

A Management Plan for
Apalachicola River
Wildlife and Environmental Area
2014 - 2024



Franklin and Gulf counties, Florida

Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600



**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION**

MARJORY STONEMAN DOUGLAS BUILDING
3900 COMMONWEALTH BOULEVARD
TALLAHASSEE, FLORIDA 32399-3000

RICK SCOTT
GOVERNOR

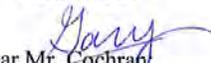
CARLOS LOPEZ-CANERA
LT. GOVERNOR

CLIFFORD D. WILSON III
INTERIM SECRETARY

December 2, 2014

Mr. Gary Cochran
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600

**RE: Apalachicola River Wildlife and Environmental Area Management Plan -
Lease 3584**


Dear Mr. Cochran:

The Division of State Lands, Office of Environmental Services, acting as agent for the Board of Trustees of the Internal Improvement Trust Fund, hereby approves the Apalachicola River Wildlife and Environmental Area management plan. The next management plan update is due December 2, 2024.

Approval of this land management plan does not waive the authority or jurisdiction of any governmental entity that may have an interest in this project. Implementation of any upland activities proposed by this management plan may require a permit or other authorization from federal and state agencies having regulatory jurisdiction over those particular activities. Pursuant to the conditions of your lease, please forward copies of all permits to this office upon issuance.

Sincerely,


Marianne S. Gengenbach
Office of Environmental Services
Division of State Lands

THIS PAGE INTENTIONALLY LEFT BLANK

**A Management Plan
for
Apalachicola River Wildlife and Environmental Area**

Franklin and Gulf counties, Florida

Owned by the Board of Trustees of the Internal Improvement Trust Fund
Managed by the Florida Fish and Wildlife Conservation Commission



June 2014

Approved Thomas H. Eason

Thomas Eason
Director, Division of Habitat and Species Conservation

THIS PAGE INTENTIONALLY LEFT BLANK

LAND MANAGEMENT PLAN EXECUTIVE SUMMARY

Lead Agency: Florida Fish and Wildlife Conservation Commission (FWC)

Common Name of Property: Apalachicola River Wildlife and Environmental Area

Location: Franklin and Gulf counties, Florida

Acreage Total: 63,257 acres

Acreage Breakdown:

<u>Land Cover Classification</u>	<u>Acres</u>	<u>Percent of Total Area</u>
Alluvial forest	1,042.3	1.6%
Alluvial river	2,252.4	3.4%
Basin swamp	416.3	0.6%
Baygall	1,675.3	2.6%
Blackwater stream	318.2	0.5%
Borrow pit	4.1	<0.1%
Bottomland forest	1,957.5	3.0%
Canal/ditch	6.8	<0.1%
Clearcut/early regeneration	539.8	0.8%
Clearing	459.1	0.7%
Depression marsh	18.8	<0.1%
Developed	13.8	<0.1%
Dome swamp	228.9	0.3%
Floodplain marsh	5,591.1	8.5%
Floodplain swamp	36,742.4	56.1%
Hydric hammock	28.6	<0.1%
Impoundment/artificial pond	29.0	<0.1%
Maritime hammock	73.3	0.1%
Mesic flatwoods	1,171.5	1.8%
Mesic hammock	64.9	0.1%
Pine plantation	8,468.1	12.9%
Salt marsh	1,254.4	2.0%
Sandhill	28.3	<0.1%
Scrubby flatwoods	133.5	0.2%
Successional hardwood forest	23.8	<0.1%
Upland hardwood forest	94.1	0.1%
Wet flatwoods	2,428.3	3.7%
Wet prairie	378.8	0.6%

*GIS-calculated acreage for land cover classification varies slightly from actual total acreage.

Lease/Management Agreement No.: 3584 (Appendix 13.1)

Use: Single

Multiple X

Management Responsibilities:

Agency FWC

Responsibilities

LEAD, SUBLESSEE (Wildlife and Environmental Area, resource protection, law enforcement)

Designated Land Use: Wildlife and Environmental Area

Sublease (s): Sublease: 3584-01 with FDEP, Florida Coastal Office

Encumbrances: Utility easement; multiple apiary agreements

Type Acquisition: Environmentally Endangered Lands, Conservation and Recreation Lands, Preservation 2000, Florida Forever

Unique Features: United Nations International Biosphere Site; Large expanse of floodplain swamp forest; Apalachicola River and associated features; and Diverse Natural communities

Archaeological/Historical: Thirty-three documented within ARWEA, including two located on the Tate's Hell portion of ARWEA.

Management Needs: Habitat restoration and improvement; public access and recreational opportunities; hydrological preservation and restoration; exotic and invasive species maintenance and control; imperiled species habitat maintenance, enhancement, and restoration.

Acquisition Needs/Acreage: 34,926 acres FWC Additions and Inholdings list; 75,010 acres remaining in the St. Joe Timberland-Lake Wimico and St. Joe Timberland St. Vincent Sound-to-Lake Wimico Ecosystem Florida Forever Projects (Figure 4).

Surplus Lands/Acreage: None

Public Involvement: Management Advisory Group consensus building meeting and Public Hearing (Appendix 13.2)

DO NOT WRITE BELOW THIS LINE (FOR DIVISION OF STATE LANDS USE ONLY)

ARC Approval Date _____ BTITF Approval Date: _____

Comments: _____

Land Management Plan Compliance Checklist

Required for State-owned conservation lands over 160 acres

Section A: Acquisition Information Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
1	The common name of the property.	18-2.018 & 18-2.021	1
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	4, 6
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	8
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	1, 152
5	A map showing the approximate location and boundaries of the property, and the location of any structures or improvements to the property.	18-2.018 & 18-2.021	2, 5, 96
6	An assessment as to whether the property, or any portion, should be declared surplus. <i>Provide information regarding assessment and analysis in the plan, and provide corresponding map.</i>	18-2.021	67
7	Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property. <i>Please clearly indicate parcels on a map.</i>	18-2.021	92-94, 97
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	10-12
9	A statement of the purpose for which the lands were acquired, the projected use or uses as defined in 253.034 and the statutory authority for such use or uses.	259.032(10)	4, 8
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	9-12

Section B: Use Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
11	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	66-67
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	63-65
13	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	66-67
14	A description of the management responsibilities of each entity involved in the property's management and how such responsibilities will be coordinated.	18-2.018	94
15	Include a provision that requires that the managing agency consult with the Division of Historical Resources, Department of State before taking actions that may adversely affect archeological or historical resources.	18-2.021	90-91, 94, 513

16	Analysis/description of other managing agencies and private land managers, if any, which could facilitate the restoration or management of the land.	18-2.021	94, 148
17	A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	259.032(10)	66-67
18	A finding regarding whether each planned use complies with the 1981 State Lands Management Plan, particularly whether such uses represent "balanced public utilization," specific agency statutory authority and any other legislative or executive directives that constrain the use of such property.	18-2.021	148-149
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	600
20	An assessment of the impact of planned uses on the renewable and non-renewable resources of the property, including soil and water resources, and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to compensate/mitigate damage caused by such uses, including a description of how the manager plans to control and prevent soil erosion and soil or water contamination.	18-2.018 & 18-2.021	72-142
21	*For managed areas larger than 1,000 acres, an analysis of the multiple-use potential of the property which shall include the potential of the property to generate revenues to enhance the management of the property provided that no lease, easement, or license for such revenue-generating use shall be entered into if the granting of such lease, easement or license would adversely affect the tax exemption of the interest on any revenue bonds issued to fund the acquisition of the affected lands from gross income for federal income tax purposes, pursuant to Internal Revenue Service regulations.	18-2.021 & 253.036	65-66
22	If the lead managing agency determines that timber resource management is not in conflict with the primary management objectives of the managed area, a component or section, prepared by a qualified professional forester, that assesses the feasibility of managing timber resources pursuant to section 253.036, F.S.	18-021	299
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	8

*The following taken from 253.034(10) is not a land management plan requirement; however, it should be considered when developing a land management plan: The following additional uses of conservation lands acquired pursuant to the Florida Forever program and other state-funded conservation land purchase programs shall be authorized, upon a finding by the Board of Trustees, if they meet the criteria specified in paragraphs (a)-(e): water resource development projects, water supply development projects, storm-water management projects, linear facilities and sustainable agriculture and forestry. Such additional uses are authorized where: (a) Not inconsistent with the management plan for such lands; (b) Compatible with the natural ecosystem and resource values of such lands; (c) The proposed use is appropriately located on such lands and where due consideration is given to the use of other available lands; (d) The using entity reasonably compensates the titleholder for such use based upon an appropriate measure of value; and (e) The use is consistent with the public interest.

Section C: Public Involvement Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
24	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	12-13, 250
25	The management prospectus required pursuant to paragraph (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	259.032(10)	250
26	LMPs and LMP updates for parcels over 160 acres shall be developed with input from an advisory group who must conduct at least one public hearing within the county in which the parcel or project is located. <i>Include the advisory group members and their affiliations, as well as the date and location of the advisory group meeting.</i>	259.032(10)	12-13, 250
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	250
28	During plan development, at least one public hearing shall be held in each affected county. Notice of such public hearing shall be posted on the parcel or project designated for management, advertised in a paper of general circulation, and announced at a scheduled meeting of the local governing body before the actual public hearing. <i>Include a copy of each County's advertisements and announcements (meeting minutes will suffice to indicate an announcement) in the management plan.</i>	253.034(5) & 259.032(10)	12-13, 261
29	The manager shall consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan. <i>Include manager's replies to the team's findings and recommendations.</i>	259.036	72, 267
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	267
31	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	267

Section D: Natural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
32	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding soil types. <i>Use brief descriptions and include USDA maps when available.</i>	18-2.021	14-18, 278
33	Insert FNAI based natural community maps when available.	ARC consensus	21-22
34	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding outstanding native landscapes containing relatively unaltered flora, fauna and geological conditions.	18-2.021	13-63

35	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding unique natural features and/or resources including but not limited to virgin timber stands, scenic vistas, natural rivers and streams, coral reefs, natural springs, caverns and large sinkholes.	18-2.018 & 18-2.021	13-63
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	62
37	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding mineral resources, such as oil, gas and phosphate, etc.	18-2.018 & 18-2.021	62
38	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding fish and wildlife, both game and non-game, and their habitat.	18-2.018 & 18-2.021	13-62
39	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding State and Federally listed endangered or threatened species and their habitat.	18-2.021	58-62
40	The identification or resources on the property that are listed in the Natural Areas Inventory. <i>Include letter from FNAI or consultant where appropriate.</i>	18-2.021	13-62, 372
41	Specific description of how the managing agency plans to identify, locate, protect and preserve or otherwise use fragile, nonrenewable natural and cultural resources.	259.032(10)	72-142
42	Habitat Restoration and Improvement	259.032(10) & 253.034(5)	
42-A.	Describe management needs, problems and a desired outcome and the key management activities necessary to achieve the enhancement, protection and preservation of restored habitats and enhance the natural, historical and archeological resources and their values for which the lands were acquired.	↓	72-142
42-B.	Provide a detailed description of both short (2-year planning period) and long-term (10-year planning period) management goals, and a priority schedule based on the purposes for which the lands were acquired and include a timeline for completion.		72-147
42-C.	The associated measurable objectives to achieve the goals.		103-118
42-D.	The related activities that are to be performed to meet the land management objectives and their associated measures. <i>Include fire management plans - they can be in plan body or an appendix.</i>		299, 315, 374, 478, 513, 529
42-E.	A detailed expense and manpower budget in order to provide a management tool that facilitates development of performance measures, including recommendations for cost-effective methods of accomplishing those activities.		144-147, 519
43	***Quantitative data description of the land regarding an inventory of forest and other natural resources and associated acreage. <i>See footnote.</i>	253.034(5)	13-61
44	Sustainable Forest Management, including implementation of prescribed fire management	18-2.021, 253.034(5) & 259.032(10) ↓	
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		72-142

44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-90
44-C.	Measurable objectives (see requirement for #42-C).		113
44-D.	Related activities (see requirement for #42-D).		299, 315, 374, 478, 513, 529
44-E.	Budgets (see requirement for #42-E).		144-147, 519
45	Imperiled species, habitat maintenance, enhancement, restoration or population restoration	259.032(10) & 253.034(5)	
45-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	72-142
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		72-147
45-C.	Measurable objectives (see requirement for #42-C).		106-107
45-D.	Related activities (see requirement for #42-D).		299, 315, 374, 478, 513, 529
45-E.	Budgets (see requirement for #42-E).		144-147, 519
46	***Quantitative data description of the land regarding an inventory of exotic and invasive plants and associated acreage. <i>See footnote.</i>	253.034(5)	29, 83-84
47	Place the Arthropod Control Plan in an appendix. If one does not exist, provide a statement as to what arrangement exists between the local mosquito control district and the management unit.	BOT requirement via lease language	591
48	Exotic and invasive species maintenance and control	259.032(10) & 253.034(5)	
48-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	83-84
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		83-84
48-C.	Measurable objectives (see requirement for #42-C).		108-109
48-D.	Related activities (see requirement for #42-D).		299, 315, 374, 478, 513, 529
48-E.	Budgets (see requirement for #42-E).		144-147, 519

Section E: Water Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
49	A statement as to whether the property is within and/or adjacent to an aquatic preserve or a designated area of critical state concern or an area under study for such designation. <i>If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.</i>	18-2.018 & 18-2.021	4

50	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding water resources, including water classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water under Rule 62-302.700, F.A.C.	18-2.021	61-62
51	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding swamps, marshes and other wetlands.	18-2.021	18-40
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	61-62, 88-89
53	Hydrological Preservation and Restoration	259.032(10) & 253.034(5)	
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	88-89, 112
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		88-89
53-C.	Measurable objectives (see requirement for #42-C).		112-113
53-D.	Related activities (see requirement for #42-D).		299, 315, 374, 478, 513, 529
53-E.	Budgets (see requirement for #42-E).		144-147, 519

Section F: Historical, Archeological and Cultural Resources			
Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
54	**Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding archeological and historical resources. <i>Include maps of all cultural resources except Native American sites, unless such sites are major points of interest that are open to public visitation.</i>	18-2.018, 18-2.021 & per DHR's request	62, 90-91, 513
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	62, 90-91, 513
56	A description of actions the agency plans to take to locate and identify unknown resources such as surveys of unknown archeological and historical resources.	18-2.021	90, 513
57	Cultural and Historical Resources	259.032(10) & 253.034(5)	
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	90
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		113-114
57-C.	Measurable objectives (see requirement for #42-C).		113-114
57-D.	Related activities (see requirement for #42-D).		299, 315, 374, 478, 513, 529
57-E.	Budgets (see requirement for #42-E).		144-147, 519

**While maps of Native American sites should not be included in the body of the management plan, the DSL urges each managing agency to provide such information to the Division of Historical Resources for inclusion in their proprietary database. This information should be available for access to new managers to assist them in developing, implementing and coordinating their management activities.

Section G: Facilities (Infrastructure, Access, Recreation)

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
58	***Quantitative data description of the land regarding an inventory of infrastructure and associated acreage. <i>See footnote.</i>	253.034(5)	91-92
59	Capital Facilities and Infrastructure	259.032(10) & 253.034(5)	
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	85-88, 91-92
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		114-116
59-C.	Measurable objectives (see requirement for #42-C).		114-116
59-D.	Related activities (see requirement for #42-D).		299, 315, 374, 478, 513, 529
59-E.	Budgets (see requirement for #42-E).		144-147, 519
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	91-92
61	Public Access and Recreational Opportunities	259.032(10) & 253.034(5)	
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	85
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		109-112
61-C.	Measurable objectives (see requirement for #42-C).		109-112
61-D.	Related activities (see requirement for #42-D).		299, 315, 374, 478, 513, 529
61-E.	Budgets (see requirement for #42-E).		144-147, 519

Section H: Other/ Managing Agency Tools

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
62	Place this LMP Compliance Checklist at the front of the plan.	ARC and managing agency consensus	iii
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	i
64	If this LMP is a 10-year update, note the accomplishments since the drafting of the last LMP set forth in an organized (categories or bullets) format.	ARC consensus	68-72
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	72-142

66	Summary budget for the scheduled land management activities of the LMP including any potential fees anticipated from public or private entities for projects to offset adverse impacts to imperiled species or such habitat, which fees shall be used to restore, manage, enhance, repopulate, or acquire imperiled species habitat for lands that have or are anticipated to have imperiled species or such habitat onsite. The summary budget shall be prepared in such a manner that it facilitates computing an aggregate of land management costs for all state-managed lands using the categories described in s. 259.037(3) which are resource management, administration, support, capital improvements, recreation visitor services, law enforcement activities.	253.034(5)	144-147, 519
67	Cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired, include recommendations for cost-effective methods in accomplishing those activities.	259.032(10)	144-147, 519
68	A statement of gross income generated, net income and expenses.	18-2.018	65, 144-147, 519

*** = The referenced inventories shall be of such detail that objective measures and benchmarks can be established for each tract of land and monitored during the lifetime of the plan. All quantitative data collected shall be aggregated, standardized, collected, and presented in an electronic format to allow for uniform management reporting and analysis. The information collected by the DEP pursuant to s. 253.0325(2) shall be available to the land manager and his or her assignee.

Table of Contents

1	Introduction and General Information	1
1.1	Management Plan Purpose	1
1.1.1	FWC Planning Philosophy	3
1.2	Location	4
1.3	Acquisition.....	4
1.3.1	Purpose for Acquisition of the Property.....	4
1.3.2	Acquisition History.....	4
1.4	Management Authority	8
1.5	Management Directives	8
1.6	Title Interest and Encumbrances	8
1.7	Proximity to Other Public Conservation Lands	9
1.8	Adjacent Land Uses.....	10
1.9	Public Involvement.....	12
2	Natural and Cultural Resources	13
2.1	Physiography and Topography	13
2.1.1	Climate	13
2.1.2	Soils	14
2.1.3	Geologic Conditions	14
2.2	Vegetation.....	18
2.2.1	FNAI Natural Community Descriptions	30
2.2.2	Forest Resources	40
2.2.3	Forest Management Plan	41
2.3	Fish and Wildlife Resources.....	41
2.3.1	FWC Wildlife Observations and FNAI Element Occurrences	41
2.3.2	Imperiled Species	58
2.4	Native Landscapes	61
2.5	Water Resources	61
2.6	Beaches and Dunes	62
2.7	Mineral Resources	62
2.8	Cultural Resources	62

2.9	Scenic Resources.....	63
3	Uses of the Property	63
3.1	Previous Use and Development	63
3.2	Current Use of the Property.....	65
3.2.1	Visitation and Economic Benefits	65
3.3	Single- or Multiple-use Management	66
3.3.1	Analysis of Multiple-use Potential.....	66
3.3.2	Assessment of Impact of Planned Uses of the Property.....	67
3.4	Acreage That Should Be Declared Surplus	67
4	Accomplished Objectives from the ARWEA Management Plan 2002 – 2012	68
5	Management Activities and Intent	72
5.1	Land Management Review.....	72
5.2	Adaptive Management	72
5.2.1	Monitoring	73
5.2.2	Performance Measures.....	73
5.2.3	Implementation	74
5.3	Habitat Restoration and Improvement.....	74
5.3.1	Objective-Based Vegetation Management.....	74
5.3.2	Prescribed Fire and Fire Management.....	75
5.3.3	Habitat Restoration.....	77
5.3.4	Apiaries.....	79
5.4	Fish and Wildlife Management and Imperiled Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration	80
5.4.1	Fish and Wildlife	80
5.4.2	Imperiled Species - Wildlife Conservation Prioritization and Recovery.....	81
5.5	Exotic and Invasive Species Maintenance and Control	83
5.6	Public Access and Recreational Opportunities.....	85
5.6.1	Americans with Disabilities Act	85
5.6.2	Recreation Master Plan.....	85
5.6.3	Public Access Carrying Capacity	85
5.6.4	Wildlife Viewing	86
5.6.5	Hunting.....	86

5.6.6	Fishing.....	87
5.6.7	Trails.....	87
5.6.8	Paddling and Boating.....	87
5.6.9	Equestrian	87
5.6.10	Camping	88
5.6.11	Geocaching.....	88
5.6.12	Environmental Education and Interpretation.....	88
5.7	Hydrological Preservation and Restoration.....	88
5.7.1	Hydrological Assessment	88
5.7.2	Water Resources Monitoring.....	89
5.8	Forest Resource Management.....	89
5.8.1	Forest Management Plan.....	90
5.9	Cultural and Historical Resources.....	90
5.10	Capital Facilities and Infrastructure.....	91
5.11	Land Conservation and Stewardship Partnerships	92
5.11.1	Optimal Resource Boundary	92
5.11.2	Optimal Conservation Planning Boundary	92
5.11.3	Conservation Action Strategy	93
5.11.4	FWC Florida Forever Additions and Inholdings Acquisition List	94
5.12	Research Opportunities.....	94
5.13	Cooperative Management and Special Uses.....	94
5.13.1	Cooperative Management	94
5.13.2	First Responder and Military Training	98
5.14	Climate Change.....	99
5.15	Soil and Water Conservation	102
6	Resource Management Goals and Objectives	103
6.1	Habitat Restoration and Improvement.....	103
6.2	Imperiled Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration.....	106
6.3	Other Wildlife (Game and Nongame) Habitat Maintenance, Enhancement, Restoration, or Population Restoration	107
6.4	Exotic and Invasive Species Maintenance and Control	108

6.5	Public Access and Recreational Opportunities.....	109
6.6	Hydrological Preservation and Restoration.....	112
6.7	Forest Resource Management.....	113
6.8	Cultural and Historical Resources.....	113
6.9	Capital Facilities and Infrastructure.....	114
6.10	Land Conservation and Stewardship Partnerships	116
6.11	Research Opportunities.....	117
6.12	Climate Change.....	117
7	Schedule: Timelines for Completion of Resource Management Goals and Objectives	118
8	Resource Management Challenges and Strategies	143
9	Cost Estimates and Funding Sources	144
10	Analysis of Potential for Contracting Private Vendors for Restoration and Management Activities.....	148
11	Compliance with Federal, State, and Local Governmental Requirements	148
12	Endnotes	150
13	Appendices	152
13.1	Lease Agreement and Amendments	152
13.2	Public Involvement.....	250
13.3	Land Management Review.....	267
13.4	Soil Series Descriptions.....	278
13.5	Timber Assessment	299
13.6	Wildlife Conservation Prioritization and Recovery Strategy.....	315
13.7	FNAI Letter.....	372
13.8	Prescribed Burn Plan.....	374
13.9	Apiary Agreements.....	417
13.10	FWC Apiary Policy.....	454
13.11	ARWEA Recreation Master Plan	478
13.12	Management Procedures Guidelines – Management of Archaeological and Historical Resources and Master Site File List	513
13.13	Operational Plan Fiscal Year 2013-2014 and Land Management Uniform Cost Accounting Council Terms.....	519
13.14	FWC Agency Strategic Plan	529

13.15	GRASI MOU	536
13.16	ARSA MOU	540
13.17	Florida Coastal Office Sublease.....	569
13.18	Arthropod Control Plans.....	591
13.19	Franklin County and Gulf County Letters of Compliance with Comprehensive Plans	600

List of Figures

Figure 1. Apalachicola River WEA with Agency Leads.....	2
Figure 2. Franklin and Gulf counties- Section, Township, and Range	5
Figure 3. Apalachicola River WEA Acquisition Tracts.....	7
Figure 4. Conservation Lands and Florida Forever Projects near ARWEA	11
Figure 5. Apalachicola River WEA - Soils.....	16
Figure 6. Apalachicola River WEA Soils- Depth to Water Table	17
Figure 7. FNAI Historic Natural Communities on ARWEA	21
Figure 8. FNAI Natural Communities on ARWEA	22
Figure 9 ARWEA Integrated Wildlife Habitat Ranking System	42
Figure 10. ARWEA- FNAI Element Occurrences and FWC Wildlife Observations	43
Figure 11. ARWEA Facilities and Infrastructure	96
Figure 12. ARWEA Optimal Conservation Planning Boundary	97
Figure 13. Sea Level Rise Potential Inundation at ARWEA.....	102
Figure 14. Project Locations.....	104

List of Tables

Table 1. Conservation Lands Within a 20-mile Radius of ARWEA	9
Table 2. Florida Forever Projects Within a 20-mile Radius of ARWEA	10
Table 3. Natural Communities and Altered Landcover Types of ARWEA	18
Table 4. Native Plant Species Known to Occur on ARWEA.....	19
Table 5. Exotic Plant Species of ARWEA.....	29
Table 6. Avian Species of ARWEA.....	44
Table 7. Mammalian Species of ARWEA.....	50
Table 8. Amphibian Species of ARWEA.....	52
Table 9. Reptilian Species of ARWEA.....	53
Table 10. Fish Species of ARWEA.....	54
Table 11. Butterfly Species of ARWEA.....	56
Table 12. Exotic Animal Species of ARWEA.....	57
Table 13. Rare and Imperiled Species of ARWEA	58
Table 14. Focal Species Identified as Having Potential Habitat on ARWEA	83

1 Introduction and General Information

Located in Franklin and Gulf counties, Florida, the Apalachicola River Wildlife and Environmental Area (ARWEA) is part of a vast ecosystem that begins hundreds of miles away in the Chattahoochee National Forest in Georgia at the headwaters of the Apalachicola River. The 86,140-acre ARWEA contains the largest expanse of floodplain forest in Florida. The ARWEA is an important element in conserving the nationally and internationally recognized biological diversity of the Apalachicola River and Bay ecosystem. This ecosystem has been designated as a United Nations International Biosphere site for its vital role in sustaining ecological diversity. The area's outstanding wildlife habitats, including floodplain swamp, floodplain marsh, bottomland forest, and pine flatwoods support significant populations of both rare and common wildlife, including the red-cockaded woodpecker, Barbour's map turtle, southern bald eagle, and northern bobwhite. The area provides excellent opportunities for wildlife viewing, nationally recognized paddling opportunities, and other fish and wildlife-based public outdoor recreation opportunities such as hunting, fishing, camping, horseback riding, bicycling, and hiking.

Although the cumulative acreage within the ARWEA is 86,140 acres, the Florida Fish and Wildlife Conservation Commission (FWC) is currently assigned lead management authority for approximately 63,257 acres of ARWEA, which is the focus of this Management Plan (Figure 1). The FWC lead management area includes a portion of Tate's Hell Wildlife Management Area, which is referred to in this document as the Tate's Hell portion of ARWEA. The Florida Forest Service (FFS), the Northwest Florida Water Management District (NFWFMD) and the Department of Environmental Protection (DEP), have lead management authority over the remaining acres within the ARWEA, with the FFS managing (~3,005 acres), the NFWFMD managing (~14,278 acres), and the DEP managing (~4,392 acres). The FWC has entered into cooperative agreements with these agencies to incorporate additional lands into the Wildlife Management Area system to provide public hunting opportunities. The ARWEA is within the boundary of the 246,766 acre Apalachicola Bay National Estuarine Research Reserve (ANERR). Nationally, NERRs have been established by the National Oceanic and Atmospheric Administration to help improve coastal management decisions and to provide opportunities for long-term estuarine research and monitoring, as well as estuarine education and interpretation.

1.1 Management Plan Purpose

This Management Plan serves as the basic statement of policy and direction for the management of ARWEA. It provides information including the past usage, conservation acquisition history, and descriptions of the natural and cultural resources found on ARWEA. Furthermore, it identifies the FWC's future management intent, goals and associated short and long-term objectives, as well as identifying challenges and solutions. This Management Plan has been developed to guide each aspect of ARWEA's management for the next ten years.

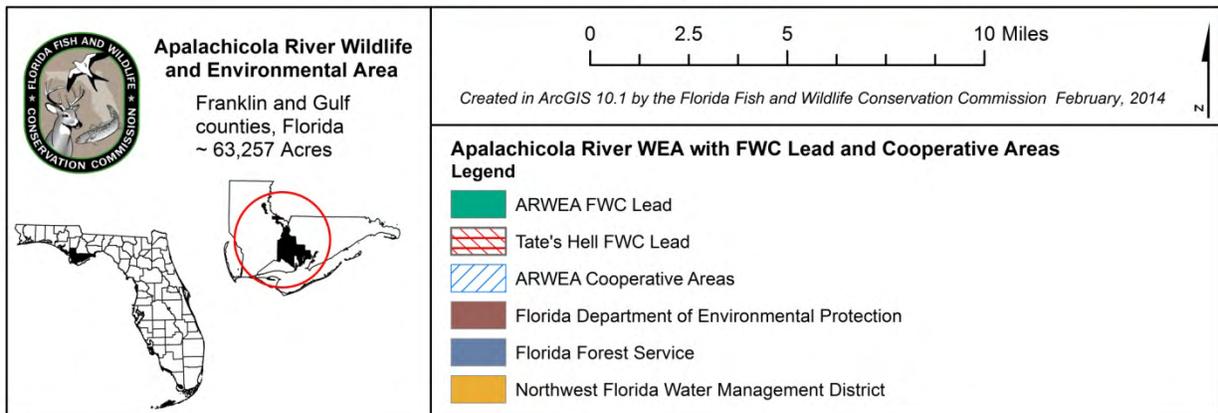
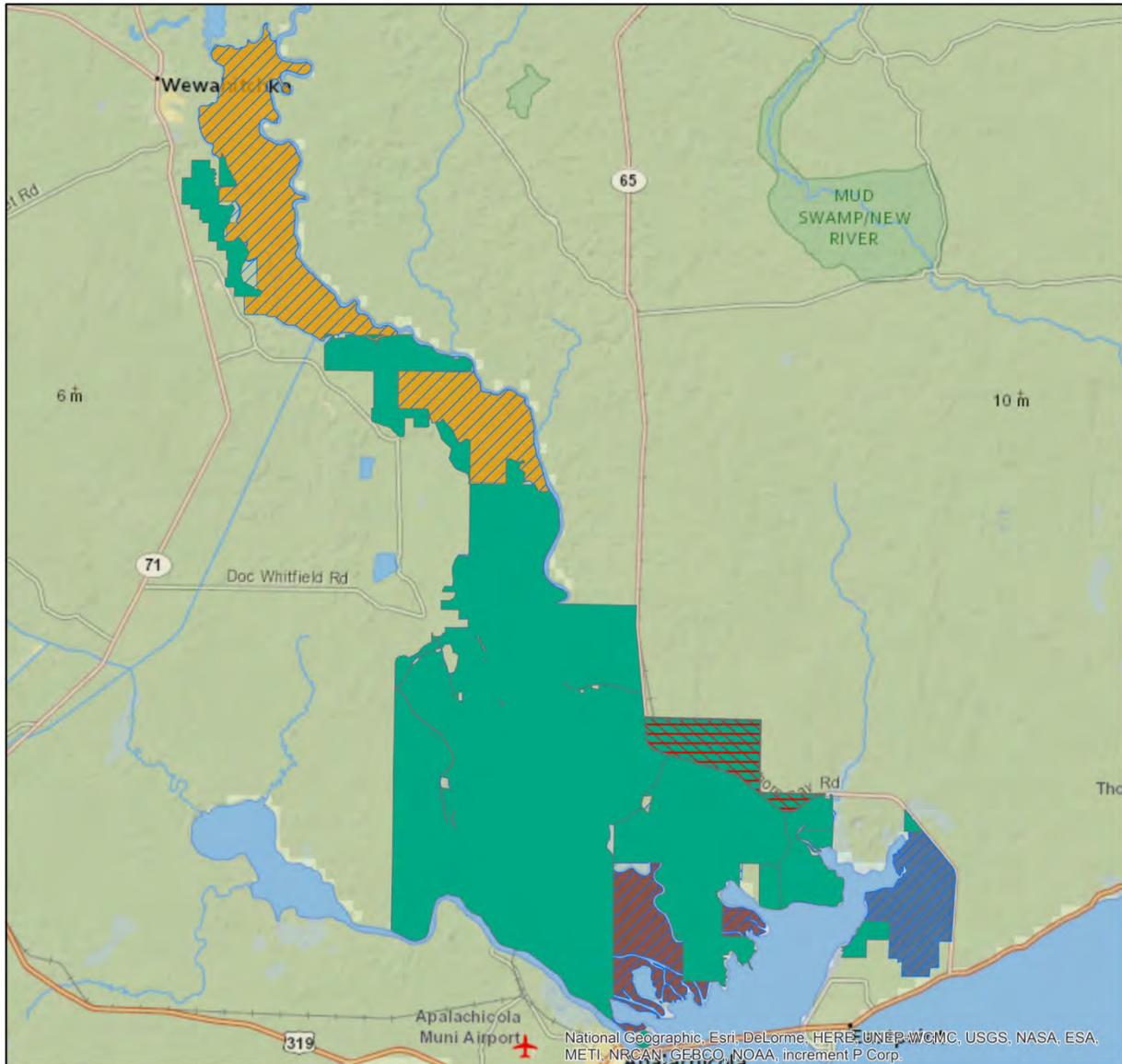


Figure 1. Apalachicola River WEA with Agency Leads

This Management Plan is submitted for review to the Acquisition and Restoration Council (ARC) acting on behalf of the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees) of the State of Florida through the DEP's Division of State Lands (DSL), in compliance with paragraph seven of Lease No. 3584 (Appendix 13.1) and pursuant to Chapters 253 and 259, Florida Statutes (FS), and Chapters 18-2 and 18-4, Florida Administrative Code (FAC). Format and content were drafted in accordance with ARC requirements for management plans and the model plan outline provided by the staff of the DSL. Terms (Appendix 13.13) used in this Management Plan describing management activities and associated measurable goals and objectives conform to those developed for the Land Management Uniform Accounting Council Biennial Land Management Operational Report.

1.1.1 FWC Planning Philosophy

The FWC's planning philosophy includes emphasizing management recommendation consensus building among stakeholders and input from user groups and the general public at the beginning of the planning process. The FWC engages stakeholders by convening a Management Advisory Group (MAG) and solicits additional input from user groups and the general public at a public hearing (Appendix 13.2). The FWC also engages area, district, and regional agency staff, as well as other FWC staff expertise, in developing this Management Plan, thereby facilitating area biologist and manager "ownership" of the Management Plan, and thus the development of meaningful management intent language, goals with associated measurable objectives, timelines for completion, and the identification of challenges and solution strategies for inclusion in the ARWEA Management Plan (Sections 5 – 8).

Additional management planning input is received through Land Management Reviews (LMR) conducted every five years, which includes a review of the previous Management Plan, as well as a field review of ARWEA. The LMR report (Section 5.1, Appendix 13.3) provides FWC staff with important information and guidance provided by a diverse team of land management auditors, and communicates the recommendations of the LMR team to the FWC so they may be adequately addressed in this Management Plan, and thus guides the implementation of the LMR team recommendations on ARWEA.

Furthermore, the FWC maintains transparency and accountability throughout the development and implementation of this Management Plan. A "living document" concept, linking this updated Management Plan to the previous one, is accomplished by reporting on the objectives, management activities, and projects accomplished over the last planning timeframe (previous ten years; see Section 4), thereby ensuring agency accountability through time. In an effort to remain adaptive for the duration of this Management Plan, continuous input and feedback will be collected from FWC staff, stakeholders, user groups, and other interested parties and individuals. As needed, the FWC will present amendments to this Management Plan to the DSL and the ARC for review and consideration.

1.2 Location

Located within the FWC's Northwest Region, ARWEA straddles both Gulf and Franklin counties. The ARWEA begins just north of the town of Apalachicola and extends northward to the vicinity of Wewahitchka. Numerous access points to the area from State Road (SR) 71, County Road (CR) 381, CR 387, and Sauls Creek Road are in Gulf County. In Franklin County, access points are located off SR 65, U. S. Highway-98, and CR 384 near Apalachicola. The city of Eastpoint is one mile south, Carrabelle is 14 miles east, and Port St. Joe is 22 miles west (Figure 2). The ARWEA is in multiple sections of Township 5 South, Ranges 8 and 9 West, Township 6 South, Ranges 8 and 9 West, Township 7 South, Ranges 7 and 8 West and Township 8 South, Ranges 6, 7 and 8 West in Franklin and Gulf counties. The Apalachicola National Forest and Tate's Hell State Forest border ARWEA to the east and the southern boundary extends to East Bay. Residential development and agricultural/forestry operations border the western side of ARWEA.

Parts of ARWEA lie within the boundary of the Apalachicola Bay Aquatic Preserve (Chapter 18-2.018 and 18-2.021 FAC). The ARWEA is not located within an Area of Critical State Concern (ACSC), but is adjacent to the city of Apalachicola, which has been designated as an ACSC (Chapter 380.05 FS).

1.3 Acquisition

1.3.1 Purpose for Acquisition of the Property

The ARWEA was purchased to protect the floodplain of the lower Apalachicola River for the purposes of (1) perpetuating its function as a buffer, a filtering system for the removal of silt and pollutants, and a source of nutrients and detritus for the river/bay complex; (2) maintaining natural wildlife habitat; and (3) protecting rare, threatened, endangered, and unique animals and plants.

The ARWEA provides for the protection and preservation of the highly productive Apalachicola River and Bay estuarine system. A buffer area was deemed critical to protect the valuable marshes and natural vegetation essential to the bay's continued productivity. Additionally, unique and outstanding wildlife habitat, including that of some rare and endangered species, was conserved. The authorization for acquisition stipulated that the property, once acquired, would be managed in accordance with a management concept submitted with the purchase recommendation.

1.3.2 Acquisition History

The Board of Trustees holds 100% undivided title interest on 63,257 acres (Lease 3584) in fee-simple title subject to any mineral reservations described in the legal descriptions of the area. In 1972, the Florida Legislature passed the "Land Conservation Act" which authorized the state to purchase environmentally endangered lands. At about this same time, the M-K Ranch began draining and diking large areas of marsh and swamp forest of the Lower Apalachicola region. This action, coupled with an ever-growing need to protect

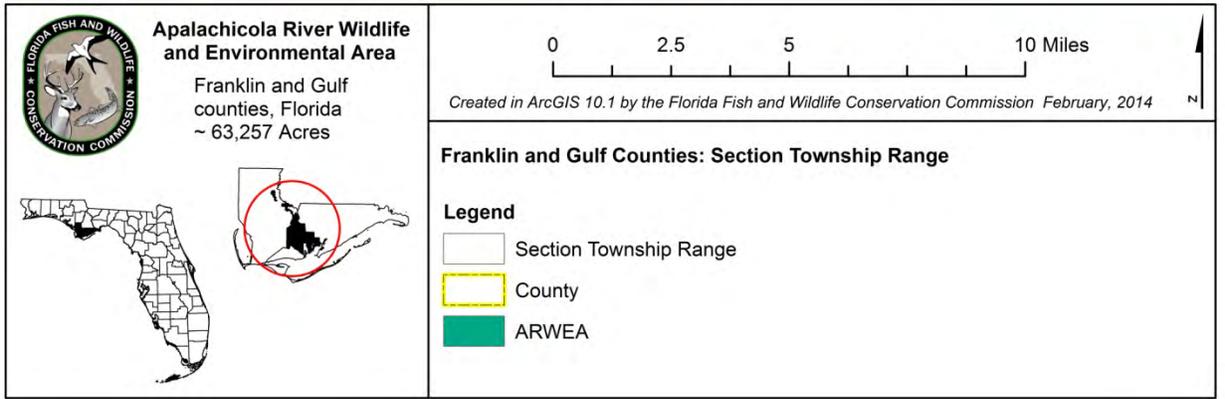
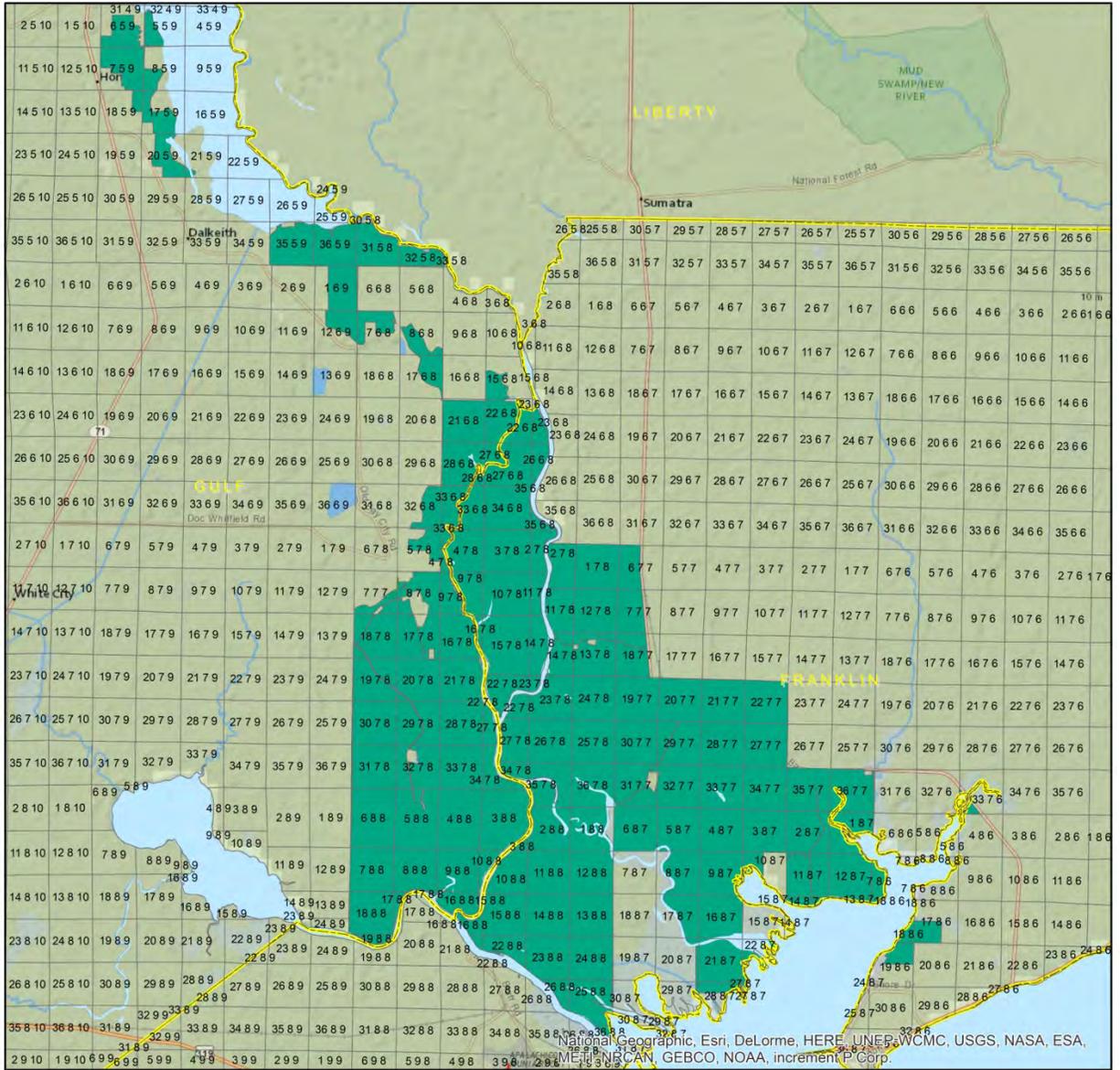


Figure 2. Franklin and Gulf counties- Section, Township, and Range

the area, resulted in the authorization of the series of land purchases in the Apalachicola River Basin.

In 1974, the Board of Trustees authorized the first purchase of a large tract of land in the Lower Apalachicola River Basin under the Environmentally Endangered Lands (EEL) program, totaling over 30,000 acres (Figure 3). The central core (EEL Tract) of the ARWEA was purchased in 1974 to protect the natural habitats in the area and the seafood industry of the lower Apalachicola River Basin. Prior to state acquisition, uses on most of this area included hardwood logging, dredging, commercial activities such as fishing and



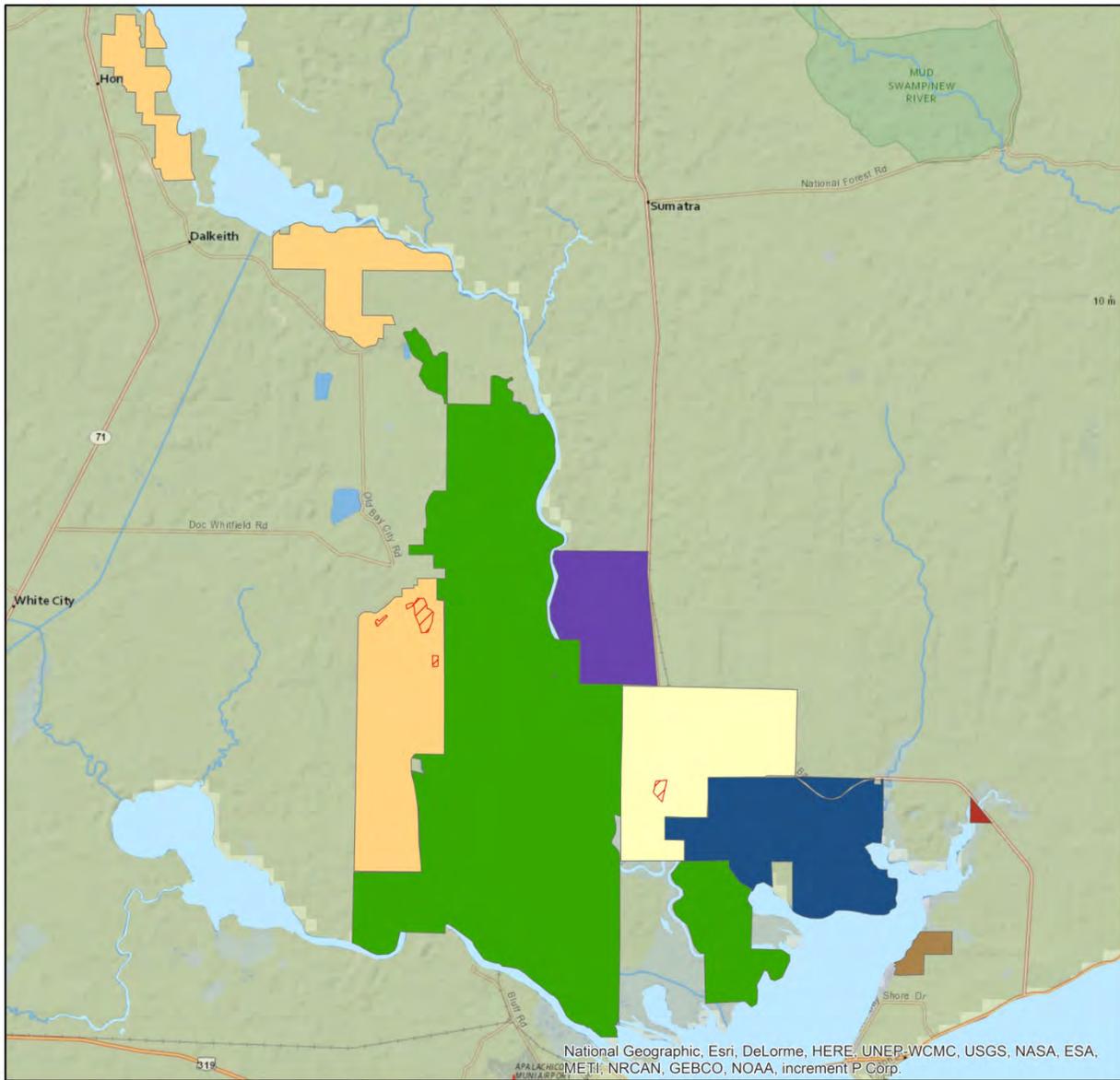
Aerial photo of ARWEA marsh, FWC

shipping (barge traffic), and recreational hunting and fishing. Dredging of the Apalachicola River for barge traffic and associated spoil deposition along the river banks occurred before and after state acquisition. A sawgrass marsh north of the Jackson River and west of the Apalachicola River was included in the original purchase. This area had been diked and drained in preparation for rice farming at the time of purchase.

In 1985, the state purchased five parcels under the Conservation and Recreation Lands (CARL) program. The M-K Ranch unit, the largest of these parcels (8,793 acres), had been intensively altered for cattle grazing and for hay and soybean farming. As with the EEL tract, the upper Saul Creek marsh was diked, ditched, and drained for rice production. A final consent decree was signed in July 1982 between the Environmental Protection Agency and M-K Ranch over their illegal dredge and fill operations. Through the settlement, M-K Ranch agreed to restore the area to pre-project hydrological and biotic regimes prior to state acquisition.

In 1994, the state purchased the Bloody Bluff unit. Originally this unit had been used for timber, cattle grazing, and turpentine production. However, with the advent of raised beds for tree planting, the area was managed for intensive silviculture, primarily for slash pine.

Sand Beach and the Quinn Tract units were acquired by the state in 1996 and 1998, respectively. The main use of these areas, prior to their purchase, was primarily for intensive silvicultural practices, though they shared the same history as the Bloody Bluff unit. As a result of past forest management activities, the historic hydrologic patterns were disrupted. Ditching, bedding, and tram or road development have expedited drainage, and in some places, negatively impacted water quality on the area. The additional lands that comprise the ARWEA were purchased under the CARL, Preservation-2000, and Florida Forever programs.





Apalachicola River Wildlife and Environmental Area
Franklin and Gulf counties, Florida
~ 63,257 Acres



0 2.5 5 10 Miles

Created in ArcGIS 10.1 by the Florida Fish and Wildlife Conservation Commission February, 2014

Apalachicola River WEA Acquisition Tracts																	
Legend																	
<table border="0"> <tr> <td style="width: 20px; background-color: purple; border: 1px solid black;"></td> <td>Bloody Bluff Tract</td> </tr> <tr> <td style="width: 20px; background-color: orange; border: 1px solid black;"></td> <td>CARL MK Ranch</td> </tr> <tr> <td style="width: 20px; background-color: red; border: 1px solid black;"></td> <td>Cash Creek</td> </tr> <tr> <td style="width: 20px; background-color: green; border: 1px solid black;"></td> <td>Environmentally Endangered Lands</td> </tr> </table>		Bloody Bluff Tract		CARL MK Ranch		Cash Creek		Environmentally Endangered Lands	<table border="0"> <tr> <td style="width: 20px; background-color: brown; border: 1px solid black;"></td> <td>Magnolia Bluff Tract</td> </tr> <tr> <td style="width: 20px; background-color: yellow; border: 1px solid black;"></td> <td>Quinn Tract</td> </tr> <tr> <td style="width: 20px; background-color: blue; border: 1px solid black;"></td> <td>Sand Beach Tract</td> </tr> <tr> <td style="width: 20px; border: 1px solid red; border-style: dashed;"></td> <td>Inholdings</td> </tr> </table>		Magnolia Bluff Tract		Quinn Tract		Sand Beach Tract		Inholdings
	Bloody Bluff Tract																
	CARL MK Ranch																
	Cash Creek																
	Environmentally Endangered Lands																
	Magnolia Bluff Tract																
	Quinn Tract																
	Sand Beach Tract																
	Inholdings																

Figure 3. Apalachicola River WEA Acquisition Tracts

1.4 Management Authority

The FWC is the designated lead managing agency for ARWEA under the authority granted by Lease Number 3584 from the Board of Trustees agent, DSL. Further management authority derives from Article IV, Section 9 of the Florida Constitution as well as the guidance and directives of Chapters 253, 259, 327, 370, 372, 373, 375, 378, 403, 487, 870, and 597 and of the Florida Statutes. These constitutional provisions and laws provide the FWC the authority to protect, conserve, and manage the State's fish and wildlife resources.

