US Army Corps of Engineers

East Lake Tohopekaliga Drawdown and Habitat Enhancement Draft Environmental Impact Statement

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ABSTRACT

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

April 2019

EAST LAKE TOHOPEKALIGA DRAWDOWN AND HABITAT ENHANCEMENT PROJECT

Osceola County

LEAD AGENCY: Jacksonville District, U.S. Army Corps of Engineers

COOPERATING AGENCIES: U.S. Environmental Protection Agency

COMMENT PERIOD: The public comment period is from April 12, 2019 to May 27, 2019, with the last day for receipt of public comment being May 27, 2019.

For additional information, contact Jeffrey S. Collins, U.S. Army Corps of Engineers, Cocoa Permits Section, 400 High Point Drive, Suite 600, Cocoa, FL 32926. Comments may also be submitted by e-mail to jeffrey.s.collins@usace.army.mil. Questions concerning the Project may be directed to Jeff Collins by phone at 321-504-3771.

This draft environmental impact statement evaluates the environmental effects of alternatives associated with a temporary deviation in the regulation schedule for East Lake Tohopekaliga water levels, 33 Code of Federal Regulations § 222.5, Water Control Management (ER 1110-2-240), thereby allowing a drawdown for the purpose of improving aquatic habitat for fish and wildlife species. Three alternatives are considered: No-Action Alternative; Alternative A-Drawdown and Aquatic Habitat Enhancement with Pumps; and Alternative B (the preferred alternative)-Drawdown and Aquatic Habitat Enhancement with Pumps Leaving Select Natural Areas (i.e., preserve small, intact islands for wildlife use). The drawdown facilitates an integral component of a Florida Fish and Wildlife Conservation Commission project, which includes, littoral zone organic sediment removal operations and in-lake disposal while East Lake Toho water stages are lowered. This activity shall be regulated through the Department of Army, U.S. Army Corps of Engineers (USACE), pursuant to Section 404 of the Clean Water Act, 33 U.S.C. § 1344 and Section 10 of the Rivers and Harbors Act of 1899, 33 U.S.C. § 403, and the USACE will ultimately determine the Least Environmentally Damaging Practicable Alternative. Long-term benefits of the action would include organic sediment and nuisance vegetation reduction; improved recreational fishery habitat and littoral zone water quality conditions; improved Everglade snail kite foraging habitat; and improved navigation and boat access around the lake. Adverse effects and controversial issues include creation of two in-lake spoil islands; potential loss of revenue to local recreational-based businesses during the drawdown; temporary limited boat access, resulting in reduced navigation opportunities, to the lake during the drawdown period due to lower water levels; short-term adverse water

quality effects; and short-term impacts to Everglade sail kite nesting and foraging habitat. Effects on the Everglade snail kite are being assessed through consultation with the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act.

EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) sought Department of the Army (DA) authorization pursuant to Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbor Act of 1899 from the Jacksonville District of the U.S. Army Corps of Engineers (USACE) for activities associated with the proposed drawdown and removal of vegetation and organic material from East Lake Tohopekaliga (East Lake Toho) in order to improve habitat for fish and wildlife. The drawdown and habitat enhancement would require a deviation from The Master Water Control Manual for Kissimmee River-Lake Istokpoga Basin (USACE 1994), which contains the relevant Water Control Plan for East Lake Toho, and a DA permit for proposed fill in waters of the United States.

East Lake Toho is an approximately 11,968-acre lake located in Osceola County, Florida within the Kissimmee Chain of Lakes. Water level stabilization via the construction of water control structures and pollution from watershed development are major contributors to deteriorating aquatic habitat conditions in East Lake Toho which require littoral zone rehabilitation. Negative environmental changes within East Lake Toho include an increase in aquatic plant density and biomass, accumulation of organic sediments, and a shift to invasive species. Decline in coverage of desirable aquatic vegetation negatively impacts the diversity and abundance of forage organisms that depend on these plant communities. In turn, this directly contributes to reduced sport fish production and potentially reduces use of the littoral zone by wading birds for feeding and nesting.

This draft environmental impact statement (EIS) evaluates the environmental effects of alternatives associated with a temporary deviation in the regulation schedule for East Lake Toho water levels, 33 C.F.R. 222.5, Water Control Management Engineering Regulation (ER 1110-2-240), thereby allowing a drawdown for the purpose of improving aquatic habitat for fish and wildlife species. Three alternatives were considered: 1) No-Action Alternative; 2) Alternative A-Drawdown and Aquatic Habitat Enhancement with Pumps; and 3) Alternative B (the preferred alternative) - Drawdown and Aquatic Habitat Enhancement with Pumps Leaving Select Natural Areas (i.e., preserve small, intact islands for wildlife use). The drawdown facilitates an integral component of the FWC proposed project, which includes, littoral zone organic sediment removal operations and in-lake disposal while East Lake Toho water stages are lowered. This activity shall be regulated by the USACE pursuant to Section 404 of the CWA, 33 U.S.C. § 1344, and Section 10 of the Rivers and Harbors Act of 1899, 33 U.S.C. § 403, and the USACE will ultimately determine the Least Environmentally Damaging Practicable Alternative.

A Notice of Intent (NOI) to prepare an EIS for the East Lake Toho Drawdown and Habitat Enhancement Project (Project) was published in the Federal Register on November 3, 2017. The NOI was provided to advise other federal and state agencies, Native American Indian Tribes and the public of the proposed Project. The NOI initiated a 60-day scoping period requesting the public's involvement in the scoping process for preparation of the draft EIS. A public scoping meeting was held at Osceola Heritage Park, Kissimmee, Florida on December 5, 2017.

Issues/concerns raised by the public during the scoping process included:

- Possible impacts to wading birds and Everglade snail kites
- Long-term lake management should include more frequent organic matter removal and vegetation treatment
- Limitations on boater access to the lake during the drawdown period
- Economic effects to lake-related businesses
- Impacts to endangered species such as the Everglade snail kite
- Water quality effects of organic matter removal and spoil island creation
- Water quality concerns from the use of herbicides to control undesirable vegetation
- Potential drawdowns of retention ponds within East Lake Toho's cone of influence for the area north of lake
- Economic impacts stemming from limitations on lake access for Boggy Creek air boat operators during the drawdown period

Comments received from the public were generally favorable of the Proposed Action, although concern was expressed about the potential for visual intrusion with the creation of two spoil islands in East Lake Toho.

Purpose and Need: Lake drawdown and habitat enhancement alternatives have been identified and evaluated to address problems associated with degraded aquatic habitat that has occurred in East Lake Toho as a result of long-term stabilized water levels and watershed development.

Major Findings and Opportunities: Long-term benefits of the Project would include organic sediment and nuisance vegetation reduction; improved recreational fishery habitat and littoral zone water quality conditions; improved Everglade snail kite foraging habitat; and improved navigation and boat access around the lake. Adverse effects and controversial issues include the creation of two in-lake spoil islands; potential loss of revenue to local recreational-based businesses during the drawdown; temporary limited boat access resulting in reduced navigation opportunities to the lake during the drawdown period; short-term air quality degradation; short-term adverse water quality effects; and short-term impacts to Everglade snail kite nesting and foraging habitat. Effects on Everglade snail kite are being assessed through consultation with the U.S. Fish and Wildlife Service, pursuant to Section 7 of the Endangered Species Act.

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ACRONYMS

B

BA	Biological Assessment
BEBR	Bureau of Business and Economic Research
BMP	Best Management Practice
BOD	Biological Oxygen Demand

C

C	Centigrade
C&SF	Central and Southern Florida
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
cfs	Cubic Feet per Second
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRAS	Cultural Resources Assessment Survey
CSSA	Critical Smoke Sensitive Area
CVM	Contingent Valuation Method
CWA	Clean Water Act

D

DA	Department of the Army
dB	Decibel
dBA	A-weighted Decibel

E

East Lake Toho	East Lake Tohopekaliga
EIS	Environmental Impact Statement
E.O.	Executive Order
EPA	Environmental Protection Agency
ER	Engineering Regulation
ESA	Endangered Species Act

F

FDEP	Florida Department of Environmental Protection
F.S.	Florida Statue
FTE	Full Time Employee
FWC	Florida Fish and Wildlife Conservation Commission
FWO	Future without Project

G

GHG	Greenhouse Gas
GIS	Geographic information system

I

ISMP	Imperiled Species Managed Plan
IWR	Institute for Water Resources

K

kg	Kilograms
KRRP	Kissimmee River Restoration Project

L

lb	Pounds
LEDPA	Least Environmentally Damaging Practicable Alternative
LORS	Lake Okeechobee Regulation Schedule
LOSOM	Lake Okeechobee System Operating Manual
LVORI	Low Visibility Occurrence Risk Index

M

MBPA	Migratory Bird Protection Act
mph	miles per hour
MSA	Metropolitan Statistical Area

N

NED	National Economic Development
NEPA	National Environmental Policy Act of 1969
NGVD29	North Geodetic Vertical Datum 1929
NHD	National Hydrography Dataset
NOI	Notice of Intent

O

OSE	Other Social Effects
OSHA	Occupational Safety and Health Administration

P

PCB	Polychlorinated biphenyls
Project	East Lake Tohopekaliga Drawdown and Enhancement Project
pvc	polyvinyl chloride

R

RCRA	Resource Conservation and Recovery Act
RECONS	Regional Economic System
RED	Regional Economic Development
ROD	Record of Decision

S

SFEC	South Florida Engineering and Consulting LLC
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Office
STOF	Seminole Tribe of Florida

T

TCM	Travel Cost Method
TKN	Total Kjeldahl Nitrogen
TP	Total Phosphorus

U

UMAM	Uniform Mitigation Assessment Method
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	US Fish and Wildlife Service

W

WBID	Water Body Identification Number
WTP	Willingness to pay

1 PROJECT PURPOSE AND NEED

1.1 INTRODUCTION

The Florida Fish and Wildlife Conservation Commission (FWC) seeks Department of the Army (DA) authorization pursuant to Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbor Act of 1899 from the Jacksonville District of the U.S. Army Corps of Engineers (USACE) for activities associated with the proposed drawdown and removal of vegetation and organic material from East Lake Tohopekaliga (East Lake Toho) to improve habitat for fish and wildlife. The drawdown and habitat enhancement would require a deviation from The Master Water Control Manual for Kissimmee River-Lake Istokpoga Basin (USACE 1994), which contains the relevant regulation schedule for East Lake Toho, and a DA permit for proposed fill in waters of the United States.

This Draft Environmental Impact Statement (EIS) for the Proposed Action, the East Lake Toho Drawdown and Habitat Enhancement Project (Project), has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and NEPA-implementing regulations issued by the President's Council on Environmental Quality (CEQ), 40 Code of Federal Regulations (C.F.R.) § 1500–1508; USACE provisions for implementing the procedural requirements of NEPA (33 C.F.R. 230, USACE Engineering Regulation (ER) 200-2-2); and 33 C.F.R. Part 325, Appendix B *National Environmental Policy Act Implementation Procedures for the Regulatory Program* (USACE 2000). The purpose of this draft EIS is to inform decision makers and the public of the potential environmental impacts from implementing the East Lake Toho drawdown and habitat enhancement Proposed Action and its alternatives and to identify the agency's Preferred Alternative. The draft EIS will be used by federal officials to make informed decisions.

This section provides background information about East Lake Toho, the need for rehabilitation, the purpose of and need for the proposed federal action (i.e., issuance of a permit), describes the purpose and need for the underlying Proposed Action, describes the public and agency involvement process for preparation of the EIS, and documents the decision(s) to be made.

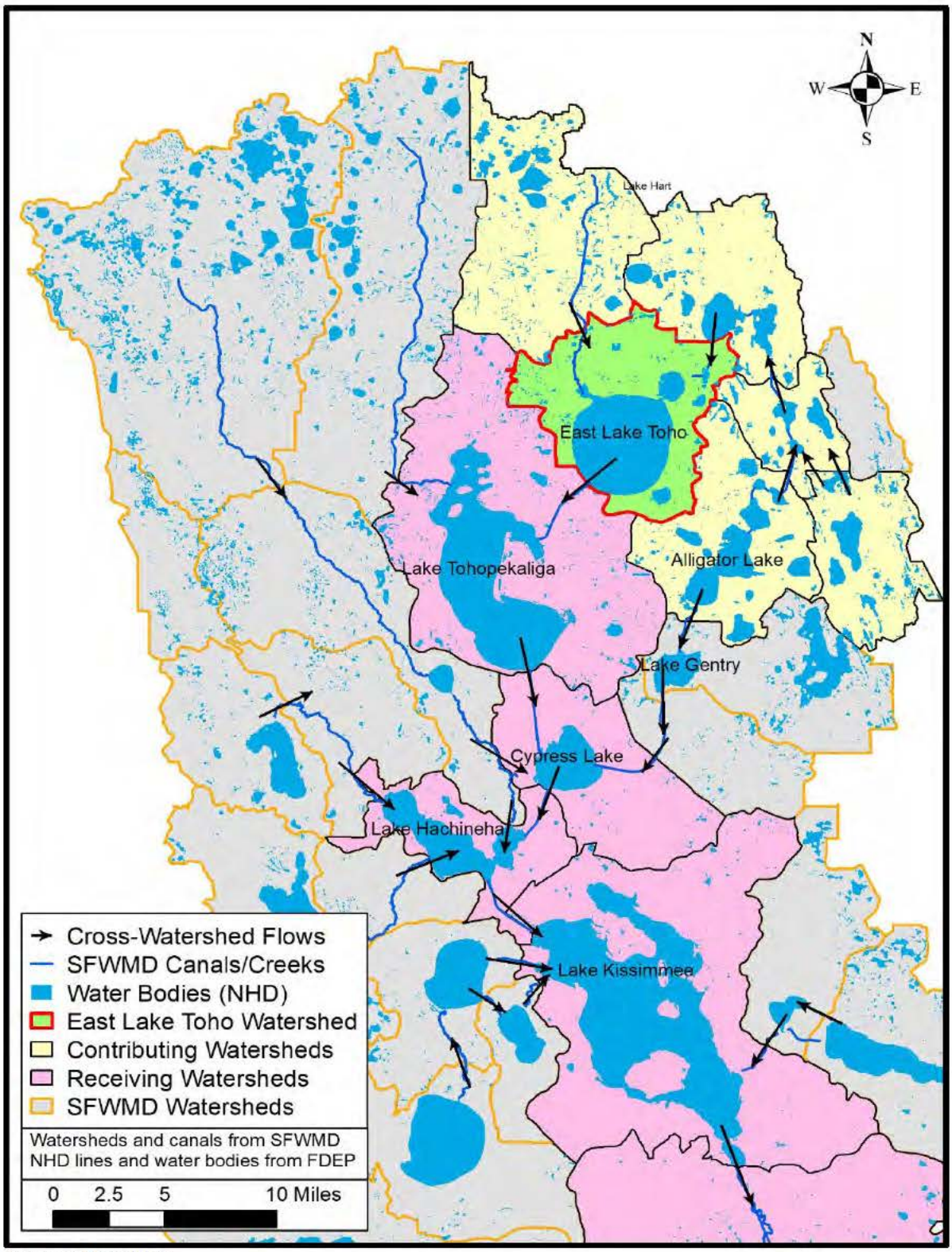
1.2 PROJECT BACKGROUND

East Lake Toho is an approximately 11,968-acre lake located in Osceola County, Florida within the Kissimmee Chain of Lakes. Water level stabilization via construction of water control structures and pollution from watershed development are major contributors to deteriorating aquatic habitat conditions in East Lake Toho which require littoral zone rehabilitation. Negative environmental changes within East Lake Toho include an increase in weedy aquatic plant density and biomass, accumulation organic sediments, and a shift to invasive species. Section 3.2 *East Lake Toho Historical Conditions* (containing a description of the water level stabilization effort, including photographs of pre and post water level stabilization). Decline in coverage of desirable aquatic vegetation negatively impacts the diversity and abundance of forage organisms that depend on these plant communities. In turn,

this directly contributes to a reduced sport fish production and potentially reduces use of the littoral zone by wading birds for feeding and nesting.

A habitat restoration project was previously implemented in East Lake Toho in December 1989 (FWC 1991) and lasted for approximately eight months. The extreme drawdown coupled with organic sediment removal, burning and disking was used to restore aquatic habitat which had severely deteriorated due to long-term stabilization of water levels. This lake management effort implemented by FWC restored 357 hectares of lake-bottom along with 22.4 kilometers of lakeshore. Approximately 305,000 cubic meters of organic sediments was scraped and hauled from the lake's littoral zone, particularly along the western shore.

Figure 1-1 depicts the East Lake Toho watershed, surrounding watersheds and the general water flow direction.



Source: SFEC 2018a
Key: SFWMD = South Florida Water Management District; NHD = National Hydrography Dataset; FDEP = Florida Department of Environmental Protection

FIGURE 1-1 EAST LAKE TOHO WATERSHED AND FLOW DIRECTION

1.3 PURPOSE AND NEED

In accordance with NEPA, an EIS "shall briefly specify the underlying purpose and need to which the agency is responding." 40 C.F.R. § 1502.13. When considered together, the "purpose" and the "need" for the project define the basic parameters for identifying the range of alternatives to be considered in the EIS. Pursuant to NEPA, 33 C.F.R. § 325, Appendix B, Section 404 of the CWA, and the associated Section 404(b)(1) Guidelines, 40 C.F.R. Part 230, the USACE is charged with examining the underlying goals or purpose of a project from three perspectives: 1) the Applicant's stated purpose and need (i.e., FWC's stated purpose and need); 2) the "basic" project purpose as defined by the USACE specifically for addressing a project's water dependency; and 3) the "overall" project purpose, which is defined by the USACE and is used to develop a range of alternatives for analysis. Pursuant to 33 C.F.R. § 325, Appendix B, when defining the purpose and need for a project, "while generally focusing on the applicant's statement, the USACE will in all cases, exercise independent judgment in defining the purpose and need for the project from both from the applicant's and the public's perspective."

1.3.1 Applicant's Purpose and Need Statement

The Project would allow FWC to address the degraded habitat conditions of East Lake Toho through water-level drawdown, vegetation spray and burn, soil and vegetation scraping and the creation of spoils islands within the lake. Water level stabilization achieved through the construction of numerous water control structures within the Kissimmee Chain of Lakes has had a negative effect on the littoral zone of East Lake Toho. In places, a discontinuous strip or berm of organic sediments has formed along the eastern lakeshore, filling the water column or even rising above it. These densely vegetated berms, combined with lakeward areas of aquatic plants such as pickerelweed and cattail, can form barriers that prevent fish from utilizing these shallow spawning areas. Stabilization of East Lake Toho's water levels has contributed to the rapid growth of dense vegetation in this nearshore aquatic habitat. Accumulated organic material can break away during sever weather conditions forming tussocks or floating islands. The berms, tussocks and dense vegetation can reduce fish, wading bird, waterfowl and other wildlife access to the littoral zone. The reduced presence of desirable aquatic vegetation negatively impacts diversity and abundance of forage organisms which in turn contributes to a reduced sports fishery and may result in less frequent use of the littoral zone by wading birds. The negative impacts of water level stabilization are further compounded by excessive nutrient input resulting from watershed development and rapid population growth.

1.3.2 USACE Project Purpose and Need Statement

1.3.2.1 USACE Basic Project Purpose and Water Dependency

The basic project purpose is aquatic habitat improvement. In general, aquatic habitat improvement does not necessarily require siting of fill in a special aquatic site. Therefore, USACE finds that the basic project purpose is not water dependent.

While the Project is not water dependent, USACE may authorize the discharge of dredged or fill material into waters of the United States where it is determined that the proposed project: 1) is

the least environmentally damaging practicable alternative and complies with other Section 404(b)(1) guidelines requirements, 2) is not contrary to the public interest, and 3) complies with all other applicable regulatory requirements.

1.3.2.2 USACE's Overall Project Purpose

Consistent with 33 C.F.R. § 325 Appendix B and NEPA, 40 C.F.R. § 1502.13, USACE has carefully considered the applicant's stated purpose and need and has determined the agency's own underlying project purpose and need which drives the analysis of alternatives, including the Proposed Action evaluated in this draft EIS. The overall purpose of the proposed activity is the improvement of littoral zone fish and wildlife habitat in East Lake Toho.

1.4 PROPOSED ACTION SUMMARY

FWC is pursuing authorization from USACE to conduct a temporary drawdown of East Lake Toho to remove vegetation and organic material for purposes of littoral zone habitat enhancement. FWC proposes to drawdown East Lake Toho from 57.0 National Geodetic Vertical Datum (NGVD) feet to 53.0 NGVD feet. Four pumps (with combined capacity of 400 cubic feet per second [cfs]) are proposed to drain East Lake Toho. Pumps are required because gravity-fed conveyance becomes inefficient as the lower East Lake Toho stage (i.e., 55 feet NGVD) approaches that of Lake Tohopekaliga. The proposed drawdown would begin in October or November 2019 and work would be conducted during February through May 2020, with the refill initiated in June 2020. Other proposed activities include:

- Modification of the East Lake Toho regulation schedule as established by the USACE Water Control Plan, to allow a temporary deviation in water levels.
- Installation of sheet piling in the canal between East Lake Toho and Lake Runnymede. These constructed elements may be necessary to maintain normal lake stages upstream of the canals.
- Approximately 112 acres of littoral zone would be mechanically scraped along the east shore and consolidated into two approximately two acres in-lake spoil islands. Woody vegetation within the scrape zone would be piled and burned.
- A total of approximately 200 acres of vegetation (primarily cattail) on the western and northern shores would be sprayed with herbicide and subsequently burned.

1.4.1 Connected Actions

At this time, it is not known if connected actions would occur but other actions that could occur prior to the drawdown include the following:

- Maintenance of near-shore littoral zone vegetation and individual lakefront homeowner lake-access channels. While interest in such work was expressed by property owners during public scoping, these actions are ill-defined and do not depend on the current EIS to occur. No permit applications have been received by USACE for future access channel dredging. Depending on the method of removal, a permit may not be required for vegetation maintenance.

- Maintenance of the Chisholm Park and St. Cloud Lakefront Park public access boat ramp channels. These actions could occur prior to, or during the drawdown and are not dependent on the Proposed Action to be completed. In fact, a permit authorization was issued by USACE for the St. Cloud Lakefront Park dredging on March 31, 2017 (SAJ-2012-01887); the work would be performed during the spring of 2019. A permit application has not been received by USACE for Chisholm Park dredging.
- Maintenance of the East Lake Fish Camp boat ramp access channel. Interest was expressed but it is currently uncertain if such maintenance work will occur. A permit application has not been received by USACE for this activity.

1.4.2 Scope of Analysis

The USACE scope of analysis describes which portions of the overall Project the USACE will evaluate pursuant to NEPA as the area subject to cumulative federal control and responsibility. This is the geographic limit of the review and environmental analysis under NEPA, and thus to be presented in the EIS.

USACE federal involvement for a DA permit decision for the Project is limited pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. However, due to the required deviation from the East Lake Toho regulation schedule, and other regulatory authorities such as Section 7 of the Endangered Species Act (ESA), Section 106 of the National and the Historic Preservation Act the expansive cumulative federal control and responsibility would also require an expanded NEPA scope. On this basis, the NEPA scope of analysis for this EIS is the entire project area as described in Section 2, and shown on Figure 2-1. This area is further defined by the summation of the spatial boundaries for resource analyses which are described within the resource section of Section 3 *Affected Environment and Environmental Consequences.* For some resource areas, such as soils and geology, the spatial scope of analysis is limited to disturbance within the project area. For other resource areas, such as water quality and socioeconomics, the spatial scope of analysis encompass broader areas surrounding the project components including downstream communities.

The NEPA scope of temporal analysis for the Project is generally limited to three years for most future resources. However, it could be up to 30 years for wetland and vegetation resources based on the anticipated duration of project benefits. The scope of the cumulative impacts analysis is discussed in Section 4 *Cumulative Impacts*.

1.5 PUBLIC AND AGENCY INVOLVEMENT

1.5.1 Public Outreach and Scoping

A Notice of Intent (NOI) to prepare an EIS for the East Lake Toho Project was published in the Federal Register on November 3, 2017. Appendix A. The NOI was provided to advise other federal and state agencies, Native American Indian Tribes and the public of the proposed Project. The NOI initiated a 60-day scoping period requesting the public's involvement in the scoping process for preparation of the draft EIS. A public scoping meeting was held at Osceola Heritage Park, Kissimmee, Florida on December 5, 2017. No formal oral comments were

offered by members of the public and only two comment cards were received at this meeting. Appendix A.

However, a number of written comments were submitted during the 60-day scoping period. The following issues and concerns were identified from the comments received from members of the public:

- Possible impacts to wading birds and Everglade snail kites (hereafter referred to as snail kite)
- Long-term lake management should include more frequent organic matter removal and vegetation treatment
- Boater access to the lake during the drawdown period
- Economic effects to lake related businesses
- Impacts to endangered species, such as the snail kite
- Water quality effects of organic matter removal and spoil island creation
- Water quality concerns during use of herbicides to control undesirable vegetation
- General appearance of the two spoil islands
- Potential drawdown of retention ponds within East Lake Toho's cone of influence for area north of lake
- Boggy Creek air boats may not have access to lake during drawdown period – need to document economic impact

Comments received from the public were generally favorable of the Proposed Action, although concern was expressed about the potential for visual intrusion with the creation of two spoil islands in East Lake Toho. Members of the public expressed interest in having the Project extended to include their properties or inquired as to how to proceed with various activities on their own properties during the drawdown period (e.g., vegetation clearing and installation of boat docks).

1.5.2 Agency Coordination

USACE coordinated and consulted with federal and state agencies seeking input on the development of alternatives to be evaluated in the draft EIS and the issues and concerns for which detailed effects analyses were conducted. USACE engaged in the following agency coordination activities:

- A site visit was conducted by boat on November 1, 2017. The site visit provided an opportunity for the participants to understand the need for proposed weirs in Lake Runnymede and Fells Cove. Viewing of the scrape areas encouraged discussion of proposed spray-and-burn operations. Possible effects to threatened and endangered species were discussed, as were access issues for business and recreational users.
- An Agency Coordination Meeting was held December 5, 2017, at Osceola Heritage Park in Kissimmee, Florida. This meeting included a review of the proposed project components, project alternatives, NEPA process, communication protocols, the draft EIS outline and critical schedule milestones.

As a result of the Agency Coordination Meeting, several changes were made to the preliminary EIS outline and all parties agreed that the drawdown of East Lake Toho would not start if snail kites were observed nesting. Agency representatives noted potential interactions with the Kissimmee River Restoration Project (KRRP) upon refilling East Lake Toho depending on timing and hydrologic conditions. State agency representatives expressed concern that lowering water levels in East Lake Toho may have downstream effects on Lake Okeechobee water levels and discharge to neighboring estuaries. The Florida State Historic Preservation Office (SHPO) and the Seminole Indian Tribe expressed concerns regarding cultural resources and recommended site surveys. The possibility that the drawdown and subsequent organic removal may disturb unknown archaeological resources located within the East Lake Toho was also of concern.

1.5.3 Cooperating and Participating Agencies

The following federal, state and local agencies requested to be either cooperating or participating agencies for this NEPA analysis process, including development of the draft EIS:

Cooperating Agencies

- U.S. Environmental Protection Agency (Letter from EPA confirming their participation as a cooperating agency is contained in Appendix A).

Participating Agencies

- U.S. Fish and Wildlife Service
- Florida Fish and Wildlife Conservation Commission
- Florida Department of Environmental Protection
- South Florida Water Management District
- Osceola County
- City of St. Cloud

Input received from cooperating and participating agencies during the scoping process changed the Proposed Action and added a companion component to the proposed Project. FWC decided not to install sheet piling between East Lake Toho and Fells Cove. This decision was a result of an assessment of the low risk of vegetated tussocks or islands being released from Fells Cove into East Lake Toho and based on field observations (SFEC 2018a) that found few organic sediments in the interior of Fells Cove and a likelihood that any thicker nearshore organic sediments would be held back by nearshore berms. Additionally, the City of St. Cloud agreed to dredge the access canal of the City Marina and boat ramp prior to drawdown of East Lake Toho as a companion project to provide boat access during the drawdown period (assuming funding availability). A U.S. Environmental Protection Agency (EPA) representative noted that a water quality monitoring plan similar to that conducted for the Lake Tohopekaliga drawdown should be designed and implemented in conjunction with the planned Project.

1.6 U.S. Army Corps of Engineer's Authorizations

USACE is preparing this draft EIS in accordance with NEPA, CEQ, 40 C.F.R. §§ 1500-1508. A primary purpose of a USACE regulatory program is to provide disclosure of the significant

impacts of an application seeking a DA permit on the human and natural environment. The EIS will be used to inform the public and agency decision makers of alternatives to an applicant's project that may avoid or minimize impacts or enhance the quality of the human environment.

Subsequent to completion of the final EIS, USACE will determine whether to issue a DA permit to FWC for the East Lake Toho drawdown and habitat enhancement. This decision will be based on the statutory and regulatory permit issuance criteria under Section 404 CWA and Section 10 of the Rivers and Harbor Act of 1989.

As part of the permit decision-making process, USACE has undertaken and will undertake the following actions.

1.6.1 Prepare Draft EIS and Final EIS

Under NEPA, a draft EIS and final EIS are required. These documents disclose potential impacts associated with the applicant's proposed project and a range of alternatives. USACE obtained public and agency input in creating this draft EIS, and will evaluate each analysis of adverse or beneficial effects on the human and natural environment. The alternatives and impact analysis in these documents will provide a basis for ultimately determining compliance with the Section 404(b)(1) guidelines. USACE is neither an opponent nor a proponent of the applicant's proposal.

1.6.2 Modify the East Lake Toho Regulation Schedule

The proposed drawdown would require a deviation to the East Lake Toho regulation schedule, as established in the Water Control Plan. The FWC has submitted a request to USACE, which would be evaluated concurrent with the draft EIS.

1.6.3 Prepare a Record of Decision

The USACE will prepare a record of decision (ROD) documenting the agency's findings and stating whether the permit is denied or granted, based on the findings of the following:

1.6.3.1 Determine Compliance with the Section 404(b)(1) Guidelines

Under 40 C.F.R. 230 Subpart B, the USACE's evaluation of the Project will use four determinations to conclude if the Project complies with the Section 404(b)(1) guidelines. The first of these determinations results in identification of the least environmentally damaging practicable alternative. Key to this determination is that the USACE cannot issue a permit for a project if there is a practicable alternative which would have less adverse impact, so long as the alternative does not have other notable adverse environmental consequences. The remaining determinations establish whether other applicable laws would be violated, whether the discharge would cause or contribute to the degradation of waters of the United States, and whether steps have been taken to minimize potential adverse impacts. The 404(b)(1) guidelines evaluation document (ROD) draws on the alternatives and impact analyses developed in the draft EIS and final EIS, with a focus on the specific decision-making framework required by

the Section 404(b)(1) guidelines. USACE will also consider the potential impacts and associated mitigation to inform its permit decision.

1.6.3.2 Conduct a Public Interest Review

USACE will evaluate FWC's application against the public interest factors. 33 C.F.R. § 320.4(a). Evaluation of the impacts which the Project may have on the public interest requires a careful weighing of all factors relevant to each proposal. Weighing these factors allows USACE to determine whether the Project is contrary to the public interest. In addition to evaluation of the public interest factors, USACE must consider the extent of the public/private need for the proposal, the practicability of using reasonable alternative locations and methods if there are unresolved conflicts as to resource use, and the extent and permanence of the beneficial and/or detrimental effects of the proposal.

1.6.3.3 Make a Permit Decision

If the decision is to deny the permit, discharge of fill material into waters of the United States would not be allowed. If the decision is to issue a permit for one of the two action alternatives described in Section 2 *Alternatives*, the permit would describe the Project, any conditions, and the mitigation required. FWC would be given the opportunity to review the permit and conditions, and to decide whether to accept all terms and conditions therein or to appeal the decision.

The Proposed Action, through the USACE permit review requires consultation under Section 7 of the ESA and Section 106 of the National Historic Preservation Act. Additionally, the Proposed Action would involve evaluation for compliance with the Section 404 (b)(1) Guidelines of the CWA; Section 401 of the CWA, and the Clean Air Act. The proposed drawdown would also require a deviation to the East Lake Toho regulation schedule, as established in the Water Control Plan.

2 ALTERNATIVES

Section 102(2)(E) of NEPA, 42 U.S.C. § 4332(2)(E), requires federal agencies to develop, study and describe alternatives for any proposal with the potential to affect the human environment. This following section describes the process that USACE used to determine the scope of alternatives considered in this draft EIS, the alternatives that will be evaluated in detail, including the No-Action Alternative and the two action alternatives. It also describes the other alternatives considered but eliminated from further study. Based on the information and analysis presented in Section 3 *Affected Environment and Environmental Consequences*, this section presents a summary of the beneficial and adverse effects of all alternatives in comparative format, providing a clear basis for choice among the alternatives. And it explains the rationale for the selection of the preferred alternative.

2.1 APPROACH TO ALTERNATIVE DEVELOPMENT AND SCREENING

Prior to consideration and screening of the alternatives for the Project, two studies were conducted by FWC and SFWMD which significantly influenced the selection of the Proposed Action Alternatives. These studies included consideration of upland disposal options and different lake drawdown scenarios.

Study 1: Upland Disposal Options

FWC conducted a desktop study to determine if suitable upland disposal sites would be available to accommodate the spoil generated by removal of organic sediments from the eastern shore littoral zone of East Lake Toho. FWC estimated that a parcel of land greater than 120-acres would be required to accommodate the approximately 100,000 to 125,000 cubic yards of spoil that would be generated by the Project. For purposes of screening potential sites, FWC selected a distance of three miles from East Lake Toho's access site (i.e., boat ramp at Chisholm Park) to limit the search for suitable sites. This decision was based on results of a transportation cost analysis performed for FWC that determined the cost of transporting a cubic yard of spoil one mile would be $2.94 and up to $11.29 for transporting the same quantity of spoils five miles. These costs were developed based on a full work day of loading and unloading a dump truck with a capacity of 16.5 cubic yards, allowing 15 minutes to load and unload and driving 20 miles per hour (mph). Transporting the spoils material to an upland site would actually require two separate loading and unloading operations as the spoils material must first be loaded within the scrap area and then transferred to a separate transport truck for accessing public highways. Based upon this progressively increasing transport cost, FWC decided to limit the search for a disposal site to a distance of approximately three miles from the lake's access site within Chisholm Park.

Ten parcels of land (see Appendix E for a listing and map of these ten sites) were identified by FWC as potentially suitable for upland disposal; the viability of each site was determined. Of the ten land parcels none were found to be acceptable for a variety of reasons, including sites were under development, sites substantially covered with wooded forest or wetland habitat, and landowners' unwillingness to accept spoils material (Appendix E).

During the public scoping period, a letter was received from the counsel for Plaza Lakes, LLC, the property south of Boggy Creek and immediately north of the Kissimmee Bay Country Club. It indicated that Plaza Lakes, LLC might be willing to receive spoil from the Project and further noted that the company had previously received spoil from past lake management efforts. However, after obtaining information regarding the project schedule, the land owner decided against receipt of any spoils material. A more detailed explanation for the elimination of upland disposal as a project component is provided in Section 2.5 *Alternatives Considered but Eliminated from Further Consideration.*

Study 2: Drawdown Scenarios

In 2017, SFWMD conducted a modeling exercise to estimate the pump size that would be required to implement an East Lake Toho drawdown; the approximate dates that the pumps would be required under various scenarios; and how much Lake Tohopekaliga would have to be lowered to meet the East Lake Toho drawdown target by gravity alone (i.e., without pumps). Results of this report are provided in Appendix C.

In June 2018, staff from USACE and FWC met to screen options for each Project component and then combined practicable option(s) for each component into project alternatives for detailed analysis. The approach used to screen project components was to review detailed design/technical information regarding each component and select the practicable options in terms of costs, technical feasibility, logistics and impacts to listed species (snail kites) to achieve the intended purpose of the Project. For example, meeting participants discerned that upland disposal of the spoil material was not a viable option because none of the ten land parcels within the three miles of the lake access site were available and transporting costs beyond the three-mile-radius was almost four times as expensive as creating the two in-lake spoil islands (i.e., transportation cost of $2.94/cubic yard of organic sediment to create spoil islands versus a transportation cost of up to $11.29/cubic yard for upland disposal beyond three miles). USACE concluded that, creating a disposal island at each end of the linear strip along the eastern shoreline of East Lake Toho (i.e., the area of proposed organic sediment removal) was practicable option for long-term management of organic sediments. This screening process was then completed for each of the Project components listed below:

- Lake drawdown scenarios
- Areas for mechanical organic sediment removal
- Spoil disposal
- Equipment staging area
- Aquatic vegetation and spray areas
- Modification of regulation schedules
- Separation of adjacent water bodies (i.e., Fells Cove and Lake Runnymede)

After screening the project components, practicable options for each component was combined to create two Action Alternatives. The three alternatives selected for detailed analysis were the No-Action Alternative and two action alternatives: Alternative A (Proposed Action) and Alternative B (Proposed Action that includes preservation of selected natural habitat areas) as described below. No alternatives were considered involving the management of East Lake

Toho in a different manner, through permanent changes in the regulation schedule, solely to improve littoral zone habitat for fish and wildlife. Fish and wildlife were previously considered in development of the Master Water Control Manual for Kissimmee River-Lake Istokopoga Basin (USACE 1994). Additionally, give the expense of drawdowns and lengthy return interval between drawdowns, more passive alternatives (e.g., drawdown with aquatic weed spraying and burning only) were not considered so that maximum environmental benefit could be achieved in the drawdown effort.

2.2 NO-ACTION ALTERNATIVE

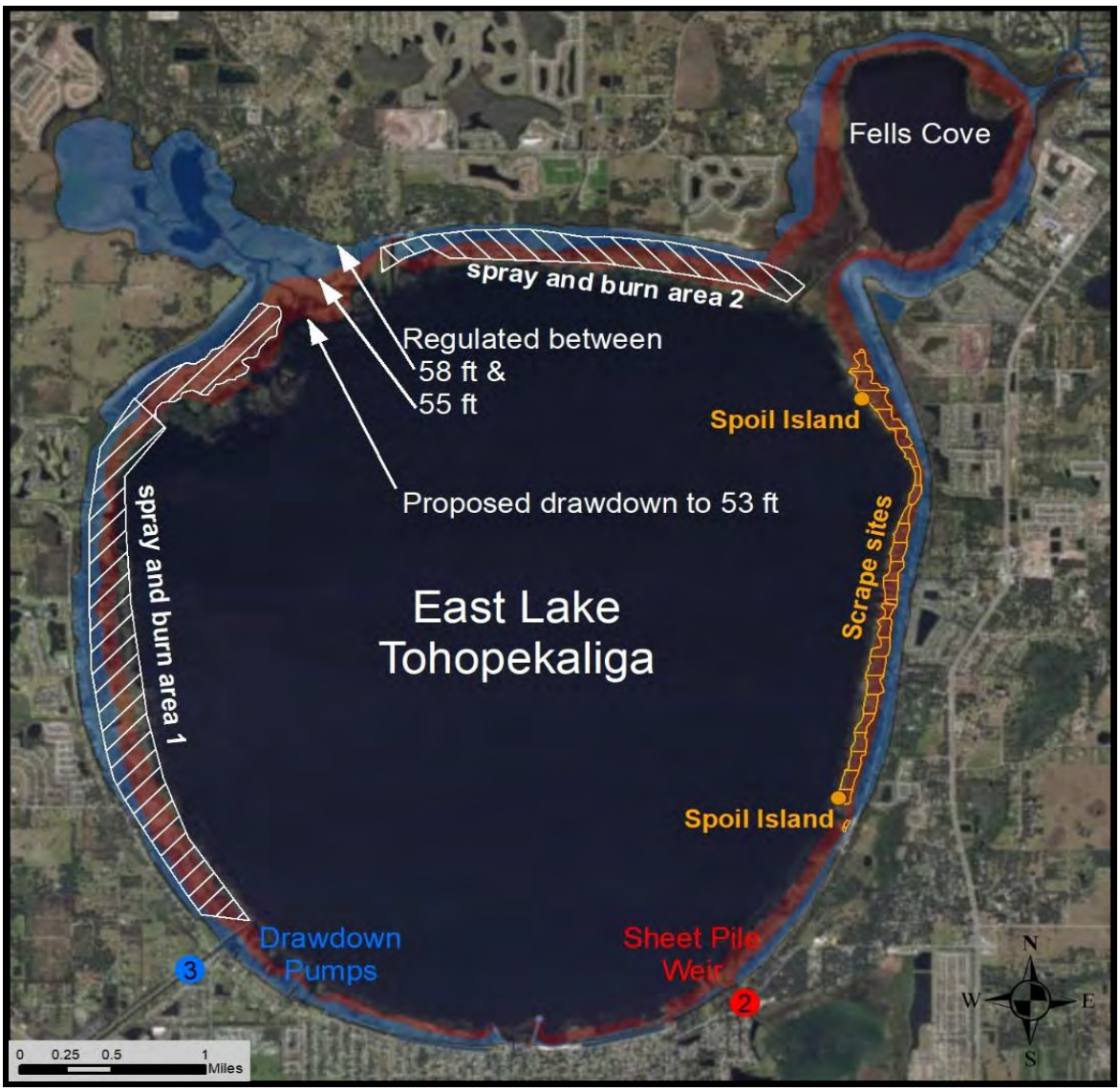
The No-Action Alternative assumes that no project would be implemented. This would be the expected future condition of East Lake Toho should the requested Section 404 and Section 10 authorizations not be approved and the East Lake Toho drawdown and habitat enhancement activities were not undertaken. Under the No-Action Alternative, the purpose and need of the Project would remain unmet, and degraded conditions in East Lake Toho would most likely continue and become increasingly worse.

2.3 ALTERNATIVE A

Project activities associated with drawdown and habitat enhancement of East Lake Toho as part of Alternative A are described below.

2.3.1 East Lake Toho Drawdown

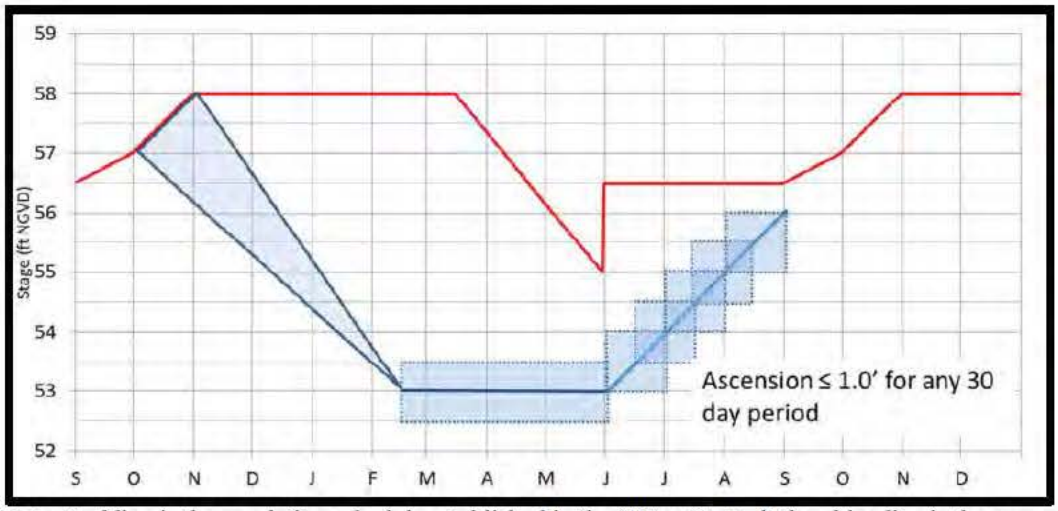
FWC proposes to drawdown East Lake Toho from 57.0 NGVD feet to 53.0 NGVD feet. The lake drawdown would temporarily increase the area of the littoral zone which dries beyond the current regulation schedule by 875 acres (Figure 2-1, maroon shading). This would be a temporary condition to accomplish removal of vegetation and organic sediments for purposes of littoral zone wildlife habitat enhancement. Four pumps with a combined capacity of 400 cfs are proposed to be placed at Water Control Structure S-59 to drain East Lake Toho (Figure 2-1, reference number 3). Pumps are necessary, because gravity-fed conveyance becomes inefficient as the lower East Lake Toho stage approaches that of Lake Tohopekaliga (SFWMD 2017). The drawdown would affect water levels in Fells Cove and Lake Ajay to the north. This activity would expose an additional 249 acres (Figure 2-1, maroon shading) beyond the area exposed under the existing schedule (Figure 2-1, blue shading).



Source: SFEC 2018a

FIGURE 2-1 EAST LAKE TOHO PROPOSED DRAWDOWN AND HABITAT ENHANCEMENT PROJECT ELEMENTS

Four pumps, with a combined capacity of 400 cfs, are proposed to be used to drain East Lake Toho. For the pump operation scenario, the pumps would begin moving water when gravity flow through the Water Control Structure S-59 drops below 20 percent of the proposed 400 cfs pump capacity. Therefore, when gravity flow drops below 80 cfs the pumps would begin moving water from East Lake Toho to Lake Tohopekaliga while Water Control Structure S-59 is closed. Gravity flow is estimated to continue for approximately two months before use of water pumps would begin. Restrictions would be in place so as not to jeopardize the storage capacity of Lake Okeechobee that would contribute to a need to discharge water to estuaries on the east and west coast of Florida as detailed in Section 2.3.8 *Implementation Schedul*e.



Note: Red line is the regulation schedule established in the Water Control Plan; blue line is the proposed drawdown schedule

FIGURE 2-2 PROPOSED DRAWDOWN SCHEDULE FOR EAST LAKE TOHO PROJECT AS MODELED BY SFWMD

2.3.2 Mechanical Scraping of East Lake Toho's Eastern Littoral Zone

Approximately 112 acres of littoral zone would be mechanically scraped along the eastern shore of East Lake Toho and consolidated into one or two spoil islands (Figure 2-1). All work would be performed within areas identified by the FWC project manager specifically for the purpose of aquatic habitat enhancement. Work would consist of removal of vegetation and the associated organic sediments. Initially all woody vegetation scraped from the littoral zone would be piled into wind rows to facilitate drying; woody vegetation would be burned (in burn boxes if not prohibitively expensive). All burning activities would be permitted and coordinated with Florida Forest Service and using proper protocols to limit impacts to neighboring communities, fish and wildlife. Aquatic plants and associated organic sediments would be removed with mechanized land-clearing equipment (e.g., bull-dozers, excavators and off-road dump trucks) under dewatered conditions. In accordance with Florida Statue (F.S.) § 403.813 (1)(r), no more than three feet of organic detrital material would be removed, or to the natural mineral substrate, whichever is less. Removal of mineralized soils would be minimized as much as feasible. Prior to starting the refill operation, FWC would evaluate the need to replant the scraped area and implement if deemed necessary.

To avoid secondary environmental damage to adjacent wetlands and prevent violations of state water quality standards, best management practices (BMPs) would be employed throughout the Project, including the use of turbidity controls as necessary (Chapter 5 *Regulatory Compliance and Mitigation* and Appendix F).

2.3.3 Equipment Staging/Lake Access Site

Equipment would be staged on a one-acre site near the Chisholm Park boat launch located along the southeast corner of East Lake Toho (Figure 2-1). This one-acre area of Chisholm Park would

be closed during the drawdown period; additionally, the City of St. Cloud may use this period to dredge the access canal, but not as part of the Proposed Action. This area of Chisholm Park would also serve as the lake access site for heavy equipment involved with removal of organic sediments.

2.3.4 Creation of Spoil Island

Approximately four acres of wetland and open water habitat would be permanently impacted by the creation of the two spoil islands. These islands are expected to become part of a long-term maintenance effort allowing FWC to periodically remove floating tussocks, scrape areas of accumulated organic sediment within the littoral zone, and use the new islands as disposal sites. The proposed two disposal locations already have significant organic accumulation (Figure 2-1 provides approximate location of the spoil islands). Disposed organic material would settle, be crushed and chopped resulting in a reduction of the overall volume (estimated volume reduction is 35 percent). The spoil island soils would be stabilized following island construction with vegetation-permeable geo-fabric and seeded with native, non-invasive grass or sedge seed. Cypress trees would be planted on the near shore side of the spoils islands. Each spoil island would be minimally managed and allowed to oxidize and decay naturally. If requested by adjacent waterfront property owners, FWC would consider special accommodations for management of the spoil islands (e.g., maintain vegetation at waist height). Future vegetation disposal would be placed on top of the existing spoil islands; the footprint of the disposal site would not be expanded. A photo of a previously constructed spoil island in Lake Toho is presented in Figure 2-3.

Source: FWC 2017

FIGURE 2-3 SPOIL ISLAND CREATED ON LAKE TOHOPEKALIGA IN 2004

2.3.5 Aquatic Vegetation Spray and Burn Areas

Additional lake management activities proposed for the low water period from February to May 2020 include vegetation management, herbicide application and controlled burning. Approximately 200 acres of dense cattail is proposed to be sprayed and burned (Figure 2-1, reference areas 1 and 2). Herbicide application would be conducted by helicopter and would not be conducted during high sustained winds (i.e., greater than ten mph) (Figure 2-4). Limited amount of organic matter has accumulated in these areas as they were previously scraped during the 1990 lake drawdown. Cattails would first be treated with herbicide and then the prescribed burning would be performed. Herbicides specific for cattails and other nuisance vegetation in the project area would be used (most likely Imazamox). Smoke, ash and health concerns from burning would be monitored by FWC with the support of the State of Florida Forest Service and Osceola County.

