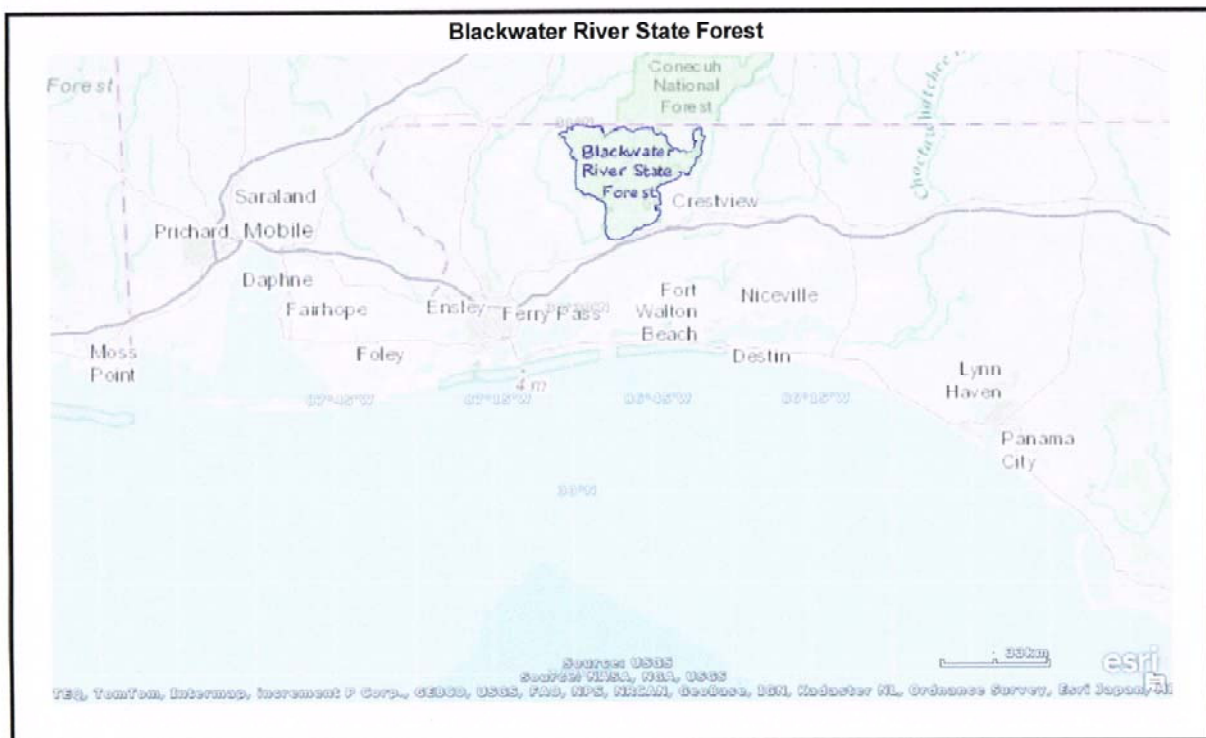
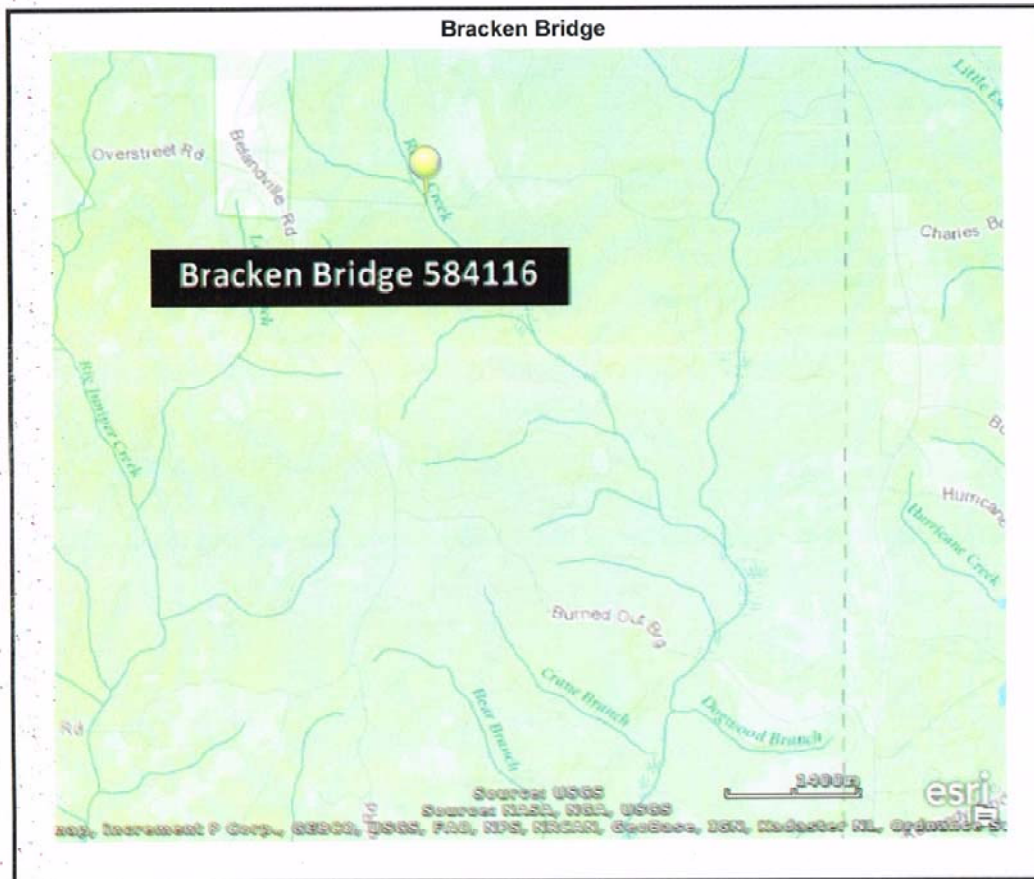
Public Acceptance (Describe any known or potential public approval or opposition to the project):

The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during hunting season.

Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

The existing structure is not high enough to provide free board during major rain events. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.

Bracken Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Bracken Bridge 584116

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$16,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$27,000.00
Construction	
Contracts	\$106,000.00
Administration & Mobilization/Demobilization	\$39,000.00
Other	
Construction Subtotal:	\$145,000.00
Monitoring	
Contracts	\$10,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$2,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$18,000.00
Project Cost	
Supervision	\$10,000.00
Subtotal:	\$10,000.00
Contingency	\$20,000.00
Total:	\$220,000.00

Estimated Costs by Year

Year1	\$20,000.00
Year2	\$200,000.00
Year3	
Year4	
Year5	
Year6	



Project Name:

Camp Henderson Bridge Replacement (584106)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 3.0 miles east of Hwy 87 in Berrydale and 2.6 miles north of State Hwy. 4 or 30°58'47"N 86°59'21"W.

Project Description *(Describe all aspects of the project):*

Camp Henderson Bridge is located in Santa Rosa County Florida and crosses Dixon Creek approximately 3.0 miles east of Hwy 87 in Berrydale and 2.6 miles north of State Hwy. 4 in Blackwater River State Forest (BRSF). Dixon Creek discharges via the Coldwater Creek into the Blackwater River (an Outstanding FL Water), and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is 53 years old and is constructed of 1940s military surplus open grate metal Treadway® panels with timber caps and pilings. The existing bridge allows sediment carried by vehicles to be deposited into Dixon Creek via the open deck metal bridge. In addition, the headwalls of this structure are failing and allow backfill to enter the creek bed. Furthermore, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has been in excess of three feet below the water level after major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane paved public road over Dixon Creek on Camp Henderson Road in Santa Rosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in Dixon Creek and increase the spacing between support piling from 11 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$352,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Dixon Creek via the open deck metal bridge. In addition, the headwalls of this structure are failing and allowing backfill to enter the creek bed. Some bridge pilings from the previous structure in this location are still in the flood plain. They would be removed during the construction process. In addition, the new bridge would have forty foot spacing between pile bents verses eleven foot between the existing pile bents. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires a significant amount of maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Camp Henderson Road which is unpaved and serves as an east to west route through a northern portion of BRSF.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.



Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no know conflicts as this will be a replacement to an existing structure.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

Due to the location of this bridge there will be a detour during construction. With the need for services and recreation access during hunting season, the project should be scheduled to be completed prior to hunting season.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

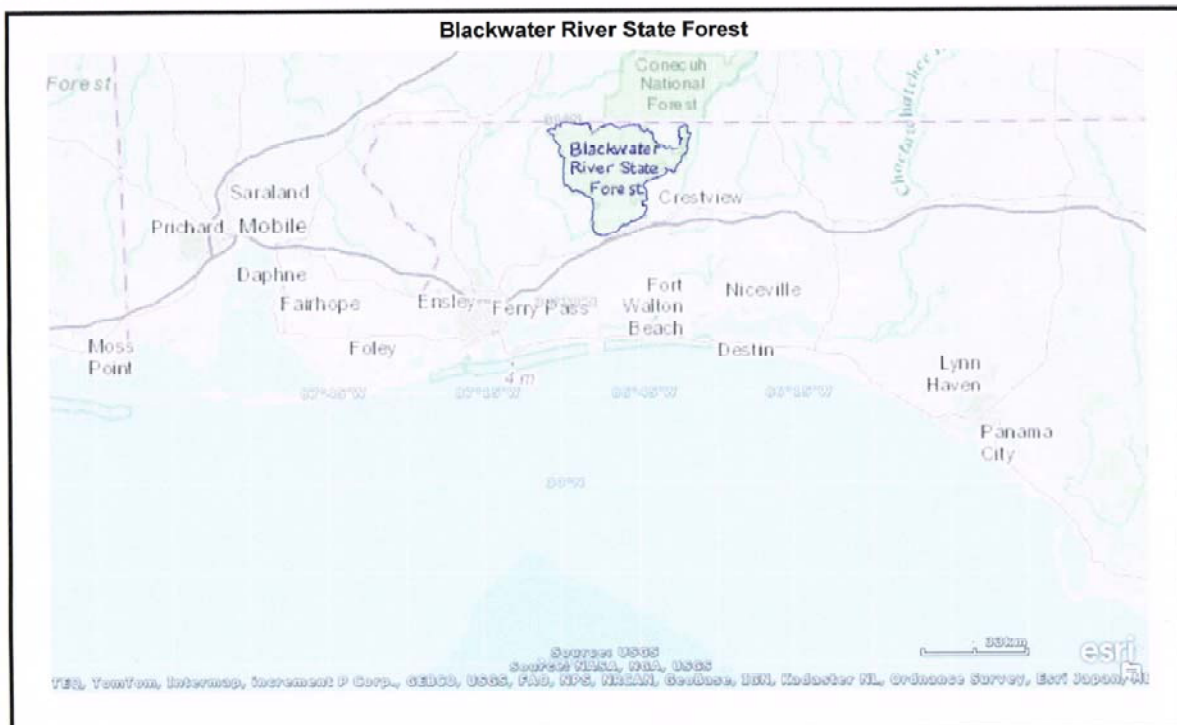
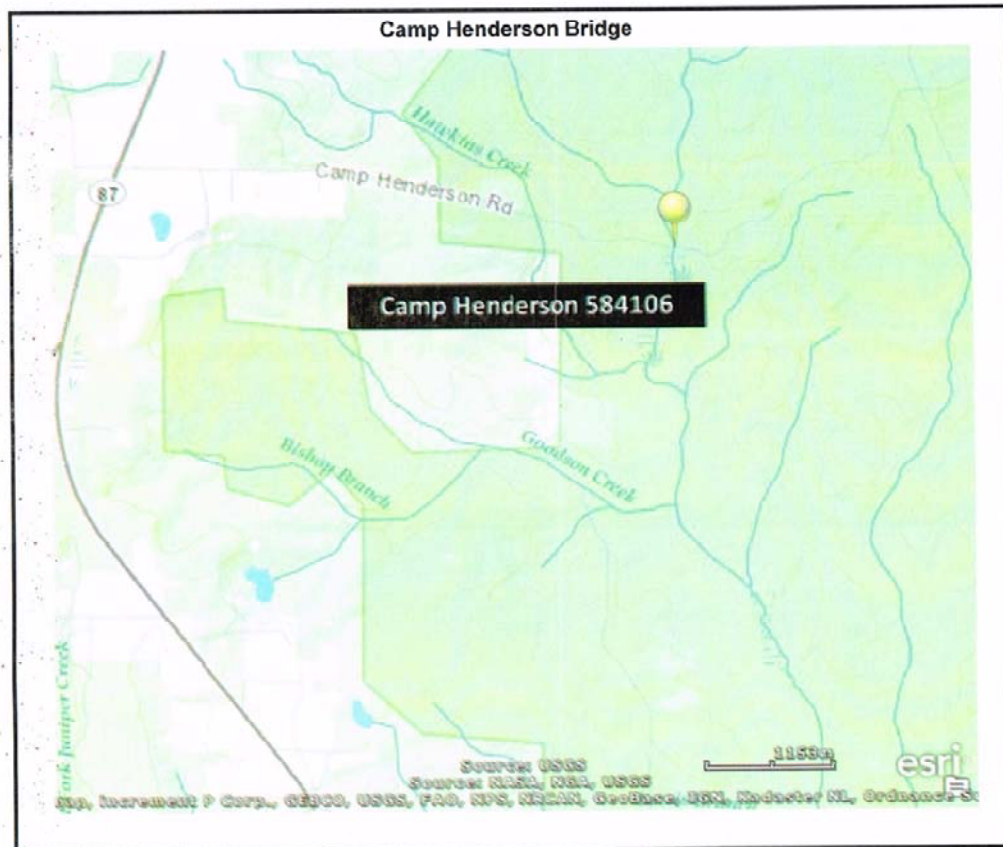
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during hunting season.

Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

The existing structure is not high enough to provide free board during major rain events. This structure has been completely submerged several times. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Camp Henderson Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Camp Henderson 584106

Cost Item	Cost Estimate
Planning	
Contracts	\$4,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$16,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$29,000.00
Construction	
Contracts	\$245,000.00
Administration & Mobilization/Demobilization	\$39,000.00
Other	
Construction Subtotal:	\$284,000.00
Monitoring	
Contracts	\$14,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$3,500.00
Other	\$3,500.00
Monitoring Subtotal:	\$25,000.00
Project Cost	
Supervision	\$14,000.00
Subtotal:	\$14,000.00
Contingency	
Total:	\$352,000.00

Estimated Costs by Year

Year1	\$52,000.00
Year2	\$300,000.00
Year3	
Year4	
Year5	
Year6	





Project Name:

Camp Henderson Bridge #2 Replacement (580803)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 2.3 miles east of Hwy 87 in Berrydale and 5.7 miles north of State Hwy. 4 or 30°58'56"N 86°60'07"W.

Project Description *(Describe all aspects of the project):*

Camp Henderson #2 Bridge is located in Santa Rosa County Florida and crosses Hawkins Branch approximately 2.3 miles east of Hwy 87 in Berrydale and 5.7 miles north of State Hwy. 4 in Blackwater River State Forest (BRSF). Hawkins Branch is a tributary of the Coldwater Creek which discharges in to the Blackwater River. Blackwater River is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting timber girders and a timber deck. The existing bridge allows sediment carried by vehicles to be deposited into Hawkins Branch via cracks in between the timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane unpaved public road over Hawkins Branch on Camp Henderson Road in Santa Rosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Hawkins Branch and increase the spacing between support piling from 11 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$220,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Hawkins Branch and on into Coldwater Creek via the openings in the timber deck bridge. In addition, the headwalls of this structure are failing and allowing backfill to enter the channel. Furthermore, the new bridge would span the entire branch verses eleven foot between the existing pile bents. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Camp Henderson Road which is unpaved and serves as an east to west route through a northern portion of BRSF.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*



Camp Henderson #2 Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest

All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Due to the location of this bridge there will be a detour during construction. With the need for services and recreation access during hunting season, the project should be scheduled to be completed prior to hunting season.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

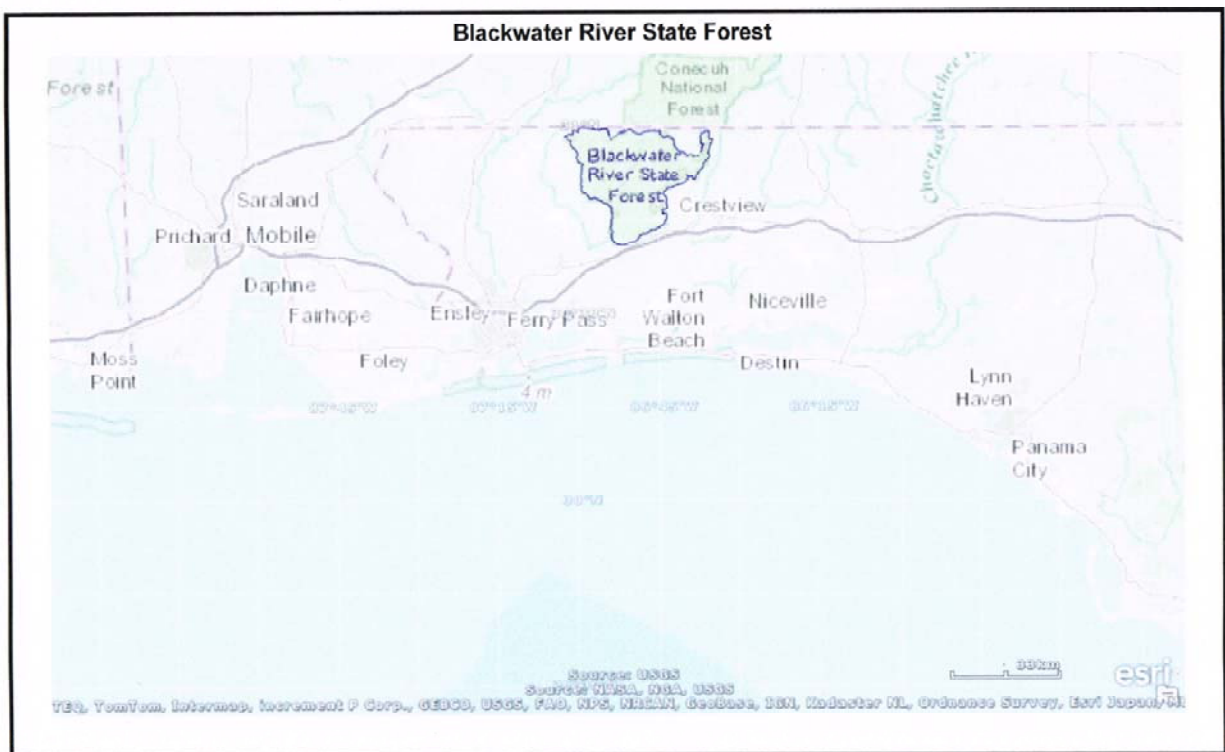
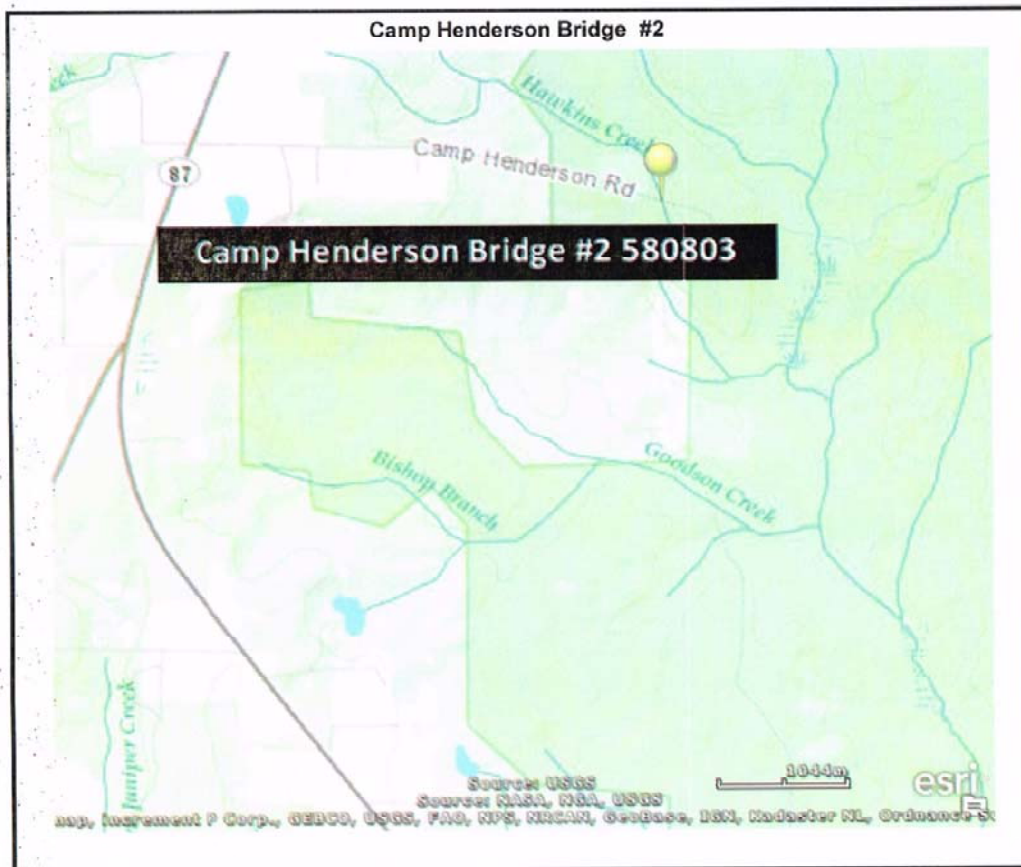
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during hunting season.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

The existing structure is not high enough to provide free board during major rain events. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Camp Henderson #2 Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Camp Henderson #2 584803

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$16,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$27,000.00
Construction	
Contracts	\$106,000.00
Administration & Mobilization/Demobilization	\$39,000.00
Other	
Construction Subtotal:	\$145,000.00
Monitoring	
Contracts	\$10,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$2,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$18,000.00
Project Cost	
Supervision	\$10,000.00
	Subtotal: \$10,000.00
Contingency	\$20,000.00
	Total: \$220,000.00

Estimated Costs by Year

Year1	\$220,000.00
Year2	
Year3	
Year4	
Year5	
Year6	





Project Name:

Charles Booker Line Branch Bridge Replacement (570804)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 1.3 miles east of Beaver Creek Hwy. and 3.5 miles north of Kennedy Bridge Road or 30°58'45"N 86°45'33"W.