1.5 Management Directives

The 50-year Board of Trustees' Lease Agreement Number 3584 with the FWC directs the FWC to "manage the leased premises only for the conservation and protection of natural and historical resources and resource-based, public outdoor recreation which is compatible with the conservation and protection of these public lands, as set forth in subsection 253.023(11), FS..." The lease agreement further directs the FWC to "implement applicable Best Management Practices for all activities under this lease in compliance with paragraph 18-2.018(2)(h), FAC, which have been selected, developed, or approved by lessor, lessee, or other land managing agencies for the protection and enhancement of the leased premises."

1.6 Title Interest and Encumbrances

As State-owned lands, title to ARWEA is vested in the Board of Trustees (Governor and Cabinet). In October 2003, DSL, as staff to the Board of Trustees, entered into Lease Agreement Number 3584, a 50 year lease agreement, granting the FWC management authority for ARWEA. The current 50-year lease agreement is an update of the original 20-year agreement signed in October 1983.

There is a sublease in effect with the DEP, Florida Coastal Office (FCO) for 203.6 acres for the operation of an administrative office, land base, and maintenance shop (Sublease 3584-01). However, the FWC manages the natural communities contained within the FCO sublease area, apart from approximately five developed acres. The FCO sublease is slated for amendment to reduce the sublease acreage to cover only the area within the footprint of the FCO facility (approximately 5 acres). The FCO is responsible for capital improvements and facilities on the developed acreage. A Management Plan Form for the FCO sublease is included as Appendix (13.17).

A 20 foot wide utility easement has been granted to Ms. J. Rodgers and the Gulf Coast Electric Cooperative to construct an overhead utility line. The easement was granted on land lying in Section 9, Township 7 South, and Range 8 West in Gulf County (Easement #30825/Agreement #94019A).

Several apiaries operate on ARWEA through the following apiary agreements (Appendix 13.9): Dax Williams through 7/09/2015 (Agreement #11385), Donald Harcus through 3/29/2016 (Agreement #12422), Donald Smiley through 3/29/2016 (Agreement #12421),

Watkins Honey, Inc. through 4/4/2016 (Agreement #12430), T's Honey through 5/13/2016 (Agreement #12429), and Stanley Wilson through 3/29/2016 (Agreement #12427).

1.7 Proximity to Other Public Conservation Lands

The ARWEA is located in the vicinity of a large number of publicly owned conservation areas and several Florida Forever projects (Figure 4). Tables 1 and 2 list the conservation lands and Florida Forever projects within a 20-mile radius of ARWEA, including lands managed by public and private entities, that conserve cultural and natural resources within this region of Florida.

The configurations, locations, and proximities of wildlife habitats among these conservation lands are important to the conservation of the many endemic and rare species within this region of Florida. Most of the conservation lands listed in Table 2 are owned in full-fee by a public entity. However, some of these conservation lands are protected by less-than-fee conservation easements, where the land is owned and being managed by a private landowner while a public agency or not-for-profit organization holds a conservation easement on the land.

Table 1. Conservation Lands Within a 20-mile Radius of ARWEA

Federal Government	Managing Agency
Apalachicola Savannah Research Natural Area	USFS
Apalachicola National Forest	USFS
Lathrop Bayou Tract	BLM
St. Vincent National Wildlife Refuge	USFWS
State of Florida	Managing Agency
Apalachicola National Estuarine Research Reserve	DEP
Box-R Wildlife Management Area	FWC
Cape St. George State Reserve	DEP
Constitution Convention Museum State Park	FFS
Corbin-Tucker Conservation Easement	DEP
Dr. Julian G. Bruce St. George Island State Park	DEP
John Gorrie Museum State Park	DEP
Orman House Historic State Park	DEP
St. Joseph Bay State Buffer Preserve	DEP
Tate's Hell State Forest	FFS
Water Management District	Managing Agency
Gaskin et al. Conservation Easement	NWFWMD
Apalachicola River Water Management Area	NWFWMD

Table 1. Conservation Lands Within a 20-mile Radius of ARWEA

County/City	Managing Agency
Dead Lakes Park	Gulf County
John David Patton Wildlife Park	City of Carrabelle
Salinas Park	Gulf County

Private/Public Conservation Organization	Managing Agency
Calhoun Spigelia Preserve	TNC
Jeff Lewis Wilderness Preserve	TNC
Eastpoint Preserve	TNC
Wilma Tract	TNC
Sumatra Property	Coastal Plains Institute

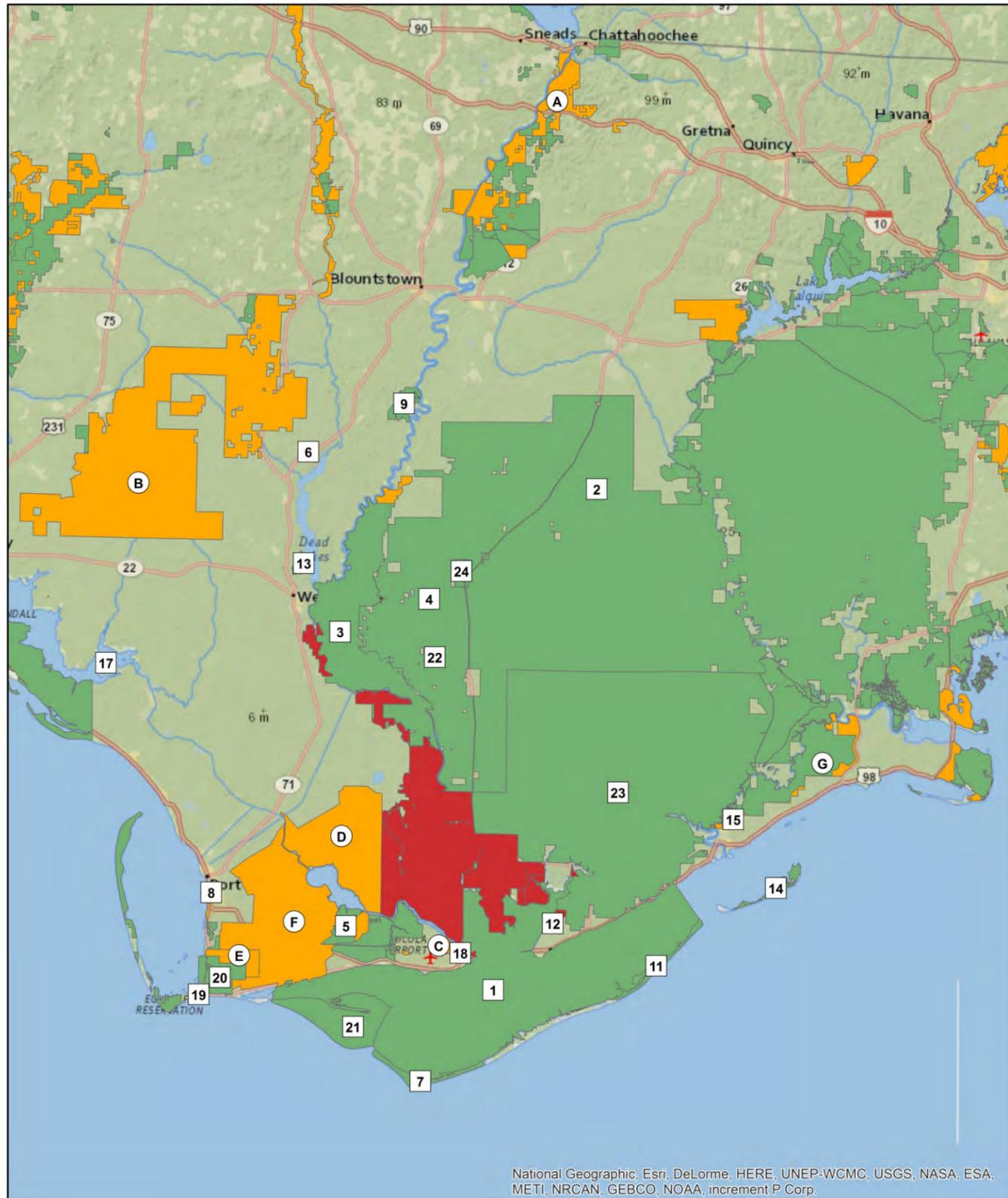
Table 1 Acronym Key	
BLM	Bureau of Land Management
DEP	Florida Department of Environmental Protection
FFS	Florida Forest Service
FWC	Florida Fish and Wildlife Conservation Commission
NWFWMD	Northwest Florida Water Management District
TNC	The Nature Conservancy
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

Table 2. Florida Forever Projects Within a 20-mile Radius of ARWEA

Project Name	GIS Acres
Apalachicola River	18,880
Bear Creek Forest	100,461
Pierce Mound Complex	650
St. Joe Timberland - Lake Wimico	25,188
St. Joe Timberland - St. Joseph Bay Buffer	3,030
St. Joe Timberland - St. Vincent Sound-to-Lake Wimico Ecosystem	49,822
St. Joe Timberland - Tate’s Hell/Carrabelle Tract	16,003

1.8 Adjacent Land Uses

The ARWEA is located in the Gulf and Franklin counties in Florida’s panhandle. The 2012 U.S. Census population estimate for Franklin County is 11,686 people. The 2010 Census reported a population of 2,231 residents in Apalachicola, located immediately south of ARWEA in Franklin County. The 2012 U.S. Census population estimate for Gulf County is 15,718 people.



Conservation Lands and Florida Forever Projects

Conservation Land	Map Label
Apalachicola National Estuarine Research Reserve	1
Apalachicola National Forest	2
Apalachicola River Water Management Area	3
Apalachicola Savannah Research Natural Area	4
Box-R Wildlife Management Area	5
Calhoun Spigelia Preserve	6
Cape St. George State Reserve	7
Constitution Convention Museum State Park	8
Corbin-Tucker Conservation Easement	9
Dead Lakes Park	10
Dr. Julian G. Bruce St. George Island State Park	11
Eastpoint Preserve	12
Gaskin et al. Conservation Easement	13
Jeff Lewis Wilderness Preserve	14
John David Patton Wildlife Park	15
John Gorrie Museum State Park	16
Lathrop Bayou Tract	17
Orman House Historic State Park	18
Salinas Park	19
St. Joseph Bay State Buffer Preserve	20
St. Vincent National Wildlife Refuge	21
Sumatra Property	22
Tate's Hell State Forest	23
Wilma Tract	24

Florida Forever Project	Map Label
Apalachicola River	A
Bear Creek Forest	B
Pierce Mound Complex	C
St. Joe Timberland - Lake Wimico	D
St. Joe Timberland - St. Joseph Bay Buffer	E
St. Joe Timberland - St. Vincent Sound-to-Lake Wimico Ecosystem	F
St. Joe Timberland - Tates Hell/Carrabelle Tract	G

Apalachicola River Wildlife and Environmental Area
Franklin and Gulf counties, Florida
~ 63,257 Acres

Conservation Lands and Florida Forever Projects in the Vicinity of ARWEA

Legend

- ARWEA
- Conservation Land
- Florida Forever Projects



Created in ArcGIS 10.1 by the Florida Fish and Wildlife Conservation Commission February, 2014

Figure 4. Conservation Lands and Florida Forever Projects near ARWEA

Located northwest of ARWEA in Gulf County, the 2010 U.S. Census reported a population of 1,981 people in Wewahitchka. The Bureau of Economic and Business Research (BEBR) mid-range population for Franklin County in 2025 is 12,000 people. The BEBR mid-range population projection for Gulf County in 2025 is 16,200 residents.

The 2011 Gulf County Comprehensive plan designated ARWEA as Conservation land that is surrounded primarily by land designated as Agriculture. The Agricultural land use designation refers to lands that support and allow activities which are predominately used for the cultivation of crops and livestock including cropland, pastureland, orchards, vineyards, nurseries, ornamental horticulture areas, groves, confined feeding operations, specialty farms, and silviculture. Low-density residential, mixed commercial, and residential areas border ARWEA where Highway 71 parallels the WEA and along County Road 381. The current land uses in Gulf County also apply for future land use designations. The city of Wewahitchka is located adjacent to the northwest corner of ARWEA, with Residential zoning to the north and south of Wewahitchka.



Cash Creek, FWC

In Franklin County, ARWEA is zoned as Preservation (P-1) and Forestry-Agriculture (A-2). The ARWEA is primarily surrounded by other public lands including Tate’s Hell State Forest (A-2) to the east, Apalachicola National Forest to the north (A-1, Forestry-Conservation), and Box-R Wildlife Management Area to the southwest. The DEP’s Apalachicola National Estuarine Research Reserve boundary includes ARWEA and Apalachicola Bay. The Magnolia Bluff Tract near Eastpoint is bordered by single family residential lots (R-1 and R-2). The Franklin County Comprehensive Plan lists the future land classification for ARWEA as Conservation and Agricultural. The future land use classification for Tate’s Hell State Forest is Agricultural.



ARWEA Management Advisory Group meeting, FWC

1.9 Public Involvement

The FWC conducted a MAG meeting in Eastpoint, Florida on January 16, 2013 to obtain input from both public and private stakeholders regarding management of ARWEA. Results of this meeting were used by the FWC to develop management goals and objectives and to identify opportunities and strategies for inclusion in this Management Plan. A summary of issues and opportunities raised by the MAG, as well as a listing of participants, is included in

Appendix 13.2. Further, two public hearings, as required by Chapter 259.032(10), FS, were held in Port St. Joe, Florida on February 27, 2013 and Eastpoint, Florida on February 28, 2013. The purpose of the public hearings was to present the draft ARWEA Management Plan and receive public comments and feedback. The reports of those hearings are also contained in Appendix 13.2. A website is also maintained for receipt of public input at <http://myfwc.com/conservation/terrestrial/management-plans/develop-mps/>. Further testimony and input is received at a public hearing held by the ARC. Input received from all public involvement efforts has been considered in the development of this Management Plan.

2 Natural and Cultural Resources

2.1 Physiography and Topography

The entire ARWEA is located within the Gulf Coastal Lowlands physiographic province, a region characterized by elevations ranging from sea level to 100 feet above mean sea level. The surface is relatively flat and characterized by karstic topography and shallow, sandy soils with muck in wetland areas¹.

The topography of the ARWEA is dictated by the extensive flat floodplain of the Apalachicola River. Elevations range from six feet in the uplands adjacent to the floodplain, to sea level at the mouth of the river and on the area adjacent to East Bay. Slopes are gradual where the floodplain intergrades into the adjacent uplands. Maximum elevation is 28 feet above mean sea level. There are levees, terraces, and flats contained in the bottomlands, although they occupy only a small fraction of the floodplain. The natural levee system is best developed along the east side of Forbes Island, where it occurs as an elongated strip from five to 100 yards wide. Levee topography usually has a local relief of five to ten feet.

2.1.1 Climate

Gulf and Franklin counties have a moderate climate with long, warm, and humid summers and mild winters^{2,3}. The Gulf of Mexico moderates temperatures year round, with greater influence in the coastal areas than inland. The average daily winter temperature is 55 degrees Fahrenheit (F), with an average minimum temperature of approximately 46 degrees F. The average daily summer temperature is 81 degrees F with an average maximum temperature of approximately 88 degrees F.

Average annual rainfall for Gulf and Franklin counties is approximately 61 inches. The majority of rainfall occurs during the summer rainy season, from June to September, averaging between 20-24 inches for both counties. In Franklin County, about 16 inches of rain, or 30 percent, falls in the winter rainy season, from late December through April. May, October and November are generally the driest months. In Gulf County, about 16

inches of rain, or 24 percent, falls January through March. October, November, and April are generally the driest months in Gulf County.

Frequent thunderstorms occur during summer in both counties. These showers are occasionally heavy, but rarely last throughout the day. Thunderstorms occur on approximately 70 days each year and average between 2-4 days per week during the summer. Winter and spring rains are generally associated with continental weather developments and are of longer duration but less intensity than summer rains. Heavy rain and high winds can accompany tropical disturbances and hurricanes that pass over the area.

2.1.2 Soils

The Natural Resource Conservation Service (NRCS) soils maps displaying ARWEA's soil series and depth to water table are presented as Figures 5 and 6. Soils series descriptions were developed using NRCS geographic information system (GIS) data for ARWEA (Appendix 13.4).

2.1.3 Geologic Conditions

The surface sediments at ARWEA are primarily Pleistocene/Holocene Alluvium sediments, described below. The geology of Franklin and Gulf counties, as reflected on the U.S. Department of Interior, United States Geological Survey's website (<http://mrddata.usgs.gov/geology/state/fips-unit.php?code=f12037>) is as follows:

2.1.3.1 Pleistocene/Holocene Formation

Much of Florida's surface is covered by a varying thickness of undifferentiated sediments consisting of siliciclastics, organics and freshwater carbonates. In the Pleistocene/Holocene formation undifferentiated sediments at the surface covers 49% of Franklin County and 55% of Gulf County. The siliciclastics are light gray, tan, brown to black, unconsolidated to poorly consolidated, clean to clayey, silty, unfossiliferous, variably organic-bearing sands to blue green to olive green, poorly to moderately consolidated, sandy, silty clays. Gravel is occasionally present in the panhandle. Organics occur as plant debris, roots, disseminated organic matrix and beds of peat. Freshwater carbonates, often referred to as marls in the literature, are scattered over much of the State. These sediments are buff colored to tan, unconsolidated to poorly consolidated, fossiliferous carbonate muds. Sand, silt and clay may be present in limited quantities. These carbonates often contain organics. The dominant fossils in the freshwater carbonates are mollusks. Lithology: clay or mud; beach sand; silt; gravel; peat; sand.

2.1.3.2 Pleistocene/Holocene Formation-Beach ridge and dune

This formation covers 18% of Franklin County and 19% of Gulf County respectively. The composition of this formation mirrors the above described Pleistocene/Holocene formation in every respect with one primary exception; the lithology is composed of beach sand; clay or mud; and silt.

THIS PAGE INTENTIONALLY LEFT BLANK

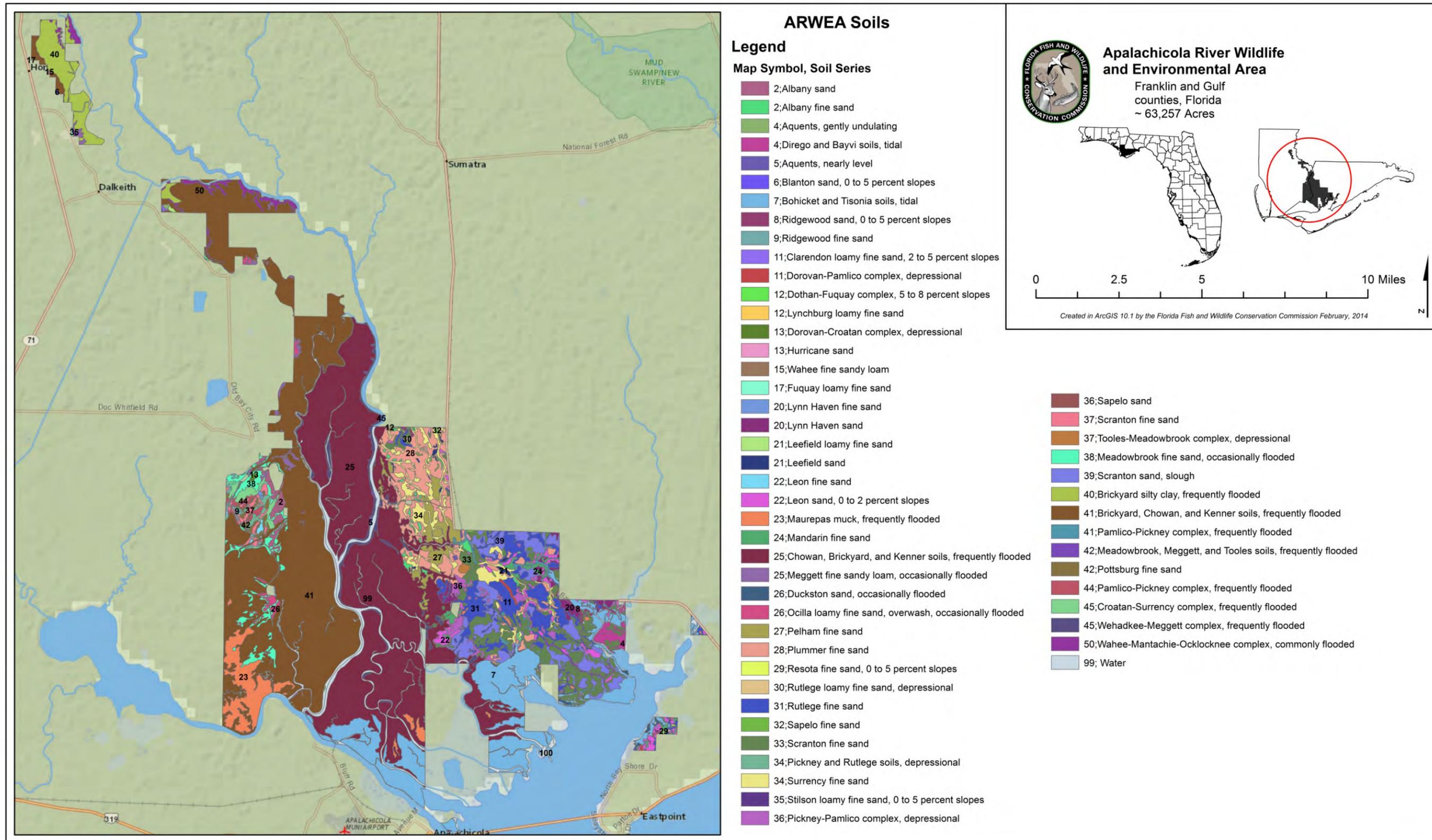
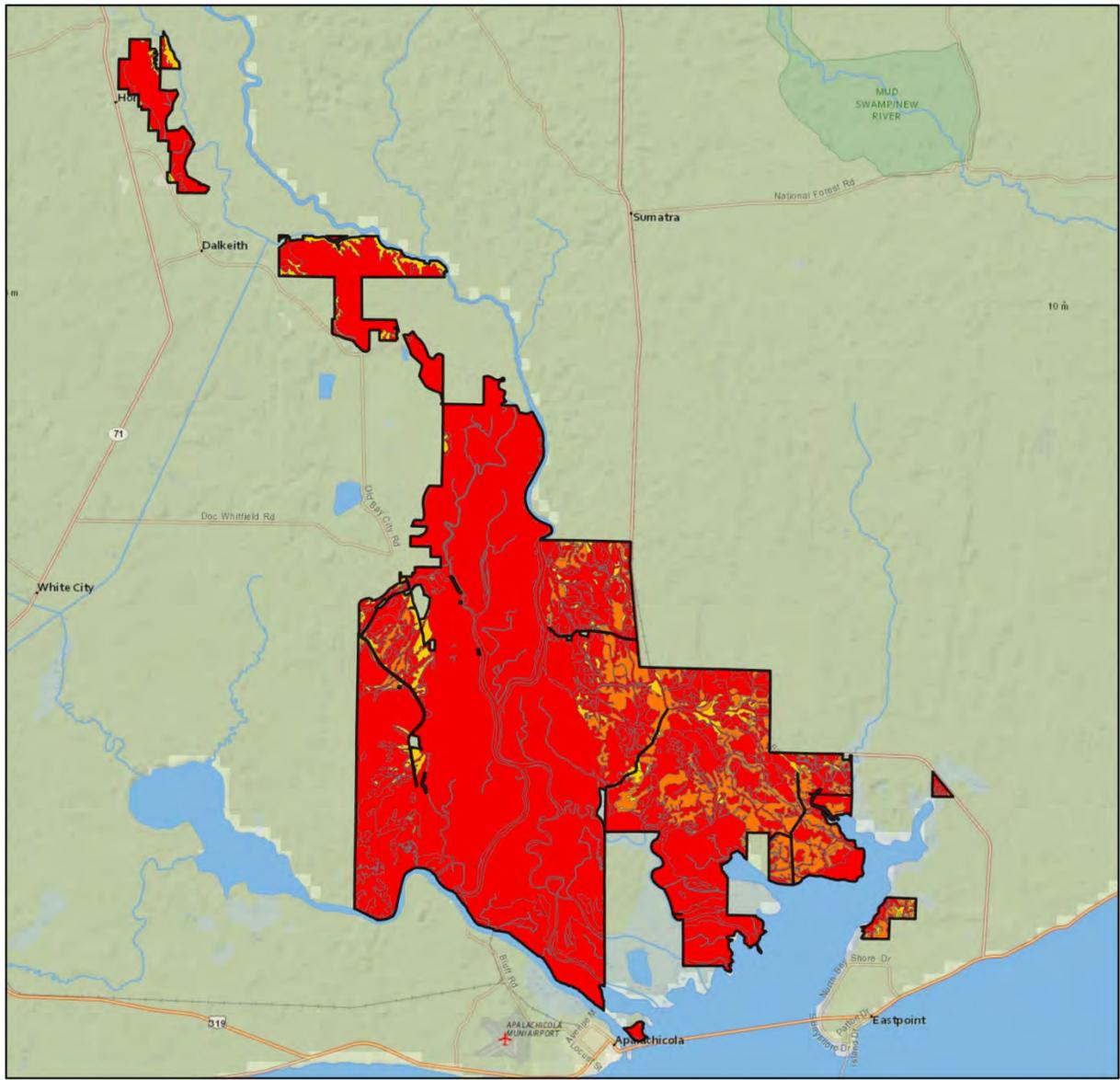


Figure 5. Apalachicola River WEA - Soils





Apalachicola River Wildlife and Environmental Area
Franklin and Gulf counties, Florida
~ 63,257 Acres



0 2 4 8 Miles

Created in ArcGIS 10.1 by the Florida Fish and Wildlife Conservation Commission February, 2014

Apalachicola River WEA Soils - Depth to Water Table

Legend

<p> 0 - 25</p> <p> 26 - 50</p> <p> 51 - 100</p>	<p> 101 - 150</p> <p> 151 - 200</p> <p> >200</p>	<p> Apalachicola River WEA</p>
--	---	--

Figure 6. Apalachicola River WEA Soils- Depth to Water Table

2.1.3.3 Pleistocene/Holocene-Alluvium

In the Pleistocene/Holocene formation alluvium at the surface covers 9% of Franklin County and 23% of Gulf County. The composition of this formation mirrors the above described Pleistocene/Holocene formation in every respect with one primary exception; the lithology is made up of alluvium; clay or mud; sand; silt; gravel; biogenic sediment; and peat.

2.1.3.4 Holocene-Holocene sediments

The Holocene sediments in Florida occur near the present coastline at elevations generally less than 5 feet. At surface they cover 9% of Franklin County and 2% of Gulf County respectively. The sediments include quartz sands, carbonate sands and muds, and organics. The lithology is comprised of beach sand; clay or mud; and biogenic sediment.

2.1.3.5 Pliocene-Intracoastal Formation

Limited exposures and shallow subsurface occurrences of the Intracoastal Formation have been reported in northwestern Florida (Bay, Franklin, Liberty and Wakulla counties) (Schmidt, 1984). At surface, the intracoastal formation covers 11 % of Franklin County. In the subsurface, it occurs to the west across the Apalachicola Embayment (Huddleston, 1984; Schmidt, 1984). The Intracoastal Formation is composed of light gray to olive gray, poorly indurated, sandy, clayey, highly fossiliferous limestone (grainstone and packstone). The fossils present include foraminifers, mollusks, barnacles, echinoids and ostracods. Quartz sand varies from very fine to coarse grained (Huddleston, 1984). The lithology is composed of mixed clastic/carbonate; and limestone.

2.2 Vegetation

Historic and current vegetative community data for ARWEA (Figures 7 - 8, Tables 3 - 5) originated from field reviews and assessments initially performed by Florida Natural Areas Inventory (FNAI) in 2003. The 2003 mapping included the Tate's Hell portion of ARWEA. In 2009-2010, the FNAI updated and revised the ARWEA GIS natural community maps; however, the remapping did not include the Tate's Hell portion of ARWEA, which is shown in Figure 8 with FNAI's 2003 natural communities. The FNAI finalized the GIS natural community map for ARWEA in 2011.

Natural communities comprise approximately 85% of ARWEA. Altered landcover types cover approximately 15% of ARWEA, with pine plantation accounting for the majority of altered landcover acreage at approximately 8,468 acres or 13%.

Table 3. Natural Communities and Altered Landcover Types of ARWEA*

Community Type	Acres	Percentage of Area
Alluvial forest	1,042.3	1.6%
Alluvial river	2,252.4	3.4%
Basin swamp	416.3	0.6%

Table 3. Natural Communities and Altered Landcover Types of ARWEA*

Community Type	Acres	Percentage of Area
Baygall	1,675.3	2.6%
Blackwater stream	318.2	0.5%
Borrow pit	4.1	<0.1%
Bottomland forest	1,957.5	3.0%
Canal/ditch	6.8	<0.1%
Clearcut/early regeneration	539.8	0.8%
Clearing	459.1	0.7%
Depression marsh	18.8	<0.1%
Developed	13.8	<0.1%
Dome swamp	228.9	0.3%
Floodplain marsh	5,591.1	8.5%
Floodplain swamp	36,742.4	56.1%
Hydric hammock	28.6	<0.1%
Impoundment/artificial pond	29.0	<0.1%
Maritime hammock	73.3	0.1%
Mesic flatwoods	1,171.5	1.8%
Mesic hammock	64.9	0.1%
Pine plantation	8,468.1	12.9%
Salt marsh	1,254.4	1.9%
Sandhill	28.3	<0.1%
Scrubby flatwoods	133.5	0.2%
Successional hardwood forest	23.8	<0.1%
Upland hardwood forest	94.1	0.1%
Wet flatwoods	2,428.3	3.7%
Wet prairie	378.8	0.6%

*Natural community acreage differs from ARWEA Establishment Order

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
American elm	<i>Ulmus americana</i>
American holly	<i>Ilex opaca</i>
American hornbeam	<i>Carpinus caroliniana</i>
Anglestem beaksedge	<i>Rhynchospora caduca</i>
Arrowfeather	<i>Aristida purpurascens</i>
Arrowhead	<i>Sagitaria</i> sp.
Ash	<i>Fraxinus</i> sp.
Axilflower	<i>Mecardonia acuminata</i>
Bald-cypress	<i>Taxodium distichum</i>
Baldwin's flatsedge	<i>Cyperus croceus</i>

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
Bamboo vine	<i>Smilax laurifolia</i>
Bayberry	<i>Myrica heterophylla</i>
Beach false-foxglove	<i>Agalinis fasciculata</i>
Beautyberry	<i>Callicarpa americana</i>
Beggar's lice	<i>Desmodium</i> spp.
Big threeawn grass	<i>Aristida condensata</i>
Black needle rush	<i>Juncus roemerianus</i>
Black titi	<i>Cliftonia monophylla</i>
Black willow	<i>Salix nigra</i>
Blackeyed Susan	<i>Rudbeckia hirta</i>
Blackgum	<i>Nyssa sylvatica</i>
Blazing star	<i>Liatris</i> sp.
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>
Bluejack oak	<i>Quercus incana</i>
Bog white violet	<i>Viola lanceolata</i>
Bracken fern	<i>Pteridium aquilinum</i>
Brazilian vervain	<i>Verbena brasiliensis</i>
Broomsedge bluestem	<i>Andropogon virginicus</i> var. <i>virginicus</i>
Buckeye	<i>Aesculus pavia</i>
Bushy bluestem	<i>Andropogon glomeratus</i> var. <i>glomeratus</i>
Bushy bluestem	<i>Andropogon glomeratus</i> var. <i>hirsutior</i>
Buttonweed	<i>Diodia virginiana</i>
Cabbage palm	<i>Sabal palmetto</i>
Canada goldenrod	<i>Solidago canadensis</i> var. <i>scabra</i>
Canadian horseweed	<i>Conyza canadensis</i>
Canadian toadflax	<i>Linaria canadensis</i>
Capillary hairsedge	<i>Bulbostylis ciliatifolia</i>
Cardinal flower*	<i>Lobelia cardinalis</i>
Caribbean purple everlasting	<i>Gamochaeta antillana</i>
Carolina cranesbill	<i>Geranium carolinianum</i>
Carolina desertchicory	<i>Pyrrhopappus carolinianus</i>
Carolina grass-of-parnassus*	<i>Parnassia caroliniana</i>
Carolina ponysfoot	<i>Dichondra carolinensis</i>
Carolina willow	<i>Salix caroliniana</i>
Catbrier	<i>Smilax bona-nox</i>
Catesby lily*	<i>Lilium catesbaei</i>
Cattail	<i>Typha</i> spp.
Chalky bluestem	<i>Andropogon virginicus</i> var. <i>glaucus</i>

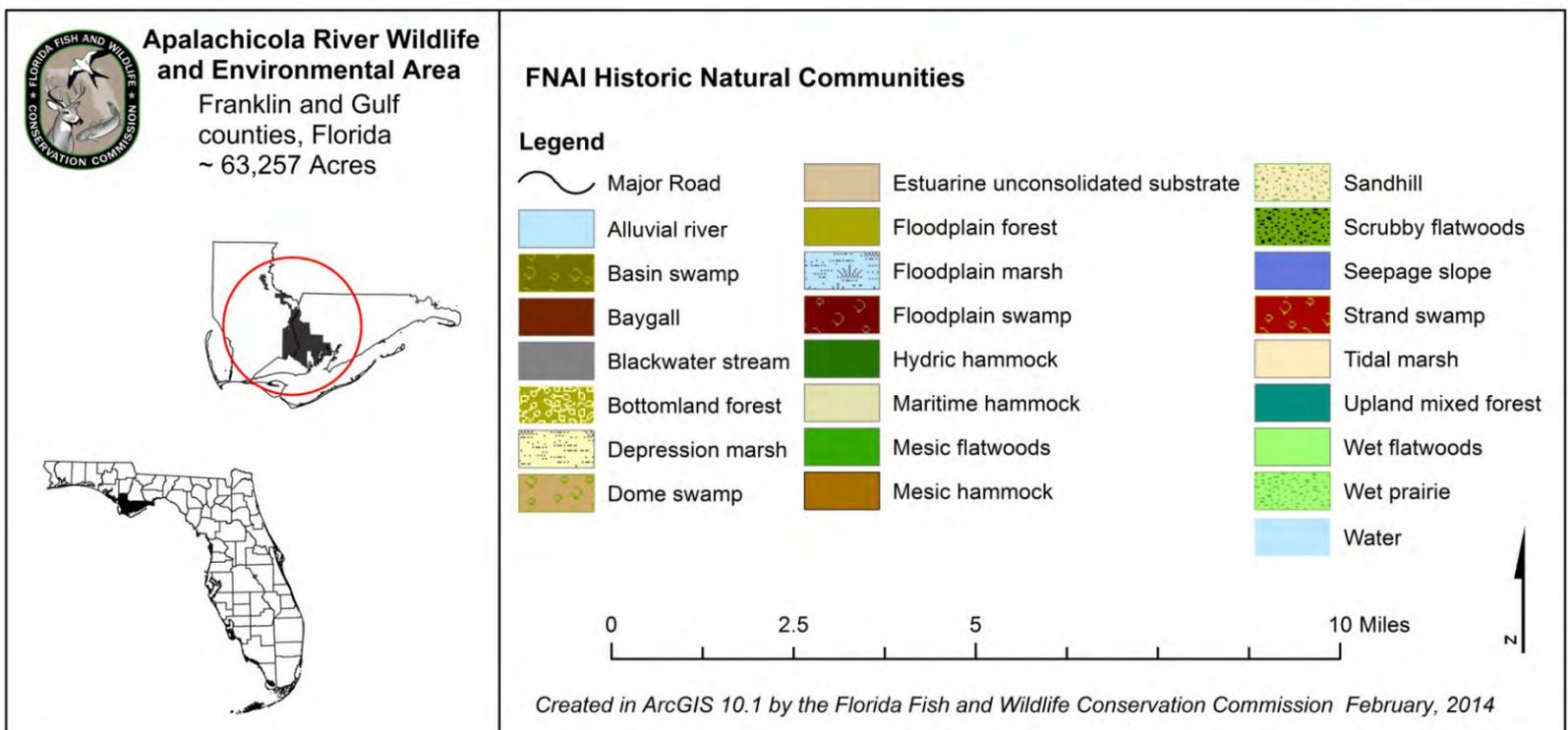
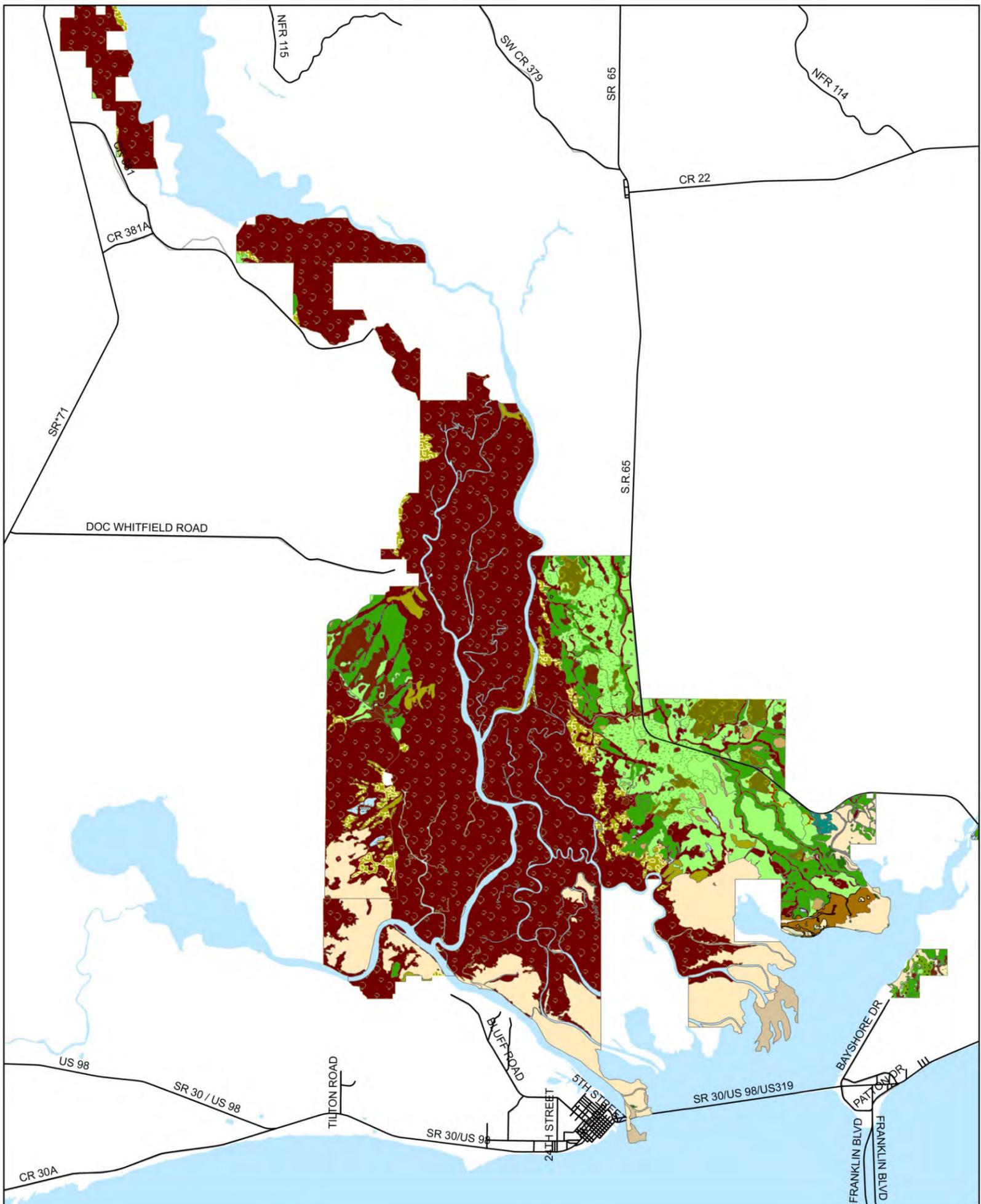


Figure 7. FNAI Historic Natural Communities on ARWEA

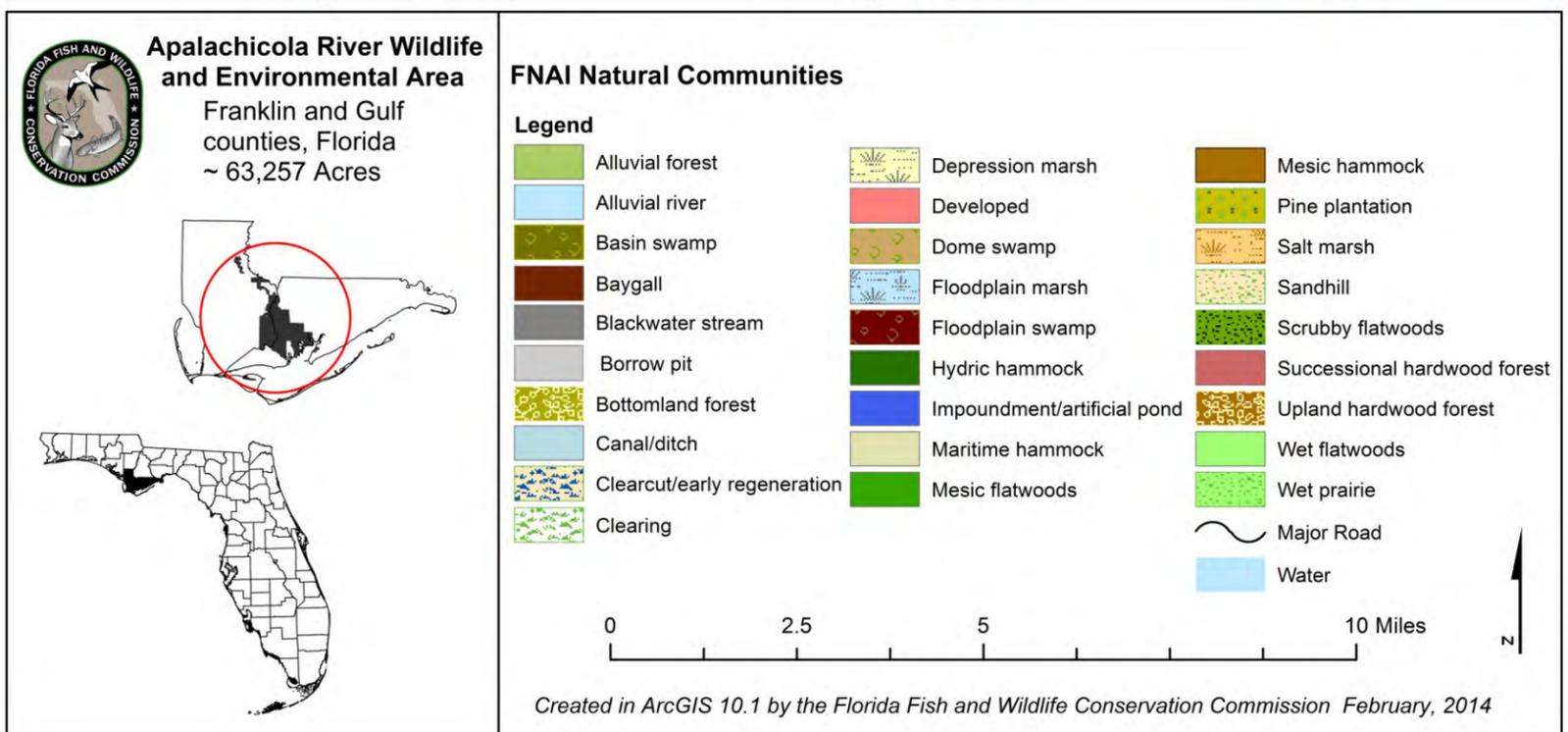
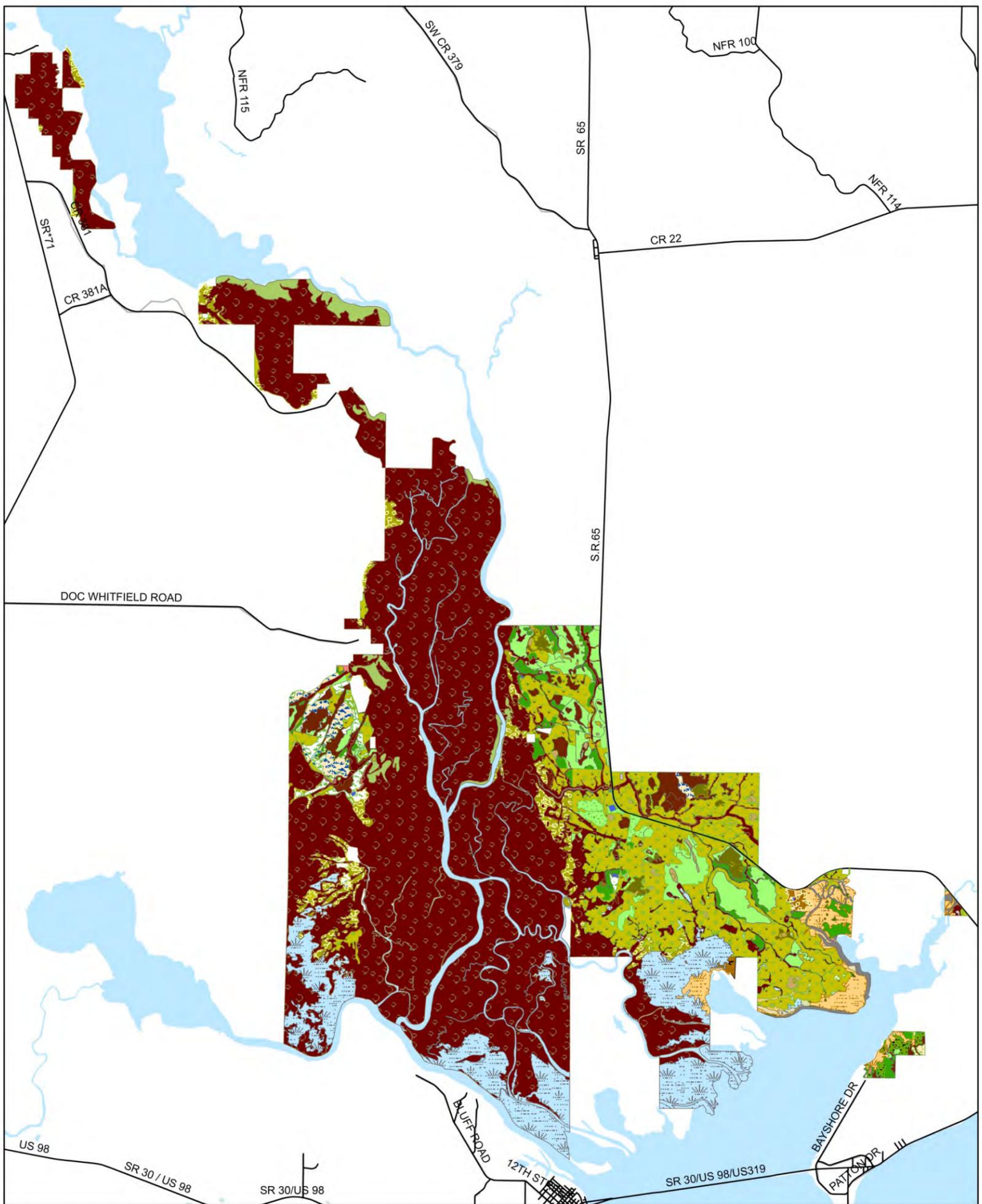


Figure 8. FNAI Natural Communities on ARWEA

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
Chapman's beakrush	<i>Rhynchospora chapmanii</i>
Chapman's fringed orchid	<i>Platanthera chapmanii</i>
Chapman's oak	<i>Quercus chapmanii</i>
Chapman's St. John's wort	<i>Hypericum chapmanii</i>
Chocolateweed	<i>Melochia corchorifolia</i>
Clematis	<i>Clematis crispa</i>
Clustered mille grains	<i>Oldenlandia uniflora</i>
Coastal plain St. John's-wort	<i>Hypericum brachyphyllum</i>
Comfortroot	<i>Hibiscus aculeatus</i>
Common fanpetals	<i>Sida acuta</i>
Common persimmon	<i>Diospyros virginiana</i>
Common ragweed	<i>Ambrosia artemisiifolia</i>
Common reed	<i>Phragmites australis</i>
Common yellow woodsorrel	<i>Oxalis corniculata</i>
Coral bean	<i>Erythrina herbacea</i>
Coral greenbriar	<i>Smilax walteri</i>
Corkwood*	<i>Leitneria floridana</i>
Crimson bluestem	<i>Schizachyrium sanguineum</i>
Cross vine	<i>Bignonia capreolata</i>
Cuban jute	<i>Sida rhombifolia</i>
Cutleaf eveningprimrose	<i>Oenothera laciniata</i>
Cypress witchgrass	<i>Dichanthelium ensifolium</i>
Deerberry	<i>Vaccinium stamineum</i>
Deertongue	<i>Carphephorus odoratissimus</i>
Dog fennel	<i>Eupatorium capillifolium</i>
Drumheads	<i>Polygala cruciata</i>
Dwarf butterwort	<i>Pinguicula pumila</i>
Dwarf huckleberry	<i>Gaylussacia dumosa</i>
Dwarf live oak	<i>Quercus minima</i>
Dwarf palmetto	<i>Sabal minor</i>
Eggleaf witchgrass	<i>Dichanthelium ovale</i>
Elderberry	<i>Sambucus nigra subsp. canadensis</i>
Elliott's fanpetals	<i>Sida elliotii</i>
Elliott's lovegrass	<i>Eragrostis elliotii</i>
False indigobush	<i>Amorpha fruticosa</i>
Fetterbush	<i>Lyonia lucida</i>
Few-flowered beakrush	<i>Rhynchospora oligantha</i>
Flatsedge	<i>Cyperus surinamensis</i>
Flattop goldenrod	<i>Euthamia graminifolia</i>