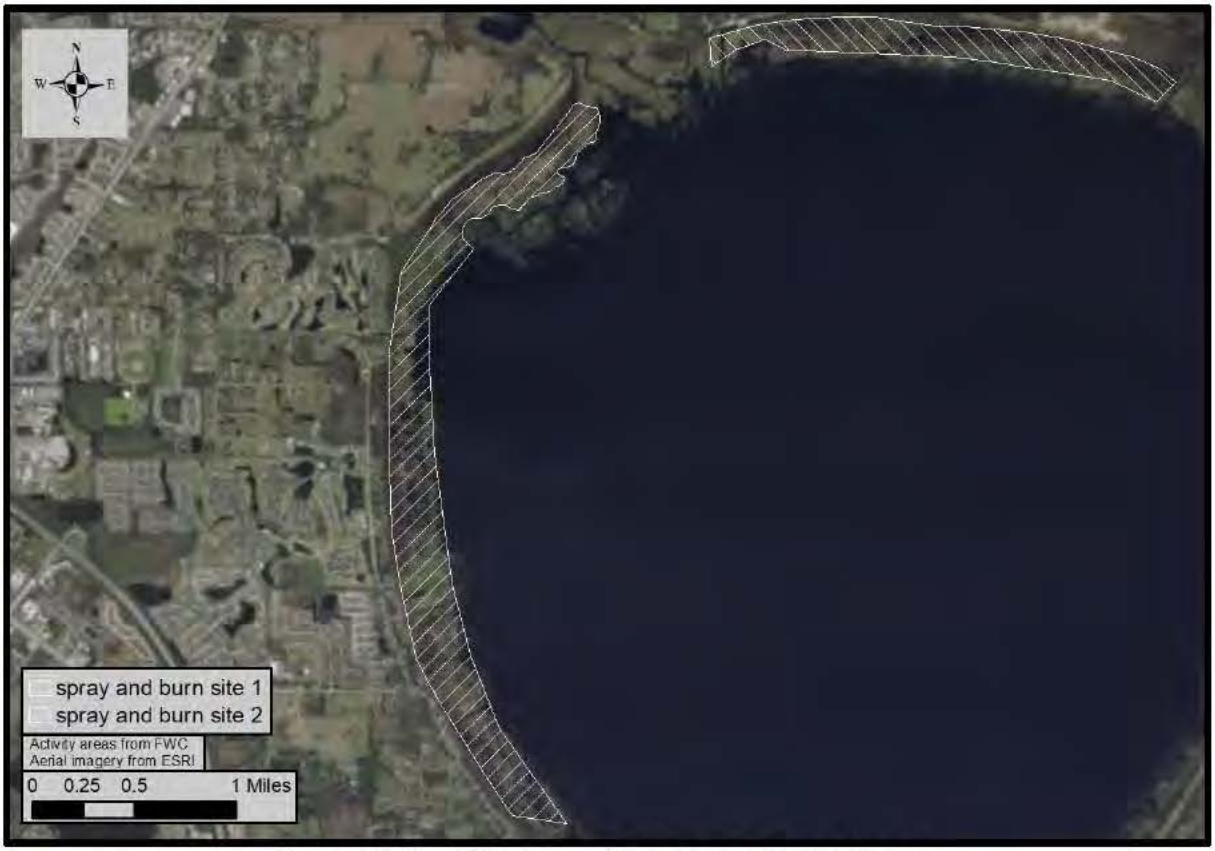


FIGURE 2-4 PROPOSED SPRAY AND BURN AREAS

2.3.6 Sheet Piling Weir between East Lake Toho and Lake Runnymede

Lake Runnymede is located on the southeastern side of East Lake Toho. This water body has extensive organic sediment deposits throughout (Figure 2-1, reference point 2). Figure 2-5 provides the depth of unconsolidated organic sediments along an extensive lake-wide transect.

In some areas, these sediments are greater than ten-feet-deep. To limit water quality impacts to East Lake Toho, a sheet pile weir would be constructed on the Runnymede Canal to isolate Lake Runnymede from East Lake Toho. The access canal to Lake Runnymede is rather narrow; the weir would not be long or costly. The weir is proposed to be located near Rummel Road because of the thick organic sediment layer that would be impacted during the East Lake Toho refilling process (e.g., thick floating mats) if the weir were not installed. Figure 2-6 provides a representation of the appearance of installed sheet piling weir similar to the proposed temporary weir between East Lake Toho and Lake Runnymede.

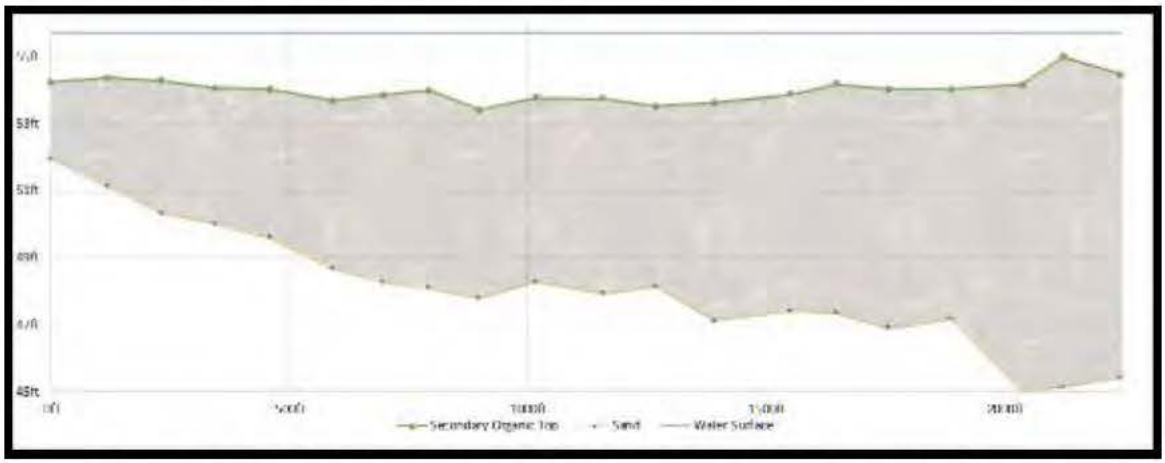


FIGURE 2-5 LAKE RUNNYMEDE BENTHIC ORGANIC SEDIMENT PROFILE

Source: SFEC 2018a (C18 Weir in Palm Beach County)

FIGURE 2-6 INSTALLED SHEET PILE WEIR SIMILAR TO PROPOSED TEMPORARY PROJECT WEIR BETWEEN EAST LAKE TOHO AND LAKE RUNNYMEDE

2.3.7 Modification of East Lake Toho and Lake Tohopekaliga Regulation Schedules

Modification of the East Lake Toho and Lake Tohopekaliga regulation schedules, established by the USACE Water Control Plan, would be required to allow the temporary deviation in water levels of both lakes. The final hydrologic effects would be associated with drawing down East Lake Toho early in the year and to a lower stage than under the current regulation schedule. Additionally, to shorten the duration of pumping from the East Lake Toho to Lake Tohopekaliga, the water level of Lake Tohopekaliga could be lowered approximately six-inches lower than under the current regulation schedule for up to six months. This stage range is within SFWMD operating schedule flexibility.

2.3.8 Implementation Schedule

The proposed drawdown would begin in October or November 2019, with work to be conducted in February to May 2020. Refill of East Lake Toho is proposed to begin in June 2020 and be completed by December 2020.

TABLE 2-1 PROPOSED EAST LAKE TOHO PROJECT SCHEDULE

DATE	ACTIVITY
October to November 2019	Begin dewatering East Lake Toho
November 2019	Begin recession of Lake Tohopekaliga
Mid-December 2019	Deploy 400 cfs pump capacity to Water Control Structure S59
Early February 2020	Begin work with heavy equipment
Mid-February 2020	Reach 53 NGVD feet water level (East Lake Toho) and maintain this level
Late May 2020	Possible revegetation of the scraped area
Early June 2020	Refill begins (less than 1.0 foot per month ascension)
Early November 2020	Reach water level of 58.0 NGVD feet (normal level)

A number of factors could influence the proposed implementation schedule (Table 2-1). For example, the Project would not proceed if snail kite nesting is observed at the start of the drawdown period (late September through October). However, if nesting is observed during the drawdown period (October to February) the Project may proceed after consultation with USFWS. Additionally, a number of factors would influence the sequencing of other project activities, such as wind direction and velocity during prescribed burns and herbicide application.

Heightened sensitivity exists where flows to Lake Okeechobee could be affected by the proposed drawdown. The Project would not be implemented if either extreme wet or extreme dry conditions exist throughout the Kissimmee Chain of Lakes. Extreme dry and wet

conditions would be determined by the SFWMD and USACE water management teams prior to initiating a drawdown (Figure 2-7). Water managers are currently guided by the Central and Southern Florida Project Water Control Plan for Lake Okeechobee and Everglades Agricultural Area (LORS 2008), in making water management decisions regarding Lake Okeechobee (Appendix G). At the time to initiate the East Lake Toho drawdown, consultation would occur between USACE water managers to determine if the volume of water to be withdrawn would induce any additional estuary releases out of Lake Okeechobee. If it was determined by the water managers to cause additional releases, based on the 2008 Lake Okeechobee Regulation Schedule, the drawdown would not proceed.

In February of 2019, the USACE began the NEPA process to modify the Lake Okeechobee regulation schedule known as Lake Okeechobee System Operating Manual (LOSOM). It is expected to be a two year process to develop LOSOM and it is possible that, should this Project be approved and extreme dry or wet conditions occur in the first two years that operational guidance would be based upon LOSOM.

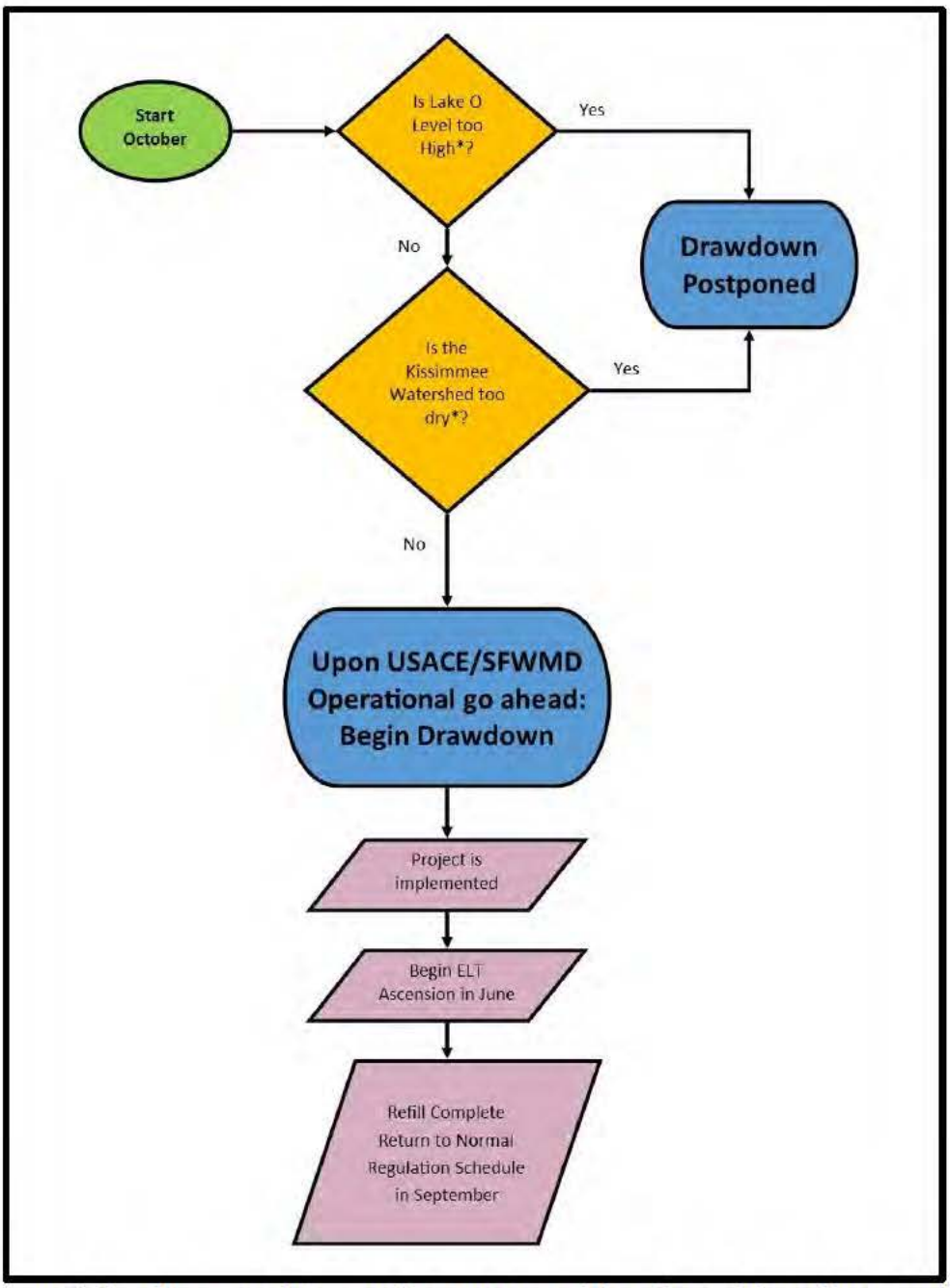


FIGURE 2-7 DECISION TREE TO DETERMINE IF EAST LAKE TOHO DRAWDOWN SHOULD BE INITIATED

The timing of the drawdown would occur in the cooler months of October to March as opposed to the warmer months of March to June. During the gravity drawdown from 57 feet NGVD to 55 feet NGVD, 26,000 acre-feet of water would be discharged downstream between October and January ahead of the current regulation schedule (i.e., during a typical year between March and June the drawdown is from 58 feet to 55 feet NGVD and consists of 38,000 acre-feet of water discharged). When the stage of East Lake Toho is at approximately 55 feet NGVD, water

pumping would begin and an additional 22,000 acre-feet of discharge would occur as East Lake Toho is dropped from 55 feet to 53 feet NGVD. Assuming that no storage is available in the Kissimmee Chain of Lakes downstream of East Lake Toho and no releases from Lake Okeechobee would occur, the additional 22,000 acre-feet of water could increase the Lake Okeechobee stage by approximately 0.7 inches. However, as East Lake Toho returns to normal, an additional 22,000 acre-feet of storage would be available in the upper Kissimmee Chain of Lakes (i.e., the amount of water required to refill East Lake Toho to 55 feet).

TABLE 2-2 FACTORS INFLUENCING PROJECT SCHEDULE

FACTORS THAT COULD DELAY PROJECT	COMMENT
DA permit not approved	Project cannot proceed without issuance of a DA permit
Snail kite nesting	Project would not proceed if snail kite nesting is observed prior to start of drawdown
Extreme dry year – drought conditions	Project would be delayed
Extreme wet conditions – heavy precipitation	Project would be delayed
FACTORS THAT COULD INFLUENCE PROJECT SEQUENCING	**COMMENT**
Indian artifacts discovered within the scrape area	Project actions would be stopped and the Florida SHPO consulted
High winds	Herbicide applications and controlled burn(s) would be delayed

2.4 ALTERNATIVE B

Alternative B is a modification of Alternative A that would leave seven isolated patches of natural tree/shrub habitat and islands in place along the eastern shore within the area proposed to be scraped. This alternative would leave approximately 25 percent (six to eight acres) of tree/shrub habitat, totaling five to ten percent of the proposed 112-acre scrape area. Alternative B meets the original project objectives while preserving some of the existing habitat for wildlife that utilize in-lake woody vegetation. A field trip was conducted in September 2018 to finalize the islands to be preserved (Figure 2-8 and Figure 2-9). Features of Alternative B different than Alternative A include:

- Within proposed scrape polygon leave seven patches of natural tree/shrub habitat and some surrounding vegetation
- The retained natural areas would be distributed as evenly as feasible, given the availability of older and well-developed habitat from which to choose. Such natural areas are more abundant in the southern portion of the proposed scrape area, such that five of the seven retained natural areas are in the southern half
- Selected habitat areas would contain larger trees and have higher tree species diversity

FIGURE 2-8 PROPOSED NATURAL HABITAT AREAS TO BE PRESERVED WITHIN THE NORTHERN PORTION OF SCRAPE AREA FOR ALTERNATIVE B

FIGURE 2-9 PROPOSED NATURAL HABITAT AREAS TO BE PRESERVED WITHIN THE SOUTHERN PORTION OF SCRAPE AREA FOR ALTERNATIVE B

Woody vegetation provides roosting habitat for the snail kite (MSRP 1999). Additional benefits of Alternative B are listed include:

- Protects habitat for species that utilize in-lake islands with woody vegetation within the existing littoral zone including wading birds, migratory birds, amphibians and reptiles
- Decreases the amount of material that requires scraping and transportation to spoil islands
- Decreases the amount of woody material to be burned
- Decreases the footprint and/or height of created spoil islands
- Limits the potential to release nutrients that are already concentrated/isolated in the peat soils and woody vegetation
- Provides roosting/nesting habitat for wading birds (increased isolation of the retained islands reduces predator access, thereby improving their utility for nesting.)
- Provides roosting habitat for snail kites
- Availability of woody nesting material
- Maintains habitat for alligators and other reptiles and amphibians (i.e., sirens and amphiuma)

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

The alternatives considered in this draft EIS but eliminated from detailed consideration were derived from several sources including: suggestions during agency coordination and alternatives developed during the alternative screening process meeting between USACE and FWC.

2.5.1 Alternative A with Gravity Flow to Accomplish Drawdown

In early 2015, members of US Fish and Wildlife Service (USFWS), FWC, SFWMD and Osceola County met to discuss plausible constraints and targets should the drawdown of East Lake Toho be pursued. Gravity draining East Lake Toho would require lowering water levels in Lake Tohopekaliga at the same time, possibly expanding on the economic, fish and wildlife impacts, depending on the extent to which it would be lowered. Therefore, the partner agencies requested that SFWMD provide an estimate of the pump size that would be required to implement an East Lake Toho drawdown with minimal lowering of Lake Toho, approximate dates that pumps would be required under the various scenarios, as well as how low Lake Tohopekaliga would have to be to meet East Lake Toho drawdown targets by gravity alone (without pumps) (refer to Appendix C contains the results of SFWMD modeling exercise.

Reason for Elimination - Gravity flow was eliminated because it provided insufficient drawdown capability when compared to using the 400 cfs pump operations. The drawdown without pumps (i.e., gravity flow) would require Lake Tohopekaliga stages to be decreased by an additional 1.7 feet, which FWC and SFWMD determined to be unacceptable because of lake-bottom exposure that lake residents might find objectionable.

2.5.2 Alternative A with Upland Disposal

Prior to finalizing the initial project concept, FWC conducted a desk top survey to determine the availability of large land parcels, greater than 120 acres in size, and within a radius of three miles of the East Lake Toho access site (i.e., Chisholm Park boat ramp), that could accommodate the volume of anticipated spoils, which were estimated at between 100,000 and 125,100 cubic yards, generated during scraping of the eastern lake shore. Ten land parcels were identified as potentially suitable for upland disposal and the viability of each site was evaluated. Of the ten land parcels, all were dismissed for a variety of reasons including ongoing development, existence of wooded and wetland habitat, and/or the unwillingness of land owners to accept spoils material (Appendix F).

Reason for Elimination - Use of upland disposal was eliminated as an option for placement of organic sediments removed from the eastern littoral zone of East Lake Toho for two reasons: 1) unavailability of large land parcels (more than 120 acres in size) within a three-mile-radius of the East Lake Toho access site to accommodate the large volume of spoils material that would be generated, and 2) high transportation costs of up to $11.29 per cubic yard compared with $2.94 per cubic yard to create the two in-lake spoil islands. As with previous lake management efforts over the past 20 to 30 years, FWC found upland disposal to be cost prohibitive and thus eliminated this component option early in the planning process.

2.5.3 Alternative A with Weir between East Lake Toho and Fells Cove

As originally conceived, the Project included the installation of sheet piling and a flood control pump to be located in the canal between East Lake Toho and Fells Cove with the intent of eliminating the effects of the drawdown within Fells Cove. By eliminating this project component, FWC would save approximately $250 thousand dollars that could be used elsewhere for the Project.

Reason for Elimination - After the November 1, 2017 site visit, a decision was made not to include this activity as part of the Proposed Action because of the limited amount of unconsolidated organic matter within Fells Cove and the few organic mats with vegetation existing within the littoral zone that might float to the top of the lake during refilling operations. These floating islands would cause navigation and visual intrusion issues.

2.6 SUMMARY COMPARISON OF ALTERNATIVES ENVIRONMENTAL BENEFITS AND ADVERSE IMPACTS

Below is a summary matrix (Table 2-3) listing the No-Action and two action alternatives and the potential benefits and/or adverse impacts of implementing any of the alternatives, as evaluated in detail for each environmental resource category in Section 3 *Affected Environment and Environmental Consequences*.

2.7 SELECTION OF PREFERRED ALTERNATIVE

The primary criterion used to select a preferred alternative for the draft EIS, considering the similarities in the two action alternatives, (Table 2-3), was the amount of woody wildlife habitat that could be preserved within the littoral zone. Alternative B would leave approximately six to eight acres of existing tree/shrub along with some neighboring vegetation totaling approximately five to ten percent of the proposed 112-acre scrape area. These natural features proposed for preservation would be more or less equally spaced across the linear shaped scrape area and provide quality wildlife habitat with larger trees. This littoral zone natural habitat is used by a wide variety of wildlife species, including wading birds, migratory birds, amphibians and reptiles. The preserved natural areas under Alternative B would provide additional roosting habitat for the endangered snail kite. Thus, USACE has selected Alternative B as the Preferred Alternative, which is consistent with FWC's expressed need for the East Lake Toho Project and complies with all applicable laws and regulations, while maintaining existing wildlife habitat.

TABLE 2-3 SUMMARY COMPARISON OF ALTERNATIVES ENVIRONMENTAL BENEFITS AND ADVERSE IMPACTS

NO.	ENVIRONMENTAL RESOURCE CATEGORY	NO-ACTION	ALTERNATIVE A: PROPOSED DRAWDOWN AND HABITAT ENHANCEMENT OF EAST LAKE TOHO	ALTERNATIVE B: PROPOSED DRAWDOWN AND HABITAT ENHANCEMENT OF EAST LAKE TOHO WITH PRESERVED NATURAL HABITAT
1.	Water Management	***Short-term*** and ***Long-term***[1] • Approximately 100-150 acre feet of storage is lost under current conditions	***Short-term*** • Water control plan modified temporarily; drawdown of East Lake Toho by up to 4 feet below existing schedule for approximately eight months (October to June) • Increased downstream discharge volumes during drawdown period • Two feet below scheduled minimum in June after which refilling would be initiated • Decreased downstream discharge volumes during East Lake Toho refilling • Potential interaction with Kissimmee River Restoration Plan depending on timing and rainfall ***Long-term*** • No effect	***Short-term*** and ***Long-term*** • Same as Alternative A
2.	Water Quality	***Short-term*** and ***Long-term*** • Intra-lake effects due to release of nutrients from accumulated organic material, tussock and/or floating islands • Lower dissolved oxygen in areas of East Lake Toho with high organic material accumulation and/or less consolidated organic (based on literature values and measures from similar systems in Florida)	***Short-term*** • Intra-lake impacts (turbidity and nutrients) due to scraping and island construction and potential nutrient flux of oxidized material upon rewetting • Loss of any treatment function of wetland vegetation and associated periphyton (within the scrape area) • Until vegetation returns (short to intermediate term), the nutrient uptake capacity of treated cattail would be lost in the north and west spray and burn polygons ***Long-term*** • Nutrients from organic material would be consolidated into spoil islands and be less available than under current conditions (i.e., benthic, tussock, and floating island associated organic material) • Lake-wide consolidation/oxidation of organic material during drawdown would result in lower BOD and nutrient flux in scraped areas post-refill.	***Short-term*** • Generally the same as Alternative A; although less organic material would be scraped from the littoral zone thereby limiting the potential to release nutrients that are already concentrated in natural features into surface water • Continued nutrient uptake by un-scraped wetland vegetation • Chance that some of the remaining island habitat could release nutrients if disturbed by storm activity ***Long-term*** • Same as Alternative A

No.	Environmental Resource Category	No-Action	Alternative A: Proposed Drawdown and Habitat Enhancement of East Lake Toho	Alternative B: Proposed Drawdown and Habitat Enhancement of East Lake Toho with Preserved Natural Habitat
3.	Soils and Geology	***Short-term*** • No effect ***Long-term*** • Continued accumulation of organic soils within East Lake Toho	***Short-term*** • Scrape of approximately 112 acres of littoral zone which includes areas of benthic and floating organic deposits and organic soils • Material to be deposited on two in-lake disposal islands; this would improve conditions in areas of the scrape zone where organic material is present ***Long-term*** • The drawdown is expected to provide long-term lake-wide benefits through the oxidation and consolidation of organic soils • Organic material accumulation would continue/resume after Project commensurate with water quality conditions, given the limited vertical range of regulation schedule	***Short-term*** • Generally the same as Alternative A; although less organic soils would be scraped from the littoral zone and placed on spoil islands • Potential release of sediments from remaining tussocks under storm conditions ***Long-term*** • Same as Alternative A
4.	Vegetation	***Short-term*** • Nuisance vegetation would continue to persist, potentially expand (predominantly large patches of cattail cover on the north and west sides of the lake and cattail and tussock vegetation in the proposed scrape area) ***Long-term*** • Cattail or torpedo grass may form dense monocultures • Under the existing FWC vegetation management plan, exotic and nuisance vegetation would be treated and decay *in-situ*.	***Short-term*** • In the proposed scrape area colonizing species would return in the short-term (one to three years) • Generally, removal of exotic and dense patches of weedy vegetation would improve habitat conditions • Opportunity to treat an expanded area of exotics on the west and north portions of East Lake Toho (due to drawdown); nutrient export by burning • Potential expansion of invasive species during drawdown and refill if not monitored/treated (e.g., cattail and torpedo grass) • Shrubby/woody and upland species and associated floating islands would be eliminated in the scrape area ***Long-term*** • Less dense vegetation would likely promote native plant growth and provide opportunities for SAV expansion in areas of appropriate habitat • The spoil island footprint(s) (up to two to four acres) would no longer support aquatic vegetation	***Short-term*** • Generally, the same as Alternative A, however, small isolated patches of mature/diverse wetland vegetation would be left within the scrape zone (tussock and freshwater marsh) • Several islands with related woody and herbaceous vegetation would remain • More seedbank and plants would be present in scrape zone (relative to Alternative A) likely increasing the rate at which native plants return to Project area ***Long-term*** • Same as Alternative A • Patches of mature/diverse wetland and existing island vegetation would be retained for the long-term in the area to be scraped along the east side of East Lake Toho lake (approximately six to eight acres) • If additional planting is performed on the retained island habitat, it would

No.	Environmental Resource Category	No-Action	Alternative A: Proposed Drawdown and Habitat Enhancement of East Lake Toho	Alternative B: Proposed Drawdown and Habitat Enhancement of East Lake Toho with Preserved Natural Habitat
				result in long-term improvement of canopy diversity, stability of the habitat, and improved conditions for birds (e.g., roosting, nesting, perching) and other species on the islands
5.	Wetlands	***Short-term*** • Invasive and exotic wetland vegetation would persist ***Long-term*** • Invasive and exotic vegetation would persist and in some areas expand (thereby further degrading habitat) if not treated under the existing vegetation management plan	***Short-term*** • The proposed spray and burn would control and limit the expansion of ruderal and to a lesser extent exotic wetland vegetation • Potential expansion of invasive species during drawdown within East Lake Toho's littoral zone (and surrounding Fells Cove and Ajay) if untreated • Scrape area would result in conversion of anthropogenically induced wetland community types to lacustrine littoral zone. • Conversion of wetlands in proposed scrape area (~112 acres) to shallow open water habitat ***Long-term*** • Loss of ~four acres of wetlands by constructing spoil s islands. • Limited areas of the scrape zone with extensive floating or benthic associated organic material accumulation would likely experience long-term habitat improvement • The removal of organic material would allow rooting and growth of wetland vegetation and SAV • Constructed spoil islands, up to four acres would no longer support wetland habitat	***Short-term*** • Small isolated patches of mature/diverse wetland vegetation would be left within scrape zone • Conversion of wetlands in proposed scrape area (~112 acres) to shallow open water habitat ***Long-term*** • Patches of mature/diverse wetland vegetation would be retained for the long-term in the area scheduled to be scraped along the east side East Lake Toho (approximately six to eight acres)
6.	Fish and Wildlife	***Short-term*** • Limited areas with high organic material accumulation and low DO would continue to negatively impact some fish species (distributions) ***Long-term*** • Continued degradation of habitat; loss of littoral zone	***Short-term*** • Negative effects due to removal of aquatic and wetland habitat and function • Direct and indirect negative effects to fish, herpeto fauna, birds, and other wildlife • Potential for small increase in access to littoral zone some scrape areas slightly increasing fish production ***Long-term***	***Short-term*** • Same as Alternative A ***Long-term*** • Same as Alternative A except the isolated patches of natural habitat would provide habitat for species that utilize islands and tussocks, including wading birds, migratory birds, alligators and other reptiles and amphibians

No.	Environmental Resource Category	No-Action	Alternative A: Proposed Drawdown and Habitat Enhancement of East Lake Toho	Alternative B: Proposed Drawdown and Habitat Enhancement of East Lake Toho with Preserved Natural Habitat
		habitat for fish, and some species of wildlife and wading birds in areas with high organic content accumulation and/or dense vegetation	• Nuisance vegetation removal would improve aquatic habitat conditions • Organic material removal would improve conditions for sport fish species	
7.	Threatened and Endangered Species	***Short-term*** • Continued degradation of snail kite nesting and foraging habitat ***Long-term*** • Potential additional encroachment of woody and exotic vegetation into snail kite nesting and foraging habitat	***Short-term*** • Snail kite nesting and foraging may be impacted both within scrape zone, burn areas and drawdown areas • Low potential for adverse impacts to striped newt ***Long-term*** • Improvement of snail kite foraging habitat due to lower invasive vegetation density • Improved littoral zone conditions for wood stork foraging	***Short-term*** • Same as Alternative A • Preserved patches may provide refuge during short-term until habitat returns to scraped areas ***Long-term*** • Generally the same as Alternative A, but the preserved isolated patches of natural vegetation would provide roosting habitat for snail kites • Improved littoral zone conditions for wood stork foraging
8.	Land Use	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** and ***Long-term*** • Same as Alternative A
9.	Navigation	***Short-term*** • Vegetation and soils limit navigation adjacent to boat access ramps and private residences ***Long-term*** • Decline due to expansion of vegetation (native, weedy and exotics)	***Short-term*** • Low-water levels would limit lake access and navigation during drawdown • Limited lake access at St. Cloud marina and fish camp; one or both may need to be dredged to provide motorboat access, other than airboats. • Loss of connectivity between East Lake Toho and Lake Runnymede • Improved navigation in treatment areas after lake refill • Potentially improved lake access by waterfront homeowners. ***Long-term*** • Improved navigation after vegetation removal	***Short-term*** and ***Long-term*** • Same as Alternative A

No.	Environmental Resource Category	No-Action	Alternative A: Proposed Drawdown and Habitat Enhancement of East Lake Toho	Alternative B: Proposed Drawdown and Habitat Enhancement of East Lake Toho with Preserved Natural Habitat
			• Increased boat access for some adjacent landowners (assuming property owners undertake individual action)	
10.	Transportation	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • Occasional construction-related road closures may impede normal traffic ***Long-term*** • None anticipated	***Short-term*** and ***Long-term*** • Same as Alternative A
11.	Cultural Resources	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • Potential disturbance of Native American historical resources during littoral zone scraping of organic soils • Possible oxidation of buried resources due to exposure during drawdown ***Long-term*** • Exposure during drawdown could have long-term negative impacts	***Short-term*** and ***Long-term*** • Same as Alternative A with reduced probability of disturbance in scrape area due to acreage of preserved habitat
12.	Air Quality	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • Minimal to no herbicide drift during application using BMPs • Release of airborne contaminants during woody vegetation burning • Diesel emissions during construction and pump activity • Carbon release associated with drawdown ***Long-term*** • None anticipated	***Short-term*** and ***Long-term*** • Generally the same as Alternative A, but with less airborne contaminants from burning woody vegetation
13.	Noise	***Short-term*** • No effect ***Long-term*** • Occasional airboat noise associated with existing herbicide events.	***Short-term*** • Temporary noise generated by construction equipment and pumps ***Long-term*** • Continued noise generated by recreational boaters, potentially closer to shoreline residents given expected improvements to navigation	***Short-term*** and ***Long-term*** • Same as Alternative A
14.	Visual Aesthetics	***Short-term*** Adjacent landowner water views are currently restricted by **vegetative growth**	***Short-term*** • Construction activities may impact some lakeside residents by encroaching within their lake viewshed resulting in a negative impact	***Short-term*** • Same as Alternative A ***Long-term***

No.	Environmental Resource Category	No-Action	Alternative A: Proposed Drawdown and Habitat Enhancement of East Lake Toho	Alternative B: Proposed Drawdown and Habitat Enhancement of East Lake Toho with Preserved Natural Habitat
		Long-term • Growth of undesirable (especially woody) vegetation • As woody vegetation increases in the littoral zone, views of water by adjacent landowners would be increasingly restricted	• Once complete, vistas may improve for some lakeside residents who prefer unobstructed lake views ***Long-term*** • Created spoil islands could encroach on adjacent landowner viewshed • Improved visual aesthetics for most landowners upon removal of undesirable woody vegetation in littoral zone	• Same as Alternative A; although to a lesser degree because of remaining patches of natural vegetation • Possible improved utilization of retained islands by aesthetically pleasing birds would benefit aesthetics
15.	Recreation	***Short-term*** and ***Long-term*** • Restricted access for some adjacent landowners due to continued nuisance littoral zone vegetation growth • Reduced recreational fishing opportunities	***Short-term*** • Portion of Chisolm Park would be closed for duration of Project; would be used as construction staging area. No boat launch access. • Limits to recreational boating activities during drawdown and refilling. • Limited lake access at St. Cloud marina and fish camp. One or both may need to be dredged for any motorboat access, other than airboats. • Possible impacts to birding ***Long-term*** • Improved access to fishing areas due to vegetation removal • Expected improved recreational fishery due to removal of thick organic material deposits	***Short-term*** and ***Long-term*** • Same as Alternative A • Possible improvement to birding
16.	Public Health and Safety	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • Smoke and ash from burning of woody vegetation • Minimal to no herbicide drift during application using BMPs ***Long-term*** • None anticipated	***Short-term*** and ***Long-term*** • Generally the same as Alternative A but with less smoke and ash from burning woody vegetation
17.	Hazardous Materials	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • Hazardous materials and/or hazardous waste may be generated or encountered as a negative impact ***Long-term*** • None anticipated	***Short-term*** and ***Long-term*** • Same as Alternative A
18.	Socioeconomics	***Short-term*** • No effect ***Long-term***	***Short-term***	***Short-term*** and ***Long-term*** • Same as Alternative A

No.	Environmental Resource Category	No-Action	Alternative A: Proposed Drawdown and Habitat Enhancement of East Lake Toho	Alternative B: Proposed Drawdown and Habitat Enhancement of East Lake Toho with Preserved Natural Habitat
		• Negative economic effects if navigation continues to be impacted (or is further impacted) and if recreational fishery were to decline	• A few local businesses (e.g., airboat eco-tour operators) may not be able to operate during drawdown and refill • Potential for reduced recreation on lake during Project implementation (and reduction in related expenditures) • Potential for negative economic impact to businesses (e.g., restaurant, marina) on the north and south lake shores. ***Long-term*** • Benefits to local economy from improved navigation and habitat conditions	
19.	Environmental Justice	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • None anticipated ***Long-term*** • None anticipated	***Short-term*** and ***Long-term*** • Same as Alternative A
20.	Native Americans	***Short-term*** • No effect ***Long-term*** • No effect	***Short-term*** • Potential disturbance of Native American historical resources during littoral zone scraping of organic soils • Possible oxidation of buried resources due to exposure during drawdown resulting in negative impact ***Long-term*** • Exposure during drawdown could have long-term negative impacts	***Short-term*** and ***Long-term*** Same as Alternative A with reduced probability of disturbance in scrape area due to acreage of preserved habitat

Notes:

1) Definition of short- and long-term.

- Short-term effects include effects during the actual work of the Proposed Action (e.g., from lake drawdown, muck scraping and disposal activities), as well as the transient ecological effects that can be expected during the first one to three years.
- Long-term refers to effects that might be expected to persist for ten or more years.

2) The analysis shown here is based on the originally Proposed Action of the lake drawdown, vegetation spraying and burning in the northern and western littoral areas and muck scraping along the eastern shore. In February 2018, two additional areas of potential muck scraping were proposed for inclusion. Collection of field data will help refine the final scope of the Proposed Action. It is possible that the matrix of anticipated effects will need to be revisited once the final scope is defined.

Key: BOD--biological oxygen demand; DO--dissolved oxygen; FWC--Florida Fish and Wildlife Commission; SAV--submerged aquatic vegetation; SSS--species of special concern

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the potential impacts of the alternatives described in Section 2 on the existing environmental resources. Generally, the defined action areas within the East Lake Toho littoral zone defines the project area for the two action alternatives evaluated; however, the spatial area affected may change based on specific resource conditions. The affected environment and potential effects were determined by environmental specialists through literature searches and information provided in agency and public comments. The environmental specialists conducted field observations of the project area where access could be obtained. Desktop analyses and field surveys for organic sediment characterization, vegetation, and wetlands were conducted by South Florida Engineering and Consulting, LLC (SFEC) staff in the spring of 2018 and the results were reported to USACE.

Results of the effects analysis detail potential direct and indirect impacts from implementation of either the action alternative or taking no action. If appropriate, measures to avoid, minimize, and/or mitigate for the effects of implementing either alternative are identified. An effects summary is the last item provided at the end of each resource category to serve as a quick reference for readers, documenting the results of the effects analysis for both action alternatives.

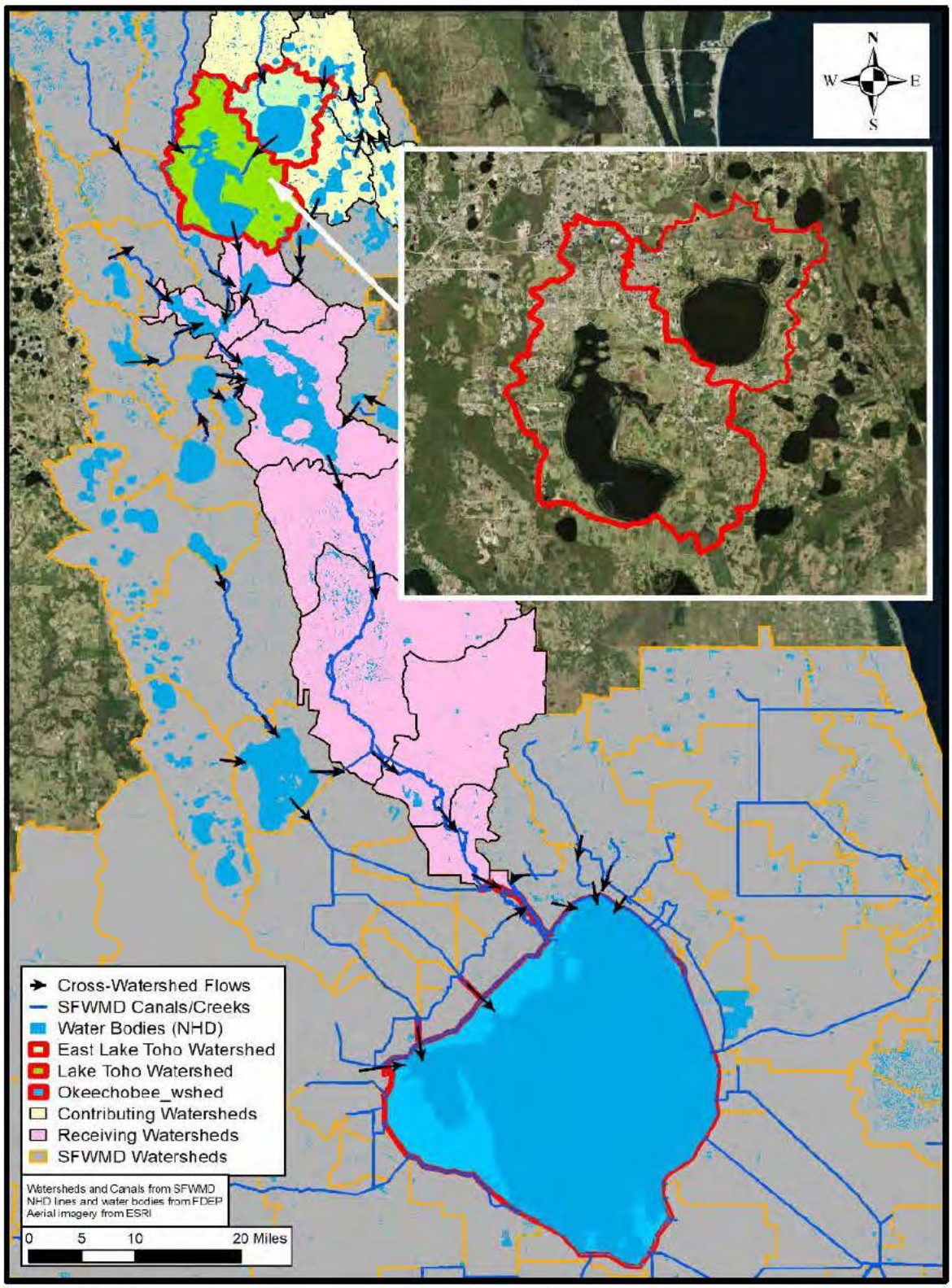
3.1 APPROACH TO CHARACTERIZING BASELINE CONDITIONS AND CONDUCTING EFFECTS ANALYSIS

3.1.1 Affected Environment

NEPA requires that the environment of the area that would be affected or created by the alternatives under consideration is succinctly described (40 C.F.R. § 1502.15). The Affected Environment section describes baseline or existing conditions of the resources that could be affected by implementation of either Alternative A or Alternative B. The resource descriptions provided in this section serve as the baseline from which to evaluate the potential impacts. Depending on which resource is being described, the project area developed for the NEPA analysis is based on the preliminary FWC conceptual design. For this draft EIS, the project area is defined as those activity areas within the littoral zone of East Lake Toho and depicted in Figure 3-1 for specifically designated segments along the eastern, western and northern lake shoreline plus a 500-foot buffer zone around the lake and Fells Cove. Table 3-1 identifies the area used to characterize baseline conditions for each resource category which is also the area used for the effects analysis. In those instances where the area to characterize baseline conditions is either smaller or larger than the project area, an explanation is provided describing how and why the specific area was determined. Generally, the project area is used to characterize the affected environment for many of the resource categories but as can be gleaned from Table 3-1, for some resource categories the spatial boundaries extend beyond the project area.

TABLE 3-1 SPATIAL BOUNDARIES OF THE AFFECTED ENVIRONMENT AND EFFECTS ANALYSIS FOR EACH RESOURCE CATEGORY

RESOURCE CATEGORY	SPATIAL BOUNDARY FOR CHARACTERIZATION OF THE AFFECTED ENVIRONMENT AND EVALUATION OF ENVIRONMENTAL EFFECTS
3.3 Water Resources	East Lake Toho watershed downstream to Lake Okeechobee
3.4 Water Quality	East Lake Toho watershed downstream to Lake Okeechobee
3.5 Soils and Geology	Project area
3.6 Vegetation	Project area
3.7 Fish and Wildlife Resources	Project area
3.8 Threatened and Endangered Species	Project area downstream to Lake Toho
3.9 Land Use	Project area
3.10 Recreation	East Lake Toho watershed and downstream to Lake Toho
3.11 Cultural Resources	Project area
3.12 Aesthetics	Project Area; to include the entire surface area of East Lake Toho
3.13 Climate	Central Florida
3.14 Air Quality	Osceola County
3.15 Noise	Project area
3.16 Hazardous, Toxic and Radioactive Waste	Project area
3.17 Public Health and Safety	Project area
3.18 Socioeconomics	Orlando regional metropolitan area
3.19 Environmental Justice	2017 Census tracts covering the Project area
3.20 Native Americans	Project area



Source: SFEC 2018a

FIGURE 3-1 EAST LAKE TOHO PROJECT AREA WITH EXTENDED EFFECTS ANALYSIS AREA FOR SELECT RESOURCE CATEGORIES

3.1.2 Environmental Effects

The Environmental Effects section analyzes both beneficial and adverse impacts that could result from implementation of the alternatives described in Section 2. NEPA requires agencies to assess the direct, indirect and cumulative impacts of all alternatives. Direct impacts are those actions that are a result of the implementation of an action alternative and occur at the same location and time. Indirect impacts are those impacts that occur later in time and/or farther removed from the project area but are still reasonably foreseeable. Cumulative impacts are defined as the "impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 C.F.R. § 1508.7). Cumulative impacts are discussed in Section 4 of this draft EIS.

Depending on which resource is being evaluated, direct and indirect effects may: be confined to a specific long-term footprint of the Project (e.g., project area), extend beyond the immediate project area (e.g., downstream water quality effects, wildlife population-level effects, or regional effects may occur), or extend over a larger area (e.g., several county regional-level effects on socioeconomics). Table 3-1 above identifies the area used to evaluate environmental effects for each resource category. An explanation is provided in each environmental resource section that follows regarding how and why the specific area for effects evaluation was determined. Effects resulting from either Alternative A or Alternative B have been quantified to the extent possible based on preliminary design attributes and information provided by FWC and SFWMD, the length of the drawdown period, and the anticipated extent of downstream project influence. Effects resulting from project activities where an actual location has not been established are quantified to the extent possible based on approximate acres of disturbance under the conceptual design. Otherwise, potential effects were only qualitatively evaluated.

To determine whether an action has the potential to result in significant impacts, the context and intensity of the action must be considered. Context refers to impact timing and duration. Intensity refers to the area and severity of the impact. For purposes of this analysis, intensity definitions (i.e, low, moderate, and high) have been developed to assess the magnitude of effects for all of the affected resource categories resulting from implementing of either Proposed Action Alternative. Context in terms of duration and timing (i.e., when in the life cycle of the project effects may occur) of impacts is estimated as either short-term or long-term.

- **Short-term** – effects include those impacts that would occur during actual implementation of the Project (e.g., lake drawdown, sediment scraping and disposal activities), as well as the transient ecological effects that can be expected to occur during the first one to three years.
- **Long-term defined** – effects might be expected to persist for up to ten years.

The definitions of intensity are specific to each resource evaluated and are described with the effects analysis for each category. Note that it is not essential that all intensity criteria be satisfied for an impact to fall under that intensity level. In some cases, potential impacts have been determined to be negligible and for purposes of the draft EIS are defined as not detectable.

3.1.3 Determination of Significant Effects

A determination of significance (i.e., significant effects) was made for those environmental resources determined to have a high intensity impact for an extended period of time. Significance determinations were made assuming appropriate BMPs and mitigation measures would be implemented by FWC. Significant effect determinations are addressed in the *Effects Summary* at the conclusion of each environmental resource discussion within this section.

3.2 EAST LAKE TOHOPEKALIGA HISTORICAL AND CURRENT CONDITIONS

This section briefly compares the current and historical character of the two main driving forces affecting East Lake Toho: hydrology and nutrient loading. Historical is loosely defined but here refers to natural conditions prior to significant influence by European settlers of Florida. The section compares and contrasts historical with current conditions, and discusses likely ecological implications of these contrasts.

3.2.1 Hydrology and Flood Control

Prior to European settlement, stages of East Lake Toho and other lakes within the Kissimmee Chain of Lakes varied only in response to natural driving forces: rainfall, evapotranspiration and natural drainage. The contributing watershed included numerous wetlands, both isolated and flowing (Figure 3-2).