Project Description *(Describe all aspects of the project):*

Charles Booker Bridge is located in Okaloosa County Florida and crosses Line Branch approximately 1.3 miles east of Beaver Creek Hwy. and 3.5 miles north of Kennedy Bridge Road in Blackwater River State Forest (BRSF). Line Branch is a tributary of the Blackwater River. Blackwater River is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting timber girders and a timber deck. The existing bridge allows sediment carried by vehicles to be deposited into Line Branch via cracks in between the timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane unpaved public road over the Line Branch, a tributary of the Blackwater River on Charles Booker Road in Okaloosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Line Branch and increase the spacing between support piling from 11.8 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$220,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Line Branch and then the Blackwater River via the openings in the timber deck bridge. In addition, the headwalls of this structure are damaged and allowing backfill to enter the channel.

Furthermore, the new bridge would clear span the branch as opposed to an 11.8' spacing between pilings on the existing bridge. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Charles Booker Road which is currently unpaved.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities. In addition, this project will complement a recently approved FDEP 319 Grant for paving on portions of Charles Booker Road.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*



All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Due to the location of this bridge there will be a detour during construction. The FDEP 319 Grant work will begin in the third quarter of 2013; however, we do have some flexibility in the start date for this grant. Contractors could likely begin work within 90-120 days of approval of this project. Permitting through the Northwest Florida Water Management District would take less than two weeks. No other permits would be required under FFS's existing silviculture permit.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

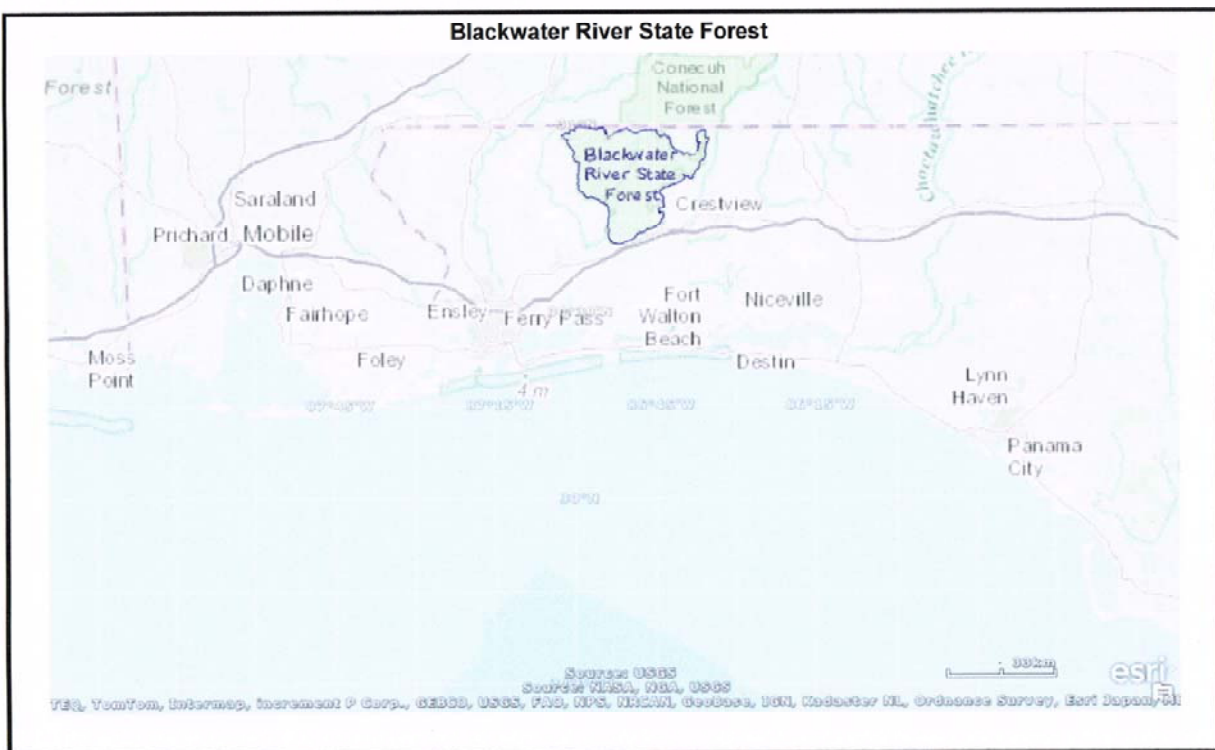
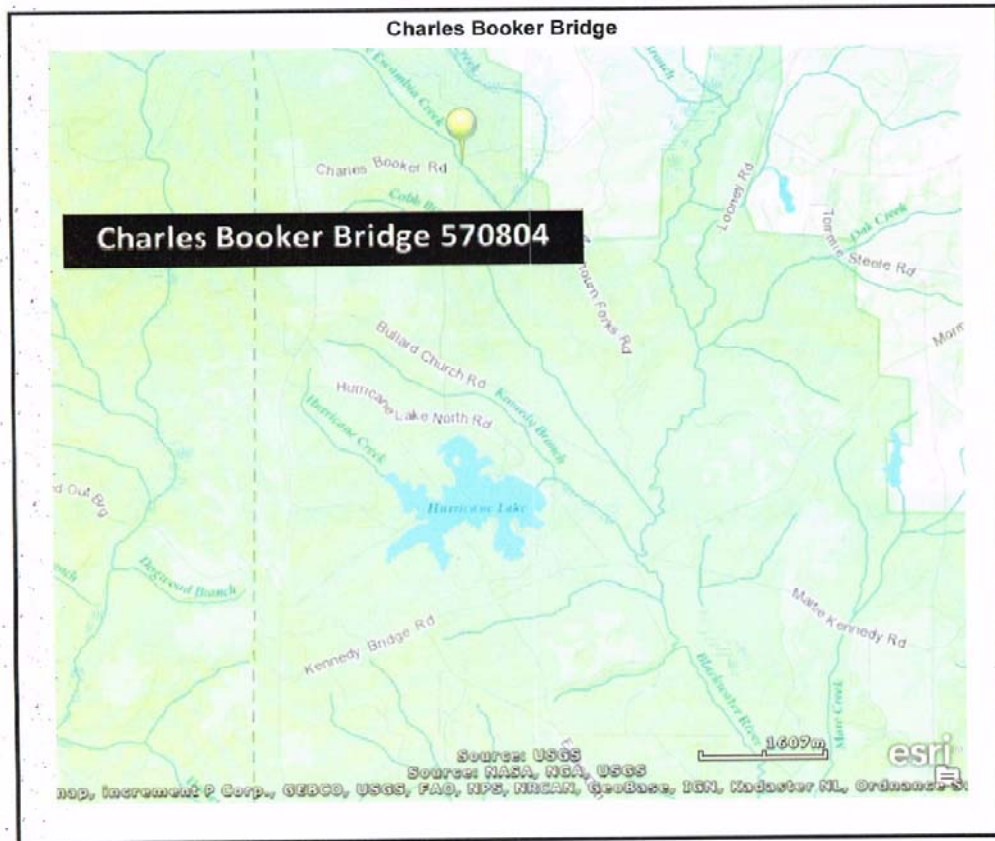
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They are already aware of the 319 paving work and it would be the ideal time to replace the bridge.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

The existing structure is not high enough to provide free board during major rain events. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Charles Booker Bridge Replacement Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Charles Booker 570804

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$16,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$27,000.00
Construction	
Contracts	\$106,000.00
Administration & Mobilization/Demobilization	\$39,000.00
Other	
Construction Subtotal:	\$145,000.00
Monitoring	
Contracts	\$10,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$2,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$18,000.00
Project Cost	
Supervision	\$10,000.00
Subtotal:	\$10,000.00
Contingency	\$20,000.00
Total:	\$220,000.00

Estimated Costs by Year

Year1	\$20,000.00
Year2	\$200,000.00
Year3	
Year4	
Year5	
Year6	





Project Name:

Chessher Bridge Replacement (570802)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 0.1 miles west of Hwy 180 and 10 miles north of State Hwy. 4 in Blackwater River State Forest (BRSF), or 30°59'21"N 86°43'14"W.

Project Description *(Describe all aspects of the project):*

Chessher Bridge is located in Okaloosa County Florida and crosses the Blackwater River approximately 0.1 miles west of Hwy 180 and 10 miles north of State Hwy. 4 in Blackwater River State Forest (BRSF) in Blackwater River State Forest (BRSF). The Blackwater River is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting timber girders and a timber deck. The existing bridge allows sediment carried by vehicles to be deposited into the Blackwater River via cracks in between the timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane unpaved public road over the Blackwater River on Charles Booker Road in Okaloosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Blackwater River and increase the spacing between support piling from 12 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$494,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into the Blackwater River via the openings in the timber deck bridge. In addition, the headwalls of this structure are damaged and allowing backfill to enter the channel. Furthermore, the new bridge would utilize a 40' spacing between pilings as opposed to a 12' spacing between pilings on the existing bridge. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Charles Booker Road which is currently unpaved.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities. In addition, this project will complement a recently approved FDEP 319 Grant for paving on portions of Charles Booker Road.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*



All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Due to the location of this bridge there will be a detour during construction. The FDEP 319 Grant work will begin in the third quarter of 2013; however, we do have some flexibility in the start date for this grant. Contractors could likely begin work within 90-120 days of approval of this project. Permitting through the Northwest Florida Water Management District would take less than two weeks. No other permits would be required under FFS's existing silviculture permit.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

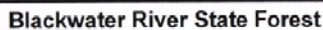
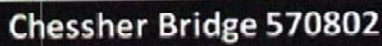
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They are already aware of the 319 paving work and it would be the ideal time to replace the bridge.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

The existing structure is not high enough to provide free board during major rain events. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Chessher Bridge 570802

Cost Item	Cost Estimate
Planning	
Contracts	\$4,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$20,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$33,000.00
Construction	
Contracts	\$354,000.00
Administration & Mobilization/Demobilization	\$49,000.00
Other	
Construction Subtotal:	\$403,000.00
Monitoring	
Contracts	\$12,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$4,000.00
Other	\$3,000.00
Monitoring Subtotal:	\$23,000.00
Project Cost	
Supervision	\$10,000.00
Subtotal:	\$10,000.00
Contingency	\$25,000.00
Total:	\$494,000.00

Estimated Costs by Year

Year1	\$494,000.00
Year2	
Year3	
Year4	
Year5	
Year6	





Project Name:

Forest Road R114 Bridge Replacement (570814)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is located at T5N, R25W, SEC26 in Blackwater River State Forest on Forest Road R114. R114 crosses Mare Creek approximately 1.0 mile west of Sherman Kennedy Road and 2.0 miles north of State Hwy. 4 in Blackwater River State Forest (BRSF), or 30°54'17"N 86°42'58"W.

Project Description *(Describe all aspects of the project):*

Forest Road R114 Bridge is located in Okaloosa County Florida and crosses Mare Creek approximately 1.0 miles west of Sherman Kennedy Road and 2.0 miles north of State Hwy. 4 in Blackwater River State Forest (BRSF). Mare Creek discharges via the Blackwater River (an Outstanding FL Water), and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed of FDOT surplus open grate metal Bailey bridge panels with timber caps and pilings. The existing bridge allows sediment carried by vehicles to be deposited into Mare Creek via the open deck metal bridge. In addition, the headwalls of this structure are failing and allow backfill to enter the creek bed. Furthermore, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The metal remediation to maintain this structure requires sandblasting and painting in place and provides potential for environmental concerns.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane road over Mare Creek on River Road in Okaloosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in Mare Creek and span the entire channel where the existing bridge has timber pilings in the channel that catch drift. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$352,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Mare Creek via the open deck metal bridge. In addition, the metal superstructure of this bridge has significant corrosion allowing rust to enter the creek bed. Metal remediation via sandblasting and painting in place provides potential for environmental concerns. The existing treated timber piles are spaced at 22'. They would be removed during the construction process, and the new bridge would free span the creek. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires a significant amount of maintenance and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on River Road which is unpaved.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*



Forest Road R114 Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest

All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no know conflicts as this will be a replacement to an existing structure.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Due to the location of this bridge there will be a detour during construction.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

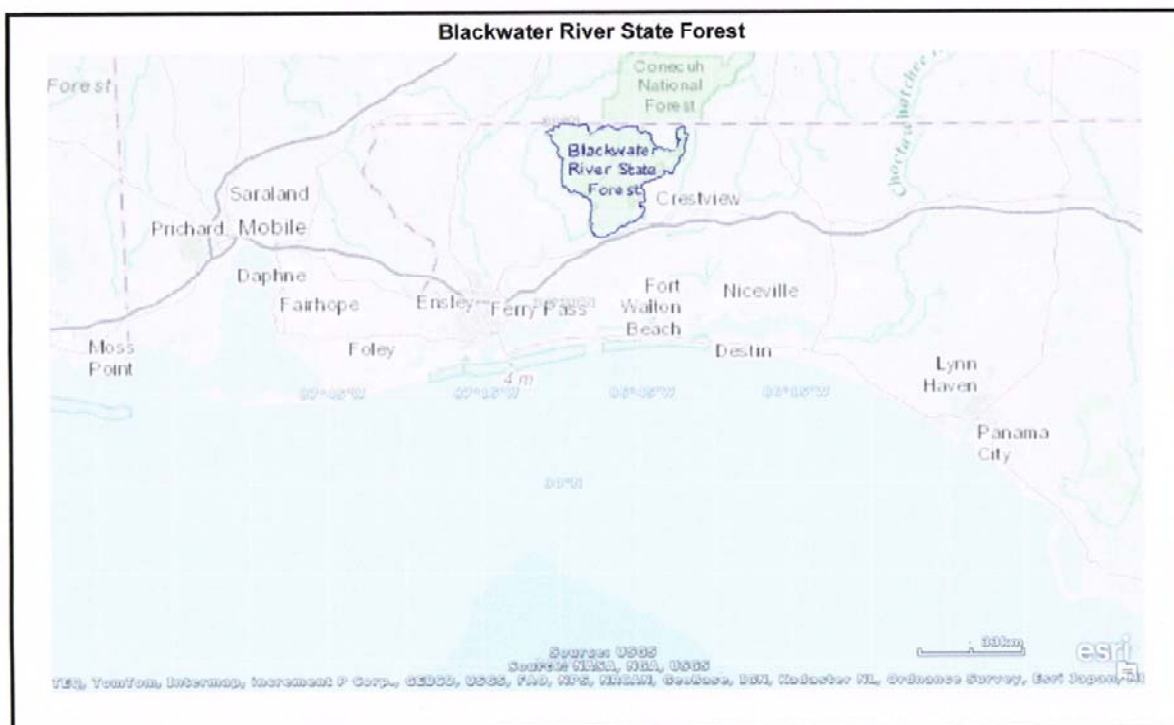
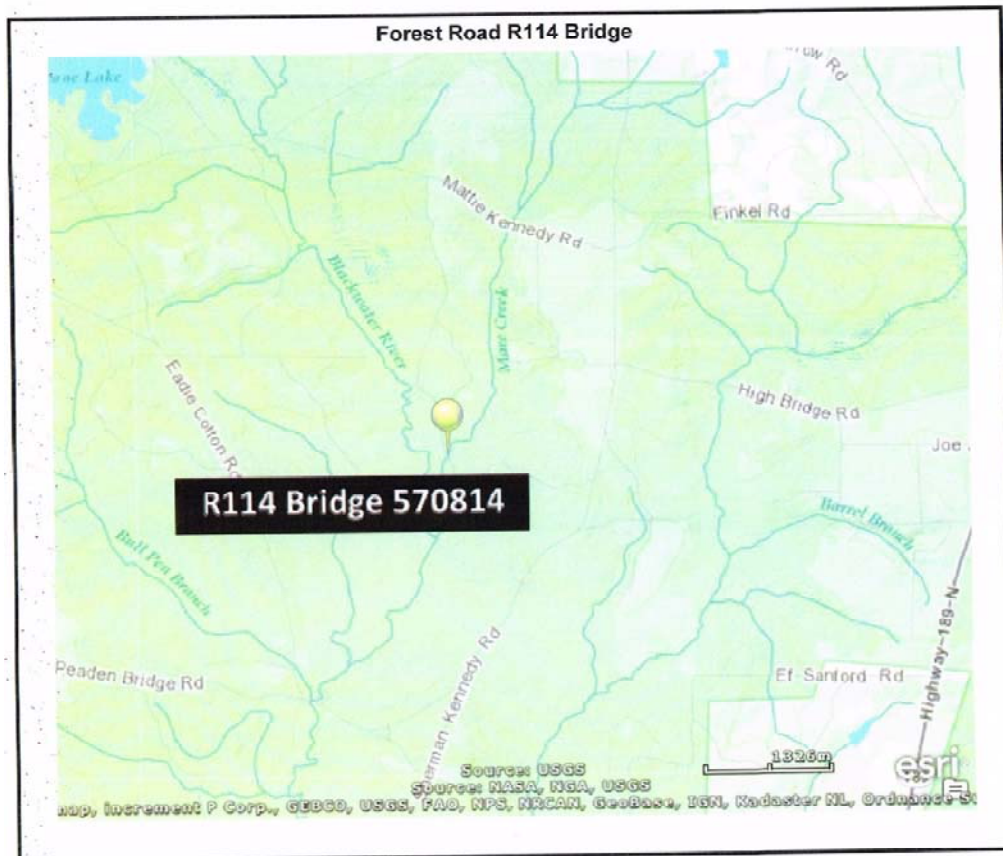
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

The existing structure is not high enough to provide free board during major rain events. This structure has been completely submerged several times. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Forest Road R114 Bridge Replacement Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Forest Road R114 570814

Cost Item	Cost Estimate
Planning	
Contracts	\$4,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$16,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$29,000.00
Construction	
Contracts	\$216,000.00
Administration & Mobilization/Demobilization	\$39,000.00
Other	
Construction Subtotal:	\$255,000.00
Monitoring	
Contracts	\$10,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$2,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$18,000.00
Project Cost	
Supervision	\$10,000.00
Subtotal:	\$10,000.00
Contingency	\$40,000.00
Total:	\$352,000.00

Estimated Costs by Year

Year1	\$45,000.00
Year2	\$307,000.00
Year3	
Year4	
Year5	
Year6	





Project Name:

Friendship Bridge Replacement (580811)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 0.75 miles east of Gordon Land Road in Berrydale and 1.3 miles south of State Hwy. 4 or 30°52'10"N 86°58'35"W.

Project Description *(Describe all aspects of the project):*

Friendship Bridge is located in Santa Rosa County Florida and crosses Surveyors Creek approximately 0.75 miles east of Gordon Land Road in Berrydale and 1.3 miles south of State Hwy. 4 in Blackwater River State Forest (BRSF). Surveyors Creek is a tributary of the Coldwater Creek which discharges in to the Blackwater River. Blackwater River is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting steel girders and a timber deck. The existing bridge allows sediment carried by vehicles to be deposited into Surveyors Creek via cracks in between the timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane unpaved public road over Surveyors Creek on Friendship Road in Santa Rosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Surveyors Creek and increase the spacing between support piling from 25 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$580,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Surveyors Creek and on into Coldwater Creek via the openings in the timber deck bridge. In addition, the headwalls of this structure are failing and allowing backfill to enter the channel. Furthermore, the new bridge would have a 40' span between pile bents verses 25' between the existing pile bents. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Friendship Road which is unpaved.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities. The increase in length and elevation of the bridge will reduce the recurring flooding problem in part associated with beavers. Draining of the beaver pond in the past has reduced wood duck activity in this location.



Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no know conflicts as this will be a replacement to an existing structure.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

Due to the location of this bridge there will be a detour during construction. With the need for services and recreation access during hunting season, the project should be scheduled to be completed prior to hunting season.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

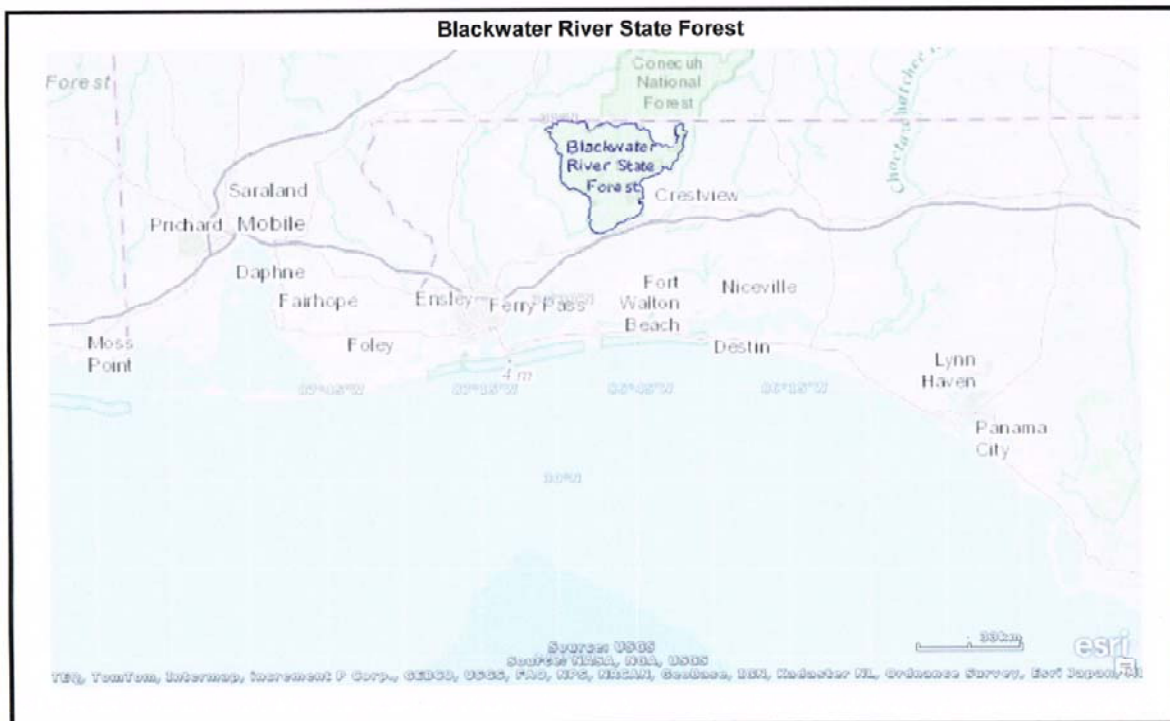
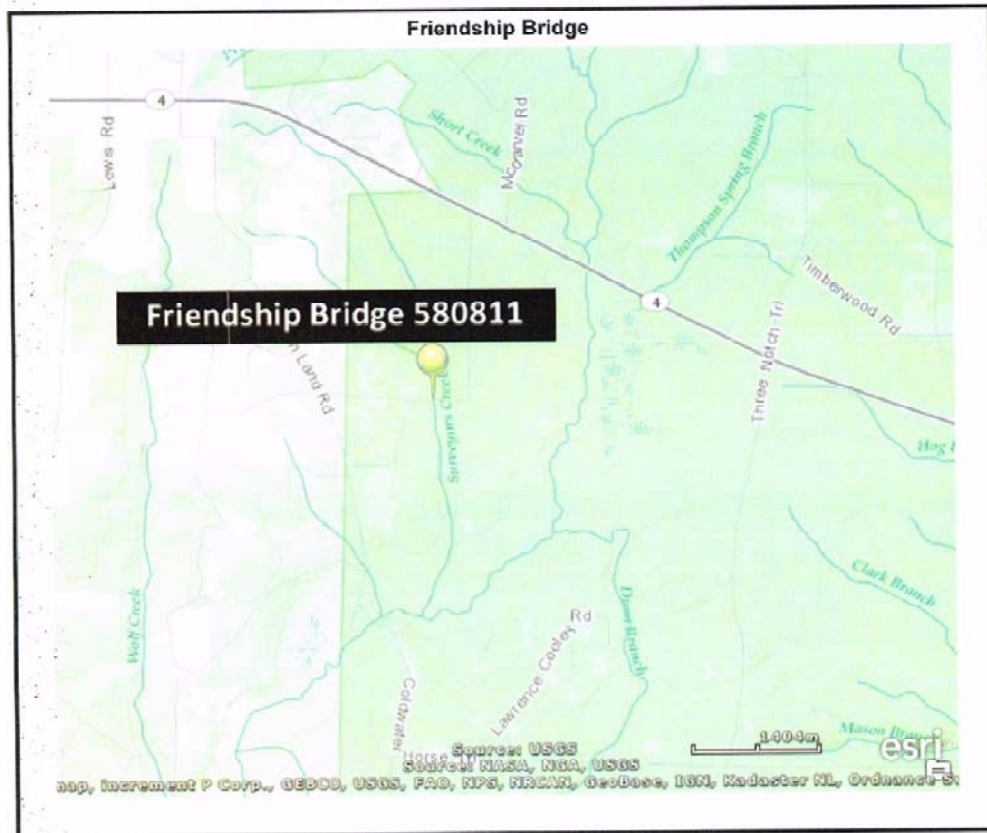
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during hunting season.

Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

The existing structure is not high enough to provide free board during major rain events. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Friendship Bridge Replacement Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Friendship Road 580811

Cost Item	Cost Estimate
Planning	
Contracts	\$4,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$20,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$33,000.00
Construction	
Contracts	\$440,000.00
Administration & Mobilization/Demobilization	\$49,000.00
Other	
Construction Subtotal:	\$489,000.00
Monitoring	
Contracts	\$12,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$4,000.00
Other	\$3,000.00
Monitoring Subtotal:	\$23,000.00
Project Cost	
Supervision	\$10,000.00
Subtotal:	\$10,000.00
Contingency	\$25,000.00
Total:	\$580,000.00

Estimated Costs by Year

Year1	\$10,000.00
Year2	\$70,000.00
Year3	\$500,000.00
Year4	
Year5	
Year6	





Project Name:

Martin Mill #2 Bridge Replacement (574072)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 6.0 mile north of US 90 near Holt, FL and 4.5 miles south of State Hwy. 4 or 30°50'11"N 86°46'19"W.

Project Description *(Describe all aspects of the project):*

Martin Mill Bridge is located in Santa Rosa County Florida and crosses Beaver Creek approximately 6.0 mile north of US 90 near Holt, FL and 4.5 miles south of State Hwy. 4 in Blackwater River State Forest (BRSF). Beaver Creek is a tributary of the Blackwater River which is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting timber girders and a timber deck. The existing bridge allows sediment carried by vehicles to be deposited into Middle Creek via cracks in between the timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane unpaved public road over Beaver Creek on Martin Mill Road in Santa Rosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Beaver Creek and increase the spacing between support piling from 11 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$443,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Middle Creek via the cracks in the timber superstructure of the existing bridge. In addition, the new bridge would have forty foot spacing between pile bents verses eleven feet between the existing pile bents. The increased spacing will allow for more unrestricted flow of the creek. Furthermore, pilings from previous bridges on this site have been left in the creek and occlude the waterway. The old piling would be removed at the time of construction.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires a significant amount of maintenance and debris removal after heavy rain events due in part to the close spacing of the existing pile bents.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is both well established and dependent upon this route for fire, EMS, school bus service, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*



All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Due to the location of this bridge there will be a minimal detour during construction.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

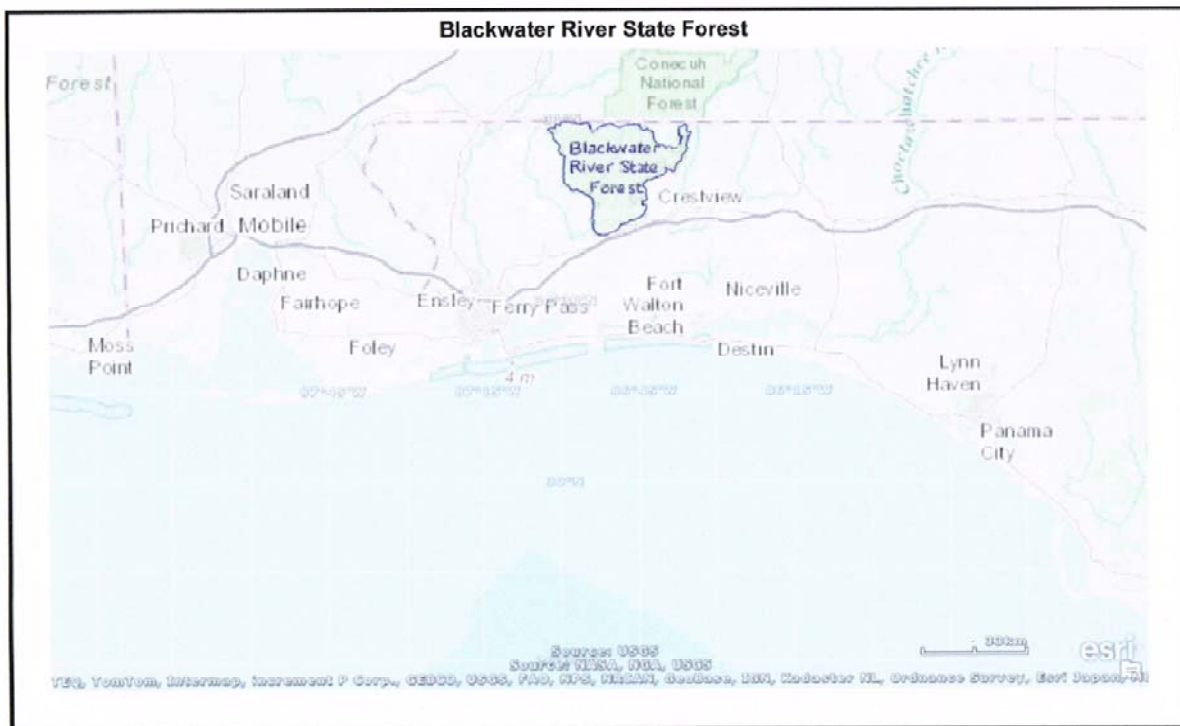
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

The existing structure is not high enough to provide free board during major rain events. This structure has been completely submerged several times. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Martin Mill Bridge Replacement Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Martin Mill Road 574072

Cost Item	Cost Estimate
Planning	
Contracts	\$4,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$20,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$33,000.00
Construction	
Contracts	\$307,000.00
Administration & Mobilization/Demobilization	\$45,000.00
Other	
Construction Subtotal:	\$352,000.00
Monitoring	
Contracts	\$12,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$4,000.00
Other	\$3,000.00
Monitoring Subtotal:	\$23,000.00
Project Cost	
Supervision	\$10,000.00
Subtotal:	\$10,000.00
Contingency	\$25,000.00
Total:	\$443,000.00

Estimated Costs by Year

Year1	\$40,000.00
Year2	\$403,000.00
Year3	
Year4	
Year5	
Year6	





Project Name:

Mashborn Forks Road Bridge Replacement (574108)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 0.7 miles east of Hurricane Lake and 0.6 miles north of Kennedy Bridge Road or 30°56'32"N 86°44'14"W.

Project Description *(Describe all aspects of the project):*

Mashborn Forks Bridge is located in Okaloosa County Florida and crosses Rock Creek approximately 0.7 miles east of Hurricane Lake and 0.6 miles north of Kennedy Bridge Road in Blackwater River State Forest (BRSF). Rock Creek is a tributary of the Blackwater River which is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting timber girders and a timber deck. The existing bridge allows sediment carried by vehicles to be deposited into the Rock Creek via cracks in between the timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane unpaved public road over Rock Creek on Mashborn Forks Road in Okaloosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Rock Creek and eliminate pilings in the channel. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$235,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Rock Creek and on into Blackwater River via the openings in the timber deck bridge. In addition, the headwalls of this structure are failing and allowing backfill to enter the channel.

Furthermore, the new bridge would eliminate pilings in the primary channel of the creek while the existing structure has three pile lines obstructing the channel. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Mashborn Forks Road which is unpaved.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*



All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Due to the location of this bridge there will be a detour during construction. With the need for services and recreation access during hunting season, the project should be scheduled to be completed prior to hunting season.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

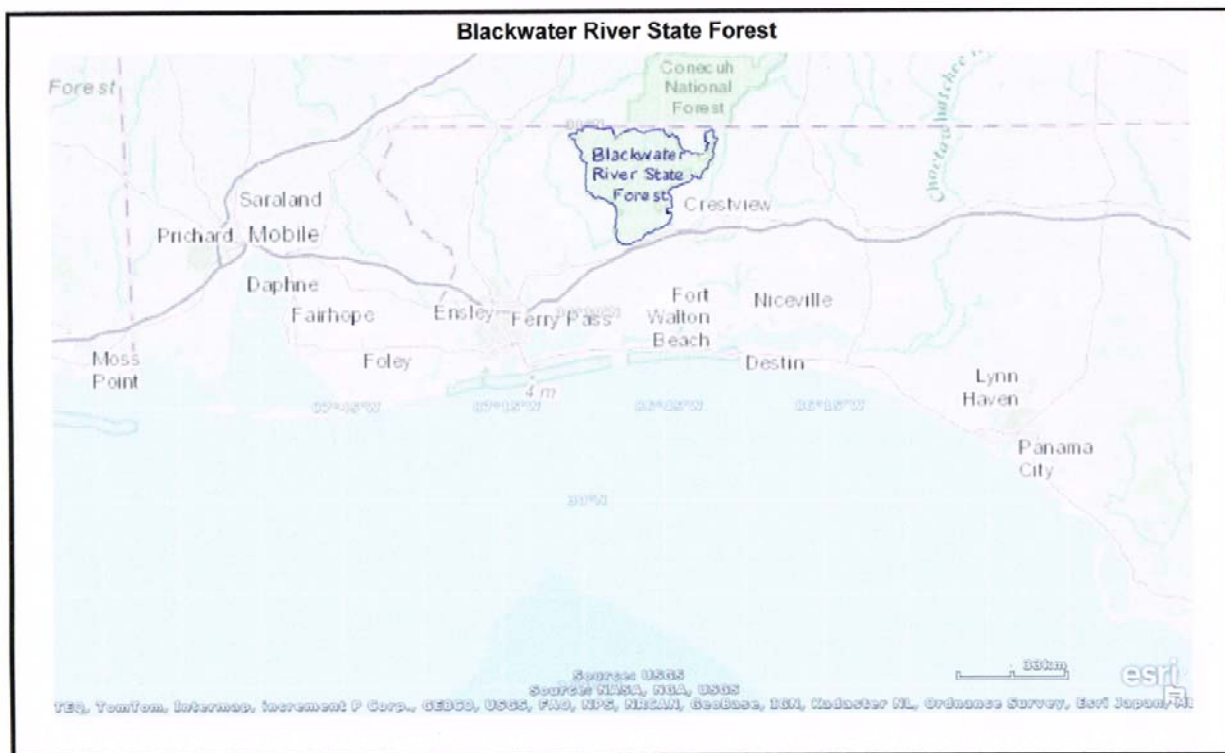
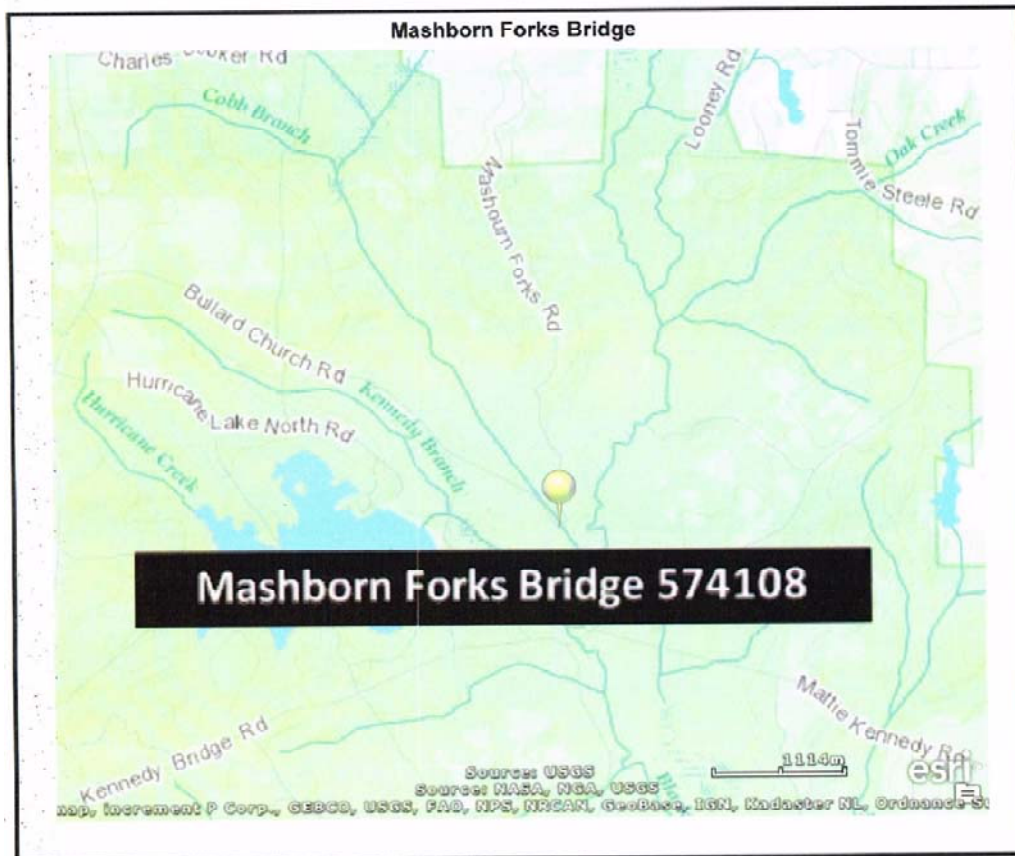
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during hunting season.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

The existing structure is not high enough to provide free board during major rain events. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Mashborn Forks Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Mashborn Forks 574108

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$16,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$2,000.00
Other	
Planning Subtotal:	\$27,000.00
Construction	
Contracts	\$116,000.00
Administration & Mobilization/Demobilization	\$39,000.00
Other	
Construction Subtotal:	\$155,000.00
Monitoring	
Contracts	\$10,000.00
Data Collection	\$4,000.00
Monitoring Administration	\$2,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$18,000.00
Project Cost	
Supervision	\$10,000.00
	Subtotal: \$10,000.00
Contingency	\$25,000.00
	Total: \$235,000.00

Estimated Costs by Year

Year1	\$25,000.00
Year2	\$210,000.00
Year3	
Year4	
Year5	
Year6	





Project Name:

Norman Riley Bridge Replacement (580813)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 6.0 mile north of US 90 near Holt, FL and 4.5 miles south of State Hwy. 4 or 30°47'12"N 86°47'50"W.

Project Description *(Describe all aspects of the project):*

Norman Riley Bridge is located in Santa Rosa County Florida and crosses Middle Creek approximately 6.0 miles north of US Hwy 90 near Holt FL, and 4.5 mile south of State Hwy. 4 in Blackwater River State Forest (BRSF). Middle Creek is a tributary of the Blackwater River which is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting a superstructure of steel girders and a timber deck overlaid with an asphalt wearing surface. The existing bridge allows sediment carried by vehicles to be deposited into Middle Creek via cracks in the asphalt and timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane paved public road over Middle Creek on Norman Riley Road in Santa Rosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Middle Creek and increase the spacing between support piling from 24 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$562,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Middle Creek via the cracks in the asphalt and timber superstructure of the existing bridge. In addition, the new bridge would have forty foot spacing between pile bents verses twenty four feet between the existing pile bents. The increased spacing will allow for more unrestricted flow of the creek. Furthermore, the metal girders of this bridge have significant corrosion allowing rust to enter the creek bed. Metal remediation via sandblasting and painting in place provides potential for environmental concerns.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires a significant amount of maintenance and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Environmental Road which serves as a primary route through the BRSF.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is both well established and dependent upon this route for fire, EMS, school bus service, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities. Furthermore, there are on-going discussions with the USAF to utilize FFS facilities adjacent to this structure for training purposes.



Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

Due to the location of this bridge there will be a 20 mile detour during construction. With the need for school bus service and recreation access during hunting season, the project should be scheduled for summer.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

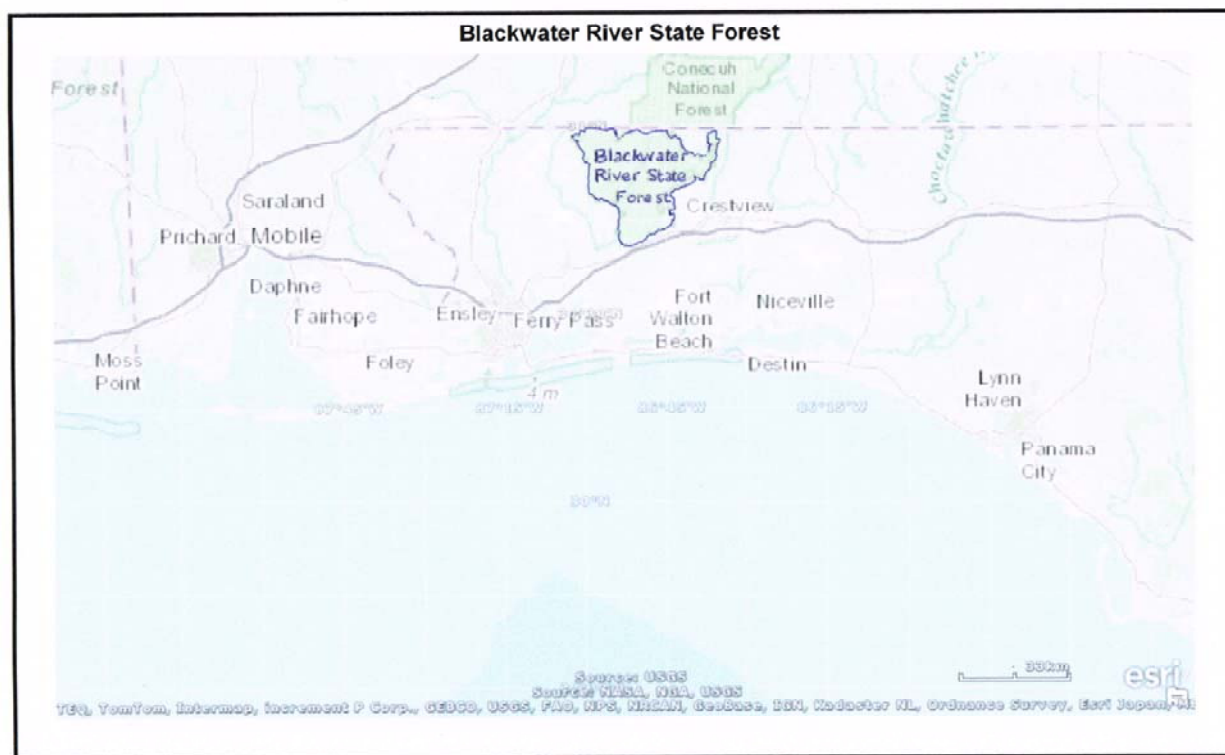
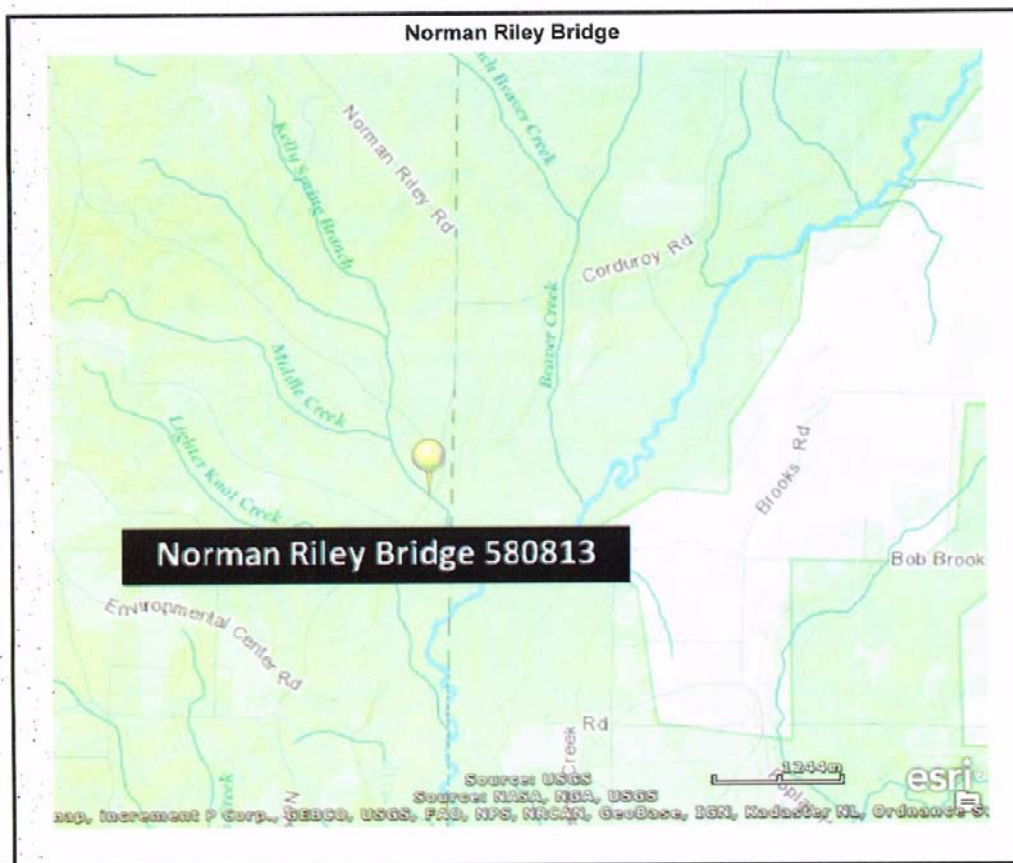
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during the school year or during hunting season.

Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

The existing structure is not high enough to provide free board during major rain events. This structure has been completely submerged several times. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Norman Riley Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Norman Riley Bridge (580813)

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$40,000.00
Restoration Plan	\$7,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$4,000.00
Other	
Planning Subtotal:	\$55,000.00
Construction	
Contracts	\$360,000.00
Administration & Mobilization/Demobilization	\$49,000.00
Other	
Construction Subtotal:	\$409,000.00
Monitoring	
Contracts	\$17,000.00
Data Collection	\$5,000.00
Monitoring Administration	\$4,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$28,000.00
Project Cost	
Supervision	\$20,000.00
Subtotal:	\$20,000.00
Contingency	\$50,000.00
Total:	\$562,000.00

Estimated Costs by Year

Year1	\$50,000.00
Year2	\$512,000.00
Year3	
Year4	
Year5	
Year6	





Project Name:

Peaden Bridge Replacement (570810)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is approximately 4.0 miles west of Baker Hwy 189, 3.5 mile east of the Okaloosa County Line or 30°52'55"N 86°43'52"W.

Project Description *(Describe all aspects of the project):*

Peaden Bridge is located in Okaloosa County Florida and crosses the Blackwater River approximately 4.0 miles west of Baker Hwy 189, 3.5 mile east of the Okaloosa County Line in Blackwater River State Forest (BRSF). The Blackwater River is classified as an Outstanding FL Water and also has a Special Waters designation. The Blackwater River discharges into Blackwater Bay and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is constructed with timber pilings and caps supporting a superstructure of steel girders and a timber deck overlaid with an asphalt wearing surface. The existing bridge allows sediment carried by vehicles to be deposited into the Blackwater River via cracks in the asphalt and timber deck of the bridge. In addition, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has frequently been submerged after heavy rain events, major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane paved public road over Blackwater River on Peaden Bridge Road in Okaloosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Blackwater River and increase the spacing between support piling from 25 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$940,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Blackwater River via the cracks in the asphalt and timber bridge. In addition, the new bridge would have forty foot spacing between pile bents verses twenty five foot between the existing pile bents. The increased spacing will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The bridge is on Peaden Bridge Road which serves as a primary east to west route through a portion of the BRSF.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is both well established and dependent upon this route for fire, EMS, school bus service, and state land access for both management and recreation.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*



All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Due to the location of this bridge there will be a detour during construction. With the need for local services and recreation access during hunting season, the project should be advertised well in advance to give the public notice.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

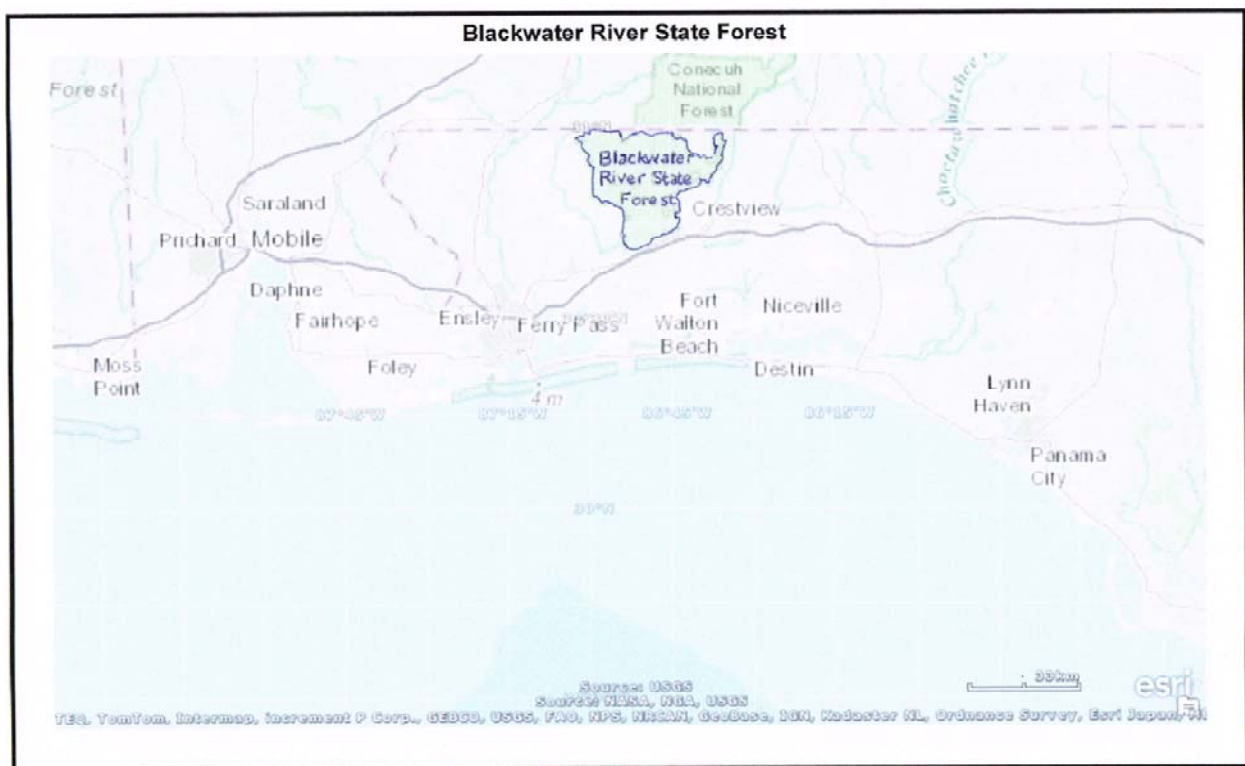
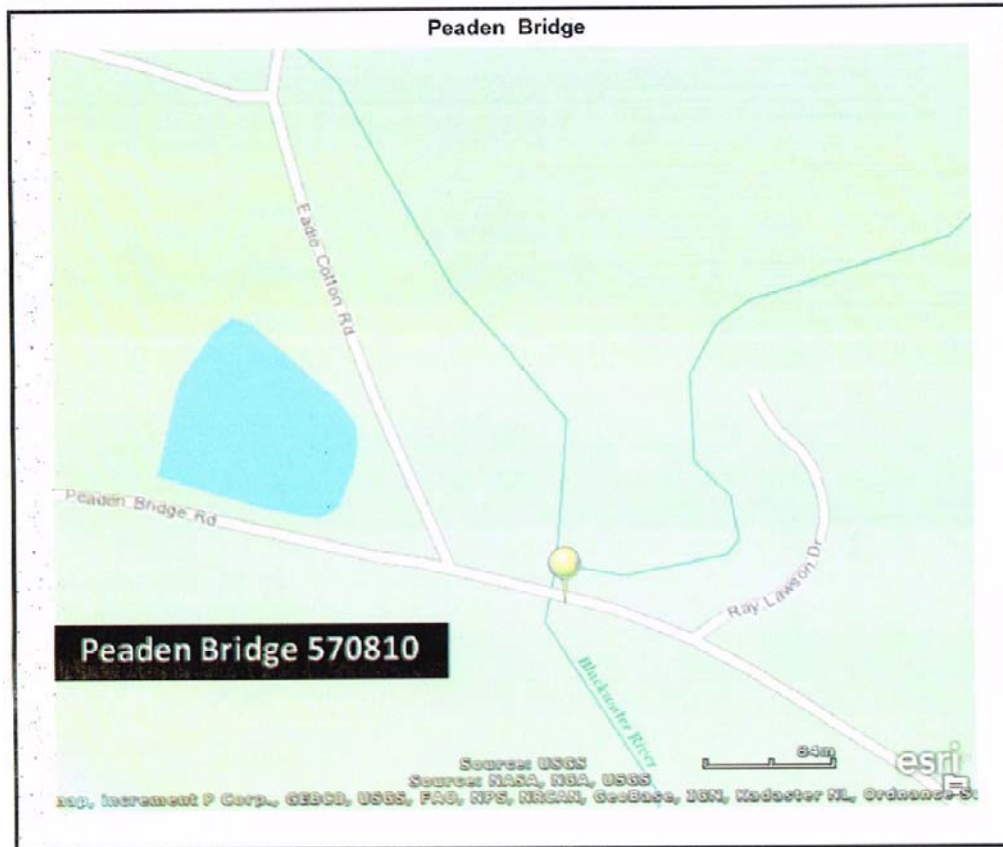
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during hunting season.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

The existing structure is not high enough to provide free board during major rain events. This structure has been completely submerged several times. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Peaden Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Peaden Bridge

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$40,000.00
Restoration Plan	\$7,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$4,000.00
Other	
Planning Subtotal:	\$55,000.00
Construction	
Contracts	\$725,000.00
Administration & Mobilization/Demobilization	\$62,000.00
Other	
Construction Subtotal:	\$787,000.00
Monitoring	
Contracts	\$17,000.00
Data Collection	\$5,000.00
Monitoring Administration	\$4,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$28,000.00
Project Cost	
Supervision	\$20,000.00
Subtotal:	\$20,000.00
Contingency	\$50,000.00
Total:	\$940,000.00

Estimated Costs by Year

Year1	\$940,000.00
Year2	
Year3	
Year4	
Year5	
Year6	





Project Name:

Sandy Forest Bridge Replacement (584069)

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

The site is in Santa Rosa County Florida approximately 1.0 mile east of Munson Hwy 191, and 0.5 mile south of State Hwy. 4 in Blackwater river State Forest (BRSF), or 30°50'14"N 86°52'16"W.

Project Description *(Describe all aspects of the project):*

Sandy Forest Bridge is located in Santa Rosa County Florida and crosses the Sweetwater Creek approximately 1.0 mile east of Munson Hwy 191, and 0.5 mile south of State Hwy. 4 in Blackwater River State Forest (BRSF). Sweetwater Creek discharges via the Big Juniper Creek into the Blackwater River (an Outstanding FL Water), and eventually enters the Gulf of Mexico at Pensacola Pass.

The existing bridge is 53 years old and is constructed of 1940s military surplus open grate metal Treadway® panels with timber caps and pilings. The existing bridge allows sediment carried by vehicles to be deposited into Sweetwater Creek via the open deck metal bridge. In addition, the headwalls of this structure are failing and allow backfill to enter the creek bed. Furthermore, the existing bridge is of insufficient height to provide adequate freeboard during major rain event. The superstructure of the existing bridge has been in excess of three feet below the water level after major floods and some hurricanes.

The proposed project will provide a new concrete bridge that will be longer and higher to ensure this road remains open for both the public and Emergency Services. This would be accomplished by establishing a construction contract for the purchase and construction of a precast concrete bridge to carry a two-lane paved public road over Sweetwater Creek on Sandy Forest Road (also known as Sandy Landing Road) in Santa Rosa County, Florida. The project is in BRSF on state land managed by the Florida Forest Service. The new bridge will decrease sediment in the Sweetwater Creek and increase the spacing between support piling from 11 feet to 40 feet. Therefore, the channel will be less occluded and debris accumulation will be reduced.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
The estimated cost to remove the existing bridge raise the level of the approaches and build the new concrete structure is \$940,000.



Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

The project is technically feasible with a straight forward pre-cast concrete bridge design. Similar bridges have been built on Blackwater River State Forest in the past few years.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

The new bridge would reduce sediment carried by vehicles and deposited into Sweetwater Creek via the open deck metal bridge. In addition, the headwalls of this structure are failing and allowing backfill to enter the creek bed. Some bridge pilings from the previous structure in this location are still in the flood plain. They would be removed during the construction process. Furthermore, the new bridge would span forty feet between pile bents verses eleven feet between the existing pile bents. The increased spacing and removal of old piles will allow for more unrestricted flow of the creek.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

The existing structure requires a significant amount of maintenance each year and debris removal after heavy rain events due in part to the close spacing of the existing pile bents. The new structure will require less annual maintenance and significantly improve the safety of the road.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

The community served by this structure is dependent upon this route for fire, EMS, school bus service, and state land access for both silviculture and recreation. The bridge is on Sandy Forest Road which serves as a primary route through a portion of BRSF, and is utilized by residents as a connector for evacuation as needed during hurricane season.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*



There are no known conflicts; however, this project will improve access for local service providers, recreation, and silviculture activities.

Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

All work would be performed in compliance with Federal, State, Local, and Tribal Laws/Regulations, and there are no known conflicts as this will be a replacement to an existing structure.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

Due to the location of this bridge there will be a 10 mile detour during construction. With the need for school bus service and recreation access during hunting season, the project should be scheduled for summer.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

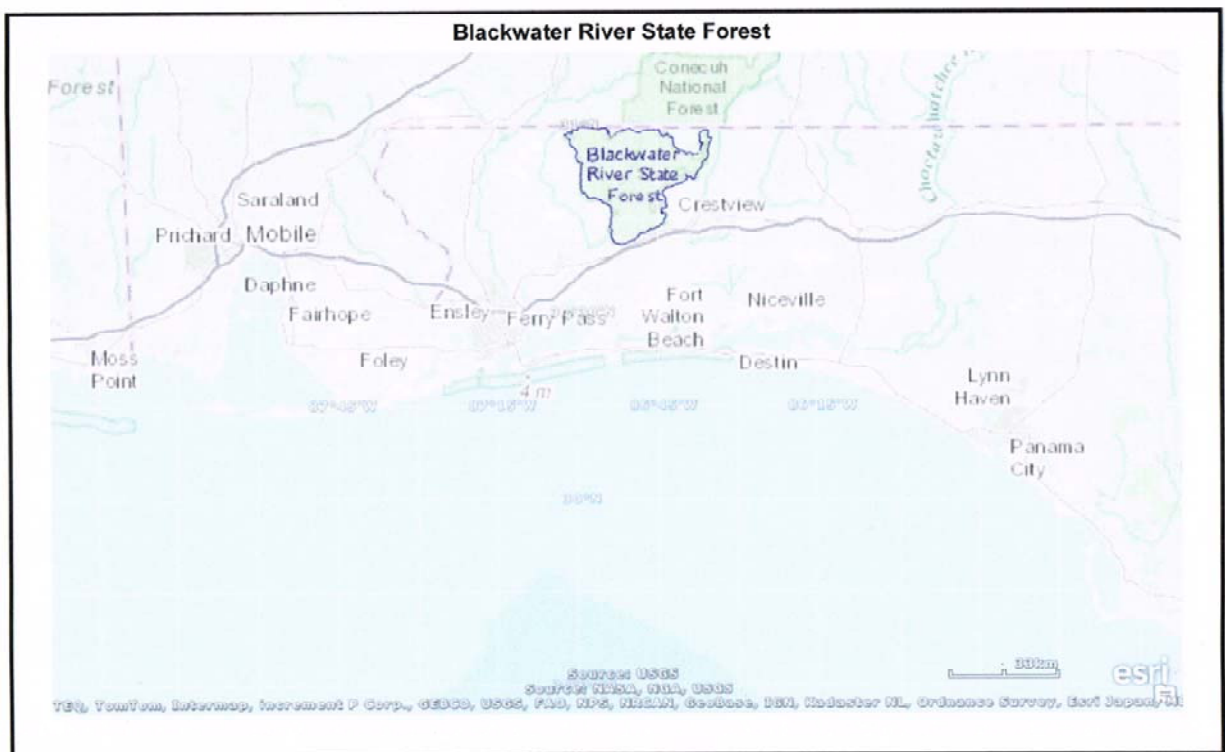
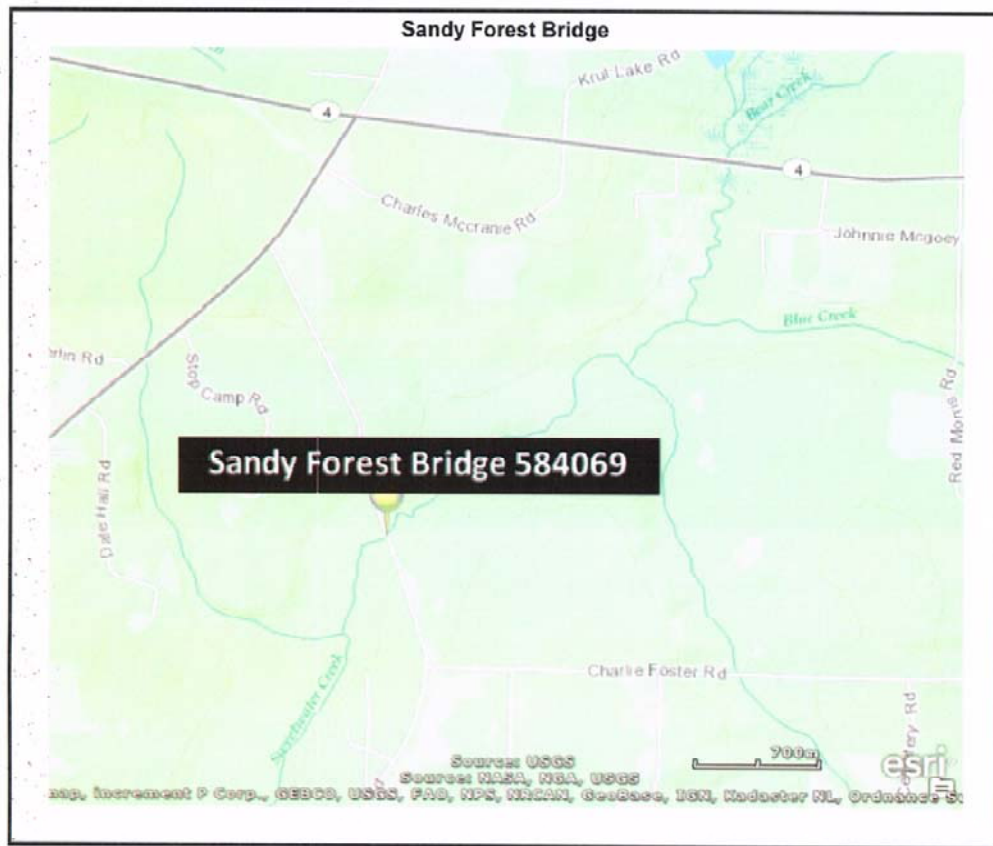
The public is aware of the need for the bridge replacement, and will be accepting although temporarily inconvenienced due to the detour. They will not be as accepting if the project is conducted during the school year or during hunting season.

Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

The existing structure is not high enough to provide free board during major rain events. This structure has been completely submerged several times. The new structure would be elevated and lengthened to keep provide adequate freeboard during floods.



Sandy Forest Bridge Replacement
Sedimentation Reduction/Elimination on Blackwater River State Forest



Cost Appendix Sheet

Sandy Forest Bridge

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	
Engineering, Design, Land Rights, & Bid Prep	\$40,000.00
Restoration Plan	\$7,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$4,000.00
Other	
Planning Subtotal:	\$55,000.00
Construction	
Contracts	\$725,000.00
Administration & Mobilization/Demobilization	\$62,000.00
Other	
Construction Subtotal:	\$787,000.00
Monitoring	
Contracts	\$17,000.00
Data Collection	\$5,000.00
Monitoring Administration	\$4,000.00
Other	\$2,000.00
Monitoring Subtotal:	\$28,000.00
Project Cost	
Supervision	\$20,000.00
Subtotal:	\$20,000.00
Contingency	\$50,000.00
Total:	\$940,000.00

Estimated Costs by Year

Year1	\$940,000.00
Year2	
Year3	
Year4	
Year5	
Year6	





Erosion

Blackwater River State Forest



Erosion Control and Soil Stabilization for Steepheads and Gulleys

Project	Acres	Yards of soil to be moved	Cost per cubic yard	Total Cost
Julian Mill	13	209,733	\$7.65	\$1,604,457.45
Sandy Forest F43	7	104,866	\$7.65	\$802,224.90
Riley Bluff	2	20,000	\$7.65	\$153,000.00
Tommy Eiland	7	26,000	\$7.65	\$198,900.00
Penny Creek	16	102,518	\$7.65	\$784,262.70
Hebert Road Yellow River	16	105,000	\$7.65	\$803,250.00
Y15	3	19,222	\$7.65	\$147,048.30
Y21	2	12,814	\$7.65	\$98,027.10
R79	1.15	7,500	\$7.65	\$57,375.00
				\$4,648,545.45





Project Name:

Julian Mill Steephead Erosion

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

T2N Sec 13 R26W. South of Interstate 10 and West of Garner Landing Road

Project Description *(Describe all aspects of the project):*

The objective of this effort is to stop the continued erosion of this system at the toe of the steephead by slope walls by dissipating the energy of the runoff through a series of earthen bermed terraces. Terraces and berms will be stabilized through the planting of native species found in these systems, and which are suited to the current arid conditions of the site.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
\$ 2,652,782.75

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

Northwest Florida is geographically located within the Gulf Coastal Plain, a low-lying flat area of land formed during the Pliocene Epoch (Means, 1991). Steephead ravines, seepage slopes, and seepage streams are unique features found in only several watersheds in northwest Florida.