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
Floodland beakrush	<i>Rhynchospora inundata</i>
Florida bear-grass*	<i>Nolina atopocarpa</i>
Florida dropseed	<i>Sporobolus floridanus</i>
Florida horsenettle	<i>Solanum carolinense</i> var. <i>floridana</i>
Forked bluecurls	<i>Trichostema dichotomum</i>
Forked rush	<i>Juncus dichotomus</i>
Fragrant flatsedge	<i>Cyperus odoratus</i>
Giant cane	<i>Arundinaria gigantea</i>
Giant cord grass	<i>Spartina cynosuroides</i>
Giant gallberry	<i>Ilex glabra</i>
Giant ironweed	<i>Vernonia gigantea</i>
Goldcrest	<i>Lophiola aurea</i>
Golden aster	<i>Pityopsis oligantha</i>
Green ash	<i>Fraxinus caroliniana</i>
Green hawthorn	<i>Crataegus viridis</i>
Groundsel tree	<i>Baccharis halimifolia</i>
Gum bumelia	<i>Sideroxylon lanuginosum</i>
Haspan flatsedge	<i>Cyperus haspan</i>
Hatpins	<i>Syngonanthus</i> spp.
Head beakrush	<i>Rhynchospora glomerata</i>
Heartwing dock	<i>Rumex hastatulus</i>
Highbush blueberry	<i>Vaccinium corymbosum</i>
Horned beakrush	<i>Rhynchospora corniculata</i>
Indian chickweed	<i>Mollugo verticillata</i>
Indian cupscale	<i>Sacciolepis indica</i>
Indian woodoats	<i>Chasmanthium latifolium</i>
Jessamine	<i>Gelsemium sempervirens</i>
Large-fruited beakrush	<i>Rhynchospora megalocarpa</i>
Laurel oak	<i>Quercus laurifolia</i>
Leathery rush	<i>Juncus coriaceus</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Live oak	<i>Quercus virginiana</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Loblolly pine	<i>Pinus taeda</i>
Longleaf pine	<i>Pinus palustris</i>
Long's sedge	<i>Carex longii</i>
Low panic grasses	<i>Dichanthelium</i> spp.
Low spikesedge	<i>Kyllinga pumila</i>
Maidencane	<i>Panicum hemitomon</i>

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
Malaysian false pimpernel	<i>Lindernia crustacea</i>
Manyflower marshpennywort	<i>Hydrocotyle umbellata</i>
Many-flowered grass-pink*	<i>Calopogon multiflorus</i>
Manyspike flatsedge	<i>Cyperus polystachyos</i>
Marsh elder	<i>Iva frutescens</i>
Marsh seedbox	<i>Ludwigia palustris</i>
Mayberry	<i>Vaccinium elliotii</i>
Mexican primrosewillow	<i>Ludwigia octovalvis</i>
Mexican tea	<i>Chenopodium ambrosioides</i>
Mild waterpepper	<i>Polygonum hydropiperoides</i>
Milk pea	<i>Galactia volubilis</i>
Mohr's thoroughwort	<i>Eupatorium mohrii</i>
Muscadine	<i>Vitis rotundifolia</i>
Myrtle oak	<i>Quercus myrtifolia</i>
Myrtle-leaved holly	<i>Ilex myrtifolia</i>
Narrowleaf primrosewillow	<i>Ludwigia linearis</i>
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>
Narrowleaf sunflower	<i>Helianthus angustifolius</i>
Netted chain fern	<i>Woodwardia areolata</i>
Obedient plant	<i>Physostegia leptophylla</i>
Ogeechee tupelo	<i>Nyssa ogeche</i>
Orange milkwort	<i>Polygala lutea</i>
Overcup oak	<i>Quercus lyrata</i>
Panhandle butterwort*	<i>Pinguicula ionantha</i>
Panhandle spiderlily*	<i>Hymenocallis henryae</i>
Panic grasses	<i>Panicum spp.</i>
Paraguayan purslane	<i>Portulaca amilis</i>
Parrot pitcherplant*	<i>Sarracenia psittacina</i>
Partridgeberry	<i>Mitchella repens</i>
Path rush	<i>Juncus tenuis</i>
Peppervine	<i>Ampelopsis arborea</i>
Pickerelweed	<i>Pontederia cordata</i>
Pignut hickory	<i>Carya glabra</i>
Piedmont marshelder	<i>Iva microcephala</i>
Piedmont pinweed	<i>Lechea torreyi</i>
Pinebarren flatsedge	<i>Cyperus ovatus</i>
Pine-woods aster*	<i>Eurybia spinulosa</i>
Pine-woods bluestem*	<i>Andropogon arctatus</i>
Pinewoods fingergrass	<i>Eustachys petraea</i>

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
Pink sundew	<i>Drosera capillaris</i>
Pipeworts	<i>Eriocaulon</i> spp.
Planer tree	<i>Planera aquatica</i>
Plumed beakrush	<i>Rhynchospora plumosa</i>
Poison ivy	<i>Toxicodendron radicans</i>
Pond-cypress	<i>Taxodium ascendens</i>
Pond pine	<i>Pinus serotina</i>
Poor joe	<i>Diodia teres</i>
Possumhaw	<i>Ilex decidua</i>
Prairie wedgescale	<i>Sphenopholis obtusata</i>
Purple lovegrass	<i>Eragrostis spectabilis</i>
Rabbitbells	<i>Crotalaria rotundifolia</i>
Red bay	<i>Persea borbonia</i>
Red chokeberry	<i>Photinia pyrifolia</i>
Red maple	<i>Acer rubrum</i>
Redroot	<i>Lachnanthes caroliniana</i>
Resurrection fern	<i>Pleopeltis polypodioides</i> var. <i>michauxiana</i>
Rice button aster	<i>Symphotrichum dumosum</i>
River birch	<i>Betula nigra</i>
Rose meadowbeauty	<i>Rhexia alifanus</i>
Rose of Plymouth	<i>Sabatia stellaris</i>
Rose pogonia*	<i>Pogonia ophioglossoides</i>
Roundleaf thoroughwort	<i>Eupatorium rotundifolium</i>
Roundseed witchgrass	<i>Dichanthelium sphaerocarpon</i>
Royal fern	<i>Osmunda regalis</i>
Runner oak	<i>Quercus pumila</i>
Rustweed	<i>Polypremum procumbens</i>
Rusty lyonia	<i>Lyonia fruticosa</i>
Sand blackberry	<i>Rubus cuneifolius</i>
Sand live oak	<i>Quercus geminata</i>
Sand pine	<i>Pinus clausa</i>
Sandweed St. John's wort	<i>Hypericum fasciculatum</i>
Sarsaparilla vine	<i>Smilax pumila</i>
Saw palmetto	<i>Serenoa repens</i>
Sawgrass	<i>Cladium jamaicense</i>
Sawtooth blackberry	<i>Rubus argutus</i>
Scare-weed*	<i>Baptisia simplicifolia</i>
Seaside primrosewillow	<i>Ludwigia maritima</i>
Sebastian bush	<i>Ditrysinia fruticosa</i>

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
Sedges	<i>Carex</i> spp.
Seedbox	<i>Ludwigia alternifolia</i>
Sensitive fern	<i>Onoclea sensibilis</i>
Sensitive pea	<i>Chamaecrista nictitans</i>
Shore rush	<i>Juncus marginatus</i>
Shortleaf gayfeather	<i>Liatris tenuifolia</i>
Shortleaf lobelia	<i>Lobelia brevifolia</i>
Shortleaf pine	<i>Pinus echinata</i>
Shortleaf rose gentian	<i>Sabatia brevifolia</i>
Sicklepod	<i>Senna obtusifolia</i>
Slash pine	<i>Pinus elliottii</i>
Slender crabgrass	<i>Digitaria filiformis</i> var. <i>filiformis</i>
Slender fimbry	<i>Fimbristylis autumnalis</i>
Slender flattop goldenrod	<i>Euthamia caroliniana</i>
Slender threeseed mercury	<i>Acalypha gracilens</i>
Slender woodoats	<i>Chasmanthium laxum</i>
Slimlead pawpaw	<i>Asimina angustifolia</i>
Small-flowered meadowbeauty*	<i>Rhexia parviflora</i>
Smutgrass	<i>Sporobolus indicus</i>
Soft rush	<i>Juncus effusus</i>
Softstem bulrush	<i>Schoenoplectus tabernaemontani</i>
Southern beaksedge	<i>Rhynchospora microcarpa</i>
Southern crabgrass	<i>Digitaria ciliaris</i>
Southern dewberry	<i>Rubus trivialis</i>
Southern lobelia	<i>Lobelia amoena</i>
Southern magnolia	<i>Magnolia grandiflora</i>
Southern milkweed*	<i>Asclepias viridula</i>
Southern red cedar	<i>Juniperus virginiana</i> var. <i>silicicola</i>
Southern rockbell	<i>Wahlenbergia marginata</i>
Spanish moss	<i>Tillandsia usneoides</i>
Sparkleberry	<i>Vaccinium arboreum</i>
Spider lily	<i>Hymenocallis</i> sp.
Spikegrass	<i>Chasmanthium laxum</i> var. <i>sessiliflorum</i>
Spindleroot	<i>Ludwigia hirtella</i>
Spoonleaf sundew*	<i>Drosera intermedia</i>
Spruce pine	<i>Pinus glabra</i>
St. Andrew's cross	<i>Hypericum hypericoides</i>
St. Peter's-wort	<i>Hypericum crux-andreae</i>
Stiff cornel	<i>Cornus foemina</i>

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
Sugarcane plumegrass	<i>Saccharum giganteum</i>
Summer grape	<i>Vitis aestivalis</i>
Swamp bay	<i>Persea palustris</i>
Swamp dock	<i>Rumex verticillatus</i>
Swamp lily	<i>Crinum spp.</i>
Swamp milkweed	<i>Asclepias perennis</i>
Swamp sawgrass	<i>Cladium mariscoides</i>
Sweetbay	<i>Magnolia virginiana</i>
Sweet everlasting	<i>Pseudognaphalium obtusifolium</i>
Sweet gallberry	<i>Ilex coriacea</i>
Sweet pepperbush	<i>Clethra alnifolia</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Sweet shrub*	<i>Calycanthus floridus</i>
Sweetbroom	<i>Scoparia dulcis</i>
Tapered witchgrass	<i>Dichanthelium acuminatum</i> var. <i>acuminatum</i>
Thick-leaved water willow*	<i>Justicia crassifolia</i>
Thin paspalum	<i>Paspalum setaceum</i>
Thorne's buckthorn*	<i>Sideroxylon thornei</i>
Toothache grass	<i>Ctenium aromaticum</i>
Tropical Mexican clover	<i>Richardia brasiliensis</i>
Tropical waxweed*	<i>Cuphea aspera</i>
Turkey oak	<i>Quercus laevis</i>
Variable witchgrass	<i>Dichanthelium commutatum</i>
Vaseygrass	<i>Paspalum urvillei</i>
Velvet witchgrass	<i>Dichanthelium scoparium</i>
Vente conmigo	<i>Croton glandulosus</i> var. <i>glandulosus</i>
Vine-wicky	<i>Pieris phillyreifolia</i>
Virginia chain fern	<i>Woodwardia virginica</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Virginia willow	<i>Itea virginica</i>
Washington hawthorn*	<i>Crataegus phaenopyrum</i>
Water hickory	<i>Carya aquatica</i>
Water locust	<i>Gleditsia aquatica</i>
Water oak	<i>Quercus nigra</i>
Water tupelo	<i>Nyssa aquatica</i>
Wax myrtle	<i>Myrica cerifera</i>
Waxweed	<i>Cuphea carthagenensis</i>
West's flax*	<i>Linum westii</i>
White titi	<i>Cyrilla racemiflora</i>

Table 4. Native Plant Species Known to Occur on ARWEA

Common Name	Scientific Name
White-birds-in-a-nest*	<i>Macbridea alba</i>
White-top pitcherplant*	<i>Sarracenia leucophylla</i>
Wicky	<i>Kalmia hirsuta</i>
Wild azalea	<i>Rhododendron</i> sp.
Wild olive	<i>Osmanthus americanus</i>
Winged sumac	<i>Rhus copallinum</i>
Wiregrass	<i>Aristida stricta</i>
Wiregrass gentian*	<i>Gentiana pennelliana</i>
Wirey beakrushes	<i>Rhynchospora</i> spp.
Witch hazel	<i>Hamamelis virginiana</i>
Woolly croton	<i>Croton capitatus</i>
Woolly-berry	<i>Gaylussacia mosieri</i>
Yankeeweed	<i>Eupatorium compositifolium</i>
Yaupon blacksenna	<i>Seymeria cassioides</i>
Yaupon holly	<i>Ilex vomitoria</i>
Yellow meadowbeauty	<i>Rhexia lutea</i>
Yellow pitcherplant	<i>Sarracenia flava</i>
Yellow-eyed grasses	<i>Xyris</i> spp.

* Indicates an imperiled species

Table 5. Exotic Plant Species of ARWEA

Common Name	Scientific Name
Alligator weed	<i>Alternanthera philoxeroides</i>
Bahiagrass	<i>Paspalum notatum</i>
Bermuda grass	<i>Cynodon dactylon</i>
Camphor tree	<i>Cinnamomum camphora</i>
Centipedegrass	<i>Eremochloa ophiuroides</i>
Chinese tallow tree	<i>Sapium sebiferum</i>
Coffeeweed	<i>Senna obtusifolia</i>
Cogongrass	<i>Imperata cylindrica</i>
Japanese climbing fern	<i>Lygodium japonicum</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Mimosa	<i>Albizia julibrissin</i>
Rattlebox	<i>Sesbania punicea</i>
Torpedo grass	<i>Panicum repens</i>
Water-hyacinth	<i>Eichhornia crassipes</i>
Wild taro	<i>Colocasia esculenta</i>

2.2.1 FNAI Natural Community Descriptions

The FNAI describes a diverse landscape of 21 natural and seven anthropogenic communities at ARWEA. The

predominant natural community is floodplain swamp, which surrounds the Apalachicola River and many of ARWEA's rivers, creeks, and sloughs and accounts for approximately 56% of the area. Floodplain marsh encompasses approximately 9% of ARWEA and is located adjacent to floodplain swamp where ARWEA meets East Bay and the Apalachicola River enters the bay. Other natural communities include



Marsh aerial at ARWEA, FWC

alluvial forest, alluvial river, baygall, basin swamp, blackwater stream, bottomland forest, depression marsh, dome swamp, hydric hammock, maritime hammock, mesic flatwoods, mesic hammock, salt marsh, sandhill, scrubby flatwoods, successional hardwood forest, upland hardwood forest, wet flatwoods, and wet prairie. Pine plantation is the predominant anthropogenic community on ARWEA, a remnant of historic silvicultural operations on the Bloody Bluff, Sand Beach, and Quinn tracts southwest of State Road 65.

The following descriptions of the upland and wetland communities found on ARWEA were prepared by the FNAI and modified by the FWC.

ARWEA Natural Communities

Alluvial forest (1,042.3 acres)

Alluvial forest is a hardwood forest found in river floodplains on low levees, ridges and terraces that are slightly elevated above floodplain swamp and are regularly flooded for a portion of the growing season. The physical environment is greatly influenced by ongoing disturbances created by a fluctuating river bed which is both eroding and depositing substrates.

At ARWEA the primary canopy trees encountered in the alluvial forest include overcup oak, laurel oak, water oak, water hickory, American elm, ash, planer tree, loblolly pine, slash pine, sweetbay, sweet gum, river birch, cabbage palm, and red maple. Overcup oak, river birch and water hickory are often the best indicator species for the alluvial forest community. A great diversity of less flood-tolerant hardwoods or swamp species such as cypress and tupelo may also be present, but not dominant elements. The ability of both adult trees and seedlings to withstand specific flooding regimes throughout the “ridge and swale” topography of the floodplain often creates a mix of mesophytic and hydrophytic tree

species. Shrubs, small trees, and vines are usually sparse or moderate in abundance with coastalplain willow, yaupon, wax myrtle, dwarf palmetto, being common. Groundcover is variable in abundance with slender woodoats and spider lily among the most commonly encountered herbs.

Alluvial forest only occurs at ARWEA in the immediate Apalachicola River floodplain and occupies low levees along river channels, expansive flats located behind levees, low ridges alternating with swamps, and successional point bars. It is usually intermixed with lower areas of floodplain swamp and higher areas of bottomland forest and baygall.

Alluvial river (2,252.4 acres)

Alluvial streams originate in uplands that are primarily composed of sandy clays and clayey-silty sands. Surface runoff is the primary water source for alluvial streams. Thus, alluvial stream waters are typically turbid due to a high content of suspended particulates, including clays, silts, sands, and organic debris. Fluctuations in water depths are dependent upon rainfall patterns and can be separated into two stages, a normal or low flow stage and a flood or high flow stage. During the low flow stage the water is confined within the stream banks, while during flood stage the water overflows the banks and inundates the adjacent floodplain communities. There are few alluvial streams in Florida, and all are restricted to the Panhandle.

The Apalachicola River flows through the center of the ARWEA, and its floodplain swamps dominate the area's central landscape. ARWEA encompasses large portions of the Apalachicola River's main channel as well as the numerous creeks and smaller rivers that spread out towards the River's mouth near the town of Apalachicola. Additionally, flow or water level fluctuations of the Apalachicola River are affected by the system of dams and reservoirs on the Chattahoochee/Flint/Apalachicola River systems that are managed by the U. S. Army Corps of Engineers.

Basin swamp (354.5 acres)

Basin swamps are forested wetlands that occur in large irregularly shaped depressions in mesic and wet flatwoods. There is typically a mix of evergreen and deciduous canopy trees and, in ARWEA, a dense understory of evergreen shrubs. Evergreen canopy tree dominants include slash pine, and sweetbay, with rarely loblolly bay. Deciduous trees are most often pond cypress or bald cypress, black gum, and red maple. Often these deciduous trees form monotypic stands in deeper portions of the basin swamp. Understory species include black titi, white titi, sweetbay, swamp bay, bayberry, giant gallberry, gallberry, and fetterbush. Herbs are typically very sparse.

The basin swamps on ARWEA, for the most part, are dominated by cypress, sweetbay and slash pine.

Baygall (1,194.8 acres)

Baygalls are dense stands of evergreen trees and shrubs that occur in depressions or

seepage areas where groundwater is at or near the surface for long periods of time. Other common species in baygalls are wax myrtle, fetterbush, giant gallberry, and sweet pepperbush. Herbs are sparse to non-existent. Bamboo vine can form large tangles throughout the vegetation.

The most common type of baygall on ARWEA is characterized by thick, nearly impenetrable thickets of evergreen shrubs, primarily black titi and white titi. Baygall occurs in flatwoods depressions and on the edges of dome swamps and basin swamps. It has expanded considerably since the exclusion of fire from the landscape since the late 1940s. In most locations in ARWEA, slash pines or sweetbay are important components and occur as emergent trees over the dense evergreen canopy. Another type of baygall on ARWEA is less common and has a dense canopy of sweetbay, swamp bay and, to a lesser extent, loblolly bay, with black and white titi beneath.

Blackwater stream (318.2 acres)

Blackwater streams are characterized as perennial or intermittent seasonal watercourses originating deep in sandy lowlands where extensive wetlands with organic soils function as reservoirs, collecting rainfall and discharging it slowly to the stream. The tea-colored waters of blackwater streams are laden with tannins, particulates, and dissolved organic matter and iron derived from drainage through swamps and marshes. They generally are acidic (pH = 4.0 - 6.0), but may become circumneutral or slightly alkaline during low-flow stages when influenced by alkaline groundwater. The dark-colored water reduces light penetration and, thus, inhibits photosynthesis and the growth of submerged aquatic plants. Emergent and floating aquatic vegetation may occur along shallower and slower moving sections, but their presence is often reduced because of typically steep banks and considerable seasonal fluctuations in water level. Blackwater streams are the most widely distributed and numerous riverine systems in the southeast coastal plain.

On ARWEA blackwater streams include Graham, Whiskey George, Doyle and Cash Creeks, located east of the Apalachicola River. These streams originate in deep sandy lowlands where extensive wetlands with organic soils function as reservoirs, collecting rainfall and discharging it slowly. Water temperatures fluctuate seasonally with air temperature, but are also dependent upon water depth and shading by adjacent vegetation.

Bottomland forest (1,957.5 acres)

Bottomland forests occur within alluvial forests and swamps on higher ground that is rarely inundated except during unusual flood events.

Much of the area classified as bottomland forest in ARWEA has likely experienced past human disturbances such as logging. Most areas are older loblolly pine stands that were almost certainly planted or seeded many years ago. However, these forests are now well developed, and can be considered a natural community. On ARWEA, bottomland forests typically have a dense canopy dominated by loblolly pine with mixture of hardwoods that

include red maple, water oak, and laurel oak. In wetter areas blackgum, sweetbay occur, and in some drier sites southern magnolia can be found. The understory and shrub layers contain American holly, American hornbeam, wax myrtle, witch hazel, deerberry, highbush blueberry, wild azalea, mayberry, dwarf palmetto, Sebastian bush and sweet pepperbush. Typical herbs include spikegrass, sedges, panic grasses, giant cane, partridgeberry, sarsaparilla vine and netted chain fern. Vines can be abundant and include muscadine, cross vine, bamboo vine, and poison ivy.

Depression marsh (18.8 acres)

Depression marshes are herbaceous wetlands found in low flatlands. Depression marsh is characterized as a shallow, usually rounded depression in sand substrate with herbaceous vegetation or subshrubs, often in concentric bands. Depression marshes typically occur in landscapes occupied by fire-maintained matrix communities such as mesic flatwoods, dry prairie, or sandhill.

On ARWEA these are a minor component of the landscape, and quite botanically simple. They seem to be remnant portions of tidal marshes, occurring primarily in the Sand Beach Road area. These marshes are typically dominated by sawgrass, and less often with black needle rush. Soft rush is commonly on the outer edges. On the edge of one marsh, dwarf butterworts and sawgrass were found.

Dome swamp (180.9 acres)

Dome swamps are shallow, forested depressions that sometimes present a domed profile because trees are shorter in the shallower waters of the outer edge, gradually becoming taller in the deeper water of the interior.

On ARWEA this profile has likely been altered due to past silvicultural site preparation practices that encroached on the outer edges of the dome swamps. These swamps are dominated by pond cypress and/or blackgum. Slash pine and sweetbay may also occur in the canopy. The understory varies from very shrubby and dense, to very open, with shrubs occurring only on hummocks surrounded by open water. Common understory shrubs include Virginia willow, sweet pepperbush, fetterbush, wax myrtle, myrtle-leaved holly, giant gallberry, white titi, and black titi. Vine-wicky can sometimes be found also climbing hummocks or tree trunks. Herbs are sparse and include Virginia chain fern, royal fern, pipeworts, panic grasses, beakrushes, sedges, and yellow-eyed grasses.

Floodplain marsh (5,591.1 acres)

Floodplain marsh is a wetland community occurring in river floodplains and dominated by herbaceous vegetation and/or shrubs. The highest part of the marsh is often a drier, wet prairie-like zone with a large diversity of graminoids and forbs. While the progression from high to low marsh occurs generally from the upland edge to the river edge, these vegetation patches may also be scattered throughout the marsh, which provides a diversity of habitats beneficial to wildlife. Floodplain marshes are found along rivers and streams from just

below the headwaters to the freshwater portions of tidally influenced river mouths. They also occur in river overflow channels and lakes with both input and output of river flow. Floodplain marshes are directly influenced by river flooding on an annual or semi-annual basis where most of the marsh is inundated from approximately 120 to 350 days per year (Toth et al. 1998). Soils are typically sand or a thin to thick organic layer over sand and may be saturated for most of the year. Floodplain marsh may burn periodically depending on dominant vegetation.

Floodplain marshes on ARWEA occur within the floodplains of blackwater streams and in small areas within the vast floodplain swamps of the Apalachicola River. These are simple communities composed of sawgrass and often grade into alluvial forest. Along the Apalachicola River there are also very narrow fringes of bulrush, arrowhead, and pickerelweed bordering alluvial forests and swamps. These narrow marshes were generally too narrow to map; they occur sporadically throughout the river. The extensive marshes dominated by sawgrass near the mouth of the Apalachicola River can be classified as the freshwater tidal marsh variant of floodplain marsh (shown on map as floodplain marsh). This variant of floodplain marsh is the dominant landscape feature associated with the mouth of the Apalachicola River.

Floodplain swamp (36,499.1 acres)

Floodplain swamp is a closed-canopy forest of hydrophytic trees occurring on frequently or permanently flooded hydric soils adjacent to stream and river channels and in depressions and oxbows within floodplains. Trees are often buttressed, and the understory and groundcover are sparse.

In ARWEA this community dominates the Apalachicola River floodplain. The canopy is dominated by bald-cypress, water tupelo, water hickory, and Ogeechee tupelo. There are relatively pure stands of these species in permanently inundated areas; in other areas these species occur with a mixture of hardwoods that include red maple, black gum, overcup oak, American elm, ash, planer tree, laurel oak, and sweetbay. Small trees and shrubs include water locust, stiff cornel, and planer tree and Virginia willow. Common herbs seen were swamp dock, lizard's tail, and pickerelweed and swamp lily. Occasionally, on the edges of the floodplain swamps and forests, particularly in small areas where sandbars occur at times of low water, black willow forms dense stands.

In the lower parts of ARWEA, where the Apalachicola River fans out into numerous smaller rivers (for example, the Little St. Marks, St. Marks, and East Rivers, this floodplain swamp vegetation grades almost imperceptibly into freshwater tidal swamp. This inclusion community contains many of the same species as floodplain swamps further upstream, but represents a transition to the salt marshes. Trees here are sparser and often fairly stunted; they are dominated by cypress and Ogeechee tupelo, with sweetbay and cabbage palm more prominent than further upstream. The understory in these freshwater tidal swamps is typically yaupon, wax myrtle and red maple, along with many of the same herbaceous

species listed above that occur in floodplain swamp. The invasive exotic, alligator weed, is very common in the floodplain swamps and freshwater tidal swamps in the lower Apalachicola River floodplain.

Hydric hammock (28.6 acres)

Hydric hammock is an evergreen hardwood and/or palm forest with a variable understory typically dominated by palms and ferns occurring on moist soils, often with limestone very near the surface. While species composition varies, the community generally has a closed canopy of oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns.

Hydric hammocks on ARWEA are dominated by slash pine and cabbage palm that forested wetland “fringes” where upland pine lands grade into salt marshes primarily in the Sand Beach Road area. They also occur as small, low “islands” within marshes and along the shoreline of Blounts Bay and East Bay. Understory species are typically saplings of cabbage palm, yaupon, sawgrass, black needlerush, wax myrtle, and marsh elder.

Maritime hammock (73.3 acres)

Maritime hammock is a predominantly evergreen hardwood forest growing on stabilized coastal dunes lying at varying distances from the shore. Species composition changes from north to south with temperate species dominating from the Georgia border to Cape Canaveral and tropical species increasingly prevalent south of Cape Canaveral. From the Georgia border to north of Cape Canaveral, live oak, cabbage palm, and red bay combine to form a dense canopy. The low, streamlined profile deflects winds and generally prevents hurricanes from uprooting the trees. Additional canopy species include pignut hickory and southern magnolia. Characteristic subcanopy species are red cedar and American holly. Yaupon, wax myrtle, and saw palmetto are typical shrubs. The herb layer is sparse to absent (Johnson and Muller 1993b).

On the Florida Panhandle coast, the forested portions of barrier islands are largely occupied by pine-dominated communities such as scrub, scrubby flatwoods, and mesic flatwoods, and maritime hammock is found only in isolated pockets, often where shell is mixed with the sandy substrate (Johnson and Barbour 1990). West of Gulf County, sand live oak replaces live oak in the canopy, occasionally mixed with sand pine and slash pine cabbage palm is absent, having reached its western range limit (Johnson et al. 1992a). These hammocks are classified as xeric, rather than maritime, even though they occur on barrier island dunes.

Maritime hammocks on ARWEA occur in the Sand Beach Road area in narrow bands along the shorelines of Blounts Bay and East Bay. The Palms to Pines foot trail at the south end of Sand Beach Road features a nice example of maritime hammock. The maritime hammocks seen on ARWEA are dominated by live oak, with cabbage palm, pignut hickory, water oak, southern magnolia also occurring in the canopy. Understory trees and shrubs

include southern red cedar, deerberry, American holly, yaupon, gum bumelia, winged sumac, saw palmetto, beautyberry, and buckeye. Herbaceous species include spikegrass, low panic grasses, beggar's lice, coral bean, and milk pea. Vines include Virginia creeper, muscadine, and greenbrier. Spanish moss and resurrection fern are found on the branches of live oaks.

Mesic flatwoods (1,171.5 acres)

Mesic flatwoods is characterized by an open canopy of tall pines and a dense, low ground layer of low shrubs, grasses, and forbs. Longleaf pine is the principal canopy tree in northern and Central Florida. Mesic flatwoods is the most widespread natural community in Florida, covering the flat sandy terraces left behind by former high stands of sea level during the Plio-Pleistocene. Soils are acidic, nutrient-poor fine sands with upper layers darkened by organic matter. Leon, Vero, and Smyrna fine sands are common examples (Gilbert et al. 1995). Drainage in this flat terrain can be impeded by a loosely cemented organic layer (spodic horizon) formed within several feet of the soil surface. The soils are alternately droughty during dry periods and saturated, or even inundated, after heavy rains.

Mesic flatwoods are open pinelands that occur on higher ground within the ARWEA, with a low understory composed of varying mixtures of shrubs and grasses. In areas that have been well-burned, shrubs are low in stature, and grasses predominate; less frequently burned areas may be more shrub-dominated, but grasses still persist. On ARWEA mesic flatwoods have all experienced some form of alteration due to past silvicultural activities, and only rarely are longleaf pine found; more typically slash pine are in the canopy and subcanopy layers. Characteristic grasses include wiregrass and Florida dropseed. Characteristic shrubs are saw palmetto and giant gallberry. Other shrubs found include fetterbush, rusty lyonia, woolly-berry, dwarf huckleberry, dwarf live oak, and wicky. Herbaceous species include rose meadowbeauty, yellow eyed grasses, golden aster, blazing star, deertongue, and occasionally bracken fern.

Mesic hammock (64.9 acres)

Mesic hammock is a well-developed evergreen hardwood and/or palm forest on soils that are rarely inundated. The canopy is typically closed and dominated by live oak with cabbage palm generally common in the canopy and subcanopy. Southern magnolia and pignut hickory may be occasional in the subcanopy.

Mesic hammocks on ARWEA occur in very small patches (“oak domes”) within pine plantations or mesic flatwoods. They are characterized by a canopy of live oak. Other canopy and subcanopy trees include laurel oak, pignut hickory and cabbage palm. Shrubs can be dense and patchy, and include yaupon, saw palmetto, and wild olive. Herbs are very sparse, but include large-fruited beakrush. Vines include jessamine, catbrier, and muscadine.

Salt Marsh (1,254.4 acres)

Salt marsh is a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater and is protected from large waves, either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. Salt marsh may have distinct zones of vegetation, each dominated by a single species of grass or rush.

These marshes are dominated by sawgrass; however, many other species are abundant and form a vast mosaic of monotypic patches. The most common species include black needle rush, giant cord grass, cattail, and common reed. Often on the outer edges of these marshes is a band of great bulrush, arrowhead, and pickerelweed. During surveys of these marshes in May, the bright pink flowering spikes of obedient plant were often visible on the edges of the salt marsh community.

Sandhill (23.8 acres)

Sandhill is characterized by widely spaced pine trees with a sparse midstory of deciduous oaks and a moderate to dense groundcover of grasses, herbs, and low shrubs. Sandhill occurs on the rolling topography and deep sands of the Southeastern U.S. Coastal Plain. Typical associations or indicator species are longleaf pine, turkey oak, and wiregrass.

Sandhill vegetation is found only in the Magnolia Bluff tract in the southern portion of the ARWEA in two small areas within a larger matrix of scrubby and mesic flatwoods. The canopy contains older longleaf pine, but is invaded with sand pine. The understory contains turkey oak, sand live oak, bluejack oak, and saw palmetto. Herbs are sparse, and include wiregrass, large-fruited beakrush, big threeawn grass, and low panic grasses. Lichens are also common.

Scrubby flatwoods (133.5 acres)

Scrubby flatwoods have an open canopy of widely spaced pine trees and a low, shrubby understory dominated by scrub oaks and saw palmetto, often interspersed with areas of barren white sand. Principal canopy species are longleaf pine and slash pine in northern and Central Florida. The shrub layer consists of one or more of the four scrub oaks and typical shrubs of mesic flatwoods including saw palmetto, gallberry, fetterbush, coastalplain staggerbush and deerberry. The shrub layer of scrubby flatwoods is not solely comprised of oaks; grasses and dwarf shrubs make up a substantial portion of the cover.

Scrubby flatwoods are found only in the Magnolia Bluff unit. This upland community is similar to mesic flatwoods in structure and species composition, but with more xeric soils that support scattered clumps of myrtle oak, sand live oak, and Chapman's oak in the tall and short shrub layers. Other typical species include saw palmetto, wiregrass and dwarf live oak.

Upland hardwood forest (94.1 acres)

Upland hardwood forest is a well-developed, closed-canopy forest dominated by deciduous hardwood trees on mesic soils in areas sheltered from fire. It typically has a diverse assemblage of deciduous and evergreen tree species in the canopy and midstory, shade-tolerant shrubs, and a sparse groundcover. Upland hardwood forest occurs on rolling mesic hills, slopes above river floodplains, in smaller areas on the sides of sinkholes, and occasionally on rises within floodplains.

Within ARWEA, upland hardwood forest is represented in only a few areas. This forest type is a mixture of pines and hardwoods and is likely a result of two scenarios: long-term fire exclusion in mesic flatwoods, or bottomland forests or mesic hammocks that were planted with pines long ago. The best example of this vegetation type is east of the north end of Sand Beach Road; it is an area that, according to FWC timber stand map data, was planted in 1969. The forest is slash pine dominated, with a mixture of hardwoods that include water oak, sweetgum, live oak, red maple, and an occasional cabbage palm. Beneath the canopy the vegetation is somewhat open, with shrubs that include gallberry, yaupon, deerberry, mayberry, wax myrtle, and sparkleberry. Saw palmetto may occur but is not dominant. Spikegrass is dominant in the groundcover and is abundant. Vines include jessamine and muscadine.

Wet flatwoods (2,428.3 acres)

Wet flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs. The pine canopy typically consists of one or a combination of longleaf pine, slash pine, pond pine. The subcanopy, if present, consists of scattered sweetbay, swamp bay, loblolly bay, pond cypress, titi and/or wax myrtle. Saw palmetto and gallberry species, also found in mesic flatwoods sites, may be present. Wet flatwoods often occur in the ecotones between mesic flatwoods and shrub bogs, wet prairies, dome swamps, or strand swamps. Wet flatwoods also occur in broad, low flatlands, often in a mosaic with these communities.

Wet flatwoods on ARWEA have a relatively open canopy of slash pine and an understory that varies widely in structure, from shrub-dominated, to open and grassy. Typical shrubs include black titi, white titi, common gallberry, giant gallberry, wax myrtle, woolly-berry, and fetterbush. In some areas, particularly where wet and mesic flatwoods intergrade, saw palmetto can be present, but typically it is not as abundant as in better drained mesic flatwoods. St. John's-wort is also present and can be considered a common shrub in more open areas, particularly in deeper parts of vehicle ruts and between silvicultural beds. Dominant graminoids include wiregrass, Chapman's beakrush, other beakrushes, panic grasses, and nutrushes. Other common herbaceous species are pipeworts, and yellow-eyed grasses.

Wet prairie (378.8 acres)

Wet prairies are grass- and sedge-dominated wetlands maintained by a high or perched ground water table and frequent fires. They occur in narrow seepage zones of saturated soil at the base of gentle slopes of stream drainages and in flat lowlands.

In ARWEA, wet prairies are dominated by wiregrass and/or wiry beakrushes, and are generally represented in small fragments within larger pine plantations that serve to offers clues to the historic vegetation. All mapped areas of wet prairie have experienced some sort of alteration from past silvicultural practices. The largest example occurs in an old pine plantation/clear cut along Pool Hammock Loop Road. The presence of wiry beakrushes such as Chapman's beakrush, plumed beakrush, or few-flowered beakrush along with wiregrass is key to identifying areas of wet prairie. Common shrubs are sandweed St. John's-wort, Chapman's St. John's-wort, and coastal plain St. John's wort. Common herbs are goldcrest, redroot, sundew, yellow meadowbeauty, and panic grasses. The yellow pitcherplant was occasionally seen in wet prairie fragments.

Altered Landcover Types

Borrow pit (4.1 acres)

The borrow pit is located on the Tate's Hell portion of the ARWEA, east of State Road 65 and adjacent to a railroad corridor.

Canal/ditch (6.7 acres)

Canals and ditches are artificial drainage ways. ARWEA contains numerous small ditches and canals, but only one small instance was large enough (> 0.5 acres) to be represented in the natural community map.

Clearcut/early regeneration (481.9 acres)

Clearcut/early regeneration areas are limited to the west central zone of ARWEA and are created by pine thinning/restoration activities.

Clearing (459.1 acres)

Clearings at ARWEA commonly include wildlife food plots and other small clearings that lack remnant native vegetation. Some areas that are in the first stages of groundcover restoration are also categorized as clearings.

Developed (13.8 acres)

Clearings that contain permanent buildings/ maintenance facilities are classified as developed lands. Developed areas on ARWEA include offices, the equipment storage building, the chemical storage building, the pole barn, and parking areas.

Impoundment/artificial pond (29.0 acres)

ARWEA contains numerous small borrow pits that hold permanent water. These areas are typed as impoundment/ artificial pond and are generally open water habitats.

Pine plantation (6,875.4 acres)

Pine plantations make up the majority of the upland areas and a large portion of historic wetland areas in ARWEA. These are large tracts of loblolly pine and slash pine plantation, in a variety of silvicultural stages. These plantations occur in areas were historically wet flatwoods, mesic flatwoods, wet prairie, and bottomland forest. Prior to acquisition by the state, these areas had been subjected to heavy site preparation techniques such as bedding and double roller-chopping. Where recent restoration activities such as thinning and burning have taken place, many of these plantations are beginning to resemble, at least in structure, the historic landscape, although deep beds or large equipment tire ruts remain throughout. When wiregrass and wiry beakrushes were seen in any abundance in a thinned plantation, the FNAI classified the plantation as a wet or mesic flatwoods. Where the groundcover was completely dominated by weeds such as broomsedges or weedy shrubs black titi, white titi, and St. John's-wort, and where wiregrass or wiry beakrushes were absent, the area was classified as pine plantation, even in these thinned stands. Denser pine plantations typically had very shrubby or vine-dominated understories with dense needle duff; in these plantations very rarely small wiregrass patches were found; although these tiny fragments of native groundcover offer clues to the historic vegetation, their existence was typically not common enough to merit classification of the denser plantation to a natural community type. However, these pine plantation polygons, with small inclusions of natural communities, may be good places to target for restoration, as at least some historic groundcover persists, even in small patches. As ecological restoration, primarily prescribed fire and tree thinning take place on ARWEA, more areas of wiregrass vegetation will certainly be revealed.

Successional hardwood forest (23.8 acres)

Successional hardwood forest is a closed-canopied forest dominated by fast growing hardwoods such as laurel oak, water oak, and/or sweetgum, often with remnant pines. These forests are either invaded natural habitat (i.e., mesic flatwoods, sandhill, upland pine, upland mixed woodland) due to lengthy fire-suppression or old fields that have succeeded to forest. The subcanopy and shrub layers of these forests are often dense and dominated by smaller individuals of the canopy species. Successional hardwood forests can contain remnant species of the former natural community. Restoration of these forests includes mechanical tree removal and reintroduction of fire. Where characteristic herbaceous species (e.g., wiregrass) have been lost, reintroduction via seed or plants may be necessary to restore natural species composition and community function.

Successional hardwood forest at ARWEA comprises a small unit located near the intersection of Sauls Creek Road and Calf Barn Road. This area is an old field site which has been abandoned.

2.2.2 Forest Resources

Section 253.036, FS requires that plans for natural areas 1,000 acres or greater in size

include a professional forester's assessment of the resource conservation and revenue-producing potentials of the tract's forests. A Timber Assessment for ARWEA was completed by the FFS in 2002 and updated by the FWC and the FFS in 2012 and 2013 (Appendix 13.5).

2.2.3 Forest Management Plan

A Forest Management Plan has also been developed by FWC through contract with a professional forest company. This plan was developed in order to guide the most cost effective and efficient way to manage the pine dominated forests areas as they are generally being enhanced and restored to the historic natural community types that occurred on the area as feasible. Forest resources included in the Forest Management Plan include the pine plantations described above, and natural pine stands within the mesic flatwoods, wet flatwoods, and wet prairie communities. The ARWEA is divided into 13 different Timber Management Units, designed for timber management/planning purposes. The 13 Timber Management Units account for 25,651 acres of ARWEA, with 11,881 of those acres dominated by pine species (slash, loblolly, longleaf and sand pine).

2.3 Fish and Wildlife Resources

The FWC has developed a GIS-based assessment tool that incorporates a wide variety of land cover and wildlife species data. This tool, the Integrated Wildlife Habitat Ranking System (IWHRS), ranks the Florida landscape based upon the habitat needs of wildlife as a way to identify ecologically significant lands in the state, and to assess the potential impacts of management and land-use changes. The IWHRS was developed to provide technical assistance to various local, regional, state,



Florida black bear at ARWEA, FWC

and federal agencies, and entities interested in wildlife needs and conservation in order to: (1) determine ways to avoid or minimize project impacts by evaluating alternative placements, alignments, and transportation corridors during early planning stages, (2) assess direct, secondary, and cumulative impacts to habitat and wildlife resources, and (3) identify appropriate parcels for public land acquisition for wetland and upland habitat mitigation purposes. The IWHRS (2009) indicates that ARWEA has a mean wildlife value of 6.3 (Figure 9).

2.3.1 FWC Wildlife Observations and FNAI Element Occurrences

Geographic information system data maintained by the FWC (Wildlife Observations) and FNAI (Element Occurrences) indicate that ARWEA has numerous documented occurrences of wildlife and a diverse assemblage of animal species. The wildlife observations and element occurrences shown in Figure 10 represent a sampling of the variety of wildlife species documented on ARWEA and displayed in Tables 6 - 12.

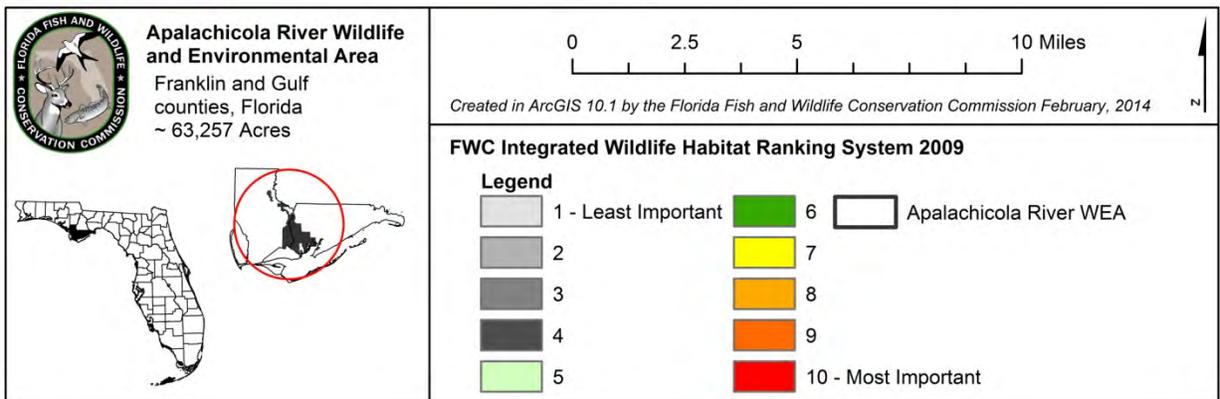
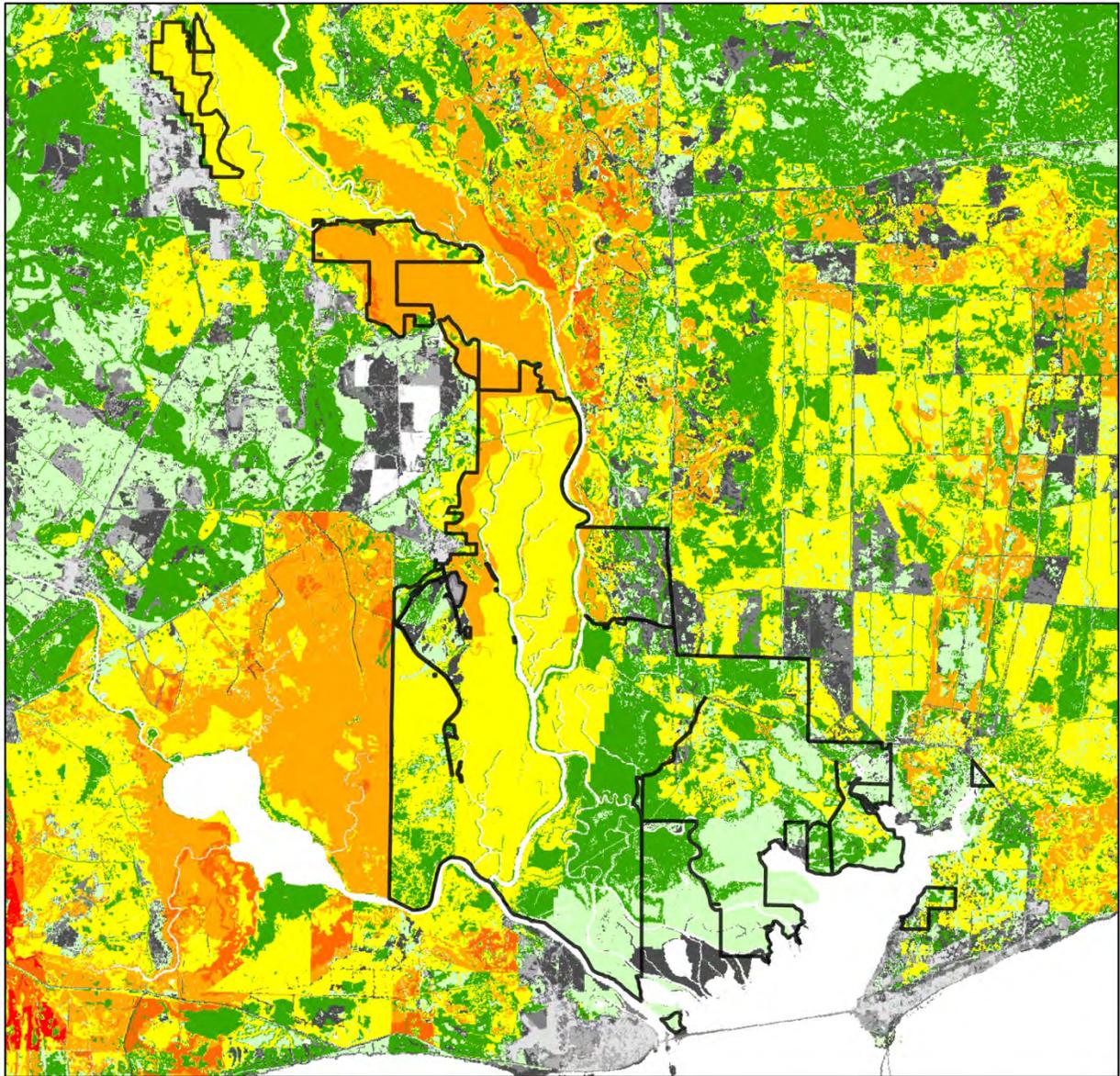


Figure 9 ARWEA Integrated Wildlife Habitat Ranking System

Table 6. Avian Species of ARWEA

Common Name	Scientific Name
Acadian flycatcher	<i>Empidonax virescens</i>
American avocet	<i>Recurvirostra americana</i>
American bittern	<i>Botaurus lentiginosus</i>
American black duck	<i>Anas rubripes</i>
American coot	<i>Fulica americana</i>
American crow	<i>Corvus brachyrhynchos</i>
American golden-plover	<i>Pluvialis dominica</i>
American goldfinch	<i>Spinus tristis</i>
American kestrel	<i>Falco sparverius</i>
American oystercatcher	<i>Haematopus palliatus</i>
American pipit	<i>Anthus rubescens</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
American wigeon	<i>Anas americana</i>
American woodcock	<i>Scolopax minor</i>
Anhinga	<i>Anhinga anhinga</i>
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>
Bachman's sparrow	<i>Peucaea aestivalis</i>
Baird's sandpiper	<i>Calidris bairdii</i>
Baltimore oriole	<i>Icterus galbula</i>
Bank swallow	<i>Riparia riparia</i>
Barn owl	<i>Tyto alba</i>
Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia</i>
Bay-breasted warbler	<i>Setophaga castanea</i>
Belted kingfisher	<i>Megaceryle alcyon</i>
Black rail	<i>Laterallus jamaicensis</i>
Black skimmer	<i>Rynchops niger</i>
Black tern	<i>Chlidonias niger</i>
Black vulture	<i>Coragyps atratus</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Black-bellied plover	<i>Pluvialis squatarola</i>
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>
Blackburnian warbler	<i>Setophaga fusca</i>
Black-crowned night heron	<i>Nycticorax nycticorax</i>
Black-necked stilt	<i>Himantopus mexicanus</i>
Blackpoll warbler	<i>Setophaga striata</i>

Table 6. Avian Species of ARWEA

Common Name	Scientific Name
Black-throated blue warbler	<i>Setophaga caerulescens</i>
Black-throated green warbler	<i>Setophaga virens</i>
Blue grosbeak	<i>Passerina caerulea</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
Blue-headed vireo	<i>Vireo solitarius</i>
Blue-winged teal	<i>Anas discors</i>
Blue-winged warbler	<i>Vermivora cyanoptera</i>
Boat-tailed grackle	<i>Quiscalus major</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Bonaparte's gull	<i>Chroicocephalus philadelphia</i>
Broad-winged hawk	<i>Buteo platypterus</i>
Brown creeper	<i>Certhia americana</i>
Brown pelican	<i>Pelecanus occidentalis</i>
Brown thrasher	<i>Toxostoma rufum</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Brown-headed nuthatch	<i>Sitta pusilla</i>
Bufflehead	<i>Bucephala albeola</i>
Canada warbler	<i>Cardellina canadensis</i>
Canvasback	<i>Aythya valisineria</i>
Cape May warbler	<i>Setophaga tigrina</i>
Carolina chickadee	<i>Poecile carolinensis</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Caspian tern	<i>Hydroprogne caspia</i>
Cattle egret	<i>Bubulcus ibis</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
Cerulean warbler	<i>Setophaga cerulea</i>
Chestnut-sided warbler	<i>Setophaga pensylvanica</i>
Chimney swift	<i>Chaetura pelagica</i>
Chipping sparrow	<i>Spizella passerina</i>
Chuck-will's widow	<i>Antrostomus carolinensis</i>
Clapper rail	<i>Rallus longirostris</i>
Clay-colored sparrow	<i>Spizella pallida</i>
Cliff swallow	<i>Petrochelidon pyrrhonota</i>
Common goldeneye	<i>Bucephala clangula</i>
Common grackle	<i>Quiscalus quiscula</i>
Common ground-dove	<i>Columbina passerina</i>
Common loon	<i>Gavia immer</i>