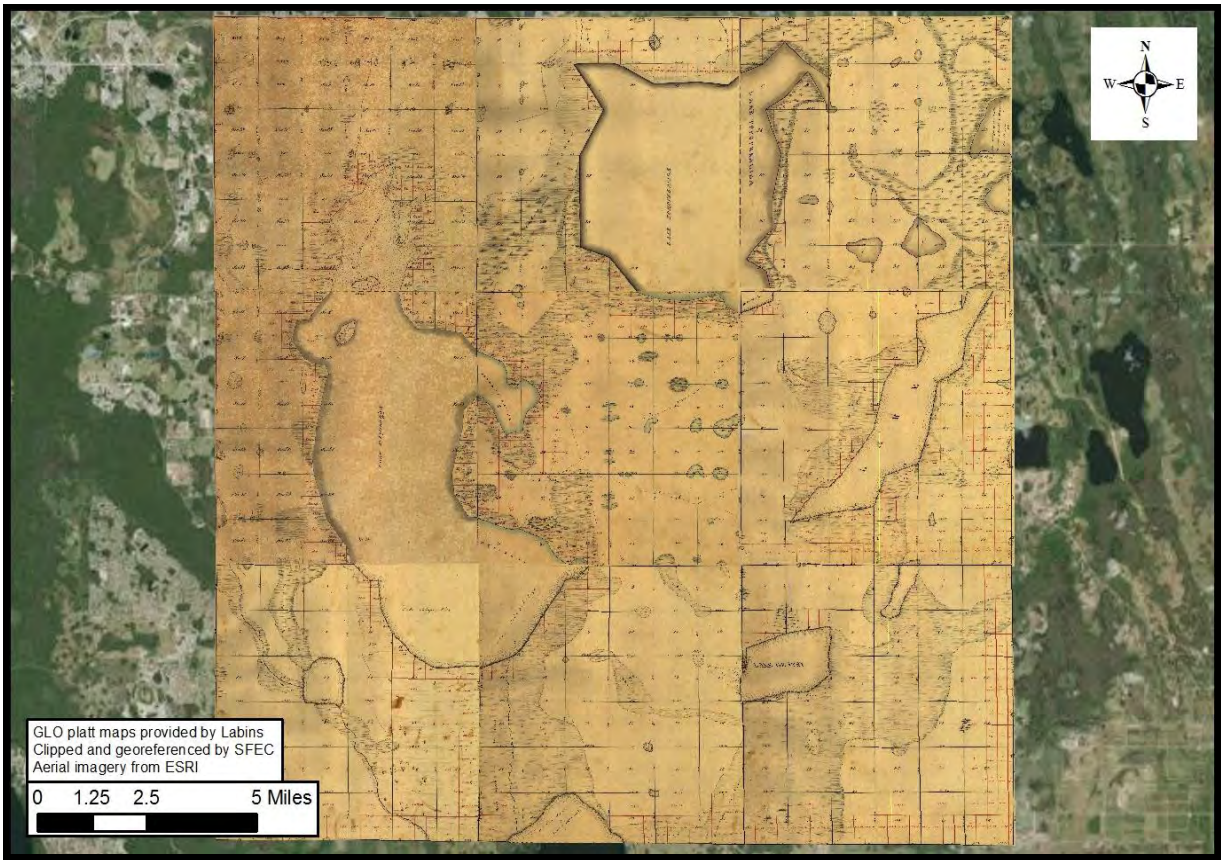
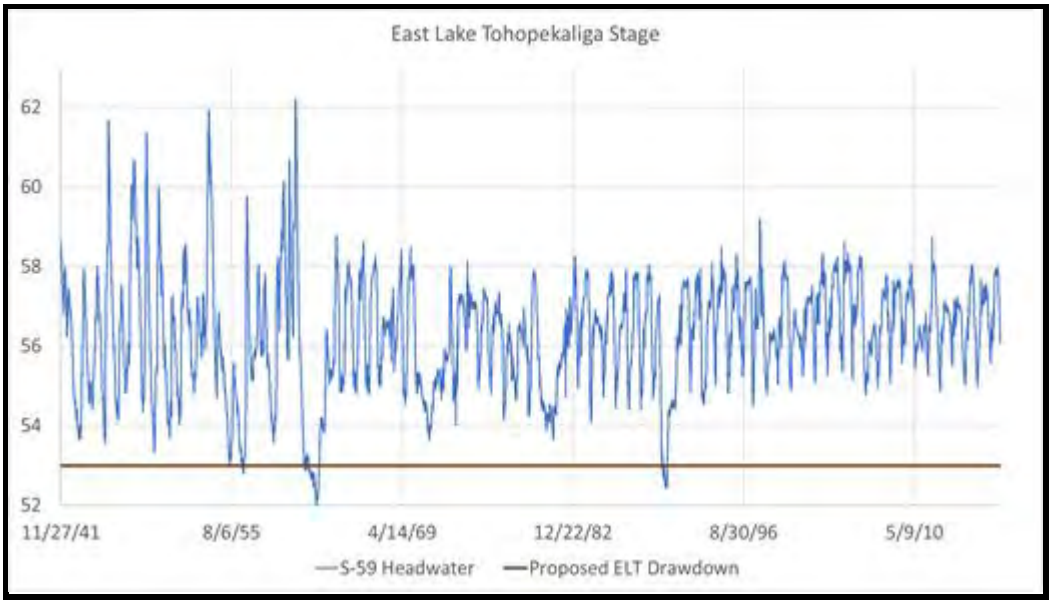


FIGURE 3-2 MOSAIC OF GOVERNMENT LAND OFFICE TOWNSHIP SURVEY MAP AND EAST LAKE TOHO AND LAKE TOHOPEKALIGA

Variability in the driving forces resulted in substantial vertical variation in lake stage. This situation may have been altered somewhat during early settlement when local canals were dug (as visible in 1940s aerial photographs). It certainly was altered later, as the need for regionally

stabilized water levels for agriculture and later for residential development became more pressing. In the 1960s, the Central and Southern Florida (C&SF) Project installed an extensive regional water management system. Locally, this included the S-61 water control structure that regulated discharges from Lake Tohopekaliga and the S-59 structure that controlled discharges from East Lake Toho (C&SF 1996). The new water management system greatly reduced the natural variability. A time series graph of East Lake Toho stages (Figure 3-3) dramatically shows the post-1962 reduction in annual and inter-annual variability compared to the pre-system period, 1941 to ca. 1962. Prior to the C&SF Project, inter-annual variability was greater, with lows of approximately 54 feet and highs of approximately 61 to 62 feet (both NGVD 29). Moreover, the average annual range was greater than four feet and the maximum difference in stage between years was greater at approximately eight feet.



Source: SFWMD 2018

FIGURE 3-3 1941 TO 2016 STAGES IN EAST LAKE TOHO

These variations in stage, combined with the shallow slopes of the East Lake Toho littoral zone mean that a wide zone was alternately covered with water or exposed to air. This classic Florida lake pattern is visible in older aerial photographs as a wide band of white sand (Figure 3-4). The white sand is a visible confirmation that under these pre-development conditions of substantial variation in stage, neither vegetation nor organic sediments accumulated in the littoral zone. The absence of vegetation is due to few plant species that survive the wide swings in annual stage, while the absence of organic material is due to any wet season accumulation being oxidized away during the subsequent dry season.

Source: USDA 1944
Note: Diagonal Vegetation-free White Sandy Shore of East Lake Toho
Vertical Narcoossee Road

FIGURE 3-4 HISTORICAL VEGETATION PATTERNS OF EAST LAKE TOHO

In Figure 3-4, the open area between East Lake Toho shore and Narcoossee Road had already been cleared for cattle pasture and likely corresponds to the original floodplain. Note a thin band of woody vegetation exists just east of the white shoreline. East of Narcoossee Road shows xeric scrub vegetation, flatwoods and some wetlands (USDA 1944).

This historical condition of a wide, white sand littoral zone, free of vegetation and free of organic sediments, stands in strong contrast to current conditions. Under current managed conditions, which have been in place for 50-plus years, there is no white sand littoral zone, and instead emergent aquatic vegetation and organic sediments are present fully into the high water edge of East Lake Toho. These conditions are not solely due to restriction of managed water stages to a narrow vertical range, but this is certainly a major factor.

3.2.2 Nutrient Loading

Prior to settlement, the watersheds contributing to East Lake Toho were all native plant habitats. In the absence of human settlement, they received very low external input of plant nutrients. These upland habitats were adapted to low nutrient conditions, so nutrient cycling was tight, with few offsite exports of nutrients. This meant that nutrient loading into East Lake Toho under pre-settlement conditions was very limited.

This historical condition of very low inputs of plant nutrients for East Lake Toho is no longer present. The contributing watershed is now dominated by agricultural and suburban residential land uses, with the area rapidly shifting even further from agricultural to residential. This is highly significant for East Lake Toho as plant nutrients are deliberately applied to both of these land uses. It is well-known that these plant nutrients are rarely retained in full on the land (*c.f.*, for example, Osceola County Ordinance 2015-05), so runoff into downstream water bodies occurs. Much of this runoff typically occurs during infrequent, high intensity events; therefore it is often under-reported unless expensive continuous monitoring or flow-activated monitoring systems are in place. At present, water quality measurements, including plant nutrients, are only taken in open water areas toward the center of the lake and only on an infrequent, non-event-based schedule. It is not known whether East Lake Toho can be considered well-mixed at all times in terms of nutrient concentrations, but it seems likely that nutrients are in fact spatially concentrated in the vegetated littoral zone. If so, open water-lake measurements would underestimate East Lake Toho plant nutrient concentrations.

3.2.3 Interactions of Hydrology and Nutrient Loading

Human alterations to lake hydrology and lake water chemistry can have a combined effect. Increased nutrients can increase plant growth, which in turn can lead to increased accumulation of organic sediments. Reduction in variations in lake stage due to water management means that those accumulated organic sediments are no longer oxidized during the dry season, further accelerating the overall accumulation.

3.2.4 Previous Lake Drawdowns

FWC previously implemented drawdowns of East Lake Toho in 1990; Lake Tohopekaliga in 1971, 1979, 1987 and 2004; Lake Kissimmee in 1977 and 1996; the Alligator Chain of Lakes in 2000; and Lake Jackson in 1994, 1995, and 1997 (USACE 2002).

FWC completed a habitat enhancement drawdown on Lake Toho in 2004 and is similar to the proposed Project. Monitoring was performed subsequent to project implementation to determine project effects on water quality and island erosion (Hoyer et al. 2006). However, monitoring results were skewed due to the three hurricanes in fall 2004. FWC consolidated excavated muck into 29 in-lake disposal islands

3.2.5 Littoral Zone Conditions

The littoral zone conditions currently present on East Lake Toho (e.g., islands of organic sediments as much as one foot to one and one-half-feet thick and supporting a growth of woody vegetation and the extensive areas of lower emergent aquatic vegetation) clearly were not present during the historical conditions described above. A management approach based solely on restoring physical conditions in the littoral zone to pre-C&SF Project conditions would suggest that organic sediments and emergent woody and other vegetation should be removed. Absent a restoration of historical driving forces, namely pre- C&SF Project fluctuations in lake stage and nutrient loading, such a removal approach would need to continue to be repeated indefinitely.

This does not imply the presence of all woody vegetation creates an adverse littoral zone condition. For example, the 1944 aerial (Figure 3-4), shows a narrow strip of woody vegetation directly bordering the white sand littoral zone. It is reasonable to assume that some birds may have used it as a base for foraging, roosting, and/or nesting. Intensive human use of the small concentric band of terrestrial land surrounding the lake has greatly altered this area. Preservation of some portion of the higher quality islands of sediment and woody vegetation now found in the littoral zone, could improve wildlife and habitat diversity consistent with historical conditions.

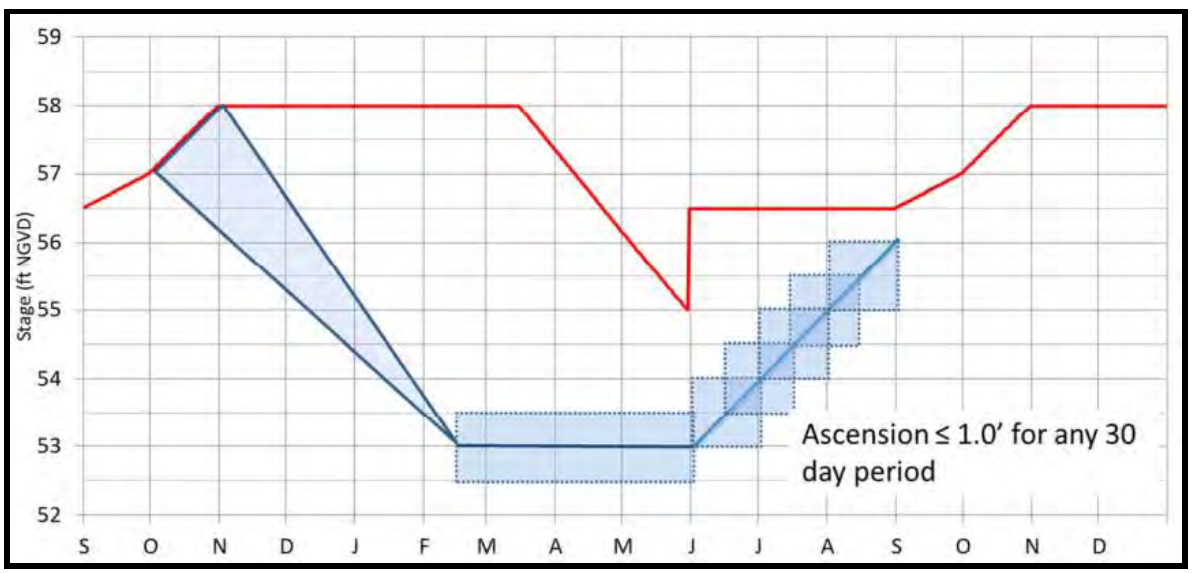
Woody vegetation growing on a significant layer of organic sediments is also likely to act as a nutrient sink, drawing nutrients out of the water column. This function would be important to counteract the increased (and likely increasing) nutrient inflows into the lake.

3.3 WATER RESOURCES (REGULATION SCHEDULE, WATER CONTROL SYSTEM, WATER SUPPLY, FOOD CONTROL AND NAVIGATION)

The water resources section addresses five topics: regulation schedule, physical features of the water control system, water supply, flood control, and navigation. The water supply evaluation is primarily focused on agriculture and residential irrigation. Effects of water supply on listed species and recreation are addressed in sections 3.8 *Threatened and Endangered Species* and 3.10 *Recreation* respectively. Section 3.3.1 includes a characterization of the affected environment and Section 3.3.2 provides an assessment of direct and indirect effects for each alternative. After which, a summary of potential effects for both action alternatives and a determination of whether the potential effects are significant is provided.

3.3.1 Affected Environment

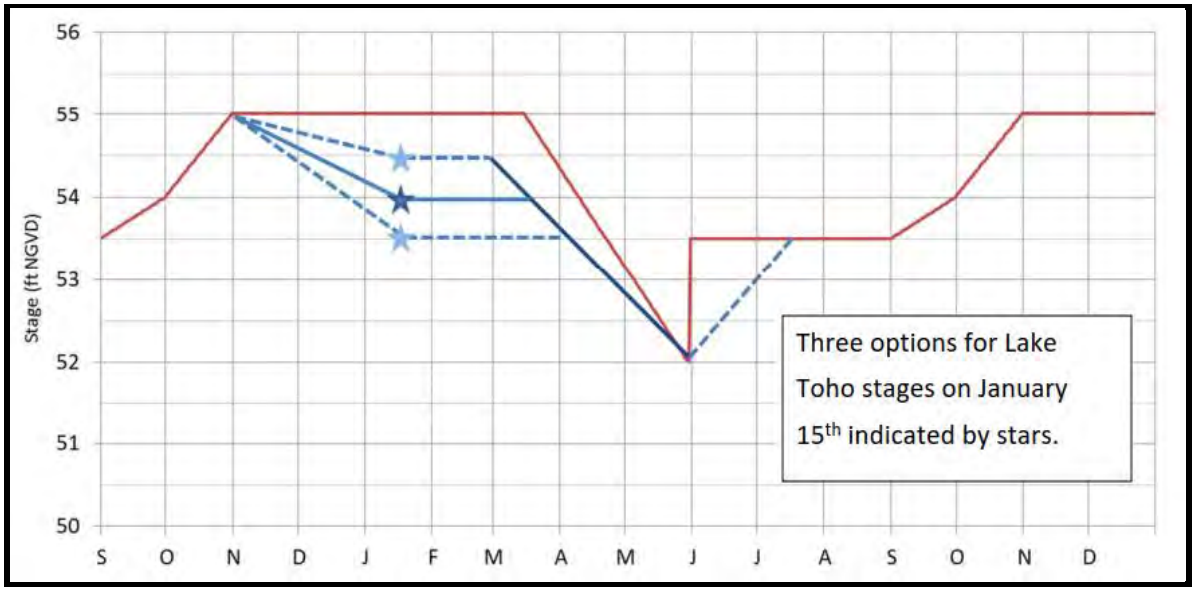
The affected environment includes East Lake Toho, including Fells Cove and Lake Ajay (up to the S-62 structure), down to Lake Okeechobee. Although most of the effects to water resources are limited to East Lake Toho and Lake Tohopekaliga, effects downstream of Lake Tohopekaliga would be expected due to the proposed temporary deviation from the existing regulation schedule. Under current conditions the East Lake Toho regulation schedule requires maximum water levels (58 feet NGVD) from November through mid-March, followed by a steady decline until June when the minimum stage should be reached (55 feet NGVD). Water levels would be increased with the onset of the rainy season in June and then remain at 56.5 feet NGVD until September. Stages are further increased from September through November, when maximum regulation schedule stages should be met (Figure 3-5). In practice, stages do no always track the regulation schedule. Both operational flexibility as well as variability in rainfall affect the ability to meet the desired regulation stages. Additionally, changes in the rate of water level increase and the timing of drawdown have been shifted to better support the snail kite and other habitat requirements.



Note: Red line represents the regulation schedule; Blue lines represent the proposed project alternatives drawdown

FIGURE 3-5 EAST LAKE TOHO EXISTING REGULATION SCHEDULE AND TARGET STAGES AND CONSTRAINTS

Management of the East Lake Toho regulation schedule affects and is directly affected by the Lake Tohopekaliga regulation schedule (Figure 3-6), including the operation of upstream and downstream structures.



Note: Red line represents Lake Tohopekaliga Regulation Schedule; Blue lines represent Modified Target Stages and Constraints

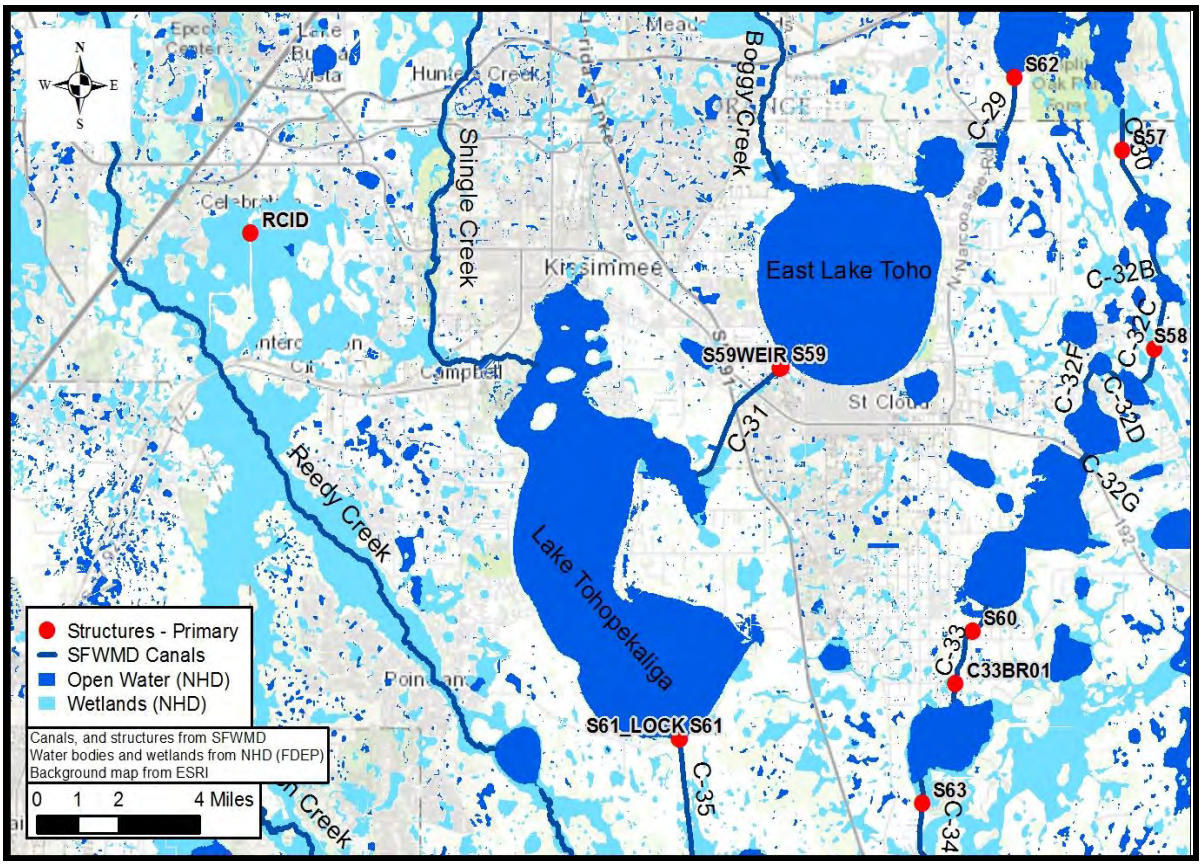
FIGURE 3-6 EXISTING LAKE TOHOPEKALIGA REGULATION SCHEDULE AND MODIFIED TARGET STAGES AND CONSTRAINTS

Physical features of the water control system are noted in Figure 3-7. The S-62 structure controls the C-29 canal (through Lake Ajay and Fells Cove) inflows to East Lake Toho. The S-59 structure controls flow out of East Lake Toho into Lake Tohopekaliga (via the C-31 canal). The S-61 structure controls outflow from Lake Tohopekaliga into the C-35 canal and downstream. The lock structure at the S-61 generally allows the passage of boats which draw less than 6 feet (Guardo 1992). Although not noted in Figure 3-7, East Lake Toho is connected to Lake Runnymede on the southeast side of the lake via the Runnymede canal.

Under existing conditions, water supply is met for natural system and downstream needs under average and wet conditions; however, in drought years, limits to water supply may be experienced. East Lake Toho is used by several housing developments for irrigation purposes. The exact amount of water intake from these sources has not been determined. During the public scoping meeting (December 5, 2017), irrigation water supply concerns were not raised by community association representatives. However, the issue was raised by staff from Osceola County.

Both East Lake Toho and Lake Tohopekaliga provide essential water storage volume to support flood control in the region. The existing regulation schedule starts to bring water levels in both lakes down between March and April well in advance of the wet season in Florida. By June, both lakes would be at their regulation schedule lows. The drawdowns provide two functions: 1) by the time the wet season arrives (usually in June), sufficient storage is available to minimize effects of storm

events in the region and, 2) the early drawdown provides enough time for downstream discharge prior to the wet season. The existing regulation not only provides additional water supply during dry periods (to downstream areas of the Kissimmee Basin) but also allows for discharge to the coast (via the Caloosahatchee and St Lucie rivers) prior to the arrival of the wet season. The existing regulation schedule also decreases the potential for flooding during the summer storm season and provides additional volume for base flow to the estuaries during a dry period. By drawing down water level during the dry season, both Lake Okeechobee and the corresponding coastal discharge structures have available capacity during the summer wet season.



Source: SFEC 2018a

FIGURE 3-7 PHYSICAL FEATURES OF EAST LAKE TOHO

Navigation within East Lake Toho is unrestricted within the open water sections of the lake. Within the littoral zone, navigation is limited by dense vegetation as well as by the accumulation of organic sediments and debris (particularly on the east side of the lake in the proposed scrape areas, Figure 3-7). The existing channel on the south side of the lake next to the boat ramp is currently impacted (partially filled by accumulated organic sediments) and at low lake stages may limit the ability to launch boats at the ramp. Many private access points to individual waterfront residences are impacted due to growth of dense cattail and other weedy vegetation. Navigation issues are similar within Lake Tohopekaliga and East Lake Toho where dense vegetation and accumulation of organics may limit boat access to nearshore locations.

3.3.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on water resources. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*. Descriptions of the three levels of intensity effects specifically developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	Drawdown of East Lake Toho would be within the operational flexibility of the existing East Lake Toho regulation schedule, would not affect structures or canals, and would have no effect on East Lake Toho water supply and flood control functions. Additionally, the East Lake Toho drawdown would not influence water levels/flood control downstream of the lake, and would not affect groundwater levels influencing water basins northeast of the lake. Boat access would not be restricted during project implementation.
Moderate	Drawdown of East Lake Toho would require a temporary deviation from the existing water control plan (for East Lake Toho), would influence water levels of Lake Tohopekaliga but would not require deviation to the regulation schedule and/or have a minor localized affect groundwater levels; would not greatly influence (≤ 0.3 feet) water levels/flood control of Lake Okeechobee boater access would be restricted during lake drawdown and refill within East Lake Toho and to a lesser extent within Lake Toho.
High	Drawdown of East Lake Toho would require a deviation to both the East Lake Toho and Lake Tohopekaliga regulation schedule and/or increase water levels in Lake Okeechobee to a noticeable degree (≥ 0.3 feet) and/or adversely affect groundwater levels in water retention basins northeast of East Lake Toho. Boater access would be restricted beyond the drawdown and lake refill time period within East Lake Toho and Lake Toho and may affect navigation downstream.

3.3.2.1 No-Action Alternative

East Lake Toho Regulation Schedule - No change in the regulation schedule would occur for East Lake Toho.

Physical Features of Water Control Structures and Canals - Under the No-Action Alternative operations of the control structure would follow the existing regulation schedules for East Lake Toho (as well as for the upstream S-62 structure). No change in operations would occur.

Water Supply - Under the No-Action Alternative water supply existing conditions would not be affected. Variation in annual rainfall and existing regulation schedules would continue to determine water supply levels for the watershed.

Flood Control - Under the No-Action alternative flood control existing conditions would not be affected. Variation in annual rainfall and existing regulation schedules would continue to determine flood control levels for the watershed.

Flood Control - Under Alternative A, East Lake Toho would be drawn down an additional 2 feet beyond the existing regulation schedule beginning in October, thereby providing additional available storage within East Lake Toho for the duration of the Project. Similarly, Lake Toho would be lowered an additional six inches (but within the operational flexibility of the existing regulation schedule) and hence additional storage volume would be available within Lake Toho. No effect to downstream lakes within the Kissimmee Chain would be expected. Although an additional 50,000 acre feet of water may be added to Lake Okeechobee if no storage is available within the Kissimmee Chain of Lakes during the two months of pumping, flood control risk would be impacted minimally and the effect would be of low intensity. Gravity discharge would occur during the first 2 months of the drawdown, which would bring East Lake Toho's stage down to 55 feet NGVD the bottom of the USACE regulation schedule. Pumping would then occur for the next 2 months drawing down the lake to 53 feet NGVD.

3.3.2.2 Alternative A

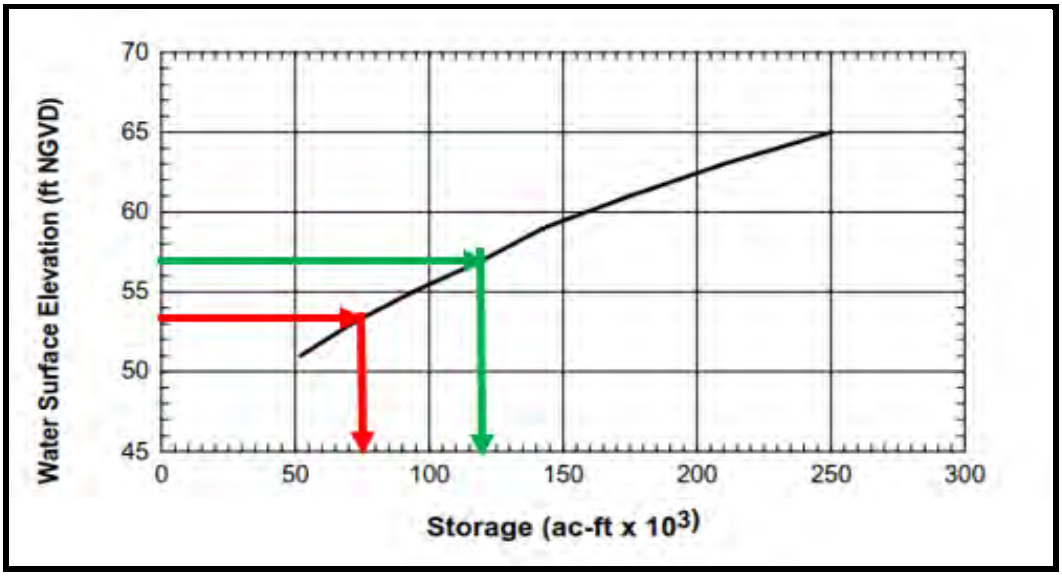
Direct Effects

East Lake Toho Regulation Schedule - The Project would temporarily alter the timing and absolute stage of the current East Lake Toho regulation schedule. Water levels would be drawn down five to six months earlier than under current conditions and two-feet greater than the current schedule (Figure 3-5). The change in stage would increase the amount of exposed lake bottom within the littoral zone by approximately 48,000 acre feet-(modified from Abtew et al 2010) (Figure 3-8). Given that no additional water would be discharged from Lake Tohopekaliga (i.e., other than pass-through volumes consistent with the current regulation schedule) and the large size of Lake Okeechobee, worst-case effects to Lake Okeechobee stages would be low (a maximum of a 1.4 inches) (Figure 3-9) (USACE 1962, Abtew et al 2007). Some of this volume could be retained in lakes Cypress and Toho, depending on their water stages in comparison to the regulation schedule.

In addition to the effects noted above, the proposed Project would have low intensity effects on the Lake Tohopekaliga regulation schedule. Changes to the regulation schedule would primarily be associated with timing. Although Lake Tohopekaliga would stay within the existing regulation schedule and not require a deviation from the schedule, water levels would be lowered approximately four months earlier than under the current regulation schedule. Water levels would be lowered to the same level as the existing regulated low of 52 feet NGVD. No change in the total amount of littoral zone exposed is expected from the base condition.

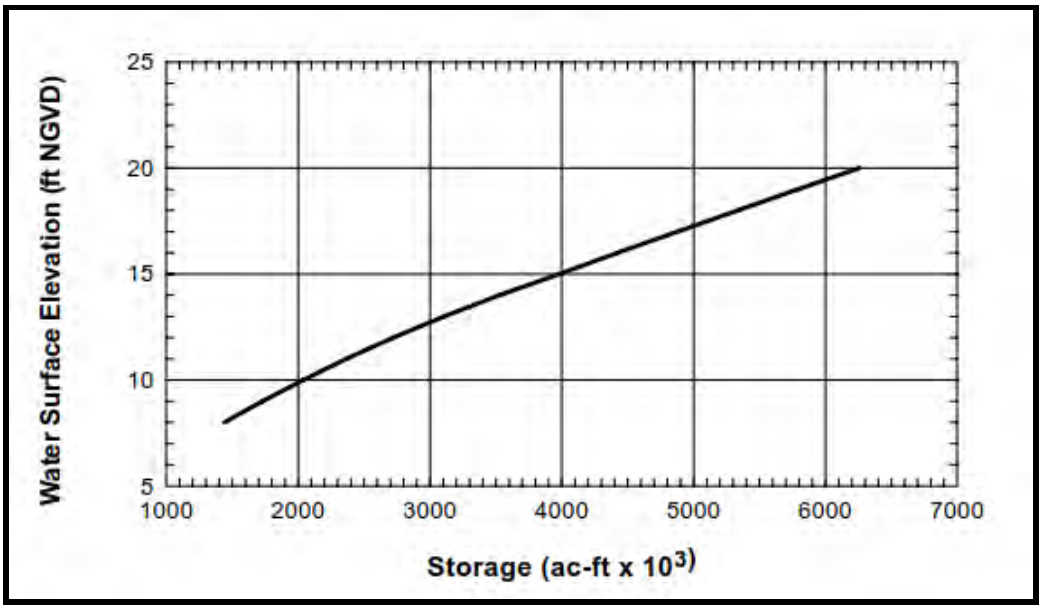
Changes to the timing and magnitude of water discharged from East Lake Toho and Lake Toho would temporarily increase the volume of water downstream. Average annual discharges from East Lake Toho through the S-59 (for the period 1996 to 2011) was approximately 118,000 acre-feet (Jones et al. 2014) with average monthly discharge from October to May (during the same period) equal to approximately 10,300 acre-feet. Based on a predicted drawdown from 57 feet to 53 feet NGVD, stage storage relationships established for East lake Toho indicate a corresponding water

volume of approximately 50,000 acre feet-(modified from Abtew et al 2010) (Figure 3-8). Given that no additional water would be discharged from Lake Tohopekaliga (i.e., other than pass-through volumes consistent with the current regulation schedule) and the large size of Lake Okeechobee, worst-case effects to Lake Okeechobee stages would be low (approximately a maximum of a few inches) (Figure 3-9) (USACE 1962, Abtew et al 2007). Some of this volume could be retained in lakes Cypress and Toho, depending on their water stages in comparison to the regulation schedule.



Source: modified from Abtew et al 2010
Note: Red arrow indicates approximate bottom of temporary deviation, green arrow indicates stage at which drawdown would begin.

FIGURE 3-8 STAGE STORAGE RELATIONSHIP FOR EAST LAKE TOHO



Source: Abtew et al. 2007

FIGURE 3-9 STAGE STORAGE RELATIONSHIP FOR LAKE OKEECHOBEE

Physical Features of Water Control Structures and Canals - The Project would require short-term operational changes to the water control structures associated with East Lake Toho and Lake Toho, as well as changes to existing canals and channels. Operations of the S-62 would not be affected.

When gravity feed to Lake Tohopekaliga becomes insufficient, the S-59 structure would be closed and the four pumps (100 cfs per pump; 400 cfs for the combined four pumps) would be brought online to move water from East Lake Toho (through the C-31) to Lake Tohopekaliga. Water from Lake Tohopekaliga would be discharged through the S-61 into the C-35. No changes to operations below Lake Tohopekaliga would be required. Although no structures are currently present affecting connectivity between East Lake Toho and Lake Runnymede, the Project would include the installation of a sheet pile weir to separate Lake Runnymede and East Lake Toho. The weir would be installed at the Rummel Road Bridge. Although short-term impacts to navigation and minor impacts to water quality may occur due to installation of the sheet pile, impacts to water control structures and canals are not anticipated.

Water Supply - A majority of the permitted water withdrawals by domestic water users in the East Lake Toho and Lake Tohopekaliga watersheds are made from the Floridan aquifer (surficial aquifer). Although much of the agriculture and irrigation withdraws come from the same source, some users (including neighboring homeowners) rely on surface water. Depending on the elevation of the intake, some users may be temporarily affected requiring the water users to extend their pump intakes farther into the lakes or temporarily use an alternate water supply source because of the drawdown.

Temporary lowering of water levels on East Lake Toho may require mitigation to ensure a water supply source for homeowners' permitted needs. This potential mitigation may require a modification to the existing water use permits. Given the change in land use over the previous decade, there is less demand by agricultural users than under previous drawdown efforts. Although impacts to water supply would be short-term and generally low to moderate in intensity under normal rainfall conditions, if drought conditions occur in the period following the drawdown, uncertainty exists regarding the ability and timing to refill East Lake Toho and Lake Tohopekaliga. FWC has committed to delay implementation of the Project during extreme dry conditions which would partially offset this concern. Given the uncertainty regarding predicting future rainfall conditions, impacts to water supply may occur until East Lake Toho can be returned to the current conditions regulation schedule.

Flood Control - Under Alternative A, East Lake Toho would be drawn down an additional two feet beyond the existing regulation schedule beginning in October, thereby providing additional available storage within East Lake Toho for the duration of the Project. Similarly, Lake Toho would be lowered an additional six inches (but within the operational flexibility of the existing regulation schedule) and hence additional storage volume would be available within Lake Toho. No effect to downstream lakes within the Kissimmee Chain would be expected (refer to Section 2.3.8). Although an additional 22,000 acre feet of water may be added to Lake Okeechobee, if no storage is available within the Kissimmee Chain of Lakes during the two months of pumping, flood control would not be impacted significantly and the effect would be of low intensity. Gravity discharge would occur during the first two months of the drawdown, which would bring East Lake Toho's stage down to 55 feet NGVD the bottom of the USACE regulation schedule. Pumping would then occur for the next two months drawing down the lake to 53 feet NGVD.

N***avigation*** - The proposed Project would have moderate to high effects on navigation within East Lake Toho, as well as low intensity effects on navigation within Lake Tohopekaliga. Within East Lake Toho, the lower water levels would increase the dried surface area of the littoral zone by approximately 1125 acres, limiting boat access to these areas. The drawdown may limit the use of the use of the two primary boat ramps used on East Lake Toho (City of St Cloud boat ramp and Chisholm Park boat ramp). Furthermore, project staging grounds may limit access and the ability to launch boats at Chisholm Park. Low water levels would limit navigation between Boggy Creek and East Lake Toho. The City of St Cloud has agreed to deepen the access channel of their boat ramp prior to the implementation of the Project to ensure boaters have access to the lake during the drawdown period.

In addition to the effects of low water levels, the insertion of a sheet pile weir between Lake Runnymede and East Lake Toho would limit connectivity/navigation between the two water bodies.

Effects to navigation on Lake Tohopekaliga would be low intensity, particularly when compared to effects on East Lake Toho. Stages on Lake Tohopekaliga would be lowered earlier than normal but the low water level target would be the same as under the current regulation schedule (52 feet NGVD); therefore, no additional lake surface area would be exposed. Low water conditions would last for several months longer than under the existing regulation schedule.

Although short-term effects would vary from high intensity within East Lake Toho to low intensity within Lake Tohopekaliga, long-term effects after project completion to navigation would be negligible. Actual improvements to navigation conditions within the littoral zone may be seen on East Lake Toho for the long-term with the oxidation of organic sediments during drawdown and more directly within the 112 acres of proposed scrape area. Given commitments to ongoing vegetation management in the 200-acre area of cattail proposed for the spray and burn area, navigation condition in these areas would also improve. If vegetation management is not conducted, the likely regrowth of cattail would limit navigation in the long-term.

Indirect Effects

Indirect effects are primarily associated with the effects on water quality. Although most effects would be local (and short-term) direct effects to water resources, interaction with downstream projects, primarily the KRRP, may result in impacts to lake stage and navigation. If water is needed for the KRRP, refill volumes necessary for East Lake Toho may be limited; therefore, effects to stages and navigation may be prolonged. Additionally, the ability to return to the current schedule may be impacted, particularly if dry conditions are experienced. FWC's commitment not to implement the Project in extreme wet or dry years would limit the potential for this effect but the inability to predict future rainfall/climate conditions may result in impacts to stage and navigation within East Lake Toho and Lake Tohopekaliga being prolonged.

3.3.2.3 Alternative B

Direct effects of selecting and implementing Alternative B on water resources would generally be similar to those described for Alternative A. Given the small reduction in the proposed scrape area

(approximately five to ten percent) impacts to navigation may be slightly increased. The effects to water supply and control structures would be the same as those noted for Alternative A.

Additionally, the ability to return to the current schedule may be impacted, particularly if dry conditions are experienced. FWC's commitment not to implement the Project in extreme wet or dry years would limit the potential for this effect but the inability to predict future rainfall/climate conditions may result in impacts to stage and navigation within East Lake Toho and Lake Tohopekaliga being prolonged.

The impacts to navigation would associated with the drawdown would be the same as those noted for Alternative A above. Under alternative B approximately six acres of existing island habitat would remain. Navigation in these areas would be improved over the base condition once the lake is returned to the regulation schedule but would be slightly reduced compared to Alternative A. Impacts to navigation associated the preserved habitat would minor.

3.3.3 Effects Summary

Implementation of either Alternative A or Alternative B would have a low to moderate intensity impact on the regulation schedule of East Lake Toho and a low intensity impact to the regulation schedule of Lake Tohopekaliga, with a need for a temporary deviation of the East Lake Toho regulation schedule. Changes to operations of the water control structures would be limited to the ten-month duration of the Project. After which, operations would return to those defined in the USACE/SFWMD water control plan. Effects to water supply would be low to moderate intensity y in the short-term within the East Lake Toho watershed. Long-term effects to water resources would be negligible. Some effects may carry over until the next wet season (e.g., time to refill if there are drought conditions) but overall impacts would be limited in intensity and duration, as long as drought conditions do not occur during the refill period.

Short-term effects to navigation would be moderate to high intensity for East Lake Toho and low intensity for Lake Tohopekaliga during project implementation and negligible following completion. No effect to navigation would occur downstream of Lake Tohopekaliga (Kissimmee chain of lakes through Lake Okeechobee).

3.4 WATER QUALITY

This section describes the existing water quality conditions of East Lake Toho and downstream Lake Tohopekaliga, and describes the results of the effects analysis of implementing either Alternative A or Alternative B. The section concludes with a summary of potential effects for all alternatives and a determination of whether the potential effects are significant.

3.4.1 Affected Environment

The spatial boundaries established to characterize effects to water quality include East Lake Toho, and downstream water bodies such as Lake Tohopekaliga.

East Lake Toho is classified as a mesotrophic lake (James 2014), which means the lake has a moderate amount of dissolved nutrients. It is listed as an impaired water body by both the EPA and the State of Florida. EPA notes impairment for both nutrients (based on a trophic status index) and for mercury in fish tissue (EPA 2012). No probable source data have been reported to the EPA. The state of Florida also lists East Lake Toho as an impaired water body for nutrients where vegetation indices are used as a proxy ((FDEP 2018a). On average, 60 percent of the inflow into East Lake Toho is from Boggy Creek and the S-62 canal, 27 percent from rainfall, and 13 percent from unmeasured inflows. Although Boggy Creek and S-62 discharges contribute most of the nutrient load to East Lake Toho, minor tributaries also contribute a significant portion of the nutrient load given the high concentrations at some of these sources (Table 3-2) (James 2014).

TABLE 3-2 PHOSPHORUS, NITROGEN AND CHLORIDE STATISTICS AT MINOR TRIBUTARIES TO EAST LAKE TOHO FOR THE PERIOD 2011-2012 DURING FLOWS

VARIABLE	TOTAL PHOSPHORUS (MG/L)	TOTAL NITROGEN (MG/L)	CHLORIDE (MG/L)
Mean	0.117	1.136	27.1
Minimum	0.065	0.435	12.7
Maximum	0.850	2.887	46.8
Stddev	0.141	0.509	9.4
Sample Number (N)	84	84	43

Source: James 2014

Lake Tohopekaliga is also listed by the state as an impaired water body (Class 4e[1]) based on failing bio-assessments (imbalance of flora and fauna, causative pollutant has not been identified), yet both nutrient and chlorophyll a concentrations are significantly lower in East Lake Toho than Lake Tohopekaliga. For the period of 2005 to 2015, total phosphorus concentrations at station A03 (open water station) on East Lake Toho (Water Body

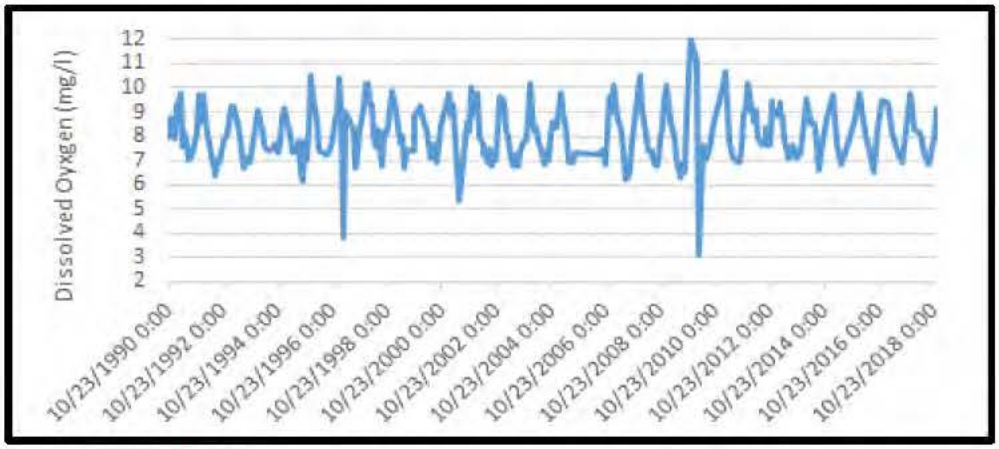
[1] Impaired, but recently completed or on-going activities to restore designated waterbody use.

Identification Number [WBID] 3172) averaged 0.02 mg/L versus 0.05 mg/L on Lake Toho (WBID 3173A). Total Kjeldahl nitrogen (TKN) concentrations followed a similar pattern with East Lake Toho averaging 0.66 mg/L and Lake Toho averaging 1.16 mg/L for the 2005 to 2015 period of record (CDM Smith 2016). The significantly lower surface water nutrient concentrations found in East Lake Toho generally limit the effects of lake discharges to downstream water bodies.

Although listed as impaired, trend analysis indicates improvement in water quality on both lakes over the past decade. On Lake Toho, total phosphorus (TP) concentrations have trended downward for the period of 2005 to 2015. Similarly, the CDM Smith (2016) analysis indicated that East Lake Toho TP concentrations were also trending downward. No TP trend was observed in the most recent 2016 analysis for East Lake Toho. It should be noted that a few extreme high values in 2005 likely drive much of the downward trend observed for Lake Toho.

Nitrogen (as TKN), on the other hand, trended upward on Lake Toho for the same period of record. Although increasing, the rate of increase has gone down compared to the previous analysis in 2014. Nitrogen concentrations showed no trend on East Lake Toho (CDM Smith 2016).

In addition to surface water nutrient concentrations, dissolved oxygen concentrations also affect habitat suitability. For the period of 2008 to 2018, the average dissolved oxygen at East Lake Toho (open-water) station A03 (SFWMD 2018) was 8.2 mg/L (Figure 3-10). Data is not available for the littoral zone of East Lake Toho but anoxic or hypoxic conditions have been assumed to be present in areas of high organic matter deposition and in areas with significant tussock cover. Given the paucity of available data, the actual distribution of dissolved oxygen impairment is unclear. The effects of organic matter accumulation combined with nutrients likely draw oxygen levels down considerably and likely make some areas hypoxic and/or anoxic (Bunch 2008). At the same time, the effects that the accumulated organic matter have on dissolved oxygen are limited in spatial extent and likely do not affect dissolved oxygen beyond the scale of a few meters or tens of meters from the accumulated organic matter.



Source: SFWMD 2018

FIGURE 3-10 DISSOLVED OXYGEN CONCENTRATIONS IN OPEN WATER PORTION OF EAST LAKE TOHO, 1990-2012

3.4.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on water quality. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*. Descriptions of the three levels of intensity effects specifically developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	The effect on water quality (e.g., nutrients, turbidity, dissolved oxygen, and/or chlorophyll A) would be measurable or perceptible, but small and restricted to specific portions of East Lake Toho. Negative effects would be short-term. The Project would not affect long-term ecosystem function.
Moderate	The effect on water quality would be measurable or perceptible and could alter chemical characteristics of East Lake Toho. The ecological functions typically provided by East Lake Toho would not be substantially altered in the long term. Down-stream receiving bodies would not be impacted.
High	Consequences of project implementation would cause a measurable effect on water quality and would modify chemical characteristics of East Lake Toho, influencing downstream water quality. Ecological functions of the lake could be substantially altered (in both the short-term and long-term).

3.4.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoil materials in waters of the United States; therefore, drawdown and proposed habitat enhancement project components would not be implemented. Implementation of the No-Action Alternative would not affect existing water quality conditions. Sediments throughout the littoral zone (i.e., below 55 feet NGVD) would not be exposed to increased oxidation, and therefore would not release additional nutrients into the overlying water column. However, since floating tussocks would not be removed under the No-Action Alternative, the undesirable low dissolved oxygen concentrations thought to be present underneath them would persist. Similarly, low light levels underneath the tussocks would persist.

3.4.2.2 Alternative A

Direct Effects

Four components of Alternative A as described in Section 2 *Alternatives*, have the potential to impact water quality. These components of Alternative A and the potential effects are discussed below:

East Lake Toho Drawdown - The Proposed Action of lowering the water level in East Lake Toho during the drawdown should not adversely impact water quality over the long-term.

Initially, the drawdown would increase the volume of water and associated nutrient load which is discharged to downstream waterbodies (via the S-59 structure). Given the relatively low nutrient concentrations within East Lake Toho, this is not expected to have negative long-term effects on downstream water quality. Within East Lake Toho, oxidation of sediments and compaction of organic matter is anticipated to occur during the drawdown providing long-term positive benefits. Reduction of organic sediments by oxidation would lead to lower BOD, potentially increasing dissolved oxygen in areas around the lake with high organic sediment accumulation. This improved condition would have direct benefits to fish and invertebrate organisms and water quality, as higher dissolved oxygen levels in the water column reduces sediment nutrient flux to surface waters. Generally, the center of the lake has healthy dissolved oxygen concentrations based on data available from SFWMD (2018) (Figure 3-10). The subsequent rewetting of oxidized sediments during the refilling of East Lake Toho is expected to result in low to moderate intensity short-term increases in turbidity and nutrients, including nitrogen and phosphorus concentrations. However, high-intensity and long-term effects are not expected to occur in East Lake Toho and over time, the reestablishment of aquatic vegetation would mitigate effects within the proposed project area. The lake refill (East Lake Toho and Lake Tohopekaliga) would offset any drawdown volume and associated nutrient loading conveyed downstream. Any short-term nutrient release into East Lake Toho, potentially resulting from the drawdown (as noted above, associated nutrient release from the entire littoral zone upon rewetting), would not necessarily exceed that resulting from current conditions in the No-Action Alternative.