These systems are formed as drainage water begins to collect underground from a slope and flow outward to the surface through the deep sands of the Citronelle formation. The seeps in turn form the headwaters of small tributaries, in which the groundwater discharges as clear cool water. Besides their unusual topographic characteristic of being between 50 to 100 feet deep, with an inclination of 45 degrees, these systems are also known to harbor a high biodiversity of flora and fauna, many of which are considered rare, threatened and/or endangered species (RTE). Healthy steephead systems maintain a micro-climate due to canopies of broad leafed hardwoods which further serve to support the higher biodiversity in these systems.



The primary objective of this proposal is to abate the threat of continued sedimentation along a gully, which is actually a buried second order tributary of Julian Mill Creek, located in the Yellow River Watershed

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

This project would provide an opportunity to address a severely eroded gully which has been actively eroding for the past two decades. Land use changes, tropical storms, and the nature of the sandy soils have accelerated conditions causing severe sedimentation at this site. The site is of biological importance due to the proximity of a RT&E population of Florida Bog Frogs, *Rana Okaloosae*, located roughly 0.2 miles from the lower end of the gully where the sedimentation has begun to fan out. Further south, located within the same tributary is another known population of RT&E species, namely the Flatwoods Salamander, *Ambystoma cingulatum*. Both species are declining due to habitat loss. The Blackmouth Shiner, Gulf Sturgeon, Blacktip Shiner and Florida Chub have also been affected by sedimentation of Yellow River.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Recreational activities including fishing have been affected by the reduction in breeding cycles of bottom dwelling stream animals by covering breeding sites and smothering eggs and young. This in turn affects other fish and wildlife that feed on them. Enhanced fishing opportunities will be created by the completion of this project with resulting reduction/elimination of sedimentation in the tributaries of Yellow River.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Once the project is complete, the Yellow River ecosystem should recover within ten to fifteen years.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

No other efforts are underway at this time.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

A Surface Water Management Permit application with Northwest Florida Water Management District will be submitted prior to commencement of work on the project.



Julian Mill Steephead Erosion
Sedimentation Reduction/Elimination on Blackwater River State Forest

The project will be continually monitored by WM personnel. FDEP and ACOE authorities will be contacted regarding permit requirements.

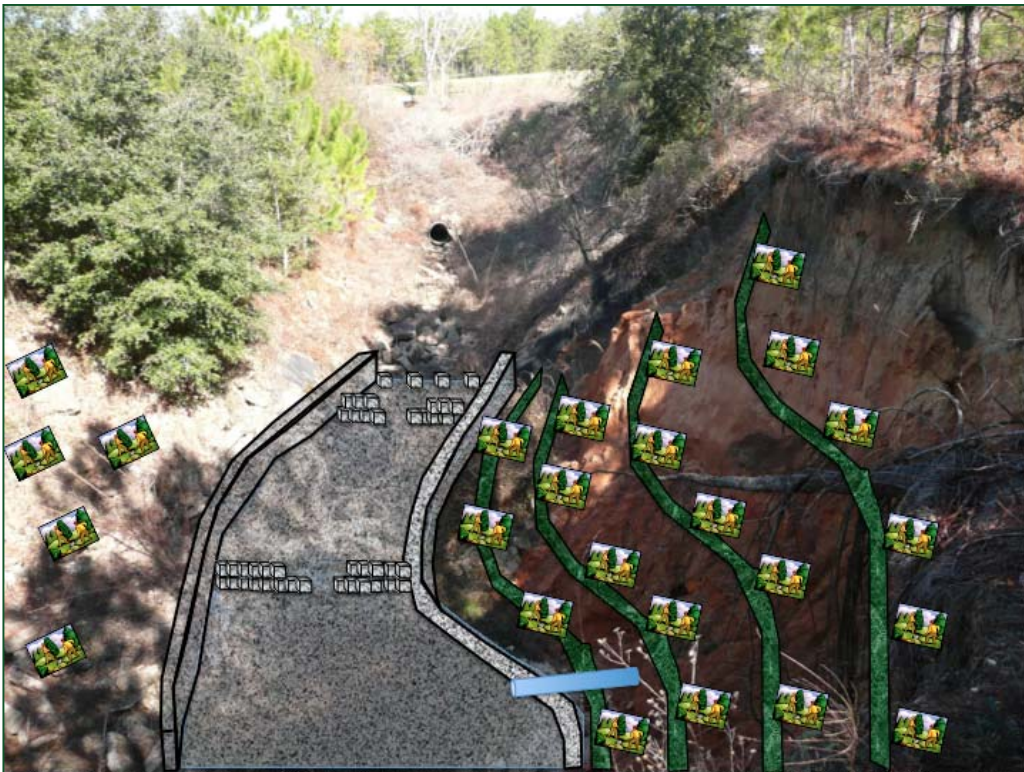
Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Approximately 24 months will be required for Surveying, Aerial Photography, GIS information, engineering, final design and permitting.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

This project could provide educational opportunities for the general public and college students that are enrolled in environmental degrees. Elimination of an eyesore that is visible and adjacent to I10 will provide proof that FFS is deeply concerned about environmental issues in the forest.

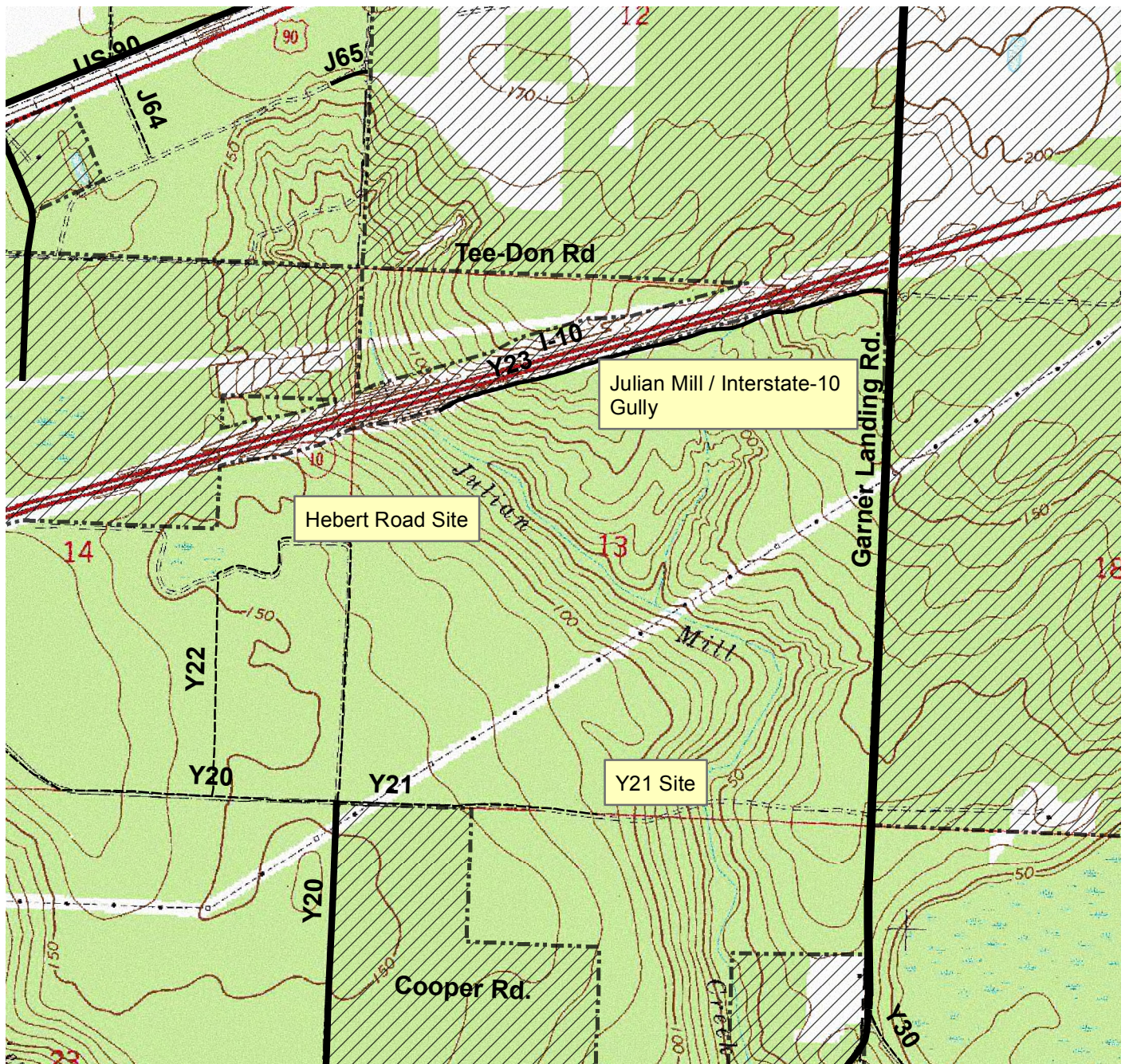
Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*



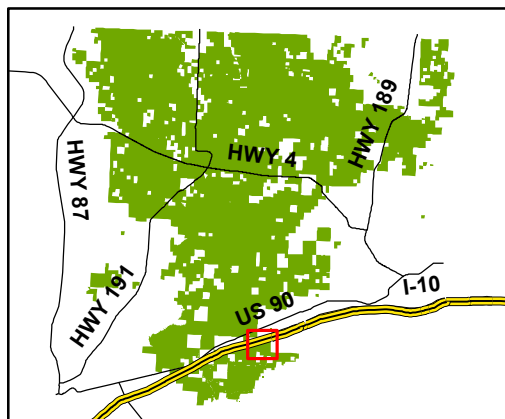
Blackwater River State Forest

Julian Mill Creek Steephead Erosion

13-2N-26W



- Primary Road
- Secondary Road
- Service Road
- Tertiary Road
- Outside State Forest



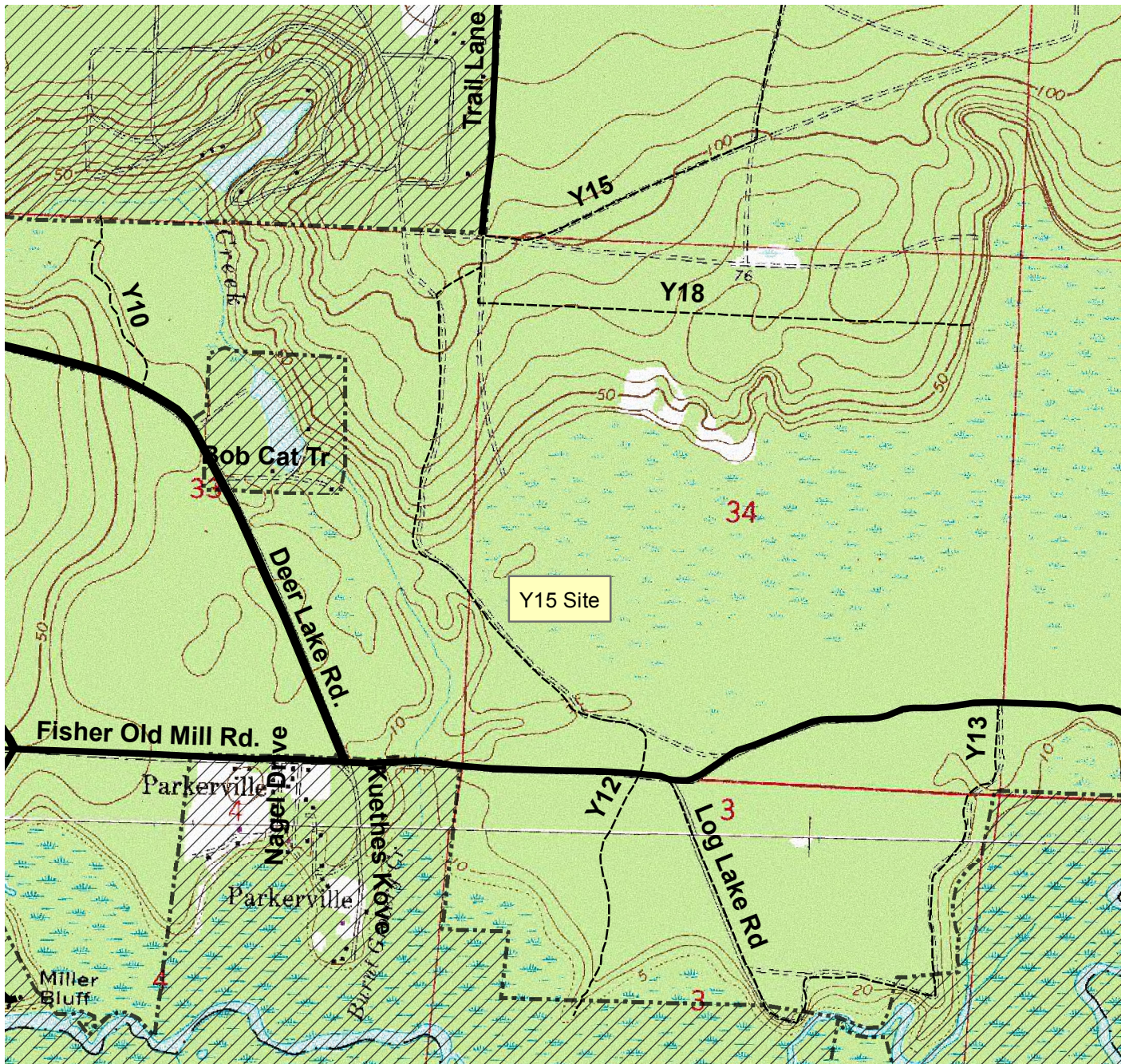
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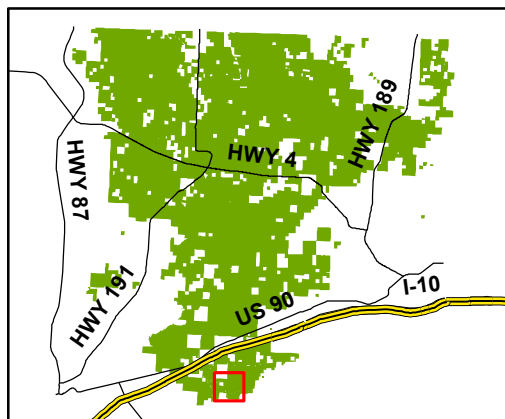
Blackwater River State Forest

Y15 Road Erosion

34-2N-26W



- Primary Road
- Secondary Road
- Service Road
- Tertiary Road
- Outside State Forest



0 1,000 2,000 3,000 Feet



Cost Appendix Sheet

Yellow River Erosion Control and Soil Stabilization

Cost Item	Cost Estimate	Projects Included	Project Cost
Planning		Julian Mill	\$1,604,457.00
Contracts	\$45,000.00	Y21	\$98,027.00
Feasibility	\$25,000.00	Hebert Road	\$803,250.00
Engineering, Design, Land Rights, & Bid Prep	\$100,000.00	Y15	\$147,048.00
Restoration Plan	\$25,000.00		
Site Visits & Cost of Site Selection	\$25,000.00	Total Cost	\$2,652,782.00
Administration, Overhead, and Indirect Other	\$25,000.00		
Planning Subtotal:	\$245,000.00		
Construction			
Contracts	\$2,032,782.00		
Administration & Mobilization/Demobilization	\$100,000.00		
Other			
Construction Subtotal:	\$2,132,782.00		
Monitoring			
Contracts	\$25,000.00		
Data Collection	\$75,000.00		
Monitoring Administration	\$75,000.00		
Other			
Monitoring Subtotal:	\$175,000.00		
Project Cost			
Supervision	\$100,000.00		
Subtotal:	\$100,000.00		
Contingency	\$200,000.00		
Total:	\$2,852,782.00		

Estimated Costs by Year

Year1	\$275,000.00
Year2	\$345,000.00
Year3	\$2,232,782.00
Year4	
Year5	
Year6	



Project Name:

Lower Blackwater River Steephead Erosion

Contact Information (Include at least one name, phone number, email address, and organization name if applicable):

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location (Include a map, if possible, and the city, county, longitude/latitude, and watershed):

T2N Sec 3 & 4 R26W. Coordinates – 30.695959, 86.841189

Project Description (Describe all aspects of the project):

Three locations are being considered in this project. Riley Bluff which is a sheer wall located in a significant bend in Blackwater River, the lower end of roadway J28 (a closed area) and the northern section of J53 (a closed area). A significant amount of sediment has entered Blackwater River as a result of erosion at these locations. Vehicle access on unpaved, sloped roads created significant erosion areas on the North and South side of the river. Soils tend to be of light and sandy composition. Those roads have since been closed and access blocked to prevent further erosion. The objective of this effort is to stop the continued sedimentation into the river by dissipating the energy of the runoff through a series of earthen bermed terraces. Terraces and berms will be stabilized through the planting of native species found in these systems, and which are suited to the current arid conditions of the site. Rip Rap will also be utilized in specific locations to aide in erosion and water flow control. Total volume of soil to be moved is 93,299 cubic yards.

Estimated Project Costs (Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):
\$ 713,200

Other Funding (Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):

None

Technical Feasibility (Describe the technologies involved and any relevant past experience or proven success with similar projects):

Northwest Florida is geographically located within the Gulf Coastal Plain, a low-lying flat area of land formed during the Pliocene Epoch (Means, 1991). Steephead ravines, seepage slopes, and seepage streams are unique features found in only several watersheds in northwest Florida.

These systems are formed as drainage water begins to collect underground from a slope and flow outward to the surface through the deep sands of the Citronelle formation. The



seeps in turn form the headwaters of small tributaries, in which the groundwater discharges as clear cool water. Besides their unusual topographic characteristic of being between 50 to 100 feet deep, with an inclination of 45 degrees, these systems are also known to harbor a high biodiversity of flora and fauna, many of which are considered rare, threatened and/or endangered species (RTE). Healthy steephead systems maintain a micro-climate due to canopies of broad leafed hardwoods which further serve to support the higher biodiversity in these systems.

The primary objective of this proposal is to abate the threat of continued sedimentation along some gullies and closed roadways.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Blackwater River is classed as an Outstanding Florida Waters by the State Water Quality Standards. This project would provide an opportunity to address a severely eroded roadway which has been actively eroding for the past decade. Land use changes, tropical storms, and the nature of the sandy soils have accelerated conditions causing severe sedimentation at this site. In a study conducted by FDEP in 2010, 8 species of fish are listed as vulnerable or threatened in Blackwater River because of sedimentation specifically the Black Mouth Shiner, Gulf Sturgeon, Blue Nose Shiner, Florida Chub, Alabama Shad, Alligator Gar, Iron Color Shiner, and Striped Bass.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Recreational activities including fishing have been affected by the reduction in breeding cycles of bottom dwelling stream animals by covering breeding sites and smothering eggs and young. This in turn affects other fish and wildlife that feed on them. Enhanced fishing opportunities will be created by the completion of this project with resulting reduction/elimination of sedimentation in the tributaries of Blackwater River and Gulf of Mexico. Sweetwater Creek is also heavily utilized by Canoe Vendors. Completion of this project will eliminate an eyesore to the general public.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Once the project is complete, Blackwater River ecosystem should recover within ten to fifteen years.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*



No other efforts are underway at this time.

Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

A Surface Water Management Permit application with Northwest Florida Water Management District will be submitted prior to commencement of work on the project. The project will be continually monitored by WM personnel. FDEP, ACOE and Corp of Engineers will be contacted regarding permit requirements.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

Approximately 18 months will be required for Surveying, Aerial Photography, GIS information, engineering, final design and permitting.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

This project could provide educational opportunities for the general public and college students that are enrolled in environmental degrees.

Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

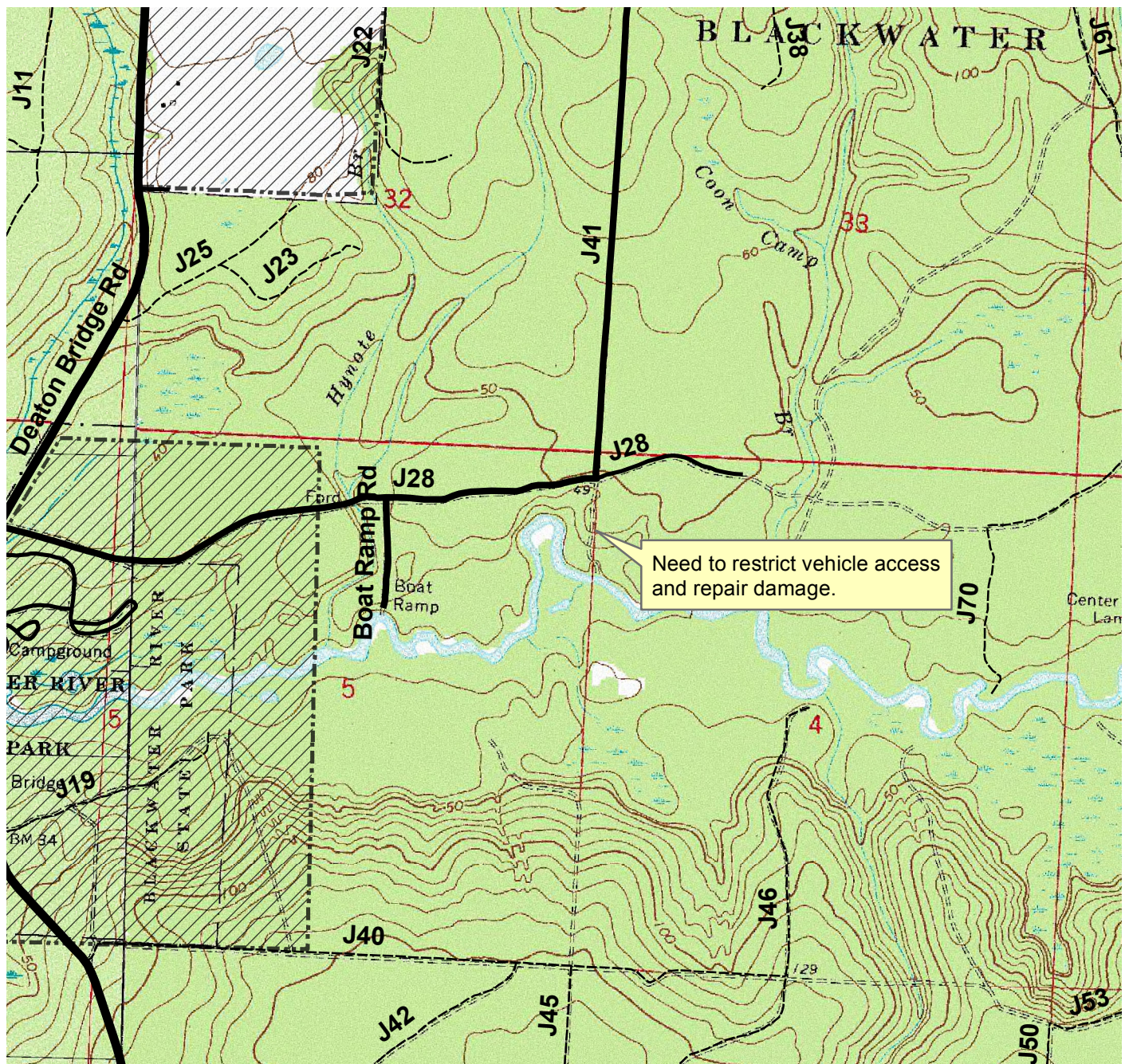
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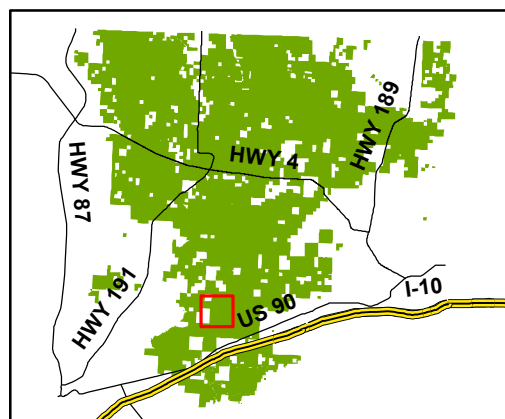
Blackwater River State Forest

"River Road" Bluffs

5-2N-26W



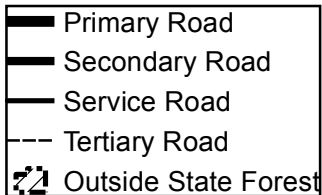
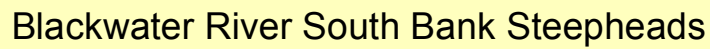
- Primary Road
- Secondary Road
- Service Road
- Tertiary Road
- Outside State Forest



0 1,000 2,000 3,000 Feet



Sections 2, 3, 4 - 2N - 26W



Cost Appendix Sheet

Lower Blackwater River Steepheads

Cost Item	Cost Estimate
Planning	\$2,500.00
Contracts	\$2,500.00
Feasibility	\$3,000.00
Engineering, Design, Land Rights, & Bid Prep	\$25,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$10,000.00
Administration, Overhead, and Indirect	\$25,000.00
Other	
Planning Subtotal:	\$73,000.00
Construction	
Contracts	\$538,200.00
Administration & Mobilization/Demobilization	\$15,000.00
Other	
Construction Subtotal:	\$553,200.00
Monitoring	
Contracts	\$10,000.00
Data Collection	\$12,000.00
Monitoring Administration	\$15,000.00
Other	
Monitoring Subtotal:	\$37,000.00
Project Cost	
Supervision	\$25,000.00
Subtotal:	\$25,000.00
Contingency	\$75,000.00
Total:	\$763,200.00

Estimated Costs by Year

Year1	\$175,000.00
Year2	\$588,000.00
Year3	
Year4	
Year5	
Year6	



Project Name:

Sandy Forest/F43 Mining Pit Erosion

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

T4N Sec 30 R26W. Coordinates – 30 49' 41.70", 86 52' 24.46"

Project Description *(Describe all aspects of the project):*

In 1999 a BioRecon was completed by the US Geology Survey on this mining pit location. Previously this pit was used to supply needed clay fill material for roads in Blackwater River State Forest (BRSF). A significant plume of red dirt had entered Sweetwater Creek and had smothered most wildlife habitats in the stream. Sweetwater Gully Branch did not meet Class III State Water Quality Standards 62-302 for recreation propagation and maintenance of a healthy well-balanced population of fish and wildlife. In the year 2000 or shortly thereafter, remediation work commenced to correct erosion problems at this location. Sediment control measures were not completely installed at the site and today hillside erosion still exists. A red tinted sand bar is being formed in Sweetwater Creek and will continue to grow until the erosion problem is abated. Sweetwater Creek discharges into Big Juniper Creek then into Blackwater River and finally into the Gulf of Mexico. Blackwater River is classified as Outstanding Florida Waters under the State Water Quality Standards. The objective of this effort is to stop the continued erosion of this system at the toe of the steephead by slope walls by dissipating the energy of the runoff through a series of earthen bermed terraces. Terraces and berms will be stabilized through the planting of native species found in these systems, and which are suited to the current arid conditions of the site. Rip Rap will also be utilized in specific locations to aide in erosion and water flow control. Total volume of soil to be moved is 104,866 cubic yards.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
\$ 802,225

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*
None



Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

Northwest Florida is geographically located within the Gulf Coastal Plain, a low-lying flat area of land formed during the Pliocene Epoch (Means, 1991). Steephead ravines, seepage slopes, and seepage streams are unique features found in only several watersheds in northwest Florida.

These systems are formed as drainage water begins to collect underground from a slope and flow outward to the surface through the deep sands of the Citronelle formation. The seeps in turn form the headwaters of small tributaries, in which the groundwater discharges as clear cool water. Besides their unusual topographic characteristic of being between 50 to 100 feet deep, with an inclination of 45 degrees, these systems are also known to harbor a high biodiversity of flora and fauna, many of which are considered rare, threatened and/or endangered species (RTE). Healthy steephead systems maintain a micro-climate due to canopies of broad leafed hardwoods which further serve to support the higher biodiversity in these systems.

The primary objective of this proposal is to abate the threat of continued sedimentation along a gully, which is actually a buried second order tributary of Sweetwater Creek, located in the Coldwater Watershed.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

This project would provide an opportunity to address a severely eroded gully which has been actively eroding for the past two decades. Land use changes, tropical storms, and the nature of the sandy soils have accelerated conditions causing severe sedimentation at this site. The site is of biological importance due to its confluence into Big Juniper Creek, Blackwater River and finally into the Gulf of Mexico. Species that are listed as vulnerable or threatened because of sedimentation in this watershed are the Black Mouth Shiner, Gulf Sturgeon, Blue Nose Shiner, Alligator Gar, Iron Color Shiner, Striped Bass and Florida Chub.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Recreational activities including fishing have been affected by the reduction in breeding cycles of bottom dwelling stream animals by covering breeding sites and smothering eggs and young. This in turn affects other fish and wildlife that feed on them. Enhanced fishing opportunities will be created by the completion of this project with resulting reduction/elimination of sedimentation in the tributaries of Blackwater River and Gulf of Mexico. Sweetwater Creek is also heavily utilized by Canoe Vendors. Completion of this project will eliminate an eyesore to the general public.



Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Once the project is complete, the Sweetwater/Coldwater ecosystem should recover within ten to fifteen years.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

No other efforts are underway at this time.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

A Surface Water Management Permit application with Northwest Florida Water Management District will be submitted prior to commencement of work on the project. The project will be continually monitored by WM personnel. FDEP, ACOE and Corp of Engineers will be contacted regarding permit requirements.

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Approximately 18 months will be required for Surveying, Aerial Photography, GIS information, engineering, final design and permitting.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

This project could provide educational opportunities for the general public and college students that are enrolled in environmental degrees.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

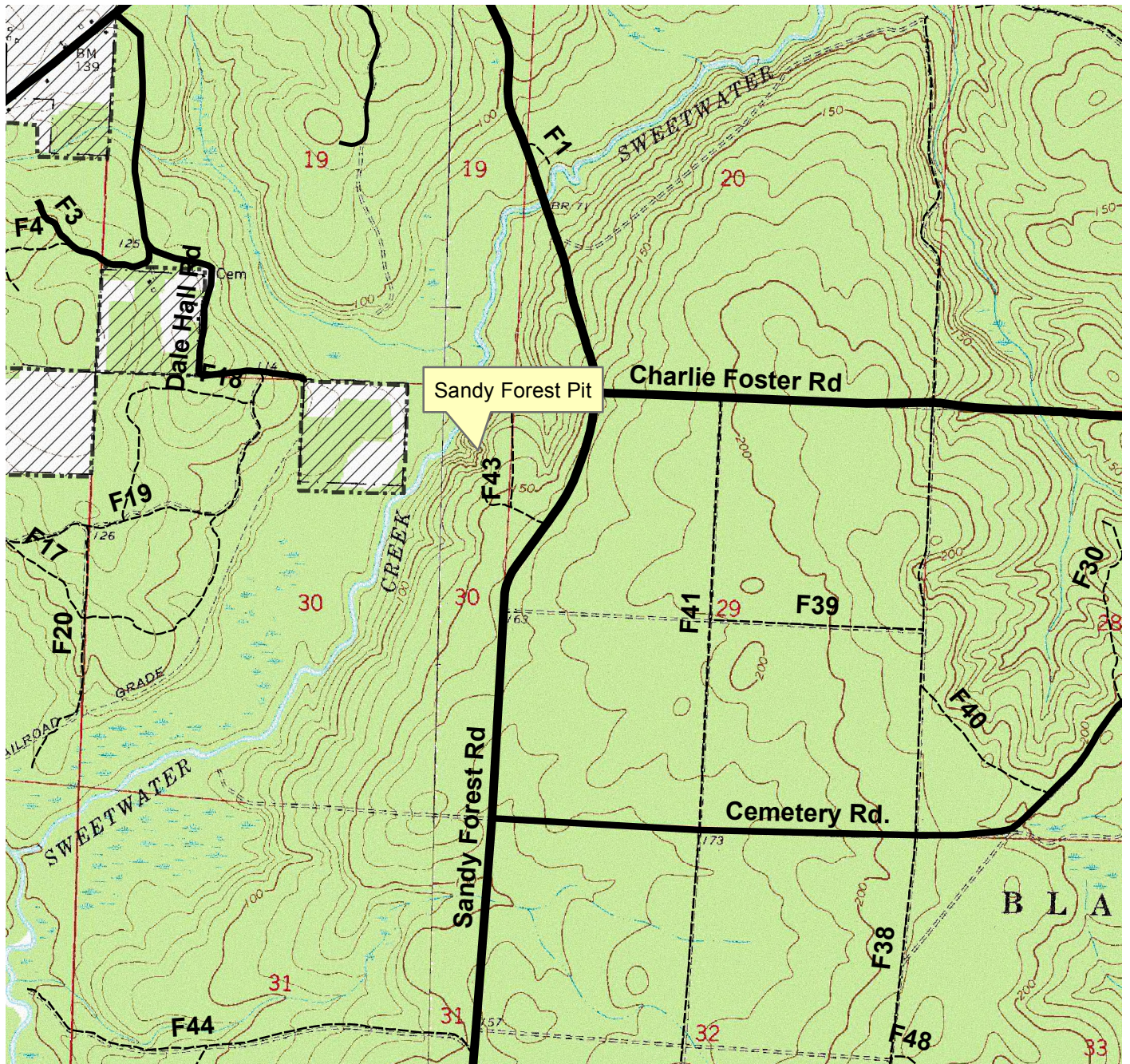
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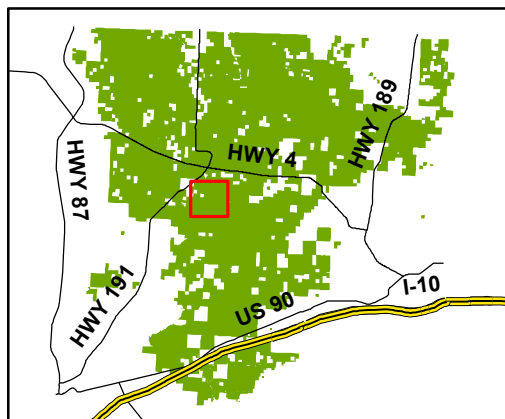
Blackwater River State Forest

Sandy Forest Pit

30-4N-26W



- Primary Road
- Secondary Road
- Service Road
- Tertiary Road
- Outside State Forest



0 1,000 2,000 3,000
Feet



Cost Appendix Sheet

Sandy Forest/F43 Erosion Mitigation

Cost Item	Cost Estimate
Planning	
Contracts	\$7,500.00
Feasibility	\$7,500.00
Engineering, Design, Land Rights, & Bid Prep	\$14,000.00
Restoration Plan	\$5,000.00
Site Visits & Cost of Site Selection	\$5,000.00
Administration, Overhead, and Indirect	
Other	
Planning Subtotal:	\$39,000.00
Construction	
Contracts	\$722,225.00
Administration & Mobilization/Demobilization	\$10,000.00
Other	
Construction Subtotal:	\$732,225.00
Monitoring	
Contracts	\$5,000.00
Data Collection	\$10,000.00
Monitoring Administration	\$6,000.00
Other	
Monitoring Subtotal:	\$21,000.00
Project Cost	
Supervision	\$10,000.00
	Subtotal: \$10,000.00
Contingency	\$80,000.00
	Total: \$882,225.00

Estimated Costs by Year

Year1	\$88,220.00
Year2	\$794,005.00
Year3	
Year4	
Year5	
Year6	





Tommy Eiland and Penny Creek/Red Wash Erosion
Sedimentation Reduction/Elimination on Blackwater River State Forest

Project Name:

Tommy Eiland and Penny Creek/Red Wash Erosion

Contact Information (Include at least one name, phone number, email address, and organization name if applicable):

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location (Include a map, if possible, and the city, county, longitude/latitude, and watershed):

T3N Sec 15 & 20 R25W. See the attached map.

Project Description (Describe all aspects of the project):

Two locations are being considered in this project. A repair to an NRCS watershed project that was completed many years ago at the end of Tommy Eiland Road in section 15, and a gully located on a closed road (B77/Red Wash) near Penny Creek in section 20. A significant amount of sediment has entered Penny Creek as a result of erosion at these locations. Vehicle access on unpaved, sloped roads created a significant erosion area on the South side of the Creek. Soils tend to be of light and sandy composition. This road has since been closed and access blocked to prevent further erosion. The objective of this effort is to stop the continued sedimentation into the creek by dissipating the energy of the runoff through a series of earthen bermed terraces. Terraces and berms will be stabilized through the planting of native species found in these systems, and which are suited to the current arid conditions of the site. Rip Rap will also be utilized in specific locations to aide in erosion and water flow control. Total volume of soil to be moved is 128518 cubic yards.

Estimated Project Costs (Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):
\$ 983,162

Other Funding (Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):
None

Technical Feasibility (Describe the technologies involved and any relevant past experience or proven success with similar projects):

Northwest Florida is geographically located within the Gulf Coastal Plain, a low-lying flat area of land formed during the Pliocene Epoch (Means, 1991). Steephead ravines, seepage slopes, and seepage streams are unique features found in only several watersheds in northwest Florida.

These systems are formed as drainage water begins to collect underground from a slope and flow outward to the surface through the deep sands of the Citronelle formation. The



seeps in turn form the headwaters of small tributaries, in which the groundwater discharges as clear cool water. Besides their unusual topographic characteristic of being between 50 to 100 feet deep, with an inclination of 45 degrees, these systems are also known to harbor a high biodiversity of flora and fauna, many of which are considered rare, threatened and/or endangered species (RTE). Healthy steephead systems maintain a micro-climate due to canopies of broad leafed hardwoods which further serve to support the higher biodiversity in these systems.

The primary objective of this proposal is to abate the threat of continued sedimentation along some gullies and closed roadways.

Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Penny Creek flows into Blackwater River in Section 19 T3N R25W. Blackwater River is classed as Outstanding Florida Waters under the State Water Quality Standards and eventually flows into the Gulf of Mexico. This project would provide an opportunity to address a severely eroded roadway which has been actively eroding for the past decade. Land use changes, tropical storms, and the nature of the sandy soils have accelerated conditions causing severe sedimentation at this site. In a study conducted by FDEP in 2010, 8 species of fish are listed as vulnerable or threatened in Blackwater River because of sedimentation specifically the Black Mouth Shiner, Gulf Sturgeon, Blue Nose Shiner, Florida Chub, Alabama Shad, Alligator Gar, Iron Color Shiner, and Striped Bass.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Recreational activities including fishing have been affected by the reduction in breeding cycles of bottom dwelling stream animals by covering breeding sites and smothering eggs and young. This in turn affects other fish and wildlife that feed on them. Enhanced fishing opportunities will be created by the completion of this project with resulting reduction/elimination of sedimentation in the tributaries of Blackwater River and Gulf of Mexico. Completion of this project will eliminate an eyesore to the general public.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

Once the project is complete, Penny Creek ecosystem should recover within ten to fifteen years.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*



No other efforts are underway at this time.

Complies with Federal, State, Local, and Tribal Laws/Regulations (Describe any concerns or potential conflicts):

A Surface Water Management Permit application with Northwest Florida Water Management District will be submitted prior to commencement of work on the project. The project will be continually monitored by WM personnel. FDEP, ACOE and Corp of Engineers will be contacted regarding permit requirements.

Readiness for Implementation (Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):

Approximately 18 months will be required for Surveying, Aerial Photography, GIS information, engineering, final design and permitting.

Public Acceptance (Describe any known or potential public approval or opposition to the project):

This project could provide educational opportunities for the general public and college students that are enrolled in environmental degrees.

Additional Information you wish to provide (Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):

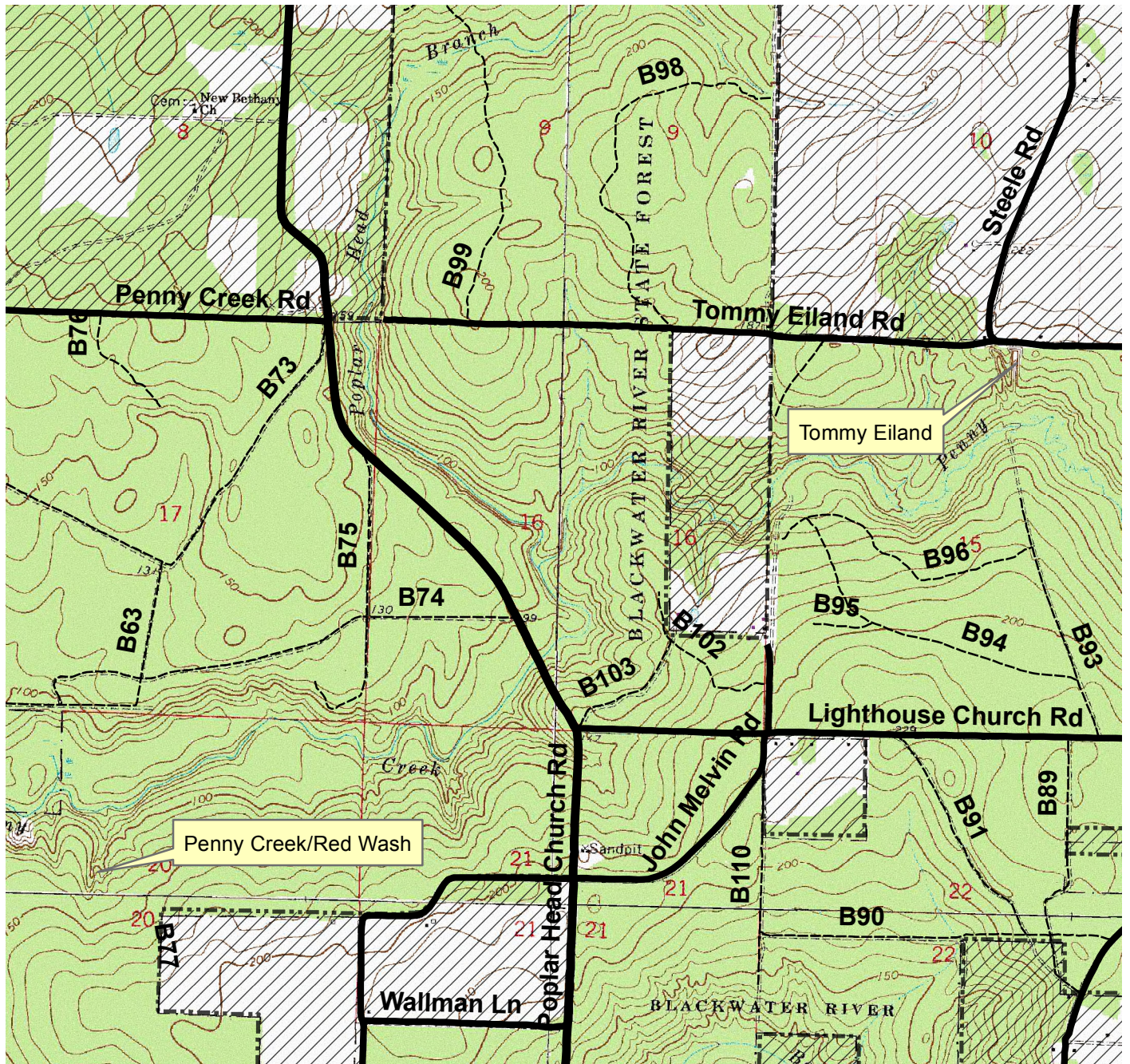
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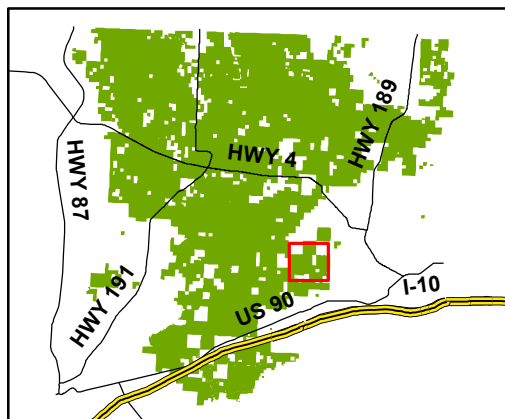
Blackwater River State Forest

Tommy Eiland S15-3N-25W

Penny Creek/Red Wash 20-3N-25W



- Primary Road
- Secondary Road
- Service Road
- Tertiary Road
- Outside State Forest



0 1,000 2,000 3,000 4,000 Feet



Cost Appendix Sheet

Tommy Eiland and Penny Creek/Red Wash

Cost Item	Cost Estimate
Planning	
Contracts	\$15,000.00
Feasibility	\$10,000.00
Engineering, Design, Land Rights, & Bid Prep	\$35,000.00
Restoration Plan	\$10,000.00
Site Visits & Cost of Site Selection	\$15,000.00
Administration, Overhead, and Indirect	
Other	
Planning Subtotal:	\$85,000.00
Construction	
Contracts	\$738,162.00
Administration & Mobilization/Demobilization	\$25,000.00
Other	
Construction Subtotal:	\$763,162.00
Monitoring	
Contracts	\$5,000.00
Data Collection	\$10,000.00
Monitoring Administration	\$15,000.00
Other	
Monitoring Subtotal:	\$30,000.00
Project Cost	
Supervision	\$25,000.00
Subtotal:	\$25,000.00
Contingency	\$80,000.00
Total:	\$983,162.00

Estimated Costs by Year

Year1	\$88,220.00
Year2	\$894,942.00
Year3	
Year4	
Year5	
Year6	





Bridge Approach Paving Blackwater River State Forest



Project Name:

Sediment Control through Bridge Approach Paving in the Blackwater, Coldwater and Sweetwater Units of BRSF

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

T5 and 6 N, Range 27 and 28W. See the attached map for locations.