Table 6. Avian Species of ARWEA

Common Name	Scientific Name
Common moorhen	<i>Gallinula chloropus</i>
Common nighthawk	<i>Chordeiles minor</i>
Common snipe	<i>Gallinago gallinago</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Connecticut warbler	<i>Oporornis agilis</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Dickcissel	<i>Spiza americana</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Downy woodpecker	<i>Picoides pubescens</i>
Dunlin	<i>Calidris alpina</i>
Eastern bluebird	<i>Sialia sialis</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Eastern meadowlark	<i>Sturnella magna</i>
Eastern phoebe	<i>Sayornis phoebe</i>
Eastern screech owl	<i>Megascops asio</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Eastern wood-pewee	<i>Contopus virens</i>
Eurasian collared-dove	<i>Streptopelia decaocto</i>
European starling	<i>Sturnus vulgaris</i>
Field sparrow	<i>Spizella pusilla</i>
Fish crow	<i>Corvus ossifragus</i>
Forster's tern	<i>Sterna forsteri</i>
Fulvous whistling duck	<i>Dendrocygna bicolor</i>
Gadwall	<i>Anas strepera</i>
Golden-crowned kinglet	<i>Regulus satrapa</i>
Golden-winged warbler	<i>Vermivora chrysoptera</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Gray catbird	<i>Dumetella carolinensis</i>
Gray kingbird	<i>Tyrannus dominicensis</i>
Gray-cheeked thrush	<i>Catharus minimus</i>
Great blue heron	<i>Ardea herodias</i>
Great crested flycatcher	<i>Myiarchus crinitus</i>
Great egret	<i>Ardea alba</i>
Great horned owl	<i>Bubo virginianus</i>
Greater scaup	<i>Aythya marila</i>
Greater yellowlegs	<i>Tringa melanoleuca</i>
Green heron	<i>Butorides virescens</i>
Green-winged teal	<i>Anas crecca</i>

Table 6. Avian Species of ARWEA

Common Name	Scientific Name
Gull-billed tern	<i>Gelochelidon nilotica</i>
Hairy woodpecker	<i>Picoides villosus</i>
Henslow's sparrow	<i>Ammodramus henslowii</i>
Hermit thrush	<i>Catharus guttatus</i>
Herring gull	<i>Larus argentatus</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
Hooded warbler	<i>Setophaga citrina</i>
House sparrow	<i>Passer domesticus</i>
House wren	<i>Troglodytes aedon</i>
Indigo bunting	<i>Passerina cyanea</i>
Kentucky warbler	<i>Geothlypis formosa</i>
Killdeer	<i>Charadrius vociferus</i>
King rail	<i>Rallus elegans</i>
Laughing gull	<i>Leucophaeus atricilla</i>
Least bittern	<i>Ixobrychus exilis</i>
Least flycatcher	<i>Empidonax minimus</i>
Least sandpiper	<i>Calidris minutilla</i>
Least tern	<i>Sternula antillarum</i>
Lesser black-backed gull	<i>Larus fuscus</i>
Lesser scaup	<i>Aythya affinis</i>
Lesser yellowlegs	<i>Tringa flavipes</i>
Little blue heron	<i>Egretta caerulea</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Long-billed curlew	<i>Numenius americanus</i>
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>
Louisiana waterthrush	<i>Parkesia motacilla</i>
Magnolia warbler	<i>Setophaga magnolia</i>
Mallard	<i>Anas platyrhynchos</i>
Marbled godwit	<i>Limosa fedoa</i>
Marsh wren	<i>Cistothorus palustris</i>
Merlin	<i>Falco columbarius</i>
Mississippi kite	<i>Ictinia mississippiensis</i>
Mottled duck	<i>Anas fulvigula</i>
Mourning dove	<i>Zenaida macroura</i>
Nelson's sparrow	<i>Ammodramus nelsoni</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern flicker	<i>Colaptes auratus</i>

Table 6. Avian Species of ARWEA

Common Name	Scientific Name
Northern harrier	<i>Circus cyaneus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern parula	<i>Setophaga americana</i>
Northern pintail	<i>Anas acuta</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Northern shoveler	<i>Anas clypeata</i>
Northern waterthrush	<i>Parkesia noveboracensis</i>
Orange-crowned warbler	<i>Oreothlypis celata</i>
Orchard oriole	<i>Icterus spurius</i>
Osprey	<i>Pandion haliaetus</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Painted bunting	<i>Passerina ciris</i>
Palm warbler	<i>Setophaga palmarum</i>
Peregrine falcon	<i>Falco peregrinus</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine siskin	<i>Spinus pinus</i>
Pine warbler	<i>Setophaga pinus</i>
Piping plover	<i>Charadrius melodus</i>
Prairie warbler	<i>Setophaga discolor</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Purple finch	<i>Haemorhous purpureus</i>
Purple gallinule	<i>Porphyrio martinica</i>
Purple martin	<i>Progne subis</i>
Red knot	<i>Calidris canutus</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-breasted merganser	<i>Mergus serrator</i>
Red-breasted nuthatch	<i>Sitta canadensis</i>
Red-cockaded woodpecker	<i>Picoides borealis</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Redhead	<i>Aythya americana</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ring-billed gull	<i>Larus delawarensis</i>
Ring-necked duck	<i>Aythya collaris</i>
Rock pigeon	<i>Columba livia</i>

Table 6. Avian Species of ARWEA

Common Name	Scientific Name
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Royal tern	<i>Thalasseus maximus</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Ruddy duck	<i>Oxyura jamaicensis</i>
Ruddy turnstone	<i>Arenaria interpres</i>
Rusty blackbird	<i>Euphagus carolinus</i>
Sanderling	<i>Calidris alba</i>
Sandwich tern	<i>Thalasseus sandvicensis</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Scarlet tanager	<i>Piranga olivacea</i>
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>
Seaside sparrow	<i>Ammodramus maritimus</i>
Sedge wren	<i>Cistothorus platensis</i>
Semipalmated plover	<i>Charadrius semipalmatus</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Short-billed dowitcher	<i>Limnodromus griseus</i>
Snow goose	<i>Chen caerulescens</i>
Snowy egret	<i>Egretta thula</i>
Snowy plover	<i>Charadrius nivosus</i>
Solitary sandpiper	<i>Tringa solitaria</i>
Song sparrow	<i>Melospiza melodia</i>
Sora	<i>Porzana carolina</i>
Southern bald eagle	<i>Haliaeetus leucocephalus</i>
Spotted sandpiper	<i>Actitis macularius</i>
Sprague's pipit	<i>Anthus spragueii</i>
Summer tanager	<i>Piranga rubra</i>
Swainson's thrush	<i>Catharus ustulatus</i>
Swainson's warbler	<i>Limnothlypis swainsonii</i>
Swallow-tailed kite	<i>Elanoides forficatus</i>
Swamp sparrow	<i>Melospiza georgiana</i>
Tennessee warbler	<i>Oreothlypis peregrina</i>
Tree swallow	<i>Tachycineta bicolor</i>
Tricolored heron	<i>Egretta tricolor</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Turkey vulture	<i>Cathartes aura</i>
Veery	<i>Catharus fuscescens</i>
Vesper sparrow	<i>Poocetes gramineus</i>

Table 6. Avian Species of ARWEA

Common Name	Scientific Name
Virginia rail	<i>Rallus limicola</i>
Western kingbird	<i>Tyrannus verticalis</i>
Western sandpiper	<i>Calidris mauri</i>
Western tanager	<i>Piranga ludoviciana</i>
Whimbrel	<i>Numenius phaeopus</i>
Whip-poor-will	<i>Antrostomus vociferus</i>
White ibis	<i>Eudocimus albus</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
White-eyed vireo	<i>Vireo griseus</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
White-winged dove	<i>Zenaida asiatica</i>
Wild turkey	<i>Meleagris gallopavo</i>
Willet	<i>Tringa semipalmata</i>
Willow flycatcher	<i>Empidonax traillii</i>
Wilson's plover	<i>Charadrius wilsonia</i>
Wilson's snipe	<i>Gallinago delicata</i>
Wilson's warbler	<i>Cardellina pusilla</i>
Winter wren	<i>Troglodytes hiemalis</i>
Wood duck	<i>Aix sponsa</i>
Wood stork	<i>Mycteria americana</i>
Wood thrush	<i>Hylocichla mustelina</i>
Worm-eating warbler	<i>Helmitheros vermivorum</i>
Yellow warbler	<i>Setophaga petechia</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-breasted chat	<i>Icteria virens</i>
Yellow-crowned night heron	<i>Nyctanassa violacea</i>
Yellow-rumped warbler	<i>Setophaga coronata</i>
Yellow-throated vireo	<i>Vireo flavifrons</i>
Yellow-throated warbler	<i>Setophaga dominica</i>

Table 7. Mammalian Species of ARWEA

Common Name	Scientific Name
Beaver	<i>Castor canadensis</i>
Big brown bat	<i>Eptesicus fuscus</i>
Bobcat	<i>Lynx rufus</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>

Table 7. Mammalian Species of ARWEA

Common Name	Scientific Name
Cotton mouse	<i>Peromyscus gossypinus</i>
Coyote	<i>Canis latrans</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Eastern fox squirrel*	<i>Sciurus niger shermani</i>
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Eastern harvest mouse	<i>Reithrodontomys fulvescens</i>
Eastern mole	<i>Scalopus aquaticus</i>
Eastern pipistrelle	<i>Pipistrellus subflavus</i>
Eastern red bat	<i>Lasiurus borealis</i>
Eastern woodrat	<i>Neotoma floridana smalli</i>
Evening bat	<i>Nycticeius humeralis</i>
Florida black bear	<i>Ursus americanus floridanus</i>
Golden mouse	<i>Ochrotomys nuttalli</i>
Gray bat*	<i>Myotis grisescens</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
Hoary bat	<i>Lasiurus cinereus</i>
Indiana bat*	<i>Myotis sodalis</i>
Least shrew	<i>Cryptotis parva</i>
Little brown bat	<i>Myotis lucifugus</i>
Long-tailed weasel	<i>Mustela frenata</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Marsh rice rat	<i>Oryzomys palustris</i>
Mink	<i>Neovison vison</i>
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Northern yellow bat	<i>Lasiurus intermedius</i>
Oldfield mouse	<i>Peromyscus polionotus</i>
Opossum	<i>Didelphis virginiana</i>
Pine vole	<i>Microtus pinetorum</i>
Raccoon	<i>Procyon lotor</i>
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>
Red fox	<i>Vulpes vulpes</i>
River otter	<i>Lontra canadensis</i>
Seminole bat	<i>Lasiurus seminolus</i>
Southeastern bat	<i>Myotis austroriparius</i>
Southeastern pocket gopher	<i>Geomys pinetis</i>
Southeastern shrew	<i>Sorex longirostris</i>
Southern flying squirrel	<i>Glaucomys volans</i>
Southern short-tailed shrew	<i>Blarina carolinensis</i>

Table 7. Mammalian Species of ARWEA

Common Name	Scientific Name
Striped skunk	<i>Mephitis mephitis</i>
West Indian manatee	<i>Trichechus manatus</i>
White-tailed deer	<i>Odocoileus virginianus</i>
Wild hog	<i>Sus scrofa</i>

* Not documented, presumed to occur on ARWEA

Table 8. Amphibian Species of ARWEA

Common Name	Scientific Name
Barking treefrog	<i>Hyla gratiosa</i>
Bird-voiced treefrog	<i>Hyla avivoca</i>
Bronze frog	<i>Lithobates clamitans clamitans</i>
Bullfrog	<i>Lithobates catesbeianus</i>
Cope's gray treefrog	<i>Hyla chrysoscelis</i>
Dwarf salamander	<i>Eurycea quadridigitata</i>
Eastern lesser siren	<i>Siren intermedia intermedia</i>
Eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>
Eastern newt	<i>Notophthalmus viridescens</i>
Eastern spadefoot toad	<i>Scaphiopus holbrookii</i>
Eastern tiger salamander	<i>Ambystoma tigrinum tigrinum</i>
Florida cricket frog	<i>Acris gryllus dorsalis</i>
Four-toed salamander	<i>Hemidactylium scutatum</i>
Greater siren	<i>Siren lacertina</i>
Green treefrog	<i>Hyla cinerea</i>
Greenhouse frog	<i>Eleutherodactylus planirostris</i>
Little grass frog	<i>Pseudacris ocularis</i>
Marbled salamander	<i>Ambystoma opacum</i>
Mole salamander	<i>Ambystoma talpoideum</i>
Mud salamander	<i>Pseudotriton montanus</i>
Oak toad	<i>Anaxyrus quercicus</i>
Ornate chorus frog	<i>Pseudacris ornata</i>
Pig frog	<i>Lithobates grylio</i>
Pine woods treefrog	<i>Hyla femoralis</i>
River frog	<i>Lithobates heckscheri</i>
Slimy salamander	<i>Plethodon grobmani</i>
Southern chorus frog	<i>Pseudacris nigrita</i>
Southern cricket frog	<i>Acris gryllus</i>
Southern dusky salamander	<i>Desmognathus auriculatus</i>
Southern leopard frog	<i>Lithobates sphenoccephalus</i>

Table 8. Amphibian Species of ARWEA

Common Name	Scientific Name
Southern spring peeper	<i>Pseudacris crucifer bartramiana</i>
Southern toad	<i>Anaxyrus terrestris</i>
Southern two-lined salamander	<i>Eurycea cirrigera</i>
Squirrel treefrog	<i>Hyla squirella</i>
Three-lined salamander	<i>Eurycea guttolineata</i>
Two-toed amphiuma	<i>Amphiuma means</i>
Upland chorus frog	<i>Pseudacris feriarum</i>

Table 9. Reptilian Species of ARWEA

Common Name	Scientific Name
Alligator snapping turtle	<i>Macrochelys temminckii</i>
American alligator	<i>Alligator mississippiensis</i>
Apalachicola kingsnake	<i>Lampropeltis getula meansi</i>
Banded water snake	<i>Nerodia fasciata fasciata</i>
Barbour's map turtle	<i>Graptemys barbouri</i>
Broad-headed skink	<i>Plestiodon laticeps</i>
Brown anole	<i>Anolis sagrei</i>
Common five-lined skink	<i>Plestiodon fasciatus</i>
Common garter snake	<i>Thamnophis sirtalis</i>
Common snapping turtle	<i>Chelydra serpentina</i>
Dusky pigmy rattlesnake	<i>Sistrurus miliarius barbouri</i>
Eastern chicken turtle	<i>Deirochelys reticularia reticularia</i>
Eastern coachwhip	<i>Masticophis flagellum flagellum</i>
Eastern coral snake	<i>Micrurus fulvius</i>
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>
Eastern fence lizard	<i>Sceloporus undulatus</i>
Eastern garter snake	<i>Thamnophis sirtalis sirtalis</i>
Eastern glass lizard	<i>Ophisaurus ventralis</i>
Eastern hognose snake	<i>Heterodon platirhinos</i>
Eastern indigo snake*	<i>Drymarchon couperi</i>
Eastern kingsnake	<i>Lampropeltis getula getula</i>
Eastern mud snake	<i>Farancia abacura abacura</i>
Eastern mud turtle	<i>Kinosternon subrubrum</i>
Eastern musk turtle	<i>Sternotherus odoratus</i>
Eastern ribbon snake	<i>Thamnophis sauritus</i>
Eastern smooth earth snake	<i>Virginia valeriae valeriae</i>
Florida cooter	<i>Pseudemys concinna floridana</i>
Florida cottonmouth	<i>Agkistrodon piscivorus conanti</i>

Table 9. Reptilian Species of ARWEA

Common Name	Scientific Name
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>
Florida softshell turtle	<i>Apalone ferox</i>
Glossy crawfish snake	<i>Regina rigida</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Gray rat snake	<i>Pantherophis spiloides</i>
Green anole	<i>Anolis carolinensis</i>
Ground skink	<i>Scincella lateralis</i>
Gulf coast box turtle	<i>Terrapene carolina major</i>
Loggerhead musk turtle	<i>Sternotherus minor minor</i>
Mole skink	<i>Plestiodon egregius</i>
Plain-bellied water snake	<i>Nerodia erythrogaster</i>
Red corn snake	<i>Pantherophis guttatus</i>
Red-bellied snake	<i>Storeria occipitomaculata</i>
Redbelly water snake	<i>Nerodia erythrogaster erythrogaster</i>
Rough green snake	<i>Opheodrys aestivus</i>
Scarlet kingsnake	<i>Lampropeltis elapsoides</i>
Scarlet snake	<i>Cemophora coccinea</i>
Six-lined racerunner	<i>Aspidoscelis sexlineata</i>
Southeastern five-lined skink	<i>Plestiodon inexpectatus</i>
Southern black racer	<i>Coluber constrictor priapus</i>
Southern ringneck snake	<i>Diadophis punctatus punctatus</i>
Striped mud turtle	<i>Kinosternon baurii</i>

* Not documented, presumed to occur on ARWEA

Table 10. Fish Species of ARWEA

Common Name	Scientific Name
Banded pygmy sunfish	<i>Elassoma zonatum</i>
Bannerfin shiner	<i>Cyprinella leedsii</i>
Black crappie	<i>Pomoxis nigromaculatus</i>
Blackbanded darter	<i>Percina nigrofasciata</i>
Blacktail shiner	<i>Cyprinella venusta</i>
Bluegill	<i>Lepomis macrochirus</i>
Bluespotted sunfish	<i>Enneacanthus gloriosus</i>
Bowfin	<i>Amia calva</i>
Brook silverside	<i>Labidesthes sicculus</i>
Brown bullhead	<i>Ameiurus nebulosus</i>
Chain pickerel	<i>Esox niger</i>
Channel catfish	<i>Ictalurus punctatus</i>

Table 10. Fish Species of ARWEA

Common Name	Scientific Name
Clear chub	<i>Hybopsis winchelli</i>
Coastal shiner	<i>Notropis petersoni</i>
Common carp	<i>Cyprinus carpio</i>
Dollar sunfish	<i>Lepomis marginatus</i>
Everglades pygmy sunfish	<i>Elassoma evergladei</i>
Flathead catfish	<i>Pylopictis olivaris</i>
Flier	<i>Centrarchus macropterus</i>
Florida gar	<i>Lepisosteus platyrhincus</i>
Gizzard shad	<i>Dorosoma cepedianum</i>
Golden shiner	<i>Notemigonus crysoleucas</i>
Green sunfish	<i>Lepomis cyanellus</i>
Gulf darter	<i>Etheostoma swaini</i>
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>
Lake chubsucker	<i>Erimyzon sucetta</i>
Largemouth bass	<i>Micropterus salmoides</i>
Least killifish	<i>Heterandria formosa</i>
Lined topminnow	<i>Fundulus lineolatus</i>
Longnose gar	<i>Lepisosteus osseus</i>
Mosquitofish	<i>Gambusia affinis</i>
Mud sunfish	<i>Acantharchus pomotis</i>
Pirate perch	<i>Aphredoderus sayanus</i>
Pugnose minnow	<i>Opsopoeodus emiliae</i>
Redbreast sunfish	<i>Lepomis auritus</i>
Redear sunfish	<i>Lepomis microlophus</i>
Redfin pickerel	<i>Esox americanus</i>
Southern brook lamprey	<i>Ichthyomyzon gagei</i>
Speckled madtom	<i>Noturus leptacanthus</i>
Spotted bullhead	<i>Ameiurus serracanthus</i>
Spotted sucker	<i>Minytrema melanops</i>
Spotted sunfish	<i>Lepomis punctatus</i>
Striped bass	<i>Morone saxatilis</i>
Sunshine bass	<i>Morone chrysops x M. saxatilis</i>
Swamp darter	<i>Etheostoma fusiforme</i>
Tadpole madtom	<i>Noturus gyrinus</i>
Taillight shiner	<i>Notropis maculatus</i>
Threadfin shad	<i>Dorosoma petenense</i>
Warmouth	<i>Lepomis gulosus</i>
Weed shiner	<i>Notropis texanus</i>
White bass	<i>Morone chrysops</i>

Table 10. Fish Species of ARWEA

Common Name	Scientific Name
White catfish	<i>Ameiurus catus</i>
Yellow bullhead	<i>Ameiurus natalis</i>

Table 11. Butterfly Species of ARWEA

Common Name	Scientific Name
Aaron's skipper	<i>Poanes aaroni</i>
American lady	<i>Vanessa virginiensis</i>
Barred yellow	<i>Eurema दौरा</i>
Berry's skipper	<i>Euphyes berryi</i>
Black swallowtail	<i>Papilio polyxenes</i>
Brazilian skipper	<i>Calpodēs ethlius</i>
Broad-winged skipper	<i>Poanes viator</i>
Carolina satyr	<i>Hermeuptychia sosybius</i>
Ceraunus blue	<i>Hemiargus ceraunus</i>
Clouded skipper	<i>Lerema accius</i>
Cloudless sulphur	<i>Phoebis sennae</i>
Common buckeye	<i>Junonia coenia</i>
Common wood-nymph	<i>Cercyonis pegala</i>
Delaware skipper	<i>Anatrytone logan</i>
Dion skipper	<i>Euphyes dion</i>
Dun skipper	<i>Euphyes vestris</i>
Eastern tiger swallowtail	<i>Papilio glaucus</i>
Eufala skipper	<i>Lerodea eufala</i>
Fiery skipper	<i>Hylephila phyleus</i>
Funereal duskywing	<i>Erynnis funeralis</i>
Gemmed satyr	<i>Cyllopsis gemma</i>
Gray hairstreak	<i>Strymon melinus</i>
Gulf fritillary	<i>Agraulis vanillae</i>
Horace's duskywing	<i>Erynnis horatius</i>
Juvenal's duskywing	<i>Erynnis juvenalis</i>
Least skipper	<i>Ancyloxypha numitor</i>
Little wood-satyr	<i>Megisto cymela</i>
Little yellow	<i>Pyrisitia lisa</i>
Long-tailed skipper	<i>Urbanus proteus</i>
Monarch	<i>Danaus plexippus</i>
Northern broken-dash	<i>Wallengrenia egeremet</i>
Oak hairstreak	<i>Satyrium favonius</i>

Table 11. Butterfly Species of ARWEA

Common Name	Scientific Name
Ocola skipper	<i>Panoquina ocola</i>
Painted lady	<i>Vanessa cardui</i>
Palamedes swallowtail	<i>Papilio palamedes</i>
Palatka skipper	<i>Euphyes pilatka</i>
Pearl crescent	<i>Phyciodes tharos</i>
Phaon crescent	<i>Phyciodes phaon</i>
Queen	<i>Danaus gilippus</i>
Question mark	<i>Polygonia interrogationis</i>
Red admiral	<i>Vanessa atalanta</i>
Red-banded hairstreak	<i>Calycopis cecrops</i>
Red-spotted purple	<i>Limenitis arthemis astyanax</i>
Salt marsh skipper	<i>Panoquina panoquin</i>
Silver-spotted skipper	<i>Epargyreus clarus</i>
Sleepy orange	<i>Eurema nicippe</i>
Southern broken-dash	<i>Wallengrenia otho</i>
Southern dogface	<i>Zerene cesonia</i>
Spicebush swallowtail	<i>Papilio troilus</i>
Tawny-edged skipper	<i>Polites themistocles</i>
Tropical checkered-skipper	<i>Pyrgus oileus</i>
Twin-spot skipper	<i>Oligoria maculata</i>
Variiegated fritillary	<i>Euptoieta claudia</i>
Viceroy	<i>Limenitis archippus</i>
Whirlabout	<i>Polites vibex</i>
White peacock	<i>Anartia jatrophae</i>
Zabulon skipper	<i>Poanes zabulon</i>
Zarucco duskywing	<i>Erynnis zarucco</i>
Zebra heliconian	<i>Heliconius charithonia</i>
Zebra swallowtail	<i>Eurytides marcellus</i>

Table 12. Exotic Animal Species of ARWEA

Common Name	Scientific Name
Mammals	
Feral hog	<i>Sus scrofa</i>
Nine-banded armadillo	<i>Dasyopus novemcinctus</i>
Birds	
Eurasian collared-dove	<i>Streptopelia decaocto</i>

Table 12. Exotic Animal Species of ARWEA

Common Name	Scientific Name
European starling	<i>Sturnus vulgaris</i>
House sparrow	<i>Passer domesticus</i>
Rock pigeon	<i>Columba livia</i>
Amphibians & Reptiles	
Brown anole	<i>Anolis sagrei</i>
Greenhouse frog	<i>Eleutherodactylus planirostris</i>
Fish	
Common carp	<i>Cyprinus carpio</i>
Flathead catfish	<i>Pylopictis olivaris</i>

2.3.2 Imperiled Species

For the purposes of this Management Plan, the term “Imperiled Species” (Table 13) refers to plant and animal species that are designated as Endangered, Threatened, or a Species of Special Concern by the FWC or the Department of Agriculture and Consumer Services. Species are designated as Endangered or Threatened by the U.S. Fish and Wildlife Service. This designation is also commonly known as “listed species.”



Alligator snapping turtle at ARWEA, FWC

On November 8, 2010 new threatened species rules approved by the FWC went into effect. All federally listed species that occur in Florida will now be included on Florida’s list as federally-designated Endangered or federally-designated Threatened species. In addition, the state has implemented a listing process to identify species that are not federally listed, but that may be at risk of extinction. These species will be called state-designated Threatened. All previous state-designated imperiled species were grandfathered on the list and are currently undergoing status reviews. The FWC will continue to maintain a separate Species of Special Concern category until all the former imperiled species have been reviewed and those species are either determined to be state-designated Threatened or removed from the list.

Table 13. Rare and Imperiled Species of ARWEA

Common Name	Scientific Name	Status
Mammals		
Eastern fox squirrel*	<i>Sciurus niger shermani</i>	SSC

Table 13. Rare and Imperiled Species of ARWEA

Common Name	Scientific Name	Status
Gray bat*	<i>Myotis grisescens</i>	FE
Indiana bat*	<i>Myotis sodalis</i>	FE
West Indian manatee	<i>Trichechus manatus</i>	FE
Birds		
American oystercatcher	<i>Haematopus palliatus</i>	SSC
Black skimmer ⁺	<i>Rynchops niger</i>	SSC
Brown pelican	<i>Pelecanus occidentalis</i>	SSC
Least tern	<i>Sternula antillarum</i>	ST
Little blue heron	<i>Egretta caerulea</i>	SSC
Piping plover	<i>Charadrius melodus</i>	FT
Red-cockaded woodpecker	<i>Picoides borealis</i>	FE
Snowy egret	<i>Egretta thula</i>	SSC
Snowy plover	<i>Charadrius nivosus</i>	ST
Tricolored heron	<i>Egretta tricolor</i>	SSC
White ibis	<i>Eudocimus albus</i>	SSC
Wood stork	<i>Mycteria americana</i>	FE
Reptiles		
Alligator snapping turtle	<i>Macrochelys temminckii</i>	SSC
American alligator	<i>Alligator mississippiensis</i>	FT(S/A)
Barbour's map turtle	<i>Graptemys barbouri</i>	SSC
Eastern indigo snake*	<i>Drymarchon couperi</i>	FT
Florida pine snake ⁺	<i>Pituophis melanoleucus mugitus</i>	SSC
Gopher tortoise	<i>Gopherus polyphemus</i>	ST
Mollusks		
Apalachicola floater	<i>Anodonta heardi</i>	NL-21S2
Chipola slabshell ⁺	<i>Elliptio chipolaensis</i>	FT
Gulf moccasinshell ⁺	<i>Medionidus penicillatus</i>	FE
Fat threeridge	<i>Amblema neislerii</i>	FE
Oval pigtoe ⁺	<i>Pleurobema pyriforme</i>	FE
Purple bankclimber	<i>Elliptioideus sloatianus</i>	FT
Washboard	<i>Megaloniaias nervosa</i>	NL-S3
Fish		
Bluenose shiner	<i>Pteronotropis welaka</i>	SSC
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	FT

Table 13. Rare and Imperiled Species of ARWEA

Common Name	Scientific Name	Status
Insects		
A mayfly	<i>Stenacron floridense</i>	NL-S3S4
Plants		
Cardinal flower	<i>Lobelia cardinalis</i>	ST
Carolina grass-of-parnassus	<i>Parnassia caroliniana</i>	SE
Catesby lily	<i>Lilium catesbaei</i>	ST
Corkwood	<i>Leitneria floridana</i>	ST
Florida bear-grass	<i>Nolina atopocarpa</i>	ST
Many-flowered grass-pink	<i>Calopogon multiflorus</i>	SE
Panhandle butterwort	<i>Pinguicula ionantha</i>	SE
Panhandle spiderlily	<i>Hymenocallis henryae</i>	SE
Parrot pitcherplant	<i>Sarracenia psittacina</i>	ST
Pine-woods aster	<i>Eurybia spinulosa</i>	SE
Pine-woods bluestem	<i>Andropogon arctatus</i>	ST
Rose pogonia	<i>Pogonia ophioglossoides</i>	ST
Scare-weed	<i>Baptisia simplicifolia</i>	ST
Small-flowered meadow beauty	<i>Rhexia parviflora</i>	SE
Southern milkweed	<i>Asclepias viridula</i>	ST
Spoonleaf sundew	<i>Drosera intermedia</i>	ST
Sweet shrub	<i>Calycanthus floridus</i>	SE
Thick-leaved water willow	<i>Justicia crassifolia</i>	SE
Thorne's buckthorn	<i>Sideroxylon thornei</i>	SE
Tropical waxweed	<i>Cuphea aspera</i>	SE
Washington hawthorn	<i>Crataegus phaenopyrum</i>	SE
West's flax	<i>Linum westii</i>	SE
White-birds-in-a-nest	<i>Macbridea alba</i>	SE
White-top pitcherplant	<i>Sarracenia leucophylla</i>	SE
Wiregrass gentian	<i>Gentiana pennelliana</i>	SE

Abbreviation	Status
FE	Federally-designated Endangered
FT	Federally-designated Threatened
FT (S/A)	Federally-designated Threatened because of similarity of appearance
NL	Not Listed
SE	State-designated Endangered
SSC	State Species of Special Concern
ST	State-designated Threatened

Abbreviation	Status
S1	FNAI State Rank Definition: Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
S2	FNAI State Rank Definition: Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3	FNAI State Rank Definition: Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
S4	FNAI State Rank Definition: Apparently secure in Florida (may be rare in parts of range).
*	Occurrence not documented on ARWEA
+	Confirmed within two miles of ARWEA

2.4 Native Landscapes

Some of the native landscapes found on ARWEA include the expansive floodplain swamp, floodplain marsh, pine flatwoods, and other natural communities that are fully described in Section 2.2.1. These natural communities support a variety of rare and common wildlife, as well as diversity of plants, including 25 listed plant species. The Apalachicola, Brothers, Jackson, Little St. Marks, St. Marks, and East rivers and associated streams are primarily in a natural state except for channels maintained by the Army Corps of Engineers.

2.5 Water Resources

Water resources at and adjacent to ARWEA are extensive. The Apalachicola River and its associated streams, marshes, and alluvial forests are essential components of a complex ecological system that is essential to the productivity of the Apalachicola Bay. The ARWEA lies within the drainage basins of the Apalachicola, Brothers, Chipola, and Jackson, rivers; the Cypress, Fort Gadsden, Doyle, Saul, Catfish, Cash, Salt Water, Graham, and Whiskey George creeks; the South Prong Slough; the Apalachicola, East, and Blounts bays; and the West Bayou.

The surface waters at ARWEA are primarily classified as Class III (fresh waters), which meet water quality criteria established to protect fish consumption, recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife (62-302.400, FAC). Surface waters adjacent to ARWEA including East Bay, Blounts Bay, Apalachicola Bay, West Bayou, Whiskey George Creek (shellfish portion), and East River (shellfish portion) are classified as Class II, which are designated for shellfish propagation or harvesting (62-302.400, FAC).

The Apalachicola River, Chipola River, and all waters within the boundary of the Apalachicola National Estuarine Research Reserve are classified as Outstanding Florida Waters. This designation is given to surface waters that are to be protected from degradation from their current water quality classification (62-302.700, FAC).



View of East Bay from ARWEA, FWC

In Franklin and Gulf counties, the Floridan Aquifer is overlain by the surficial and intermediate aquifers. Water availability from the Floridan Aquifer is limited by the factors typically associated with the embayment, i.e., low horizontal groundwater flow and poor water quality at depth⁴. The Gulf of Mexico coastline is a discharge boundary for the Floridan Aquifer System.

Approaching the coastline, the freshwater portion of the aquifer thins considerably, reflecting the loss of fresh water to the Gulf of Mexico. This places a significant constraint on the long-term viability of water production from the Floridan Aquifer in immediate proximity of the Gulf coast⁴. The network of conservations lands within Franklin and Gulf counties, including ARWEA, help to provide protection of underground potable water supplies.

2.6 Beaches and Dunes

There are no beaches or dunes located on ARWEA.

2.7 Mineral Resources

Known mineral resources in Franklin and Gulf counties include sand, gravel, limestone, clay, and dolomite. There are no commercially mined mineral resources in Franklin County². In Gulf County, surficial sand from private borrow pits has been used for local fill projects³. Heavy mineral resources in Gulf County include ilmenite, zircon, rutile staurolite, monazite, and tourmaline. However, these heavy mineral deposits are not wide enough or thick enough to be of commercial grade³. There are no outstanding mineral rights on ARWEA.

2.8 Cultural Resources

Procedures outlined by the Florida Department of State's Division of Historical Resources (DHR) will be followed to preserve cultural and historical resources. The FWC will continue to consult with the DHR in an attempt to locate and preserve any features on the area. As appropriate and necessary, FWC will contact professionals from the DHR for assistance prior to any ground-disturbing activity on the area.

To date, the DHR Master Site File indicates 33 sites on the ARWEA, including two located on the Tate's Hell portion of ARWEA (Appendix 13.12). The FWC will submit subsequently located cultural sites on the ARWEA to the DHR for inclusion in their Master Site file. In addition, FWC ARWEA staff has undergone DHR Archaeological Resources Monitoring

training. Furthermore, the FWC will continue to refer to and follow the DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for management of these resources and prior to any facility development or other ground disturbing activities.

2.9 Scenic Resources

The ARWEA provides a wide variety of native wildlife species, both resident and seasonally migratory, that are available for visitors' enjoyment for observation and photography. The area's outstanding wildlife habitats, including floodplain swamp, floodplain marsh, salt marsh, and pine flatwoods support significant populations of both rare and common wildlife. The ARWEA is part of a network of sites along the Great Florida Birding & Wildlife Trail, which includes areas across the state selected for their excellent bird watching, wildlife viewing, or educational opportunities.

Many of ARWEA's scenic resources can be viewed along the approximately 67 miles of trails comprising the Apalachicola River Paddling Trail System. Paddlers can explore rivers and creeks winding through expansive marsh and towering pines or deep into alluvial forests and can choose from short, easy jaunts to more strenuous multi-day adventures. The Apalachicola River Paddling Trail System was awarded the American Canoe Association "Recommended Water Trail for 2006" and designated a "National Recreation Trail" by the Department of Interior in 2008.

3 Uses of the Property

3.1 Previous Use and Development

Prior to European settlement, the landscape of Florida, including this area of the panhandle, was settled and used by a variety of aboriginal peoples whose culture relied mainly on hunting, fishing, and subsistence agriculture. The Apalachicola region has been populated since the first Floridians arrived 12-14,000 years ago. Numerous aboriginal sites are found along old meanders and along the present banks in the lower Apalachicola River valley. Scattered throughout the estuary and river swamps are clam and oyster shell middens. Creek Indians from Georgia and Alabama began settling along the river in the early 1700s.

Though some land alteration occurred during the time of aboriginal culture and settlements, only minor alteration of the Florida landscape is thought to have taken place. However, with the advent of European settlement beginning with the Spanish occupation of Florida in the sixteenth century this trend began to change.

Along with more advanced agricultural practices, the Spanish and other settlers brought livestock, primarily cattle and hogs, as well as horses to Florida. This began an era of broad use of the landscape for agriculture. Rangeland cattle grazing and other agricultural practices began to be utilized in a more systematic way and occurred throughout much of

the central Florida peninsula through most of the European settlement era from the 16th through the 20th centuries. Use of these agricultural practices began an era of increased alteration of the natural landscape. However, it wasn't until the 19th and 20th centuries that major settlement and more extensive alteration of the landscape in the area began with the widespread use of agriculture and associated development.

Around the turn of the 19th century this landscape was subjected to heavy lumbering and agricultural conversion. The upland plant communities of the ARWEA were historically pine flatwoods with a much more open and grassy aspect than they have today. Slash pine and evergreen shrubs now dominate those habitats, a legacy of intensive timbering and silviculture, and attendant alterations in hydrology.

During the 1830s and 1840s increasing numbers of steamboats shipped cotton from inland plantations to Apalachicola for export. Following the Civil War, lumber became the dominant cargo. Sawmills sprang up along the river and millions of board feet of longleaf pine and cypress passed through the port of Apalachicola. Pines were also sought for their sap, which was distilled into turpentine and rosin and known collectively as naval stores. The famous Apalachicola oyster industry began in the later part of the 19th century, and by 1896, three oyster-canning factories were shipping 50,000 cans of oysters each day.

In 1946, Congress passed the River and Harbor Act, which authorized the Corps of Engineers to maintain a 100-ft by 9-ft channel in the Apalachicola-Chattahoochee-Flint system from Apalachicola to Columbus, Georgia. The dredging of the channel and disposal of dredged material along the banks degrades habitat.

Prior to state acquisition, timber companies had leased apiary sites for Tupelo honey production throughout the area, and some of the sites consisted of raised platforms along the Apalachicola River and its tributaries. There were also numerous cabins and floating structures (houseboats) along the waterways of the lower Apalachicola River basin. These "fish camps" were used seasonally by recreational hunters and fishermen and were unregulated by the landowners, primarily timber companies. The Creels site located at the intersection of Sand Beach Road and State Road 65, along with some smaller sites (Buck Siding and Creels Side Camp), were the location of a historic town and camps associated with the turpentine and lumber industries in the early to mid 20th century. These settlements consisted of several buildings, including churches and a commissary, housing for workers, storage, or processing points and barns for horses and livestock.

Prior to state acquisition, the core (EEL tract, approximately 30,000 acres) of the ARWEA was used for hardwood logging, and the Apalachicola River's main channel was dredged for barge traffic with spoil deposition occurring along the river banks. The Saul Creek Unit was intensely disturbed to accommodate cattle grazing, hay and soybean production. The lower Saul Creek marsh was diked by MK Ranches, then ditched and drained for rice farming. However, through a final settlement between the Environmental Protection Agency and MK Ranches prior to state acquisition, this area of sawgrass marsh was later restored (as close as possible) to the pre-project biotic and hydrologic regimes that existed

before the disturbance. Prior uses of the state purchased land in Franklin County (Bloody Bluff, Sand Beach and Quinn tracts) included cattle grazing, turpentine industry, and intensive silvicultural practices aimed at maximizing fiber production. Forest management activities included site conversion to pine plantations (primarily slash pine), fire suppression, bedding, ditching and road construction. These activities disrupted the hydrology and negatively impacted the natural communities.

3.2 Current Use of the Property

Currently, ARWEA is managed for the conservation and protection of fish and wildlife habitat and fish and wildlife-based public outdoor recreation. A wide range of operational and resource management actions are conducted on ARWEA each year including activities such as prescribed burning; wildlife habitat restoration and improvement; invasive exotic species maintenance and control; road repairs and maintenance; imperiled species management, monitoring and protection; facilities and infrastructure maintenance and repair; conservation acquisition and stewardship activities; archeological and historic resources monitoring and protection; and research related activities.

Current and anticipated resource uses of the property are diverse. Hunting and fishing continue to be popular recreational activities on ARWEA. The area also offers excellent opportunities for bird watching, especially for wading birds. The diversity of vegetation not only harbors a variety of bird species but also provides good opportunities for mammalian wildlife viewing. Other uses include paddling, hiking, photography, biking, sightseeing, and horseback riding.

3.2.1 Visitation and Economic Benefits

Due to the proximity of population centers in Franklin and Gulf counties, public use can be expected to increase as public awareness of opportunities increases. The FWC administers hunts in the fall and spring for various game species including small game, deer, turkey, and feral hogs, which account for many of the user-days. The ARWEA is also heavily used year-round by recreational fishermen and boating enthusiasts.

Visitation and public use of the area for fish and wildlife based public outdoor recreational opportunities is the primary source of economic benefits from ARWEA, and contribute to the overall economy for this region of Florida. In Fiscal Year 2012-2013 an estimated 133,515 people visited ARWEA. Primarily, as a result of this visitation and use of the area, FWC economic analysis estimates indicate that ARWEA generated an estimated annual economic impact of \$26,087,496 (with a multiplier effect) for the State and the panhandle region. This estimated annual economic impact has aided in the creation of an estimated 266 jobs.

Further revenue generating potential of ARWEA will depend upon future uses described in this Management Plan. Additional revenue from environmental lands such as ARWEA might include sales of various permits and recreational user fees and ecotourism activities,

if such projects could be feasibly developed. The annual area regulations can be consulted to clarify the necessary and required permits, fees, and regulations. Additionally, the long-term values of ecosystem services to local and regional land and water resources from air and water quality functions of the area, among others, and to human health, are considered to be significant.

3.3 Single- or Multiple-use Management

The ARWEA will be managed under the multiple-use concept as a Wildlife and Environmental Area. The ARWEA will provide fish and wildlife resource based public outdoor recreation and educational opportunities, while protecting the natural and cultural resources found on the area. Any natural and cultural resources of ARWEA will be managed under the guidance of the ARC, the Conceptual State Lands Management Plan, and as outlined in the original purposes for acquisition.

3.3.1 Analysis of Multiple-use Potential

The following actions or activities have been considered under the multiple-use concept as possible uses to be allowed on ARWEA. Uses classified as “Approved” are considered to be in accordance with the purposes for acquisition, as well as with the Conceptual State Lands Management Plan, and with the FWC agency mission, goals and objectives as expressed in the Agency Strategic Plan (Appendix 13.14). Uses classified as "Conditional" indicate that the use may be acceptable but will be allowed only if approved through a process other than the management plan development and approval process (e.g., special-use permitting, managed-area regulation and rule development). Uses classified as “Rejected” are not considered to be in accordance with the original purpose of acquisition or one or more of the various forms of guidance available for planning and management:

	<u>Approved</u>	<u>Conditional</u>	<u>Rejected</u>
Apiaries	✓		
Astronomy	✓		
Bicycling	✓		
Cattle grazing			✓
Citrus or other agriculture			✓
Ecosystem services and maintenance	✓		
Ecotourism	✓		
Environmental Education	✓		
First-responder training		✓	
Fishing	✓		
Geocaching		✓	
Hiking	✓		
Horseback riding	✓		
Hunting	✓		
Linear facilities			✓

Military training		✓	
Preservation of cultural sites	✓		
Preservation of historical sites	✓		
Primitive camping	✓		
Protection of imperiled species	✓		
Off-road vehicle use			✓
Shooting sports park		✓	
Soil and water conservation	✓		
Timber harvest	✓		
Wildlife observation	✓		

3.3.2 Assessment of Impact of Planned Uses of the Property

To communicate the FWC’s planned uses and activities, specific management intentions, long- and short-term goals and with associated objectives, identified challenges, and solution strategies have been developed for ARWEA (Sections 5 -8). A detailed assessment of the benefits and potential impacts of planned uses and activities on natural and cultural resources was an integral part of the development of the management activities and intent, goals, objectives, challenges, and strategies sections of this Management Plan.

3.4 Acreage That Should Be Declared Surplus

On conservation lands where the FWC is the lead manager, the FWC evaluates and identifies recommended areas for a potential surplus designation by the DSL, the ARC, and the Board of Trustees. This evaluation consists of GIS modeling and analysis, aerial photography interpretation, analysis of fish and wildlife resources, a review of resource and operational management needs, and a review of public access and recreational use of the area. Also, the FWC considers recommendations for surplus lands as they relate to Florida’s “No Net Loss of Hunting Lands” legislation (Ch. 379.3001 F.S.), as well as surplus restrictions for lands acquired through the Federal Aid in Wildlife Restoration Act (Pittman-Robertson) or through other federal grant programs.

The evaluation of ARWEA by the FWC has determined that all portions of the area are being managed and operated for the original purposes of acquisition, and remain integral to the continued conservation of important fish and wildlife resources, protection of the Apalachicola River and Apalachicola Bay ecosystem, and continue to provide good fish and wildlife resource-based public outdoor recreational opportunities. For these reasons, none of the lands currently located within ARWEA meet the FWC criteria for a potential surplus designation.

4 Accomplished Objectives from the ARWEA Management Plan 2002 – 2012

The following Resource Management Goals and Objectives are from the ARWEA Management Plan 2002 – 2012. Planned activities for ARWEA during this period were detailed in the Objectives listed below. The degree to which the FWC was able to accomplish the planned activities during this period is reflected as **Percent Accomplished** with each associated **Objective**. Accomplishments for ARWEA during the previous planning timeframe are further discussed in more comprehensive detail throughout Section 5 Management Activities and Intent of this management plan.

Resource Management Goals and Objectives	Percent Accomplished
Goal 1: Enhance and maintain the integrity of native natural communities.	
Objective 1: Utilizing the ARWEA prescribed fire plan (Appendix 13.8) or its modification, continue to employ a diverse fire regime designed to achieve a desired future condition (as determined by vegetative management objectives) on 20,000 acres of fire-dependant plant communities, including the 1,800 acres of reforested longleaf pines at Bloody Bluff and other locations (ongoing).	100%
Objective 2: Continue to protect and conserve 38,000 acres of alluvial forests, through hydrological restoration, appropriate fire management and management for old-growth forest conditions (ongoing).	100%
Objective 3: Continue emphasis on acquisition of identified land parcels, or areas to enhance and protect resource integrity (ongoing).	100%
Objective 4: Continue to participate on multi-agency committees and groups dealing with Apalachicola-Chattahoochee-Flint River system issues (ongoing).	100%
Objective 5: Contract with Florida Natural Areas Inventory (FNAI) to identify historic and current vegetative community types pursuant to objective-based vegetation management by 2003.	100%
Objective 6: In cooperation with NFWMD, and others, develop a hydrological restoration plan by 2003.	100%

Resource Management Goals and Objectives	Percent Accomplished
Objective 7: Develop quantifiable vegetative management objectives by 2004.	100%
Objective 8: Contract for a systematic survey of invasive exotic plant species, such as cogon grass, Chinese tallow, elephant-ear, and Japanese climbing fern by 2004.	100%
Objective 9: Seek funding through the North Florida Upland Invasive Plant Council, or other sources, for invasive exotic plant control by 2005.	100%
Objective 10: Using results of the twelve experimental plots in mesic flatwoods, determine the best treatment methods for achievement of flatwoods management objectives by 2007.	100%
Objective 11: In order to protect water resources, maintain, improve or install culverts or hardened low water crossings on at least 25 sites by 2007.	100%
Objective 12: Using the silvicultural guidelines developed by DOF, implement management practices to improve wildlife habitats on Quinn, Sand Beach and Bloody Bluff tracts by 2007.	100%
Goal 2: Survey and inventory natural resources.	
Objective 1: Update faunal inventories, emphasizing rare and listed wildlife species, including wading bird rookeries, bald eagle/osprey nests, flatwoods salamander, Florida black bear, and red-cockaded woodpecker (ongoing).	100%
Objective 2: Update inventories of game wildlife species, including white-tailed deer, bobwhite quail and furbearers (ongoing).	100%
Objective 3: Contract with FNAI to identify historic and current vegetative community types pursuant to objective-based vegetation management by 2003.	100%
Objective 4: Contract for a systematic survey of invasive exotic plant species, such as cogon grass, Chinese tallow, elephant-ear, and Japanese climbing fern by 2004.	100%

Resource Management Goals and Objectives	Percent Accomplished
Objective 5: Using FNAI's historical vegetative community data, develop quantifiable vegetation management objectives for desired future conditions by 2004.	100%
Objective 6: Contract for a systematic survey of reptile and amphibian species by 2007.	100%
Goal 3: Provide and expand nature-based recreation and educational opportunities.	
Objective 1: Continue to maintain and improve 46 miles of the existing road network, as well as roads on new acquisitions, where appropriate (ongoing).	100%
Objective 2: Continue to coordinate with Gulf and Franklin counties to assure adequate public access from county roads (ongoing).	100%
Objective 3: Continue to assess the need to close unnecessary roads and propose closures as needed (ongoing).	100%
Objective 4: Continue to maintain at least 600 acres of wildlife openings, and develop new openings on appropriate disturbed sites, including those on new acquisitions (ongoing). <i>Comment: Earlier estimates of acreage needed for wildlife openings exceeded viability. Some ruderal areas have been restored to longleaf pine. Wet prairie restoration and enhancement is included in this acreage.</i>	100%
Objective 5: Continue to maintain four boat ramps [Whiskey George Creek, Bloody Bluff, Graham Creek, and Gardner Landing] to allow public access to river and bay fisheries and other resources (ongoing).	100%
Objective 6: Involve the DHR staff in planning and development of interpretive information regarding cultural resources (ongoing).	100%

Resource Management Goals and Objectives	Percent Accomplished
Objective 7: Continue to provide a diversity of traditional hunting opportunities, including seasons for white-tailed deer, quail, dove, gray squirrel, turkey, waterfowl, and snipe (ongoing).	100%
Objective 8: Monitor the level of public use at all boat ramps, landings, and recreational facilities to determine where picnic tables, trash receptacles, and toilet facilities may be warranted (ongoing).	100%
Objective 9: By 2005, complete the Nature-Based Recreation (NBR) Enhancements for the ARWEA.	100%
Objective 10: Install bear resistant trash receptacles at 4 public boat ramps and at the wildlife observation tower/picnic facility at Sand Beach, by 2004.	100%
Goal 4: Continue to identify and protect cultural resources.	
Objective 1: Contact DHR prior to site selection for all ground-disturbing activities (ongoing).	100%
Objective 2: Involve DHR staff in planning and development of interpretive information regarding cultural resources (ongoing).	100%
Objective 3: Contact DHR to determine the need for further cultural resource survey on the Quinn tract, or others, by 2002.	100%
Goal 5: Maintain adequate infrastructure and supplement existing staff to facilitate operations and visitation.	
Objective 1: Continue to utilize volunteers to aid in management activities, such as dove field planting, wildlife surveys and infrastructure maintenance (ongoing).	100%
Objective 2: By 2004, supplement existing FWC staffing using appropriate OPS positions and contracted services in response to increased management workloads due to new acquisitions, NBR programs, increased visitation, etc.	100%

Resource Management Goals and Objectives	Percent Accomplished
Objective 3: Complete the Equipment Storage and Maintenance Facility at the FWC's Howard Creek compound by constructing offices and a tool room to serve as a field office and equipment storage/maintenance facility for area personnel, by 2004.	100%

5 Management Activities and Intent

The following section provides a description of agency plans to locate, identify, protect, preserve or otherwise use fragile natural resources and nonrenewable cultural resources. In general, the FWC management intent for ARWEA is to restore and maintain natural communities in a condition that sustains ecological processes and conserves biological diversity, especially fish and wildlife resources. In conjunction with this primary emphasis, it is the FWC's intent to provide quality fish and wildlife resource based public outdoor recreational opportunities on ARWEA. The FWC will utilize the best available data, guidelines, natural resource management practices, and recreational management practices to achieve these outcomes in accordance with the original purposes for acquisition. Furthermore, the management activities described in this section are in compliance with those of the Conceptual State Lands Management Plan.