Mechanical Scraping of East Lake Toho's Littoral Zone and Creation of Spoil Islands - The proposed removal of organic sediments by scraping and creation of two spoil islands using the accumulated organic material would have low to moderate intensity short-term impacts to water quality. Piling the excess organic sediments unto spoil islands would partially limit bioavailability of sediment nutrients, however some degree of leaching of nutrients is anticipated. Short-term water quality impacts adjacent to the spoil islands would be low to moderate in intensity. Increased turbidity and increased nutrient loading could occur during refilling of the lake as nutrients flux from the spoil islands. Long-term water quality effects are expected to be of low intensity as the spoil islands re-vegetate and after the initial nutrient flux has occurred. Negative water quality effects from the spoil islands would be partially minimized through the use of BMPs (such as use of fabric and/or seeding to minimize erosion; see Appendix F) (Table 3-3).

Previous spoil island construction on Lake Toho occurred just prior to a period of high tropical storm activity. Effects of spoil island construction on water quality were hence confounded with storm activity (Hurricanes Charley, Frances and Jeanne). Informal observation noted significant losses in island volume just after the storms passed (2004, shortly after lake refill). By 2006, volume measures of 15 islands indicated an approximate 21 percent loss of island mass. Declines in water quality (increased phosphorus, chlorophyll a and color, and decreased dissolved oxygen) were observed in the short-term (up to two years), after which water quality returned to pre-project conditions (Hoyer et al 2006, 2008). Hence there is some risk of more intense short-term water quality impacts during tropical storm activity. As noted above, phosphorus concentrations have continued to trend down within East Lake Toho since the 2004 drawdown (CDM Smith 2016).

In the scrape zone (approximately 112 acres), most of the organic sediment and vegetative matter would be removed to form two in-lake spoil islands. This makes the associated nutrients less bioavailable and once the islands are stabilized would provide a low to moderate intensity long-term water quality benefit. In the short-term, the burning of woody material in the scrape zone would leave nutrient rich ash. Although much of the nitrogen would be volatilized, all of the associated phosphorus would remain, having the potential to enter in the water column during refilling operations. Nutrients associated with the ash would have low to moderate intensity short-term negative effect on water quality. BMPs could be employed to minimize potential impacts (Table 3-3).

Aquatic Vegetation Spray and Burn - Areas that are proposed for spray and burn (Figure 2-2) may experience short-term increases in BOD due to decomposition of any unburnt organic material. Microbial activity may lower dissolved oxygen in the short-term, but this condition should return to baseline conditions in the long-term. Long-term improvement in dissolved oxygen levels should occur in areas that currently have dense vegetation and /or high detrital accumulation. The post-project reduction in littoral vegetation (i.e., cattail loss from the spray and burn areas and complete vegetation loss in the scraped areas) would decrease the nutrient uptake capacity of vegetation within the littoral zone in the short-term and may lead to an increase in nutrient levels within the water column of East Lake Toho. Increased light penetration in the water column combined with increases in available nutrients may also result in short-term increases of chlorophyll a concentrations.

Use of Best Management Practices to Minimize Environmental Effects - BMPs such as those shown in Table 3-3 should be used to limit adverse water quality effects to the project action areas and to limit duration of the effects.

TABLE 3-3 LIST OF POTENTIAL BEST MANAGEMENT PRACTICES TO PROTECT WATER QUALITY

BMPS FOR DEWATERING
Sediment traps
Confined disposal facilities
Dewatering/gravity filter bags
Silt fence barriers
BMPS FOR ACTIVITIES IN DEWATERED CONDITIONS
Equipment selection
Natural vegetative barriers
Silt fence barriers
BMPS FOR ACTIVITIES IN INUNDATED CONDITIONS
Equipment selection
Dredging operational controls
Floating turbidity barriers
BMPS FOR MUCK ISLAND EROSION CONTROL
Seeding
Silt fence barriers
Filter berm barriers
Rolled erosion control products
Sod

Source: Chang *et al*. n.d.

Indirect Effects

Implementation of the proposed drawdown would increase the water volume and associated nutrient load which is transported downstream out of East Lake Toho, but nutrient concentrations are not expected to increase significantly. Increased nutrient loads would have low to moderate intensity effects downstream to Lake Tohopekaliga. Biotic uptake of nutrients (assimilation by plants and algae) within Lake Toho would limit negative affects to the remainder of the Kissimmee Chain of Lakes below Lake Tohopekaliga.

Short-term effects could include increases in turbidity within Lake Tohopekaliga adjacent to the pumped in-flow during the drawdown period. Similar to the effects expected on East Lake Toho (noted above), the drawdown would likely lead to short-term nutrient flux and slight increases in turbidity. *In situ* oxidation of organic sediments and consolidation of remaining organic sediments into spoil islands would likely provide long-term benefits by decreasing BOD. Water levels within Lake Tohopekaliga would not go below the current regulation schedule; therefore, any effects on water quality associated with lowering water stages (within Lake Tohopekaliga) would differ little from the No-Action Alternative.

The long-term increase of phosphorus loads delivered to the Kissimmee Chain of Lakes and Lake Okeechobee as a result of the East Lake Toho drawdown should be of negligible to low intensity. This is based on the assumption that the release of water down the Kissimmee River Channel during the drawdown of East Lake Toho and Lake Tohopekaliga would be balanced by the need to refill the lakes at a later date. Additionally, the consolidation of nutrient laden lake sediments into spoil islands may reduce future nutrient contributions from East Lake Toho to downstream receiving bodies (particularly if other tussock management activities are not implemented).

3.4.2.3 Alternative B

Direct and indirect effects of selecting and implementing Alternative B on water quality would generally be similar to those described above for Alternative A, but slightly less intense. The preservation of five to ten percent of the natural area (patches of existing of woody vegetation and surrounding herbaceous marsh) within the proposed scraped area is anticipated to provide water quality benefits. The nutrient uptake capacity of the preserved natural vegetation would provide localized benefits to water quality surrounding the preserved habitat. Additionally, the reduction in the volume of potential spoil material would likely reduce the flux of material from the two spoil islands.

3.4.3 Effects Summary

Under either Alternative A or Alternative B, removal of littoral zone organic sediments and subsequent placement of them into in-lake spoil islands would concentrate the organic material, reducing its contact with East Lake Toho's water column. This would decrease biological oxygen demand, resulting in more stable and higher levels of dissolved oxygen within the scraped areas. The removal of tussocks and resulting increased light penetration should encourage productivity, thereby further improving dissolved oxygen concentrations.

Short-term negative impacts to water quality caused by increased turbidity and nutrient levels may be of moderate intensity within East Lake Toho, but long-term effects would be low intensity and may be beneficial. With the implementation of BMPs and water quality monitoring[2], long-term impacts to water quality from the East Lake Toho Project would not be significant.

[2] Per EPA request, a project specific water quality monitoring plan would be implemented to maximize benefits of the proposed East Lake Toho habitat enhancement project. Monitoring would be conducted to establish a pre-project baseline, during project implementation (in accordance with existing permits and state water quality standards), and post project to assure return to baseline (pre-project) conditions.

3.5 SOILS AND GEOLOGY

This section describes soils and geology within and near the project area and the potential consequences of implementing the East Lake Toho Project upon them.

3.5.1 Affected Environment

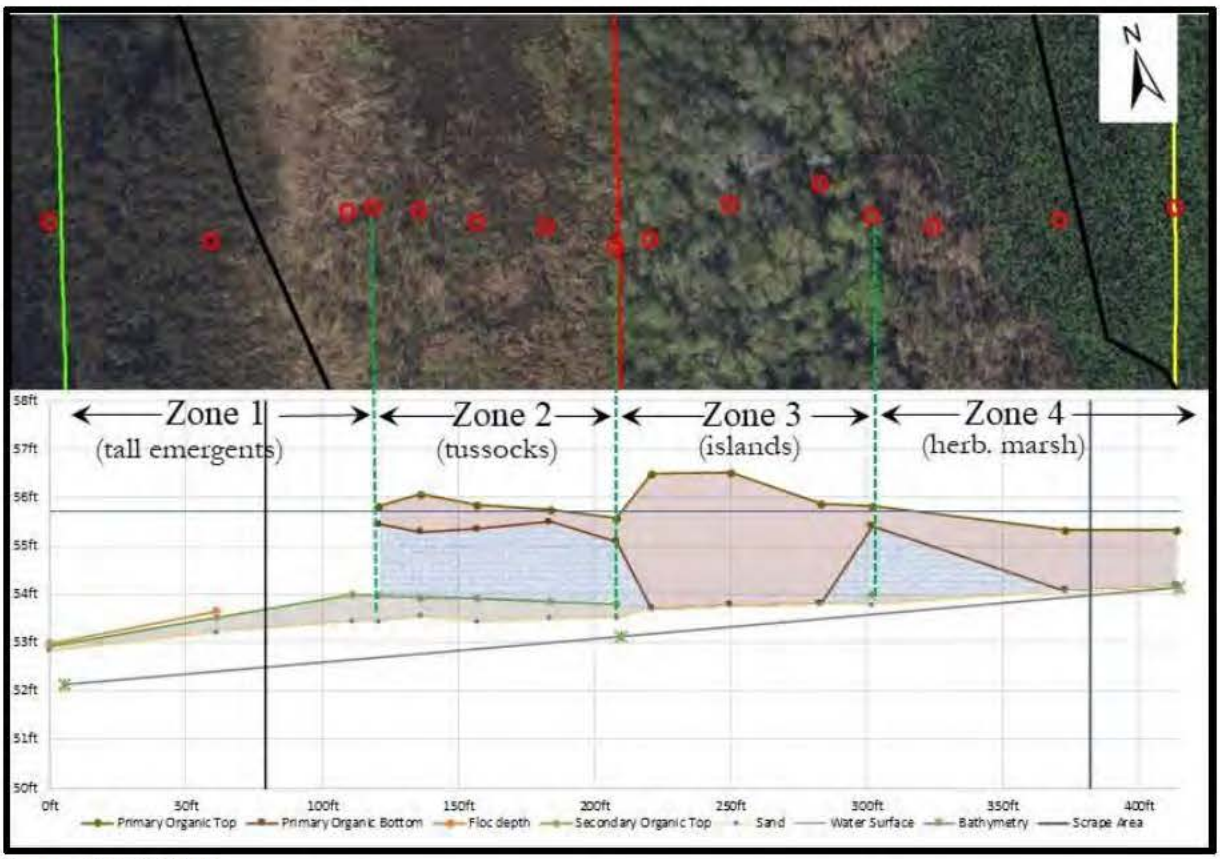
The proposed project actions would directly affect soils and topography of the entire lake littoral zone, with the most intense effects in the proposed eastern littoral zone scrape area where soils (organic sediments) would intentionally be removed. The proposed Project, whether Alternative A or B, would not affect either local or regional geology.

SFEC (2018b) conducted fieldwork in the littoral zone of East Lake Toho. The descriptions of organic sediments are condensed from that report. The lake bottom of East Lake Toho is sand. At present, within the littoral zone there is a varying degree of organic sediment on top of this sand. In some places the sediments are primarily root mats with little additional detritus, on other places the organic sediments can be as much as one and one-half-feet thick. These within-lake organic sediments are for the most part not mapped on Natural Resources Conservation Service soil maps. SFEC (2018b) used transects to partially quantify sediment thickness and distribution within the eastern, northern and western portions of the East Lake Toho littoral zone.

These organic sediments can positively affect lake water quality by acting as a sink for nutrients, either by sequestering the nutrients directly within the sediments or by forming a substrate that supports plant growth. The plant growth in turn typically takes up nutrients.

On the eastern side of the lake, the organic sediments have fostered substantial growth of woody and tall vegetation, creating habitat that is otherwise absent from the lake and even from the lake shoreline. Possible negative effects of these thicker sediments include locally lowering dissolved oxygen levels and creating physical barriers between the lake center and the shallowest portions of the littoral zone.

In the eastern littoral zone where organic sediments are thickest and are proposed for removal by scraping, a zonation in vegetation was observed, along with matching zonation in the organic sediments. Four zones were noted, from lakeward to shoreward: 1) a zone of tall emergent species, mostly bulrush (*Scirpus*) and cattails (*Typha*), with little organic material present other than live roots; 2) a zone of tussocks with pickerel weed (*Pontedaria*), ferns, and other low stature vegetation, where the sediments formed a floating mat of roots and peat; 3) an "island" or berm zone with tall, woody vegetation and a sturdy, sometimes floating, mat of peat and roots, apparently anchored to the lake bottom by tree roots; and 4) a herbaceous marsh "back zone" of low species and open water with organic sediments located at the bottom of the water column. Figure 3-11 shows an aerial and corresponding cross-sectional view of this zonation. Note however that along other transects through the proposed eastern scrape zone, the organic sediments within Zone 3, the island zone, did not necessarily extend fully down to the sand bottom. They were anchored and did support the researchers' weight but appeared to have a slurry like layer underneath the peat/root mat.



Source: SFEC 2018a

FIGURE 3-11 CROSS-SECTION OF ORGANIC SEDIMENT THICKNESSES MEASURED ALONG TRANSECT 8E

3.5.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and the two action alternatives on the soils, geology and topography of the East Lake Toho area. Definitions for duration are discussed in Section 3.1, *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, and descriptions of the three levels of intensity effects specifically developed for this Project are included below.

INTENSITY LEVEL	DESCRIPTION
Low	Disturbance to geology or soils (i.e., lake sediments) from project implementation would be detectable, but localized and discountable. Erosion and/or compaction would occur from construction in localized areas, but natural restoration would resolve these issue.
Moderate	Disturbance would occur over a relatively wide area from construction of the Project. Impacts to geology or soils (lake sediments) would be readily apparent and result in short-term changes to the soil character or local geologic characteristics. Erosion and compaction impacts would occur over a wide area.
High	Disturbance would occur over a relatively large area from implementation of the Project. Impacts to geology or soils (lake sediments) would be readily apparent and result in short-term and long-term impacts to the to the soil character over a large area, both inside and outside the Project area. Erosion and compaction impacts would occur over a large area.

3.5.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters of the United States; therefore, drawdown of East Lake Toho and scraping, removal of vegetation and organic sediments would not occur. Implementation of the No-Action Alternative would preserve the existing soils (organic sediments), topography and geology. The existing one foot to one and one-half-feet of organic sediments provide ecological functions, including acting as a sink for lake nutrients (Water Quality, Section 3.4) and creating elevated topography that supports woody vegetation at a distance from the shoreline (Vegetation, Section 3.6, and Fish and Wildlife, Section 3.7).

3.5.2.2 Alternative A

Direct Effects

Alternative A would have no effect on either local or regional geology. Effects on soils and topography vary with the different project subcomponents, as noted below.

East Lake Toho Drawdown - The Proposed Action of lowering water levels in East Lake Toho by two feet below the normal regulation schedule minimum would expose approximately 1,125 additional acres of littoral zone to air and direct sunlight. As a result, it can be expected that a large fraction of the organic sediments present in these areas would be lost to microbial oxidation during the course of the drawdown. This would be a high intensity effect due both to the spatial extent (whole littoral zone) and to the time that it would take to re-accumulate the organic sediments (depending on thickness, greater than ten years).

***Aquatic Vegetation Spray and Burn* -** If burning of the proposed spray and burn areas occurs at a time when the lake drawdown has allowed the organic sediments to dry out, then there is a high likelihood that the organic sediments would burn along with the vegetation. It is possible that this would increase the loss of organic sediments above what would have occurred as a result of drawdown-induced microbial oxidation alone. This would be a moderate intensity effect because of the more limited spatial extent and because the involved change may already have occurred through microbial oxidation.

***Mechanical Scraping of East Lake Toho's Littoral Zone and Creation of Spoil Islands* -** The proposed removal by scraping of organic sediments from the eastern portion of the littoral zone would have a major, albeit intentional, high intensity effect on these sediments – complete removal. This would be a high intensity effect because it would take 20-40 years to re-accumulate the present day thickness of one to one and a half feet.

***Use of Best Management Practices to Minimize Environmental Effects* -** It is envisioned that BMPs (Appendix F) would be used to ensure that during the vegetation and sediment scraping in the eastern littoral zone, extra care would be taken to ensure that only organic sediments and not the underlying mineral sediments would be removed (Section 5.2.1 *Best Management Practices*).

Indirect Effects

Indirect effects of implementing Alternative A would include water quality effects, greenhouse gas (GHG) effects and ecological effects due to loss of topography. Oxidation of organic sediments, whether rapidly by actual burning or more slowly by microbial oxidation, would result in mineralization, which would release inorganic nutrients into lake waters, and which would release carbon dioxide into the atmosphere. Loss of the organic sediments would constitute loss of a potential sink for lake water nutrients, which have been elevated and can be expected to continue increasing. Removal of the eastern organic sediments, which are one foot to one and one-half-feet thick, would constitute an ecologically important change by eliminating the elevation that currently supports substantial growth of woody vegetation. Vegetation at this location, away from the shoreline and hence away from human and pet influence, as well as surrounded by water, has distinct value to wildlife.

Creation of the proposed spoil islands using the scraped organic sediments would create a vertical hydrological gradient within the islands, in turn leading to oxidation of the organic sediments, with the associated water quality and GHG concerns.

3.5.2.3 Alternative B

Alternative B is similar to Alternative A, differing in preserving five percent to ten percent of the existing area of eastern littoral zone organic sediments, a selected subset of in-lake wooded habitat, Alternative B would therefore have similar direct and indirect effects, but with a five percent to ten percent reduction in oxidation of organic sediments and the preservation of the ecologically important woody vegetation and habitat growing on top of those sediments.

3.5.3 Effects Summary

The No-Action Alternative would cause little or no alterations to existing soil (organic sediment) or topographic conditions; it would also preserve some ecologically positive aspects of existing sediments and topography. Alternative A would have a beneficial long-term effect on the portion of East Lake Toho within the proposed 112 acre scrape area. The removal of 112 acres of organic sediments would take 20 to 40 years to replace if removed. Alternative B would have a similar long-term beneficial effect, but the effect would be less due to retention of a portion of the sediments. The removal of the organic sediments is an intended goal of the Project and thought to be beneficial; however, there are associated negative effects due to release of nutrients (3.4 *Water Quality*) and loss of ecologically important woody habitat that depends on the sediment topography (3.6 *Vegetation* and 3.7 *Fish and Wildlife*). While the Project would have a high-intensity long-term effect on a portion (112 acres) of East Lake Toho these significant long-term effects are part of the stated purpose of the Project and considered beneficial.

3.6 VEGETATION (TERRESTRIAL AND AQUATIC)

This section describes the aquatic and terrestrial vegetation within and near the project area and potential consequences upon them due to the implementation of the proposed Project.

3.6.1 Affected Environment

Vegetation within and adjacent to East Lake Toho includes a mix of aquatic and terrestrial plants. Aquatic plants include submersed, emergent and floating vegetation while the terrestrial habitat includes lands adjacent to East Lake Toho as well as multiple islands within the littoral zone. The islands are comprised of wetland and upland species that include woody shrubs and trees. By providing woody vegetation in an area surrounded by water, the islands may provide important habitat.

Vegetation of the East Lake Toho littoral zone was mapped in 2016 (URS). Table 3-4 provides the main vegetation classes of the littoral zone along with the acreage. Plant distribution varies throughout the East Lake Toho littoral zone. The eastern side of East Lake Toho is generally more diverse, and includes more woody species (shrubs and trees). The western and northern sides generally have greater cattail cover. Figure 3-12 and Figure 3-13 depict the vegetation distribution on the eastern side of East Lake Toho, which includes the proposed scrape area. Figure 3-15 depicts the community structure on the north and west sides of the lake.

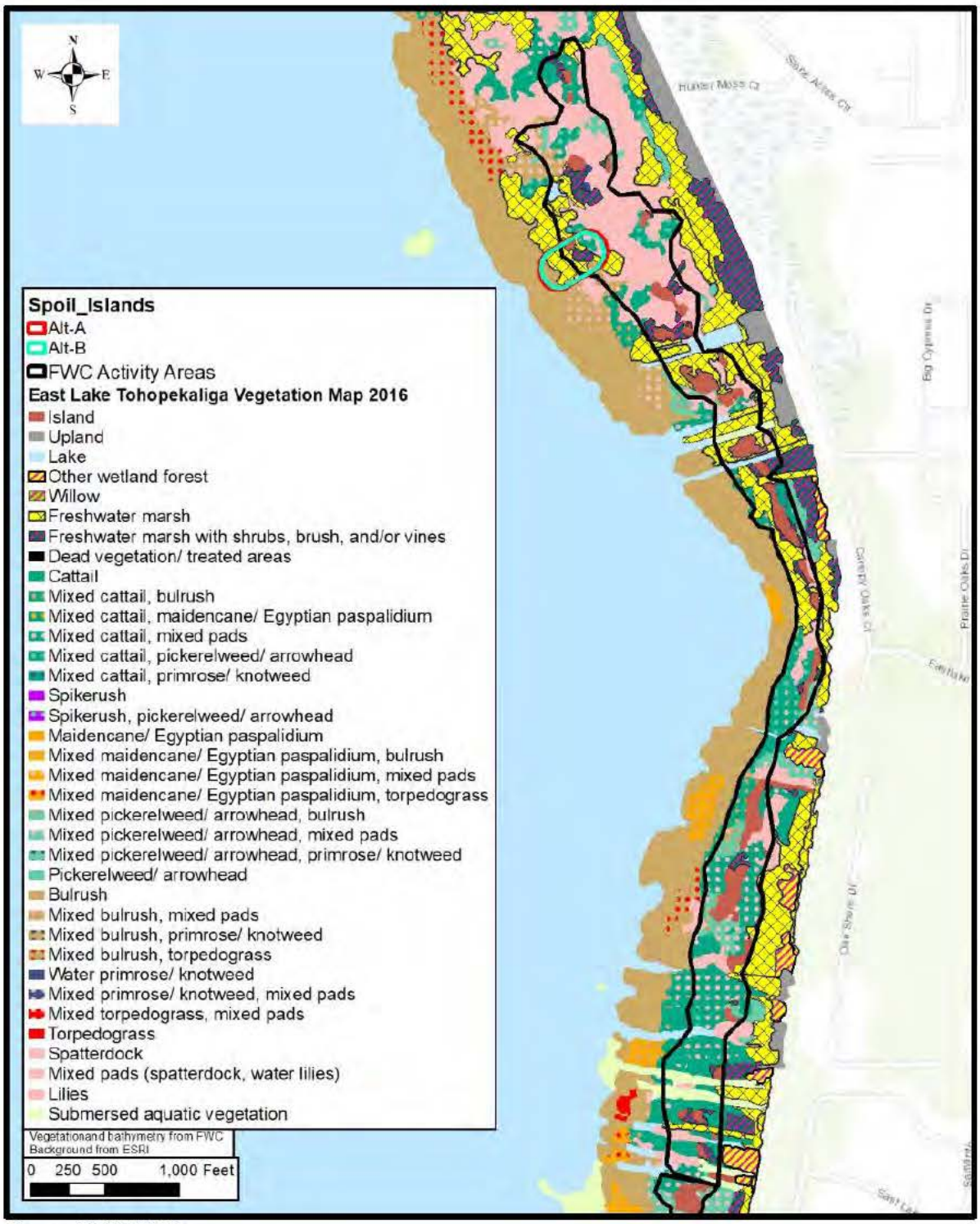
TABLE 3-4 SPATIAL EXTENTS OF PLANT CATEGORIES WITHIN THE LITTORAL ZONE OF EAST LAKE TOHO

FLUCCS CODE	VEGETATION CLASS	ACRES	% COVER
6410	Freshwater marsh	701	17.4%
6417	Freshwater marsh with shrubs, brush, and/or vines	443	11.0%
6421	Bulrush	418	10.4%
6412	Cattail	311	7.7%
6412-6440	Mixed cattail, mixed pads	249	6.2%
6301	Other wetland forest	245	6.1%
6421-6440	Mixed bulrush, mixed pads	218	5.4%
6440	Mixed pads (spatterdock, lilies, and/or American lotus)	199	4.9%
6412-6420	Mixed cattail, pickerelweed/ arrowhead	162	4.0%
6442	Spatterdock	127	3.2%
6445	Lilies	127	3.2%
6420	Pickerelweed/ arrowhead	108	2.7%
6420-6440	Mixed pickerelweed/ arrowhead, mixed pads	102	2.5%
6181	Willow	77	1.9%
6450	Submersed aquatic vegetation	74	1.8%
6414-6440	Mixed maidencane/ Egyptian paspalidium, mixed pads	72	1.8%
6423	Torpedograss*	69	1.7%
6414-6423	Mixed maidencane/ Egyptian paspalidium, torpedograss	55	1.4%
6414	Maidencane/ Egyptian paspalidium	50	1.2%
6412-6424	Mixed cattail, primrose/ knotweed	42	1.0%
	Total Acres littoral vegetation, % in table	4027	95.6%

Source: SFEC 2018a

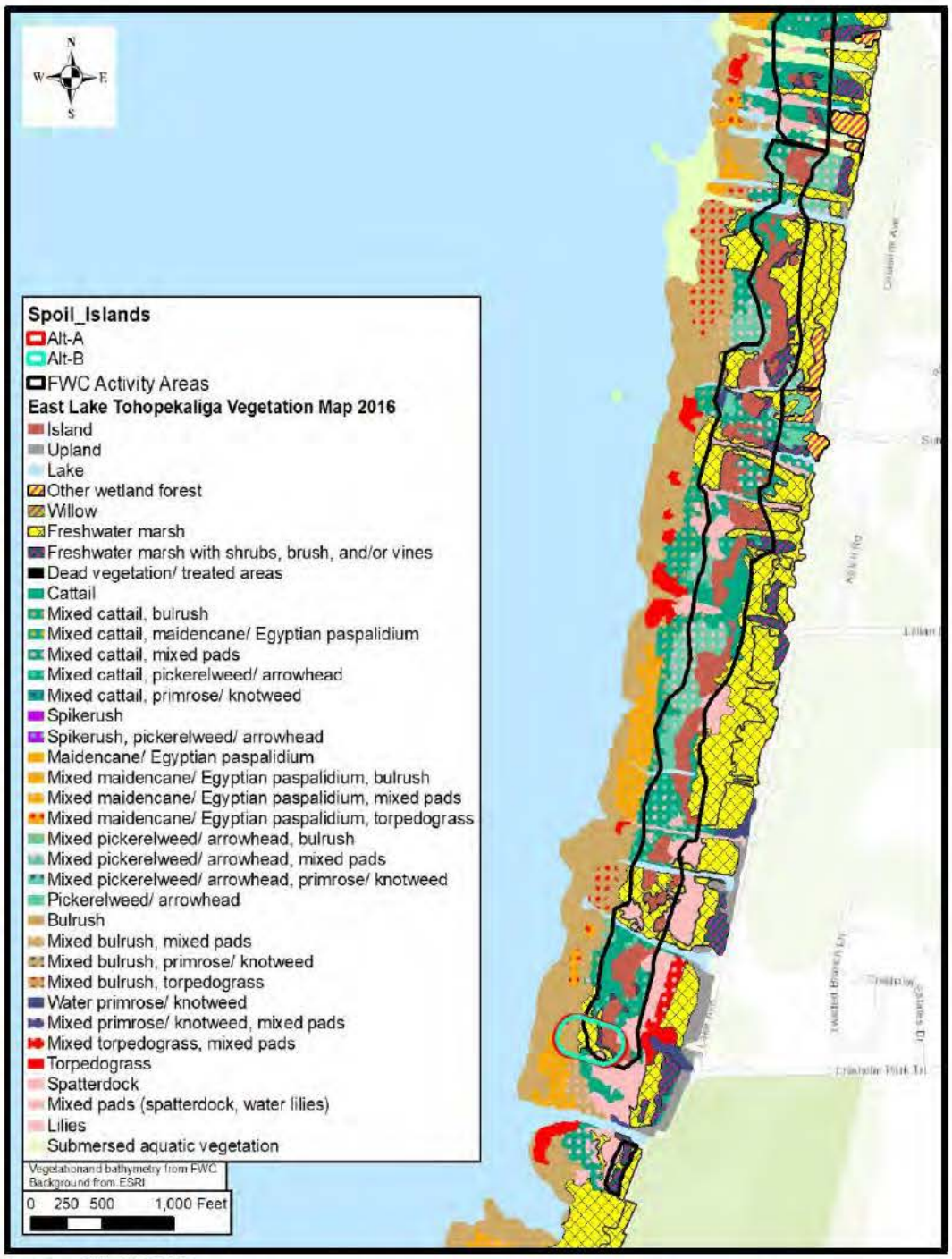
Note: Excludes upland classes, open water and lasses of <1%. Many species listed here are also occur as components of minor extent mixed classes.

* Much of the area mapped as Freshwater marsh is actually torpedograss.



Source: SFEC 2018a

FIGURE 3-12 LITTORAL VEGETATION IN THE NORTHERN PORTION OF THE PROPOSED EASTERN SCRAPE ZONE (BLACK OUTLINE)



Source: SFEC 2018a

FIGURE 3-13 LITTORAL VEGETATION IN THE SOUTHERN PORTION OF THE PROPOSED EASTERN SCRAPE ZONE (BLACK OUTLINE)

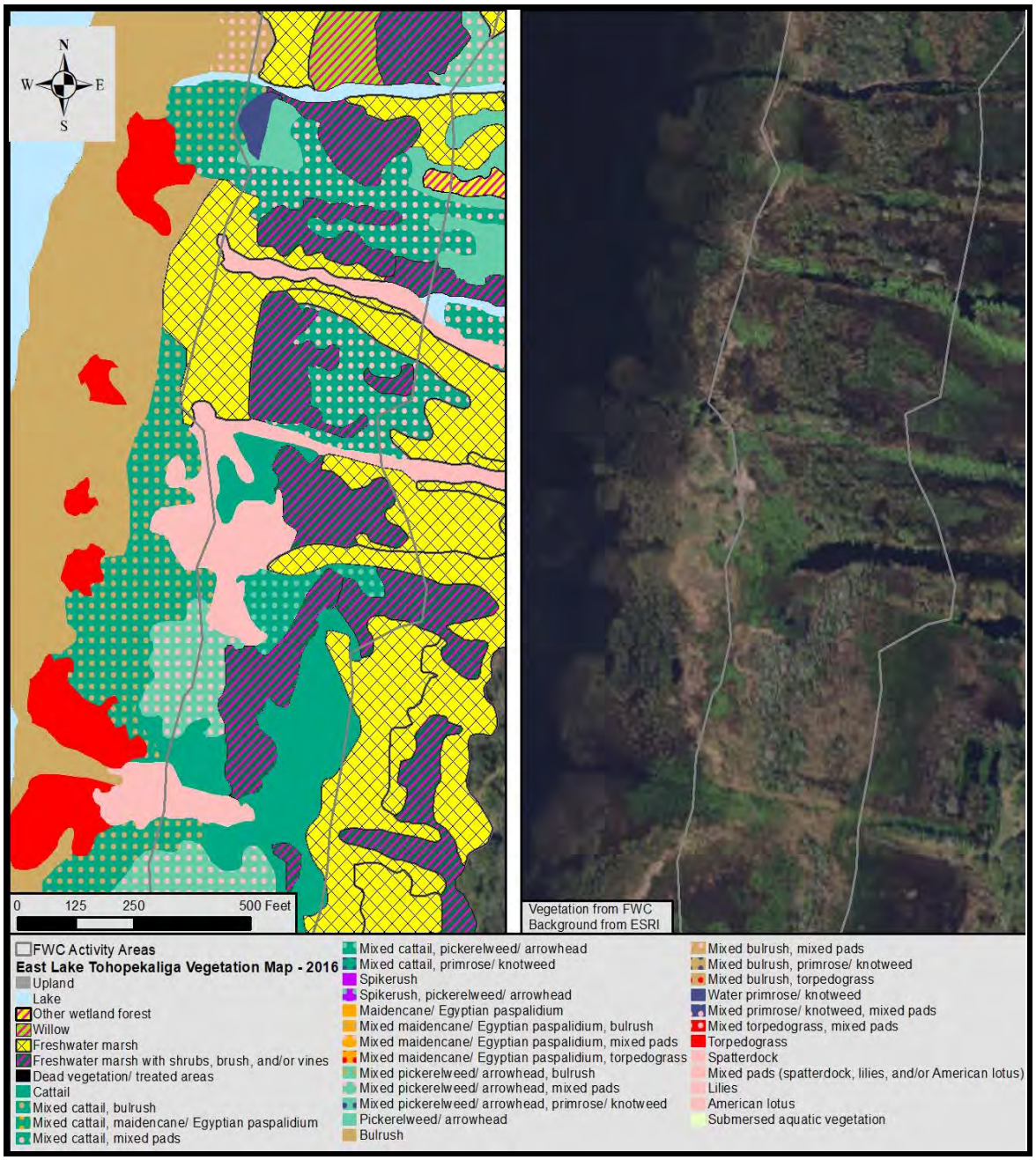
The portion of the littoral zone identified by FWC staff as the proposed scrape area for vegetation and organic sediment removal is located on the eastern shore of East Lake Toho (Figure 3-12 and Figure 3-13). The representative subset of the 112 acre area shown in Figure 3-14 suggests a somewhat complicated pattern. However, field observations (SFEC 2018a) from a number of

approximately east-west transects across the littoral zone that suggest a zonation of four main groupings (lakeward to shoreward): 1) a zone of tall emergent species; 2) a zone of tussocks; 3) an island zone (has also been called a "berm"); and 4) a zone of herbaceous marsh.

- Zone 1, tall emergents, included bulrush (*Schoenoplectus californicus*) on the lakeward edge, with cattail (*Typha spp*.), and spatterdock (*Nuphar advena*).
- Zone 2, tussocks, supported pickerel weeds, and fern species, sometimes the shrubs water primrose (*Ludwigia peruviana*) (non-native), large primrose (*Ludwigia grandiflora*) (non-native), Mexican primrose (*Ludwigia octovalvis*) (native), and/or wax myrtle (*Morella* [formerly *Myrica*] *cerifera*) (native), often with some cattail.
- Zone 3, the islands, were covered with a dense stand of woody species, including some combination of wax myrtle, coastal plain willow (*Salix caroliniana*) and sometimes red maple (*Acer rubrum*), with an undergrowth of ferns, taro, some herbs, and mosses.
- Zone 4, herbaceous marsh, included a range of mixtures. One common mixture was American white lily with various bladderwort species, and sometimes included spatterdock. Another frequent mixture was pickerel weeds, sometimes with primrose, much like in Zone 2. Alternatively, a graminoid/herb marsh, featuring spike rush (*Eleocharis*) species with other sedges, grasses, pennywort (*Hydrocotyle*) and arrowhead (*Sagittaria spp.*) were observed. Scattered cattail was common in many of the mixtures. Zone 4 was often dominated by invasive species, such as torpedo grass and Wright's nutrush (*Scleria lacustris*): however, any open water within Zone 4 often contained extensive growth of bladderwort.

Boundaries were sometimes irregular and/or unclear. FWC identified scrape zone includes mostly Zones 2 and 3. Examples of the vegetation zones, depicted in aerial imagery and explored during sediment transects, can be found in Section 3.5 Soils and Geology.

The elevated substrate on both tussocks (Zone 2) and islands (Zone 3) likely provides useful habitat for wading and non-wading birds, amphibians and reptiles. The field team observed that the shallow habitat in Zone 4 (herbaceous marsh) was frequently used by wading birds for foraging, as well as by sandhill cranes for nesting and foraging. The SFEC field team observed snail kites using tall emergents (Zone 1) and tussocks (Zone 2); as well as in Zone 4, south of the boat ramp at Chisholm Park.



Source: SFEC 2018a

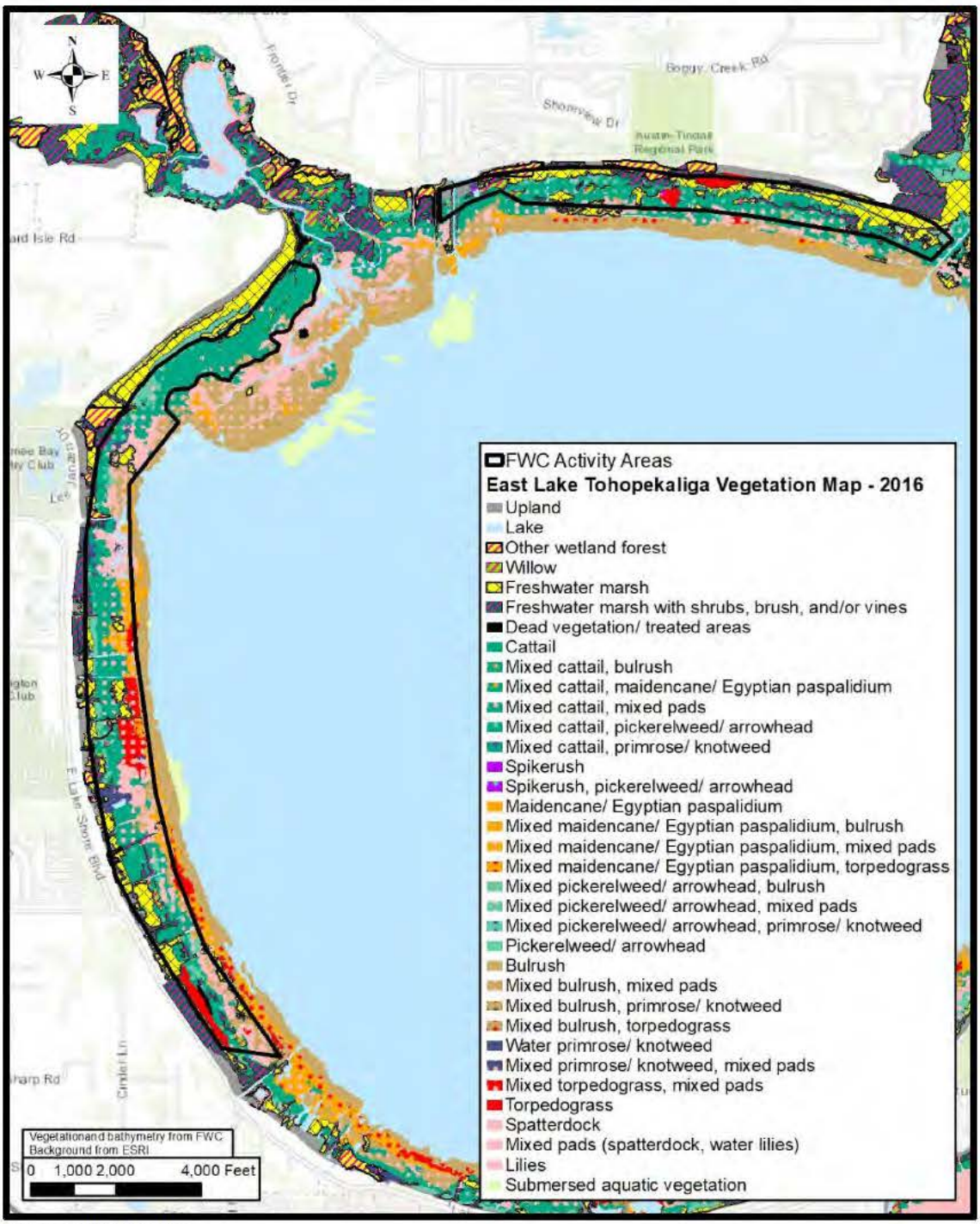
FIGURE 3-14 EXAMPLES OF VEGETATION THE PROPOSED SOUTHEASTERN SCRAPE AREA

Table 3-5 provides an approximate relation between the 17 vegetation classes mapped by URS (2016) and the four zones. This is only an approximate assignment, and one limited by the fact that several URS (2016) classes span two or more zones. For example, freshwater marsh was observed in both Zone 4 and Zone 2, and mixed cattail, pickerel weed/arrowhead were observed in Zone 1 and Zone 2, and occasionally in zone 4. Of particular note, the class of freshwater marsh with shrubs, brush, and/or vines blurs the distinction (clearly seen in the field) between tussocks and islands.

TABLE 3-5 VEGETATION CLASSES MAPPED INTO ZONES*

ZONE	VEGETATION CLASS
Zone 1 (Tall Emergents)	Bulrush Mixed bulrush, mixed pads Mixed cattail, bulrush Mixed pickerelweed/ arrowhead, bulrush Cattail Mixed cattail, mixed pads Spadderdock Mixed cattail, pickerelweed/ arrowhead
Zone 2 (Tussocks)	Mixed cattail, pickerelweed/ arrowhead Mixed pickerelweed/ arrowhead, mixed pads Pickerelweed/ arrowhead Water primrose/ knotweed Freshwater marsh Freshwater marsh with shrubs, brush, and/or vines
Zone 3 (Islands)	Freshwater marsh with shrubs, brush, and/or vines Willow
Zone 4 (Herbaceous Marsh)	Freshwater marsh Lilies

*Note: Based upon URS 2016 vegetation classifications.



Source: SFEC 2018a

FIGURE 3-15 WEST AND NORTH AREAS OF EAST LAKE TOHO PROPOSED FOR SPRAY AND BURN

3.6.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and Alternative A and Alternative B on the vegetation of the East Lake Toho area. Definitions for duration are discussed in Section 3.1, *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, and descriptions of the three levels of intensity effects specifically developed for this Project are included below.

INTENSITY LEVEL	DESCRIPTION
Low	Impacts on vegetation would be detectable but discountable, and would not alter natural conditions measurably. Infrequent disturbance to plant communities could be expected, but without affecting local or range-wide population stability. Permanent removal of vegetation communities during the life of the Project would be minimal.
Moderate	Impacts on native vegetation would be detectable and/or measurable. These disturbances could adversely affect local populations but are not expected to affect regional population stability. While some permanent vegetation removal would occur in key habitats, sufficient local habitat would remain functional to maintain the viability of the communities both locally and throughout its range.
High	Impacts on native vegetation would be measurable and extensive. These disturbances could adversely affect local vegetation communities, and could affect range-wide population stability. Large quantities of specific vegetation communities would be permanently removed. Opportunity for increased spread of noxious weeds would be measurable and extensive.

3.6.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoil material in waters of the United States; therefore, drawdown of East Lake Toho and scraping/removal of vegetation and organic sediments would not occur. Implementation of the No-Action Alternative would allow current vegetative trends to continue. Successional processes would reduce the amount of low-density herb and graminoid-dominated marsh, replacing it with higher density marsh along with reduced fraction of open water within the marsh, as it fills with living plant stems/roots and detritus, and as the lake bottom elevation increases through organic matter accretion and floatation. As the process continues, shrubs and trees would take root in the accreted floating organic sediments, as the sediments increase in thickness and peaty-texture, replacing the herb/graminoid marsh with shrub and tree islands. All these successional stages are already present in the eastern part of East Lake Toho. Successional processes would continue to proceed, converting more open marsh to dense marsh with high sediment content, and converting dense marsh to tree islands. These successional processes are not part of the historical natural processes of East Lake Toho. They were precipitated by anthropogenic stabilization of the lake level and nutrient inputs from agricultural and developed areas upstream in the watershed.

FWC would continue to spray invasive and undesirable plants, but the most effective means to reduce some very problematic invasive plants (e.g., *Ludwigia grandiflora*) is to scrape and remove the scrapings. Lack of disposal ability would restrict the options to control this very aggressive weed, and it would likely increase in abundance and dominance within East Lake Toho's littoral zones.

3.6.2.2 Alternative A

Direct Effects

East Lake Toho Drawdown - The Proposed Action of lowering water levels in East Lake Toho by two-feet-below the normal regulation schedule minimum would expose approximately 1,124 additional acres of littoral zone to air and direct sunlight, leading to increased oxidation and consolidation of organic sediments. The drawdown would likely push plant successional processes backwards, compared to the No-Action Alternative. It may also promote the germination of some desirable native grass and sedge species.

Aquatic Vegetation Spray and Burn - Large expanses of dense cattail have formed on the north and west sides of East Lake Toho. Approximately 200 acres of cattail would be treated by spraying and burning within the north and west sides of East Lake Toho (Figure 2-4, within FWC activity areas in black). The intent of this Project is to replace those expanses with more diverse vegetation that is a better habitat for more kinds of fish and birds. Cattails would remain as a component of the recolonizing vegetation and dense pockets would remain in other areas of East Lake Toho. Commitment to continued treatment of undesirable vegetation within these treated areas, as they are colonized by new vegetation, is intended to ensure that the vegetation that replace the cattails is mostly desirable.

Mechanical Scraping of East Lake Toho's Littoral Zone and Creation of Spoil Islands - The scraping would remove the entirety of all vegetative communities, including desirable species (as well as all small animals inhabiting them) from within the scrape area. Over time, the area would be recolonized and managers expect that the recolonizing species assemblages, their densities and the associated newly sandy substrate, would serve as better overall fish and wildlife habitat than what exists currently. The dominant vegetation classes mapped within the scrape area are shown in Table 3-6.

TABLE 3-6 VEGETATION CLASSES WITHIN THE SCRAPE AREA

FLUCCS CODE	VEGETATION CLASS	ACRES	% COVER
6417	Island	22.6	20.0%
6410	Freshwater marsh	19.9	17.6%
6445	Lilies	18.7	16.6%
6412-6440	Mixed cattail, mixed pads	10.8	9.6%
6412	Cattail	9.3	8.2%
6412-6420	Mixed cattail, pickerelweed/ arrowhead	7.5	6.6%
6420-6440	Mixed pickerelweed/ arrowhead, mixed pads	5.3	4.7%
6417	Freshwater marsh with shrubs, brush, and/or vines	4.9	4.3%
5200	Lake/Open Water	2.7	2.4%
6412-6421	Mixed cattail, bulrush	2.1	1.9%
6450	Submersed aquatic vegetation	1.9	1.7%
6420	Pickerelweed/ arrowhead	1.8	1.6%
6442	Spatterdock	1.7	1.5%
6421-6440	Mixed bulrush, mixed pads	1.3	1.2%
6420-6421	Mixed pickerelweed/ arrowhead, bulrush	1.3	1.2%
	Total Acres in scrape area, % in table	113	98.9%

Source: URS 2016
Note: Classes below one-percent cover excluded

The island category was created by SFEC and excerpted mostly from the URS categories Freshwater marsh with shrubs, brush, and/or vines and willow, to represent a more advanced successional stage with large dense trees/shrubs and a more cohesive and substantial peaty substrate.

Approximately four acres of littoral zone vegetation would be permanently removed by creation of in-lake spoil islands. However, a benefit is that these islands can continue to be used in the future to dispose of scraped up *Ludwigia grandiflora* and other problem vegetation.

One effect of the scraping would be a dramatic reduction in East Lake Toho's population of water-spider orchids (*Habenaria repens*), a reduction of probably greater than 90 percent. This orchid was found most abundantly in East Lake Toho in the middle-successional communities of floating dense herb/graminoid marsh/tussock. The greatest concentration of this species was found on mobile chunks of floating organic matter as well as recently floated cohesive mats of *Nymphaea* roots, in the vicinity of the planned northern spoil island.

Indirect Effects

Short-term impacts to water quality can be expected given the loss of vegetation and the associated loss of nutrient uptake capacity. Additionally, particle settling and trapping benefits would be lost temporarily. The scraped area would be devoid of plants and would take time to revegetate. This

disturbance would create a strong opportunity for colonization by native and exotic species, both desirable and unwanted. Invasive wetland species such as Wright's nutrush, torpedo grass (*Panicum repens*), and others are of particular concern as they are already abundant in the shoreward part of the littoral zone that will not be scraped, and which would likely provide propagules to colonize the scraped area.

Use of Best Management Practices to Minimize Environmental Effects **-** Use of BMPs (Appendix F) and management measures would minimize the short-term impacts, particularly the indirect effects to water quality. The long-term benefits associated with improved plant community structure are dependent upon ongoing vegetation management so that ruderal and exotic species do no return in place of treated plants.

3.6.2.3 Alternative B

Direct Effects

Alternative B is identical to Alternative A except that approximately 25 percent of the existing tree island area within the scrape area would be retained; approximately five percent of the scrape area. The location of the islands selected for retention under this alternative are shown in Figure 3-16 and Figure 3-17. Selection criteria included spatial distribution, target size (one-half acre to one acre), canopy height and diversity, and tree rooting to underlying sandy lake bottom. Rooting was included to reduce the likelihood of islands breaking loose and moving within East Lake Toho. The islands selected are among the oldest and most well developed peaty islands.

Source: SFEC 2018a

FIGURE 3-16 ISLANDS TO BE RETAINED UNDER ALTERNATIVE B IN THE NORTH SCRAPE AREA

Source: SFEC 2018a

FIGURE 3-17 ISLANDS TO BE RETAINED UNDER ALTERNATIVE B IN THE SOUTH SCRAPE AREA

These islands are a product of the human-induced changes to the lake's ecological processes, which caused the conditions this Project seeks to ameliorate. While the islands are not historically part of the natural ecology of East Lake Toho, retaining a selection of them may benefit wildlife and water quality. Retaining these selected islands would retain many of the largest and oldest trees. Tree/shrub species observed on these islands include mostly: wax myrtle, willow and red maple. Bay (*Persea palustris*), and pond apple (*Annona glabra*) were also observed. Some discussions have occurred regarding planting additional species on the retained islands to improve canopy diversity, wildlife value and anchorage. One of the larger maple trees is pictured in Figure 3-18.