Project Description *(Describe all aspects of the project):*

Throughout the history of BRSF back to its original ownership by timber companies and through its purchase by the Federal Government and transfer to FFS, roads were created to expedite movement of harvested timber to the saw mills. Planning for the location, future maintenance and the environmental impacts of roadways was secondary to the movement of timber or not a consideration at all. Because of continual use of unpaved forest roads by BRSF personnel, timber harvesters', hunters and the general public, Total Suspended Solids and sediment is creating a threat to stream and estuarine ecology. The Nature Conservancy and FDEP both recommend paving of roadways/bridge approaches and roadside vegetation as methods to reduce or eliminate sedimentation into streams and rivers. These projects include paving and shoulder vegetation at the approaches to 29 bridges and complete roadway paving of 6 miles of the North entrances of Hurricane Lake. Approach paving will encompass ridge to ridge points with an average distance of ¼ mile each direction. All of the sediment created in BRSF eventually flows from Blackwater River into the Gulf of Mexico.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
\$6,732,000

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*

None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

Most of the roadways that we anticipate paving have a stone base that is capable of receiving asphalt application with minimal prep. We have included in this analysis the cost of purchasing and applying appropriate base materials prior to paving operations on roads that may be in need. Because of the minimal prep time, this could be a "quick start" project.



Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Blackwater River is classed as an Outstanding Florida Waters under the State Water Quality Standards. Studies have been performed in BRSF over the past 10 years by FDEP and the Nature Conservancy that outline the negative effects of sediment on streams and rivers primarily in the form of disruption of the breeding cycles of bottom dwelling stream animals by covering breeding sites and smothering eggs and young. This in turn affects other fish and wildlife that feed on them. When excess sand and clay from roads, construction sites and croplands drain into the river, they can smother the entire system by covering food sources and interfering with respiratory systems of fish and aquatic invertebrates. We can reduce or eliminate this problem by paving the approaches to bridges at stream crossings or paving whole roadways. Elimination or reduction of sediments will help restore our streams and rivers to their natural state and produce an increase in native species.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Restoring our streams and rivers to their natural state will yield an increase in visitors to the forest and result in greater fisheries population counts, thereby producing better recreational opportunities for fisherman.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

An exact timeframe for the recovery is not known but a lack of efforts on our part will eventually result in continued destruction of the Blackwater Tributary and Gulf of Mexico ecosystem.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

Projects in the past such as 319 grants have showed improvements to our watershed but have been restricted to specific areas of the forest. This project will encompass a broad area of the forest and should yield greater results.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

This project will be permitted through the Northwest Florida Water Management District under the Silviculture rules for Forestry Operations prior to commencement of work.



Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Once the funding is available, a minimal amount of prep to dirt road surfaces will be required to commence paving operations. A limited amount of surveying, design and permitting work will precede construction. Anticipated time for design, permitting and surveying will be 12 months or less.

Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

Part of this project involves paving roadways in “Dog Hunt” areas and roads to the north camping area of Hurricane Lake. Rough roads in these areas have always been a source of complaints by the Dog Hunters Association and campers. A nicely paved roadway will produce happy campers and hunters.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

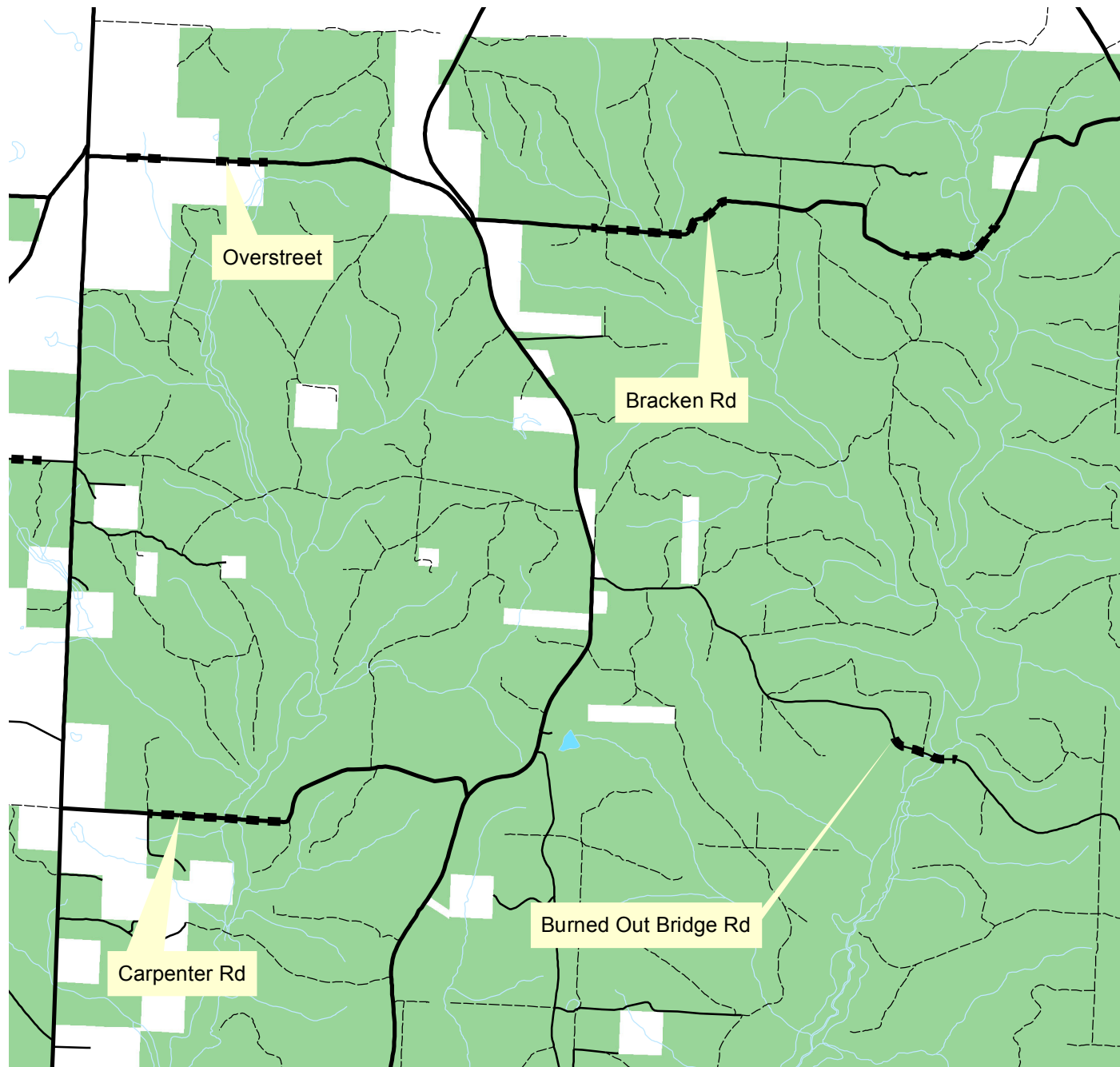
See attached.



Blackwater River State Forest

Proposed Road Paving, 2013

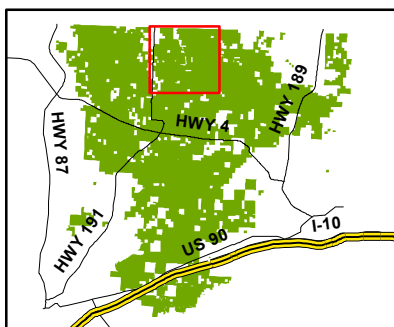
Sweetwater Tract



0 2 Miles



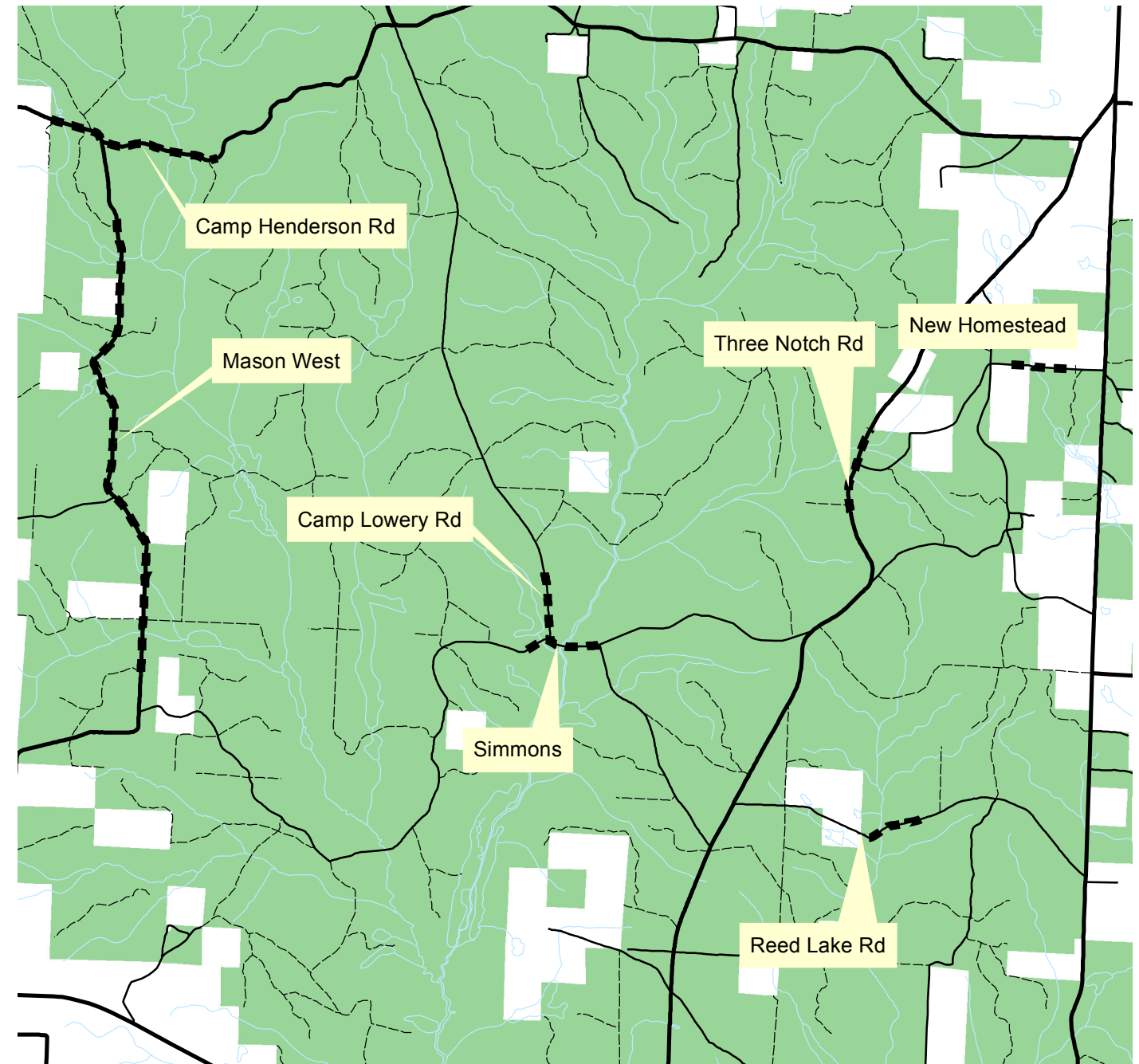
- Proposed paving
- Primary Road
- Secondary Road
- - - Tertiary Road
- Stream
- Lake
- State Forest



DISCLAIMER

This map is the product of the Florida Forest Service. There are no warranties made as to the fitness of this map for any unlisted purpose. Furthermore, no warranties are provided for data therein. Its use, or its interpretation,

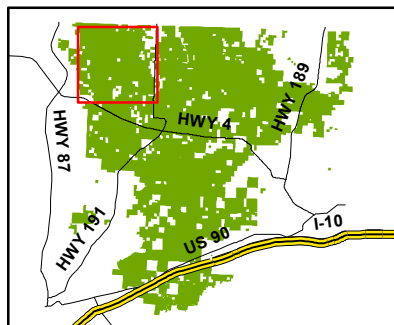
Blackwater River State Forest Proposed Road Paving, 2013 Coldwater Tract



0 2 Miles



- Proposed paving
- Primary Road
- - - Secondary Road
- ... Tertiary Road
- Stream
- Lake
- State Forest



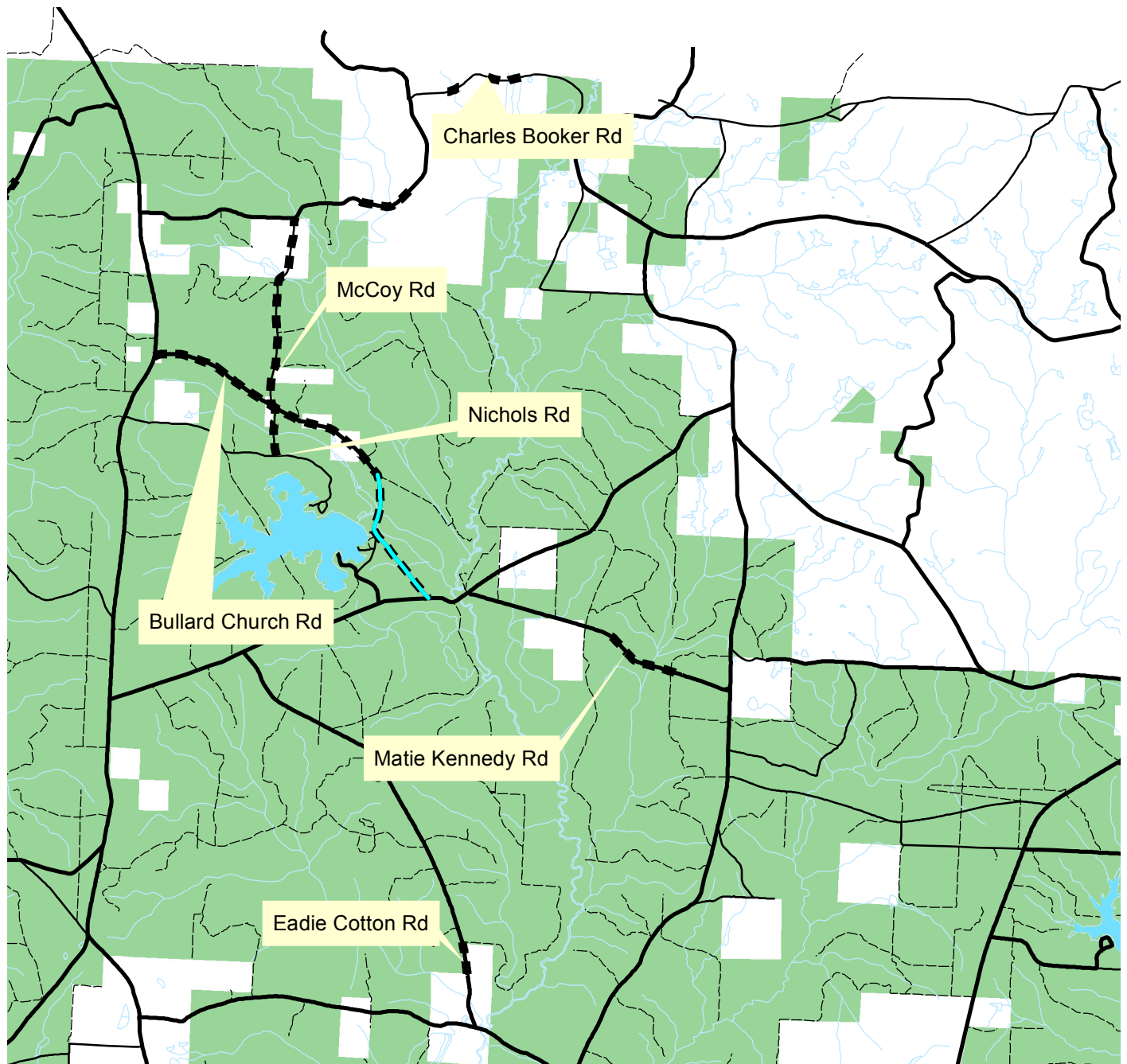
DISCLAIMER

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Blackwater River State Forest

Proposed Road Paving, 2013

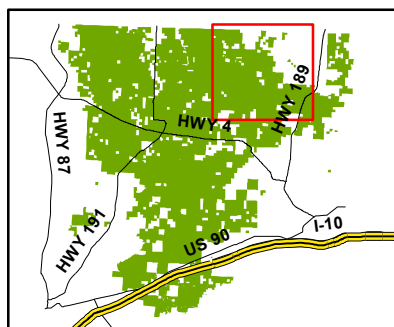
Rock Creek Tract



0 3 Miles



- Proposed paving
- Primary Road
- Secondary Road
- - - Tertiary Road
- Stream
- Lake
- State Forest



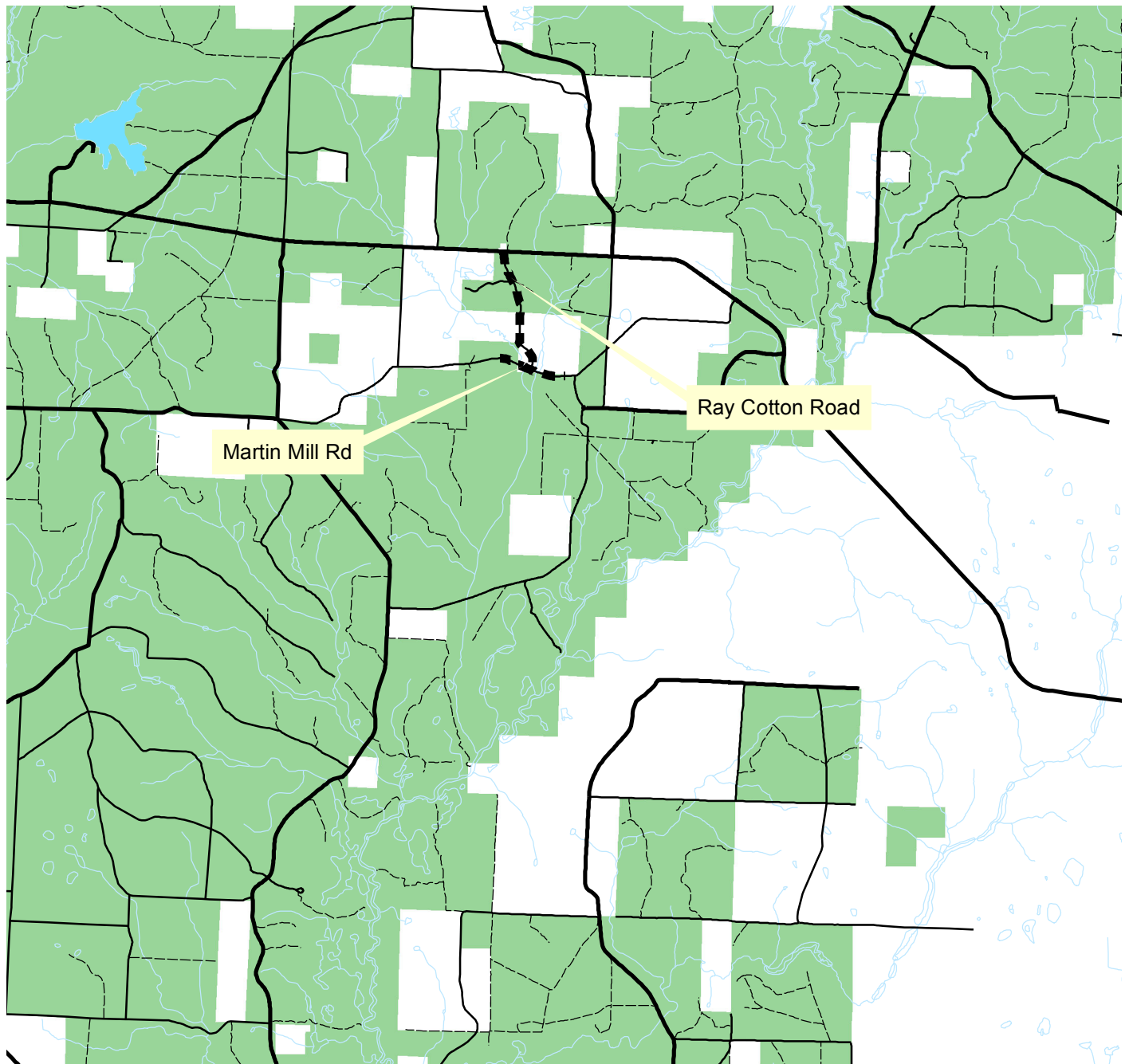
DISCLAIMER

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Blackwater River State Forest