5.1 Land Management Review

The 2011 Land Management Review of ARWEA (Appendix 13.3) found that the FWC was managing the area in accordance with the purpose(s) of acquisition. The recommendations from the LMR were considered and addressed in the development of this Management Plan, including development of management intent language, goals and objectives, and identification of management challenges and development of solution strategies (Sections 5 - 8).

5.2 Adaptive Management

Adaptive management is "learning by doing"⁵ it is the adjustment or modification of conservation actions to achieve a desired conservation goal. In practice, adaptive management is a rigorous process that includes sound planning and experimental design with a systematic evaluation process that links monitoring to management.^{5, 6} Adaptive management requires flexibility for implementation, but should be fitted over a fundamentally sound, well-planned design.

An adaptive management process produces the strongest inference and most reliable results when experimental design components are incorporated into the monitoring process. Adaptive management is most rigorously applied in an active format when components of

experimental design (i.e., controls, replication, and randomization) are included in the monitoring process.^{6,7} Incorporating valid statistical analyses of results will further enhance the value of the adaptive management process. However, in some situations, rigorous experimental design procedures can be relaxed without invalidating monitoring results. In a passive format, adaptive management can involve applying a conservation action at a site, observing the results and adjusting the action in the future if warranted.^{6,7}

Proposed adaptive management, monitoring and performance measures are developed through literature reviews and FWC staff meetings. Overall, a results-based approach is incorporated into this Management Plan, for which effective monitoring is an integral component. The FWC will monitor conservation actions, species, habitats, and major threats to the conservation of the natural and cultural resources of ARWEA.

5.2.1 Monitoring

A well-developed monitoring protocol is also one of the principal, required criteria for the management of ARWEA. Monitoring and performance measures are important, but often overlooked elements of conservation planning. Monitoring provides the critical link between implementing conservation actions and revising management goals.

Monitoring is the systematic, repeated measurement of environmental characteristics to detect changes, and particularly trends, in those characteristics. Monitoring provides essential feedback, the data needed to understand the costs, benefits, and effectiveness of planned conservation actions and the management projects undertaken to address them.⁶

For natural communities, monitoring protocols are established through the FWC's Objective-Based Vegetation Management (OBVM, Section 5.3.1) program, which monitors how specific vegetative attributes are responding to FWC management. For imperiled and focal species, monitoring protocols are established through FWC's Wildlife Conservation Prioritization and Recovery (WCPR, Section 5.4.2) program. FWC staff may monitor additional wildlife species when deemed appropriate. Exotic and invasive plant and animal species (Section 5.5) are also monitored as needed and appropriate. Recreational uses are monitored through FWC's Public Access and Wildlife Viewing program, and work in conjunction with the establishment and adjustment of public access carrying capacities (Section 5.6.3). Cultural and historical resources (Section 5.9) are monitored with guidance from the DHR.

5.2.2 Performance Measures

Performance measures include qualitative or quantitative measures used to provide an estimate or index of the characteristic of interest, and to chart the overall progress of conservation actions towards specific goals. Successful monitoring programs and their associated performance measures provide natural resource professionals with valuable feedback on the effectiveness of conservation actions and make it possible to implement a more flexible adaptive management approach. An adaptive management approach

ultimately will be more efficient and effective when it tracks inputs, incorporates an effective monitoring program that integrates performance measures, and evaluates results against desired goals.

5.2.3 Implementation

The ARWEA Management Plan serves as the guiding framework to implement this adaptive management process. It serves as the underpinning for the integration of management programs (OBVM, WCPR, Public Access and Wildlife Viewing, Recreation Master Plans, etc.) underway to accomplish needed conservation actions that are planned to manage the natural resources of ARWEA, and resolve conservation threats to fish and wildlife and the habitats they occupy. Based on evaluations of project results, the conservation actions are revised as necessary, and the adaptive management process is repeated.

5.3 Habitat Restoration and Improvement

On ARWEA, the FWC will focus on managing for native habitat diversity, emphasizing maintenance of high-quality natural communities, and restoration of disturbed areas. Restoration may be achieved on disturbed areas by the re-introduction of fire, restoring historic hydrological conditions and/or the use of mechanical or chemical forest management techniques as appropriate. Retention of the native old growth component of forests, while also providing for natural regeneration, remains an important consideration. ARWEA has high-quality native communities including floodplain swamp, floodplain marsh, wet flatwoods, and bottomland forest that the FWC will continue to manage and protect. On disturbed upland sites, the FWC intends to initiate ground cover and natural community restoration.

The FNAI has conducted surveys and mapped the current vegetative communities and historic vegetation communities on ARWEA. This information will be used to guide and prioritize management and restoration efforts on the area.

5.3.1 Objective-Based Vegetation Management

The FWC uses a comprehensive resource management approach to managing FWC-managed areas. Restoring the form and function of Florida's natural communities is the foundation of this management philosophy. The FWC uses OBVM to monitor how specific vegetative attributes are responding to FWC management.

The first step in implementing OBVM is to map the current, and in most cases the historic natural communities, on the managed area using the FNAI Natural Community Classification. The FWC contracts with FNAI to provide these mapping services, and plans to have natural community maps recertified on most areas on a five-year basis. A natural community, as defined by FNAI, is a distinct and recurring assemblage of populations of plants, animals, fungi and microorganisms naturally associated with each other and their physical environment.

After natural communities have been mapped, management units are delineated. Delineating management units takes into account the distribution and extent of the current and/or historic mapped natural communities, existing and proposed infrastructure, and other management considerations. FWC land managers then identify the predominant current or historic natural community within each management unit that guides the type and frequency of management activities that should be applied.

At the same time, measurable habitat management objectives referred to as ‘desired future conditions’ (DFC) are established for each actively managed natural community. Desired future conditions are the acceptable range of values for quantifiable vegetation attributes, such as basal area, shrub height and cover, and ground cover. The FWC collaborated with the FNAI to identify ‘reference sites’ for each actively managed natural community and applied the OBVM monitoring methodology at these reference sites to determine what attribute values occur in a high-quality community (<http://www.fnai.org/reference-natural-communities.cfm>). FWC staff considers the reference site attribute values when setting area-specific desired future conditions for natural communities.

Vegetation monitoring samples the selected attributes with the results being compared to the established desired future conditions. All monitoring performed under OBVM is completed using the program’s Standard Operating Procedures.

Initial mapping and vegetation sampling provides FWC staff with baseline data indicating natural community structure, distribution, and condition on the area. Comparing the subsequent monitoring results to desired future conditions, provides key operational information on a natural community’s vegetation structural status at a given point in time and trend over time. Using this information, managers can evaluate, adjust and modify their management practices to meet the stated objectives. By comparing natural community mapping products through the years, managers can track progress in moving altered communities to functioning natural communities.

5.3.2 Prescribed Fire and Fire Management

Periodic spring and summer fires occurred in fire-adapted communities under natural conditions. Plant species composition reflects the frequency and intensity of these fires. In the absence of fire, fallow fields on former longleaf sites follow a successional pattern through mixed pine-hardwood forests to an exclusively hardwood community rather than to the original plant community. The plant species composition may differ slightly on poorer soils of the slash pine flatwoods, but the dominant role of fire in controlling hardwoods is equally important in either ecosystem.

Timber removal, site preparation, drainage, and lack of fire have all combined to alter the plant species composition of the area resulting in a loss of fuel and inhibiting the return to

a more “natural” fire management regime. Site-specific combinations of prescribed fire, timber thinning, mechanical and chemical vegetation control, reforestation, and restoration of natural water regimes are likely necessary actions needed to restore the area to historic natural communities.

The FWC employs a fire management regime to increase both species and habitat diversity and will continue a prescribed burning program on the ARWEA in accordance with vegetative management objectives. As fire moves



Aerial view of a prescribed burn on ARWEA, FWC

across a landscape, some areas carry fire better than others. Areas with higher vegetative fuel loads typically burn more evenly and with greater intensity. Areas with lower vegetative fuel loads or wetland areas inundated with water typically will not carry fire as evenly, and usually burn at a lower intensity. Employing a burning program with different burning frequencies, intensities, and seasonality (dormant season vs. growing season) of prescribed burns create habitat diversity and a mosaic of vegetation patterns. This mosaic is designed to have both frequently burned and infrequently burned aspects.

On some areas, prescribed burning is limited by the buildup of mid-story brush and a lack of pyrogenic groundcover fuels. This condition creates unsuitable habitat for many wildlife species. Mechanical control of brush on upland sites by roller chopping, logging, shredding, or incidentally by equipment during commercial thinning operations, can reduce shading and encourage the grasses and forbs that are necessary to sustain prescribed fire.

Whenever possible, existing firebreaks such as roads and trails, as well as natural breaks such as creeks and wetlands, will be used to define burning compartments. Disk harrows, mowing, and foam lines will be used as necessary to minimize disturbance and damage created by fire plows.

The transitional areas between two adjacent but different vegetative cover types, such as forests and wetlands, are known as ecotones. With the possible exception of wildfire suppression, mechanical soil disturbance in ecotones will be avoided in order to protect habitats for important rare species that often occur between flatwoods and riparian drainages. Silvicultural site preparation and creation of firebreaks are avoided when possible in these zones. Additionally, fires are allowed to burn into the edges of marshes, swamps and other wetlands in order to maintain these habitats.

A diversified fire management regime is employed on ARWEA to increase species and habitat diversity. By using different fire return intervals (1-4 years), different intensities (determined by firing method), and seasonal timing (dormant and growing seasons), prescribed burns create habitat diversity and a mosaic of vegetation patterns with regularly burned areas and fire shadow aspects. Most burning intervals are planned on a two-three year rotation. Some areas of heavy fuel build up remain on the area due to the lack of prescribed fire prior to state acquisition.



FWC employee working during a prescribed burn on ARWEA, FWC

In addition to the general prescribed fire management guidelines described above, an area-specific Prescribed Fire Plan has been developed and implemented for ARWEA (Appendix 13.8). This plan includes, but is not limited to, delineation of burn management units, detailed descriptions of prescribed fire methodology, safety, and smoke management guidelines. The current Prescribed Fire Plan will be updated and implemented during the 10-year management planning period.

5.3.3 Habitat Restoration

Prescribed fire is an important tool for restoring and maintaining habitat on ARWEA. Fire return intervals, intensities, and season of application are determined in part by an area's DFC and its WCPR Strategy goals. Prescribed fire is used on ARWEA to control hardwoods, enhance ground cover, reduce hazardous fuel loads, and prepare areas for restoration work. There are 18,218 acres of fire maintained communities on ARWEA, with an average of 8,361 acres burned per year over the previous two fiscal years.

Restoration of mesic and wet flatwoods from the slash pine plantations that were previously bedded and planted is ongoing. Timber thinning is an effective way to open the canopy and reduce the basal area of a site in order to promote herbaceous ground cover. An added benefit is that logging equipment utilized during the commercial harvest operations incidentally reduces midstory hardwoods. Wildlife openings are created during timber thinning operations through logging ramps and small clearcuts, and these openings are then maintained.

Timber thinning on the ARWEA has consisted primarily of 3rd row thinning with selective cuts on the 2 "leave" rows, reducing the basal area of the timber stands to approximately 40 – 60 sq ft/ac. The first timber thinning on the ARWEA by the FWC occurred in 1999 when 54 acres on the Sand Beach tract were thinned. From 2003 to 2007, approximately 1,789 acres were thinned on the Sand Beach/Quinn tracts. An additional 497 acres of the Doyle

Creek tract in Franklin County was thinned in 2007. Most recently in 2009-2011 640 acres of the Quinn Tract was thinned to a basal area of 50-60 sq. ft/ac. In 2012, a timber inventory was completed for pine and pine-hardwood stands on the ARWEA. A comprehensive Forest Management plan, which will include growth and yield models, proposed harvest schedules, and wet prairie and longleaf pine restoration strategies, will be completed by mid-year 2014.

Additionally, mechanical treatments have also been used to reduce fuel loads, which lower prescribed fire intensities. Mechanical habitat restoration treatments and are an important component in restoring the natural communities on ARWEA in areas where prescribed burning is limited by a buildup of invasive hardwoods in the midstory that shades out fine fuels. Generally, mechanical vegetation treatments, i.e. use of roller chopping and Gyro-Trac, have been used to reduce invasive woody species and encourage herbaceous growth in an effort to restore historic wet prairies and mesic/wet flatwoods. To date 290 acres of offsite planted pines have been cleared/mulched with Gyro-Tracs and restored to historic wet prairies on the Quinn and Doyle Creek Units. Roller chopping and Gyro-Trac work (318 acres and 30 acres respectively) on the Saul Creek Unit have reduced the understory woody vegetation, particularly titi which has encroached into the uplands due to historic fire suppression. An additional 232 acres of former historic wet prairie on the Bloody Bluff Unit that was overgrown with shrubs that prevented appropriate burning was cleared with the use of Gyro-Tracs.

Roller chopping was used to control approximately 270 acres of invasive brush that hindered burning operations within mesic/wet flatwoods on the Bloody Bluff Unit. Since 2006, 1,249 acres of wet flatwoods and mesic flatwoods have been treated with Gyro-Trac work. Both chopping and Gyro-Trac are used to control invasive titi on wetland edges and through upland communities. Since 2006, 2,541 acres have been roller chopped to control woody invasives and restore wet and mesic flatwoods with minor soil disturbance. Since 2009, approximately 586 acres of ruderal field, mesic, and wet flatwoods have been mowed using various equipment to reduce encroachment of woody invasives as well as to maintain wildlife openings in a stage of early succession.



Collecting wiregrass seed, FWC

In addition, a groundcover restoration project has been initiated on a 47 acre ruderal site in the Saul Creek Unit focusing on restoring the site to the historic mesic flatwoods community, with approximately 30 acres of the project currently completed. Native seed used in this restoration project is collected from donor sites in the Apalachicola National

Forest (ANF). Donor sites on the ANF are burned in April-June to provide a seed source for native grasses and forbs that are harvested and planted on the selected recipient site.

A 2003 survey conducted on ARWEA ranked 59 ephemeral wetlands for their potential as habitat for flatwoods salamanders, which have not been documented on ARWEA. Ephemeral pond restoration work was completed to restore and enhance 49 potential future breeding ponds. The restored ponds had been identified as “potential” and “unlikely” to support a breeding population of flatwoods salamanders in the 2003 survey. Prior to restoration, the ponds had thick titi and gallberry (fire shadows); fire alone was not adequately controlling the hardwoods.

Prior to acquisition, pine plantations were planted by the previous landowners to maximize fiber production with minimal time and cost. Slash pine was generally used because of its rapid growth potential compared to longleaf pine, as well as its tolerance to different soil types and hydrologic regimes.

Restoring these former pine plantations to the historic forest communities that were originally occurring on these pine plantations sites is another important feature of the ongoing habitat restoration work on ARWEA. To date, 1,978 acres (1,762 acres from 1996-2000 and 216 acres in 2010) have been reforested with longleaf pine seedlings on the Bloody Bluff Unit. Approximately 468 acres have been planted with longleaf, slash and loblolly pine on the Saul Creek area. An additional 151 acres of longleaf pine was planted in 2012-2013 on the Saul Creek unit on ruderal field and mesic flatwoods sites.

Additional restoration work has involved re-planting degraded wetland bottoms with native wetland oaks and other hardwoods and treatment of exotic vegetation. Herbicide is used to control exotic and invasive plants throughout the area.

5.3.4 Apiaries

Currently, there are multiple apiaries on ARWEA operating under six apiary agreements (Section 1.6, Appendix 13.9)

The use of apiaries is approved for ARWEA and is deemed to be consistent with purposes for acquisition, is in compliance with the Conceptual State Lands Management Plan, and is consistent with the FWC agency mission, goals, and objectives as expressed in the agency Strategic Plan and priorities document (13.14 Appendix). Location, management, and administration of apiaries on ARWEA are guided by the FWC Apiary Policy (Appendix 13.10).

5.4 Fish and Wildlife Management and Imperiled Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration

5.4.1 Fish and Wildlife

Due to the variety of natural communities, a diversity of associated wildlife, including rare and imperiled species, common game and non-game species can be found on ARWEA. In managing for wildlife species, an emphasis is placed on conservation, protection, and management of natural communities. Natural communities important to wildlife include floodplain swamp, floodplain marsh, bottomland forest, alluvial river, mesic flatwoods, and wet flatwoods (see Section 2.2.1). Wildlife management emphasis is placed on documenting the occurrence and abundance of rare and imperiled species on the property. Following species inventory work, management practices are designed to restore, enhance or maintain imperiled species and their habitats. The size and diversity of ARWEA creates a habitat mosaic for a variety of wildlife species. Resident wildlife will be managed for optimum diversity and abundance. In addition to resident wildlife, ARWEA provides resources critical to many migratory birds including waterfowl, passerines, raptors, shorebirds and others. Habitats important to migratory species will be protected, maintained or enhanced.

The FWC intends to manage game populations on a sustained-yield basis to assure healthy game populations and a high-quality recreational experience. In general, game wildlife populations will be managed to provide continued recreational sport hunting and wildlife viewing opportunities. However, some of the hunting opportunities may be regulated through a limited entry hunt program to ensure the persistence of viable game species populations, as well as hunter safety and satisfaction. The potential for conflicts among recreational activities and user groups will also be considered and continually monitored. The FWC will maintain 200 acres of wildlife openings in an early successional stage as supplemental wildlife forage on disturbed sites for the benefit of wildlife, hunting, and wildlife viewing opportunities.



Bachman's sparrow, FWC

Wildlife management emphasis is placed on documenting the occurrence and abundance of rare and imperiled species on the property. The FWC will continue to update inventories for selected species, including Barbour's map turtle, alligator snapping turtle, wading birds, Bachman's sparrow, brown-headed nuthatch, red-cockaded woodpecker, and frosted flatwoods salamander. Monitoring of wildlife species, bald eagles, marsh birds and various amphibians will continue as an ongoing effort for the area.

Concurrent with ongoing species inventory and monitoring activities, management practices are designed to restore, enhance or maintain rare and imperiled species, and their habitats. This will be accomplished by following approved Federal and FWC species recovery plans, guidelines, and other scientific recommendations for these species. Guided by these recommendations, land management activities including prescribed burning and timber stand improvements will address rare and imperiled species requirements and habitat needs. Section 5.4.2 below provides further information on FWC's comprehensive species management strategy for rare and imperiled wildlife and their respective habitats.

The Bloody Bluff, Quinn, and Sand Beach units have been managed to enhance red-cockaded woodpecker habitat through prescribed burning, Gyro-Trac restoration work, roller chopping, timber harvests, longleaf pine planting, and hydrologic restoration. Three natural clusters and eight recruitment clusters exist on the ARWEA; each recruitment cluster consists of 4-6 artificial cavities. New nest structures will be installed as necessary, and when habitat conditions are conducive to the target species.

As previously discussed, extensive ephemeral pond restoration has improved potential breeding ponds for the frosted flatwoods salamander at 49 locations. The FWC will continue to monitor for the presence of frosted flatwoods salamanders and continue to prescribe burn 250 acres of ephemeral wetlands to improve habitat for frosted flatwoods salamanders and other pond breeding amphibians.

5.4.2 Imperiled Species - Wildlife Conservation Prioritization and Recovery

The FWC has identified the need to: 1) demonstrate optimal wildlife habitat conservation on FWC-managed lands; 2) develop science-based performance measures to evaluate management; 3) recover imperiled species; and 4) prevent future imperilment of declining wildlife species. To help meet these needs, the FWC uses a comprehensive resource management approach to managing FWC-managed areas. Restoring the form and function of Florida's natural communities is the foundation of this management philosophy. The FWC uses OBVM to monitor how specific vegetative parameters are responding to FWC management, and uses the WCPR program to ensure management is having the desired effect on wildlife.



Red-cockaded woodpecker at ARWEA, FWC

The goal of WCPR is to provide assessment, recovery, and planning support for the FWC-managed areas to enhance management of focal species and the recovery of imperiled species. WCPR program objectives include prioritizing what the FWC does for imperiled

and focal species on FWC-managed areas; ensuring the actions taken on these areas are part of statewide conservation programs and priorities; and informing others about the work accomplished on lands the FWC manages.

The WCPR program helps the FWC take a proactive, science-based approach to species management on FWC-managed lands. This approach assesses information from statewide potential habitat models and Population Viability Analysis, and in conjunction with input from species experts and people with knowledge of the area, creates site-specific wildlife assessments for imperiled wildlife species and a select suite of focal species. Staff combines these assessments with area-specific management considerations to develop a wildlife management strategy for the area. Each strategy contains area-specific measurable objectives for managing priority species and their habitat, prescribes management actions to achieve these objectives, and establishes monitoring protocols to verify progress towards meeting the objectives. By providing FWC managers with information on actions they should undertake, the FWC intends for the strategy to assure the presence and persistence of Florida's endangered and threatened fish and wildlife species (see http://myfwc.com/media/1515251/Threatened_Endangered_Species.pdf), as well as select focal species found on the area.

In summary, for FWC-managed areas, the WCPR program helps assess imperiled and focal wildlife species needs and opportunities, prioritize what the FWC does for imperiled and focal species, prescribe management actions to aid in species recovery, prescribe monitoring protocols to allow evaluation of the species' response to management, and ensure the information is shared with others. Through the actions of this program, the FWC will facilitate fulfilling the needs of focal and imperiled wildlife species on ARWEA. In the long-term, by implementing these strategies on FWC-managed lands and continuing to assess wildlife species' needs, the FWC will continue to play an integral role in aiding the recovery of imperiled species and preventing the future imperilment of declining wildlife species.

In December 2009, a completed WCPR Species Management Strategy (WCPR Strategy) was approved for the ARWEA (Appendix 13.6). Of the 60 focal species statewide, 13 were modeled to have potential habitat on ARWEA, with wading birds included as a group (Table 13). Additionally, the southeastern bat, though not modeled to have potential habitat on the area, was added to the area-specific species list due to its likelihood of occurrence.

Not all of the focal species modeled to have potential habitat on ARWEA occur on the area or are in need of specific management actions. Therefore, of the focal species identified, frosted flatwoods salamander, Bachman's sparrow, brown-headed nuthatch, northern bobwhite, red-cockaded woodpecker, southern bald eagle, wading birds (multiple species) are surveyed or monitored annually. The WCPR Strategy includes measurable objectives for the frosted flatwoods salamander, Bachman's sparrow, brown-headed nuthatch, Northern bobwhite, and red-cockaded woodpecker. Additionally, the WCPR Strategy

identifies Strategic Management Areas on ARWEA for the frosted flatwoods salamander, Bachman’s sparrow, Northern bobwhite, and red-cockaded woodpecker.

Table 14. Focal Species Identified as Having Potential Habitat on ARWEA

Common Name	Scientific Name	Status
American swallow-tailed kite	<i>Elanoides forficatus</i>	NL
Bachman’s sparrow	<i>Peucaea aestivalis</i>	NL
Brown-headed nuthatch	<i>Sitta pusilla</i>	NL
Cooper’s hawk	<i>Accipiter cooperii</i>	NL
Florida black bear	<i>Ursus americanus floridanus</i>	NL
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	SSC
Frosted flatwoods salamander	<i>Ambystoma cingulatum</i>	FT
Gopher tortoise	<i>Gopherus polyphemus</i>	ST
Northern bobwhite	<i>Colinus virginianus</i>	NL
Red-cockaded woodpecker	<i>Picoides borealis</i>	FE
Sherman’s fox squirrel	<i>Sciurus niger shermani</i>	SSC
Southeastern bat	<i>Myotis austroriparius</i>	NL
Southern bald eagle	<i>Haliaeetus leucocephalus</i>	NL
Wading birds		
Great egret	<i>Ardea alba</i>	NL
Little blue heron	<i>Egretta caerulea</i>	SSC
Snowy egret	<i>Egretta thula</i>	SSC
Tricolored heron	<i>Egretta tricolor</i>	SSC
White ibis	<i>Eudocimus albus</i>	SSC
Wood stork	<i>Mycteria americana</i>	FE

Abbreviation	Status
FE	Federally-designated Endangered
FT	Federally-designated Threatened
NL	Not Listed
SE	State-designated Endangered
SSC	State Species of Special Concern
ST	State-designated Threatened

5.5 Exotic and Invasive Species Maintenance and Control

The FWC will continue efforts to control the establishment and spread of Florida Exotic Pest Plant Council (FLEPPC) Category I or II plants on ARWEA. Control technologies may include mechanical, chemical, biological, and other appropriate treatments. Treatments

utilizing herbicides will comply with instructions found on the herbicide label and employ the Best Management Practices for their application.

Exotic invasives were initially mapped by the FNAI during the natural community mapping project on ARWEA. In subsequent years, the FNAI and the DEP have surveyed invasive exotic plants on the ARWEA along with FWC staff. Exotic plants documented on ARWEA include Japanese climbing fern, Chinese tallowtree, mimosa, camphor tree, cogongrass, torpedo grass, water hyacinth, bermudagrass, and bahiagrass. Japanese climbing fern is the main exotic invasive species of focus on the ARWEA, it establishes itself on high ground along the river and flood waters spread the spores all over the floodplain, making control difficult. Ongoing exotic invasive species treatments on ARWEA include Japanese climbing fern, Chinese tallowtree, mimosa, camphor tree, cogon grass, torpedo grass, water hyacinth, bermudagrass, and bahiagrass. Herbicide is used to control exotic and invasive plants throughout the area. The control of exotic vegetation is contracted through grants provided by the Panhandle Invasive Exotic Plant Working Group or by FWC staff purchasing and applying herbicide.

An exotic animal species of concern on the ARWEA is the feral hog. These animals have high reproductive rates, and when populations reach high densities, feral hogs can significantly degrade natural communities through foraging activity (rooting). The FWC will consult with other regional natural resource managing agencies and private landowners to coordinate feral hog control measures as necessary. Hog populations are controlled by hunts during the wild hog-dog hunt season, archery, small game, general gun, muzzleloading gun, and archery/muzzleloading gun seasons. Trapping is another measure that may be implemented on the area to augment ongoing feral hog control efforts and to further reduce the natural community damage and degradation caused by this species.



Feral hogs on ARWEA, FWC

The nine-banded armadillo is another animal classified by the FWC as being an invasive exotic species. This species is believed to potentially impact ground nesting bird populations due to their predation of the birds' eggs. Similar to wild hogs, the FWC will control armadillos by allowing hunting of the species during appropriate hunting seasons. The FWC will monitor for additional exotic animal species and control as necessary.

5.6 Public Access and Recreational Opportunities

5.6.1 Americans with Disabilities Act

When public facilities are developed on areas managed by the FWC, every effort is made to comply with the Americans with Disabilities Act (Public Law 101-336). As new facilities are developed, the universal access requirements of this law are followed in all cases except where the law allows reasonable exceptions. Recreation facilities in semi-primitive or primitive zones will be planned to be universally accessible to the degree possible except as allowed by the ADA⁸ where:

1. Compliance will cause harm to cultural or historic sites, or significant natural features and their characteristics.
2. Compliance will substantially alter the nature of the setting and therefore the purpose of the facility.
3. Compliance would not be feasible due to terrain or prevailing construction practices.
4. Compliance would require construction methods or materials prohibited by federal or state statutes, or local regulations.

5.6.2 Recreation Master Plan

The FWC has adopted a comprehensive approach to the planning and administration of fish and wildlife resource based public outdoor recreational opportunities for ARWEA. To accomplish this, the FWC worked with recreational stakeholders and the general public to develop a Recreation Master Plan for ARWEA. This plan is used to further design and develop appropriate infrastructure that supports the recreational use of the area by the general public (Appendix 13.11). This Recreation Master Plan includes planning for parking, trail design, and area resource interpretation. The Recreation Master Plan will be updated in 2014 and the FWC will reassess recreational opportunities every three years.

5.6.3 Public Access Carrying Capacity

Baseline carrying capacities for users on FWC-managed lands are established by conducting a site specific sensitivity analysis using available data for the site.

The intent of the carrying capacity analysis is to minimize wildlife and habitat disturbance and provide the experience of being “immersed in nature” that visitors to FWC-managed areas desire. Carrying capacities are just a first step; management of recreational use requires a means of monitoring visitor impacts.



Observation tower at ARWEA, FWC

Responding to these impacts may require adjusting the carrying capacities as necessary. The carrying capacities generated through this process are used as a tool to help plan and develop public access, wildlife viewing, and fish and wildlife resource based public outdoor recreation opportunities.

Based on an analysis of the overall approved uses and supported public access user opportunities, and the anticipated proportional visitation levels of the various user groups, the FWC has determined that ARWEA can currently support 881 visitors per day. However, an objective to improve access and infrastructure resulting in an increase of the carrying capacity to 989 visitors per day has been proposed in Section 6.4 of this Management Plan. It is important to note that public access carrying capacities are not developed to serve as a goal for expanding the public use of a particular area to match the established carrying capacity. Rather, they are developed to establish maximum thresholds for public use of the respective area in order to protect the natural and cultural resources on ARWEA and to ensure that visitors will have a high-quality visitor experience. The public access carrying capacity will be periodically reevaluated, and additional capacity may be contemplated as part of the Recreation Master Plan update and implementation process.

5.6.4 Wildlife Viewing

The ARWEA provides a wide variety of native wildlife species, both resident and seasonally migratory, that are available for visitors' enjoyment for observation and photography. The quality of habitat found on the ARWEA attracts a suite of species including various birds, mammals, reptiles, and amphibians throughout the area. The area's outstanding wildlife habitats, including alluvial forest, sawgrass marshes, and pine flatwoods support significant populations of both rare and common wildlife. Four sites of the Great Florida Birding & Wildlife Trail are located within ARWEA.



White-tailed deer on ARWEA, FWC

5.6.5 Hunting

The ARWEA currently offers hunting opportunities for deer, turkey, small game, migratory birds, and feral hogs. Hunting is available during the following seasons: year-round fishing, frogging, fox, raccoon, opossum and bobcat season; wild hog-dog season; archery season; general gun season; trapping season; muzzleloading gun season; archery/muzzleloading gun season; spring turkey season; and migratory bird seasons. An evaluation of the hunting opportunities offered on ARWEA is performed periodically by the FWC.

5.6.6 Fishing

Fishing opportunities for largemouth bass, catfish, striped bass, and bream are extensive on ARWEA. Numerous creeks and tributaries to the Apalachicola River flow through the property, offering exceptional recreational potential for anglers as well as paddlers.

5.6.7 Trails

Approximately 100 miles of unpaved roads are available for public recreation activities including hiking, bicycling, and horseback riding on the ARWEA. Approximately 67 miles of paddling trails are also available. Hiking trails also include the Palms to Pines walking trail at Sand Beach Tower. The FWC will continue to periodically reevaluate the potential for additional trails, as well as trail connectivity opportunities to other conservation areas, and will monitor new trails biannually for user impacts to natural communities.

5.6.8 Paddling and Boating

Nearly 67 miles of trails comprising the ARWEA Paddling Trail System offer opportunities to paddlers of all interests and abilities. Paddlers can explore rivers and creeks winding through expansive marsh and towering pines or deep into alluvial forests and can choose from short, easy jaunts to more strenuous multi-day adventures. Most trails are accessible from boat ramps along State Road 65. Secure bike racks located at several ramps provide an option for shuttling. Two routes are accessed from the west bank of the Apalachicola River north of the city of Apalachicola. The Apalachicola River Paddling Trail System was awarded the American Canoe Association "Recommended Water Trail for 2006" and designated a "National Recreation Trail" by the Department of Interior in 2008.

There are four FWC-maintained boat ramps and multiple county boat ramps which allow access to the ARWEA. There are 11 canoe/kayak launch sites on ARWEA.

5.6.9 Equestrian

Currently, horseback riding is allowed on designated trails and named and numbered roads within the ARWEA. Recreation opportunities will be reassessed every three years.



Kayaker on Graham Creek, FWC



Whiskey George boat launch, FWC

5.6.10 Camping

Camping is permitted throughout the area, except where posted as no camping; length of stay is limited to 14 consecutive days. Permits are required to camp at designated campgrounds. There are four designated campgrounds on ARWEA in Franklin County: Butcher Pen Recreation Area, Gardner Landing, Bloody Bluff Landing and Van Horn Landing, each with designated campsites; the number of campsites vary between campgrounds, with 6, 4, 5, and 2 respectively. Camping is primitive with no amenities, other than bear resistant trash receptacles. At designated campgrounds, length of stay is variable from two days up to 14 consecutive days between March 11th and October 31st. Camping permits obtained after October 31st may be for any length of time, not extending beyond March 10th. Camping is limited to tents, trailers, or self-propelled camping vehicles.

5.6.11 Geocaching

Geocaching, also known as GPS Stash Hunt or GeoStash, is a contemporary combination of orienteering and scavenger hunting generally utilizing a GPS receiver unit. Geocache websites routinely promote good stewardship. However, the potential exists for resource damage, user conflicts, or safety issues caused by inappropriately placed caches and/or links that do not provide adequate information about the area.

It is the policy of the FWC to allow placement of geocaches only in those locations that do not present the potential for resource damage, user conflicts, or threats to the safety of the activity participants. The placement of geocaches on FWC-managed lands is governed by specific guidelines. These guidelines may be found on the following FWC website: http://myfwc.com/media/1074886/FWC_Geocache_Guidelines.pdf.

5.6.12 Environmental Education and Interpretation

Interpretive information is available at three informational kiosks located at the Howard Creek Office, Sand Beach Road, and Bloody Bluff Road. Informational signs are located at all boat ramps and at the Sand Beach Recreation Area. Additional environmental education and interpretive information is available at FWC's ARWEA website and in the ARWEA Recreation and Paddling Trail guides. The FWC also maintains an area bird list and hunting regulation brochures with additional information about ARWEA.

5.7 Hydrological Preservation and Restoration

5.7.1 Hydrological Assessment

Prior to state acquisition, intensive silvicultural practices and land clearing for agronomic purposes disrupted historical hydrologic patterns on ARWEA. Ditching, diking, bedding, and tram/road development has expedited drainage and altered the historic vegetative communities. Re-establishing the natural hydrology, prescribed burning, timber thinning, invasive hardwood reduction, and reforestation have been the major management tools on the area since it was purchased by the state.

The goal of hydrologic restoration on ARWEA is to reconnect disjunct wetlands and ultimately restore hydrologic conditions conducive to the re-establishment of historical vegetation communities. The FWC has partnered with the NFWFMD to restore hydrologic regimes on ARWEA. In June 2004, the NFWFMD hydrologists completed a “Hydrologic Restoration Plan” for ARWEA. The plan assessed the current/historic patterns of water flow based on field measurements and analysis of archive aerial photos and made recommendations on the restoration of the hydrologic regimes on the area including the construction and installation of water control structures to reroute water flow and volume. Recommendations included breaching dikes, plugging ditches, and installing culverts and hardened low-water crossings to facilitate hydrological restoration on the area. Most of the 107 structures recommended in the plan have been completed. The only exceptions are a few road removals, culverts, and hardened low-water crossings that were agreed to be unnecessary after further discussion between ARWEA staff and the NFWFMD. To date over 280 water control structures have been installed throughout the area based on area staff recommendations and observations of water flow during droughts and peak water flows. These include 117 culverts, 94 hardened low-water crossings, and over 70 ditch plugs. The FWC will continue to implement management activities and regimens to better maintain and enhance natural hydrologic functions.

5.7.2 Water Resources Monitoring

The FWC cooperates with the NFWFMD to monitor ground water quality on ARWEA. Bay and river water levels and quality are monitored by the FWC and the DEP. The FWC will continue to cooperate with the NFWFMD and the DEP to develop and implement any necessary surface water quality and quantity monitoring protocols for ARWEA. In this capacity, the FWC will primarily rely on the expertise of the NFWFMD and the DEP to facilitate these monitoring activities. Additionally, the FWC may also initiate and facilitate water resources monitoring, in cooperation with the NFWFMD and the DEP as deemed necessary.

5.8 Forest Resource Management

A Timber Assessment of the timber resources of ARWEA was conducted by the FFS in 2002 and updated by FFS staff and FWC staff in 2012 and 2013. The management of timber resources was considered in the context of the Timber Assessment and in the overall land management goals and activities.

Timber resources include some pine plantations in need of thinning for habitat improvement. Thinning of the forest over-story, hydrological restoration and reintroduction of prescribed burning are the most important factors in re-establishment of natural communities and the enhancement of wildlife habitats in these areas. Upland pine forest planted with off-site pines will be reforested with longleaf pine or other on-site species as appropriate. Degraded or disturbed bottomland hardwood sites will be encouraged to reforest naturally with native wetland oaks, hardwoods, and other appropriate native plant

species.

Pursuant to OBVM management goals, the FWC will continue to manage timber resources for wildlife benefits and natural community restoration. Management activities including the use of timber thinning and harvesting may be utilized. The primary management technique for encouraging reforestation is protection of young trees and seedlings on these sites from damage. However, where natural regeneration is lacking or off-site species occur, artificial reforestation may be implemented predominately with longleaf pine. Planting trees on these selected sites is used to increase the rate of reforestation and to ensure diversity. Forested wetlands are managed for stands with old growth characteristics. Snags will be protected to benefit cavity-nesting species.

5.8.1 Forest Management Plan

A comprehensive and prescriptive forest management plan for the ARWEA focusing on the pine dominated stands, reforestation, harvesting, and prescribed burning activities based on restoration and maintenance needs of the natural communities and other goals established for management of ARWEA will be prepared by 2016. A complete timber inventory was completed in early 2012 to help guide the forest management plan planning process. The forest management plan will include:

Long Term Targets

- A) Creation of spatially heterogeneous management units that include irregular, uneven- or all-aged stands
- B) Differentiation into distinct crown classes, size classes and distributions of trees;
- C) Conversion of pure stands to ones of mixed species composed primarily of longleaf pine;
- D) Perpetual regeneration of fire-maintained forest stands;

Intermediate-term goals and objectives

- A) Drive stands toward composition (species frequency) that is dominated by longleaf pine;
- B) Create or maintain fine fuel conditions that promote safe use of prescribed fire; and
- C) Create overstory structural diversity within and among management units.

5.9 Cultural and Historical Resources

The Apalachicola region has been populated since the first Floridians arrived 12-14,000 years ago. Numerous aboriginal sites are found along the river banks in the lower Apalachicola River valley. Clam and oyster shell middens are scattered throughout the estuary and river swamps. Creek Indians from Georgia and Alabama began settling along the river in the early 1700s. The ARWEA also contains evidence from later human

settlements including the timber and turpentine industries as well as shipwrecks.

To date, the DHR Master Site File indicates 33 archaeological sites on the ARWEA, including two located on the Tate's Hell portion of ARWEA, North Beverly (FR00886) and Pitcher Plant (FR00751, Appendix 13.12). Twelve archaeological and historical surveys have been performed on parts of ARWEA. There are two historic structures, the Bloody Bluff House (circa 1920, FR00860) and the Brothers River Apiary (circa 1960, FR00968). There is one historic cemetery on the area, the Bloody Bluff cemetery (FR00861). Three historic burial sites require annual monitoring and protection, the Creels (FR00863), Thank You Ma'am Creek (FR00755), and Sam's Creek Cutoff (FR00754) shell mound sites.

Procedures outlined by the DHR will be followed to preserve cultural and historical resources. The FWC will continue to consult with the DHR in an attempt to locate and preserve any features on the area. In addition, FWC ARWEA staff has undergone DHR Archaeological Resources Monitoring training. As appropriate and necessary, the FWC will contact professionals from DHR for assistance prior to any ground-disturbing activity on the area.

The FWC will submit subsequently located cultural sites on ARWEA to the DHR for inclusion in their Master Site file. The FWC will continue to refer to and follow the DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for management of these resources and prior to any facility development or other ground disturbing activities.

5.10 Capital Facilities and Infrastructure

The FWC's land management philosophy is designed to conserve the maximum amount of wildlife habitat while providing the minimal number of capital facilities and infrastructure necessary to effectively conduct operational and resource management activities, and provide ample opportunities for fish and wildlife resource based public outdoor recreation. For these reasons, planned capital facilities and infrastructure will focus on improving access, recreational potential, hydrology, or other resource and operational management objectives.

Current capital facilities and infrastructure (Figure 11) on ARWEA include:



FWC office compound at ARWEA, FWC

- 4 boat launches (Graham Creek, Bloody Bluff, Gardner Landing, Whiskey George); 11 canoe/kayak launch points
- FWC equipment maintenance and storage building/office compound
- A pole barn

- Chemical storage building
- 80 miles of roads (an additional 20 miles of roads are county maintained)
- An observation tower
- 67 miles of paddling trails
- 3 kiosks (Bloody Bluff, Sand Beach, Howard Creek Office)
- 5 parking areas (Bloody Buff parking area, State Road 65 parking area, Gardner Landing parking area, Whiskey George parking area, Sand Beach parking area)
- Four designated campsites (Butcher Pen Recreation Area, Gardner Landing, Bloody Bluff Landing and Van Horn Landing)
- Butcher Pen recreation area
- Sand Beach recreation area

As described in Section 5.6.1 of this Management Plan, for any public facilities that are developed on areas managed by the FWC, every effort is made to comply with the Americans with Disabilities Act (Public Law 101-336).

5.11 Land Conservation and Stewardship Partnerships

The FWC utilizes a three-tiered approach to identifying, acquiring or otherwise protecting important conservation lands adjacent to or in proximity to existing FWC-managed areas. This involves development of an Optimal Resource Boundary (ORB), Optimal Conservation Planning Boundary (OCPB) and associated Conservation Action Strategy (CAS).

Increasingly, cooperative land steward partnership efforts with private landowners plays an integral role in this effort as does ongoing land conservation, either through fee-simple or less-than-fee conservation easements. In combination, this tiered model helps the FWC to further the regional conservation of important fish and wildlife habitats through a proactive, comprehensive, and cooperative approach towards conservation.

5.11.1 Optimal Resource Boundary

This three tiered model begins with the development of an ORB, which is a resource-based analysis on a regional scale that integrates important FWC conservation research and analysis into practical planning, acquisition, and management efforts through GIS analysis. The ORB focuses on critical and important wildlife species or habitat considerations such as rare and imperiled species habitat within a particular region or ecosystem-like area on a landscape scale within which an FWC managed area is contained while eliminating urban areas or lands that have already been conserved or protected.

5.11.2 Optimal Conservation Planning Boundary

The second tier is known as the OCPB (Figure 12). The OCPB combines the regional natural resources identified in the ORB, as well as regional and local area conservation planning, including habitat conservation and restoration, habitat linkages, management challenges, land use and zoning issues, infrastructure including roads and developments, improving access, eliminating inholdings, providing prescribed burn buffers, resolving

boundary irregularities, water resource protection, and conserving other important natural and cultural resources.

The OCPB provides the basis for development of a broader CAS for ARWEA. Although the OCPB provides the basis for potential future voluntary, willing-seller conservation acquisitions, it is designed to function primarily as a conservation planning boundary. The OCPB identifies surrounding lands and natural resources that may be important to the continued viability of fish and wildlife populations in the region. As they are currently managed, these lands appear to contribute to regional conservation and may support conservation landscape linkages.

5.11.3 Conservation Action Strategy

The CAS is the third tier, and implements the results of the ORB and OCPB tiers. This element of the process incorporates the conservation planning recommendations into an action strategy that prioritizes conservation needs. The CAS is integral to the development of conservation stewardship partnerships and also implements the current approved process for establishing the FWC Florida Forever Inholdings and Additions acquisition list.

Primary components of the CAS may include:

- FWC Landowner Assistance Program
- FWC conservation planning
- FWC Additions and Inholdings Program Land Conservation Work Plan
- Forest Stewardship Program proposals
- Florida Forever project proposals and boundary modifications
- Conservation easements
- Federal or State grant conservation proposals
- Regional or local conservation proposals
- Local, state, and federal planning proposals
- Non-governmental organization conservation proposals

Continued conservation of these lands may be aided by available voluntary landowner stewardship programs, conservation easements, and in some cases, potential voluntary conservation acquisitions. Participation in any FWC conservation effort is entirely voluntary and at the sole choice of willing landowners.

Private landowners seeking assistance with habitat management will likely find it offered within the FWC's Landowner Assistance Program (LAP). The FWC employs biologists who are available to provide wildlife-related assistance with land-use planning and habitat management. There are many forms of assistance that include technical, financial, educational, and various forms of recognition that seek to award landowners who manage their wildlife habitat responsibly. More information on the FWC's LAP program and online

habitat management tools are available online at: <http://myfwc.com/conservation/special-initiatives/lap/>.

5.11.4 FWC Florida Forever Additions and Inholdings Acquisition List

Currently, the FWC has identified numerous potential additions or privately held inholdings for ARWEA, totaling approximately 34,926 acres. The two largest parcels (totaling roughly 33,595 acres) were previously owned by St. Joe Timberland and sold to AgReserves Inc. in 2013. In addition, approximately 75,010 acres of the St. Joe Timberland-Lake Wimico and St. Joe Timberland St. Vincent Sound-to-Lake Wimico Ecosystem Florida Forever projects remain to be acquired. Upon completion of the CAS, additions to the FWC Florida Forever Additions and Inholdings acquisition list may be recommended.

5.12 Research Opportunities

The FWC intends to cooperate with researchers, universities, and others as feasible and appropriate. For ARWEA, the FWC will continue to assess and identify research needs, and pursue research and environmental education partnership opportunities as appropriate. Research proposals involving the use of the area are evaluated on an individual basis. All research activities on ARWEA must have prior approval by the FWC.

5.13 Cooperative Management and Special Uses

5.13.1 Cooperative Management

The FWC is responsible for the overall management and operation of ARWEA as set forth in the lease agreement with the Board of Trustees. In keeping with the lease agreement, and in order to conduct its management operations in the most effective manner, the FWC cooperates with other agencies to achieve management goals and objectives. These include cooperating with DHR to ensure the requirements of the Management Procedures Guidelines - Management of Archaeological and Historical Resources document (Appendix 13.12) are followed with regard to any ground-disturbing activities. In addition, the FFS is a designated cooperating agency, and assists the FWC by providing technical assistance on forest resource management. The FWC cooperates and consults with the NFWFMD and the DEP for the monitoring and management of both ground and surface water resources and the overall management of ARWEA. Additionally, the FWC cooperates with the FCO in the management of natural communities contained within the DEP-FCO sublease area.

The FWC is a signatory in a Memorandum of Understanding (MOU) establishing the Apalachicola River Stewardship Alliance (ARSA), a public/private landowner collaboration seeking to address the conservation needs of the Apalachicola River corridor, barrier islands, and hundreds of thousands of acres of longleaf pine and wiregrass habitats in northwest Florida (Appendix 13.16). The Goals of ARSA are to protect, restore and manage lands that will sustain the high biodiversity of the region; and increase the fire management capacity of all partners. The MOU also provides for the sharing of

information concerning land management and ecosystem restoration techniques. Other signatories to the MOU are the DEP, the FFS, the Department of Defense (DOD), The Nature Conservancy (TNC), the NFWMD, the USFWS, the U.S. Forest Service (USFS), the Bureau of Land Management, and the National Interagency Prescribed Fire Training Center.