Source: SFEC 2018a

FIGURE 3-18 LARGE MAPLE TREE GROWING ON TREE ISLAND #7

Indirect Effects

Increased isolation of retained woody roosting habitat may improve utility for bird roosting/nesting.

3.6.3 Effects Summary

Under the No-Action Alternative plant communities would continue on their current successional trajectories and nuisance vegetation (if left untreated) would expand unabated inhibiting navigation and recreational activities. Implementation of Alternative A would treat 200 acres of mostly cattails with herbicides and then a controlled burn, clear 112 acres of vegetation in the littoral zone of the eastern shore, and convert four acres of open water/wetland habitat to in-lake upland habitat. Alternative B differs from Alternative A in that approximately five percent of area to be scraped would be retained as preserved natural habitat. Impacts to vegetation would be moderate to high intensity in the short-term, low intensity in the long-term and would not be considered significant.

3.7 FISH AND WILDLIFE RESOURCES

Section 3.7.1 is divided into two parts: the first (Section 3.7.1.1) describes the affected environment within the proposed project area, and the second (Section 3.7.1.2) evaluates and compares the direct and indirect effects of the alternatives on aquatic (fish and wildlife) resources, and qualitatively measures impact intensity based on the criteria described at the beginning of the effects section. The section concludes with a summary of potential effects for both action alternatives and a determination of whether the potential effects are significant. Section 3.7.2 follows the same format but addresses terrestrial (wildlife) resources.

3.7.1 Aquatic Resources

3.7.1.1 Affected Environment

The affected environment (for aquatic fish and wildlife resources) of the Project includes East Lake Toho, Fells Cove and Lake Ajay. The littoral zone of East Lake Toho is the primary area that would be affected by project actions. The littoral zone of East Lake Toho supports a wide variety of fish and wildlife species, as well as invertebrates. Fish communities include both wetland species used by wading birds, as well as sport fish (such as largemouth bass [*Micropeterus salmoides*], crappie [*Pomoxis nigromaculatus*], bluegill [*Lepomis macrochirus*] and others). Note: Section 3.8 *Threatened and Endangered Species*, addresses state and federally listed species. This section focuses on the remaining fish and wildlife resources.

Under current conditions, fish utilize most available habitat. The littoral zone contains floating, submersed and emergent vegetation providing substrate for fish habitat. Some areas of the littoral zone, particularly on the east side of East Lake Toho, the proposed scrape zone (Figure 2-1), have dense patches of vegetation and organic soils that form tussocks and floating vegetation islands. These areas often preclude fish utilization both physically (acting as barriers), as well as a limiting environment due to the low dissolved oxygen concentrations beneath and adjacent to the tussocks. Generally, the East Lake Toho contains healthy sport fish populations and smaller marsh fishes.

Invertebrate community structure data is generally lacking for East Lake Toho; however, SFEC staff (SFEC 2018a) observed seasonally dense patches of mayflies within the cattail stands. Both the native and the exotic apple snail are also common on East Lake Toho. The relatively large size of the invasive apple snail, and the large number of eggs deposited with each cluster, results in an abundant population of the invasive species.

In addition to fish and invertebrates, birds are extremely common on East Lake Toho. The littoral zone provides habitat for many birds including the American coot (*Fulica americana*), ring-necked duck (*Aythya collaris*), Northern pintail (*Anas acuta*), bluewinged teal (*Anas discors*), mottled duck (*Anas fulvigula*), great and snowy egrets (*Casmerodius albus, Egretta thula*), great blue heron (*Ardea herodias*), limpkin (*Aramus guarauna*), moorehen/gallinule (*Gallinula sp.*) and others. Several smaller bird species utilize the tussocks and islands for foraging and cover (i.e., swallows and finches).

Other species utilizing the littoral zone and nearshore environment around the periphery of East Lake Toho include alligators, turtles, frogs, snakes, sirens and amphiuma. Otters and raccoons are also found in shallow habitat and within the nearshore islands and tussocks.

3.7.1.2 Direct and Indirect Effects

This subsection discusses the short-term and long-term direct and indirect impacts of the No-Action and Alternative A and Alternative B on fish and wildlife within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above, and the descriptions of the three intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, but discountable and would not measurably alter natural conditions. Infrequent responses to disturbance by some individuals could be expected, but without interference to feeding, breeding and/or sheltering. Sufficient habitat would remain functional at both the local and range-wide scales to maintain the viability of the species
Moderate	Impacts on native species, their habitats or the natural processes sustaining them would be detectable and/or measurable. Occasional responses to disturbance by some individuals could be expected, with some adverse impacts on feeding, reproduction, resting, migrating or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat would retain function to maintain the viability of the species both locally and throughout its range.
High	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and would be extensive. Frequent responses to disturbance by some individuals is expected, with adverse impacts on feeding, reproduction, or other factors resulting in a decrease in both local and range-wide population levels and habitat type. Impacts would occur during critical periods of reproduction or in key habitats and would result in direct mortality or loss of habitat that might affect the viability of the species.

No-Action Alternative

Under the current condition thick organic sediment deposits are found in varying locations within the littoral zone (on the east side) of the lake. Tussocks and islands as common features in the proposed scrape area on the east side of the lake (SFEC 2018a). These areas would continue to impact fish distributions and spawning. Generally, sport fish (particularly large-mouth bass) nest in less densely vegetated areas with firm substrate (Bruno et al. 1990). Although secretive bird species may benefit (e.g., bittern, moorehen, rail and limpkin) under current conditions, organic deposits and dense vegetation would likely limit foraging by several wading bird species. The presence of tussocks and dense patches of vegetation would continue to support other species such as alligators, turtles, frogs, sirens and amphiumas.

Alternative A - Direct Effects

Four components of Alternative A, as described in Section 2 *Alternatives*, have the potential to impact fish and wildlife resources within the project area. These components of Alternative A and the potential effects are discussed below:

East Lake Toho Drawdown - The Proposed Action of lowering the water level in East Lake Toho during the drawdown would have short-term, moderate intensity negative impacts on fish and wildlife species within East Lake Toho as well as Fells Cove and Lake Ajay. The drawdown would directly affect aquatic species in particular. Much of the littoral zone (Figure 2-1) would be dry during project implementation; therefore, fish, invertebrates, reptiles and amphibians would be directly impacted. More mobile species could escape to suitable open water habitat but those species that require vegetated habitat would experience moderate to high intensity localized short-term effects. Fish, invertebrates, amphibians and reptiles within the drawdown area (Figure 2-2) would experience high levels of mortality (Aresco and Gunzberger 2004). Hoyer et al. compared the fish community structure before and after the Lake Tohopekaliga drawdown of 2002 to 2003, and 2004 to 2005. Hoyer et al. found that both fish abundance and fish diversity (species richness) were lower where significantly lower after the lake enhancement project was completed. During 2002 and 2003 the average catch rate using electrofishing was 255 (fish per hour), whereas the 2-year period after draw own, the catch rate was 55 (fish per hour). They also found that species richness declined from 17.5 to an average of 10.5 species during the same period (Hoyer et al 2006). Species that were not found during the sample period after the lake enhancement period include marsh fishes. These fish are important as forage for both wading birds and bass.

Other studies have found mixed results. Moyer et al (1995) found greater abundance of age-0 class largemouth bass, redear sunfish and crappie in restored plots, relative to control plots associated with the 1987 Lake Tohopekaliga drawdown and restoration. Generally, past habitat enhancement efforts have not yielded long-term benefits to sportfish populations (Allen and Tugend 2002). Moyer et al (1995) noted that enhanced sites debilitated to previous conditions within three years,

In addition to obligate aquatic species, species which depend on the littoral zone for foraging and nesting would also be impacted. The most notable, the listed snail kite, is discussed in more detail in Section 3.8 *Threatened and Endangered Species*. Species such as the alligator, several turtle species and others would have limited habitat available for nesting and other activities (during the drawdown period and until vegetation recruitment occurs). Although a band of vegetation (mostly *Schoenoplectus, Typha, Nuphar*, and occasional patches of *Panicum* spp.) would be available, most of the other vegetated habitat would be dry. This would lead to short-term moderate negative impacts for species dependent upon littoral zone habitat.

Mechanical Scraping of East Lake Toho's Littoral Zone and Creation of Spoil Islands - The proposed removal of organic sediments by scraping and creation of two in-lake spoil islands would have moderate to high intensity short-term impacts to fish and wildlife within the littoral zone of East Lake Toho. In the scrape zone (approximately 112 acres), most of the organic sediment and vegetative matter would be removed and the spoils used to create the two spoil islands. Direct effects to species and related habitat would occur through use of large earth moving equipment. Although efforts would be made to minimize effects (including use of BMPs and site surveys prior to scrape

and construction), short-term moderate intensity impacts would be expected to occur. In addition to temporary impacts to the proposed scrape area, approximately four acres of littoral zone habitat would be permanently altered to create the two in-lake spoil islands.

Although fish and wildlife species would experience short-term moderate intensity negative effects due to the scrape and spoil island construction activities, some species would experience benefits from the proposed scrape. Sport fish species would have improved spawning habitat in cleared areas. Fish mobility in some areas would be improved, given that tussocks and dense vegetation patches may limit movement under current conditions. Wading bird access for foraging would be improved in areas which currently have dense, weedy plant cover (or the presence of floating vegetated islands and tussocks).

Aquatic Vegetation Spray and Burn - Areas that are proposed for spray and burn (Figure 2-1) would experience short-term moderate intensity negative impacts to habitat. Those species that use dense cattail habitat would be impacted the most (see comments above regrading secretive marsh birds). Other species present within cattail include otters, turtles, and snakes may be impacted by either or both the spray and/or burn activities. Impacts due to spray and burn would generally be short-term given the likely regrowth of native plant communities in the two proposed spray and burn areas. Although short-term impacts would be expected, long-term effects would be negligible.

Use of Best Management Practices to Minimize Environmental Effects - BMPs such as those shown in Table 3-3 should be used to limit adverse water quality effects to the project action areas and limit the intensity and duration of the effects to fish and wildlife. Commitments to ongoing vegetation management within the spray and burn areas would likely improve the structure and function of plant communities that regrow in treated areas. Additional details regarding BMPs, including contractor training, are noted in Section 5.2.1 *Best Management Practice*s.

Alternative A - Indirect Effects

Indirect effects to fish and wildlife would be of moderate intensity and predominantly associated with effects to water quality and effects to habitat structure. Each of the four project components would likely have direct, short-term effects to water quality which in turn may have indirect effects to fish and wildlife. Increased turbidity and increased nutrients would affect the community structure of plants that return to treated areas and would likely affect dissolved oxygen concentrations in surface waters.

Initially, the lack of vegetation cover after treatment would decrease the amount of substrate available for invertebrates (e.g., apple snail egg laying), and for nesting needs. Short-term low dissolved oxygen concentrations would affect the distribution and abundance of fish and invertebrates within treated areas. In the long-term, improved dissolved oxygen concentrations would likely lead to improved fish distributions within the treated areas. Combined fish monitoring and water quality monitoring (within treatment and non-treatment areas) would help determine if habitat enhancement activities affect (increase) lake level fish populations (and diversity).

Alternative B – Direct and Indirect Effects

Direct and indirect effects of selecting and implementing Alternative B on fish and wildlife would be similar to those described for Alternative A. Alternative B would have approximately five to ten-percent fewer acres impacted within the proposed scrape area because patches of existing natural habitat would be preserved. This conservation approach would provide useful woody habitat for bird roosting while still providing the open water habitat benefits associated with Alternative A. Additionally, Alternative B would have approximately ten percent less spoil material and would result in a corresponding decrease in the size of the two spoil islands, slightly reducing impacts to habitat and potential effects to water quality. The preserved natural areas under Alternative B would retain habitat for previously mention bird, reptile and amphibian species.

3.7.1.3 Effects Summary

The proposed Project would have short-term moderate to high impacts on fish and wildlife species within the littoral zone of East Lake Toho. Both direct impacts to species and habitat, as well as indirect impacts (primarily associated with water quality) would occur. Long-term impacts would be of low intensity and beneficial. Some species (predominantly sport fish) would experience benefits after recovery of impacted areas (only after the initial decline in fish and invertebrate abundance). Sport fish would experience a small increase in the acreage of available spawning habitat. Once plant species reestablish in treated areas, wading bird foraging habitat would likely improve.

3.7.2 Terrestrial Resources

3.7.2.1 Affected Environment

The affected environment for terrestrial wildlife habitat is defined as that area within 500 feet of the East Lake Toho shoreline. Given that most of the shoreline of East lake Toho has already been developed, limited upland habitat remains and impacts to terrestrial wildlife would be limited.

3.7.2.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and Alternative A and Alternative B on terrestrial wildlife resources within the project area. Descriptions of intensity levels developed for this Project are described in Section 3.7.1.

No-Action Alternative

Implementation of the No-Action Alternative would not affect current conditions (or trends) for terrestrial wildlife species. Two regions adjacent to East Lake Toho contain most of the upland resources (Chisholm Park and Hilliard Island). Chisholm Park is located adjacent to the proposed spoil island on the southeast side of East Lake Toho. This area contains a mix of wooded and open habitat. Several state listed species use the uplands within Chisholm Park (Section 3.8 for discussion of listed species). Hilliard Island is the second large upland area, adjacent to the

northwest side of the lake. This are is predominantly converted pasture. Terrestrial wildlife resources would not be effected by the No-Action Alternative (SFEC 2018a).

Alternative A

Lake drawdown would potentially affect a small buffer strip within 500 feet of the lake edge, as well, as a slightly larger area in Chisholm Park where project staging grounds are proposed.

Project activities are not expected to negatively affect upland species. Project work zones would not occur within 320 feet of potential bald eagle nests; implementation of BMPs (Appendix F) would be used as needed to address concerns for bald eagles and other listed species. Particularly, contractors would be informed of potential presence of terrestrial wildlife (e.g., Audubon's crested caracara, Eastern indigo snake, gopher tortoise, fox squirrel and Sandhill crane).

Audubon's crested caracara would potentially experience a small improvement to foraging habitat within the proposed spray and burn areas. Audubon's crested caracara have been known to forage in more open marsh habitat (adjacent to pasture and prairie) and with the removal of dense cattail may improve foraging habitat.

Alternative B

Direct and indirect effects of implementing Alternative B on terrestrial wildlife would be similar to those described above for Alternative A. The removal of approximately ten-percent less organic sediment from the proposed eastern shore scrape zone would result in slightly less use of heavy equipment and may reduce effects due to mobilization of equipment in upland staging areas and associated disturbance of wildlife.

3.7.2.3 Effects Summary

Environmental impacts to upland wildlife would be short-term and of low intensity, primarily restricted to the staging area within Chisholm Park. Thus, no significant long-term effects to terrestrial wildlife would occur with implementation of either Alternative A or Alternative B.

3.8 THREATENED AND ENDANGERED SPECIES

Issuance of a permit and subsequent implementation of the East Lake Toho Project would affect listed species within the spatial boundaries of the affected environment. The Project would be located in habitats known to support both state and federal listed species. As discussed below, the Project would have the potential to affect listed species in a number of ways including disturbance of feeding or reproductive behavior, and loss or degradation of suitable habitat.

The USACE prepared a Biological Assessment (BA) to assess the effects of the Project on federally listed threatened and endangered species and to meet the requirements of Section 7 of the Endangered Species Act (ESA) of 1973, as amended. Section 7(a)(2) of the ESA states that each federal agency shall consult with the Secretary of the Department of the Interior to ensure their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat for such species. The BA prepared by the USACE is appended to the draft EIS as Appendix B and discusses the status, distribution, habitat characteristics and use, and occurrence within the affected environment for each federally listed species and other special status species. The discussion that follows includes a summary of information presented in the BA and submitted to the USFWS. It also includes a discussion of potential affects to state listed species and species listed under the Migratory Bird Act.

3.8.1 Affected Environment

The spatial boundaries that define the affected environment to characterize baseline conditions and conduct the effects analysis include the project area surrounding East Lake Toho and Lake Tohopekaliga watersheds, and the Kissimmee Chain of Lakes south to, and including, Lake Okeechobee. Although downstream habitats would receive flows, no direct effects to threatened or endangered species are expected south of Lake Tohopekaliga.

Table 3-7 and Table 3-8 list the state and federally listed species found within the project evaluation area, respectively. The probability of species occurrence within the affected environment is ranked from low to high. Potential effects to these species are evaluated in section 3.8.2 below. Many of the listed species are found in upland habitat adjacent to or outside of the influence of the proposed Project and hence have a low likelihood of occurrence.

TABLE 3-7 STATE PROTECTED SPECIES OF SPECIAL CONCERN AND THREATENED SPECIES

COMMON NAME	SCIENTIFIC NAME	STATUS	PROBABILITY OF OCCURRENCE
Homosassa Shrew	*Sorex longirostris eionis*	SSC	Low
Black skimmer	*Rynchops niger*	Threatened	Low
Florida burrowing owl	*Athene cunicularia*	Threatened	Low*
Florida sandhill crane	*Antigone canadensis pratensis*	Threatened	High
Least tern	*Sternula antillarum*	Threatened	Low
Little blue heron	*Egretta caerulea*	Threatened	Medium to High
Reddish Egret	*Egretta rufescens*	Threatened	Medium
Roseate spoonbill	*Platalea ajaja*	Threatened	Low
Southeastern American kestrel	*Falco sparverius*	Threatened	Low
Tricolored heron	*Egretta tricolor*	Threatened	Medium to High
Florida pine snake	*Pituophis melanoleucus*	Threatened	Low
Gopher frog	*Lithobates capito*	SSC	Low
Bluenose shiner	*Pteronotropis welaka*	Threatened	Low
Sherman's fox squirrel	*Sciurus niger shermani*	SSC	Medium

Note: SSC Species of Special Concern
Source: FWC 2016

TABLE 3-8 FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES IN OSCEOLA COUNTY (IPAC) AND OCCURRENCE POTENTIAL

GROUP	COMMON NAME	SCIENTIFIC NAME	STATUS	PROBABILITY OF OCCURRENCE
Birds	Whooping crane	*Grus americana*	Experimental Population, Non-Essential	Low
Birds	Everglade snail kite	*Rostrhamus sociabilis plumbeus*	Endangered	High
Birds	Red-cockaded woodpecker	*Picoides borealis*	Endangered	Low
Birds	Wood stork	*Mycteria americana*	Threatened	Moderate
Birds	Audubon's crested caracara	*Polyborus plancus audubonii*	Threatened	Moderate*
Birds	Florida grasshopper sparrow	*Ammodramus savannarum floridanus*	Endangered	Low
Birds	Florida scrub-jay	*Aphelocoma coerulescens*	Threatened	Low
Mammals	Florida panther	*Puma (=Felis) concolor coryi*	Endangered	Low
Mammals	Puma (=mountain lion)	*Puma (=Felis) concolor (all subsp. except coryi)*	Similarity of Appearance (Threatened)	Low
Reptiles	American alligator	*Alligator mississippiensis*	Similarity of Appearance (Threatened)	High**
Reptiles	Eastern indigo snake	*Drymarchon corais couperi*	Threatened	Low to Medium*
Reptiles	Bluetail mole skink	*Eumeces egregius lividus*	Threatened	Low
Reptiles	Sand skink	*Neoseps reynoldsi*	Threatened	Low
Reptiles	Gopher tortoise	*Gopherus Polyphemus*	Candidate	Low*
Flowering Plants	Papery whitlow-wort	*Paronychia chartacea*	Threatened	Low
Flowering Plants	Lewton's polygala	*Polygala lewtonii*	Endangered	Low
Flowering Plants	Sandlace	*Polygonella myriophylla*	Endangered	Low
Flowering Plants	Florida bonamia	*Bonamia grandiflora*	Threatened	Low
Flowering Plants	Pygmy fringe-tree	*Chionanthus pygmaeus*	Endangered	Low
Flowering Plants	Pigeon wings	*Clitoria fragrans*	Threatened	Low
Flowering Plants	Scrub buckwheat	*Eriogonum longifolium var. gnaphalifolium*	Threatened	Low
Flowering Plants	Britton's beargrass	*Nolina brittoniana*	Endangered	Low
Flowering Plants	Wide-leaf warea	*Warea amplexifolia*	Endangered	Low
Flowering Plants	Scrub lupine	*Lupinus aridorum*	Endangered	Low

Source: USFWS 2018a

Notes* Under the currently proposed alternative, no effect to these species is expected. If upland disposal is pursued (Hilliard Island or other location), further evaluation would be conducted.

** The American alligator is listed as threatened due to its similarity of appearance to the American crocodile; this is only true in areas within the range of the American crocodile. Given Osceola County is outside of the range of the American crocodile, no effect is expected.

In addition to state and federally listed species, effects to bird species listed under the Migratory Bird Act (50 C.F.R. 21.11) (Table 3-9) and the Eagle Protection Act (1940) are also evaluated in this section.

TABLE 3-9 MIGRATORY BIRD ACT SPECIES PRESENT IN OSCEOLA COUNTY

COMMON NAME	PROBABILITY OF OCCURRENCE WITHIN THE EVALUATION AREA	SPECIES NOTES
Bald Eagle	Moderate	
Black Rail	Low	
Black Skimmer	Low to Moderate	State listed. Predominantly coastal. South Florida--coastal and inland.
Henslow's Sparrow	Low	Uncommon, generally found north of project area
King Rail	Low	Throughout Florida
Lesser Yellowlegs	Low to Moderate	Common in winter throughout Florida
Limpkin	High	No longer state listed but remains part of Florida ISMP*
Prothonotary Warbler	Low	
Red Headed Woodpecker	Low	
Reddish Egret	Moderate	State listed
Semipalmated Sandpiper	Low	
Short-tail hawk	Low	
Swallow-tailed kite	Low to Moderate	
Whimbrel	Low	
Willet	Low	

Source: USFWS 2018a

Currently, the East Lake Toho watershed supports several listed species. Most species are found in upland habitat, including: Audubon's crested caracara, gopher tortoise, scrub jay, red cockaded woodpecker, Eastern indigo snake, Sherman's fox squirrel, and several plant species. These species are generally found in uplands including flatwood and scrub habitat. Caracara and indigo snake may use wetlands for foraging, or seasonally during low water periods.

Several listed bird species are also found on East Lake Toho and other water bodies potentially affected by the Project. The most notable is the federally endangered snail kite which nests within East Lake Toho and Lake Tohopekaliga (FWS 2018). Currently, portions of the eastern side of East Lake Toho contain significant organic deposits in the form of islands and tussocks. These deposits limit the amount of open marsh habitat used by snail kites for foraging. Although dense cattail is present in much of the littoral zone (on the western and northern sides), generally

precluding foraging by snail kites, cattail habitat is used by the snail kites for nesting within East Lake Toho.

Other bird species present on East Lake Toho include the Sandhill crane, limpkins, tricolor heron and little blue heron. The Sandhill crane is commonly seen nesting and foraging in the nearshore littoral zone. Limpkins are generally more secretive and use less open habitat. Herons utilize a variety of habitat on the lake including the herbaceous marsh and the tussocks and edges of islands.

3.8.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect effects of the project alternatives on state and federally listed threatened and endangered species within the spatial boundaries of the effects evaluation area. Direct impacts are those that are caused by implementation of an action alternative and happen at the same location and time. Indirect impacts are those impacts that happen later in time and/or farther removed from the project area, but are still reasonably foreseeable. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above and the descriptions of the three intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	Impacts on listed species, their habitats, or the natural processes sustaining them would be detectable, but would not measurably alter natural conditions. Sufficient habitat would remain functional to maintain the viability of the species both locally and regionally. No take of federally listed species or impacts on designated critical habitat is expected to occur.
Moderate	Impacts on listed species, their habitats, or the natural processes sustaining them would be detectable and/or measurable. Some adverse impacts on feeding, reproduction, resting, migrating or other factors affecting local population levels. Some impacts might occur in key habitats. However, sufficient population numbers or habitat would remain functional to maintain the viability of the species both locally and throughout its range. No mortality or injury of federally listed species is expected; however, some disturbance to individuals or impacts on potential or designated critical habitat could occur.
High	Impacts on listed species, their habitats, or the natural processes sustaining them would be detectable and could result in a take. Substantial impacts on listed species, including interference with their survival, growth, or reproduction is expected. Project would result in destruction or adverse modification of designated critical habitat, or habitat currently used by federally listed species.

3.8.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoil materials in waters of the United States; therefore, proposed drawdown and habitat enhancement activities on East Lake Toho would not occur. Implementation of the No-Action

Alternative would not affect current conditions (or trends) for listed species within the affected environment. Under the current condition, thick organic sediment deposits are found in varying locations throughout East Lake Toho, including tussocks and vegetation islands in the proposed scrape area on the east side of the lake (SFEC 2018a).

Under the No-Action Alternative, species which prefer open water or less dense vegetation would continue to be negatively affected by the current abundance of mats of organic matter, tussocks and vegetation islands. Species such as the federally endangered snail kite would have less open water marsh habitat for foraging. Increased density of vegetation and organic deposits may facilitate predation of snail kite eggs by snakes and raccoons (Olbert 2013). In the short-term, apple snails (the primary food source for snail kites) would remain abundant on East Lake Toho, but in the long-term, if islands and tussocks continue to expand, coverage of apple snail habitat would most likely decrease. Additionally, snail kite foraging would be more difficult as they prefer open expanses of water to search for food. Although snail kites prefer open habitat for foraging, snail kites utilize cattail habitat for nesting within East Lake Toho and other lakes in the Kissimmee chain.

Similar to the snail kite, the federally threatened wood stork would have less open water habitat available for foraging under the No-Action Alternative compared to the other two project alternatives.

Under the No-Action Alternative, some listed species that utilize tussocks and dense patches of vegetation would continue to benefit from these habitats. The limpkin, a secretive marsh bird would continue to benefit from current vegetation patterns. Although the limpkin is listed under the Migratory Bird Protection Act (MBPA), it is no longer listed by the state of Florida. It is however, included on the state's Imperiled Species Managed Plan (ISMP). Other species that utilize the island and tussock habitat include the little blue heron and the tri-colored heron (FWC 2016).

In addition to those species that utilize tussocks and dense stands of cattail, many species utilize the herbaceous marsh on the shoreward side of the tussocks. In particular, Sandhill cranes nest and forage within this habitat type. Under the No-Action Alternative, cranes would continue to utilize this habitat in the short-term. This area dries on a nearly annual basis under the existing regulation schedule and therefore supports a healthy herbaceous marsh community. In the long-term, however, potential expansion of tussocks and shrub vegetation may impact herbaceous marsh and decrease utilization by cranes. From a cumulative impact perspective, regional development is resulting in loss of foraging areas for sandhill crane breeding pairs with juveniles, and is also introducing more predators.

3.8.2.2 Alternative A

Direct Effects

Four components of Alternative A, as described in Chapter 2 *Alternatives*, have the potential to impact listed species. Direct effects on listed species and their habitat are expected both within the littoral zone of East Lake Toho and to a lesser extent within Lake Tohopekaliga.

East Lake Toho Drawdown - The drawdown would affect water levels in East Lake Toho, Fells Cove and Lake Ajay and to a lesser extent Lake Toho. Lowering water levels would have short-term impacts to snail kites, limpkin, wood stork, sandhill crane and egrets, decreasing both nesting and available foraging habitat. Additionally, the drawdown would have low intensity short-term effects to the population of apple snails, the primary food source for the endangered snail kite (Darby et al 1998, Bennetts and Darby 2001). Long-term, direct effects from the drawdown would be of little intensity and generally beneficial to threatened and endangered species. Improved habitat conditions (i.e., reduced weedy plant density and improved community structure in marsh habitat) would provide benefits to the snail kite and potentially to the wood stork. Similarly, the benefits to vegetation structure would support Sandhill crane nesting and foraging over the long-term.

Mechanical Scraping of East Lake Toho's Eastern Littoral Zone and Spoil Island Creation - Removal of vegetation would create moderate intensity short-term impacts to listed species by temporarily removing nesting and foraging habitat. This action may affect utilization of East Lake Toho by snail kites, Sandhill cranes, limpkin, egret and lesser blue heron. The scrape and burn components would lead to the direct loss of apple snails. Furthermore, vegetation removal would limit the available substrate for apple snail eggs possibly affecting the population of apple snails for one to three years after Project completion, impacting the availability of food for snail kites (Darby et al 1998, Bennetts and Darby 2001). After this period, apple snail populations are anticipated to respond to improved habitat conditions and return to current levels (Bennetts and Darby 2001).

In addition to the removal of vegetation by scraping, the construction of two spoil islands would result in the permanent loss of approximately four acres of wetland habitat. The impacts of the proposed spoil islands would be partially offset because the islands would be used for long-term vegetation management. Although most project activity would occur within the boundaries of East Lake Toho, staging grounds in Chisholm Park (adjacent to the southern spoil island) may cause short-term impacts to several upland species including the Sherman fox squirrel, Indigo snake, and gopher tortoise. Commitments to species surveys and utilization of BMPs should offset these potential impacts (Chapter 5 *Regulatory Compliance and Mitigation* and Appendix B).

Aquatic Spray and Burn Areas - The Project would spray and burn approximately 200 acres of cattail on the north and west sides of East Lake Toho (Figure 2-2). Spraying and burning of cattail would initially remove habitat for species that prefer dense vegetation; primarily the limpkin. Because East Lake Toho is used by the snail kite for nesting, they may be impacted in the short-term via impacts to nesting habitat and direct loss of apple snails from (drawdown,) spray and burn. However, removal of cattail would temporarily open marsh habitat for snail kite foraging. As vegetation regrows, and substrate is available for apple snails to deposit egg clusters, snail kites would have additional habitat available to forage in the intermediate period between the spray and the likely vegetation recovery. Spraying and burning adjacent to the shoreline (particularly in the northwest portion of the lake near Hilliard Island) may open limited habitat for crested caracara foraging. Spraying and burning is likely to make additional phosphorus available for plant uptake, and because burning is unlikely to remove the rhizome of much of the cattail, one would expect regrowth of dense cattail in the long-term (barring ongoing treatment).

Overall, the direct effects of implementing Alternative A to listed species would be of moderate intensity for the short-term and negligible over the long-term.

Indirect Effects

Indirect effects on listed species associated with implementation of Alternative A would predominantly be associated with water quality effects and interactions associated with weather conditions during project implementation.

Water quality effects could come from two sources, nutrient flux from oxidized organic matter (including flux from spoil islands) and from shoreline vegetation management (including fertilizer application) conducted by residents with homes adjacent to East Lake Toho. Hoyer et al (2006) noted that much of the likely nutrient release associated with the Lake Tohopekaliga habitat enhancement project was tied to intense storm activity resulting in significant erosion of spoil islands. They also noted effects to water quality were short-term (see additional discussion in section 3.4 *Water Quality*). Effects on water quality associated with vegetation management by lake side residents would likely be minimized by the Osceola County fertilizer management ordinance (#2015-5). Potential release of nutrients would support growth of weedy plant species targeted by the Project. Commitment to ongoing vegetation management by FWC would help limit these impacts.

Weather conditions and precipitation patterns may have an indirect effect on listed species, primarily the snail kite. Under drought conditions in critical habitat to the south such as in Lake Okeechobee and Water Conservation Areas 1, 2 and 3 of the Everglades, the snail kite preferentially utilizes East Lake Toho and Lake Tohopekaliga for nesting. During the 2011 drought, nearly 70 percent of the snail kite nesting system-wide occurred on East Lake Toho and Lake Tohopekaliga (Audubon 2011). If water levels are drawn down for the proposed Project, East Lake Toho would be unavailable for nesting. Similarly, portions of Lake Tohopekaliga would be unavailable due to the reduction in stage. FWC has committed not to implement the Project under extreme weather conditions (i.e., a declared water shortage in Osceola County in accordance with Sections 373.175 and 373.246, F.S.) thereby limiting snail kite impacts during drawdown. Given the inability to forecast future conditions, a drought may affect the refill of the East Lake Toho and Lake Tohopekaliga and could negatively impact snail kite nesting. Interactions with the KRRP may further exacerbate the problem. Water volume may be needed by the KRRP and may affect the ability to refill East Lake Toho and Lake Tohopekaliga during drought conditions under the current project schedule.

3.8.2.3 Alternative B

Direct and indirect effects on threatened and endangered species of selecting and implementing Alternative B would be similar to those described above for Alternative A. Alternative B would have approximately five percent fewer acres impacted due to less area proposed to be scraped (refer to Section 2.4 for additional detail). This would provide useful woody vegetation habitat for snail kite roosting while still providing the open water habitat benefits associated with Alternative A. Additionally, Alternative B would have approximately ten percent less spoil material and would result in a corresponding decrease in the size of the two proposed spoil islands slightly reducing impacts to snail kite foraging habitat and negative water quality effects. The preserved patches of natural area under Alternative B would retain habitat for limpkins, sandhill cranes, lesser blue heron, tricolor heron, and several other migratory bird species within the proposed scrape area.

3.8.3 Effects Summary

Under either Alternative A or Alternative B, the Project would result in low to moderate negative effects to both state and federally listed species (predominantly snail kite, limpkin, and Sandhill crane) on East Lake Toho with a negligible to low intensity negative effect to listed species on Lake Tohopekaliga. Impacts to both areas are expected to be short-term with negligible long-term impacts. Low to moderate intensity short-term effects are anticipated to occur on East Lake Toho within the proposed scrape and spray/burn areas until vegetative recovery has occurred. Significant effects would not be expected for Lake Tohopekaliga given the project would only shift the timing and not the magnitude of the drawdown.

Although some species may experience negative, short term direct or indirect impacts to habitat, due to implementation of either project alternative, improvement to the distribution and abundance of native vegetation would provide long-term benefits for some species. In particular, habitat enhancement would likely benefit the snail kite by providing additional marsh foraging habitat. Decreasing vegetation density would likely benefit the wood stork by opening additional area to forage. Under current conditions, wood stork utilization of East lake Toho is minimal, yet East lake Toho falls within the core foraging area of two known colonies (Appendix B).

Given commitments to the timing of project implementation, use of BMPs (Appendix F), listed species surveys, and environmental monitoring elements, the short-term effects to threatened and endangered species would be low to moderate intensity. Long-term impacts to listed species would not be significant[3].

[3] If drought conditions occur within critical habitat to the south, the snail kite may experience significant impacts. For additional discussion on potential effects to federally listed species, the reader is referred to the project biological assessment report submitted to the USFWS (Appendix B).

3.9 LAND USE

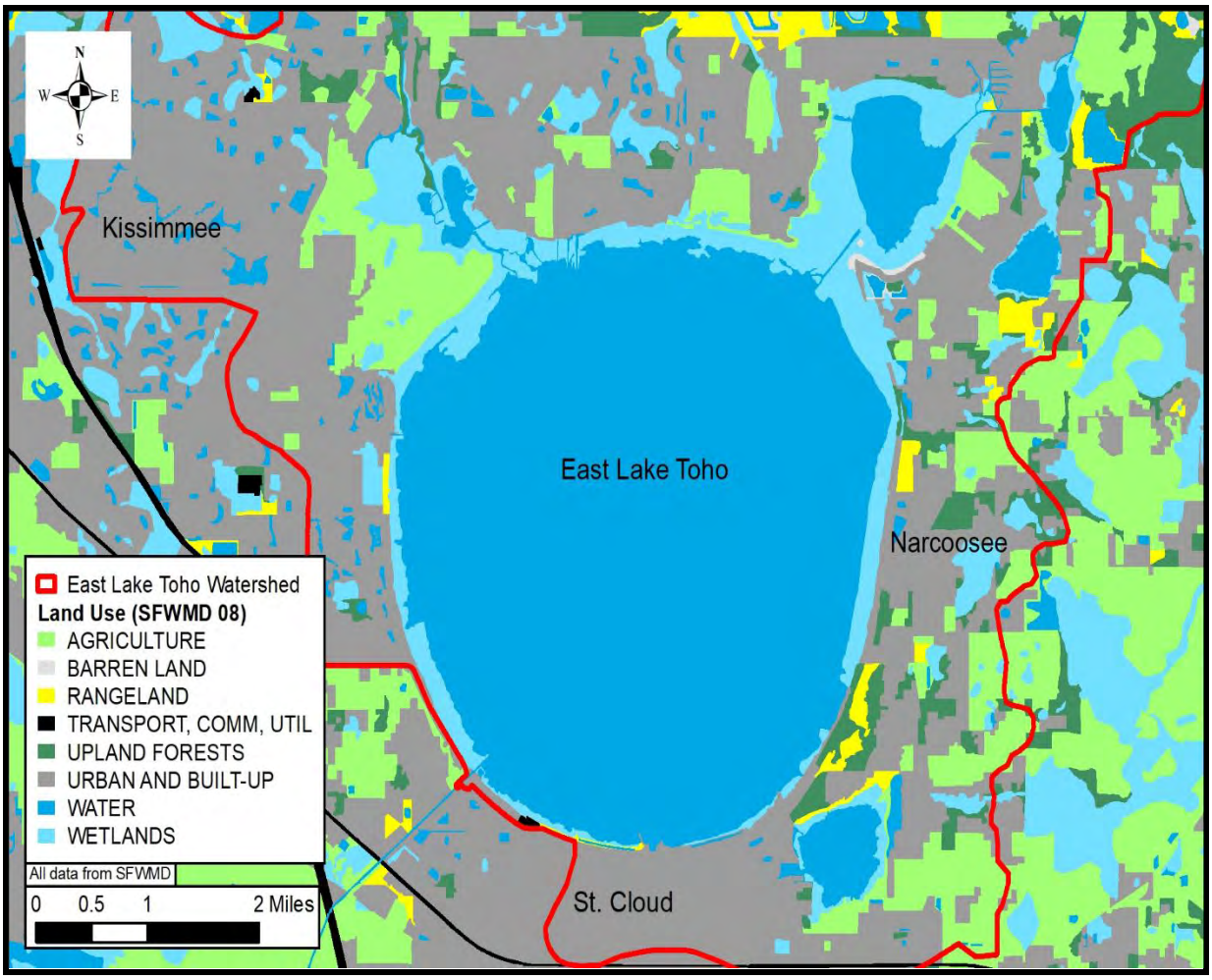
This section is divided into two parts: the first describes the affected environment for land use within the project area and the second evaluates and compares the direct and indirect effects of the alternatives on land use resources and qualitatively measures impact intensity. The section concludes with a summary of potential effects from implementation of the alternatives and a determination of whether the potential effects are significant.

3.9.1 Affected Environment

The shoreline of East Lake Toho occurs within two governmental boundaries: Osceola County covering the west, north and east, and the City of St. Cloud along the south/southeast shoreline. The City of Kissimmee is generally located along Simpson Road, west of East Lake Toho, but includes some property along Boggy Creek to the northwest. The shoreline is highly developed with lakeshore residents, recreational based businesses and three parks (Figure 3-19). Three recreational areas are located along the periphery of East Lake Toho:

- St Cloud Lakefront Park consisting of a marina and sandy beach, all within the City of St Cloud;
- Chisholm Park, a 152-acre multi-purpose park managed by the City of St Cloud located along the southeastern shore and
- Boggy Creek Resort and RV Park located along the northwestern shore of East Lake Toho.

Most of the land surrounding East Lake Toho previously mapped as “other than urban” in 2008 (SFWMD 2008) has since been developed, or is either currently under construction or in the planning/permitting phase for future development.



Source: SFEC 2018a

FIGURE 3-19 LAND USE SURROUNDING EAST LAKE TOHO

3.9.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on land use in the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above and the descriptions of intensity developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	Current land uses would continue without interruption; existing land uses may experience temporary construction-related disturbances. The Project would not conflict with local zoning or with land use management plans.
Moderate	Current land uses would be diminished or required to change a portion of the project area to be compatible with the Project. Only a few parcels in the project area would require zoning changes to be consistent with local plans.
High	More than 25 percent of the project area would require a change in land ownership or easement acquisition. All land use on these parcels would be discontinued. Most parcels of land in the project area would require zoning changes to be consistent with local plans.

3.9.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters of the United States; therefore, drawdown and habitat enhancement of East Lake Toho would not occur. Implementation of the No-Action Alternative would not affect land use practices and there would be no conflict with local zoning ordinances or requirements.

3.9.2.2 Alternative A

Direct effects on land use resulting from implementation of Alternative A are confined to a much smaller spatial area than the actual project area. Generally, proposed project activities would be restricted to that portion of the littoral zone where water levels would be lowered within East Lake Toho during the drawdown. Land use activities around the periphery of the lake would generally not be interrupted and any current or future land use practices within the project area would remain unchanged. One acre of Chisolm Park, located on the southeast corner of East Lake Toho, would be used as a staging area to park large equipment (e.g., dozers and trucks) needed for scraping the eastern shore of the lake and disposing of organic sediments for the two spoil islands. This small portion of the park would be closed to public access from February to June 2019. Implementation of Alternative A would be consistent with all Osceola County and City of St Cloud zoning ordinances and requirements; no alternations would be required. Additionally, no parcels of land would be purchased or easements required to implement the Project.

Property values would be anticipated to increase for some individual parcels as a result of improved views of East lake Toho. The direct effects of implementing Alternative A on land use would be of low intensity for the short-term and negligible intensity over the long-term.

Indirect effects on land use associated with implemented of Alternative A would be limited to lakeshore residents using the drawdown period to enhance their own properties by clearing nuisance vegetation or constructing/repairing boat docks. Appropriate permits from FDEP and USACE would be required for some of these activities.

3.9.2.3 Alternative B

Direct and indirect effects of selecting and implementing Alternative B on land use would be the same as those described above for Alternative A.

3.9.3 Effects Summary

Under either Alternative A or Alternative B, the Project would result in low intensity effects for the short-term with negligible long-term impacts. In the short term, project activities would primarily occur within the littoral zone of East Lake Toho and thus would not disturb current land use practices. Existing land uses would continue without interruption. However, one acre of Chisolm Park would be used as a staging area for the equipment involved with the scraping of the lake's eastern shore and disposal of organic sediments. This area of Chisolm Park would be closed to the public during project implementation. No lands would be purchased or easements required for the Project. Over the long term, effects on land use resources would be negligible, as current and future land use practices would not be disturbed. The Project would be consistent with local zoning ordinances and requirements, and with management plans for state and local lands. For all the above reasons, implementation of either Alternative A or Alternative B would not significantly affect land use resources within the project area.

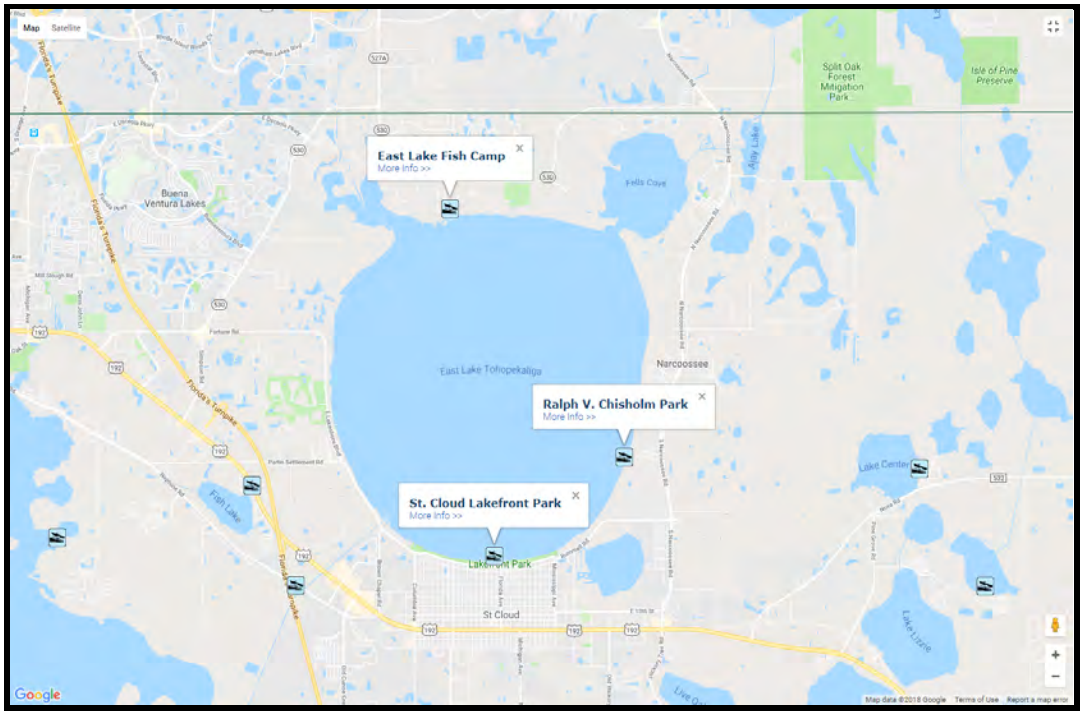
3.10 RECREATION

This section is divided into two parts: the first describes the affected environment for recreational resources within the project area and the second evaluates and compares the direct and indirect effects of the alternatives on recreational resources and qualitatively measures impact intensity based on the criteria described at the beginning of the effects section. The section concludes with a summary of potential effects for both action alternatives and a determination of whether the potential effects are significant.

3.10.1 Affected Environment

Recreational uses that are popular on East Lake Toho include fishing, boating, water-skiing, jet skiing, boat racing, sightseeing, air boat rides, kayaking, and ecotourism. In 1998, East Lake Toho was designated as a Fish Management Area through an agreement between Osceola County and the FWC. East Lake Toho is known for its largemouth bass, black crappie, bluegill, redear sunfish, and warmouth fishing. Wildlife enthusiasts are attracted to East Lake Toho to view bald eagles, Florida sandhill cranes, snail kites, limpkins and alligators (Osceola County LMP 2015).

There are several locations providing public boat access to East Lake Toho waters. The FWC's Boat Ramp Finder (Figure 3-20) provides the most immediate locations of access points.



Source: Google Earth 2018

FIGURE 3-20 PUBLIC BOAT RAMP AND ACCESS POINTS TO EAST LAKE TOHO

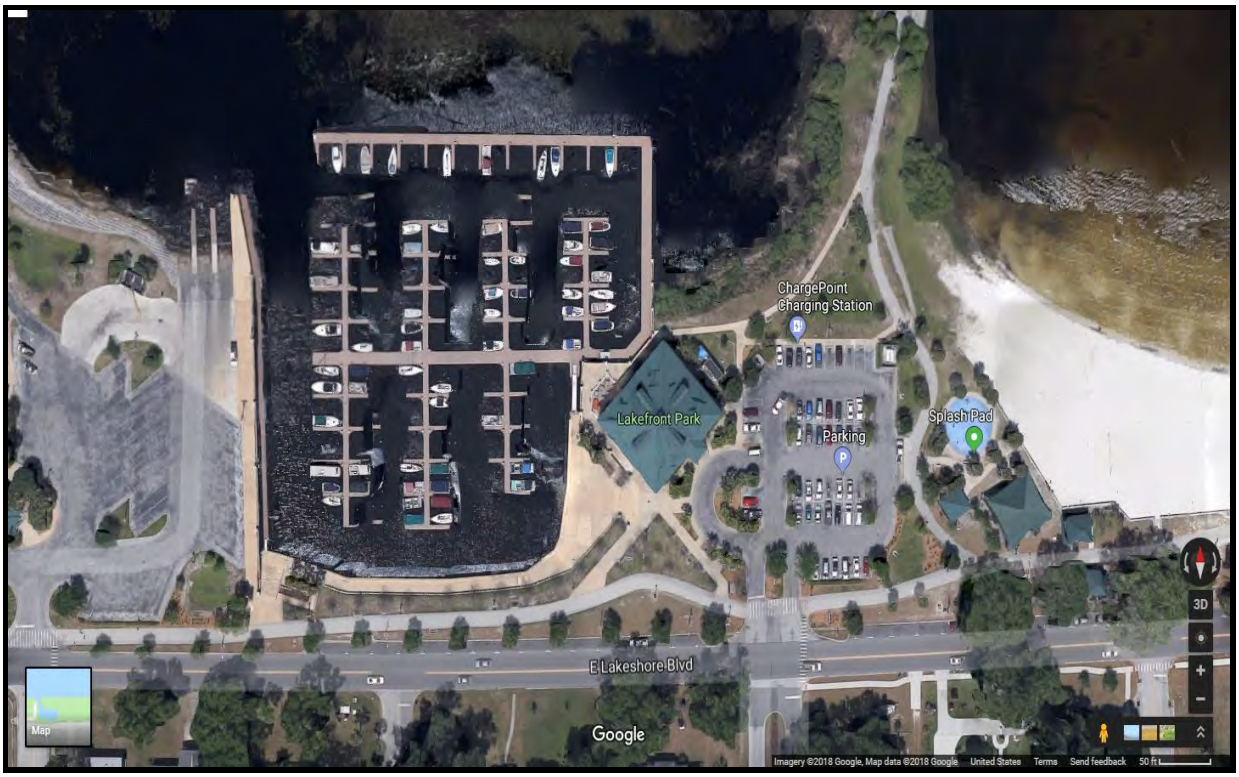
Table 3-10 provides detail information regarding the attributes and location of these facilities. All of the facilities are publically accessible and for public use. Located on East Lake Toho directly in front of the East Lake Fish Camp (now called Boggy Creek) is the Wicked Air Boat Rides recreational site. The St. Cloud Lakefront Park also has a marina with boat slips.