Proposed Road Paving, 2013

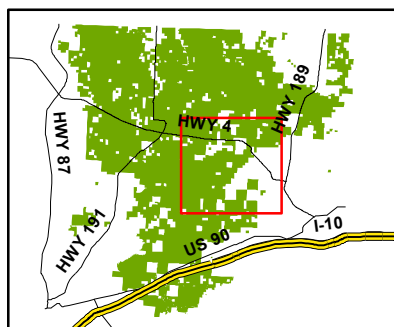
Bone Creek Tract



0 3 Miles



- Proposed paving
- Primary Road
- Secondary Road
- - - Tertiary Road
- Stream
- Lake
- State Forest



DISCLAIMER

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Cost Appendix Sheet

Bridges Approaches in Blackwater Unit to be Paved

Cost Item	Cost Estimate	Road Names	Length in Miles
Planning		Hurricane Lake North	2.45
Contracts	\$10,000.00	McCoy	2
Feasibility	\$10,000.00	Nichols	0.6
Engineering, Design, Land Rights, & Bid Prep	\$85,000.00	Bullard Church	3.4
Restoration Plan		Mattie Kennedy	0.5
Site Visits & Cost of Site Selection	\$10,000.00	Charles Booker	1
Administration, Overhead, and Indirect	\$25,000.00	Eadie Cotton	0.25
Other		Martin Mill	0.85
Planning Subtotal:	\$140,000.00	Ray Cotton	0.5
Construction			
Contracts	\$3,400,000.00	Total Miles	11.55
Administration & Mobilization/Demobilization	\$29,040.00	Total Feet	60984
Other		Cost Per Foot	\$60.00
Construction Subtotal:	\$3,429,040.00	Total Cost	\$3,659,040.00
Monitoring			
Contracts	\$35,000.00		
Data Collection	\$10,000.00		
Monitoring Administration	\$10,000.00		
Other			
Monitoring Subtotal:	\$55,000.00		
Project Cost			
Supervision	\$35,000.00		
Subtotal:	\$35,000.00		
Contingency	\$369,000.00		
Total:	\$4,028,040.00		

Estimated Costs by Year

Year1	\$235,000.00
Year2	\$369,000.00
Year3	\$3,424,040.00
Year4	
Year5	
Year6	



Cost Appendix Sheet

Bridges Approaches in Coldwater Unit to be Paved

Cost Item	Cost Estimate	Road Names	Length in Miles
Planning		Camp Henderson	1.0
Contracts	\$10,000.00	Mason West	3.0
Feasibility	\$10,000.00	Simmons	0.5
Engineering, Design, Land Rights, & Bid Prep	\$65,000.00	Camp Lowery	0.5
Restoration Plan		New Homestead	0.5
Site Visits & Cost of Site Selection	\$10,000.00	Overstreet	0.6
Administration, Overhead, and Indirect	\$26,000.00	Reed Lake	0.5
Other		Three Notch	0.5
Planning Subtotal:	\$121,000.00		
Construction			
Contracts	\$2,010,280.00	Total Miles	7.1
Administration & Mobilization/Demobilization	\$30,000.00	Total Feet	37488
Other		Cost Per Foot	\$60.00
Construction Subtotal:	\$2,040,280.00	Total Cost	\$2,249,280.00
Monitoring			
Contracts	\$34,000.00		
Data Collection	\$10,000.00		
Monitoring Administration	\$10,000.00		
Other			
Monitoring Subtotal:	\$54,000.00		
Project Cost			
Supervision	\$34,000.00		
Subtotal:	\$34,000.00		
Contingency	\$200,000.00		
Total:	\$2,449,280.00		

Estimated Costs by Year

Year1	\$249,280.00
Year2	\$2,200,000.00
Year3	
Year4	
Year5	
Year6	



Cost Appendix Sheet

Bridges Approaches in Juniper Unit to be Paved

Cost Item	Cost Estimate	Road Names	Length in Miles
Planning		New	0.5
		Homestead	
Contracts	\$3,500.00	Overstreet	0.6
Feasibility	\$3,500.00	Carpenter	0.8
Engineering, Design, Land Rights, & Bid Prep	\$18,000.00	Reed Lake	0.5
Restoration Plan		Three Notch	0.5
Site Visits & Cost of Site Selection	\$3,500.00		
Administration, Overhead, and Indirect	\$10,000.00		
Other			
Planning Subtotal:	\$38,500.00		
Construction			
Contracts	\$842,720.00	Total Miles	2.9
Administration & Mobilization/Demobilization	\$10,000.00	Total Feet	15048
Other		Cost Per Foot	\$60.00
Construction Subtotal:	\$852,720.00	Total Cost	\$902,880.00
Monitoring			
Contracts	\$9,500.00		
Data Collection	\$3,500.00		
Monitoring Administration	\$3,500.00		
Other			
Monitoring Subtotal:	\$16,500.00		
Project Cost			
Supervision	\$11,000.00		
Subtotal:	\$11,000.00		
Contingency			
Total:	\$918,720.00		

Estimated Costs by Year

Year1
Year2
Year3
Year4
Year5
Year6



Cost Appendix Sheet

Bridges Approaches in Sweetwater Unit to be Paved

Cost Item	Cost Estimate	Road Names	Length in Miles
Planning		Bracken	1.3
		Burned Out	
Contracts	\$3,200.00	Bridge	0.5
Feasibility	\$3,200.00	Carpenter	0.8
Engineering, Design, Land Rights, & Bid Prep	\$16,000.00		
Restoration Plan			
Site Visits & Cost of Site Selection	\$14,000.00		
Administration, Overhead, and Indirect	\$9,000.00		
Other			
Planning Subtotal:	\$45,400.00		
Construction			
Contracts	\$726,240.00	Total Miles	2.6
Administration & Mobilization/Demobilization	\$9,000.00	Total Feet	13464
Other		Cost Per Foot	\$60.00
Construction Subtotal:	\$735,240.00	Total Cost	\$807,840.00
Monitoring			
Contracts	\$10,000.00		
Data Collection	\$3,600.00		
Monitoring Administration	\$3,600.00		
Other			
Monitoring Subtotal:	\$17,200.00		
Project Cost			
Supervision	\$10,000.00		
Subtotal:	\$10,000.00		
Contingency			
Total:	\$807,840.00		

Estimated Costs by Year

Year1	\$75,000.00
Year2	\$732,840.00
Year3	
Year4	
Year5	
Year6	





Sedimentation Control through Application of Stone

Blackwater River State Forest



Sediment Control through application of Stone to Approaches of LWCs and Bridges
Sedimentation Reduction/Elimination on Blackwater River State Forest

Project Name:

Sediment Control through the application of Stone to the Approaches of Low Water Crossings (LWCs) and Bridges in the Blackwater, Coldwater and Sweetwater Units of BRSF.

Contact Information *(Include at least one name, phone number, email address, and organization name if applicable):*

Tom LeDew, Center Manager Blackwater River State Forest 11650 Munson Hwy. Milton, FL. 32570 850-957-6140 x108 Thomas.Ledew@freshfromflorida.com

Project Location *(Include a map, if possible, and the city, county, longitude/latitude, and watershed):*

See the attached map for locations

Project Description *(Describe all aspects of the project):*

Throughout the history of BRSF back to its original ownership by timber companies and through its purchase by the Federal Government and transfer to FFS, roads were created to expedite movement of harvested timber to the saw mills. Planning for the location, future maintenance and the environmental impacts of roadways was secondary to the movement of timber or not a consideration at all. Because of continual use of dirt forest roads by BRSF personnel, timber harvesters', hunters and the general public, the Total Suspended Solids and sediment is creating a threat to stream and estuarine ecology. The Nature Conservancy and FDEP both recommend the application of erosion resistant stone and roadside vegetation as methods to reduce or eliminate sedimentation into streams and rivers. These projects include applying stone at the approaches to 4 bridges and 53 LWCs. Rock application will encompass ridge to ridge points with an average distance of ¼ mile each direction. All of the sediment created in BRSF eventually flows into the Gulf of Mexico.

Estimated Project Costs *(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form):*
\$1,525,404

Other Funding *(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so please describe the funding source [e.g. State/Federal Grants]):*
None

Technical Feasibility *(Describe the technologies involved and any relevant past experience or proven success with similar projects):*

Most of the LWCs for which we anticipate applying stone, already have stone in the stream bottom. We have included in this analysis the cost of a contractor supplying and applying appropriate stone materials to the approaches. Because of the minimal prep time, this could be a "quick start" project.



Environmental Benefits *(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation]):*

Studies have been performed in BRSF over the past 10 years by FDEP and the Nature Conservancy that outline the negative effects of sediment on streams and rivers primarily in the form of disruption of the breeding cycles of bottom dwelling stream animals by covering breeding sites and smothering eggs and young. This in turn affects other fish and wildlife that feed on them. When excess sand and clay from roads, construction sites and croplands drain into the river, they can smother the entire system by covering food sources and interfering with respiratory systems of fish and aquatic invertebrates. We can reduce or eliminate this problem by applying stone to the approaches of bridges and LWCs at stream crossings. Elimination or reduction of sediments will help restore our streams and rivers to their natural state and result in an increase in native species.

Economic and Social Benefits *(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved):*

Restoring our streams and rivers to their natural state will yield an increase in visitors to the forest and result in greater fisheries population counts, thereby producing better recreational opportunities for fisherman.

Community Resilience *(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines]):*

An exact timeframe for the recovery is not known but a lack of efforts on our part will eventually result in continued destruction of the Blackwater Tributary and Gulf of Mexico ecosystem.

Conflicts or Complements to Existing Efforts *(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives):*

Projects in the past such as 319 grants have showed improvements to our watershed but have been restricted to specific areas of the forest. This project will encompass a broad area of the forest and should yield greater results.

Complies with Federal, State, Local, and Tribal Laws/Regulations *(Describe any concerns or potential conflicts):*

This project will be permitted through the Northwest Florida Water Management District under the Silviculture rules for Forestry Operations prior to commencement of work.



Sediment Control through application of Stone to Approaches of LWCs and Bridges
Sedimentation Reduction/Elimination on Blackwater River State Forest

Readiness for Implementation *(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project):*

Once the funding is available, a minimal amount of prep to dirt road surfaces will be required to commence stone application operations. A limited amount of surveying, design and permitting work will precede construction. Anticipated time for design, permitting and surveying will be less than 12 months.

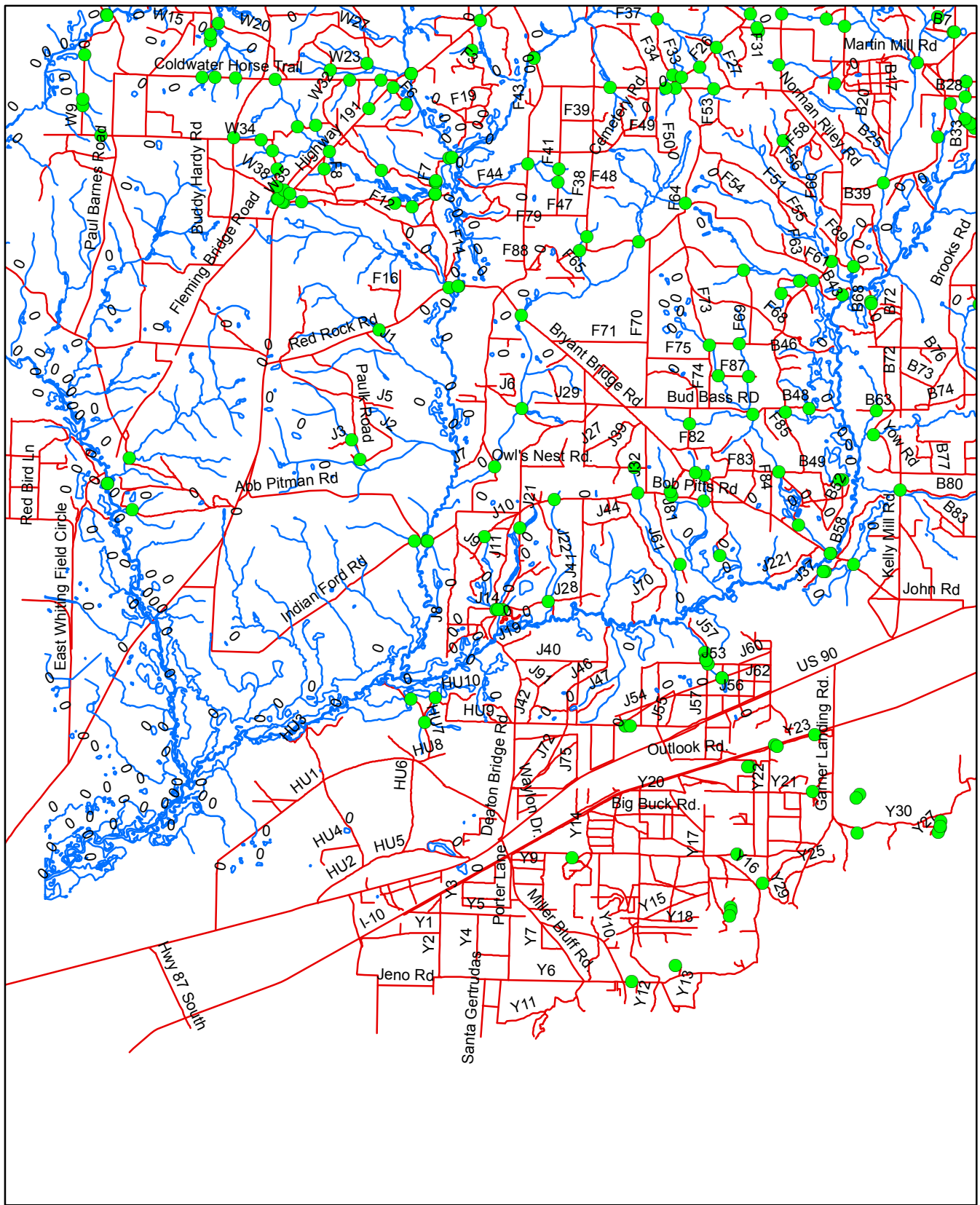
Public Acceptance *(Describe any known or potential public approval or opposition to the project):*

Part of this project involves stone application in “Dog Hunt” areas in Blackwater and Coldwater Units. Rough roads in these areas have always been a source of complaints by the Dog Hunters Association and other recreational individuals. A nicely paved roadway will produce happy hunters and visitors.

Additional Information you wish to provide *(Please include any maps, designs, drawings, photos, or background resources that may assist in completely and accurately understanding the project):*

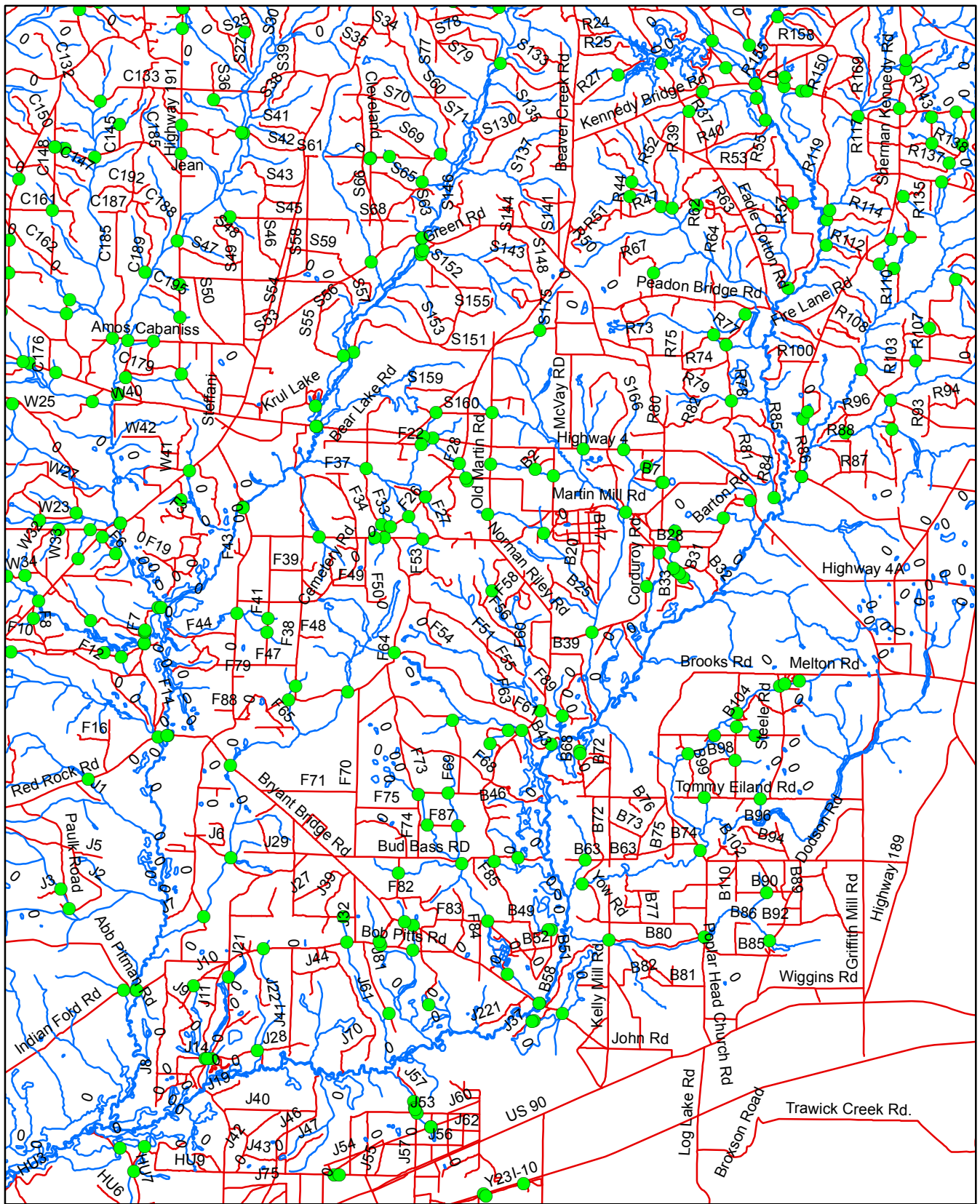
See attached.





Blackwater River State Forest "H" & "Y" Rock Crossings





Blackwater River State Forest "F" Rock Crossings



Cost Appendix Sheet

Rock Application to LWC and Bridge Approaches

Cost Item	Cost Estimate
Planning	
Contracts	\$2,000.00
Feasibility	\$2,000.00
Engineering, Design, Land Rights, & Bid Prep	\$3,000.00
Restoration Plan	\$2,000.00
Site Visits & Cost of Site Selection	\$2,000.00
Administration, Overhead, and Indirect	\$10,000.00
Other	
Planning Subtotal:	\$21,000.00
Construction	
Contracts	\$1,424,400.00
Administration & Mobilization/Demobilization	\$10,000.00
Other	
Construction Subtotal:	\$1,434,400.00
Monitoring	
Contracts	\$15,000.00
Data Collection	\$15,000.00
Monitoring Administration	
Other	
Monitoring Subtotal:	\$30,000.00
Project Cost	
Supervision	\$25,000.00
Subtotal:	\$25,000.00
Contingency	\$150,000.00
Total:	\$1,660,400.00

Estimated Costs by Year

Year1	\$830,200.00
Year2	\$772,700.00
Year3	
Year4	
Year5	
Year6	





Land Acquisition Recommendations





Florida Land Acquisition Projects: Fee or Less-Than-Fee

Department of Agriculture and Consumer Services Recommendation

Several of Florida's land acquisition projects were developed with an eye toward conservation and management of watershed areas which support the Gulf of Mexico and its estuaries while providing habitat for Florida's indigenous species. Florida Forever is Florida's premier conservation and recreation lands acquisition program, a blueprint for conserving natural resources and renewing Florida's commitment to conserve the state's natural and cultural heritage. Florida Forever is the successor to Preservation 2000 (P2000), the largest public land acquisition program of its kind in the United States.

The Department of Agriculture and Consumer Services is not tasked with oversight of the Florida Forever program; however, the Department recommends that several projects directly impacting the gulf be considered for funding by the RESTORE Act of 2012. This list of projects is not intended to be exhaustive or prioritized as other projects may prove to be important as well. The Department's recommendations are as follow:

- | | | |
|---------------------------------|---------------|-----------------------------------|
| • Wolf Creek Forest* | 10,750 acres | Santa Rosa County |
| • Bear Creek Forest* | 104,461 acres | Bay, Gulf, and Calhoun Counties |
| • St Joe Timber/St Vincent* | 4,600 acres | Gulf and Franklin Counties |
| • Apalachicola River** | 18,800 acres | Liberty, Gulf & Franklin Counties |
| • Lower Suwannee Gulf Watershed | 46,519 acres | Dixie County |
| • Knight Family Trust*** | 55,000 acres | Washington and Bay Counties |

* *In addition to providing environmental and economic buffers for the Gulf of Mexico, affording species habitat and watershed recharge areas, these lands directly support the mission of the United State military either as military installation buffering, flyway buffering, exercise and training grounds for low to no impact training operations.*

***The Apalachicola River watershed contains nationally significant forests, with some of the highest biological diversity east of the Mississippi River and rivaling that of the Great Smoky Mountains. Significant areas of temperate deciduous forests as well as longleaf pine forests remain intact. These southeastern forest types were harvested by logging between 1880 and 1920 and the Apalachicola contains some of the finest remaining examples in the southeast. Where the river enters the Gulf Of Mexico, at Apalachicola Bay, it creates a rich array of wetlands varying in salinity. These include tidal marshes and sea grass meadows. Over 200,000 acres of this diverse delta complex are included within the Apalachicola National Estuarine Research Reserve.*

****Knight Family Trust lands are privately owned and are not a Florida Forever Project.*