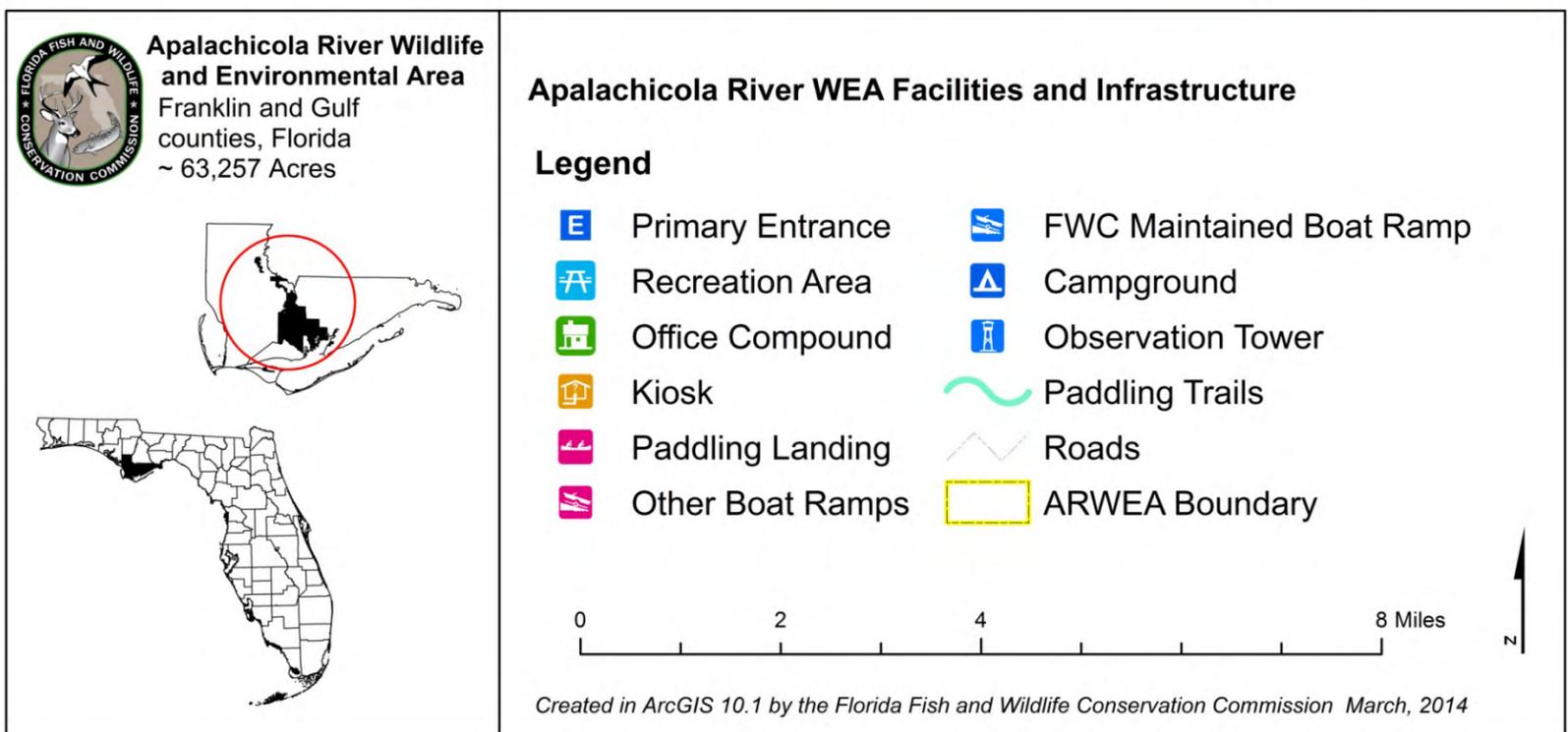
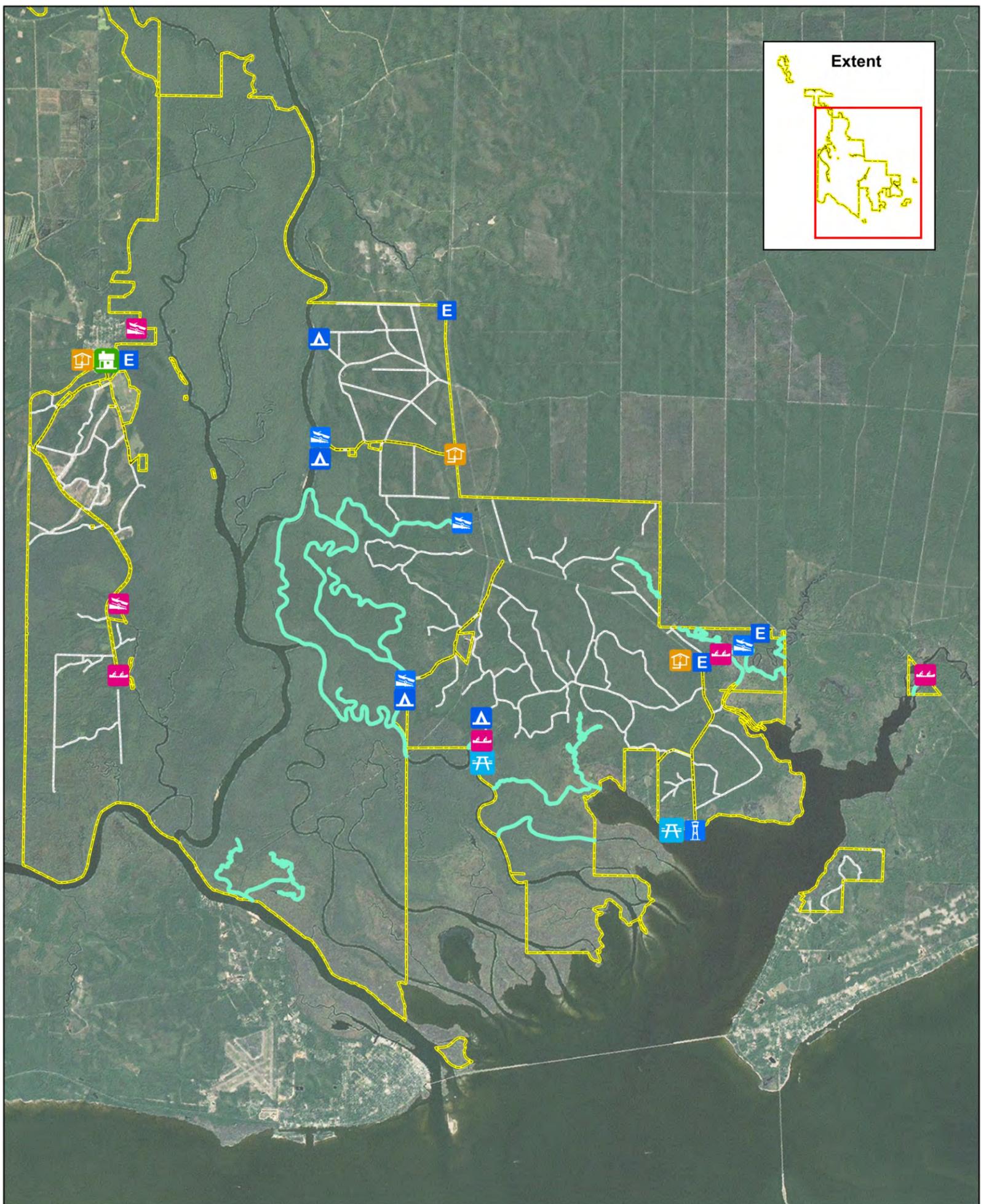


Figure 11. ARWEA Facilities and Infrastructure

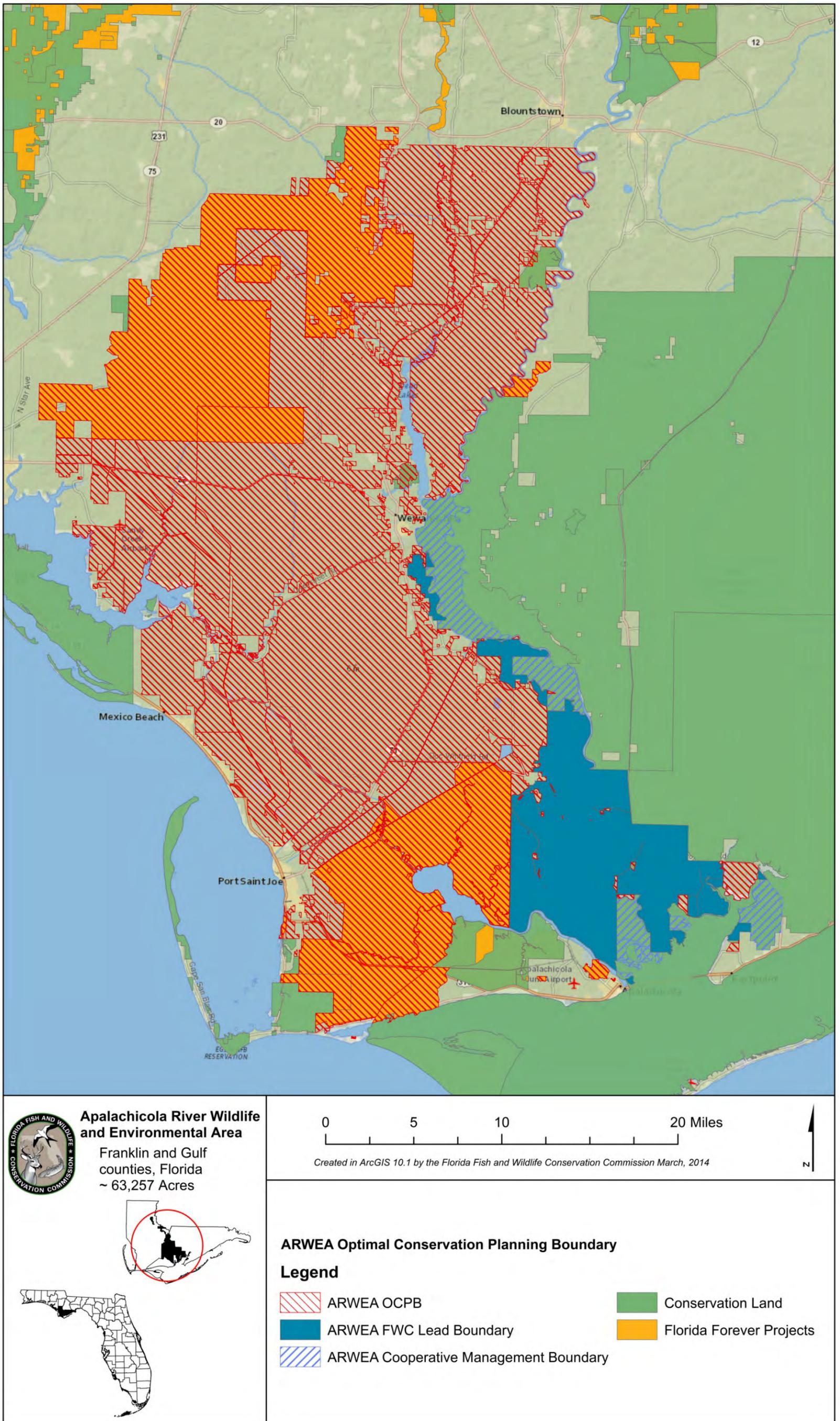


Figure 12. ARWEA Optimal Conservation Planning Boundary

5.13.2 First Responder and Military Training

First-responder (public governmental police department or agency, fire and emergency medical service personnel) training and military training are conditionally allowed on ARWEA. Such activities are considered allowable uses only when undertaken intermittently and in a manner that does not impede the management and public use of ARWEA, or cause unreasonable impact to the natural resources of the area. Additionally, FWC staff must be notified prior to any such training taking place on ARWEA. Any first responder or military training that is not low-impact, intermittent and occasional would require an amendment to this management plan, and therefore will be submitted by the FWC to the DSL and the ARC for approval consideration prior to authorization.

Additionally, the Gulf Regional Air Space Initiative (GRASI) is a continuation of ongoing, mutually beneficial cooperation among the DOD and its military branches, including the United States Air Force (USAF), State and regional agencies, on issues related to military readiness and conservation. The GRASI was initiated to prepare for the addition to the regional airspace (Northwest Florida) of the Joint Strike Fighter (F-35), as well as additional training needs of air and ground units of the military. The GRASI's primary purpose for FWC-managed lands is to allow important military ground training activities on areas where related ground-support air activities can also be safely conducted, and thereby relieve congestion in other restricted airspaces.

The FWC participates in GRASI along with a consortium of military, state and regional agencies (FWC, DACS, NFWFMD, DEP, TNC, DEO, USFS, NPS, DOD and USAF). The GRASI consortium of agencies have worked to assess and recognize mutually compatible areas for training that minimize adverse impacts to natural resources and public recreational opportunities. As a result of this effort, FWC has identified and provided to the military a list of FWC-managed lands with potential for GRASI training areas. To further determine the suitability of the recommended FWC-managed areas, FWC and military personnel will coordinate site visits for areas of interest.

In addition, a GRASI Memorandum of Agreement (MOA; Appendix 13.15) between FWC and the USAF was developed and signed by FWC. Similar MOAs between other GRASI consortium entities and the USAF have also been developed and enacted. In general, the FWC GRASI MOA outlines management responsibilities and activities of the participating entities that are considered compatible among all parties and that are not expected to unreasonably impact the managed lands. The GRASI MOA further calls for FWC and USAF personnel to work cooperatively to develop an "Annual Operations Plan."

To advance our shared national and State interests, FWC will continue to coordinate and cooperate with the USAF, other branches of the military, and other GRASI consortium members to achieve the goals of GRASI, and fulfill the commitments established in the

FWC GRASI MOA. As with first-responder and other training described above, GRASI-related military training activities that are not low-impact, intermittent and occasional would require an amendment to this management plan, and therefore will be submitted by FWC to DSL and ARC for consideration and approval prior to authorization.

5.14 Climate Change

Because of Florida's unique ecology and topography, any potential impacts as a result of climate change may be particularly acute and affect multiple economic, agricultural, environmental, and health sectors across the state. The impact of climate change on wildlife and habitat may already be occurring, from eroding shorelines and coral bleaching to increases in forest fires and saltwater intrusion into inland freshwater wetlands.

The Intergovernmental Panel on Climate Change (IPCC), a multi-national scientific body, reports that climate change is likely proceeding at a rate where there will be unavoidable impacts to humans, wildlife, and habitat. Given current levels of heat-trapping greenhouse gas emissions, shifts in local, regional, and national climate patterns including changes in precipitation, temperature, increased frequency and intensity of extreme weather events, rising sea levels, tidal fluctuations, and ocean acidification are projected. The current trend of global temperature increase has appeared to accelerate in recent decades, and continued greenhouse gas emissions may result in projected global average increases of 2 – 11.5° F by the end of the century.⁹

This apparent change in global climate has the potential to disrupt natural processes; in some areas, climate change may cause significant degradation of ecosystems that provide services such as clean and abundant water, sustainable natural resources, protection from flooding, as well as hunting, fishing and other recreational opportunities. Consequently, climate change is a challenge not only because of its likely direct effects, but also because of its potential to amplify the stress on ecosystems, habitats, and species from existing threats such as exponential increases in surface and ground water use, habitat loss due to increased urbanization, introduction of invasive species, and fire suppression.

Potential impacts that may be occurring as a result of climate change include: change in the timing of biological processes, such as flowering, breeding, hibernation, and migration;^{10, 11,} ¹² more frequent invasions and outbreaks of exotic invasive species;¹³ and loss of habitat in coastal areas due to sea level rise.¹⁴ Some species are projected to adjust to these conditions through ecological or evolutionary adaptation, whereas others are projected to exhibit range shifts as their distributions track changing climatic conditions. Those species that are unable to respond to changing climatic conditions are projected to go extinct. Some estimates suggest that as many as 20% - 30% of the species currently assessed by the IPCC are at risk of extinction within this century if global mean temperatures exceed increases of

2.7 – 4.5° F.¹⁵ A number of ecosystems are projected to be affected at temperature increases well below these levels.

At this time, the potential effects of climate change on Florida’s conservation lands are just beginning to be studied and are not yet well understood. For example, the FWC has begun a process for currently developing climate change adaptation strategies for monitoring, evaluating, and determining what specific actions, if any, may be recommended to ameliorate the projected impacts of climate change on fish and wildlife resources, native vegetation, and the possible spread of exotic and invasive species. Currently, the FWC is continuing its work on the development of these potential adaptation strategies. However, as noted above, the effects of climate change may become more frequent and severe within the time period covered by this Management Plan.

For these reasons, there is a continuing need for increased information and research to enable adaptive management to cope with potential long-term climate change impacts. The most immediate actions that the FWC can take are to work with partners to gather the best scientific data possible for understanding natural processes in their current state, model possible impacts and subsequent changes from climate change, develop adaptive management strategies to enhance the resiliency of natural communities to adapt to climate change, and formulate criteria and monitoring for potential impacts when direct intervention may be necessary to protect a species. To this end, when appropriate, the FWC will participate in organizations such as the Peninsular Florida Land Conservation Cooperative or similar organizations so that the FWC continues to gain understanding and share knowledge of key issues related to potential climate change. In addition, the FWC will consider the need for conducting vulnerability assessments to model the potential effects of climate change, especially sea level rise and storm events, on imperiled species and their habitats on FWC managed land.

A 2012 analysis of the Apalachicola Bay region completed by TNC for the DEP applied a Sea Level Affecting Marsh Model (SLAMM) simulation to three sea level rise scenarios (0.69 m, 1 m, 2 m)¹⁶. The 274,525 ha Apalachicola Bay study area included the lower half of ARWEA. The results indicated a loss of forested wetlands ranging from -16% to -44% (depending on the wetland system and sea level rise scenario) and inland freshwater marsh (-14%, -20% and -27%, respectively). The SLAMM indicated that salt marsh, brackish marsh, and tidal flat would increase, mostly at the expense of forested wetland and inland freshwater marsh in the Apalachicola Bay study area. These results are particularly significant for ARWEA because floodplain swamp and marsh account for approximately 67% of the area. The analysis also demonstrated that natural system changes would be substantially accelerated if freshwater flows from the Apalachicola River were reduced; potentially increasing the loss of coastal wetlands beyond what was simulated using SLAMM¹⁶.

Additionally, the study examined potential effects of a 1 meter sea level rise for terrestrial and aquatic species that were determined to be vulnerable to sea level rise. Of the thirteen species modeled to have significant (>6%) reductions in occupied or potential habitat, eight are found on ARWEA (snowy plover, corkwood, Thorne's buckthorn, West's flax, tropical waxweed [Florida waxweed], Florida manatee, fat threeridge mussel, and gulf sturgeon). Sea-level rise potential inundation scenarios at ARWEA ranging from one to six meters are depicted in Figure 13.

To address the potential impacts of climate change on the ARWEA, Goals and Objectives have been developed as a component of this Management Plan (Section 6.12). Depending on the recommendations of the adaptive management strategies described above, additional specific goals and objectives to mitigate potential climate change impacts may be developed for the ARWEA Management Plan in the future.

5.15 Soil and Water Conservation

Soil disturbing activities will be confined to areas that have the least likelihood of experiencing erosion challenges (see Section 2.1.2 and Figure 5. ARWEA-Soils). On areas that have been disturbed prior to acquisition, an assessment will be made to determine if soil erosion is occurring, and if so, appropriate measures will be implemented to stop or control the effects of this erosion.

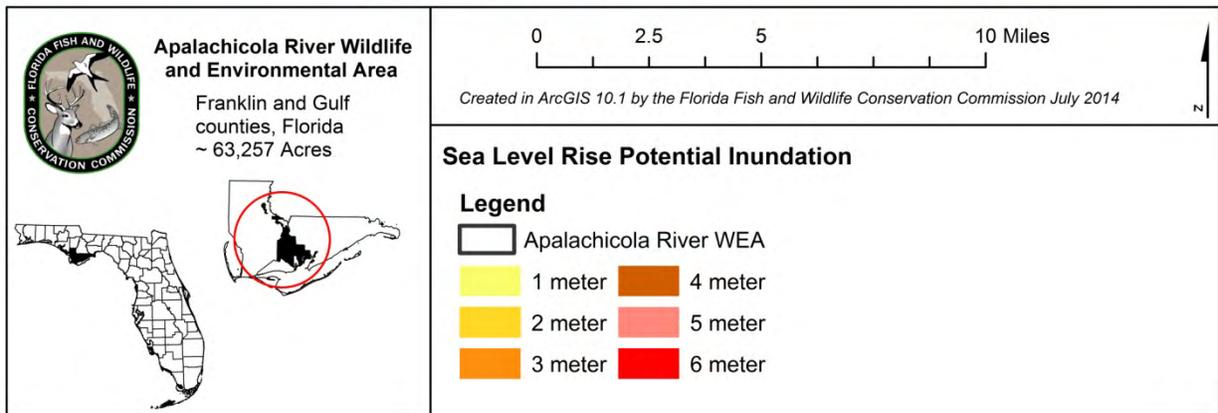
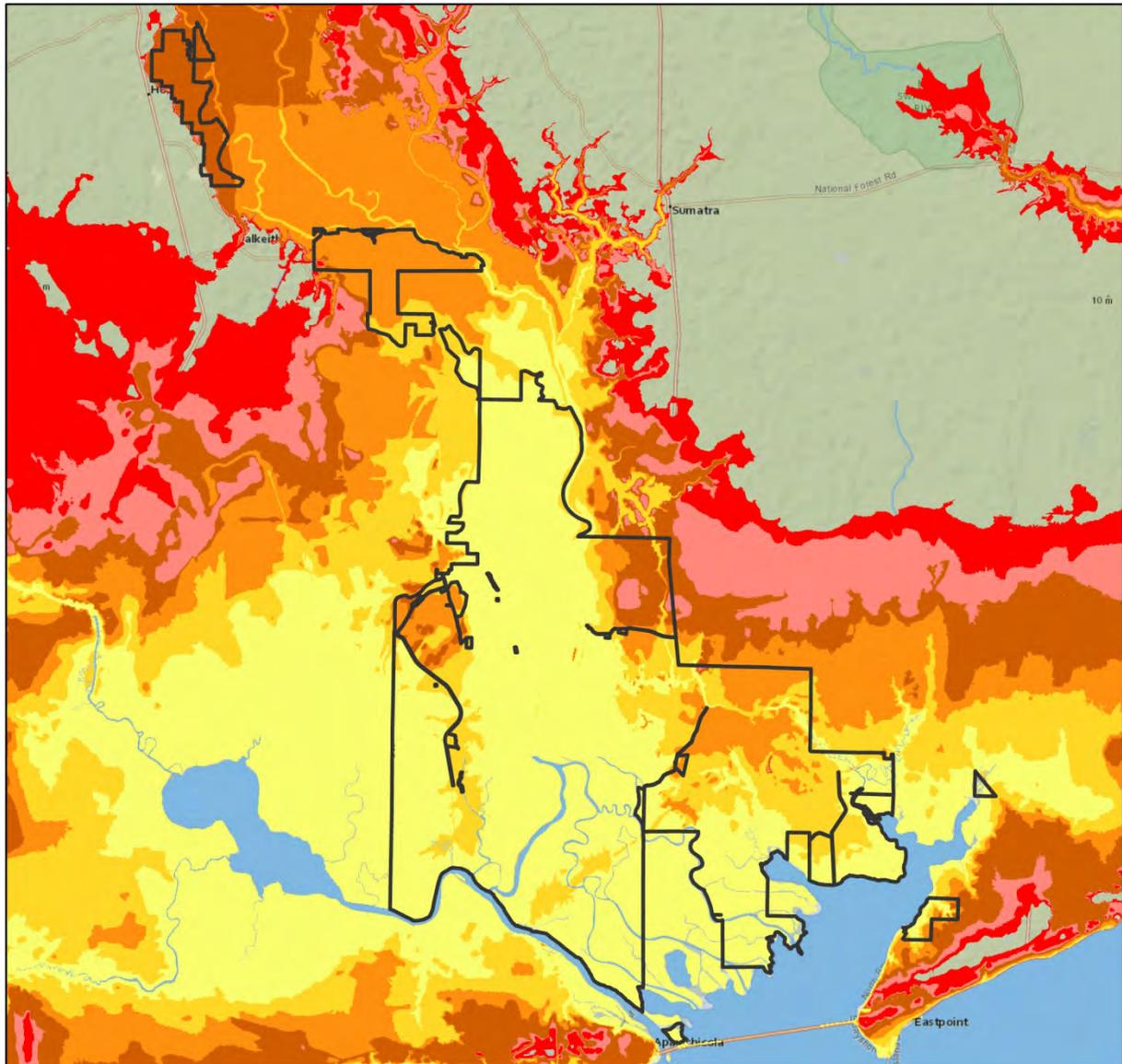


Figure 13. Sea Level Rise Potential Inundation at ARWEA

6 Resource Management Goals and Objectives

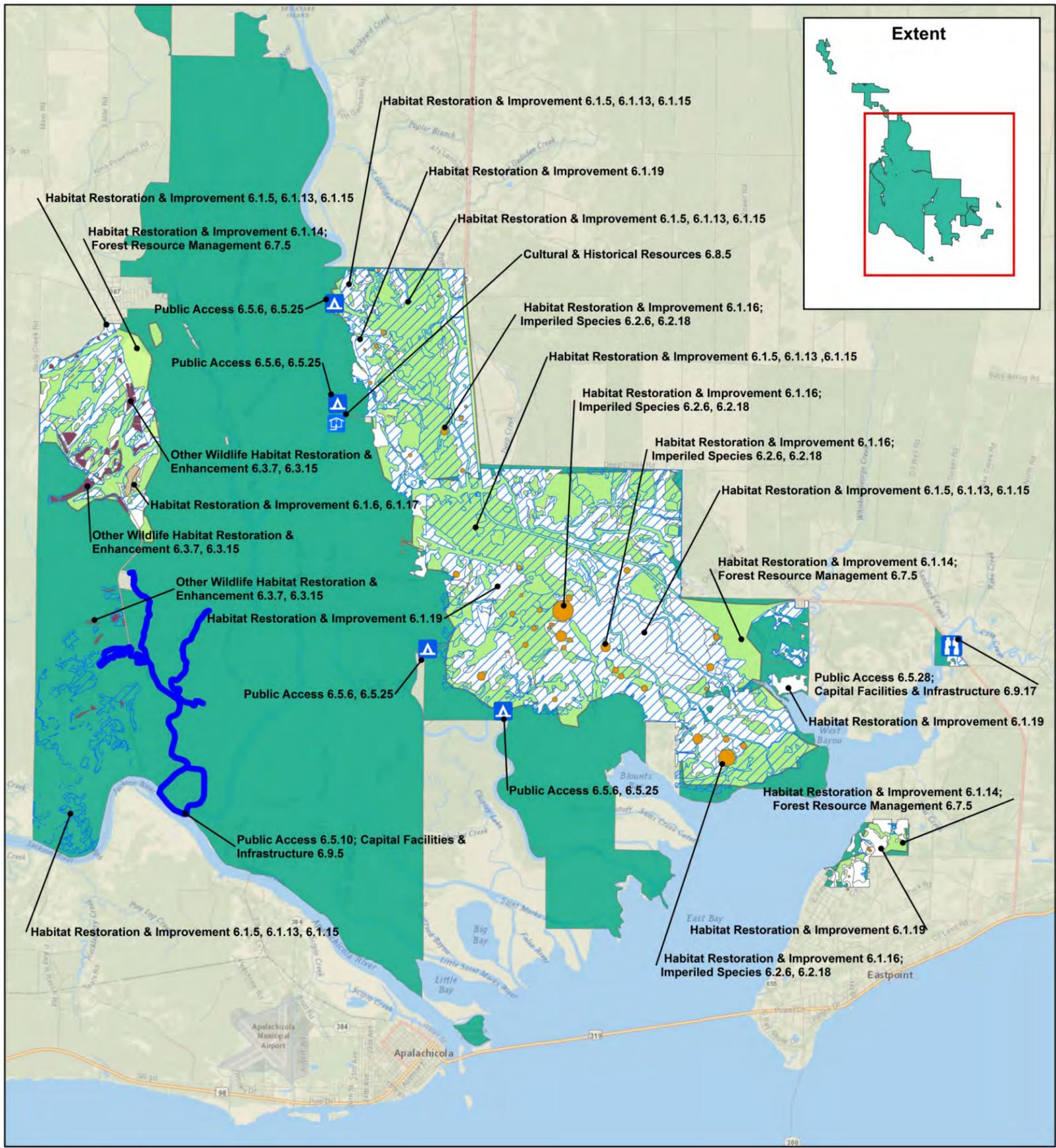
The management goals described in this section are considered broad, enduring statements designed to guide the general direction of management actions to be conducted in order to achieve an overall desired future outcome for ARWEA. The objectives listed within each management goal offer more specific management guidance and measures, and are considered the necessary steps to be completed to accomplish the management goals. Many of the objectives listed have specific end-of-the-calendar-year target dates for completion and all of them are classified as having either short-term (2014-2015) or long-term (up to 2016-2024) timelines for completion.

6.1 Habitat Restoration and Improvement

Goal: Improve extant habitat and restore disturbed areas.

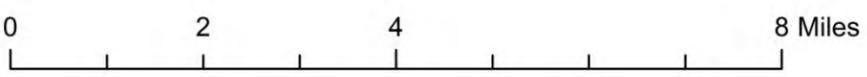
Short-term

- 6.1.1 Implement the prescribed burn plan.
- 6.1.2 Prescribe burn 5,200 acres of fire-adapted communities per year with emphasis on growing season burns.
- 6.1.3 Through continued focus on restoring form and function of pyrogenic communities, increase the amount of growing season burn acreage as viable.
- 6.1.4 Maintain 15,000 acres (~80%) of fire-adapted natural communities within two - four year target fire return interval.
- 6.1.5 Conduct habitat/natural community improvement and restoration on 500 acres (wet prairie, wet and mesic flatwoods; pine plantation conversion) including roller chopping, Gyro-Trac, mowing, herbicide, and other viable vegetation management techniques (Figure 14).
- 6.1.6 Conduct ground cover restoration of a 10 acre ruderal field site on Saul Creek Unit (Figure 14).
- 6.1.7 Coordinate and cooperate with the ARSA, National Wild Turkey Foundation (NWTF), and other partners on potential grant funding opportunities for natural community restoration.
- 6.1.8 Continue to implement OBVM on the area.




Apalachicola River Wildlife and Environmental Area
Franklin and Gulf counties, Florida
~ 63,257 Acres






Created in ArcGIS 10.1 by the Florida Fish and Wildlife Conservation Commission May, 2014

ARWEA Project Locations

Legend

-  Public Access 6.5.28; Capital Facilities & Infrastructure 6.9.17
-  Public Access 6.5.6, 6.5.25
-  Cultural and Historical Resources 6.8.5
-  Habitat Restoration & Improvement 6.1.16; Imperiled Species 6.2.6, 6.2.18
-  Other Wildlife Habitat Restoration & Enhancement 6.3.7, 6.3.15
-  Habitat Restoration & Improvement 6.1.6, 6.1.17
-  Habitat Restoration & Improvement 6.1.5, 6.1.13, 6.1.16
-  Habitat Restoration & Improvement 6.1.19
-  Habitat Restoration & Improvement 6.1.14; Forest Resource Management 6.7.5
-  Public Access 6.5.10; Capital Facilities & Infrastructure 6.9.5
-  ARWEA

Figure 14. Project Locations

Long-term

- 6.1.9 Continue to prescribe burn 5,200 acres of fire-adapted natural communities per year with emphasis on growing season burns.
- 6.1.10 Through continued focus on restoring form and function of pyrogenic communities, increase the amount of growing season burn acreage as viable.
- 6.1.11 Maintain 18,218 acres (100%) of fire-adapted natural communities within two - four year target fire return interval.
- 6.1.12 Continue to implement OBVM on the area.
- 6.1.13 Continue to conduct habitat/natural community improvement and restoration on at least 2,000 acres (wet prairie, wet and mesic flatwoods; pine plantation conversion) including roller chopping, gyrotrac, mowing, herbicide, and other viable vegetation management techniques (Figure 14).
- 6.1.14 Conduct timber harvest for the purposes of habitat restoration on at least 3,000 acres (Figure 14).
- 6.1.15 Conduct habitat/natural community improvement (i.e., prescribed fire, timber thinning, mechanical treatment) on 10,204 acres of upland habitat (e.g., mesic and wet flatwoods, wet prairie, salt marsh, pine plantation) within the WCPR Strategic Management Areas (SMA) to benefit red-cockaded woodpeckers (RCWs) and other focal species (Figure 14).
- 6.1.16 Continue to prescribe burn 250 acres of ephemeral wetlands to improve habitat for frosted flatwoods salamanders and other pond breeding amphibians (Figure 14).
- 6.1.17 Continue to conduct ground cover restoration of a 40 acre ruderal field site on the Saul Creek Unit (Figure 14).
- 6.1.18 Investigate the feasibility of additional ground cover restoration projects (e.g., select pine plantation conversion sites). If feasible, implement new ground cover restoration projects as appropriate.
- 6.1.19 Evaluate the need for longleaf pine reforestation efforts on approximately 600 acres of pine plantation conversion sites and implement reforestation if determined appropriate to achieve restoration goals and OBVM objectives (Figure 14).
- 6.1.20 Continue to protect and monitor old growth forest conditions on 36,742 acres of floodplain swamp and 2,999 acres of alluvial/bottomland forest.
- 6.1.21 Continue to coordinate and cooperate with the ARSA, NWTF, and other partners on potential grant funding opportunities for natural community restoration.

6.2 Imperiled Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration

Goal: Maintain, improve, or restore imperiled species populations and habitats.

Short-term

- 6.2.1 Continue to implement the WCPR strategy on the area.
- 6.2.2 As described in the WCPR strategy, evaluate and consider impacts for planned management activities on non-focal and imperiled species (e.g., Gulf sturgeon, imperiled mussel species) occurring in the Apalachicola River and Estuary; continuing to avoid activities which may negatively affect water flow and quality.
- 6.2.3 Continue to collect opportunistic wildlife and plant species occurrence data.
- 6.2.4 Continue basking surveys for Barbour's map turtle presence in the Apalachicola River system annually.
- 6.2.5 Continue annual surveys of wading bird colonies in the Apalachicola River basin.
- 6.2.6 Continue surveying potential frosted flatwoods salamander breeding ponds in the Franklin County portion of ARWEA biennially (Figure 14).
- 6.2.7 Continue annual nesting productivity survey for southern bald eagles within the Apalachicola River basin.
- 6.2.8 Continue annual spring songbird surveys to detect presence of Bachman's sparrow, brown-headed nuthatch, and RCW.
- 6.2.9 Continue the annual RCW nest monitoring and nestling banding program.

Long-term

- 6.2.10 Continue to implement WCPR strategy by managing identified habitats and monitoring identified species.
- 6.2.11 As described in the WCPR strategy, continue to evaluate and consider impacts for planned management activities on non-focal and imperiled species (e.g., Gulf sturgeon, imperiled mussel species) occurring in the Apalachicola River and Estuary.
- 6.2.12 As described in the WCPR strategy, maintain at least six potential breeding groups of RCWs and investigate the feasibility of establishing three additional RCW recruitment clusters between Bloody Bluff and Doyle Creek by 2019.

- 6.2.13 Continue to collect opportunistic wildlife and plant species occurrence data.
- 6.2.14 By 2019, revise and update the WCPR strategy.
- 6.2.15 Continue basking surveys for Barbour’s map turtle presence in the Apalachicola River system annually.
- 6.2.16 Continue annual surveys of wading bird colonies in the Apalachicola River basin.
- 6.2.17 Monitor the alligator snapping turtle population every three years through mark-recapture surveys.
- 6.2.18 Continue surveying potential frosted flatwoods salamander breeding ponds in the Franklin County portion of ARWEA biennially. If no frosted flatwoods salamanders are documented within ten years of habitat restoration, investigate feasibility of further species management options (Figure 14).
- 6.2.19 Continue annual nesting productivity survey for southern bald eagles within the Apalachicola River basin.
- 6.2.20 Continue annual spring songbird surveys to detect presence of Bachman’s sparrow, brown-headed nuthatch, and RCWs.
- 6.2.21 Continue annual RCW nest monitoring and nestling banding program.
- 6.2.22 Investigate feasibility of banding adult RCWs to aid in population dynamics such as immigration, emigration, and adult survival.
- 6.2.23 Contract with the FNAI to conduct a survey of rare and listed plant species.

6.3 Other Wildlife (Game and Nongame) Habitat Maintenance, Enhancement, Restoration, or Population Restoration

Goal: Maintain, improve, or restore game and non-game populations and habitats.

Short-term

- 6.3.1 Collect biological harvest data, as needed for management recommendations.
- 6.3.2 Continue to collect opportunistic wildlife occurrence data.
- 6.3.3 Continue to monitor the amphibian population through North American Amphibian Monitoring Program (NAAMP) surveys biennially.
- 6.3.4 Continue conducting early morning covey call point counts to estimate northern bobwhite autumn densities.

- 6.3.5 Continue monitoring marsh bird population trends on ARWEA biennially following the North American Marsh Bird Monitoring Protocol (NAMBMP).
- 6.3.6 Continue annual wild turkey camera monitoring to determine turkey presence/absence and habitat use in the Saul Creek unit.
- 6.3.7 Maintain 200 acres of wildlife openings in an early successional stage by mowing, disking, or planting native or non-invasive agronomic species as supplemental wildlife forage on disturbed sites for the benefit of wildlife, hunting, and wildlife viewing opportunities (Figure 14).

Long-term

- 6.3.8 Collect biological harvest data, as needed, for management recommendations.
- 6.3.9 Continue to collect opportunistic wildlife occurrence data.
- 6.3.10 Conduct a herpetological inventory by 2019.
- 6.3.11 Continue to monitor amphibian population through NAAMP surveys at least biennially.
- 6.3.12 Continue conducting early morning covey call point counts to estimate northern bobwhite populations within the northern bobwhite SMA.
- 6.3.13 Continue monitoring marsh bird population trends on ARWEA biennially following the NAMBMP.
- 6.3.14 Continue annual wild turkey camera monitoring to determine turkey presence/absence and habitat use in the Saul Creek Unit.
- 6.3.15 Continue to maintain 200 acres of wildlife openings in an early successional stage by mowing, disking, or planting native or non-invasive agronomic species as supplemental wildlife forage on disturbed sites for the benefit of wildlife, hunting, and wildlife viewing opportunities (Figure 14).

6.4 Exotic and Invasive Species Maintenance and Control

Goal: Remove exotic and invasive plants and animals and conduct needed maintenance- control.

Short-term

- 6.4.1 Annually treat at least 40 acres of FLEPPC Category I and Category II invasive exotic plant species including cogon grass, Chinese tallowtree, Japanese climbing fern, torpedo grass, camphor tree, mimosa, rattlebox, wild taro, water hyacinth, and

Japanese honeysuckle.

- 6.4.2 Continue to implement control measures on one exotic and nuisance animal species (feral hog), including increased hunting and trapping as appropriate.
- 6.4.3 Determine feasibility of expanding exotic species control measures through the use of recreational user groups.
- 6.4.4 Monitor for exotic animal species and control as necessary.
- 6.4.5 Continue to record any incidental observations of both invasive plant and animal species.
- 6.4.6 Work with ARSA Cooperative Invasive Species Management Area (CISMA) to identify and control Early Detection and Rapid Response (EDRR) species.
- 6.4.7 Seek funding through the Upland Invasive Exotic Plant Management Program (UIEPMP) and/or other sources for invasive exotic plant control.

Long-term

- 6.4.8 Annually treat at least 40 acres of FLEPPC Category I and Category II invasive exotic plant species including cogon grass, Chinese tallowtree, Japanese climbing fern, torpedo grass, camphor tree, mimosa, rattlebox, wild taro, water hyacinth, and Japanese honeysuckle.
- 6.4.9 Contract to conduct resurvey and remapping of invasive exotic plant species.
- 6.4.10 Continue to implement hunting and trapping control measures as feasible on one exotic and nuisance animal species (feral hog).
- 6.4.11 Monitor for exotic animal species and control as necessary.
- 6.4.12 Continue to record any incidental observations of both invasive plant and animal species.
- 6.4.13 Continue to work with ARSA CISMA to indentify and control EDRR species.
- 6.4.14 Continue to seek funding through the UIEPMP and/or other sources for invasive exotic plant control.
- 6.4.15 Conduct an exotic plant species survey.

6.5 Public Access and Recreational Opportunities

Goal: Provide public access and recreational opportunities.

Short-term

- 6.5.1 Maintain existing public access and recreational opportunities.
- 6.5.2 Increase emphasis on recreational and environmental education and enforcement of area regulations to address potential user conflicts and adjacent landowner conflicts with ongoing recreational uses.
- 6.5.3 Develop additional public access and recreational opportunities as needed to accommodate expanded recreational demand in conjunction with evaluation of existing recreational opportunities on adjacent conservation lands.
- 6.5.4 Continue to provide hunt brochures, recreation guide, website, three interpretive kiosks (Howard Creek, Sand Beach, Bloody Bluff), informational signage, paddling trail guide, website, Great Florida Birding Trail Guide, area specific bird list for interpretation and education.
- 6.5.5 Maintain 67 miles of trails, primarily paddling trails and the Palms to Pines walking trail at Sand Beach Tower.
- 6.5.6 Develop four designated campgrounds for permit only camping at high use areas (i.e., Butcher Pen Landing, Gardner Landing, Bloody Bluff Landing, Van Horn Landing) (Figure 14).
- 6.5.7 Determine need for additional campgrounds and/or campsites at existing campgrounds to accommodate high demand.
- 6.5.8 Manage camping on ARWEA to prevent impacts to cultural and natural resources.
- 6.5.9 Revise the area Recreation Master Plan.
- 6.5.10 Develop up to seven additional miles of paddling trails (Figure 14).
- 6.5.11 Continue to monitor trails biannually for visitor impacts.
- 6.5.12 Continue to provide hunting opportunities for deer, turkey, small game, and feral hogs.
- 6.5.13 Continue to provide paddling opportunities on appropriate water bodies.
- 6.5.14 Continue to provide fishing opportunities on appropriate water bodies.
- 6.5.15 Revise the ARWEA Road Plan by 2014 to update road characterizations, current conditions, and inventory of public access roads (primary, secondary, and unimproved roads) and service/administrative roads.
- 6.5.16 Maintain public access and recreational opportunities to allow for a recreational

carrying capacity of 881 visitors per day to minimize disturbance and impacts to natural communities.

- 6.5.17 Continue to cooperate with Apalachicola National Estuarine Research Reserve (NERR) to provide and expand as feasible interpretive, visitor information, and educational programs.

Long-term

- 6.5.18 Continue to monitor trails biannually for visitor impacts.
- 6.5.19 Reassess recreational opportunities every three years.
- 6.5.20 Continue to provide hunting opportunities for deer, turkey, small game, and feral hogs.
- 6.5.21 Continue to provide paddling opportunities on appropriate water bodies.
- 6.5.22 Continue to provide fishing opportunities on appropriate water bodies.
- 6.5.23 Cooperate with other agencies, County, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking, and multi-use trail systems between adjacent public areas.
- 6.5.24 Continue to identify partnerships that could provide for environmental educational programs and outreach.
- 6.5.25 Maintain four designated campgrounds for permit only camping at high use areas (i.e., Butcher Pen Landing, Gardner Landing, Bloody Bluff Landing, Van Horn Landing) (Figure 13).
- 6.5.26 Continue to determine need for additional campgrounds and/or campsites at existing campgrounds to accommodate high demand.
- 6.5.27 Continue to manage camping on ARWEA to prevent impacts to cultural and natural resources.
- 6.5.28 Determine the feasibility of a scenic overlook on the nationally designated scenic byway on State Road 65 for wildlife viewing and fishing opportunities at Cash Creek (Figure 13).
- 6.5.29 Develop new facilities (i.e., Cash Creek improvements, paddling trail) to increase the recreational carrying capacity up to 989 visitors per day.
- 6.5.30 Continue to cooperate with Apalachicola NERR to provide and expand as feasible interpretive, visitor information, and educational programs.

- 6.5.31 To assist with promotion and marketing of ARWEA, continue to cooperate with County Tourism Development Councils, Chamber of Commerce, and other related tourism organizations; link FWC recreation web site resources to appropriate local and regional tourism web sites.

6.6 Hydrological Preservation and Restoration

Goal: Protect water quality and quantity, restore hydrology to the extent feasible, and maintain the restored condition.

Short-term

- 6.6.1 Continue to maintain and refurbish low-water crossings, culverts, and ditch plugs installed through the NFWFMD 2004 Hydrologic Restoration Plan. As appropriate, install additional water control structures to maintain and enhance natural hydrological functions.
- 6.6.2 Continue to cooperate with the NFWFMD and DEP for the monitoring of surface and ground water quality and quantity.
- 6.6.3 Determine the need for log jam removal, spoil/silt removal on tributaries and distributaries of the Apalachicola and Chipola Rivers to improve habitat.

Long-term

- 6.6.4 To enhance natural hydrological functions, continue to install and maintain low-water crossings, culverts, and ditch plugs as appropriate.
- 6.6.5 Reassess the completed hydrological restoration plan for additional water control structure needs or to remove/discontinue use of roads as appropriate and feasible.
- 6.6.6 Continue to maintain natural hydrologic condition and functions to 40,401 acres on site.
- 6.6.7 Continue to determine the need for log jam removal, spoil/silt removal on tributaries and distributaries of the Apalachicola and Chipola Rivers to improve habitat.
- 6.6.8 Continue to remove derelict boats and houseboats along the rivers and sloughs to improve habitat quality.
- 6.6.9 Continue to support and provide technical assistance as needed to multi-agency committees and groups dealing with Apalachicola-Chattahoochee-Flint River system and Apalachicola Bay issues (water distribution and quality problems) to protect and restore water resources including Apalachicola Bay fisheries, restore sloughs, and natural hydroperiods.

6.6.10 Continue to work with partners to explore the feasibility of different management options for waterbird habitat improvements.

6.7 Forest Resource Management

Goal: Manage timber resources to improve or restore natural communities for the benefit of wildlife.

Short-term

- 6.7.1 Consult with the FFS or a private professional forestry consultant regarding forest management activities as appropriate.
- 6.7.2 Continue longleaf pine reforestation measures as appropriate.
- 6.7.3 Work with ARSA in grant funding opportunities from various sources for longleaf pine restoration.
- 6.7.4 Prepare and implement a Forest Resource Management Plan including reforestation, harvesting, and prescribed burning activities based on restoration and maintenance needs of the natural communities and other goals established for management of ARWEA.

Long-term

- 6.7.5 Conduct timber harvest for the purposes of habitat restoration on at least 3,000 acres (Figure 14).
- 6.7.6 Continue to consult with the FFS or a private professional forestry consultant regarding forest management activities as appropriate.
- 6.7.7 Continue longleaf pine reforestation as appropriate, using differing planting techniques as described in the Timber Assessment and Forest Resource Management Plan.
- 6.7.8 Continue to work with ARSA on grant funding opportunities from various sources for longleaf pine restoration.

6.8 Cultural and Historical Resources

Goal: Protect, preserve and maintain cultural and historic resources.

Short-term

- 6.8.1 Ensure all known sites are recorded in the DHR Master Site file.

- 6.8.2 Continue to monitor, protect, and preserve as necessary 33 identified sites.
- 6.8.3 Coordinate with the DHR to assess the need for conducting additional cultural resource survey needs.
- 6.8.4 Work with the DHR to develop a formal monitoring plan for cultural resource sites on the area.
- 6.8.5 Design and develop a new interpretive kiosk with cultural and historical information at Bloody Bluff (Figure14).

Long-term

- 6.8.6 Cooperate with DHR, or trained FWC staff, in designing site plans for development of infrastructure.
- 6.8.7 Cooperate with DHR to manage and maintain known existing cultural resources.
- 6.8.8 Continue to monitor, protect, and preserve as necessary 33 identified sites.
- 6.8.9 Coordinate with DHR for cultural resource management guideline staff training (Archaeological Resource Management training).
- 6.8.10 Continue to maintain all cultural resource sites on the area in “good” or better condition, if conditions deteriorate on any site implement protection measures to reduce site degradation and potentially improve the site to “good” condition.

6.9 Capital Facilities and Infrastructure

Goal: Develop the capital facilities and infrastructure necessary to meet the goals and objectives of this Management Plan.

Short-term

- 6.9.1 Continue to maintain 12 facilities (i.e., Bloody Bluff kiosk and parking area, Whiskey George Creek campsite, equipment maintenance and storage building/office compound, Graham Creek boat launch and parking area, HWY 65 unimproved boat launch and parking area, mixed use area Butcher Pen landing, campground and parking area Bloody Bluff boat launch, campground and parking area Gardner landing boat launch, parking area Whiskey George boat launch, Sand Beach picnic/day use, Sand Beach primary entrance area and kiosk, Van Horn campground).
- 6.9.2 Maintain 80 miles of roads.
- 6.9.3 Maintain 67 miles of trails existing on site (as applicable).

- 6.9.4 Improve or repair all area facilities, roads, and trails existing on site as needed.
- 6.9.5 Develop up to seven miles of new paddling trail (Figure 14).
- 6.9.6 Continue to coordinate and cooperate with Franklin County on maintenance of day use facilities, campgrounds, Sand Beach Recreation area, entrances, boat ramps, information kiosks, etc.
- 6.9.7 Continue to coordinate and cooperate with the Department of Corrections for grounds cleaning, road maintenance, fences, and gate maintenance, etc.
- 6.9.8 Coordinate with other partners and stakeholders to develop and promote additional recreational facilities, if feasible.

Long-term

- 6.9.9 Monitor trails and infrastructure biannually for visitor impacts.
- 6.9.10 Continue to maintain 12 facilities (i.e., Bloody Bluff kiosk and parking area, Whiskey George Creek campsite, equipment maintenance and storage building/office compound, Graham Creek boat launch and parking area, HWY 65 unimproved boat launch and parking area, mixed use area Butcher Pen landing, campground and parking area Bloody Bluff boat launch, campground and parking area Gardner landing boat launch, parking area Whiskey George boat launch, Sand Beach picnic/day use, Sand Beach primary entrance area and kiosk, Van Horn campground).
- 6.9.11 Continue to maintain 80 miles of roads.
- 6.9.12 Continue to maintain up to 74 miles of trails existing on site.
- 6.9.13 Continue to improve or repair all area facilities, roads, and trails existing on site on an as needed basis.
- 6.9.14 Coordinate with other partners and stakeholders to develop and promote additional recreational facilities, if feasible.
- 6.9.15 Continue to coordinate and cooperate with Franklin County on maintenance of day use facilities, campgrounds, Sand Beach Recreation area, entrances, boat ramps, information kiosks, etc.
- 6.9.16 Continue to coordinate and cooperate with the Department of Corrections for grounds cleaning, road maintenance, fences and gate maintenance, etc.
- 6.9.17 Determine the feasibility of a scenic overlook on the nationally designated scenic byway on State Road 65 for wildlife viewing and fishing opportunities at Cash Creek

(Figure 14).

- 6.9.18 Replace three-sided Sand Beach kiosk, four interpretive sign kiosks (i.e., Bloody Bluff, Gardner Landing, Graham Creek, Whiskey George Creek).
- 6.9.19 Maintain and replace as necessary two primary entrance signs and three secondary signs.

6.10 Land Conservation and Stewardship Partnerships

Goal: Enhance fish and wildlife conservation, resource, and operational management through development of an optimal boundary.

Short-term

- 6.10.1 Identify potential important wildlife resources, habitat, landscape-scale linkages, and wildlife corridors for operational/resource management that may be important to the continued viability of fish and wildlife populations in the region.
- 6.10.2 Develop a CAS.
- 6.10.3 Contact and inform adjoining landowners about the FWC LAP to pursue non-acquisition conservation stewardship, partnerships, and potential conservation easements.
- 6.10.4 Identify and recommend parcels for addition to the FWC acquisition list and parcels to declare as surplus property.
- 6.10.5 Identify potential non-governmental organization partnerships and grant program opportunities.
- 6.10.6 Determine efficacy of conducting an adjacent landowner's assistance/conservation stewardship partnership workshop.
- 6.10.7 Coordinate and cooperate with DOD military branches to allow for training opportunities for military personnel such as GRASI and other initiatives as appropriate and compatible with the conservation of ARWEA.