TABLE 3-10 EAST LAKE TOHO BOAT RAMP AND MARINA FACILITIES

DESCRIPTION	FACILITY NAME		
	ST. CLOUD LAKEFRONT PARK	RALPH V. CHISHOLM PARK	EAST LAKE FISH CAMP
Management	Government Owned	Government Owned	Commercially Owned
Access	General Public Use	General Public Use	General Public Use
Facility Type	Boat Ramp within Marina	Stand Alone Ramp	Stand Alone Ramp
Ramp Capacity (Total Lanes)	3	2	2
Ramp Condition	Good to Excellent	Good to Excellent	Good to Excellent
Parking			
Vehicle with trailer	27	5	11
Vehicle only	15	0	13
Handicap with trailer	0	0	0
Handicap only	0	1	1
Type of Dock	Boat Launch and Staging Dock	Launch Docks	N/A
Location / East Lake Toho Orientation	Southern Shore (6 o'clock)	Eastern Shore (4 o'clock)	N/A
Address	1104 Lakeshore Boulevard	4700 Chisholm Park Trail	3705 Big Bass Road
City	St. Cloud	St. Cloud	Kissimmee
Zip	34769	34771	34744
Latitude/Longitude	28° 15.516' / 81° 16.974'	28° 16.6758' / 81° 15.1602'	28° 19.59' / 81° 17.592'
Marina Capacity			
No. of Slips (Est.)	144	N/A	N/A

Source: https://public.myfwc.com/LE/boatramp/public/CountyMap.aspx

Since the number of boat slips are not listed on the FWC website for the St. Cloud Lakefront Park, an estimate of the number of slips was derived from the aerial photograph shown in Figure 3-21.



Source: Google Earth 2018

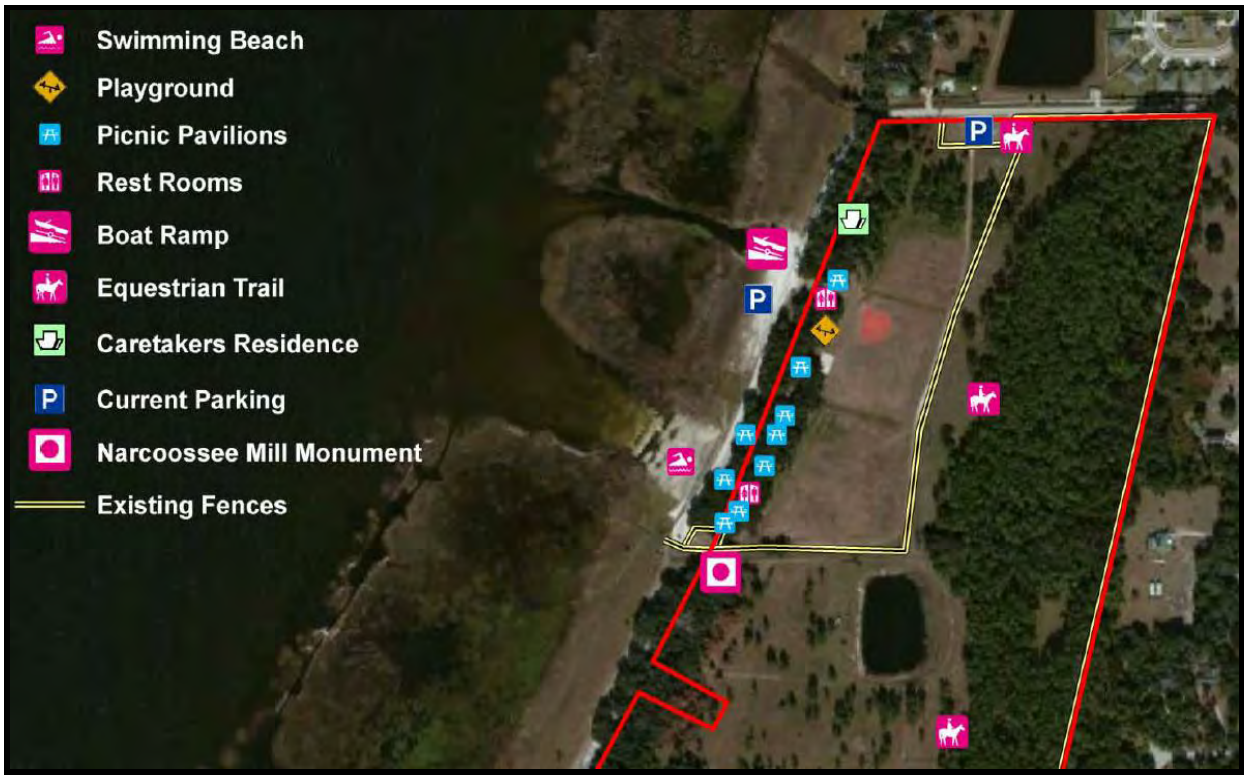
FIGURE 3-21 AERIAL IMAGE OF LAKEFRONT PARK

It is estimated that the Lakefront Park Marina has approximately 144 working slips that can accommodate fishing boats and small craft used for recreational excursions and wildlife viewing, in addition to other water sports and activities (Google Earth 2018).

Lakefront Park also provides a freshwater beach area, playground equipment, concession stand, and picnic tables. This area is popular as a neighborhood park. To the immediate west of this area is a boat ramp, marina, fishing pier, car and trailer parking lot, and pavilion. Numerous fishing tournaments, civic festivals and special events take place in this general location drawing citizens from all over Osceola County and central Florida. Open space exists along the lakefront area, from Massachusetts Avenue to Montana Avenue on the west side, and from Indiana Avenue to Mississippi Avenue on the east side. Activities that occur in these areas are wade fishing, bird watching /wildlife viewing and walking (City of St. Cloud 2018).

Chisholm Park is 152 acres in size and is located on the southeastern shore of East Take Toho. The recreational amenities and facilities include a softball field, volleyball, a lighted boat ramp, horse trails, a playground, picnic pavilions, grills, restrooms, a conservation area and undeveloped lands (Chisholm Park 2018). The recreational facilities for Chisholm Park are primarily located in the northwestern portion of the site and comprise approximately 18.40 acres of the park. The areas for the pavilions, picnic areas, playground, restroom, and some of the parking areas are located under an established canopy of live oak (Chisolm LMP 2013).

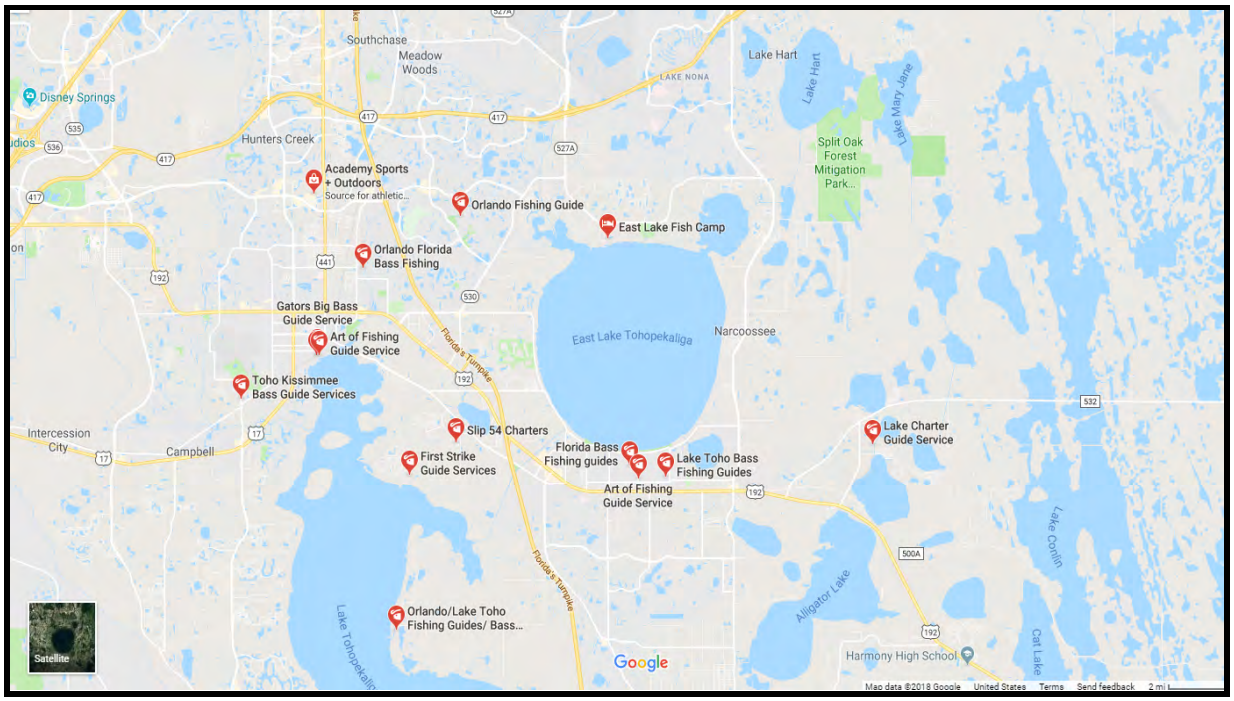
Chisholm Park is the site of a civil war reenactment for the Battle at Narcoossee Mill. The location of the Narcoossee Mill monument (the remnants of an old sugar cane mill) is indicated in Figure 3-22. The 2018 reenactment took place over March 23 through March 25, 2018. The battle is an enactment or scenario of how a civil war battle may have been fought. There was never an actual battle on this site (Reenactment 2018).



Source: Chisolm LMP 2013

FIGURE 3-22 CHISHOLM PARK RECREATIONAL FACILITIES/AMENITIES

East Lake Toho is a popular tourist destination for sport fishing and draws anglers from a wide area. Fishing guides operate their businesses within or near the St. Cloud and Kissimmee area. Sport fishing is an important economic asset to the St. Cloud community. The City of St. Cloud cooperates and works with the SFWMD, Osceola County, and other government agencies to protect the water quality of East Lake Toho, to support and sustain recreational fishing for both outside tourists and area residents (City of St. Cloud 2018). Figure 3-23 provides the location of fishing guides and charter services in the vicinity of East Lake Toho and Lake Toho. The Wicked Airboat Rides dock area, located adjacent to the Boggy Creek (formerly East Lake Fish) camp is shown in Figure 3-24. Figure 3-23 depicts at last twelve business establishments that provide fishing charter and guide services in the East Lake Toho vicinity.



Source: Google Earth 2018

FIGURE 3-23 FISHING GUIDE SERVICES AND WICKED AIRBOAT RIDES ON/NEAR EAST LAKE TOHO

Source: Google Earth 2018

FIGURE 3-24 WICKED AIRBOAT RIDES LOCATION

The Boggy Creek Resort and RV Park is located on the northwestern shore of East Lake Toho. In addition to offering cabins (24), the resort offers 325 RV parking stations for lease. The resort offers a number of amenities, some of which are dependent on having direct, unfettered access to East Lake Toho. Among these amenities are: a boat marina and lake access boat slips, a resort pool, restaurant bar and RV park store. Boggy Creek Resort and RV Park consists of over 100 acres that includes walking trails and a boat marina that is designed to accommodate all types of watercraft including seaplanes. The resort has covered slips that can accommodate boat sizes from 20 feet to 40 feet and can accommodate over 150 boats in the boat slip area (Boggy Creek 2018).

Located southwest of East Lake Toho on Lake Toho is the headquarters of Boggy Creek Airboat Adventures. In 2016 Boggy Creek Airboat Adventures added the following tourist amenities: a Native American Village, gemstone and fossil mine, alligator oasis, covered pavilions, a tiki bar, a swamp photo shack and a restaurant, the Boggy Bottom BBQ. The company has a fleet of 12 airboats has provided nature viewing access to several million nature viewers via trips into the wetlands of the Kissimmee River (Boggy Creek 2018).

3.10.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on recreation within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Analysis*, above and the descriptions of impact intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	The impact would be detectable and/or would only affect some recreationists in the area. Users would likely be aware of the action, but changes in use would be slight. There would be partial area closures in the short term to protect public safety. There would be no long-term closures of popular recreation areas.
Moderate	The impact would be readily apparent and/or would affect many recreationists in the area. Users would be aware of the action. In the short term, there would be complete area closures to protect public safety. However, the areas would be reopened after activities occur. Some users would choose to pursue activities in other available local or regional areas.
High	The impact would affect the majority of recreationists in the area. Users would be highly aware of the action. Most recreational areas would be closed or eliminated in the short term and the long term. Users would choose to pursue activities in other available local or regional areas and completely avoid the area.

3.10.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters of the United States; therefore, drawdown and habitat enhancement of East Lake Toho would not occur. However, under the No-Action Alternative conditions in East

Lake Toho would continue to degrade reducing future recreational opportunities and enjoyment. Under the No-Action Alternative, as the East Lake Toho's natural capital resource base declines (including the littoral zone and lake conditions) sport fishing, and other lake dependent recreational activities would most likely be impaired as conditions deteriorate, without ecosystem project intervention. The impact intensity would most likely increase from low to moderate intensity as a greater number of recreational resources are impacted. Exactly what year this would most likely occur would be dependent upon the continued rate of high population growth (within the Orlando-Kissimmee-Sanford, metropolitan statistical area [MSA]), and the associated development (and increase in impervious surface coverages) within the East Lake Toho watershed.

3.10.2.2 Alternative A

Recreation is not the primary purpose of the project alternative(s), but it is inextricably linked to the health and functioning of the natural resource base of East Lake Toho. Ecological restoration and enhancement would directly and indirectly support an improved recreational experience on East Lake Toho.

Resident Recreational Users and Lakeside Businesses - In the short term, during the drawdown phase, some lakeside businesses with boat launches and floating docks may experience a temporary inconvenience as water levels are reduced. With the shoreline impacted, and to mitigate these impacts, longer floating dock extensions may be required to enable boats to access lower water levels that would be located farther away from the original shoreline contours during the drawdown phase. This shoreline impact would be temporary and would have a low economic effect, since only a few lake dependent business establishments would experience this impact.

There may be short-term low to moderate intensity negative impact arising from reduced water levels effects on traditional navigation channels that have now become too low for boats to reach deeper lake depths. This phenomenon may impact a number of airboats, motorized watercraft and paddle boat users who have traditionally relied on these channels (from various lakeside points) to navigate to deeper lake areas.

During the drawdown construction phase, residents and tourists who lease RV/camper spaces from East Lake Toho accessible facilities would experience some inconvenience in accessing East Lake Toho surface waters, but over the longer term, post project completion, access is expected to improve along the enhanced shoreline.

Over the long-term, post project completion, water levels would return to normal steady state seasonal levels. Boat access would not be adversely impacted but some channel area passages may actually improve and provide for improved access after organic sediment removal and vegetation control activities are completed.

Boat Ramps - During the drawdown phase, the distance from the current shoreline in terms of boat ramp access to the water line would increase. Boat ramps would be affected by the drawdown and this could impact the ability to launch boats, and potentially the number of boat excursions and trip access over the drawdown period. It is worth noting that some drought-stricken lake communities have deployed portable boat ramp extensions and board walks during these extended

dry periods to mitigate this type of impact. On the positive side, the period of low water levels may also create an opportunity allowing some existing ramp facilities to be upgraded, extended or widened. The City of St Cloud has agreed to deepen the boat ramp access channel at the Lakefront Park Marina (assuming funding availability) prior to beginning of the lake drawdown to meet the FWC objective of providing at least one boat access point during project execution (scheduled for the spring of 2019). The City of St Cloud also intends to deepen the boat ramp at Chisholm Park during the drawdown period.

With lower water levels there is a short-term window of opportunity to inspect, maintain and rehabilitate (if needed) the now exposed and accessible shoreline structures. This opportunity may also be extended to other shoreline structures such as bulkheads that are owned by public park facilities and private owners.

As water levels return to steady state seasonal levels, post drawdown, boat ramps would provide for improved access to East Lake Toho. To mitigate the short-term adverse impacts anticipated from lower water levels, extending boat launches, modifying mooring docks, and dredging deeper channels would allow for improved watercraft access at lower water levels during the East Lake Toho drawdown and construction phase. Maintaining facilitated public access during the East Lake Toho drawdown and construction phase would reduce the magnitude of the low intensity, short-term, adverse economic impacts anticipated to recreational users and recreational value. If mitigation measures are implemented the effects would be of moderate intensity and if not they would be high intensity for the short-term during duration of the drawdown.

***Beach Distance to Water Line* -** During the East Lake Toho drawdown and construction phase, at lower lake levels, sandy public beach designated areas may now be located further away from the water's edge, and mud flats may be exposed between the sand and the water. This effect may potentially discourage swimming and other beach activities for a short-term period, for a number of beach users. The anticipated impacts may be similar to historic drought periods, or extended dry seasons that had a similar impact on beach distances to water lines. These changes are anticipated to have a low intensity, adverse, temporary effect on beach usage and may contribute to decreased visitor use at the designated beach recreation areas on East Lake Toho for the duration of the drawdown phase. However, post construction, there would be no adverse effects as water levels return to steady state conditions following refill activities. Shoreline access would be expected to improve under Alternative A.

***Sport Fishing, Bass Fishery and Other Forms of Recreation* -** Over the longer term, the Project would enhance ecological habitat and improve lake conditions and environmental inputs for ecosystems that support lake fish populations. A primary objective of the organic sediment removal is to improve linked inter-dependent habitats that are integral to sustaining sport fishing and other recreational uses of East Lake Toho, such as bird watching and wildlife viewing/nature study. Improvements in littoral zones habitats, spawning areas and recruitment, and the creation of improved water quality conditions would be conducive to improving recreational experiences for lake users: including boaters, fishers, wildlife viewers, nature students, and other recreational users of the lake.

It is anticipated that improved habitats for fish and wildlife would improve the quality of the recreational experience dependent upon these resources and not result in a material increase in the quantity or frequency of recreational usage above what would normally occur with expected population growth, and varying seasonal usage over time. Therefore under Alternative A, it is expected that an increase in the daily utility (benefit value) for recreational resident and tourist users of East Lake Toho would occur. The increase in average daily recreational utility is anticipated to occur post project completion, and after a gestation/maturation period, that allows for stressed natural communities to resume their normal growth and functioning.

Recreation Costs **-** While it is not necessary to equate the costs of recreation elements for each alternative (as there are no explicit project feature structural elements, and they are not separable), to the benefits, recreational benefits are discussed here because they are part of the incremental national economic development (NED) benefits that may be generated by the two action alternative(s).

The NED benefit evaluation procedures contained in ER 1105-2-100 (USACE 2000), Appendix E, Section VII, endorses three methods for evaluating the beneficial and adverse NED effects of project recreation: the travel cost method (TCM), the contingent valuation method (CVM), and the unit day value (UDV) method. It was not feasible to apply either the TCM or CVM methods for this EIS given a lack of data, time and resources.

The use the UDV method to value recreation benefits would consist of two elements, quantity (i.e., the number of visitor days) and the average value per day. Average value per day is provided by applying a weighting system (based on expert judgment, knowledge and observation) that assigns points based on the underlying features that can influence value. The criteria for assigning points are: recreation experience (30 points), availability of opportunity (18 points), carrying capacity (14 points), accessibility (18 points) and environmental quality (20 points). Five categories of expert judgment factors are used to assign points within each criteria category based on a spectrum of usage and quality. Cumulative point values assigned by the expert analyst can then be assigned a corresponding average UDV for general recreation or specialized recreation. The USACE provides updated average UDVs corresponding to different aggregate "points" assigned for an alternative plan that can be applied to determine the total recreational benefit value. The values are provided through an Economic Guidance Memorandum (USACE 2018). The average UDV serves as a proxy for average willingness to pay.

While full annual recreational benefits with and without the project alternatives were not calculated, some underlying recreational usage data that is related to the UDV method is provided in this section because it is informative to describing the scale and relative magnitude of the NED benefits for Alternative A. Future annual recreational benefit valuations that are based on the number of recreation days (in a year) times the average value of a recreation day are anticipated to increase mostly because the unit value of a recreational day is expected to rise to a higher level after the Project is implemented. This is primarily because if one were to assign points based on the future with/future without project evaluation framework, there would be an incremental increase or net increase in points gained under the future with project situation, compared to the future without project situation (i.e., No-Action Alternative). A greater number of aggregate points would generate a greater UDV.

Table 3-11 combines household data for the census tracks directly abutting East Lake Toho (Section 3.19 *Socioeconomics*) with estimates of household recreation participation for central Florida, sourced from the Florida Statewide Comprehensive Outdoor Recreation Plan Participation Study 2016-2017 (FDEP 2017). The estimated total number of households for the census tracks abutting East Lake Toho was 21,418. Applying the participation percentages (21,418), per select types of lake dependent recreation activities shown in Table 3-11 results in the baseline estimated household recreation participation within the previous 12 months for the select activities shown. Table 3-11, Column C also shows the mean days of participation for the select activities. When viewing Table 3-11 the following caveats that can influence recreational valuations for East Lake Toho should be kept in mind.

1. The households abutting East Lake Toho have many different substitute lake/watershed outlets from which to choose, for recreation. Therefore, the survey provided participation estimates for the central Florida lake region could also reflect recreational days spent at other lake sites within the chain of lakes district, besides East Lake Toho. Adjusting for these other substitute sites would lower the number of recreational activity days estimated for, or solely attributable to close proximity to East Lake Toho.
2. Table 3-11 counts only one participant or individual per household when multiplying the number of households times the average number of recreation days, per activity. So, it is quite possible that entire households participate in these activities together, or a few individuals per household participate. Therefore the estimated number of recreation days shown below is a conservative estimate from this perspective.
3. Some activities may be combined, such as wildlife viewing, bird watching and fishing. Therefore, user days may include combined activities that all provide utility to the user.

TABLE 3-11 ESTIMATED RECREATIONAL PARTICIPATION AMONG HOUSEHOLDS FOR CENSUS TRACKS ABUTTING EAST LAKE TOHO

ACTIVITY \A	A PERCENT OF HOUSEHOLDS IN CENTRAL REGION PARTICIPATING \A	B PROJECT AREA HOUSEHOLDS PARTICIPATING IN PREVIOUS 12 MONTH PERIOD \B	C MEAN NUMBER OF DAYS OF PARTICIPATION\A	D TOTAL PARTICIPATION DAYS (HHS X MEAN DAYS)
Freshwater Fishing	33%	7,068	12.8	90,470
Canoeing, Kayaking, Paddle Boarding	28%	5,997	9.3	55,772
Nature Study	25%	5,355	13.9	74,428
Freshwater Beach Activities (not including fishing)	28%	5,997	10.8	64,768
Launching from a Freshwater Boat Ramp	14%	2,999	14	41,979
RV or Trailer Camping	18%	3,855	14.3	55,130
Water Skiing / Wake-boarding	13%	2,784	9.6	26,730
Wildlife Viewing	55%	11,780	22.6	266,226

Note: Household HH
Sources:
\a FDEP 2017
\b Census Bureau 2017

Table 3-11 shows that a significant number of households engage in wildlife viewing (i.e., over 50 percent of the households in census tracts abutting East Lake Toho). It is likely that during project construction activities (drawdown, littoral zone scraping, and vegetation burning) there would be a short-term moderate adverse impact upon these shoreline and lake dependent activities. However, these households have other recreational outlet areas available to them to continue to engage in these activities that would moderate or dampen the anticipated, short-term adverse impacts. Over the longer term time horizon, post restoration enhancement, it is likely that lake conditions would improve the quality of the recreational experience for recreational users.

It is expected that recreational usage of East Lake Toho would fall slightly during the project implementation (low effect), but return to normal average and steady state growth levels once the Project is completed, and after restoration/enhancement efforts have had time to grow and mature. Over the longer term, it is anticipated that the value of recreational benefits would increase based on an increase in the willingness to pay (increase in consumer surplus per recreation day or trip) for these resources as East Lake Toho environmental conditions improve. Therefore over a 50-year project evaluation period, it is expected that cumulative net incremental recreational benefit values (the difference between the future with and the future without Project) would result in a positive increase in the value of the NED account.

3.10.2.3 Alternative B

Direct and indirect effects of selecting and implementing Alternative B on recreational resources would be the same as those described above for Alternative A.

3.10.3 Effects Summary

While East Lake Toho drawdown and construction activities may temporarily disrupt and inconvenience sport fishing and optimal fishing/recreation conditions, over the longer term, the Project would enhance habitat and improve in-lake and lakeside conditions and access. The Project would improve environmental inputs for ecosystems that support sport fish populations and benefit this form of recreation, and other dependent forms of recreation such as nature viewing and wildlife observation. These improved conditions are expected to result in an increase in willingness to pay (or alternatively, higher average unit day values per recreational trip) for users. Implementation of either Alternative A or Alternative B would result in moderate intensity impacts for the short-term and improved conditions in the long-term. The Project would not significantly impact recreational resources, and would provide beneficial effects in the long-term.

3.11 CULTURAL RESOURCES

This section describes cultural resources that have been identified to date near the project area and the potential consequences of implementing the East Lake Toho Project upon these resources.

3.11.1 Affected Environment

The area of potential effect (APE) includes East Lake Toho activity areas on the east, north and west littoral zones, staging area at Chisholm Park and the C-31 Canal in the vicinity of Lakeshore Boulevard near Lake Runnymede (Figure 2-2). A review of the Florida Master Site File, the state's list of cultural resources, was performed by FWC during initial data collection for this Project. The Florida Master Site File lists 29 cultural resources within the immediate vicinity of East Lake Toho, all of which are archaeological sites. A total of 20 sites are listed as prehistoric; the remainder date to the nineteenth or more likely twentieth century. In this environment, most prehistoric sites occupy elevated sandy ridges and other comparatively high and dry locations. Most of the prehistoric sites near East Lake Toho are greater than 200 feet from shore. However, two sites are closer to the shore: Hilliard Island, which is near Boggy Creek along the northwestern shore and the Little Tohopekaliga Site, a mound designated as Site OSO0016, located along the southeastern shore. Based on a review of aerial photographs, Site OSO0016 has probably been destroyed. The sites on Hilliard Island are small prehistoric camps and shell middens[4], not immediately located on the lake shore.

The St. Cloud (C-31) Canal (Site OS02752) is eligible for listing in the National Register of Historic Places due to its direct association with Hamilton Disston's plan to connect the Kissimmee River with the Gulf of Mexico, and being an older canal from the nineteenth century (Collins 2018).

3.11.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and Alternative A and Alternative B on cultural resources. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, and descriptions of the three levels of intensity effects specifically developed for this Project are described below. The probability of encountering cultural resources within the APE for the East Lake Toho Drawdown and Habitat Enhancement Project is regarded as low because of the relatively small area that would be excavated and the fact that the scraping would not exceed depths of three inches to six inches.

[4] Midden – a refuse heap. https://www.merriam-webster.com/dictionary/midden. Accessed October 17, 2018.

INTENSITY LEVEL	DESCRIPTION
Low	Construction activities in the vicinity of cultural resources would avoid any physical or vibratory disturbance to the resources. Ground disturbance or changes to the visual environment would not disrupt the integrity of traditional cultural properties (TPCs) or sacred sites.
Moderate	Construction activities would take place within the boundaries of some archaeological sites; however, there would be no physical or vibratory effects on the characteristics of the sites that qualify them for listing in the NRHP. Ground disturbance or changes to the visual environment would have short-term impacts on TCPs or sacred sites, but long-term impacts would be avoided.
High	Archaeological sites would be disturbed through direct physical effects of ground disturbance within site boundaries from project activities. Project construction would cause structural damage to historical sites from vibrations. Ground disturbance or changes to the audio/visual environment would disrupt the integrity of TCPs or sacred sites.

3.11.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters of the United States; therefore, drawdown and habitat enhancement of East Lake Toho would not occur. Implementation of the No-Action Alternative would not affect cultural resources in any manner.

3.11.2.2 Alternative A

Direct Effects

Alternative A would have a low probability of impacting known cultural resources, all of which are more than 200 feet from the East Lake Toho shore. Even those archaeological sites closest to East Lake Toho are beyond the area where this Project would have direct impacts.

Concern has been expressed regarding the potential for cultural resources in the East Lake Toho, specifically prehistoric canoes. Dugout canoes are fairly common in Florida's wetlands, and more than 200 have been reported to the Division of Historic Resources (DHR) (Laskow 2017). Besides their intrinsic value, the canoes are considered indications that other wet site resources may be present. Canoes on lake bottoms are the property of the State of Florida and cannot be moved or disturbed without contacting the DHR.

The placement of pumps, intake and outfall piping on the C-31 Canal/levee is not anticipated to result in adverse effects to this site. The pump installation is temporary, has minimal impacts, and is below the level of disturbance that has occurred in the canal vicinity (e.g., construction of Lakeshore Boulevard, adjacent homes and the water control structure).

Because of the degree of fluctuation in the level of East Lake Toho, organic preservation in the areas that would be impacted by this Project seems unlikely. Nonetheless, given the potential for

prehistoric remains in the lake floor, an archaeological monitor would be required to be present during the Project to ensure that no canoes or other preserved organic artifacts are encountered. The project excavation activities would be supervised by a FWC project manager certified as an Archaeological Monitor by the DHR. If required by DHR, a professional archaeologist who meets the Archaeology and Historic Preservation Secretary of Interior's Standards and Guidelines would be retained to develop a plan for protection of the cultural resources within and around East lake Toho. The FWC project manager would be responsible for conducting a short training session for the heavy equipment operators explaining what might be expected to be found during the organic sediment removal activities, including steps that should be taken if cultural resources are found. If a canoe or other potentially significant artifact is uncovered, work would have to cease in that vicinity until a mitigation procedure could be arranged with the Florida DHR. The direct effects of implementing Alternative A would be of low intensity for the short-term and negligible over the long-term.

Indirect Effects

No indirect effects are anticipated as a result of implementing Alternative A.

3.11.2.3 Alternative B

In comparison to Alternative A, Alternative B would have less opportunity to encounter a prehistoric dugout canoe during scraping activities because fewer acres would be involved with this option; otherwise the direct and indirect effects would be the same as those described for Alternative A.

3.11.3 Effects Summary

Implementation of either action alternative would have low intensity effects for the short-term upon known cultural resources and negligible long-term effects. There is some concern that either of two Action Alternatives might have an effect on unknown resources, specifically prehistoric dugout canoes on the bottom of East Lake Toho. To avoid this, an FWC archeological monitor would be present during the grading of the eastern shore littoral zone. In the unlikely event that a canoe is discovered, a mitigation plan would be negotiated with the Florida DHR. No significant effects upon cultural resources would occur from implementing the East Lake Toho Project.

3.12 AESTHETICS

Because aesthetics contribute to quality of life and enjoyment of the environment, NEPA requires consideration of the effects of project actions on aesthetics or visual resources. This section evaluates the potential effects of the alternatives on aesthetics within the project area. Existing conditions are described and the consequences of project implementation evaluated. The section ends with an effects summary that makes a determination of impact significance.

3.12.1 Affected Environment

Consideration of aesthetic resources within the project study area is required by the NEPA 1969 PL 91-190, as amended. Aesthetic resources are defined as "those natural and cultural features of the environment that elicit a pleasurable response" for the observer, most notably from the predominant visual sense. Consequently, aesthetic resources are commonly referred to as visual resources, features that can potentially be seen.

The lands adjacent to the Project are of low relief and provide many panoramic view corridors of open lake waters and adjacent prairie and swamp in the rural setting. East Lake Toho is rimmed by sandy shorelines, pine flatlands and or mesic oak hammocks in the immediate background. Overall the project area possesses moderately good aesthetic characteristics and value, with floating and emergent vegetation in some areas as the exception. This floating vegetation which contains woody vegetation restricts views of the lake and diminishes the aesthetic “lake” experience as can be seen in the photo below (Figure 3-25).

Source: SFEC 2018a
Note: Woody vegetation on the floating vegetation mats obstructing lake views can be seen in the background.

FIGURE 3-25 VIEW OF EAST LAKE TOHO FROM THE EASTERN SHORE

3.12.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on aesthetics within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above and the descriptions of the three impact intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	Proposed project actions could attract attention, but would not dominate the view or detract from current user activities.
Moderate	Proposed project actions and changes would attract attention and contribute to the landscape, but would not dominate. User activities would remain unaffected
High	Proposed project actions and changes to the characteristic landscape would be considered substantial when those changes dominate the landscape and detract from current user activities

3.12.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters (East Lake Toho) of the United States; therefore, drawdown and habitat enhancement of East Lake Toho would not occur. However, under the No-Action Alternative aesthetic conditions in East Lake Toho would continue to degrade, especially with the continued growth and expansion of woody vegetation, further reducing lake views and enjoyment for many waterfront residents, park visitors, boaters, and other recreationalists.

3.12.2.2 Alternative A

Implementation of Alternative A would require the drawdown of East Lake Toho approximately four feet below normal water levels exposing the lake bottom and creating an adverse view of the lake. These views would be temporary; lasting for approximately eight months until the lake refill is complete; however, the views of the lake bottom do occur naturally during drought periods as in the summer of 2012. Project implementation would require use of heavy equipment which would create a temporary visual intrusion. Once the Project is complete, lakefront residents and recreationists would have an improved lake view due to the removal of woody and other undesirable vegetation from the littoral zone. Boaters would experience improved views of the entire lake and a more enjoyable recreational experience as a consequence.

Creation of the two in-lake spoil islands would have a permanent impact on the aesthetic resources within the project area, particularly for those residences along the eastern shoreline of East Lake Toho in the general vicinity of the proposed spoil island locations (Figure 2-1). To the extent practicable, the two spoil islands would be sited adjacent to public property to minimize aesthetic impacts to lakeshore residents. While some individuals may appreciate the view with the islands to improve wildlife observations, others would not; it would be largely a matter of personal preference. FWC staff have indicated their willingness to plant cypress trees along the front edge of the spoil islands to improve the appearance, if requested by lakeshore residents (see Figure 2-1 for the anticipated location of the spoil islands and Figure 2-3 for a photo of an existing spoil island on Lake Toho).

3.12.2.3 Alternative B

Generally, the direct and indirect effects of selecting Alternative B on aesthetic would be the same as those described above for Alternative A. The only exception is along the eastern shoreline where six small patches of natural habitat would be preserved within the area proposed to be scraped. These patches of natural habitat may be viewed by some waterfront residents, park visitors, and other recreationists as obstructions to lake views while others perceive them as beneficial for wildlife observation (e.g., birdwatching).

3.12.3 Effects Summary

Under either Alternative A or Alternative B the East Lake Toho Project would result in short-term moderate intensity effects on visual resources and low intensity in the long-term. During the drawdown period for Alternative A, most locations around the periphery of East Lake Toho would

experience an altered view as the lake water levels would be four to five feet below normal with an exposed lake bottom. Although it is worth noting that these low water levels with an altered lake view are experienced during drought periods such as occurred in the summer of 2012 Once the Project is complete and water levels restored, lake vistas would be improved for most lakefront residents and boaters who prefer unobstructed lake views. Improved aesthetics would be experienced for waterfront residents with removal of visually obstructive woody vegetation from the littoral zone in front of their property. Creation of the two in-lake spoil islands may have a permanent impact on the aesthetic resources, particularly for those residences along the eastern shoreline of East Lake Toho. However, the aesthetic impact could be considered less intrusive than that occurring in the current condition (i.e., the No-Action Alternative).

Under Alternative B the aesthetic impact would generally be the same as for Alternative A, but with a few remaining patches of natural habitat along the eastern shoreline that waterfront residents and park visitors might perceive as either an opportunity for wildlife observation or as an additional obstruction to lake views.

Under the No-Action Alternative aesthetics would continue to deteriorate as woody vegetation would continue to obstruct lake views.

The East Lake Toho Drawdown and Habitat Enhancement Project is not anticipated to have a significant effect on aesthetics under either Alternative A or Alternative B.

3.13 CLIMATE

This section describes the climate conditions of central Florida, including Osceola County, and assesses the potential implications of the Project on local weather patterns.

3.13.1 Affected Environment

The climate of central Florida is humid subtropical. There is a defined rainy season from May through October, when air mass thundershowers that build in the heat of the day release high intensity, but generally brief summer rainfall. Late summer and early fall bring reduced tropical lows that contribute to late summer and early fall rains. In October, the dry season sets in across much of central Florida and generally lasts until late April to mid-May. Mid and late winter can become severely dry in central Florida; in some years dry conditions result in conservation water restrictions being imposed.

Osceola County gets an average of 48 inches of rain per year with precipitation on average occurring on 74 days out of the year. In St Cloud, average daily temperatures vary from 52 degrees F to 90 degrees F and rarely are below 38 degrees F or above 94 degrees F. According to a tourism index, the best time of year to visit St Cloud for warm weather activities is from early March to mid-May and from mid-October to early December.

Generally, central Florida has experienced a warming trend over the past decade; whether this is attributable to normal weather cycles or anthropogenic climate change is unclear. Either way, a trend of increased weather extremes (e.g., wet and dry years) with more intense hurricane activity is predicted.

3.13.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and Alternatives A and B within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above and the descriptions of the three climate related impact intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	No potential for alteration of local weather patterns, whether due to changes in extents of open water (with associated changes in evapotranspiration rates) or changes in surface albedo (with associated changes in heat balance)
Moderate	Potential for temporary alteration of local weather patterns due to temporary changes in extents of open water or changes in surface albedo
High	Potential for permanent effect on local weather patterns due to spatially significant and permanent changes in extents of open water or changes in surface albedo

3.13.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoil materials in waters (East Lake Toho) of the United States; therefore, drawdown and habitat enhancement of East Lake Toho would not occur and there would be no changes to local weather patterns or long term climate.

3.13.2.2 Alternative A

As described in Section 2, *Alternatives,* the East Lake Toho Drawdown and Habitat Enhancement Project would not be implemented during either an extremely dry or wet year. Alternative A is highly unlikely to alter local weather patterns and certainly not sufficiently to increase risk of local flooding in either the short-term or long-term.

The drawdown aspect of the Project would temporarily reduce the surface area of East Lake Toho, but this would be offset to some extent by increases in the surface area downstream in Lake Toho. Thus, evapotranspiration rates and volumes would not be greatly altered. Additionally, these changes in the surface areas of East Lake Toho and Lake Toho would be short-term (i.e., six to eight months). No other aspect of the Project is likely to affect local weather patterns or long-term climate. The impact on climate is expected to be negligible to low in the short-term and negligible in the long-term.

3.13.2.3 Alternative B

The direct and indirect effects of implementing Alternative B on changes in surface area of East Lake Toho and Lake Tohopekaliga would be essentially identical to those of Alternative A. Alternative B would result in somewhat smaller changes in surface albedo due to retention of more of the existing vegetated islands. However, the area that would be retained, approximately six acres, is less than 0.05 percent of the lake surface, so climatic effects would be negligible. Overall, the impact on climate would be the same as for Alternative A: essentially none in either the short-term or long-term.

3.13.3 Effects Summary

Under either action alternative the effects on climate would be negligible in both the short-term and long-term and would not be significant.

3.14 AIR QUALITY

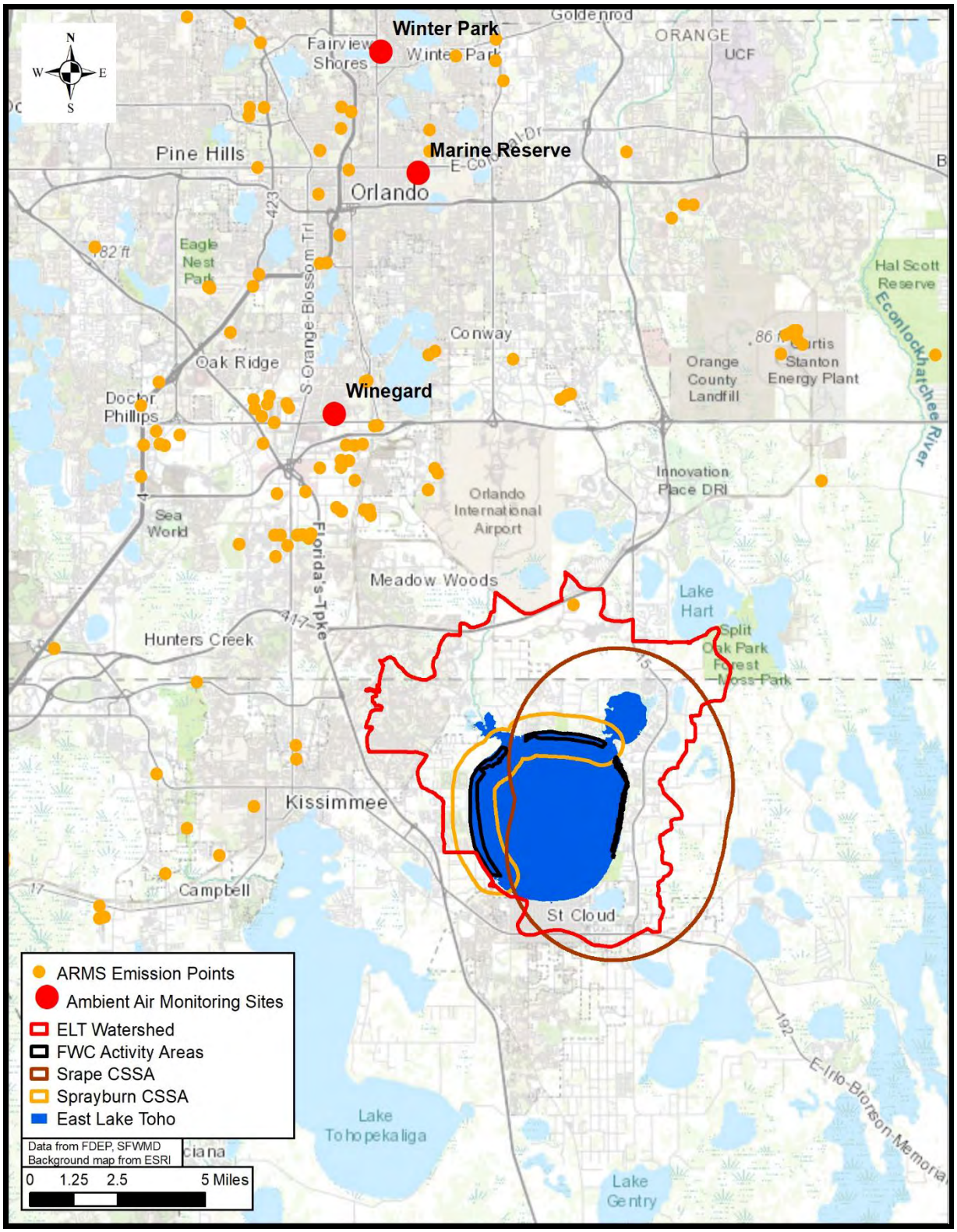
This section describes the likely impacts to air quality from the East Lake Toho Project. The section reviews two categories of air emissions: criteria air pollutants (carbon monoxide, lead, ground-level ozone, nitrogen dioxide, particulate matter, and sulfur dioxide) and GHG (here carbon dioxide and methane). Criteria air pollutants are evaluated relative to the National Ambient Air Quality Standards (NAAQS). GHG emissions are reported in a narrative qualitative format.

3.14.1 Affected Environment

The study area for air quality related to the Project is approximately the East Lake Toho watershed. The East Lake Toho watershed is a rapidly urbanizing area that is primarily residential and agricultural, with only a single permitted point source of industrial air pollution (a hospital). Air quality is assumed to be mostly good most of the time. Existing impacts to air quality are mostly from vehicle emissions, with some impacts from land-clearing, road building, and construction activities. On rare occasions wildfire smoke will degrade air quality in the area.

No air quality monitoring exists within the watershed. The closest monitoring site that measures all the criteria air pollutants is Winter Park, 18.5 miles north of East Lake Toho. The Winegard site (ten-miles away) only measures ozone. Both of these monitoring sites are surrounded by higher density urban areas and more industrial point sources than are found in most of the East Lake Toho watershed. Ozone at Winter Park exceeded the eight-hour NAAQS only once in 2018, and never at the Winegard site. Other criteria air pollutants measured at Winter Park are below NAAQS (floridadep.gov).

The geographic arrangement of the items discussed can be seen in Figure 3-26. This figure provides the arrangement of urban areas, point sources of air pollution, air quality monitoring sites, and critical smoke sensitive distances for burning associated with the Project in relation to the East Lake Toho watershed.



Source: FDEP, SFWMD, ESRI 2018

FIGURE 3-26 EAST LAKE TOHO AIR QUALITY

3.14.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and Alternative A and Alternative B on air quality in the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*. Descriptions of the three intensity levels developed for this Project are described in the table below.

INTENSITY LEVEL	DESCRIPTION
Low	The impact on air quality associated with project emissions of criteria pollutants is measurable, but localized and low such that emissions would not exceed the NAAQS; GHG emissions would not exceed the EPA mandatory reporting threshold.
Moderate	The impact on air quality would be measurable and primarily localized, but would have the potential to result in regional impacts. Emissions of criteria pollutants associated with the Project would not exceed the NAAQS; GHG emissions would not exceed the EPA mandatory reporting threshold.
High	The impact on air quality would be measurable on a local and regional scale. Emissions of criteria pollutants associated with the Project are high, such that they would exceed the NAAQS; GHG emissions would exceed the EPA mandatory reporting threshold.

3.14.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoil materials in waters (East Lake Toho) of the United States; therefore, drawdown and proposed habitat enhancement project elements on East Lake Toho would not occur. Implementation of the No-Action Alternative would not affect criteria air pollutants in the area. GHGs would be affected through two competing mechanisms: 1) sequestration of atmospheric carbon dioxide into slowly accumulating littoral zone organic sediments; and 2) release of a portion of that sequestered carbon as methane, a higher potency GHG, because these sediments are partially anoxic. The net effect is unknown. Methane emissions are not included in the EPA GHG reporting requirement, but if they were, the annual emissions are expected to be below the EPA mandatory reporting threshold (40 C.F.R. § 98.2(a)).

3.14.2.2 Alternative A

Direct Effects

The direct effects of Alternative A on criteria air pollutants would be short-term and would affect only a limited area. The most significant criteria pollutant is likely to be particulate matter. Emissions of criteria air pollutants would result from three sources:

1. The engines powering the four water pumps used to lower and control the water level during the drawdown period.
2. The heavy equipment involved with the organic sediment scrape operations on the east side of the lake as well as installation and removal of the sheet pile weir between East Lake Toho and Lake Runnymede.
3. Burning of organic matter, such as the sprayed cattails within the northern and western lake periphery spray/burn areas, and piled woody vegetation from the eastern scrape area.

The intensity of air quality impacts from the actions described in project actions numbers 1 and 2 above are likely to be moderate in the immediate vicinity of the work areas, but of low intensity throughout the remainder of the evaluated area.

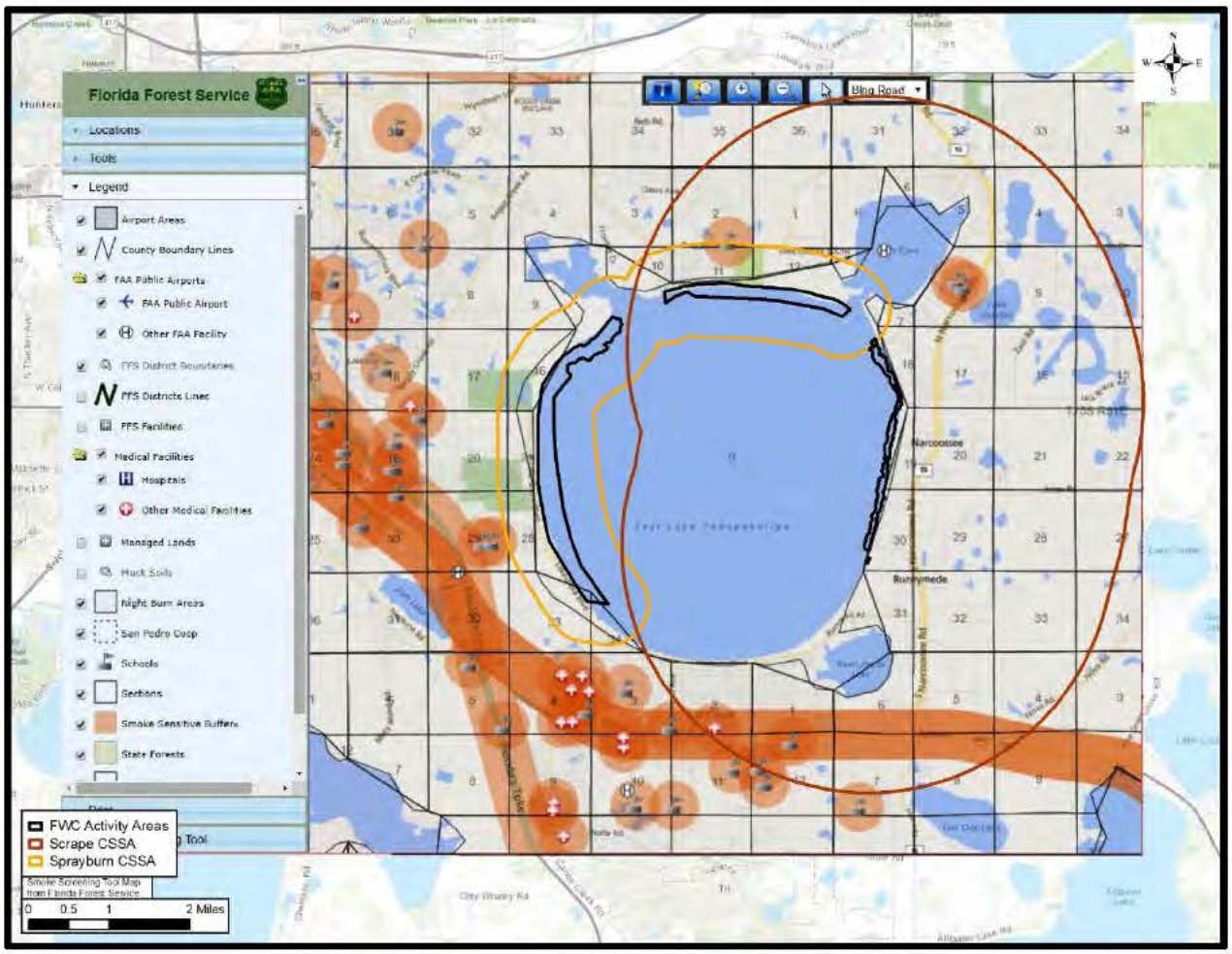
Burning of organic matter (refer to #3 above) would be conducted by certified burn managers who are trained to minimize smoke impacts to smoke sensitive areas. A map showing relevant smoke sensitive areas as well as Critical Smoke Sensitive Area (CSSA) search distances is depicted in (Figure 3-27). The CSSA is the critical distance from the burn, in a 30 degree angle from both sides of the predicted wind direction (to account for divergence of the wind direction from the prediction), within which, a burn manager searches for smoke sensitive areas such as schools, hospitals and major roads. The mapped CSSAs were drawn in all directions from all potential fire locations to indicate all possibilities, though this does not indicate the actual or likely smoke movement directions. (Burn managers also employ a Smoke Sensitive Area search distance, which is far longer than the CSSA.)