Long-term

- 6.10.8 To minimize fragmentation of the area, continue to identify strategic parcels to revise the completed optimal conservation planning boundary for ARWEA as deemed necessary.
- 6.10.9 Continue to identify and recommend parcels for addition to the FWC acquisitions list.

- 6.10.10 Pursue acquisition of parcels added to the FWC acquisition list as acquisition work plan priorities and funding allow.
- 6.10.11 Coordinate landowner assistance/conservation stewardship partnership workshop as deemed appropriate.
- 6.10.12 Periodically (at least every three to five years) continue to contact and meet with adjacent landowners for willingness to participate in the CAS. Coordinate landowner assistance/ conservation stewardship partnership workshop as deemed appropriate.
- 6.10.13 Continue to coordinate and cooperate with DOD military branches to allow for training opportunities for military personnel such as GRASI and other initiatives as appropriate and compatible with the conservation of ARWEA.
- 6.10.14 Obtain an updated digitized survey and GIS shapefile of the ARWEA boundary.
- 6.10.15 Continue to survey unknown boundaries and inholdings as needed to minimize encroachment and provide resource protection.

6.11 Research Opportunities

Goal: Explore and pursue cooperative research opportunities.

Long-term

- 6.11.1 Explore and pursue cooperative research opportunities through universities, FWRI, other agencies (ANERR), etc.
- 6.11.2 Continue to cooperate with researchers, universities, and others as appropriate.
- 6.11.3 Continue to assess the need for and pursue research and environmental education partnership opportunities as appropriate.

6.12 Climate Change

Goal: Develop appropriate adaptation strategies in response to projected climate change effects and their potential impacts on natural resources, including fish and wildlife, and the operational management of the ARWEA.

Long-term

- 6.12.1 Coordinate with FWC-FWRI Climate Change Adaptation Initiative to identify potential impacts of projected climate change on fish and wildlife resources and operational management of the ARWEA.
- 6.12.2 Incorporate appropriate climate change monitoring protocols and management

strategies into the OBVM program for the ARWEA.

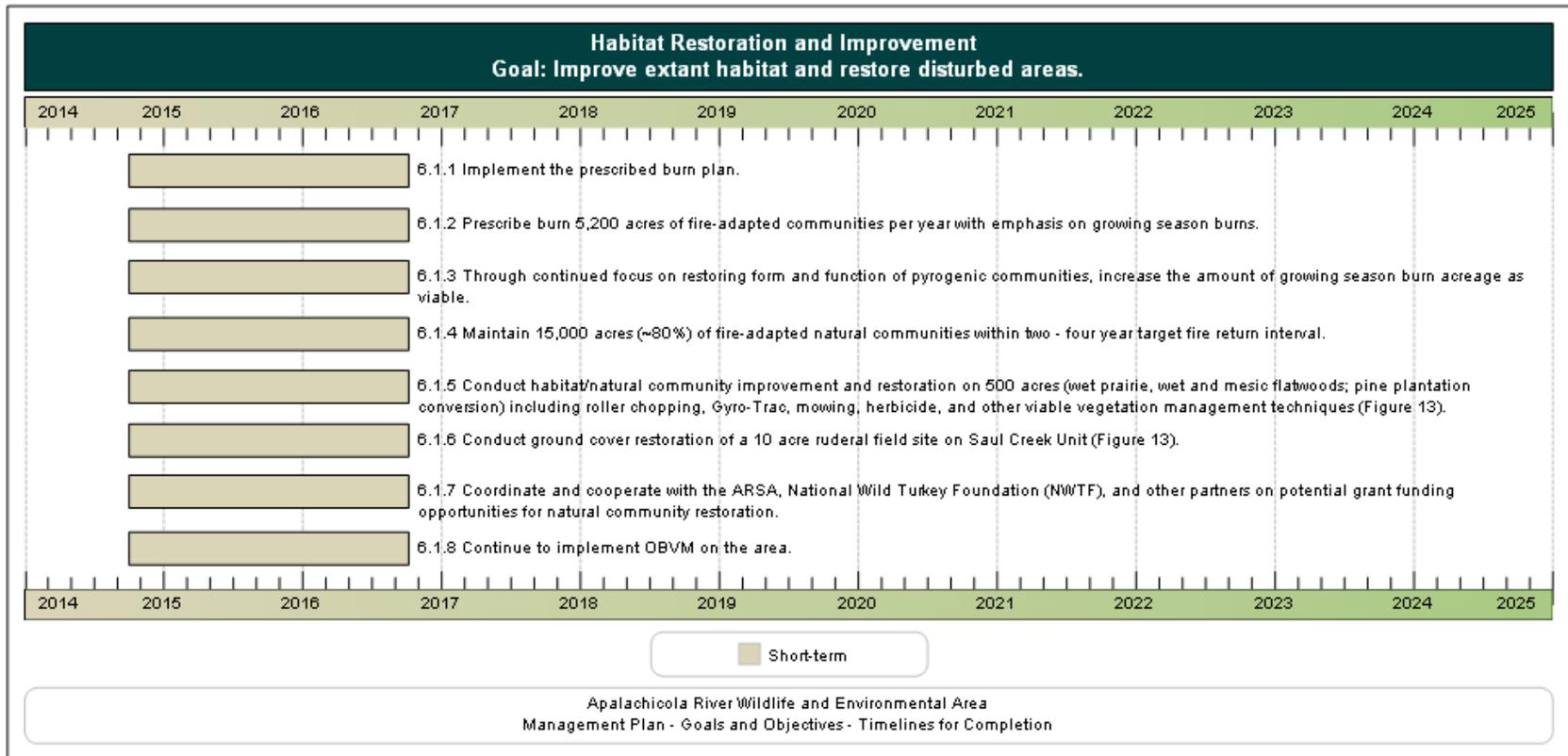
6.12.3 Incorporate appropriate climate change adaptation strategies into the WCPR for ARWEA.

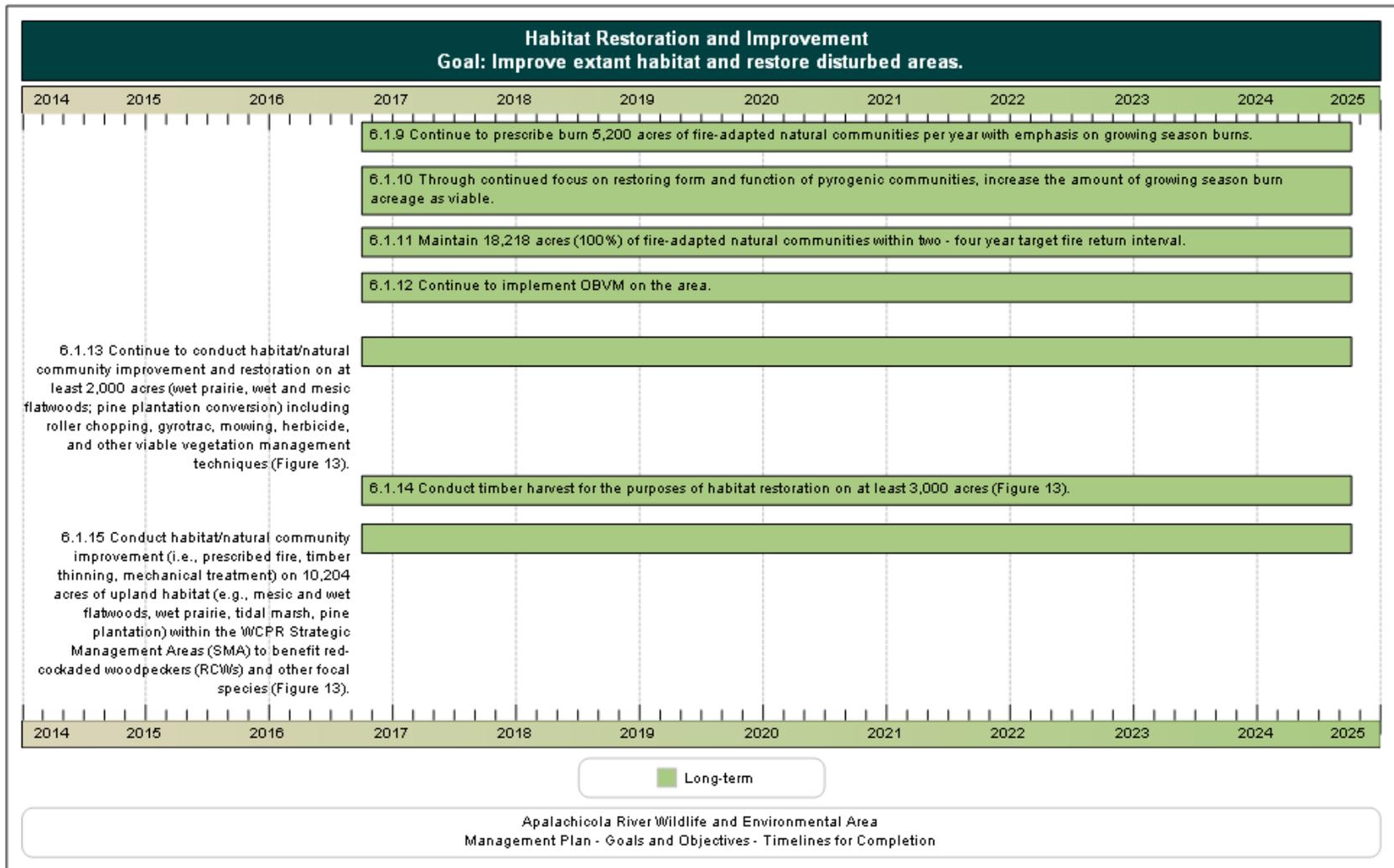
6.12.4 As appropriate, update the ARWEA Prescribed Fire Plan to incorporate new scientific information regarding projected climate change, such as increased frequency of drought, on the fire regime of ARWEA's fire-adapted habitats.

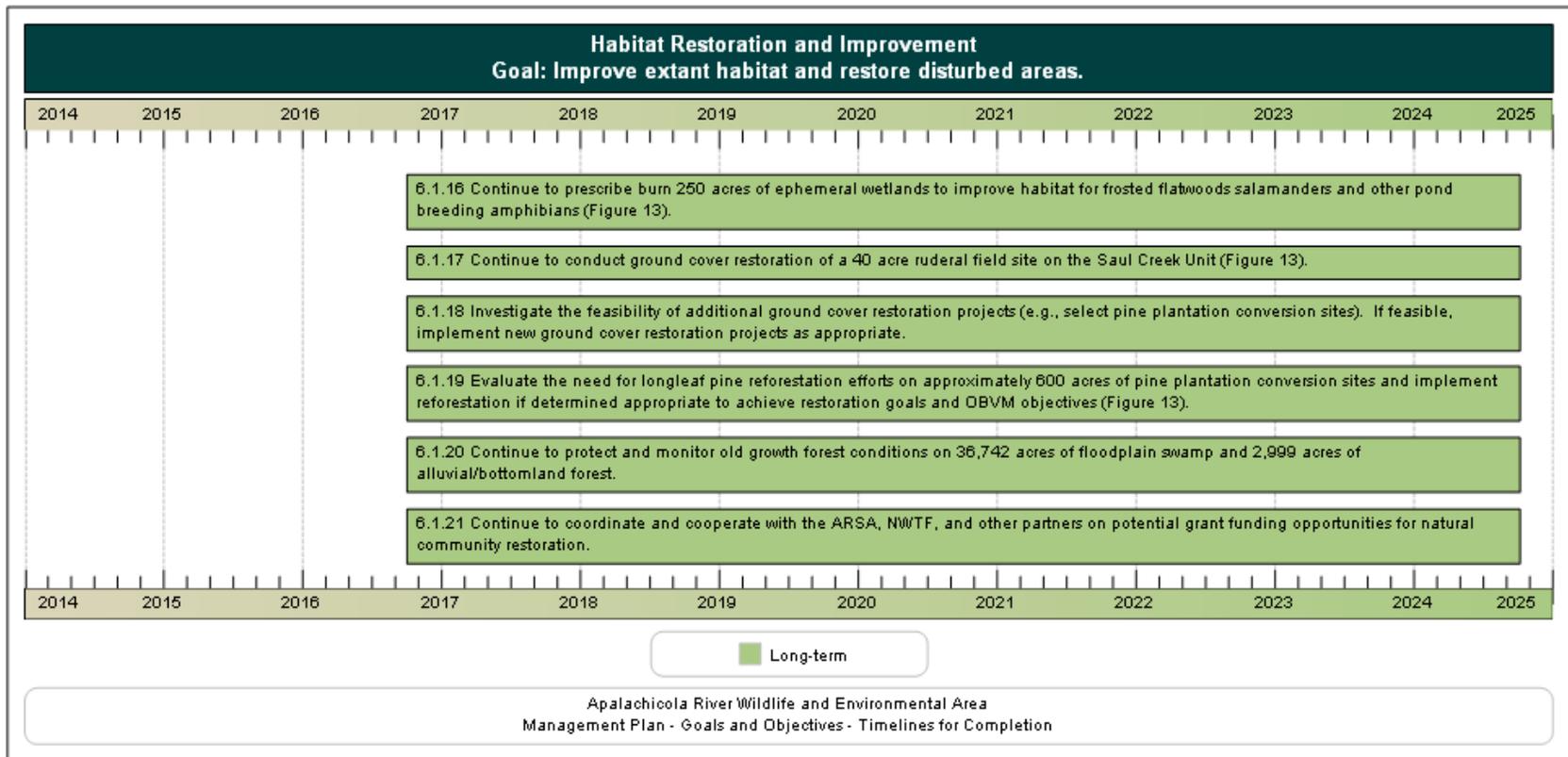
6.12.5 As science, technology, and climate policy evolve, educate natural resource management partners and the public about the agency's policies, programs, and efforts to study, document and address potential climate change; assess the need to incorporate public education about climate change into the update of the Recreation Master Plan.

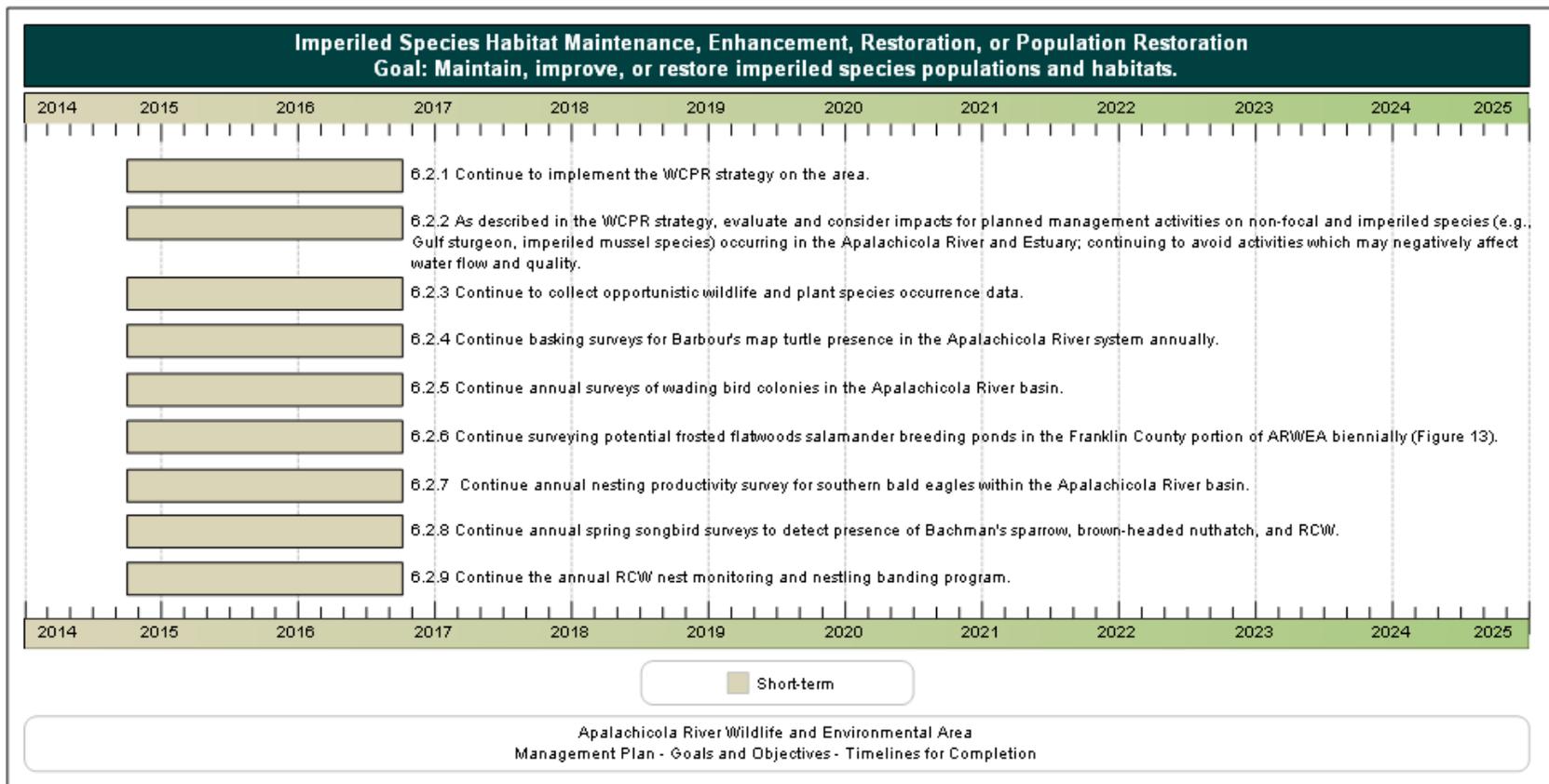
7 Schedule: Timelines for Completion of Resource Management Goals and Objectives

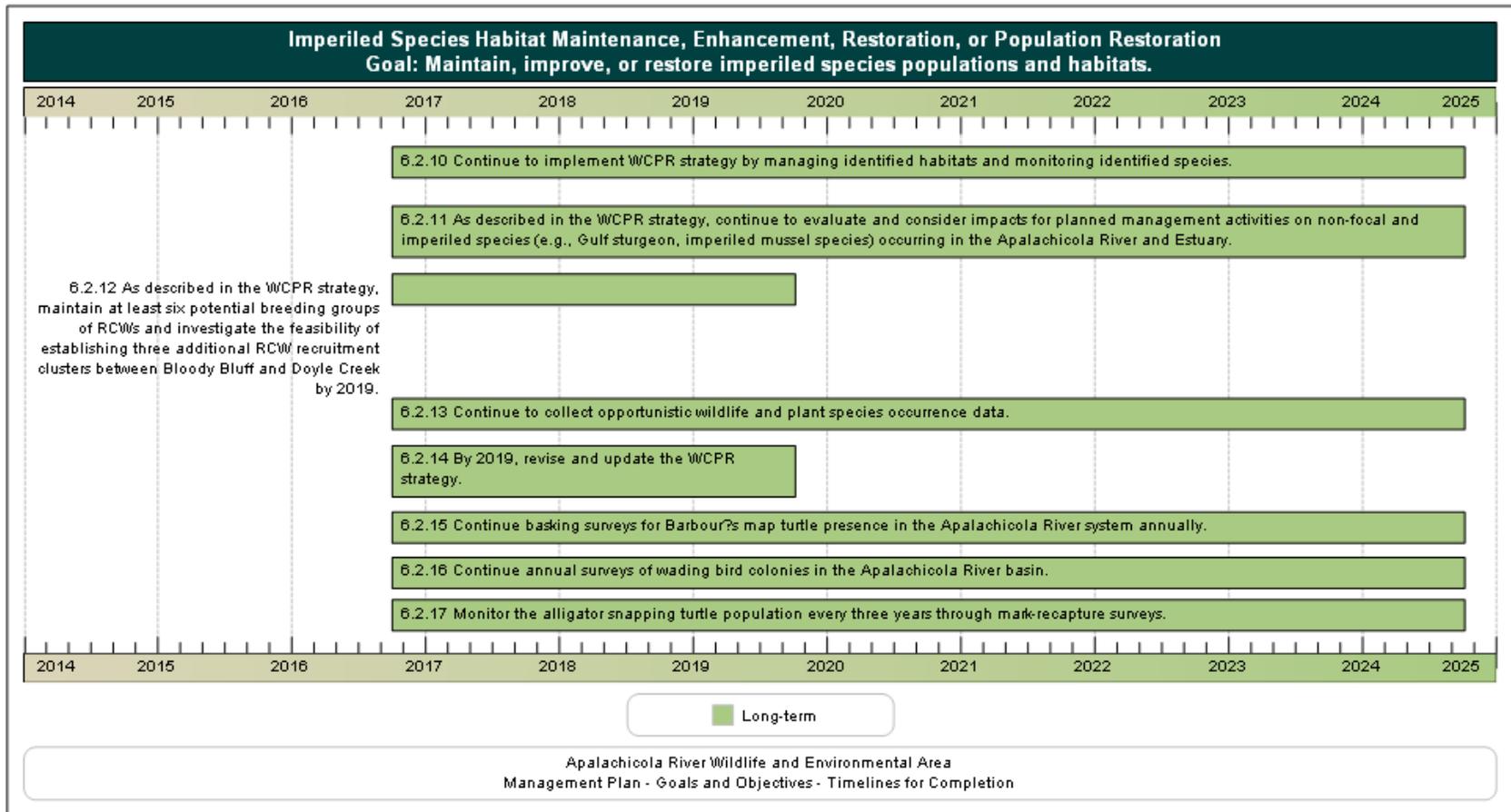
The following section presents the short- and long-term goals and objectives for the management of ARWEA graphically in a timeline format. These timelines directly reflect the short- and long-term goals and objectives presented above in Section 6.