The burning (and spraying) of cattails would be conducted in areas of dense cattail growth within the general regions labeled "spray and burn site 1 and 2" in (Figure 2-4), totaling approximately 200 acres. Burning of the dried cattails would be conducted on days with favorable weather that should remove and dilute the smoke rapidly. With this kind of fuel, no residual smoke production should occur after the burn is completed. The area of greatest potential impact is likely to be within the area marked on Figure 3-27 as the spray-burn CSSA. The buffer distance used in the mapped CSSA (0.5 mile) was taken from the *Florida Forest Service's Florida's Certified Smoke Management Plan 2014* (Forest Service 2014), using the CSSA search distance for a grass fire, as the closest analog to cattail. The actual impacted area would be only in the direction of surface level winds on the day of the fire, from the location where the burn that day is conducted. Burn managers are trained to prescribe burning on days with wind directions that minimize impacts to smoke sensitive areas. For example, a west wind would carry smoke from a fire in the west spray/burn site over East Lake Toho, where it would be diluted substantially before reaching any smoke-sensitive areas. Only a portion (approximately 200 acres) of the area within the spray/burn polygons (750 acres) would be burned during the Project, and that area would be divided among a maximum of five burn days. Burning cattails could have a temporary moderate intensity level effect downwind, and only on the day that a specific area is burned. Beyond the spray-burn CSSA, impacts would be low intensity.

Burning of the piled woody vegetation gathered from the eastern scrape area is likely to have the greatest impact on air quality. The piled woody vegetation is unlikely to be completely dry and would contain leaves, roots, and some organic soil at the time of burning. This type of fuel smolders for long periods and produces high amounts of smoke, with a lot of residual smoke at night when wind speeds and mixing heights are reduced. This situation creates the potential for smoke to stay near the ground within the vicinity of the burn area instead of being diluted by wind currents. Some mitigating

efforts would be implemented to minimize the smoke impacts on nearby residents. The area of greatest impact is likely to be within the area marked in Figure 3-26 as "Scrape CSSA." The buffer distance for that area was also adapted from Florida Forest Service guidance (Forest Service 2014), using the criteria for logging slash, as the closest analog to piled shrubs and trees (i.e., three miles). As with the cattails, the actual impacted area would depend on the location of the burn pile and the direction and speed of surface level winds on the days when burning is actually conducted, and weather conditions at night. A west or northwest wind (depending on the burn location) would carry the smoke away from all the nearby smoke sensitive areas, though it could still affect residences not labeled as smoke-sensitive. Additionally, an east or northeast wind would carry the smoke across the lake, where it could be substantially diluted before reaching smoke sensitive areas or other residences. Burn piles could be made smaller to reduce smoke production and shorten the duration of combustion of individual piles. A shorter burn duration can reduce uncertainty associated with weather forecasting. Using smaller piles would also result in more burn days required to consume the amount of woody material that needs to be burned. Air quality impacts from burning piled woody vegetation in the scrape areas has the potential to be high intensity within the CSSA. Beyond the CSSA area, impacts are likely be moderate to low intensity.

In addition to wind directions, burn managers can require that the burns only take place when additional weather criteria are present, to aid in smoke dispersal. High mixing heights, higher transport wind speeds, higher dispersion indexes, and lower low visibility occurrence risk index (LVORI) categories can all be prescribed to improve removal and dispersal of smoke. However, those conditions also make fires more dangerous and more likely to escape containment. Additionally, the more stringent the weather requirements are, the less likely the burn manager would be to find days when conditions are suitable. Certified burn managers have the training and experience to effectively weigh these conflicting considerations, and will do so for each planned burn in each location within the Project.



Source: FWC

Note: Map includes critical smoke sensitive area search distances (CSSA) drawn in all directions from zones where fires may be placed.

FIGURE 3-27 SMOKE SENSITIVE AREAS NEAR EAST LAKE TOHO

GHG emissions from Alternative A, specifically CO_2, would be short term events. However, CO_2 persists in the atmosphere. GHG emissions from Alternative A would come from a variety of sources. All three combustion-related sources of criteria emissions listed earlier would release carbon dioxide, as well as from these three additional project sources:

1. Lake Tohopekaliga would be lowered by a foot much earlier than the regulation schedule normally prescribes, to assist with the gravity-drain phase of the East Lake Toho drawdown. This action would expose sediments around the periphery of Lake Tohopekaliga to oxidation, emitting carbon dioxide.
2. The drawdown of East Lake Toho to 53 feet NGVD29, would be two-feet-below the normal bottom of the regulation schedule for the lake, and it would be substantially below the normal regulation stages for a much longer period of time than normal. This is one of the primary objectives of the Project. This drawdown would expose a large area of near-shore lake

bottom to oxidation. Oxidation of near-shore organic sediments would release carbon dioxide.

3. The organic sediments in the scrape area would be disposed of on two in-lake spoil islands. The 2018 Sediment Report (SFEC 2018b) estimates that the area would contain 10,000 tons (dry weight) of organic sediments, not including the above-ground plant biomass. SFEC estimated that half to two thirds of that amount would be piled above the normal high water level of East Lake Toho, and therefore would eventually oxidize.

Alternative A may reduce the amount of methane that would have been released from any anoxic littoral zone organic sediments that would be preserved under the No-Action Alternative. These sediments would be disposed on two spoil islands where the fraction above the water would be exposed to oxygen and is likely to oxidize almost completely within the next few years. Using the IPCC multiplier of 44/12 (as recommended by EPA) to convert organic carbon to CO_2 yields 18.3-24.5 thousand tons of CO_2 likely to be released from the spoil islands (EPA 2018). Similarly, the lake drawdown would expose littoral zone organic sediments outside of the scrape area to oxidization rather than methanogenesis. We have no estimate of carbon dioxide to be generated by burning cattails and woody vegetation, or by oxidation of sediments outside the scrape area, but together, they would certainly be on the order of tens of thousands of tons.

This analysis seeks to relate the project GHG emissions to the threshold that triggers mandatory reporting to the EPA. That requirement is triggered when qualifying emissions reach 25,000 tons of CO_2 equivalent per year. These activities, while conducted during the same dry season, may straddle the division between two calendar years. Additionally, the oxidation of scraped sediments would occur over multiple years. Furthermore, none of these GHG emission sources qualify for the mandatory reporting requirement. However, if all the GHG emissions associated with the Project were aggregated and assumed to qualify, it would exceed the EPA annual mandatory reporting threshold. (40 C.F.R. § 98.2(a)).

Additionally, most of the CO_2 emissions might be appropriately considered a net zero because it would be from carbon that had recently (decadal scale) been fixed from the atmosphere by plant growth. Furthermore, the sequestration of that carbon only happened because of anthropogenic perturbations of natural processes, associated with lake level stabilization and nutrient loading. Of all these sources of GHG emissions, only those associated with running the engines in heavy equipment and in the drawdown pumps would unambiguously add to overall anthropogenic carbon loading to the atmosphere, because they involve burning fossil fuels.

The sum of all the air quality direct effects of Alternative A would be low to moderate intensity in the short-term and negligible in the long-term.

Indirect Effects

Indirect effects of Alternative A include a temporary reduction in the pollution filtering ability of littoral-zone vegetation with the temporary removal of some of it by scraping and/or burning. This would allow an additional amount of pollution from watercraft to affect residential communities along the East Lake Toho shore. Additionally, GHG emissions resulting from Alternative A would contribute to climate change.

3.14.2.3 Alternative B

Direct and indirect effects of selecting and implementing Alternative B would be similar to Alternative A. Alternative B retains approximately 25 percent of the existing tree island areas designated for organic sediment removal along the eastern shoreline, which contains some of the largest trees and shrubs. This would reduce the amount of woody vegetation that would need to be burned. The 2018 Sediment Report (SFEC 2018b) estimated that the retained natural area patches would constitute approximately ten percent of the organic sediments. Alternative B would therefore oxidize somewhat fewer organic sediments and would involve slightly less heavy machine use and associated emissions. Both of these would proportionally reduce the GHG emissions associated with this alternative, compared to Alternative A.

3.14.3 Effects Summary

Under both Alternatives A and B, emissions from the combustion of motor fuels and vegetation would produce criteria air pollutants, mostly particulate matter, in the short term, during various phases of the Project. Motor fuels could produce moderate intensity impacts in the immediate vicinity of the water pumps and heavy equipment. Burning of cattails would create smoke for durations shorter than a day on multiple occasions. Smoke from the burning of cattails should rapidly be removed from the project area and diluted by wind currents, but could be of moderate intensity downwind. The most significant pollution risk is from pile-burning of woody vegetation in the east scrape area. This activity could result in high to moderate intensity impacts for multiple days and nights during the scraping of organic sediments phase of the Project. Alternative B would reduce the pile-burning of woody vegetation by approximately 25 percent. The combustion activities as well as the oxidation of organic matter that is the intent of the Project would release GHGs, but not of an amount significant to global climate change. Alternative B would release a slightly smaller volume of GHGs. Although the release of GHG emissions have long-term effects, the Project is not expected to have significant long-term effects on air quality.

3.15 NOISE

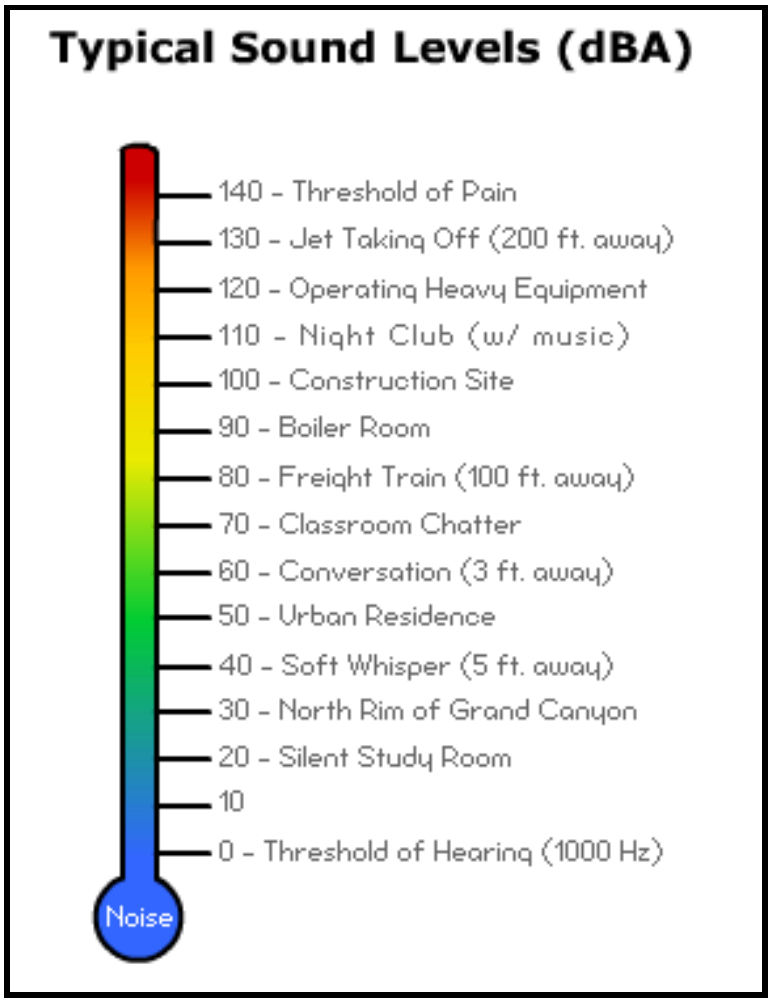
Issuance of a permit and subsequent implementation of the Project would increase noise levels over ambient conditions in portions of the project area. This section evaluates the potential effects of implementing any of the alternatives on sensitive noise receptors within the project area. Existing conditions are described and the consequences of project implementation are assessed. The section concludes with a summary of potential effects.

3.15.1 Affected Environment

According to the Occupational Safety and Health Administration (OSHA), noise is defined as unwanted sound. Sound is all around us; it becomes noise when it interferes with normal activities, such as speech, concentration, or sleep. Noise may be classified as continuous (constant), impulsive (sudden burst), intermittent (increases or decreases rapidly), or low frequency (low background humming).

The standard measurement unit of sound is the decibel (dB), which represents the acoustical energy present. Sound levels are measured in A-weighted decibels (dBA), a logarithmic scale that approaches the sensitivity of the human ear across the frequency spectrum. The human ear responds to sound in audible frequencies in a similar way in most individuals. A 3-dBA to 5-dBA increase is equivalent to doubling the sound pressure level, but is barely perceptible to the human ear. A 6-dBA increase is a readily perceptible change and a ten-dBA increase is doubling of the apparent loudness.

Ambient sound levels in portions of the project area can range from static to highly variable and are based on sound sources and disturbances in the immediate area. For much of the project area, which is predominantly natural habitat adjacent to residential areas with some agricultural, sound levels are expected to fall in the range of 40 to 60 dBA. These levels are generally characterized as quiet, and as documented by OSHA (2013), Figure 3-28, they are common to urban residences and conversation. The one notable exception within the project area for waterfront residences and businesses is that they are exposed to the frequent (daily), but short-term, noise of airboat tours that could exceed 70 dBA.



Source: OSHA 2013

FIGURE 3-28 TYPICAL NOISE LEVELS FOR VARIOUS TYPES OF HUMAN ACTIVITY

Communities (e.g., City of St Cloud) in the project area generally have higher ambient sound levels resulting from human activity (e.g., higher than 60dBA). Areas adjacent to roadways, such as U.S. 192, county and local roads, have higher ambient noise levels from vehicle traffic and human activity. Using the OSHA (2013) scale, those noise levels would range from 50 to 70 dBA.

3.15.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on noise within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above and the descriptions of the three impact intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	Noise impacts could attract attention, but would not dominate the soundscape or detract from current user activities during construction activities.
Moderate	Noise impacts would attract attention, and contribute to the soundscape, but would not dominate. User activities would remain unaffected during construction activities.
High	Impacts on the characteristic soundscape would be considered significant when those impacts dominate the soundscape and detract from current user activities during construction.

3.15.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoil materials in waters (East Lake Toho) of the United States; therefore, drawdown and habitat enhancement of East Lake Toho would not occur and no new noise would be created. However, the occasional helicopter noise associated with herbicide treatment of undesirable vegetation along the periphery of East Lake Toho would continue.

3.15.2.2 Alternative A

During implementation of Alternative A, noise would originate from a number of sources at various project activity sites, including work crews and vehicles, heavy equipment and water pumps. This noise would have the potential to affect nearby residences, lake shore businesses, recreation users, wildlife and other sensitive receptors. Short-term low noise levels are anticipated to occur while project activities are ongoing. Specifically, potential sources of noise from project activities include the following: staging area equipment startup and movement, heavy equipment use to scrape the eastern shore littoral zone and disposal of organic sediments, helicopter usage to apply herbicides along the northern and western lake shores, construction of the weir between East Lake Toho and Lake Runnymede, and operation of the four water pumps during the drawdown period.

At a distance of 50 feet, the overall combined noise estimate generated by use of conventional equipment that would likely be used during weir construction activities and scraping activities is 89 dBA. Noise produced by project activities would decrease with distance at a rate of 6dBA per doubling distance from any of the activity sites (FHWA 2011). For example, at a distance of 50 feet from a typical activity site, the sound level would be 89 dBA, at 100 feet it would be 83 dBA, and at 200 feet it would be 77 dBA. The use of four water pumps to discharge up to 400 cfs of water during the latter stages of the drawdown period would also be expected to produce noise levels in the range of 89 dBA at a distance of 50 feet from the pumps. However, unlike the equipment used for organic sediment removal and disposal, the pumps may operate 24 hours a day, seven days a week, for up to two to three months. If complaints are received from residents regarding the level of noise generated by the operating pumps, FWC has a few choices to mitigate this concern. Dependent on the amount of precipitation received, pumps may only have to be operated during the day time. If significant precipitation is received, additional pump(s) could be added to maintain

the same pumping rates during daylight hours or the drawdown period could be extended. The closest residence to the anticipated location of the pumps is approximately 375 feet (Figure 3-29).

FIGURE 3-29 RESIDENCES NEAR THE ANTICIPATED WATER PUMPS LOCATION

As described in the Affected Environment section, current ambient sound levels typically vary between 40 and 70 dBA. Based on these existing conditions, an increase in noise levels during project implementation exceeding 70 dBA in areas with sensitive noise receptors, would be considered to be of moderate intensity and all noises below 70 dBA would be considered to be of low intensity. The implementation of Alternative A would generally have a low intensity, short-term effect on sensitive noise receptors because of the limited number of sensitive receptors within 500 feet of most project activities. However, for those waterfront residents in the immediate vicinity of the earthmoving equipment and water pumps, (less than 500 feet), they may experience temporary moderate intensity noise levels (see Figure 3-29). Additionally, the frequency of the recreational use of air boats, jet skis and other motorized vehicles generating noise is part of the ambient environment around the periphery of East Lake Toho and is anticipated to be less during the drawdown period.

Long-term effects on sensitive receptors would generally be negligible; although the Project would improve access close to the eastern shore of East Lake Toho, potentially increasing recreational boater use activity in this area.

3.15.2.3 Alternative B

Generally, the direct and indirect effects of selecting Alternative B on sensitive noise receptors would be the same as those described above for Alternative A, although earth moving equipment would not operate for as long a period of time under Alternative B.

3.15.3 Effects Summary

Under either Alternative A or Alternative B, the East Lake Toho Project would result in short-term low intensity effects for most sensitive noise receptors around the periphery of the lake and moderate intensity effects for those residences in the immediate vicinity of earth moving equipment and water pumps, with negligible effects in the long-term. Noise receptors would not be significantly affected by the Project.

3.16 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

The potential impacts that hazardous, toxic, and radioactive waste can have on human health and the environment largely depend on their types, quantities, toxicities, and associated management practices. This section evaluates the potential effects of the use of hazardous materials and the generation of hazardous wastes under each of the alternatives. The specific sites within the project area that have the potential for existing contamination are identified in Section 3.16.1, *Affected Environment*, which also includes a brief summary of the federal and state statutes and implementing regulations regarding hazardous materials and hazardous wastes applicable to the two action alternatives. The potential for proposed activities to be located where there is existing contamination as well as the effects from the use of hazardous materials and the generation of hazardous wastes associated with the alternatives are evaluated and compared in Section 3.16.2, *Direct and Indirect Effects*. The intensity of potential environmental effects from hazardous, toxic, and radioactive wastes was evaluated using the criteria outlined below.

3.16.1 Affected Environment

Federal Statutes and Implementing Regulations

Spill Prevention, Control, and Countermeasures Rule **-** The Spill Prevention, Control, and Countermeasures Rule, promulgated under the CWA, as amended by the Oil Pollution Act, is intended to prevent discharge of oil into navigable waters of the United States or adjoining waterbodies. Facilities subject to the Rule must prepare and implement a plan to prevent any discharge of oil into or upon navigable waters or adjoining shorelines. The plan is called an SPCC Plan.

Resource Conservation and Recovery Act **-** Resource Conservation and Recovery Act (RCRA), as amended, is designed to provide a program for managing and controlling hazardous waste by imposing requirements on generators and transporters of this waste, and on owners and operators of treatment, storage, and disposal facilities. Each treatment, storage, and disposal facility owner or operator is required to have a permit issued by EPA or the state.

Toxic Substances Control Act **-** The Toxic Substances Control Act is intended to protect human health and the environment from toxic chemicals. Section 6 of the Act regulates the use, storage, and disposal of polychlorinated biphenyls (PCBs).

Federal Insecticide, Fungicide, and Rodenticide Act **-** The federal Insecticide, Fungicide, and Rodenticide Act registers and regulates pesticides. FWC uses herbicides only in a limited fashion and under controlled circumstances.

Comprehensive Environmental Response, Compensation, and Liability Act **-** The Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as CERCLA or Superfund) was enacted by Congress on December 11, 1980, to establish prohibitions and requirements concerning closed and abandoned contaminated sites, provide for liability of persons responsible for releases of contamination at these sites, and establish a trust fund to provide for cleanup when no responsible party could be identified.

State of Florida Statutes and Implementing Regulations **-** Florida received authorization from the U.S. EPA in 1985 to administer permitting and enforcement of hazardous waste regulations, superseding the Federal RCRA (FDEP 2018a).

Section 403, Florida Statutes, Sections 403.702 to 403.7893 **-** Florida Statutes, Sections 403.702 to 403.7893 were created to manage all forms of solid waste in the state. It is the law for handling, collection, transportation, responsibility, recycling, processing use for fuel, permitting, ownership, etc. of all types of hazardous and non-hazardous solid wastes (Florida Senate 2018).

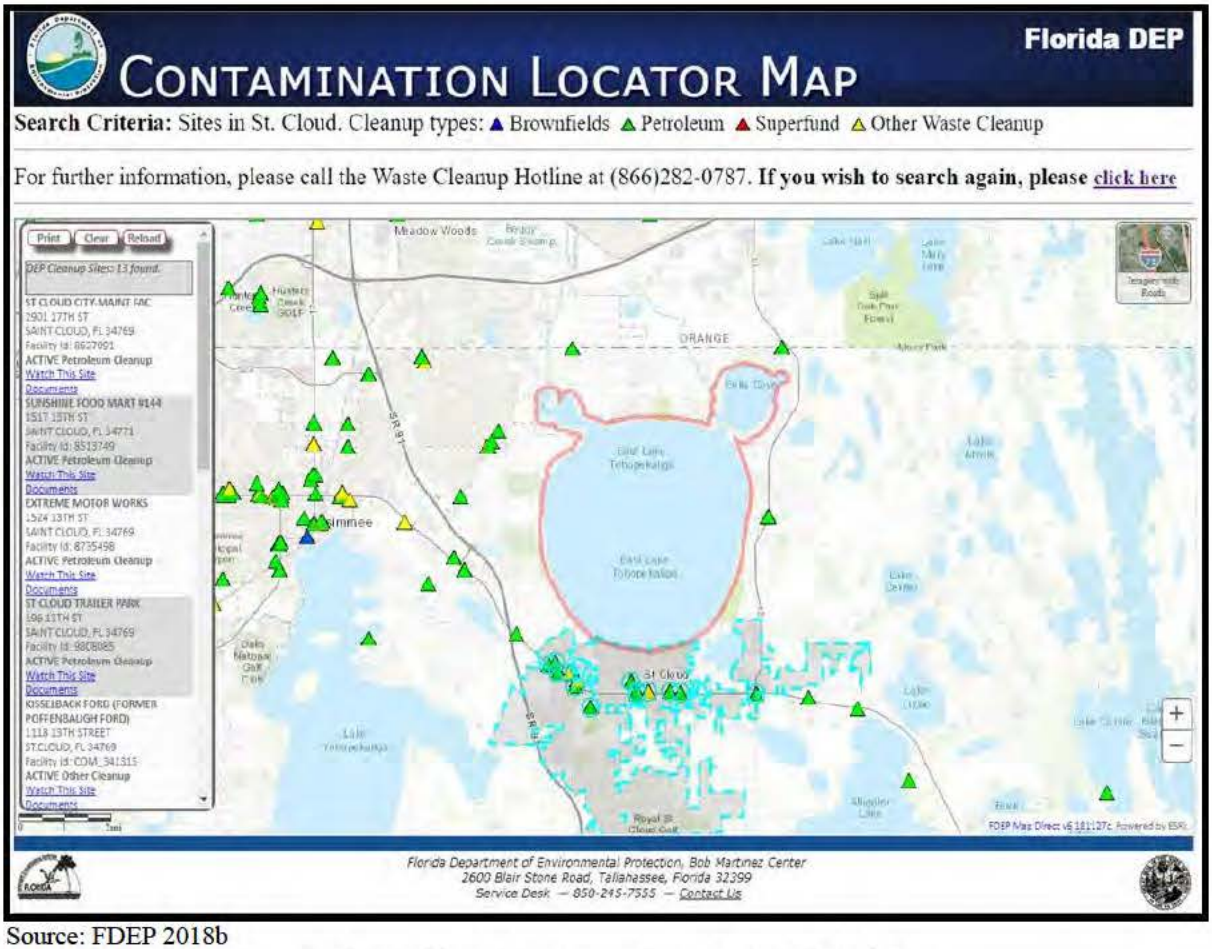
FAC 57-40: Hazardous Materials Safety **-** The Hazardous Materials Safety section of the Florida Administrative Codes (57-40) deals with storage, handling, and testing of all hazardous materials related to space exploration (Dept. of State 2018a).

FAC 62-730: Hazardous Waste - The Hazardous Waste section of the Florida Administrative Codes (62-730) regulates hazardous waste, from identification, permitting, and creation, through transportation and disposal (Dept. of State 2018b).

3.16.1.1 Contaminated Sites within the Area of Analysis under EPA or FDEP Programs

Existing and known contaminated sites within the area of analysis for hazardous, toxic or radioactive waste as listed under EPA or FDEP programs are depicted in Figure 3-30. As can be gleaned from this figure none of the identified sites are within the project area

3.16.1.2 Contaminated Sites within the Area of Analysis under USEPA or FDEP Programs



Source: FDEP 2018b

FIGURE 3-30 CONTAMINATION LOCATOR MAP

3.16.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on hazardous, toxic, and radioactive within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above and the descriptions for the three impact intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	Minor spills below thresholds for reporting to FDEP
Moderate	Spills reportable to FDEP
High	Spills far exceeding reportable quantities to FDEP

3.16.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters (East Lake Toho) of the United States; therefore, drawdown and habitat enhancement of East Lake Toho would not occur. However, under the No-Action Alternative, FWC would continue to occasionally apply herbicides to undesirable aquatic vegetation in the littoral zone, representing an opportunity for fuel spillage from the use of boats.

3.16.2.2 Alternative A

Direct Effects

As described above, Figure 3-30 demonstrates due diligence evidencing an absence of known sites that are within 500 feet of the project area within the USEPA or FDEP environmental programs. However, if areas contaminated with hazardous materials, toxic substances, or petroleum products that may pose an immediate threat to human health or the environment are discovered during project implementation, FWC requires its contractor to notify FWC immediately. FWC contractors must also immediately report to FWC other conditions, such as large dump sites, drums of unknown substances, suspicious odors, or stained soil, if encountered. In these situations, the contractor would not be allowed to disturb such contaminants until FWC notifies the appropriate authorities and appropriate investigations are completed.

Many types of hazardous materials, such as hydraulic fluids, fuels, and lubricants, would be used during implementation of the Project but only in small quantities and for short periods of time, and only small amounts of hazardous waste would be generated. FWC requires its employees and contractors to handle and dispose of hazardous waste in accordance with federal regulations and Florida's Florida Administrative Codes, chapter 62-730.

Accidental release of contaminants during project implementation, such as an inadvertent spill of gasoline, oil, or lubricants when fueling or storing construction equipment, could affect surface water, groundwater, and wetlands located down gradient from the project area. However, an uncontained spill of hazardous materials or hazardous wastes would affect a limited area because the volume of these materials would be relatively small. FWC's contractor would develop and implement an SPCC Plan, which would help ensure that any spill would be cleaned up before it reached any wetlands or waterbodies. Hazardous or toxic materials or hazardous wastes would not be stored for long periods at construction yards. In addition, the implementation of an SPCC Plan would limit potential effects from a spill, if one were to occur.

Potential contaminants, such as oils, hydraulic fluids, and fuels, would not be disposed of within the project area, and all spills would be immediately cleaned up. Contractor workers would be trained prior to starting work in the appropriate procedures for handling and storage of hazardous materials and hazardous wastes. All hazardous materials and hazardous wastes would be properly stored to prevent an accidental release; however, effects on human health and the environment could occur if hazardous or toxic materials or hazardous wastes were to leak from containment vessels, storage containers, or construction vehicles. Accordingly, the effects from hazardous

materials associated with Alternative A would be low intensity in the short term and negligible in the long-term.

The organic sediments in the eastern part of the lake, that would be scraped and disposed in spoil islands, were sampled and analyzed for the presence of certain toxic contaminants. No problematic concentrations of toxic chemicals were discovered (SFEC 2018b).

Indirect Effects

Under Alternative A, no indirect effects from the use of hazardous materials and/or the generation of hazardous waste are expected as a result of project implementation. FWC would conduct all project activities within the project area and would implement BMPs to ensure hazardous materials use and generation of hazardous waste effects would not occur in adjacent areas

3.16.2.3 Alternative B

Generally, the direct and indirect effects of selecting Alternative B, from the release of hazardous, toxic or radioactive waste would be the same as those described above for Alternative A; the only exception is there would be less heavy equipment usage in the scraping of the eastern shore littoral zone and thus less chance for fuel or oil spillage with the implementation of Alternative B.

3.16.3 Effects Summary

Under either Alternative A or alternative B the East Lake Toho Project would necessitate the use of various hazardous materials and generate hazardous wastes. FWC and all personnel associated with the Project would be required to follow applicable federal and state regulations for handling hazardous materials and hazardous wastes. In the event of a release, FWC personnel and its contractors would immediately implement response actions articulated in the applicable SPCC Plan. Consequently, the effects from hazardous, toxic and radioactive waste under either action alternative would be of low intensity in the short term and negligible in the long term. Consequently, the Project would not pose a significant impact from hazardous waste, toxic, or radioactive waste.

3.17 Public Health and Safety

This section evaluates the potential effects of the alternatives on public health and safety within the project area. Existing conditions are described and the consequences of project implementation evaluated. The section ends with an effects summary that makes a determination of the potential significance of project impact on public health and safety.

3.17.1 Affected Environment

Herbicide application to control invasive and nuisance vegetation in conjunction with controlled burns are tools employed by FWC for lake management throughout Florida. The sequence used first involves applying herbicide to the vegetation being treated and letting it dry, then proceeding with the controlled burn. FWC has been using these tools for decades and has developed numerous procedures and protocols to limit public health or safety concerns.

Approximately 200 acres on the northern and western lake shore of East Lake Toho would be sprayed and burned to remove weedy and exotic vegetation, primarily dense cattail, as well as torpedo grass, and limited patches of water primrose. Figure 2-4 depicts the proposed spray and burn areas. A limited amount of organic matter has accumulated in these areas as they were previously scraped during the last drawdown of East Lake Toho conducted in 1990. Invasive plant species would be treated with herbicide, and prescribed burning would be performed.

Even with implementation of applicable safety protocols by FWC, these activities do present certain risks involving potential public health and safety concerns; such as the risk of wild fire, or harmful effects from smoke and particulate matter, and exposure to toxic chemicals.

3.17.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on public health within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, and the descriptions of the three impact intensity levels developed for this Project are described below.

Intensity Level	Description
Low	Implementation of the Project would not rise to a level of concern with regard to public health and safety.
Moderate	Implementation of the Project could adversely affect health and safety; however, the Project would not be implemented in a manner to be a public health or safety concern.
High	Implementation of the Project would increase health and safety hazards to a level high enough to adversely affect public health and safety.

3.17.2.1 No-Action Alternative

Under the No-Action Alternative, FWC would continue to use herbicides to treat undesirable vegetation within the littoral zone of East Lake Toho as part of its ongoing lake management efforts.

3.17.2.2 Alternative A

Herbicide Application - Only herbicides approved by the Florida Department of Agriculture and Consumer Services and EPA would be used to spray undesirable vegetation within the littoral zone. The spraying of herbicides would be conducted by helicopters. FWC would inform the public and adjacent property owners of the days scheduled for herbicide application. Extreme wind conditions (sustained winds greater than ten mph) would require the herbicide treatment to be rescheduled. There would be no restrictions on recreational activities immediately following herbicide application, but FWC would restrict public access within the designated treatment areas during the day(s) of application. There would be a five-day restriction from using the treated water for irrigation of both food crops and ornamentals grown in greenhouses or nurseries. However, under Alternative A, not much water is expected to be contacted by herbicides during treatments, because the water levels would be lowered and leaving only bare ground around most of the cattails. Follow-up treatments within the burned areas would be conducted by airboat, and would affect much smaller areas.

Prior to herbicide application, the FWC project manager would release a news bulletin for public notification with an explanation about the herbicide application including proposed dates of treatment. A map depicting the area to be treated would be posted at all public access points, including fish camps, marinas and other businesses located on the lake. Businesses would be notified in person by FWC staff at least 48 hours prior to treatment. The public would be notified that herbicide treatment would be postponed when sustained winds exceed ten mph.

FWC research has led to strategies that increase herbicide selectivity and reduce overall use. This is accomplished through better understanding of target and non-target plant physiology, evaluating timing and rates of applications, integrating herbicide use with other control methods, and working with industry to register new chemistries, formulations, and use patterns more compatible with current water uses and functions.

Hazards from Burning - Fire and weather can sometimes behave in ways contrary to expectations. Lighting any fire involves a risk that the fire can escape and burn vegetation or property or worse outside of the intended area. Through FWC's long history of applying prescribed fires for land management, techniques for effective prediction and control of fires have been developed, studied, and are taught to today's fire managers. FWC has extensive experience controlling prescribed fires with many experienced fire managers. The standard method for containing controlled burns is through the use of fire lines and black lines. Fire lines are mechanically cleared linear breaks in fuel continuity that are used in conjunction with firing techniques to create a black line and contain a fire. Controlled burns are normally lit on the intended side of a fire line, which is monitored while the fire burns away from it. As the fire burns away from the line, it creates a black line, or area where the fuel has been consumed. This widens the effective break in fuel continuity, thereby

bolstering the function of the fire line. That section would then require less attention, enabling crews to focus on lighting and monitoring the next section of the line. Control of fires within the littoral zone of East Lake Toho would be aided by being inside a lake, which is unlikely to catch fire. Additionally, most of the vegetation in the littoral zone is poor fuel and does not burn easily. Even the cattails proposed to be burned are poor fuel unless they are first treated with herbicide and left to dry.

As described above, FWC would notify the public prior to initiating burn activities on either side of the lake. Smoke and particulate matter, and other health concerns associated with project burning of woody vegetation would be monitored by FWC with the support of the Florida Forest Service and Osceola County.

Overall, the herbicide treatments and controlled burns proposed under Alternative A would represent a short-term low intensity risk to public health and safety and a negligible long-term risk.

Alternative B

Generally, the direct and indirect effects of selecting Alternative B, on public health would be the same as those described above for Alternative A.

3.17.3 Effects Summary

Implementation of either Alternative A or Alternative B would have low intensity environmental effects on public health and safety in the short-term and negligible effects in the long-term. Public health effects, which would include the potential for wild fires and exposure of lakefront residents and boaters to herbicides would not be significant.

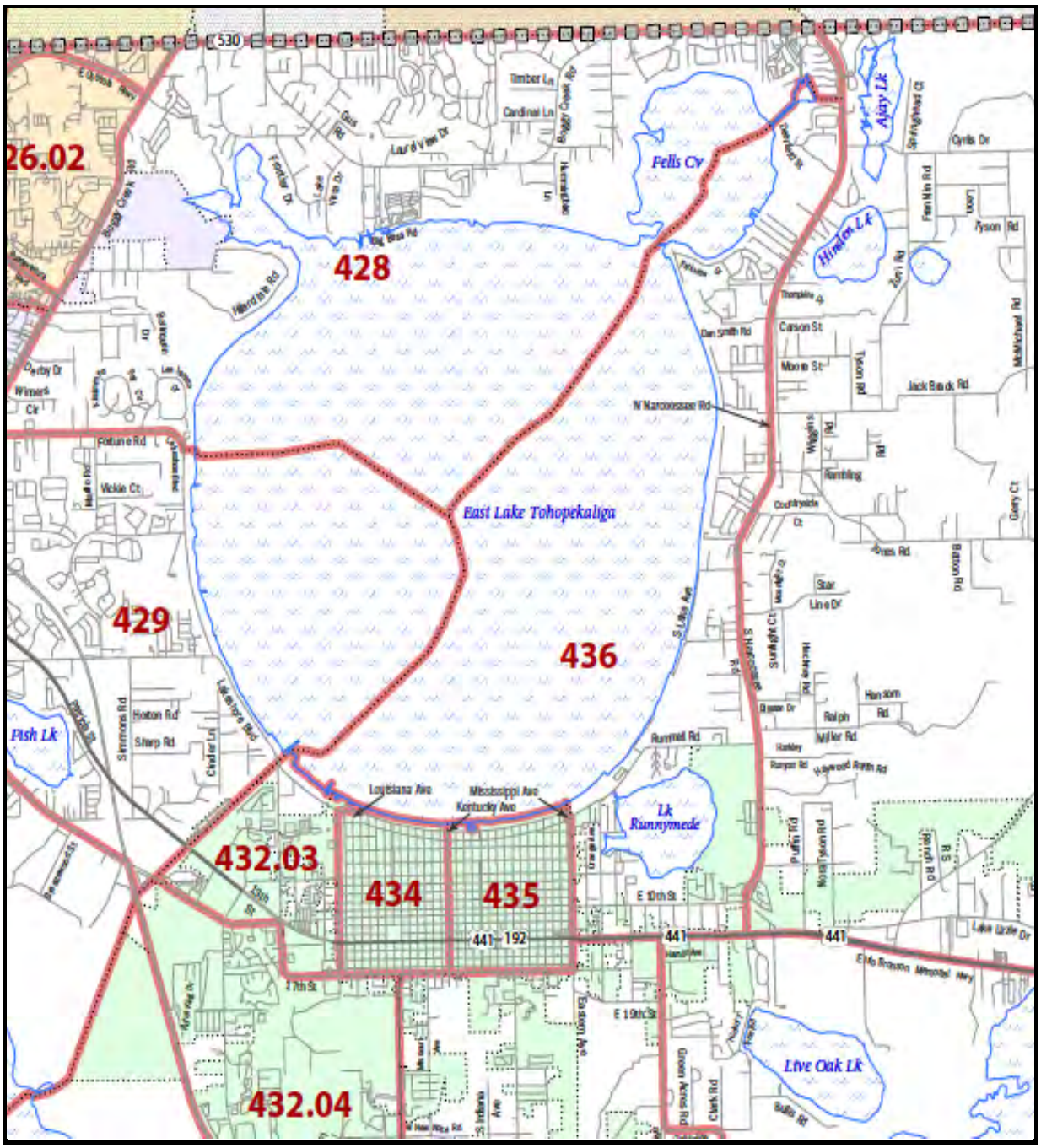
3.18 SOCIOECONOMICS

The Socioeconomic section first describes the baseline socioeconomic profile of the region called the Affected Environment. The second section on direct and indirect effects describes how the proposed Alternative A and Alternative B could impact key resources within the project area compared to the No-Action Alternative. The No-Action Alternative evaluates the impacts associated with not implementing the Project and represents the future without project condition against which Alternatives A and B are compared.

This socioeconomic assessment was conducted consistent with federal statutes and USACE policy. Procedures for estimating NED, Regional Economic Development (RED), and Other Social Effects (OSE) effects are specified in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council 10 May 1983), ER 1105-2-100 (USACE 2000), and other USACE guidance as specified in succeeding sections.

3.18.1 Affected Environment

The project area falls within the East Lake Toho vicinity in Osceola County, Florida. This community is economically linked to the Greater Orlando economy and is socio-economically dependent upon the sustained health and viability of East Lake Toho to support tourism, recreation and a variety of inter-dependent industries. Figure 3-31 is a map of the project area and the immediate census tracts surrounding East Lake Toho. The census tracts profiled include the community areas closest to the littoral zone of East Lake Toho as depicted in other figures in this draft EIS (Figure 2-2), specifically designated segments along the eastern and western lake shorelines. This figure is reproduced, as many of the socioeconomic indicators describing the profile are reported at the tract level. Readers can then orient themselves to the location of these tracts on Figure 3-31. The City of St. Cloud abuts the southern end of East Lake and is represented, predominantly by Census Tracts 432.03/04, 434 and 435.



Source: Census Bureau 2017

FIGURE 3-31 CENSUS TRACTS IN EAST LAKE TOHO VICINITY

Figure 3-31 provides the population levels and average annual population growth rates experienced from 2010 to 2017. The table shows census tracts in closest proximity to East Lake Toho as well as the surrounding community and county. Average annual growth within the Osceola County and the Greater Orlando metropolitan area has been faster than the Florida average in recent years. Average annual growth was 4.4 percent in the City of St. Cloud between 2010 and 2017, and 3.9 percent for Osceola County. The counties surrounding Metro Orlando (i.e., Orange, Lake and

Osceola) registered some of the fastest growth in the state between 2010 and 2017 (BEBR 2018a). One demographic trend has been the population inflow from Puerto Rico since 2005, especially to central Florida; this is a trend that has continued to increase after Hurricane Maria, as families have become more established in Florida (BEBR 2018b).

For the communities surrounding East Lake Toho, Census tracts 428 and 429 representing the western, north-western, and northern lake shore areas have grown the fastest. In addition, Census Tract 432.04 to the south, within the City of St. Cloud, is one of the most populated sub-areas and has grown the fastest in recent years.

TABLE 3-12 POPULATION LEVELS AND AVERAGE ANNUAL GROWTH RATES

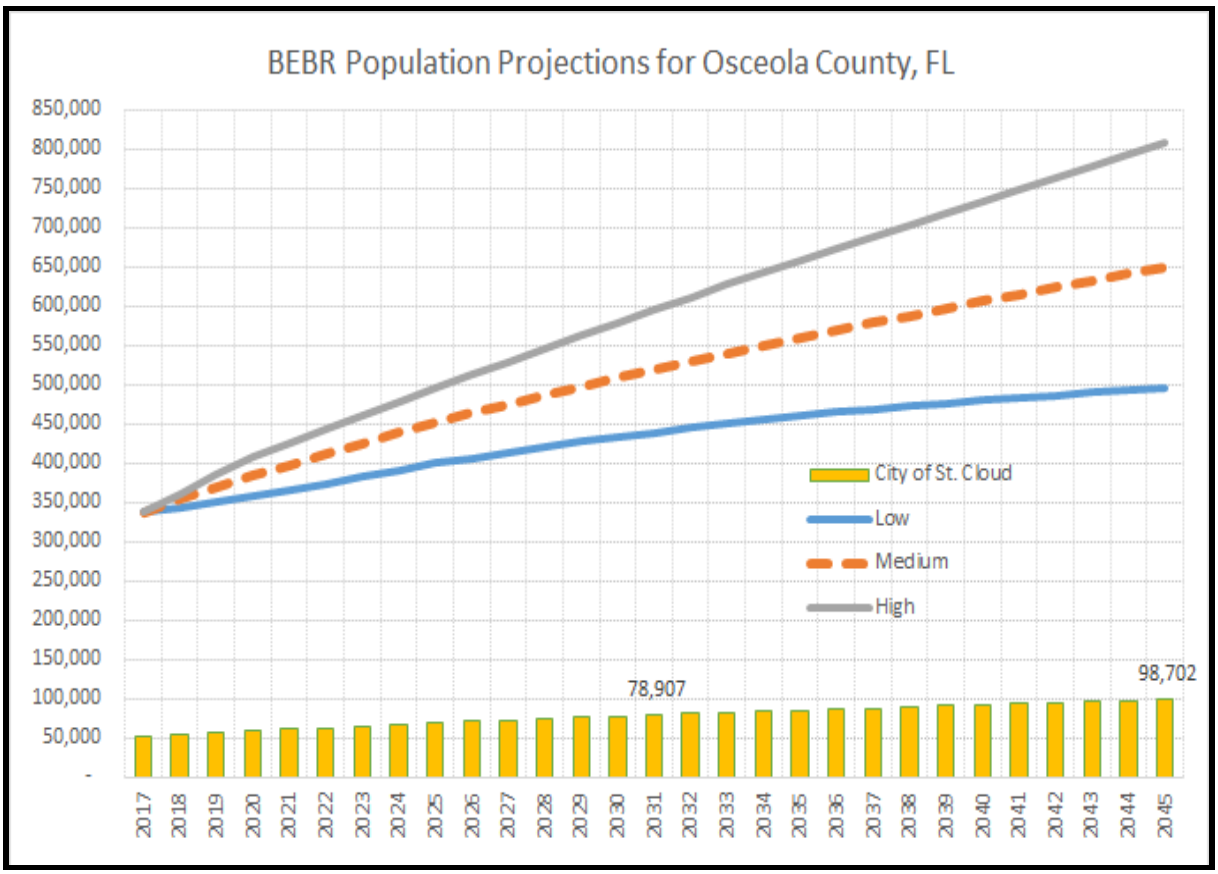
GEOGRAPHY	POPULATION			AVERAGE ANNUAL GROWTH RATES	
	2010	2016	2017	2010-2016	2010-2017
Florida	18,846,461	20,656,589	20,984,400	1.5%	1.5%
Osceola County, Florida	269,852	337,990	352,180	3.8%	3.9%
St. Cloud city, Florida	37,840	48,349	51,282	4.2%	4.4%
East Lake Toho Vicinity Census Tracts					
Census Tract 428	8,917	11,317	11,792	4.1%	4.1%
Census Tract 429	14,789	19,187	19,993	4.4%	4.4%
Census Tract 432.03	4,854	4,707	4,905	-0.5%	0.1%
Census Tract 432.04	12,301	17,710	18,454	6.3%	6.0%
Census Tract 434	4,959	5,392	5,618	1.4%	1.8%
Census Tract 435	4,947	5,145	5,361	0.7%	1.2%
Census Tract 436	6,308	6,645	6,924	0.9%	1.3%
ELT Surrounding Tracts Total	**57,075**	**70,103**	**73,046**	**3.5%**	**3.6%**

Source: Census Bureau 2017

The combined population for the census tracts either directly abutting, or having close access to East Lake Toho is approximately 73,000. The population density varies by census tract and is densest in the tracts that are most mature in their development and that have achieved relative buildout or full capacity development.

The University of Florida Bureau of Business and Economic Research (BEBR) provides projections for Osceola County to calendar year 2045. Using the medium population projection as a base, and a constant population share for the City of St. Cloud, it is estimated that by the year 2031 the city could have a population of at least 79,000 rising to 99,000 by 2045. This growth would be an almost two-fold increase from the 2017 estimated level of 51,000.

Figure 3-32 provides the population projections for Osceola County and the estimates and projections for the City of St. Cloud for the period of 2017 to 2045.



Source: BEBR 2018a

FIGURE 3-32 BEBR POPULATION PROJECTS FOR OSCEOLA COUNTY

Figure 3-32 provides the distribution of households for the years 2010, 2013 and 2016. Under U.S. Census definitions, an occupied housing unit is equivalent to a household. For the Census Tracts abutting East Lake Toho, or within close proximity to it, the combined number of households was 21,418 in 2016 with an average household size of 3.3 persons. For this sub-area, in closest proximity to East Lake Toho, this growth in household formation has been faster, on average, compared to both the state and Osceola County rate of growth since 2013. The City of St. Cloud has been growing at a relatively faster rate than either the county or state.

The immediate project area surrounding East Lake Toho had 21,418 households in 2016. Extrapolating to 2018 by applying average annual growth rates to this level, the number of households is estimated to be approximately 22,500.