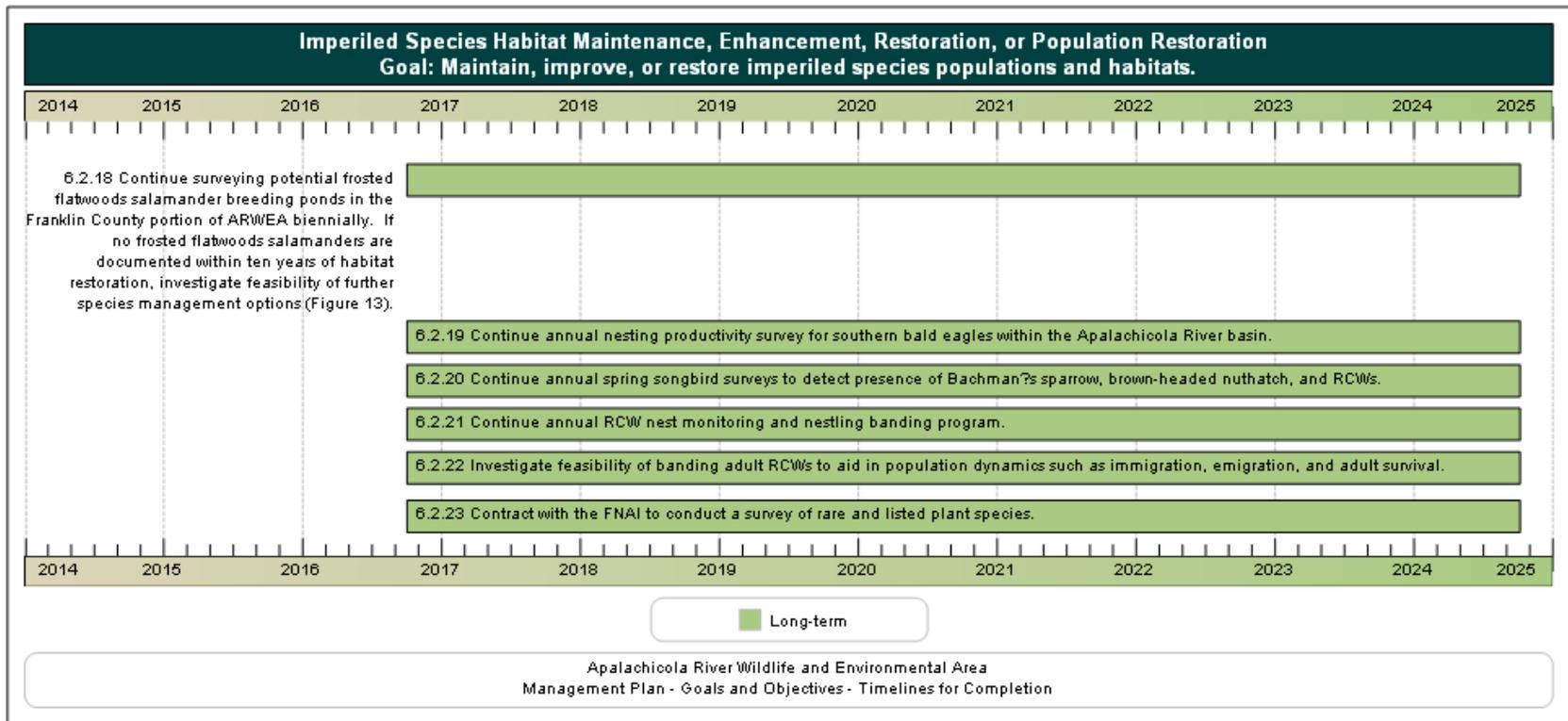


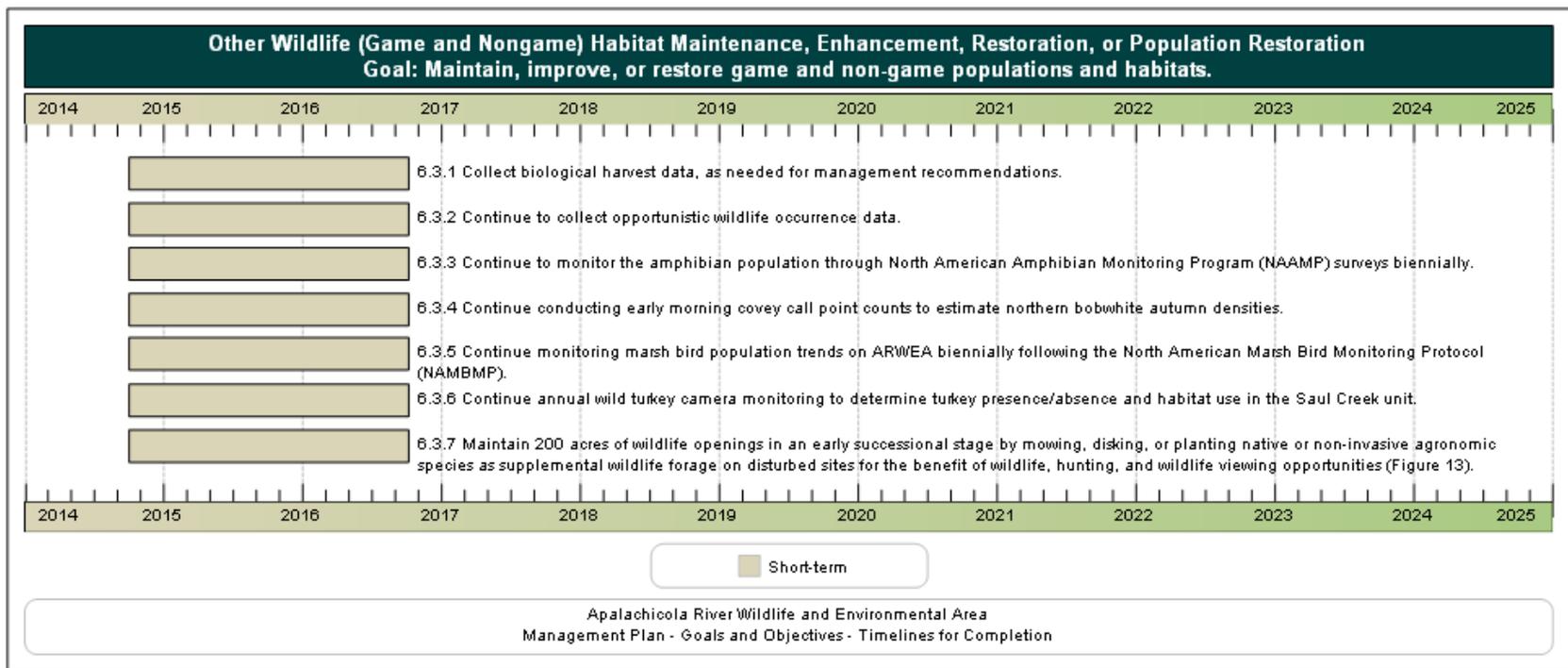


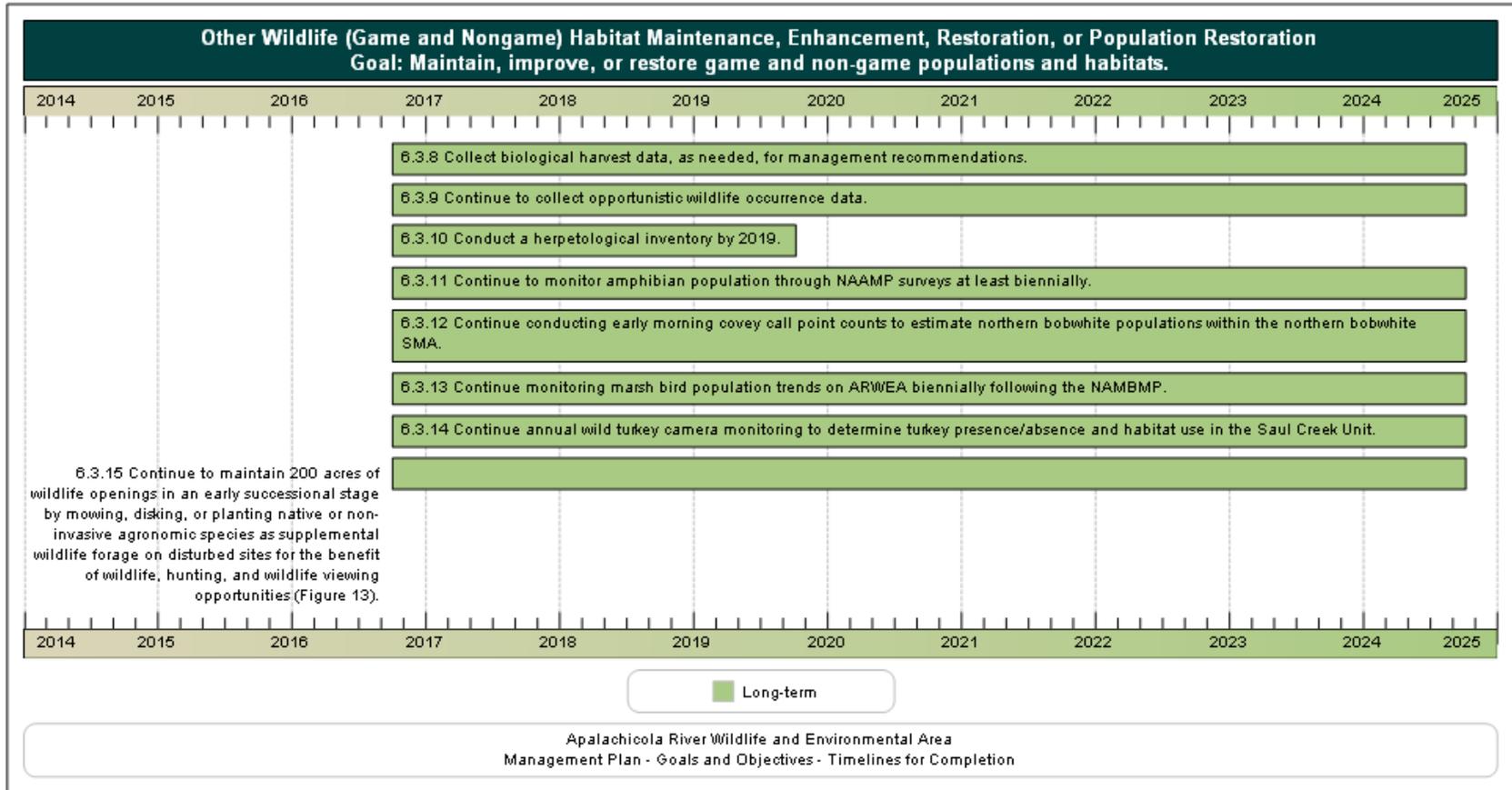


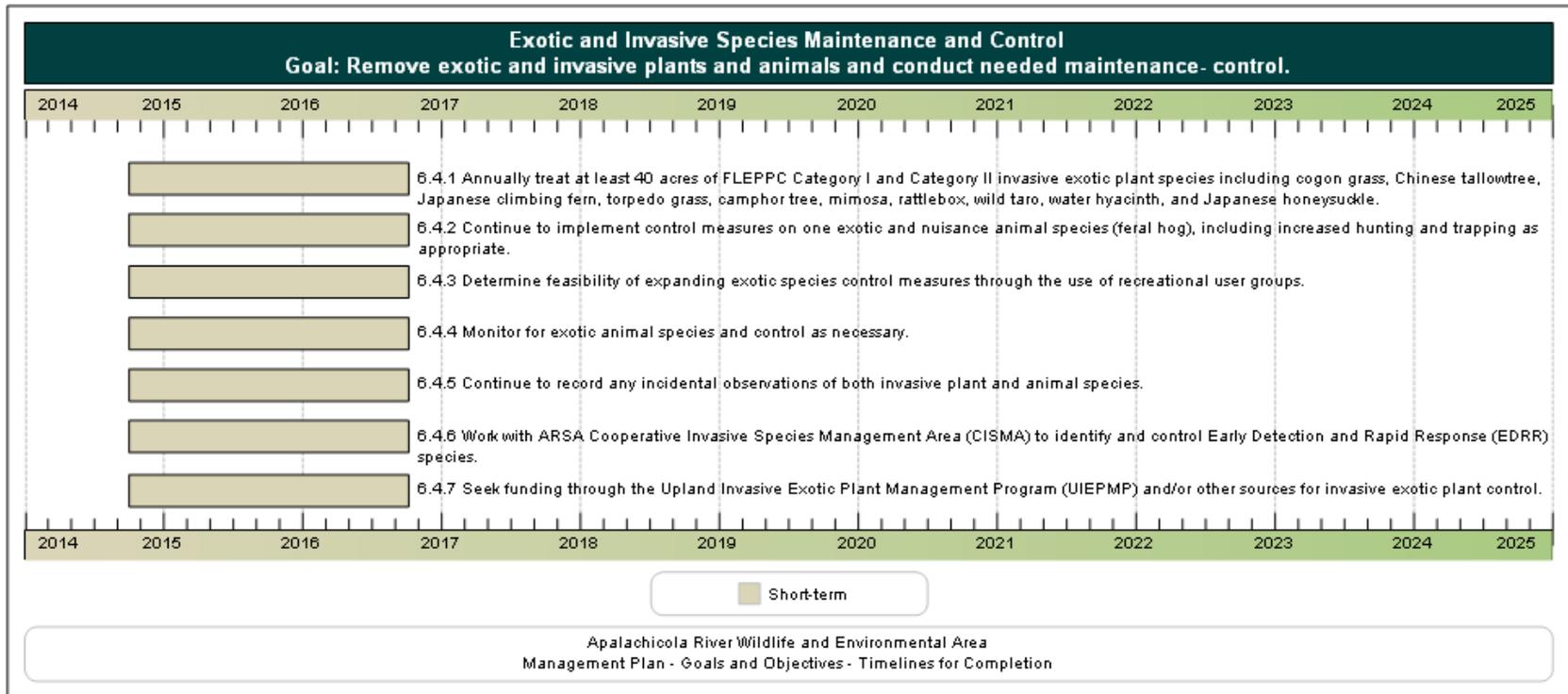


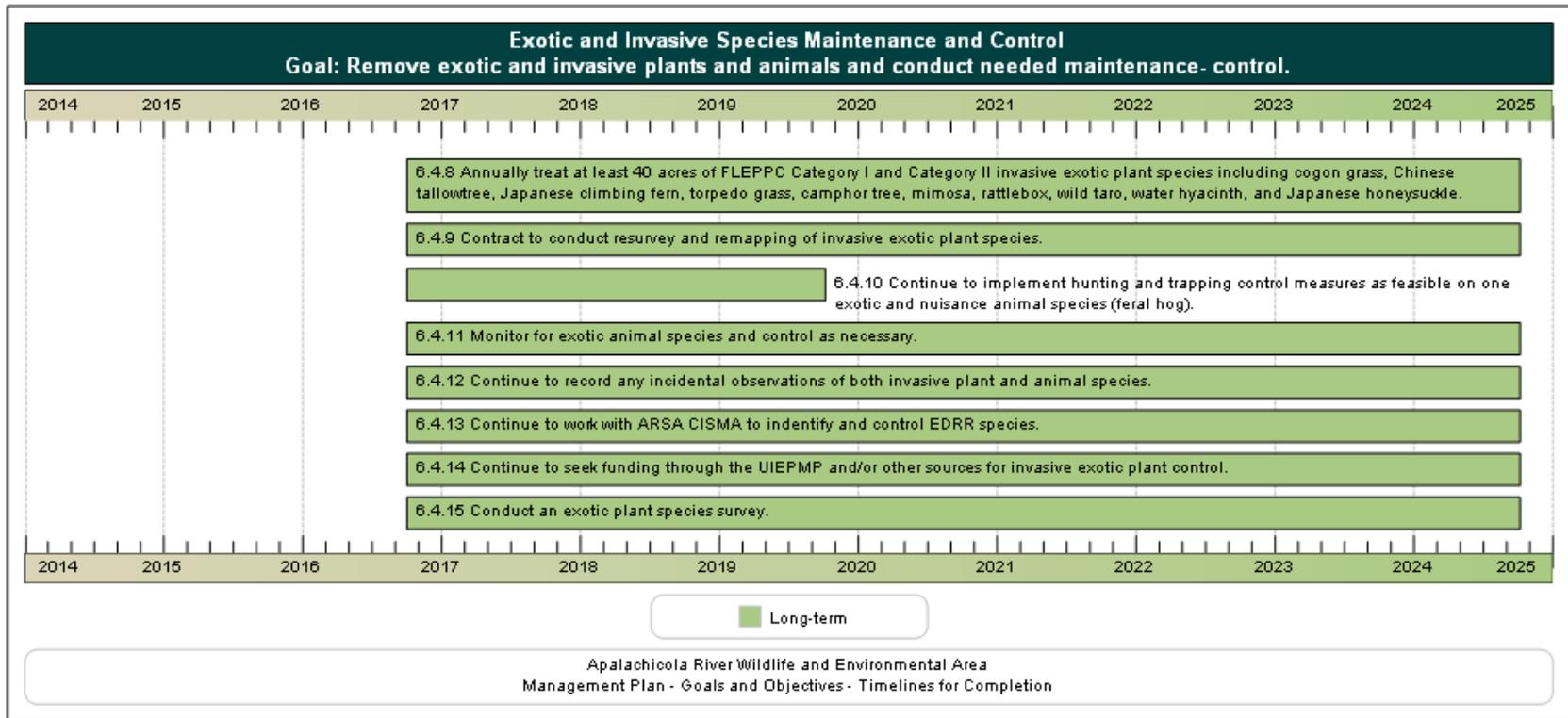


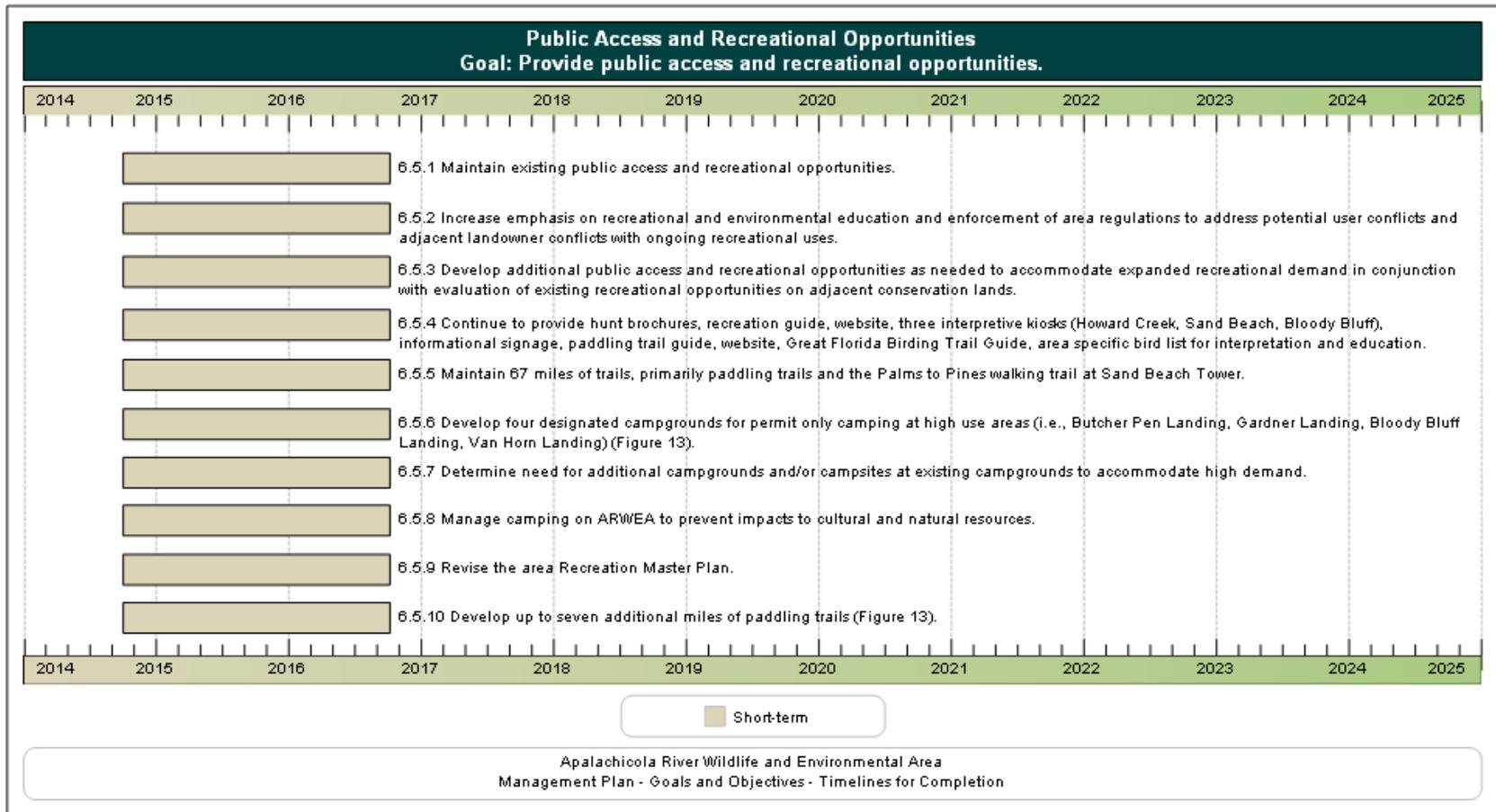


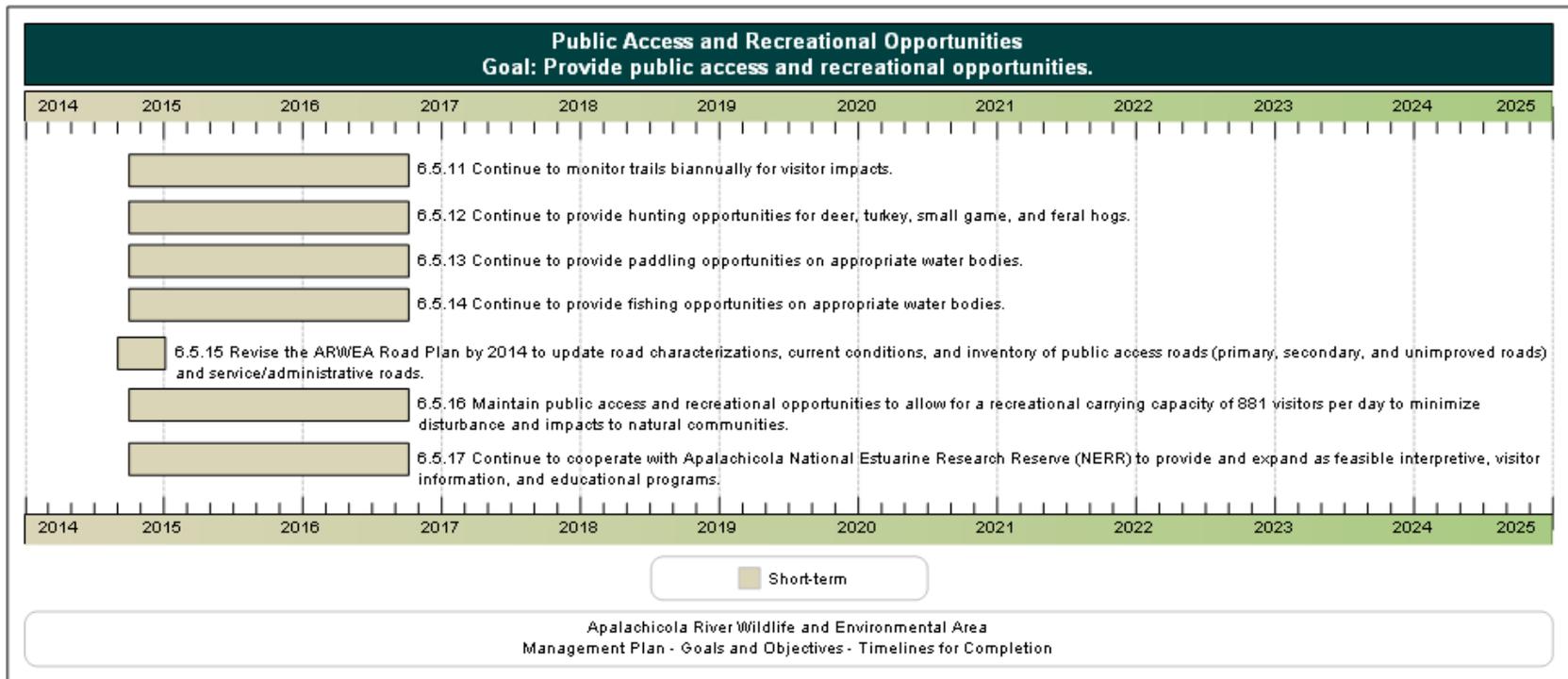


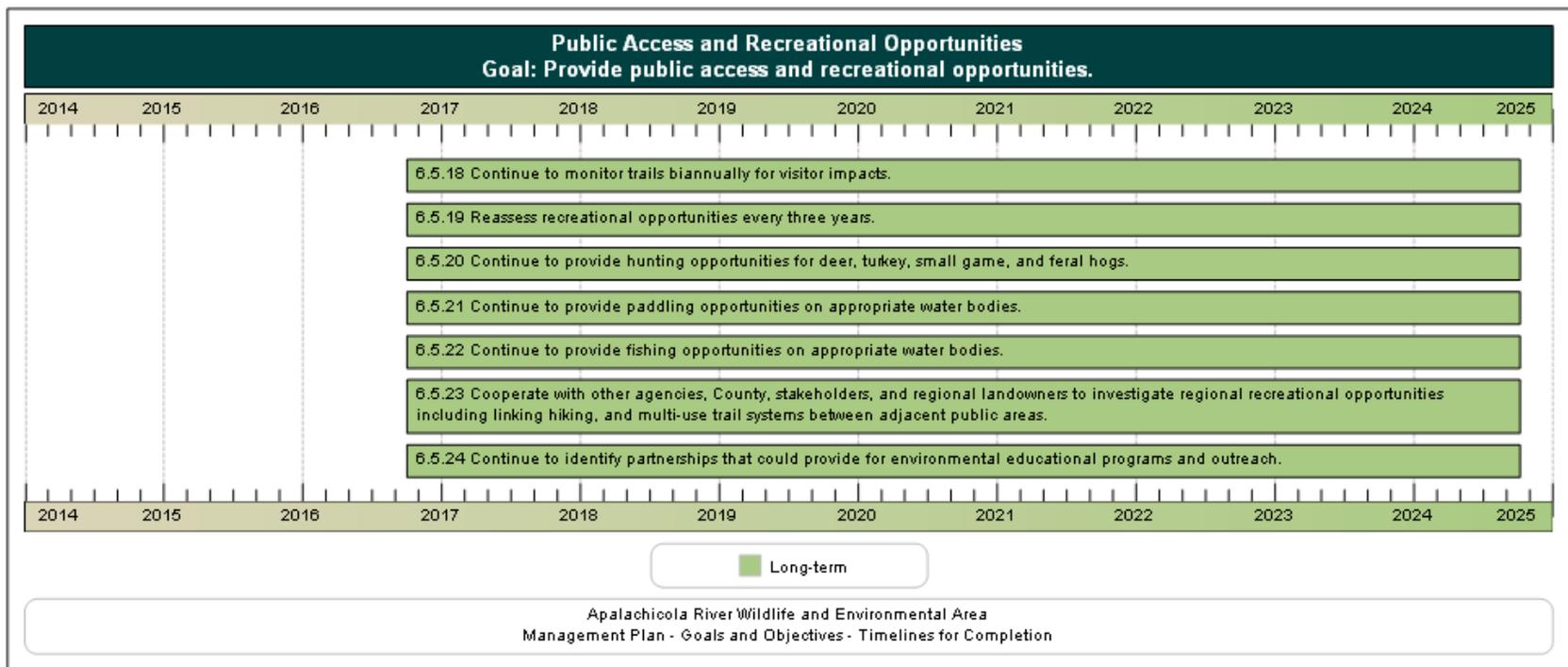


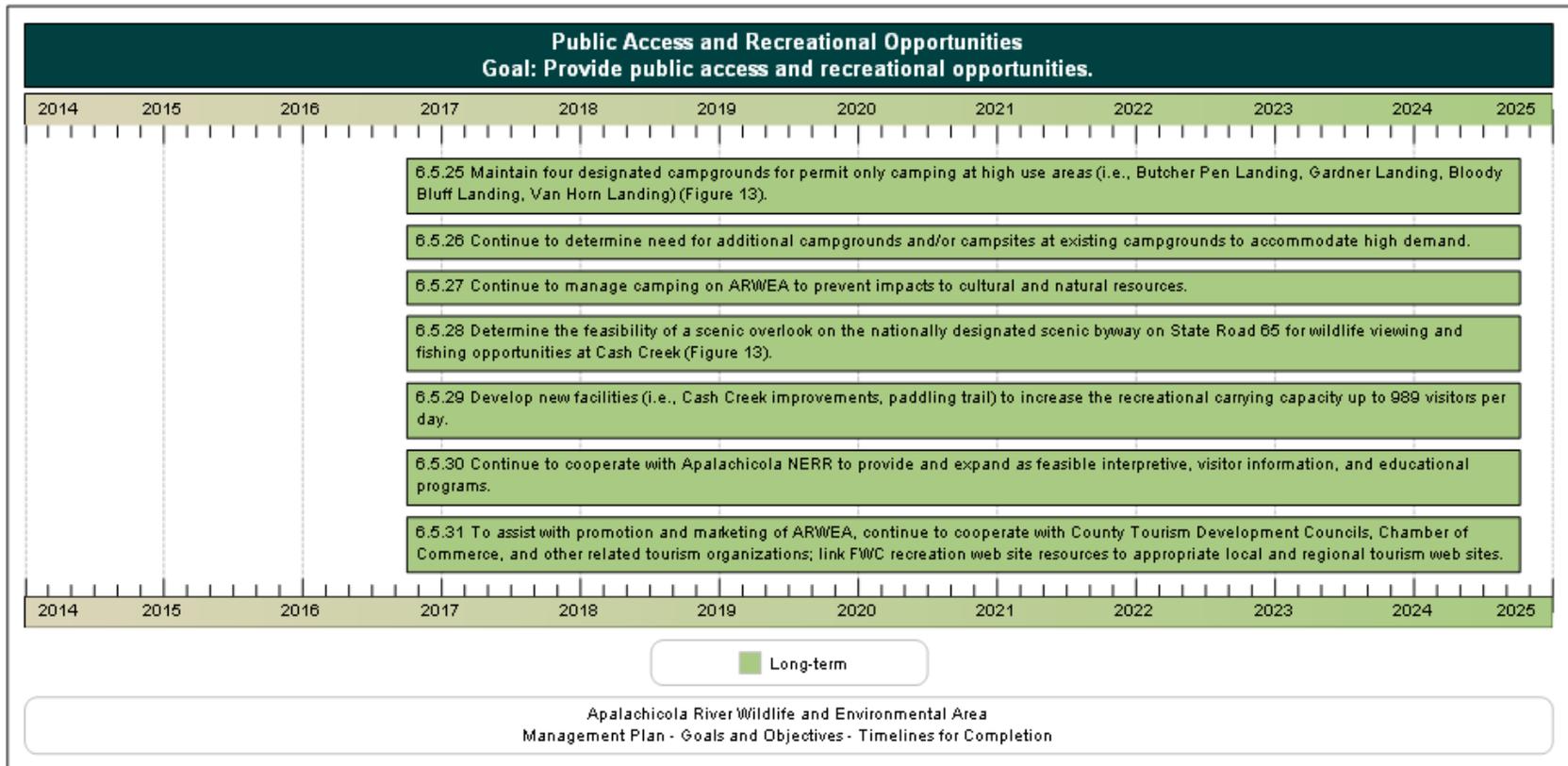


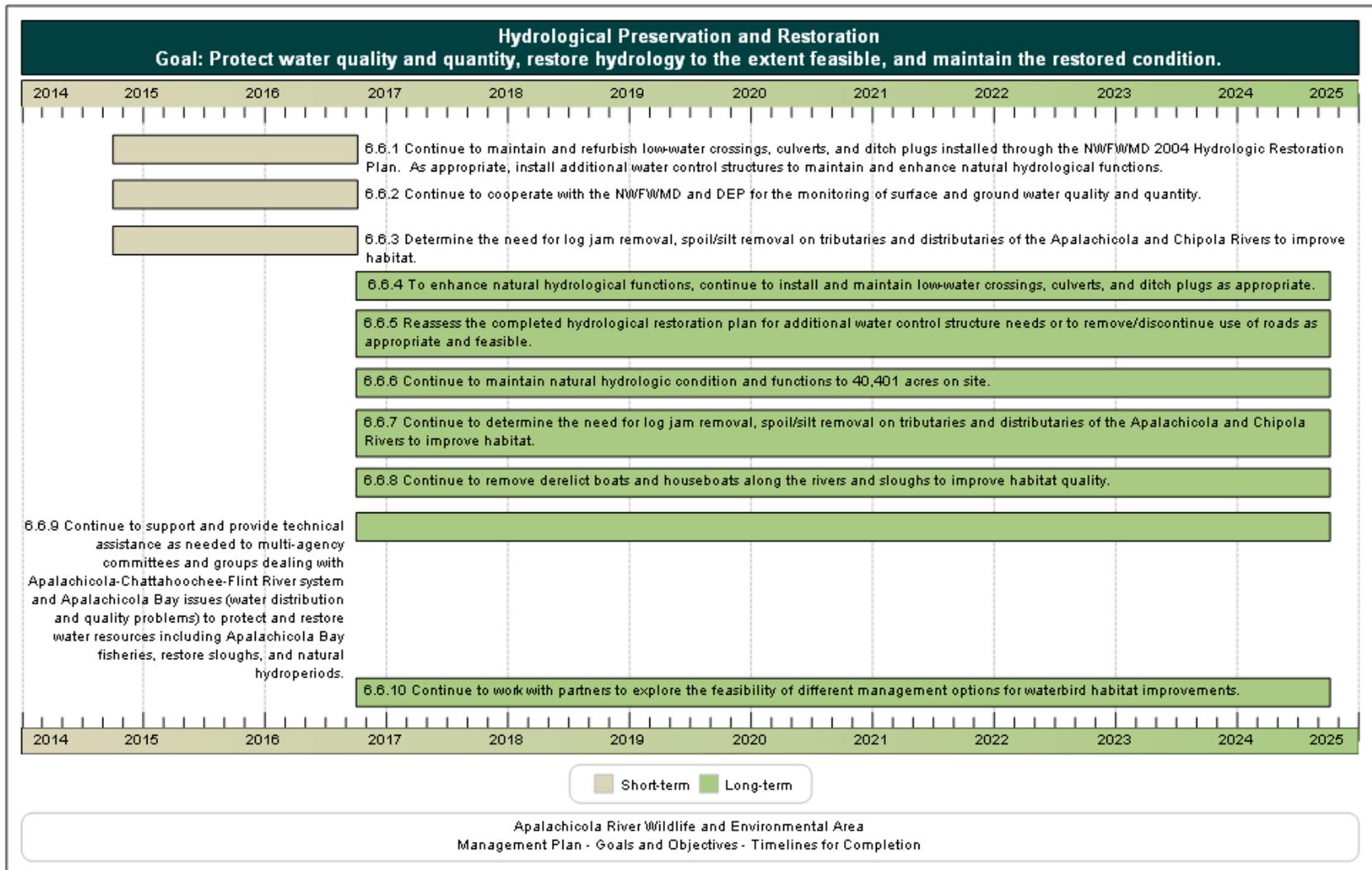


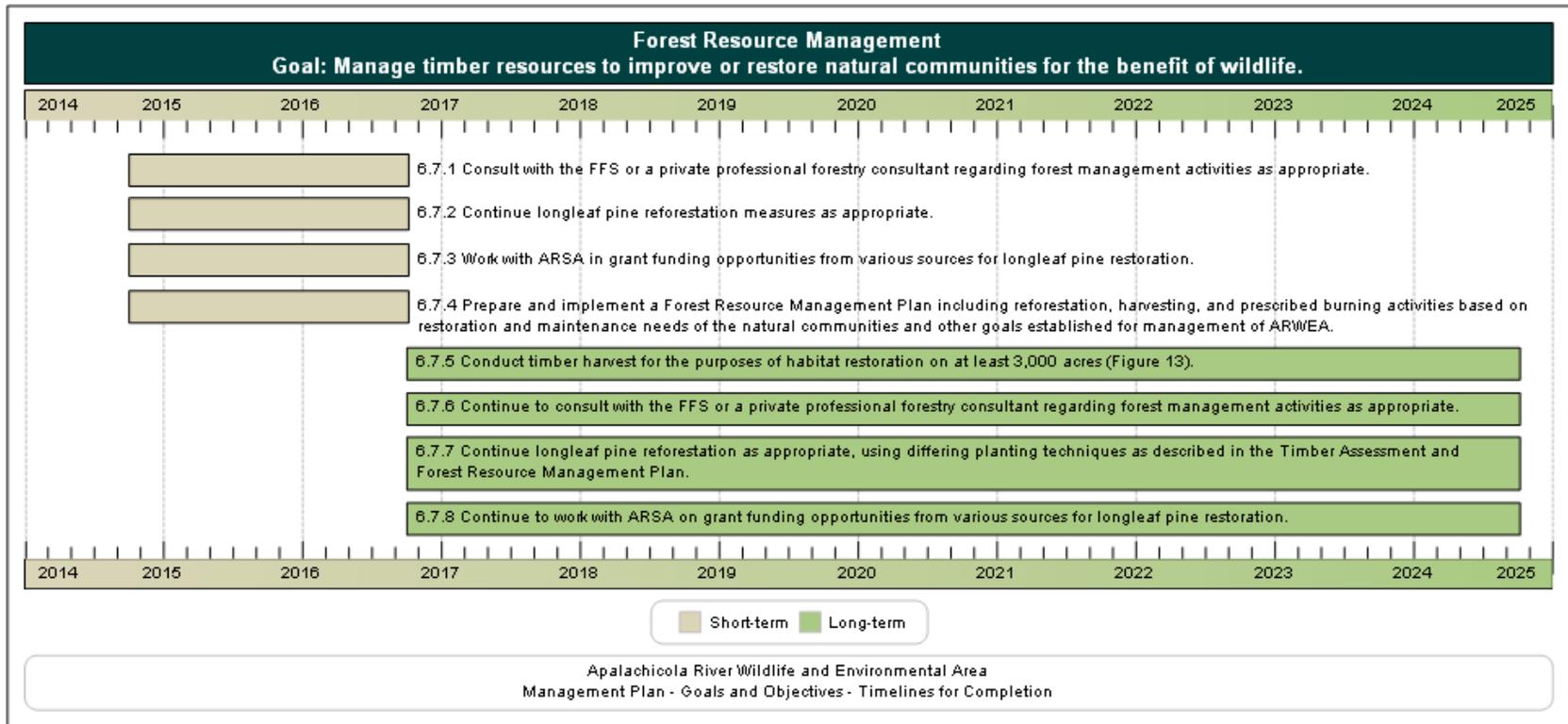


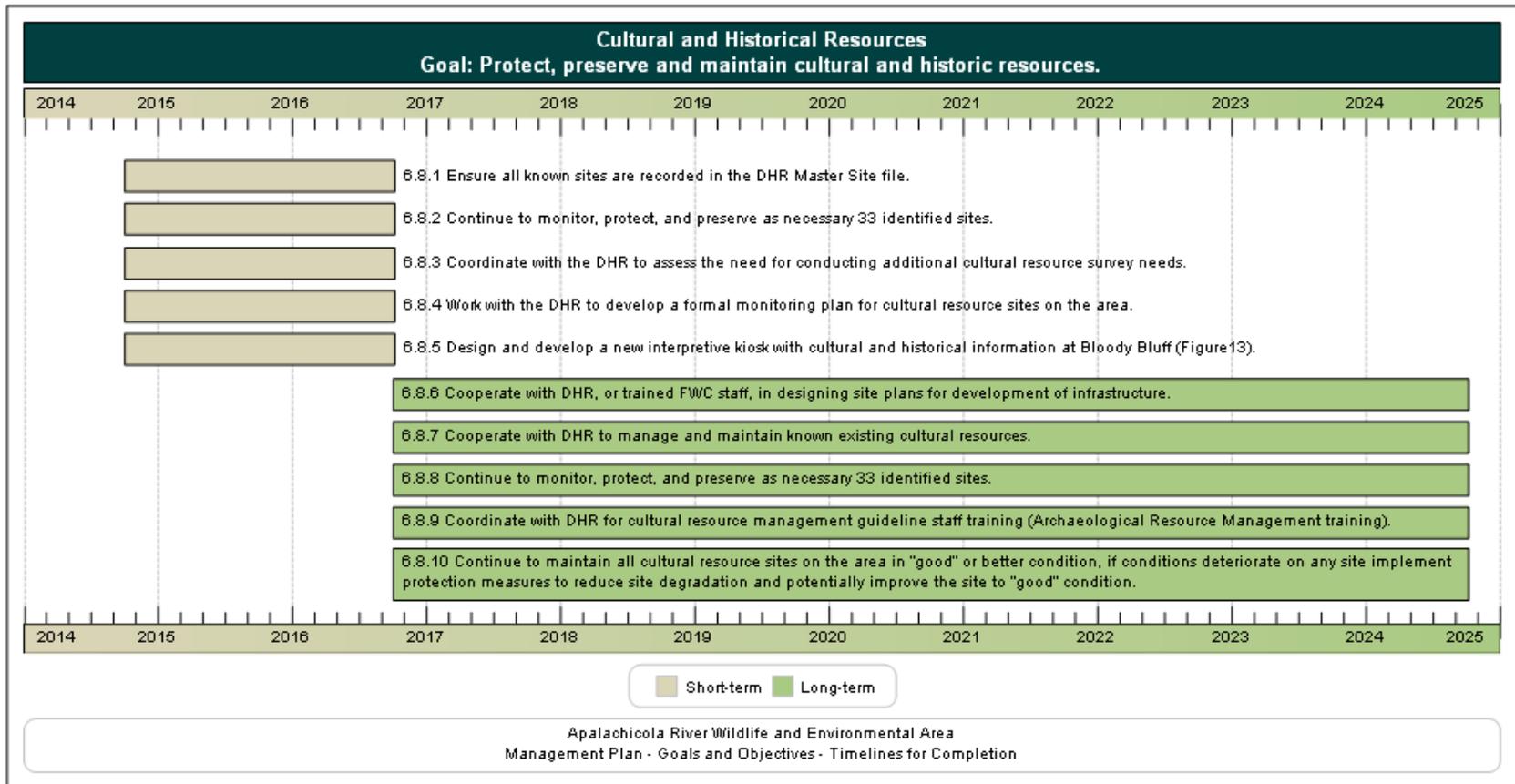


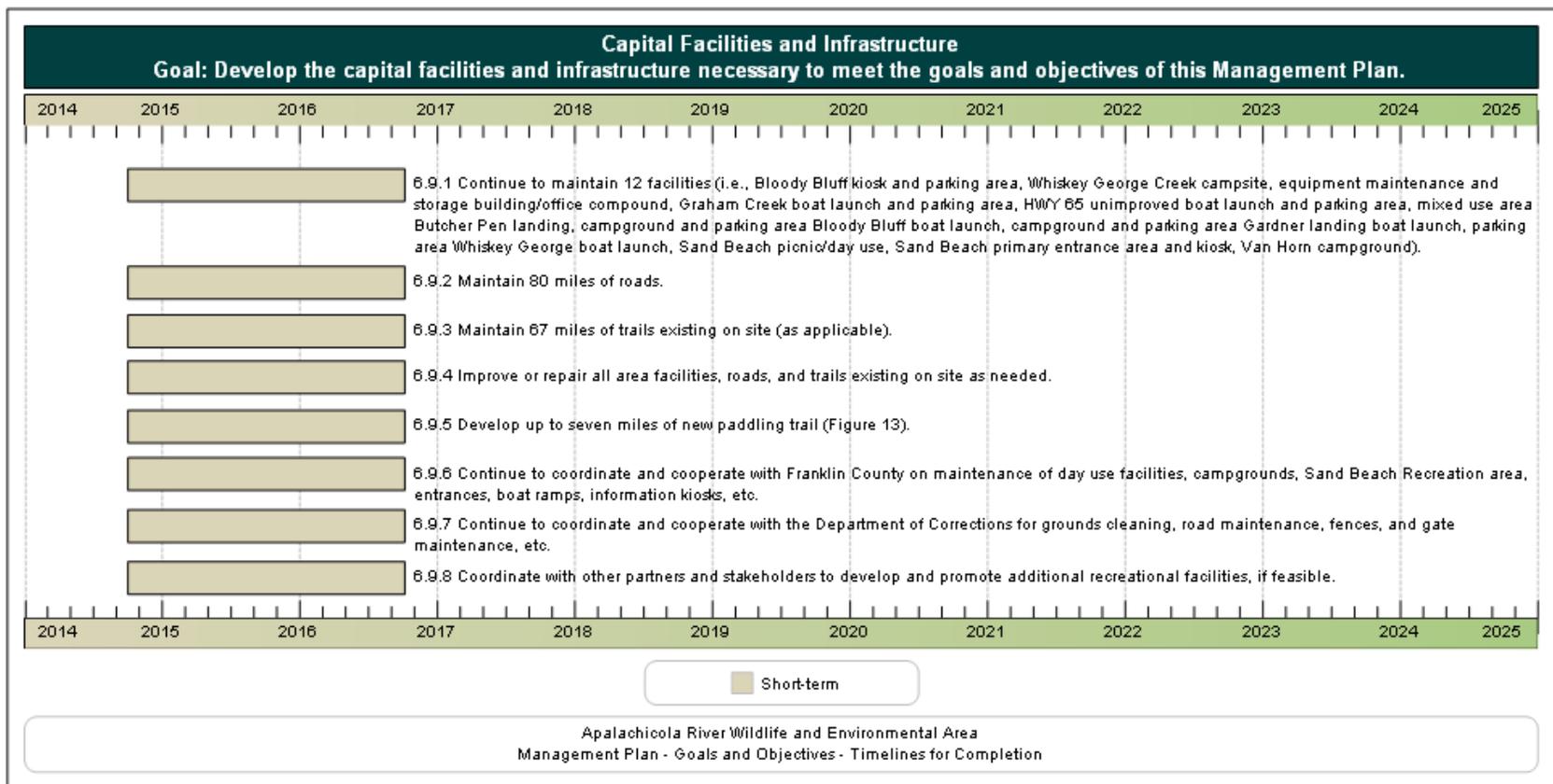


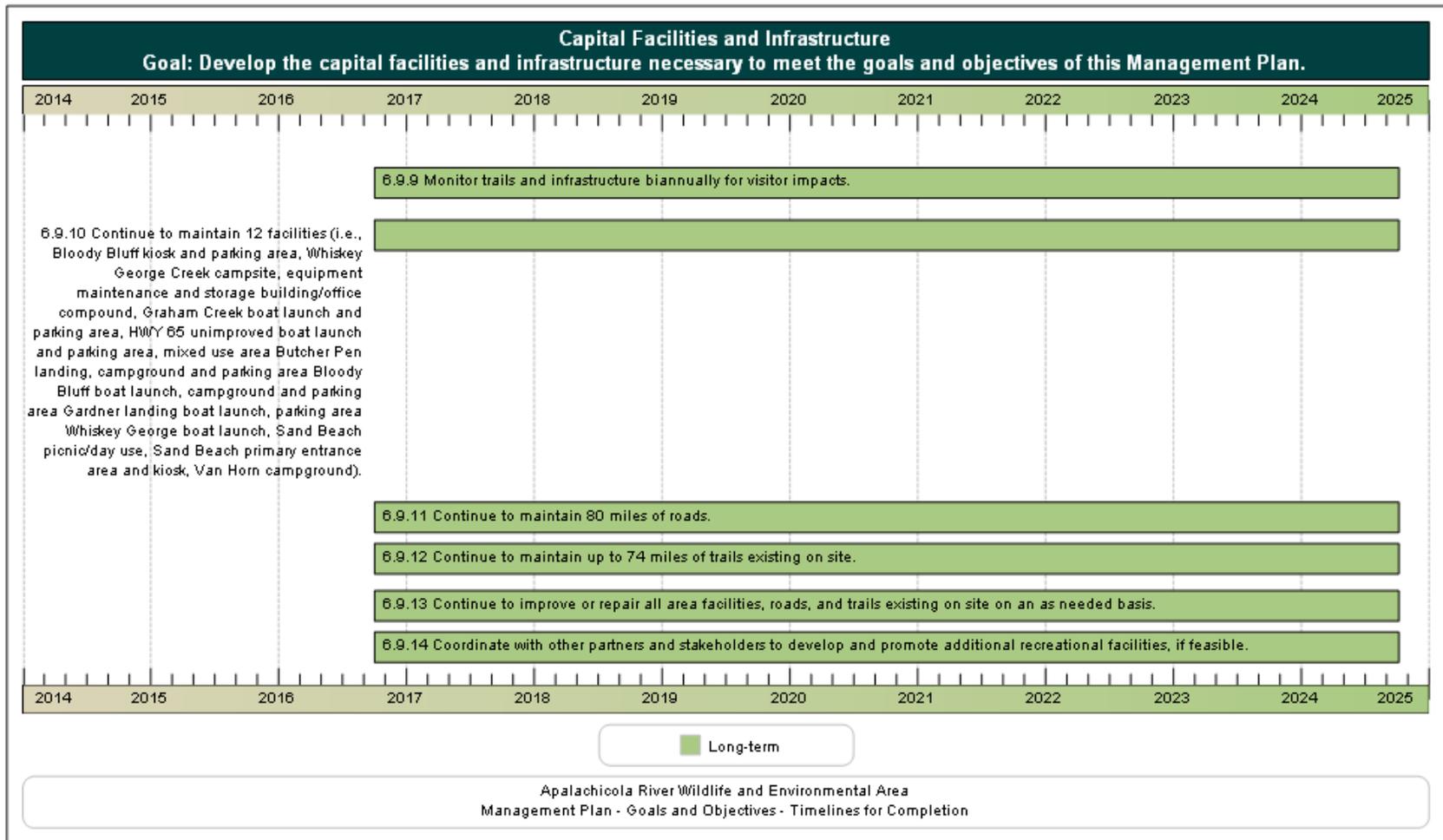


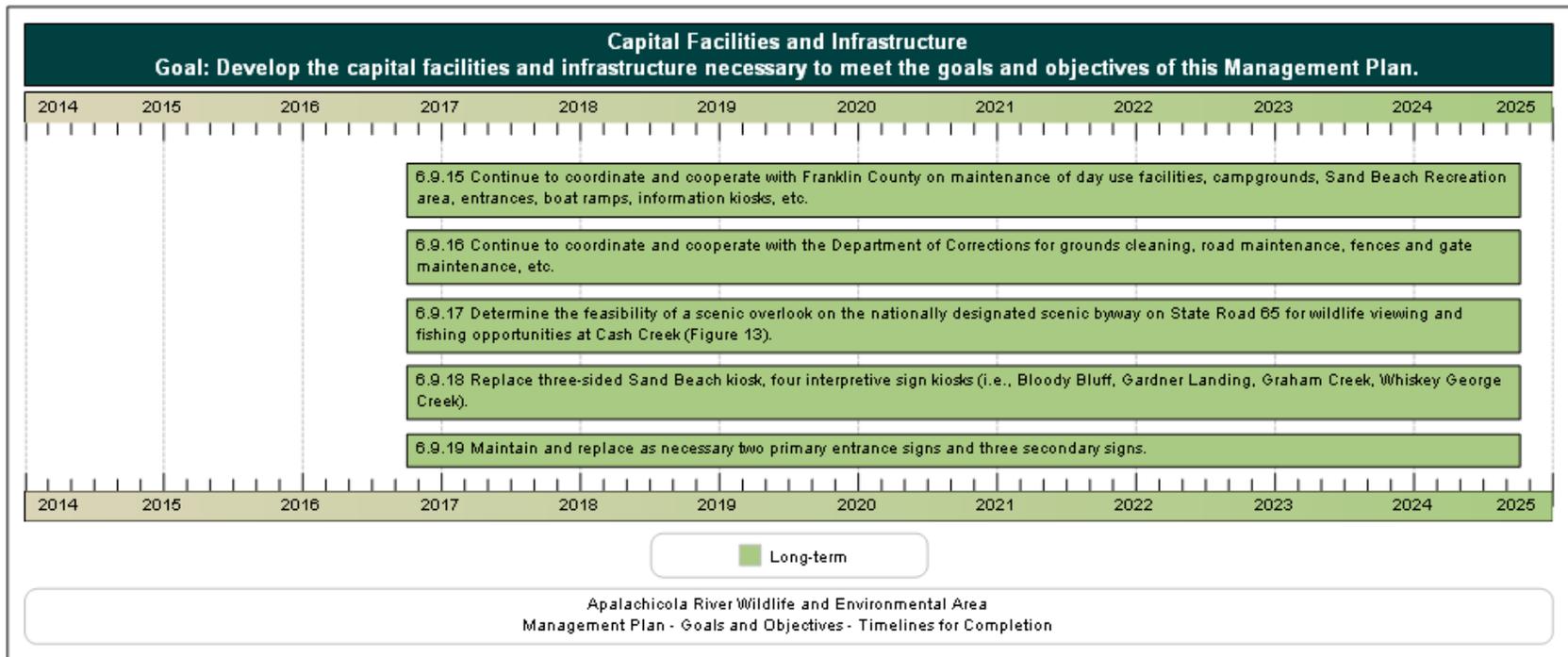


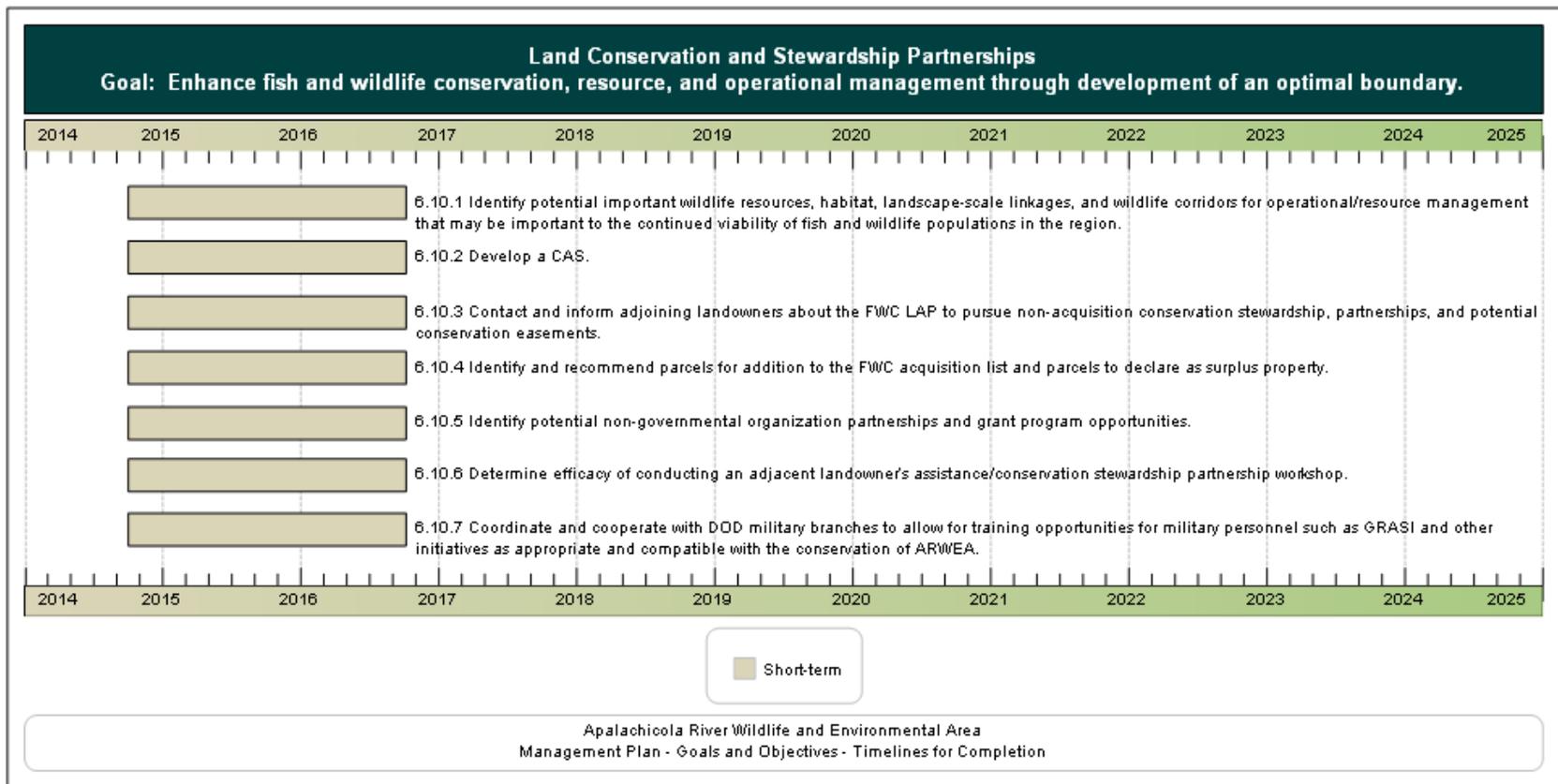


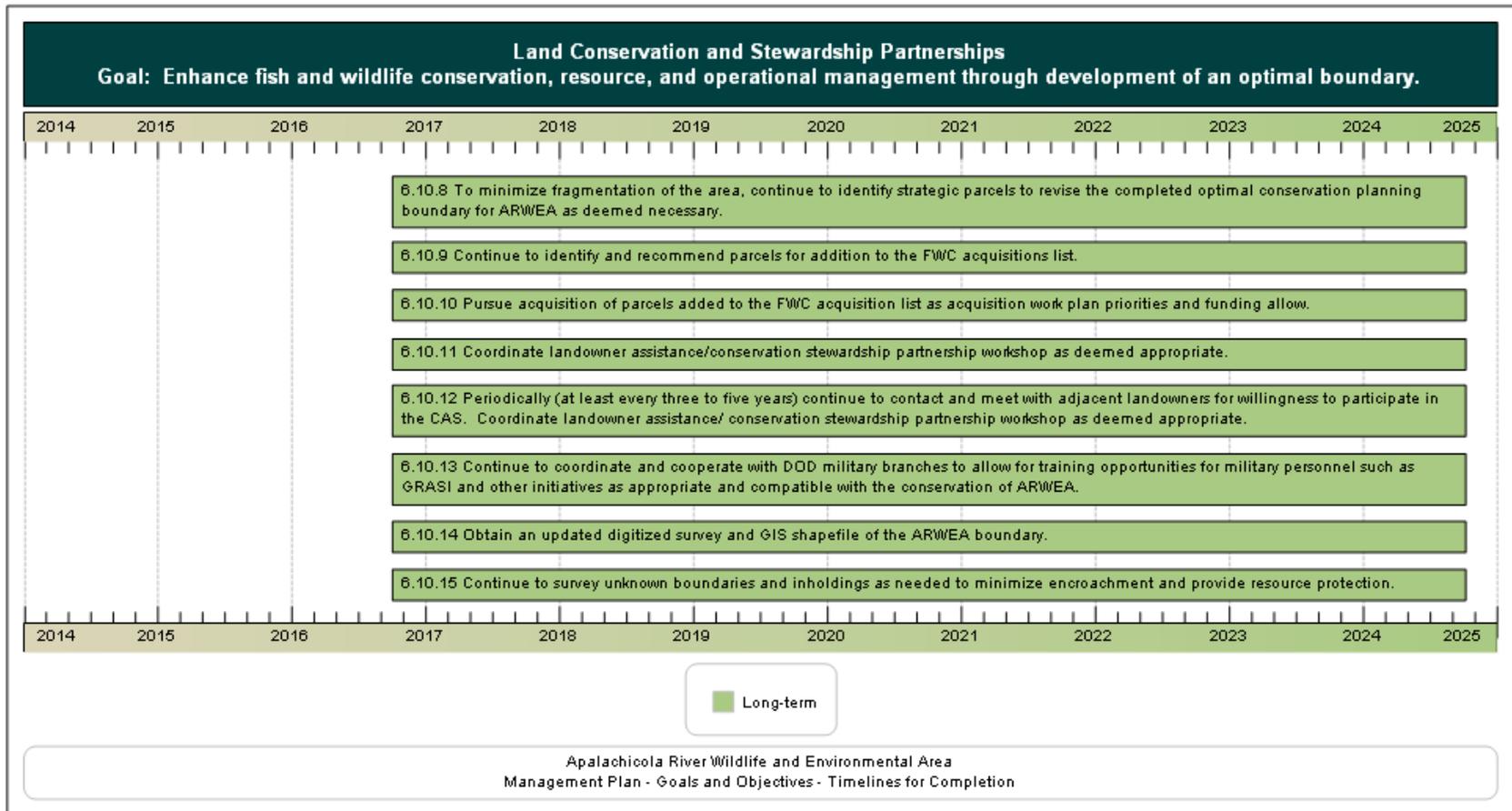


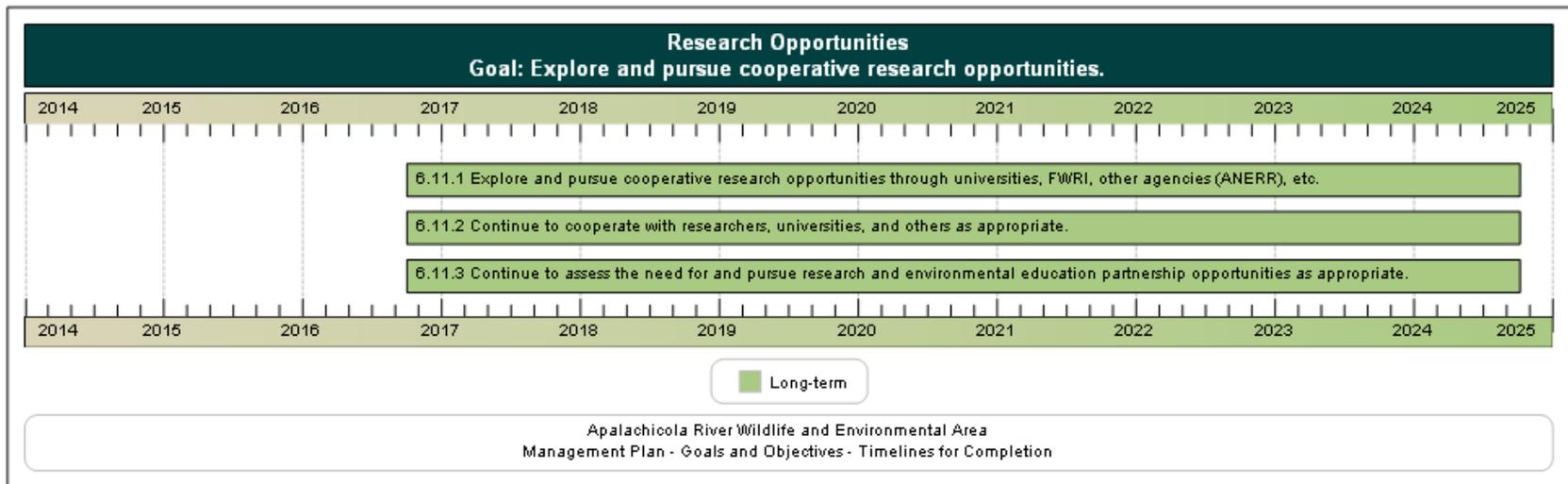


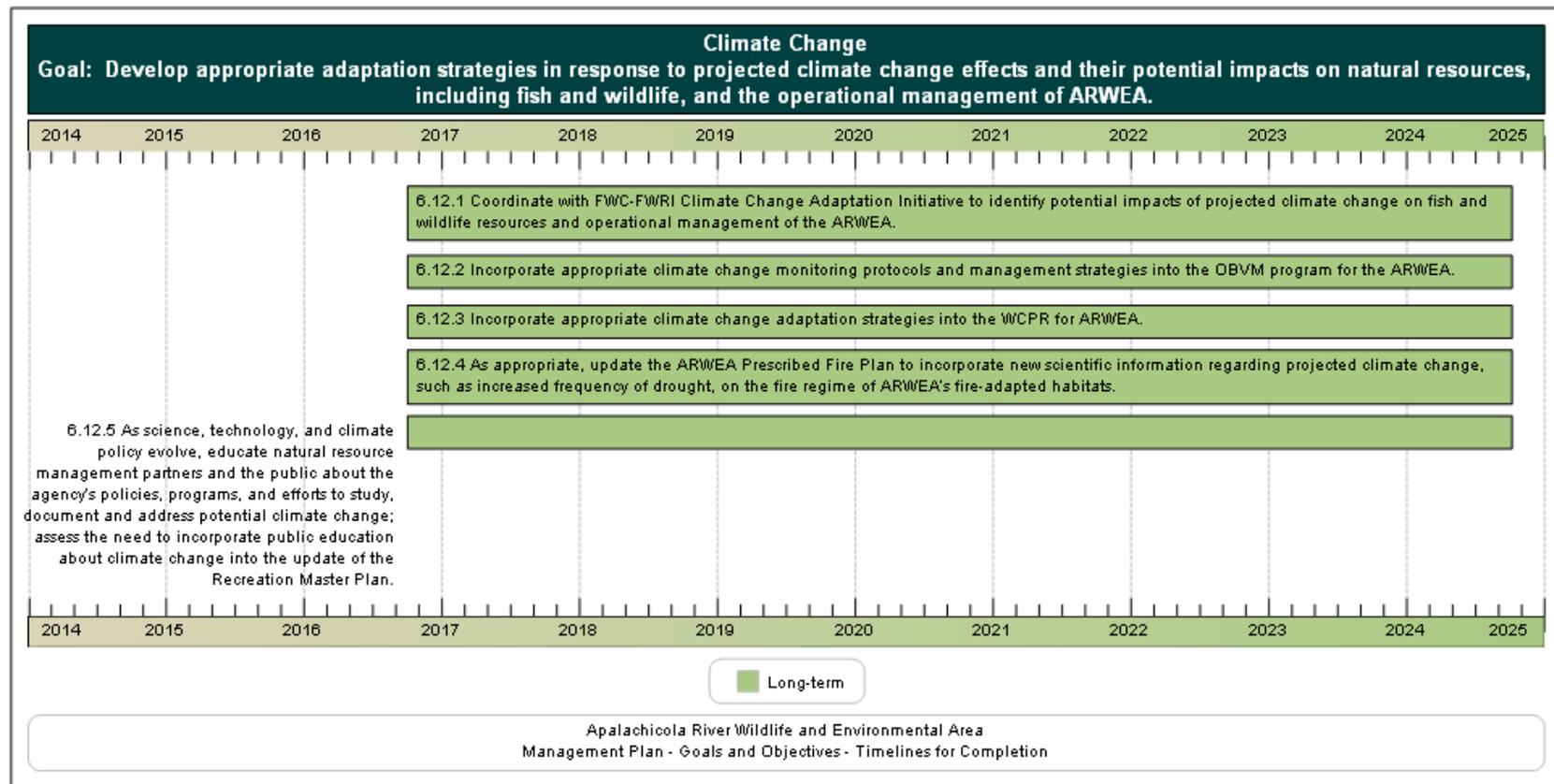












8 Resource Management Challenges and Strategies

The following section identifies and describes further management needs and challenges associated with ARWEA and provides solution strategies that will address these challenges. These specific challenges may not be fully addressed in the broader goals and objectives section above, and are thereby provided here.

8.1 Challenge: There are several prohibited activities occurring on the ARWEA including off-road vehicle travel that have negative impacts on sensitive plant communities and water quality, degrade aesthetic qualities of the area, and damage wildlife species or their habitats

8.1.1 Strategy: Through news media outlets, postings at entrance kiosks, and signage, inform public about these activities and their detrimental effects on the area.

8.1.2 Strategy: Install additional gates and fences/guard rails adjacent to gates as needed to control off-road vehicle access.

8.1.3 Strategy: Improve compliance with designated road regulations through directed law enforcement patrols of problem areas.

8.2 Challenge: Erection of permanent or semi-permanent structures that have negative impacts on sensitive plant communities and water quality, degrade aesthetic qualities of the area, and damage wildlife species or their habitats.

8.2.1 Strategy: Through news media outlets, postings at entrance kiosks, and signage, inform public about these activities and their detrimental effects on the area.

8.2.2 Strategy: Utilize existing regulations and enforcement authority to reduce upland impacts resulting from long-term camping.

8.2.3 Strategy: Continue to coordinate with Franklin and Gulf counties and stakeholders for management of camping areas.

8.3 Challenge: Facility vandalism, dumping/littering that have negative impacts on sensitive plant communities and water quality, degrade aesthetic qualities of the area, and damage wildlife species or their habitats.

8.3.1 Strategy: Through news media outlet, postings at entrance kiosks, and signage, inform public about these activities and their detrimental effects on the area.

8.3.2 Strategy: Improve compliance with designated road regulations, litter laws, and protection of facilities through directed law enforcement patrols of problem areas.

8.4 Challenge: Illegal “deadhead” logging that has negative impacts on sensitive plant communities and water quality, degrades aesthetic qualities of the area, and damages wildlife species or their habitats.

8.4.1 Strategy: Through news media outlets, postings at entrance kiosks, and signage, inform public about these activities and their detrimental effects on the area.

8.4.2 Strategy: Improve compliance of permitted deadhead loggers from illegally removing deadhead logs from non-sovereign lands or from non-submerged riverine habitat through directed law enforcement patrols of problem areas.

8.5 Challenge: Ongoing monitoring and past survey of the riverine floodplain habitat within the area has revealed substantial amount of unpermitted floating structures and their appurtenances, which impact terrestrial and riparian habitats, public access and use, and potential water quality impacts.

8.5.1 Strategy: Continue to cooperate with FDEP, NFWFMD, Law Enforcement, Army Corps of Engineers, USFS, USFWS, Gulf and Franklin counties, etc., in development of effective measures to address potential water quality; terrestrial and riparian disturbance impacts occurring from mooring of floating structures and unpermitted facilities and shoreline appurtenances.

8.6 Challenge: Currently, there is insufficient habitat to sustain viable populations of RCW clusters on ARWEA without depending on populations on adjacent conservation lands.

8.6.1 Strategy: Pursue conservation efforts on lands surrounding or adjacent to ARWEA that have potential for enlarging RCW habitat.

9 Cost Estimates and Funding Sources

The following represents the actual and unmet budgetary needs for managing the lands and resources of ARWEA. This cost estimate was developed using data developed by the FWC and other cooperating entities, and is based on actual costs for land management activities, equipment purchase and maintenance, and for development of fixed capital facilities. Funds needed to protect and manage the property and to fully implement the recommended program are derived primarily from the Conservation and Recreation Lands

Trust Fund and from State Legislative appropriations. However, private conservation organizations may be cooperators with the agency for funding of specific projects. Alternative funding sources, such as monies available through mitigation, may be sought to supplement existing funding.

The cost estimate below, although exceeding what the FWC typically receives through the appropriations process, represents optimal funding necessary to fully implement is consistent with current resource and operational management needs for ARWEA. Cost estimate categories are those currently recognized by the FWC and the Land Management Uniform Accounting Council. More information on these categories, as well as the Fiscal Year 2013-2014 operational plan showing detailed cost estimates by activity and categories of expenditures, may be found in Appendix 13.13.



Aerial ignition during a prescribed burn, FWC



FWC staff during a prescribed burn at ARWEA, FWC

ARWEA Management Plan Cost Estimate

Maximum expected one year expenditure

<u>Resource Management</u>	<u>Expenditure</u>	Priority schedule:
Exotic Species Control	\$146,504	Immediate (annual)
Prescribed Burning	\$95,573	Intermediate (3-4 years)
Cultural Resource Management	\$4,836	<i>Other (5+ years)</i>
Timber Management	\$21,166	
Hydrological Management	\$13,785	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$408,413	
Subtotal	\$690,278	
<u>Administration</u>		
General administration	\$23,004	
<u>Support</u>		
Land Management Planning	\$44,182	
<i>Land Management Reviews</i>	\$0	
Training/Staff Development	\$20,451	
Vehicle Purchase	\$188,611	
Vehicle Operation and Maintenance	\$70,402	
Other (Technical Reports, Data Management, etc.)	\$35,139	
Subtotal	\$358,784	
<u>Capital Improvements</u>		
New Facility Construction	\$0	
Facility Maintenance	\$190,754	
Subtotal	\$190,754	
<u>Visitor Services/Recreation</u>		
Info./Education/Operations	\$59,950	
<u>Law Enforcement</u>		
Resource protection	\$59,860	
Total	\$1,382,631	*

* Based on the characteristics and requirements of this area, 12 full-time equivalent (FTE) positions would be optimal to fully manage this area. All funding is dependent upon annual legislative appropriations.

ARWEA Management Plan Cost Estimate

Ten-year projection

<u>Resource Management</u>	<u>Expenditure</u>	Priority schedule:
Exotic Species Control	\$1,287,199	Immediate (annual)
Prescribed Burning	\$839,718	Intermediate (3-4 years)
Cultural Resource Management	\$42,492	<i>Other (5+ years)</i>
Timber Management	\$185,967	
Hydrological Management	\$121,120	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$3,588,360	
Subtotal	\$6,064,856	
<u>Administration</u>		
General administration	\$202,117	
<u>Support</u>		
Land Management Planning	\$388,185	
<i>Land Management Reviews</i>	\$28,860	
Training/Staff Development	\$179,687	
Vehicle Purchase	\$663,729	
Vehicle Operation and Maintenance	\$618,559	
Other (Technical Reports, Data Management, etc.)	\$308,734	
Subtotal	\$2,187,754	
<u>Capital Improvements</u>		
New Facility Construction	\$370,948	
Facility Maintenance	\$1,675,987	
Subtotal	\$2,046,935	
<u>Visitor Services/Recreation</u>		
Info./Education/Operations	\$526,726	
<u>Law Enforcement</u>		
Resource protection	\$525,940	
<u>Total</u>	\$11,554,328	*

* Based on the characteristics and requirements of this area, 12 FTE positions would be optimal to fully manage this area. All funding is dependent upon annual legislative appropriations.

10 Analysis of Potential for Contracting Private Vendors for Restoration and Management Activities

The following management and restoration activities have been considered for outsourcing to private entities. It has been determined that items selected as “approved” below are those that the FWC either does not have in-house expertise to accomplish or which can be done at less cost by an outside provider of services. Those items selected as “conditional” items are those that could be done either by an outside provider or by the agency at virtually the same cost or with the same level of competence. Items selected as “rejected” represent those for which the FWC has in-house expertise and/or which the agency has found it can accomplish at less expense than through contracting with outside sources:

Approved Conditional Rejected

- | | | |
|---|---|---|
| • Dike and levee maintenance | | ✓ |
| • Exotic species control | | ✓ |
| • Mechanical vegetation treatment | | ✓ |
| • Public contact and educational facilities development | | ✓ |
| • Prescribed burning | | ✓ |
| • Timber harvest activities | ✓ | |
| • Vegetation inventories | | ✓ |

11 Compliance with Federal, State, and Local Governmental Requirements

The operational functions of FWC personnel are governed by the agency’s Internal Management Policies and Procedures (IMPP) Manual. The IMPP Manual provides internal guidance regarding many subjects affecting the responsibilities of agency personnel including personnel management, safety issues, uniforms and personal appearance, training, as well as accounting, purchasing, and budgetary procedures.

When public facilities are developed on areas managed by FWC, every effort is made to comply with Public Law 101 - 336, the Americans with Disabilities Act. As new facilities are developed, the universal access requirements of this law are followed in all cases except where the law allows reasonable exceptions (e.g., where handicap access is structurally

impractical or where providing such access would change the fundamental character of the facility being provided).

Uses planned for ARWEA are in compliance with the Conceptual State Lands Management Plan and its requirement for “balanced public utilization,” and are in compliance with the mission of the FWC as described in its Agency Strategic Plan (Appendix 13.14). Such uses also comply with the authorities of the FWC as derived from Article IV, Section 9 of the Florida Constitution as well as the guidance and directives of Chapters 372, 253, 259, 327, 370, 403, 870, 373, 375, 378, 487, and 597 FS.

The FWC has developed and utilizes Arthropod Control Plans for ARWEA in compliance with Chapter 388.4111 F.S. (Appendix 13.18). These plans were developed in cooperation with the local Gulf and Franklin counties arthropod control agencies. This plan is also in conformance with the Local Government Comprehensive Plans as approved and adopted for Franklin County, Florida and Gulf County, Florida (Appendix 13.19).

12 Endnotes

- ¹ Schneider, J.W., Upchurch S.B., Chen, J., and Cain, C. 2004. Simulation of Groundwater Flow in North Florida and South-Central Georgia. SDII Global Corporation. Tampa, Florida, 3 p.
- ² United States Soil Conservation Service. 1994. Soil Survey of Franklin County, Florida. Available at: <http://ufdc.ufl.edu/UF00026080/00001>
- ³ United States Natural Resources Conservation Service. By J.N. Schuster. 2001. Soil Survey of Gulf County, Florida. Available at: <http://ufdc.ufl.edu/UF00026058/00001>
- ⁴ Northwest Florida Water Management District. 2007. Regional Water Supply Plan: Region V, Franklin and Gulf counties. Havana, Florida. Available at: <http://www.nfwmd.state.fl.us/pubs/rwsp/Region%20V%20RWSP.pdf>
- ⁵ Aldridge, C. L., M. S. Boyce and R. K. Baydack. 2004. Adaptive management of prairie grouse: how do we get there? *Wildlife Society Bulletin* 32:92-103.
- ⁶ Wilhere, G. F. 2002. Adaptive management in Habitat Conservation Plans. *Conservation Biology* 16:20-29.
- ⁷ Walters, C. J. and R. Hilborn. 1978. Ecological optimization and adaptive management. *Annual Review of Ecology and Systematics* 9:157–188.
- ⁸ Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas, Final Report (1999).
- ⁹ Karl, T. R., J. M. Melillo, and T. C. Peterson (Eds.). 2009. *Global Climate Change Impacts in the United States*. Cambridge University Press. New York, NY.
- ¹⁰ McCarty, J. P. 2001. Ecological consequences of recent climate change. *Conservation Biology* 15:320-331.
- ¹¹ Walther, G. R., E. Post, P. Convey, A. Menzel, C. Parmesan, T. J. . Beebee, J. M. Fromentin, O. Hoegh-Guldberg, and F. Bairlein. 2002. Ecological responses to recent climate change. *Nature* 416:389–395.
- ¹² Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. *Annual Review of Ecology, Evolution, and Systematics* 37:637-669.
- ¹³ Logan, J. A., and J. A. Powell. 2009. Ecological consequences of climate change altered forest insect disturbance regimes. In *Climate Warming in Western North America*:

Evidence and Environmental Effects (F. H. Wagner, Ed.). University of Utah Press, Salt Lake City, UT.

- ¹⁴ Stevenson, J. C., M. S. Kearney, and E. W. Koch. 2002. Impacts of sea level rise on tidal wetlands and shallow water habitats: A case study from Chesapeake Bay. *American Fisheries Society Symposium* 32:23-36.
- ¹⁵ IPCC. 2007b. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK.
- ¹⁶ Freeman, K., L. Geselbracht, D. Gordon, E. Kelly, L. Racevskis. 2012. *Understanding Future Sea Level Rise Impacts on Coastal Wetlands in the Apalachicola Bay Region of Florida's Gulf Coast*. The Nature Conservancy for Florida Department of Environmental Protection, DEP Agreement No. CM112.