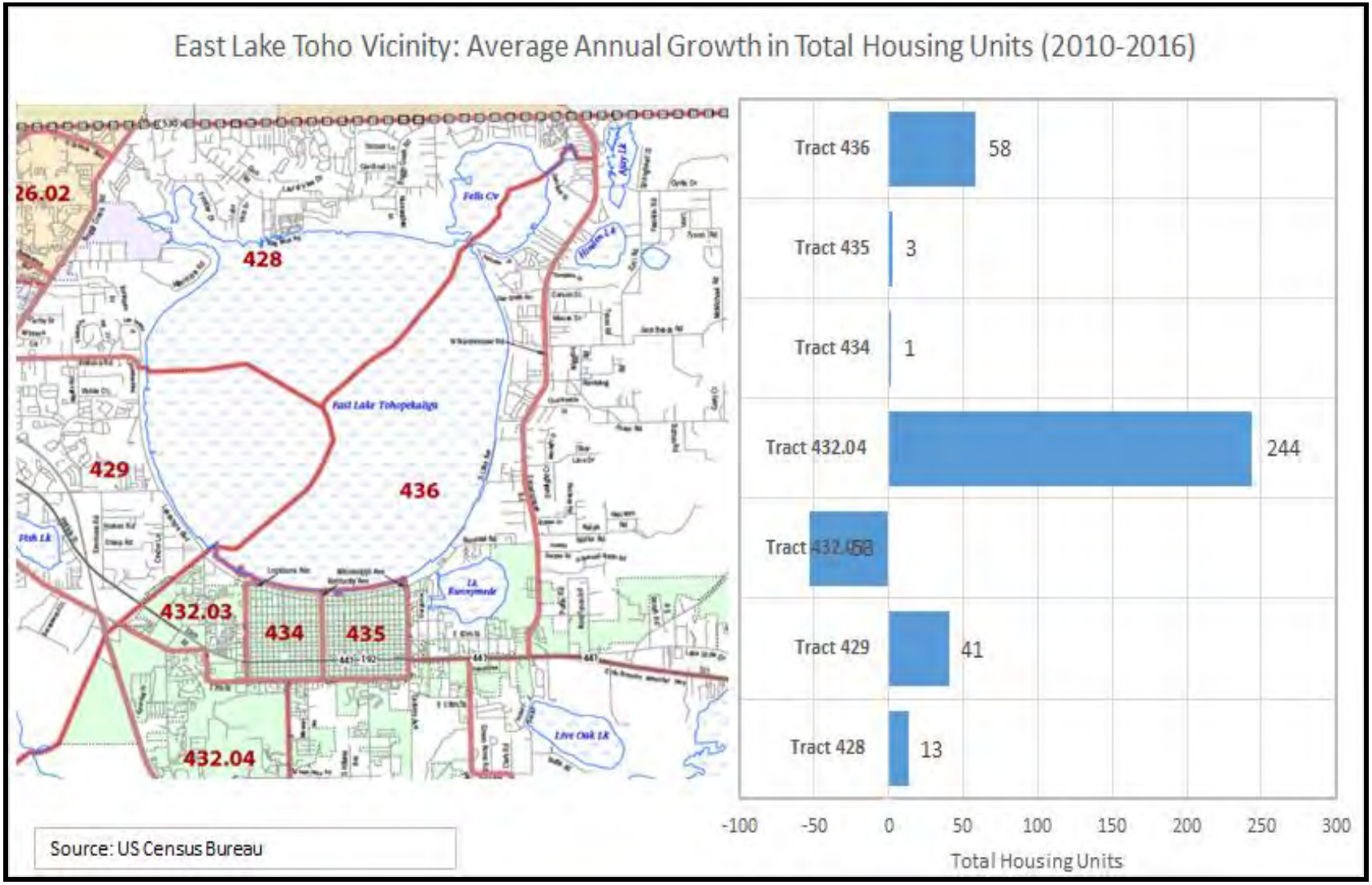
TABLE 3-13 HOUSEHOLDS AND AVERAGE HOUSEHOLD SIZE IN PROJECT AREA

GEOGRAPHY	NUMBER OF HOUSEHOLDS			AVERAGE ANNUAL GROWTH (2013-2016)		AVERAGE HOUSEHOLD SIZE	
	2010	2013	2016	HH Units	CAGR	2010	2016
Florida	7,152,844	7,158,980	7,393,262	78,094	1.1%	2.6	2.8
Osceola County, Florida	92,526	90,413	93,324	970	1.1%	2.9	3.62
St. Cloud city, Florida	12,776	12,886	14,102	405	3.1%	3.0	3.4
East Lake Toho Vicinity Census Tracts							
Census Tract 428	3,197	3,032	3,093	20	0.7%	2.8	3.7
Census Tract 429	5,015	5,059	5,467	136	2.6%	2.9	3.5
Census Tract 432.03	2,020	1,652	1,728	25	1.5%	2.4	2.7
Census Tract 432.04	4,244	4,238	5,075	279	6.2%	2.9	3.5
Census Tract 434	1,938	1,822	1,806	-5	-0.3%	2.6	3.0
Census Tract 435	2,207	1,876	1,961	28	1.5%	2.2	2.6
Census Tract 436	2,219	2,130	2,288	53	2.4%	2.8	2.9
East Lake Toho Surrounding Tracts	20,840	19,809	21,418	536	2.6%	2.7	3.3

Source: Census Bureau 2017
Note: HH Households
CAGR Compound Annual Growth Rate

Figure 3-33 provides the average annual growth in total housing units between 2010 and 2016 for the areas comprising the East Lake Toho shoreline communities and is helpful in determining where most growth pressure has been occurring within the East Lake Toho surrounding environs. The differing growth rates and patterns visible in the total housing units data reflects the built out areas as well as areas where development is ongoing. So for example, Census Tracts 434 and 435 have seen relatively small pockets of redevelopment, while most of the growth in units has been concentrated to the area southwest of East Lake Toho in Census Tract 432.04, to the east in Census Tract 436, and to the west in Census Tract 429.

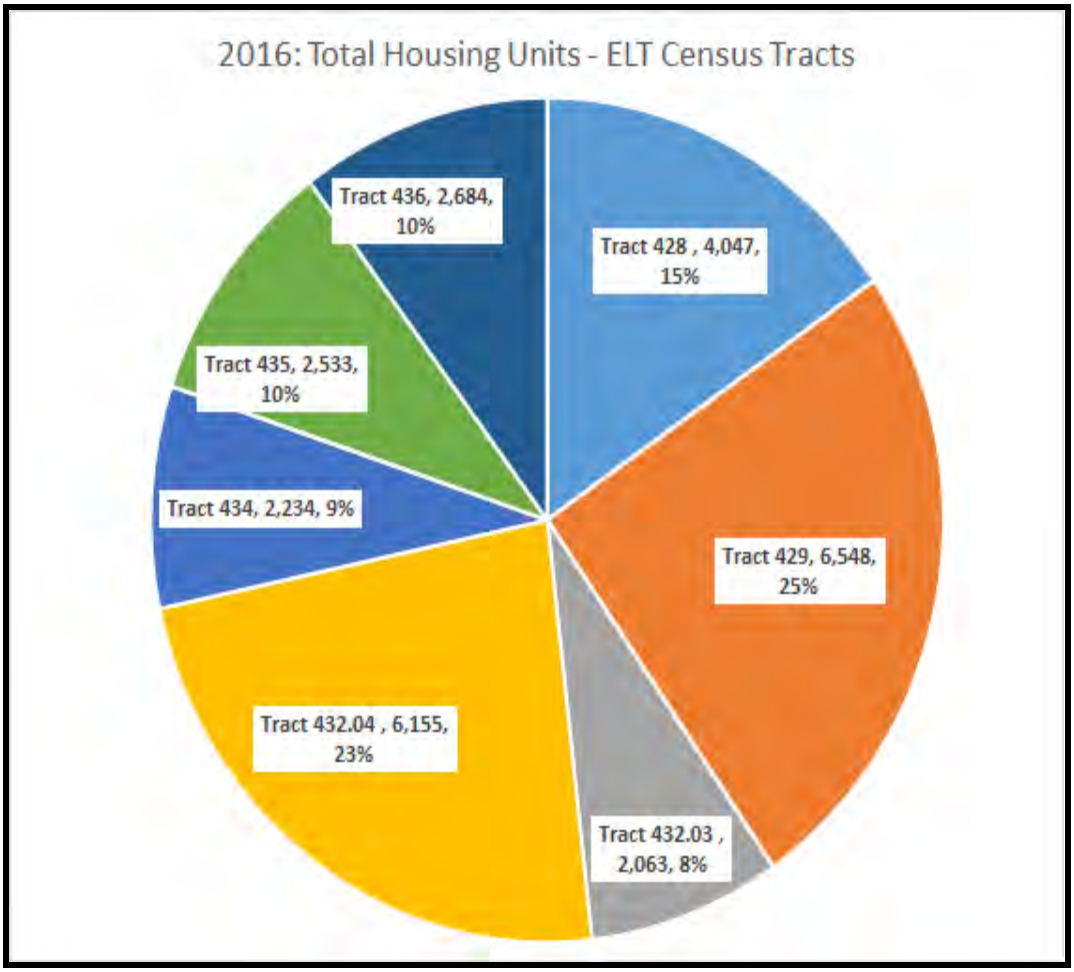
The particular distribution of households within the watershed, their location, and proximity to East Lake Toho is important for stormwater management purposes as new construction and greater upstream additions to impervious surfaces can contribute to stormwater runoff. The additional formation of new households also contributes to greater demand for potable water within the watershed as well.



Source: RECONS 2018

FIGURE 3-33 EAST LAKE TOHO VICINITY AVERAGE ANNUAL GROWTH IN TOTAL HOUSING UNITS

Figure 3-34 provides the distribution of total housing units for the census tracts as depicted in Figure 3-33.



Source: Census Bureau 2017

FIGURE 3-34 2016 TOTAL HOUSING UNITS

In 2016, 26,264 total housing units existed within the combined census tracts abutting East Lake Toho.

According to Zillow Research[5], the median home value in Saint Cloud is $230,800. This region includes the project area for East Lake Toho. Saint Cloud home values have appreciated by 8.8 percent over the past year and Zillow predicts they will rise 7.7 percent within the next year (2019). The median list price per square foot in Saint Cloud is $131, which is lower than the Orlando-Kissimmee-Sanford Metro average of $145. The median price of homes currently listed in Saint Cloud is $269,900 while the median price of homes that sold is $222,700. The median rent price

[5] https://www.zillow.com/research accessed November 2018.

in Saint Cloud is $1,495, which is lower than the Orlando-Kissimmee-Sanford Metro median of $1,550 (Zillow 2018).

Recent job statistics (August 2018) confirm that the central Florida economy has been strong and growing at above average rates of growth across a variety of sectors. The Orlando-Kissimmee-Sanford, Florida, MSA, which covers Osceola County and the project area registered an unemployment rate of 3.4 percent in August of 2018, lower than the state of Florida unemployment rate of 3.7 percent (Dept. of Labor 2018a). The Orlando-Kissimmee-Sanford, Florida, MSA accounts for 13 percent of the state's labor force and the employment breakdown reflects the economic importance of the leisure and hospitality, recreation and tourism sectors (i.e., Disney World and Epcot Center and their suppliers and dependent supporting industries) as well as relatively larger shares of professional and business services employment and trade and transportation. In addition, the region is host to major colleges and universities including the University of Central Florida, Stetson University and Rollins College among others.

TABLE 3-14 EMPLOYMENT PROFILE OF ORLANDO-KISSIMMEE-SANFORD, FLORIDA, MSA

NUMBER OF JOBS IN '000S, NSA[1]	2018 AUGUST	% OF TOTAL	Y/Y % CHG.
Total Non-farm	1,298.70	100.0%	4.1%
Mining and Logging	0.3	0.02%	0.0%
Construction	83.4	6.4%	11.5%
Manufacturing	48.9	3.8%	9.2%
Trade, Transportation, and Utilities	236.6	18.2%	1.8%
Information	24	1.8%	0.0%
Financial Activities	76.9	5.9%	3.1%
Professional and Business Services	227.9	17.5%	5.1%
Education and Health Services	158.1	12.2%	4.0%
Leisure and Hospitality	269.9	20.8%	4.8%
Other Services	46.8	3.6%	6.8%
Government	125.9	9.7%	0.2%

[1] NSA non-seasonally adjusted
Source: Dept. of Labor 2018a

Table 3-14 provides a breakdown of employment by sector for non-farm payroll jobs. Recent job growth has been particularly strong in construction, manufacturing, other services and leisure and hospitality. (U.S. Department of Labor 2018a).

Osceola County is an important agricultural producer. The 2012 Florida Census of Agriculture confirmed that Osceola County had 95,881 head of cattle and calves and ranked third in the state for cattle rearing and production. The value of cattle and calve sales was $39 million. Osceola County is also an important producer of sod, ranking third in the state, and harvested close to 7,000 acres in 2012 (Agriculture Census 2012).

Table 3-14 provides a breakdown of per capita, median household income, and the percent of households in the project area with incomes below the poverty line. In the East Lake Toho

shoreline vicinity there is wide variation in incomes. On the eastern shore, Census Tract 436 is comprised of households with a higher per capita median household income. Compared to this area are communities with incomes below the county and state averages, as well as relatively higher rates of persons classified as living below the poverty line (i.e., Census Tracts 434 and 435).

TABLE 3-15 INCOME CHARACTERISTICS OF THE PROJECT AREA

GEOGRAPHIC UNIT	PER CAPITA INCOME	MEDIAN HOUSEHOLD INCOME	PERSONS BELOW POVERTY LINE
Florida	$28,621	$50,860	14.7%
Osceola County, Florida	$20,074	$51,436	14.8%
St. Cloud City, Florida	$21,385	$50,646	16.0%
Census Tract 428	$21,868	$58,711	16.9%
Census Tract 429	$15,931	$43,750	17.0%
Census Tract 432.03	$21,048	$38,421	17.1%
Census Tract 432.04	$22,325	$59,521	16.0%
Census Tract 434	$17,536	$39,625	28.7%
Census Tract 435	$19,347	$37,803	21.3%
Census Tract 436	$25,089	$59,274	12.0%

Source: Census Bureau 2017

Recreational uses that are popular on East Lake Toho include fishing, boating, water-skiing, jet skiing, boat racing, sightseeing, air boat rides, kayaking, and ecotourism. The recreational aspect of the project area economy is discussed in Section 3.10 *Recreation*.

3.18.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and Alternative A and Alternative B on socioeconomic resources within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, above and the descriptions of impact intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	A few individuals, groups, businesses, properties or institutions would be affected. Impacts would be minor and limited to a small geographic area. These impacts are not expected to substantively alter social and/or economic conditions either beneficially or adversely.
Moderate	Many individuals, groups, businesses, properties or institutions would be affected. Impacts would be readily apparent and detectable across a wider geographic area and could have a noticeable effect on social and/or economic conditions either beneficially or adversely.
High	A large number of individuals, groups, businesses, properties or institutions would be affected. Impacts would be readily detectable and observed, extend to a wider geographic area, possibly regionally, and would have a substantial influence on social and/or economic conditions either beneficially or adversely.

3.18.2.1 No-Action Alternative

The No-Action Alternative evaluates the impacts associated with not implementing the Project and is assessed over time based on the future without project (FWOP) condition against which alternatives considered in detail are compared. This analysis provides a benchmark, enabling decision makers to compare the magnitude of environmental and socioeconomic effects of implementing a Proposed Action.

Under the No-Action Alternative, the drawdown and habitat enhancement of East Lake Toho would not occur. In general, in the short-term, the absence of this ecological enhancement Project would have a low impact on socioeconomic resources. Over the longer term, however, as the habitats, ecological conditions, linked species/fish food organisms, and lake water quality deteriorates, the dependent socioeconomic resources would likely become compromised as continued stress impeded normal functioning and growth. At stake over the long-term is the East Lake Toho carrying capacity, and the continued ability to provide ecosystem service flows that sustain the dependent socioeconomic resources within the central Florida economy.

3.18.2.2 Alternative A

Table 3-16 provides a preliminary breakdown of the total project cost elements by phase. Preconstruction, engineering and design activities would consist of pre-construction fish monitoring, snail monitoring, and snail kite monitoring that would last for two years. The fish monitoring would be performed by FWC internally, while the snail and snail kite monitoring would be conducted by the University of Florida. The EIS work is being completed under a third-party consultant agreement. The PED costs would include the estimated costs for the NEPA EIS preparation and permitting work.

TABLE 3-16 ALTERNATIVE A PROJECT COSTS BY PHASE AND TYPE

		2018 US$	% OF TOTAL
I.	**Preconstruction, Engineering, and Design**		
a.	Pre-construction fish monitoring (2 years)	$20,000	0.8%
b.	Pre-construction snail kite monitoring (2 years)	$82,000	3.2%
c.	Pre-construction snail monitoring (2 years)	$100,000	3.9%
d.	East Lake Toho sediment analysis study	$95,000	3.7%
e.	Environmental Impact Statement	$260,000	10.0%
	Subtotal:	$557,000	21.5%
II.	**Construction**		
a.	East Lake Toho drawdown and habitat enhancement detailed design	$50,000	1.9%
b.	East Lake Toho east shore scrape of approximately 120 acres and disposal of organic matter via 2 spoil islands	$600,000	23.2%
c.	Drawdown via use of 4 pumps with capacity of 400cfs	$800,000	30.9%
d.	Weir construction in canal between East Lake Toho and Lake Runnymede	$35,000	1.4%
e.	Hydro seeding East Lake Toho east shore scrape area (approximately 5 acres)	$5,000	0.2%
f.	Spray and burn vegetation on East Lake Toho western shore (approximately 300 acres)	$3,000	0.1%
	subtotal:	$1,493,000	57.6%
III.	**Post Construction Activities**		
a.	Post-construction fish monitoring (2 years)	$20,000	0.8%
b.	Post-construction snail kite monitoring (2 years)	$82,000	3.2%
c.	Post-construction snail monitoring (2 years)	100000	3.9%
	subtotal:	$202,000	7.8%
	Base Cost:	$2,252,000	87.0%
	Contingency (15% of Base Costs)	$337,800	13.0%
	Total Cost:	**$2,589,800**	100.0%

Source: FWC 2018

Construction costs as a group would consist of the drawdown and habitat enhancement activities which include East Lake Toho drawdown, littoral shore scraping, and creation of two spoil islands for disposal of organic sediments. In addition, these costs include weir construction between East Lake and Lake Runnymede and hydro seeding of the eastern shore scraped area. Cost estimates include spray and burn activities on the western shore.

Table 3-17 provides the calculation of average annual costs per USACE Guidelines. The guidelines relate to how NED costs are calculated and presented to decision makers charged with evaluating alternative plans. To calculate interest during construction (a component of total project costs) and to convert current and future costs to their annual worth equivalents, the Federal Discount Rate for Fiscal Year 2018 that is used in Project Evaluation and Formulation, of 2.750 percent was applied. The standard project evaluation time horizon of fifty years was used to calculate the total average annual costs shown in Table 3-17 (USACE 2018).

TABLE 3-17 EAST LAKE TOHO PROJECT AVERAGE ANNUAL COSTS

COST ELEMENT	NO-ACTION	ALT A	ALT B
Preconstruction Engineering Design	00	$640,550	$640,550
Construction Costs	00	$1,716,950	$1,716,950
Construction Period (Months)	00	6	6
Interest During Construction	00	$32,416	$32,416
Total First Costs	00	$2,389,922	$2,389,922
Average Annual Costs, n = 50, j =2.75%	00	$88,525	$88,525
Post Construction Activities	00	$232,300	$232,300
Total Average Annual Costs	00	$97,130	$97,130

Source: Louis Berger 2018
Note: Average annual costs @2.750% (US$), 50 Year Project Life

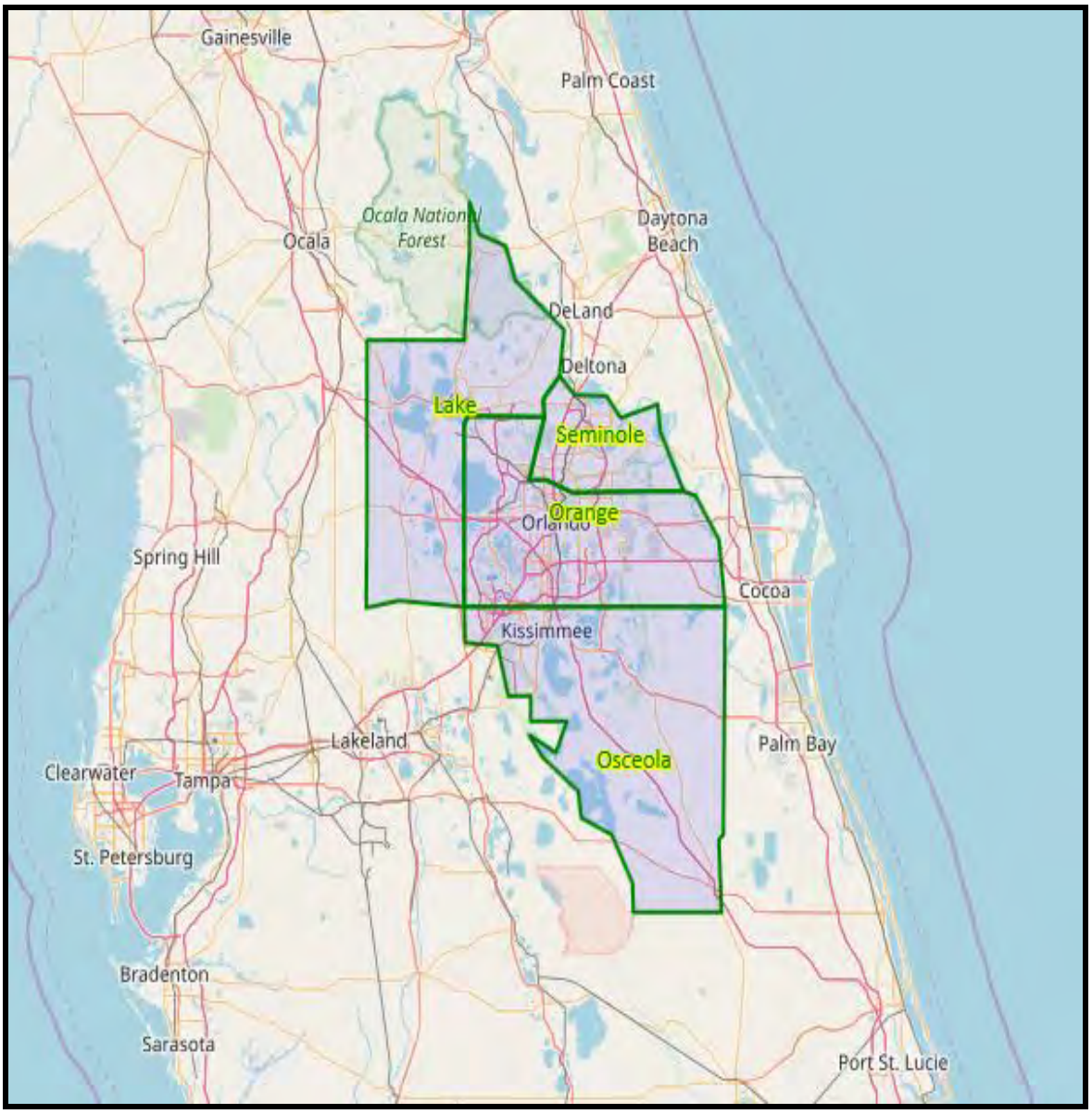
Regional Economic Development Account - The RED account registers changes in the distribution of regional economic activity resulting from each alternative plan. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output and population (USACE 2011).

To assess the RED impacts within the socioeconomic analysis area, the USACE Institute for Water Resources (IWR's) updated Regional Economic System (RECONS) modeling tool was applied. The RECONS tool is an approved certified application used by USACE planners to evaluate RED impacts. The RECONS modeling tool provides estimates of jobs and other economic impact measures such as labor income, value added, and output (sales) that are supported by USACE programs, projects, and activities. The RECONS modeling tool automates calculations and generates estimates of jobs, labor income, value added, and sales using IMPLAN®'s (Impact Analysis for Planning Inc.) multipliers and ratios, customized impact areas for USACE project locations, and customized spending profiles for USACE projects, business lines, and work activities. RECONS allows USACE to evaluate the regional economic impacts and contributions associated with USACE expenditures, activities, and infrastructure.

The RECONS modeling approach applied for this Project was to estimate the economic impacts for the three main phases of the Project separately, that are outlined in the project cost, Table 3-16 above. Therefore, the direct project expenditures associated with PED activities were modeled as separate spending profiles that accounted for the timing of these activities, when they occurred per each project phase, and the particular types of spending activities related to fish monitoring, snail kite monitoring, snail monitoring, analysis of sediments, EIS and feasibility design related tasks. The first phase PED activities, were followed by a separate RECONS modeling run for the second phase construction related activities. The construction phase activities listed in Table 3-16 above, reflected a different set of spending profiles related to East Lake Toho drawdown, shore scraping, dredging and organic sediment removal, spoil island creation, drawdown, weir creation, hydro-seeding and spray and burn vegetation activities. Post construction monitoring activities were the third phase of economic impacts to be modeled. These latter impacts were modeled over a two-year post construction period. The results table below make this process clearer and show how each phase results in a particular

magnitude of economic impacts over a three to four year period, both cumulatively, and for individual years.

Given the scope of analysis, the Orlando-Kissimmee-Sanford, Florida, MSA region, was selected as the local region that would be most relevant for the RECONS modeling economic impact estimates. Most of the resources (for PED, construction, and post-construction activities) would be mobilized from within this area, and project phase expenditures would subsequently directly, and indirectly impact the central Florida MSA regional economy. The counties included within this region include Lake, Orange, Osceola, and Seminole. RECONS modeling also estimates the economic impacts from the three project phases for Florida and the United States. Figure 3-35 shows the central Florida impact region.



Source: Louis Berger 2018

FIGURE 3-35 EAST LAKE TOHO LOCAL ECONOMIC IMPACT REGION

The direct expenditures associated with the East Lake Toho Drawdown and Habitat Enhancement - Customized Impact Area and Work Activities within the Orlando-Kissimmee-Sanford, Florida, MSA, are estimated to be $2,589,800. Of this total expenditure, Table 3-18 shows that $2,048,000 would be captured within the local impact area. The remainder of the expenditures would be captured within the state impact area and the nation.

TABLE 3-18 TOTAL ECONOMIC IMPACTS*

	ECONOMIC IMPACT REGIONS		
Output, ($000)	**Local**	**State**	**US**
Direct Impact	$2,048	$2,052	$2,476
Secondary Impact	$923	$1,133	$2,774
Total Impact	$2,971	$3,185	$5,251
Jobs[b]	**Local**	**State**	**US**
Direct Impact	10.7	12.9	15.2
Secondary Impact	5.8	6.8	13.8
Total Impact	16.5	19.7	28.9
Labor Income ($000)	**Local**	**State**	**US**
Direct Impact	$539	$567	$796
Secondary Impact	$305	$356	$857
Total Impact	$844	$923	$1,652
Value Added ($000)	**Local**	**State**	**US**
Direct Impact	$1,090	$1,104	$1,273
Secondary Impact	$532	$616	$1,455
Total Impact	$1,622	$1,720	$2,728

Source: USACE RECONS 2018
Notes:
/a Phases combined are PED, Construction and post construction activities
/b Jobs are presented in full-time equivalent (FTE)
*spanning an estimated 3-4 year period

These direct expenditures would generate additional economic activity, often called secondary or multiplier effects. The direct and secondary impacts are measured in output (sales), jobs, labor income, and gross regional product (value added) as summarized in the following tables. Direct economic impacts are generated from the initial project contractual related spending and sub-contracts. This first round of spending would stimulate spending among suppliers and other vendors who are linked to the first round of spending. These indirect economic impacts are part of the secondary impacts displayed in Table 3-18. In addition, wages received directly, and across industries indirectly impacted (linked to direct spending) across the supply chain would be spent by households as consumer spending. These impacts are called induced effects and are part of the secondary impacts. Direct plus secondary impacts equal the total economic impacts attributable to the Project. The regional economic effects are shown for the local, state, and national impact areas.

In summary, the direct local project expenditures ($2,589,800) support a total of 10.7 full-time equivalent (FTE) jobs, $539,000 in labor income, $1,090,000 in the gross regional product, and $2,048,000 in economic output in the local impact area. More broadly, these direct expenditures support 15.2 FTE jobs, generating $796,000 in labor income, $1,273,000 in the gross regional product, and $2,476,000 in economic output in the nation.

The intensity of RED impacts for Alternative A during the PED, construction and post-construction project phases are classified as low intensity. A small number of FTE jobs would

be supported by each phase, whose durations are temporary and limited to a few years cumulatively. Drawdown and construction activities, including spoil island creation, would most likely be completed within a year, while pre and post construction monitoring activities are designated for two years each, respectively.

In terms of relative economic impacts on the Orlando-Kissimmee-Sanford, Florida, MSA, attributable to total output (sales), value added and labor income, the effects are also low. To place the economic impacts shown in Table 3-18 in perspective the following comparisons in Table 3-19 are noted.

TABLE 3-19 RELATIVE ECONOMIC IMPACTS FROM PROJECT RED EFFECTS

TOTAL IMPACTS	PROJECT AREA IMPACTS	ORLANDO MSA TOTAL VALUES	PROJECT AREA % OF TOTAL VALUES
Labor Income	$844,000	$65,877,000,000	0.001%
Value Added	$1,622,000	$119,372,000,000	0.001%
Employment	16.5	1,473,572	0.001%

Source: Louis Berger 2018

The RED activities from the Project are expected to have a low intensity, beneficial, short-term effect on the central Florida regional economy.

Table 3-20 provides the breakdown of economic impacts by project phase. The first part of each table section provides the distribution of total output, jobs, labor income and value added by impact region and by project/phase or year. The majority of the impacts would occur in the construction phase. The second part of each table section shows the distribution of total local impact, divided between direct and secondary impacts by project phase.

TABLE 3-20 RED ECONOMIC IMPACTS BY PROJECT PHASE/YEAR

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
PHASE==>	PED	PED/ CONSTRUCTION	POST CONSTRUCTION	POST CONSTRUCTION	SUM OF YEARS
Total Output In Thousand Dollar Increments by Impact Region and Project Phase/Year					
Local	$469	$2,162	$170	$170	$2,971
State	$513	$2,300	$186	$186	$3,185
US	$761	$3,938	$276	$276	$5,251
Local Output In Thousand Dollar Increments by Direct/Indirect Impact and Project Phase/Year					
Direct Impact	$315	$1,506	$114	$114	$2,048
Secondary Impact	$155	$657	$56	$56	$923
Total Impact	$469	$2,162	$170	$170	$2,971
Total Jobs (FTE) by Impact Region and Project Phase/Year					
Local	3.9	9.8	1.4	1.4	16.5
State	4.9	11.4	1.8	1.8	19.7
US	6.3	18.2	2.3	2.3	28.9
Local Jobs (FTE) by Direct/Indirect Impact and Project Phase/Year					
Direct Impact	3.0	5.6	1.1	1.1	10.7
Secondary Impact	0.9	4.2	0.4	0.4	5.8
Total Impact	3.9	9.8	1.4	1.4	16.5
Labor Income ($000) by Impact Region and Project Phase/Year					
Local	$181	$533	$66	$66	$844
State	$191	$595	$69	$69	$923
US	$315	$1,110	$114	$114	$1,652
Local Labor Income by Direct/Indirect Impact and Project Phase/Year					
Direct Impact	$131	$313	$48	$48	$539
Secondary Impact	$50	$220	$18	$18	$305
Total Impact	$181	$533	$66	$66	$844
Total Value Added by Impact Region and Project Phase/Year					
Local	$356	$1,008	$129	$129	$1,622
State	$373	$1,078	$135	$135	$1,720
US	$501	$1,864.50	$182	$182	$2,728
Local Value Added by Direct/Indirect Impact and Project Phase/Year					
Direct Impact	$268	$628	$97	$97	$1,090
Secondary Impact	$88	$380	$32	$32	$532
Total Impact	$356	$1,008	$129	$129	$1,622

Source: Louis Berger 2018

National Economic Development Account - The NED impacts for Alternative A and Alternative B were evaluated by referencing guidance contained within ER 1105-2-100, 22 Apr 2000, Appendix E, Civil Works Missions and Evaluation Procedures (USACE 2000). The NED account describes that part of the NEPA environment that identifies beneficial and adverse effects on the economy. NED beneficial effects are increases in the value of the national output of goods and services from an alternative plan. Benefits that arise from project alternatives are measured in terms of willingness to pay (WTP). NED adverse effects are the opportunity costs of resources used in implementing an alternative plan (USACE 1983). The NED account effects are also described using intensity and duration definitions from Section 3.1.

The following discussion of anticipated effects for Alternative A is largely based on impacts to recreational resources which is analyzed in greater detail in Section 3.10 Recreation, and summarized here.

Lakeside Business Establishments and Resident Recreational Users Anticipated Impacts - In the short term, during the drawdown phase, some lakeside businesses with boat launches and floating docks may experience a temporary inconvenience as water levels are reduced. In addition, it is possible that patronage could impact sales revenues at some lake access dependent businesses such as fish camps and charter boat and East Lake Toho guide services. Over the long-term, post project completion, water levels would return to normal steady state seasonal levels. Boat access would not be adversely impacted but some channel area passages may actually improve and provide for improved access after project activities are completed.

Boat Ramps - Boat ramps would be affected by the drawdown and this could impact the ability to launch boats, and potentially the number of boat excursions and trip access over the drawdown period. East Lake Toho users who are dependent on boat ramps would access other boat ramps for other lakes in the vicinity of East Lake Toho, during the drawdown period. Therefore, the availability of substitute locations may mitigate some of the recreational impacts but may result in higher travel/transportation costs for some resident and area users who were primarily recreating on East Lake Toho. As water levels return to steady state seasonal levels, post drawdown, boat ramps would provide for improved access to East Lake Toho. Maintaining facilitated public access during the East Lake Toho drawdown and construction phase would reduce the magnitude of the low intensity, short-term, adverse economic impacts anticipated to recreational users and recreational value.

Beach Distance to Water Line - During the East Lake Toho drawdown and construction phase, at lower lake levels, sandy public beach designated areas may now be located further away from the water's edge, and mud flats may be exposed between the sand and the water. This effect may potentially discourage swimming and other beach activities for a short-term period. These changes are anticipated to have a low intensity, adverse, temporary effect on beach usage and may contribute to decreased visitor use at the designated beach recreation areas on East Lake Toho. However, post construction, there would be no adverse effects as water levels would return to steady state conditions.

Property Values and Viewshed Effects - It is anticipated that some shoreline area residents and business establishments with views of both the littoral zone and shoreline, where scraping and burning activities would occur, may experience negative impacts for a short period. Lake views could be impacted by scraping, dredging and burning activities as well as the new construction of the in-lake islands. These impacts would affect residents and businesses that are closest to the approximately 300 acre western shore littoral zone area over which these remedial activities would be conducted. Given the short-term nature of these activities, they are unlikely to have a permanent adverse impact on area property values.

Over the longer term, research results are available that have assessed the impact of improved lake conditions, notably water quality (measured by clarity) on property values for adjacent and lakeside residents. The research has examined the effects that indicators such as improved water quality, clarity and reduced turbidity have on area residential property values, measured by varying distances to East Lake Toho. Improved water quality generally raised property values for shoreline accessible residences, with greater increases in value observed at closer distances (FL Realtors 2015; Benson et. al. 1998). As the new islands mature, and vegetation is established, they will likely evolve into communities that host more wildlife and then transition to established in-lake amenities that enhance viewsheds, and wildlife and bird watching opportunities for residents and visitors.

Sport Fishing, Bass Fishery and Other Forms of Recreation - Over the longer term, the Project would enhance habitat and improve conditions in East Lake Toho and environmental inputs for ecosystems that support fisheries. It is anticipated that improved habitats for fish and wildlife would improve the quality of the recreational experience and not result in a material increase in the quantity or frequency of recreational usage. Therefore under Alternative A, it is expected that an increase in the daily utility (benefit value) for recreational resident and tourist users of East Lake Toho would occur. The increase in average daily recreational utility is anticipated to occur post project completion, and after a gestation/maturation period, that allows for stressed natural communities to resume their normal growth and functioning. Increases in marginal utility per recreational trip or day can be translated into an increase in willingness to pay or consumer surplus per user.

Recreational Value Anticipated using the Unit Day Value Method - Recreation is not the primary purpose of the project alternative(s), but it is inextricably linked to the health and functioning of the natural resource base of East Lake Toho. Ecological restoration and enhancement directly and indirectly supports an improved recreational experience on East Lake Toho. For example, a significant number of households engage in wildlife viewing (i.e., over 50 percent of the households in census tracts abutting East Lake Toho). However, it is likely that during project construction activities there would be a short-term moderate intensity adverse impact upon these shoreline and lake dependent activities. However, these households have other recreational outlet areas available that would allow them to continue to engage in these activities that would moderate or dampen the anticipated, short-term adverse impacts.

Over the longer term, it is likely that lake conditions would improve the quality of the recreational experience for East Lake Toho recreational users. This improvement is expected

to result in an increase in willingness to pay or consumer surplus per capita. It is expected that recreational usage of the East Lake Toho would fall slightly during project implementation, but return to normal average and steady state growth levels once construction is completed, and after restoration/enhancement efforts have had time to grow and mature. Over the longer term, it is anticipated that that the value of recreational benefits would increase based on an increase in the willingness to pay (increase in consumer surplus per recreation day or trip) for these resources as East Lake Toho environmental conditions improve. Therefore over a 50-year project evaluation period, it is expected that cumulative net incremental recreational benefit values (the difference between the Future With and the Future without Alternatives) would result in a positive increase in the value of the NED account.

Other Social Effects Account **-** The OSE account allows for the inclusion and integration into water resource planning alternatives, of effects that are not captured by the other accounts. The categories of effects relate to social impacts that may not be captured elsewhere and include urban and community impacts; life, health and safety factors, displacement, long-term productivity, fiscal impacts, and energy requirements and conservation.

Given the rapid population growth and development experienced within the central Florida region in recent years, the environmental quality of lake resources will continue to be under development pressure from stressors. The East Lake Toho drawdown and habitat enhancement Project can serve to sustain the quality of these resources such that future generations can continue to use and enjoy them in an unfettered, and uncompromised manner. Addressing impacts to environmental quality, such as habitat and water quality are necessary to sustain the long-term productivity of the East Lake Toho natural resources which contribute to the vitality of the economy and which also serve to attract essential outside tourism. The generation of sales taxes from tourism are an important budget element that Florida counties rely on to maintain fiscal health, and to supplement property taxes and intergovernmental transfers.

3.18.2.3 Alternative B

The direct and indirect effects of selecting and implementing Alternative B on socioeconomics would be the same as those described above for Alternative A.

3.18.3 Effects Summary

The cost estimated for implementation of either Alternative A or Alternative B is $2.6 million over a multi-year period. This cost includes all PED activities (e.g., East Lake Toho drawdown, weir construction, sediment removal, littoral zone scraping, vegetation burning and spraying, and two years of post-construction monitoring). The annual average cost of these resources, expressed in annual present worth equivalents by applying a 2.750 percent discount rate over a 50-year project life, is $97,130.

The RED account registers changes in the distribution of regional economic activity resulting in the implementation of either Alternative A or Alternative B. The direct expenditures associated with the drawdown and construction phase within the Orlando-Kissimmee-Sanford, Florida, MSA, are estimated to be $2,589,800. Of this total expenditure, $2,048,000 would be

captured within the local impact area regional economy of Orlando-Kissimmee-Sanford, MSA. The remainder of the expenditures would be captured within the state of Florida impact area and the nation. The direct local project expenditures ($2,589,800) support a total of 10.7 FTE jobs, $539,000 in labor income, $1,090,000 in the value added, and $2,048,000 in economic output within the Orlando-Kissimmee-Sanford, Florida, MSA. More broadly, these direct expenditures support 15.2 FTE jobs, generating $796,000 in labor income, $1,273,000 in gross regional product, and $2,476,000 in economic output to the nation.

The NED account effects can be summarized as follows. The East Lake Toho drawdown and construction phase would have a low intensity, short-term adverse impact on lakeside businesses that depend on water levels to provide boating, airboat rides and lake dependent excursions. During the construction phase, it is expected that a slight decline in traditional patterns of seasonal visitation and boat usage trips may occur. This impact would last for the drawdown period and could be mitigated to some extent with floatable dock extensions and boardwalks to enhance access during the low water period. Post construction, over the longer term, it is anticipated that lake access and navigation would improve and visitation patterns would return to normal steady state growth seasonal levels.

Some shoreline area residents and business establishments with views of both the littoral zone and shoreline where scraping and burning activities are proposed to occur would experience negative impacts for a short period. Lake views could be impacted by scraping and burning activities, and the creation of existence of the spoil islands. These viewshed impacts would be short-term, low in intensity, and are unlikely to have a permanent adverse impact on area property values. Over the longer term, empirical studies have demonstrated that improved lake conditions have generally been associated with appreciation in property values for shoreline accessible and vicinity residences, with greater increases observed at closer distances.

The East Lake Toho Project would not result in significant socioeconomic effects within the study area or project area by implementing either Alternative A or Alternative B.

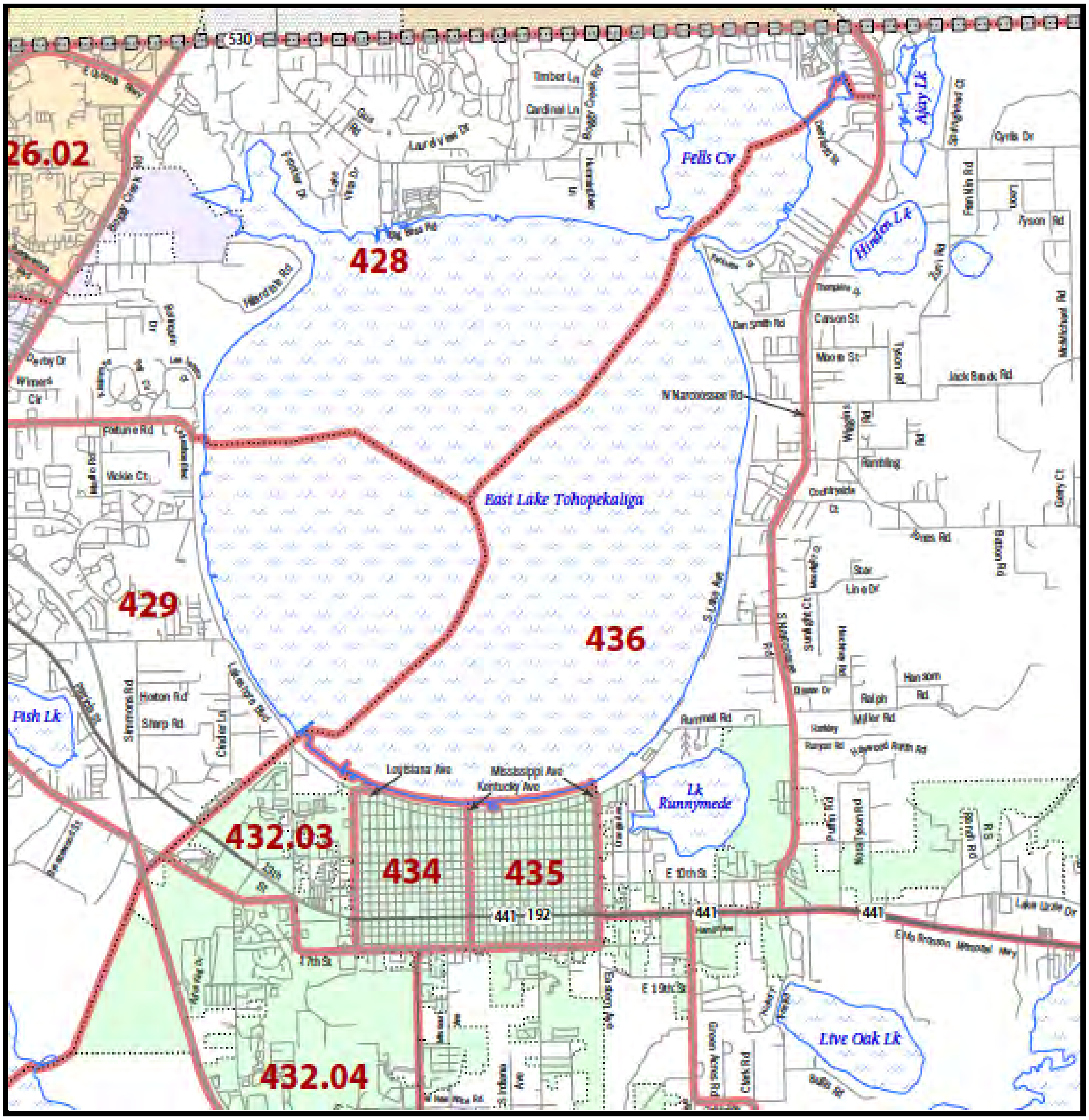
3.19 ENVIRONMENTAL JUSTICE

This section describes environmental justice populations that have been identified within the project area and the potential consequences of implementing the East Lake Toho Project upon these minority and low-income populations.

3.19.1 Affected Environment

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* mandates that each federal agency identify and address as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. This mandate requires that federal agencies must identify and disclose the distribution of effects on minority and low-income populations.

The affected environment for environmental justice populations associated with the Project consists of identifying the racial composition and income characteristics for communities described below in census tracts that abut East Lake Toho. Figure 3-36 presents these census tracts and Source: Census Bureau 2017
Table 3-21 provides data on income, poverty and racial composition.



Source: Census Bureau 2017

FIGURE 3-36 CENSUS TRACTS SURROUNDING EAST LAKE TOHO VICINITY

Source: Census Bureau 2017

	INCOME/WEALTH		RACIAL COMPOSITION							
	Median Household Income	**Persons below poverty level**	**White alone**	**Black or African American alone**	**Native American alone**	**Asian alone**	**Native Hawaiian and Other Pacific Islander alone**	**Some Other Race alone**	**Two or more races**	**Hispanic or Latino (of any Race)**
Florida	$50,860	14.7%	55.6%	15.4%	0.2%	2.6%	0.0%	0.3%	1.7%	24.1%
Osceola County	$51,436	14.8%	35.5%	9.4%	0.2%	2.5%	0.1%	0.4%	1.7%	50.2%
St. Cloud City	$50,646	16.0%	54.8%	5.9%	0.1%	1.5%	0.0%	0.5%	3.3%	33.8%
Census Tract 428	$58,711	16.9%	23.8%	8.6%	0.0%	6.9%	0.0%	0.0%	1.4%	59.4%
Census Tract 429	$43,750	17.0%	29.2%	9.2%	0.0%	3.4%	0.0%	0.3%	1.6%	56.3%
Census Tract 432.03	$38,421	17.1%	51.6%	1.7%	0.0%	0.9%	0.0%	0.0%	2.7%	43.1%
Census Tract 432.04	$59,521	16.0%	45.0%	6.9%	0.0%	2.6%	0.0%	0.8%	5.6%	39.1%
Census Tract 434	$39,625	28.7%	68.2%	1.2%	1.1%	0.2%	0.0%	0.0%	4.5%	24.9%
Census Tract 435	$37,803	21.3%	74.8%	2.8%	0.0%	2.6%	0.0%	0.4%	0.0%	19.4%
Census Tract 436	$59,274	12.0%	69.6%	1.5%	0.0%	3.1%	0.0%	0.3%	1.2%	24.4%

TABLE 3-21 INCOME, POVERTY AND RACIAL COMPOSITION OF FLORIDA, OSCEOLA COUNTY AND ST. CLOUD

Figure 3-36 provides the median household income, percent of persons below the poverty level threshold and the racial composition within the East Lake Toho vicinity. Census Tract 434 has the highest relative proportion of households with incomes below the poverty level threshold, followed by Census Tract 435. These tracts abut the south of East Lake Toho and comprise the densest part of the City of St. Cloud (within the project area). The other surrounding tracts are slightly above the St. Cloud City average, with the exception of Census Tract 436. This latter tract is relatively wealthier as shown by the household median income that surpasses county and state averages. Census Tract 434 (City of St. Cloud) contains both majority and minority populations with relatively lower incomes compared to other census tracts that surround East Lake Toho. This particular tract has the greatest relative share of households (both white and non-white) with incomes that fall below the Osceola County average and Florida average poverty level thresholds. The racial composition for census tract 434 is 68.2 percent white and 24.9 percent Hispanic. Hispanic populations can be of any race. While relatively poorer, Census Tract 434 is not characterized by a large proportion of minority households compared to other East Lake Toho tracts.

3.19.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative, Alternative A and Alternative B on low income and minority populations within the project area. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, and the descriptions of impact intensity levels developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	One environmental justice community (e.g., low income or minority population) would be affected, and impacts would be limited to a small geographic area. Additionally, impacts on this community would not be experienced disproportionately when compared to other communities in the study area.
Moderate	More than one environmental justice community (e.g., low income or minority population) would be affected. Impacts would be adverse; environmental justice communities would possibly be disproportionately affected when compared to other affected communities in the study area.
High	Two or more environmental justice communities (e.g., low income or minority population) would be affected in a wider geographic area. Impacts would be of high intensity and adverse and would affect more environmental justice communities than other communities in the study area (disproportionate impact).

3.19.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters of the United States (East Lake Toho); therefore, drawdown and

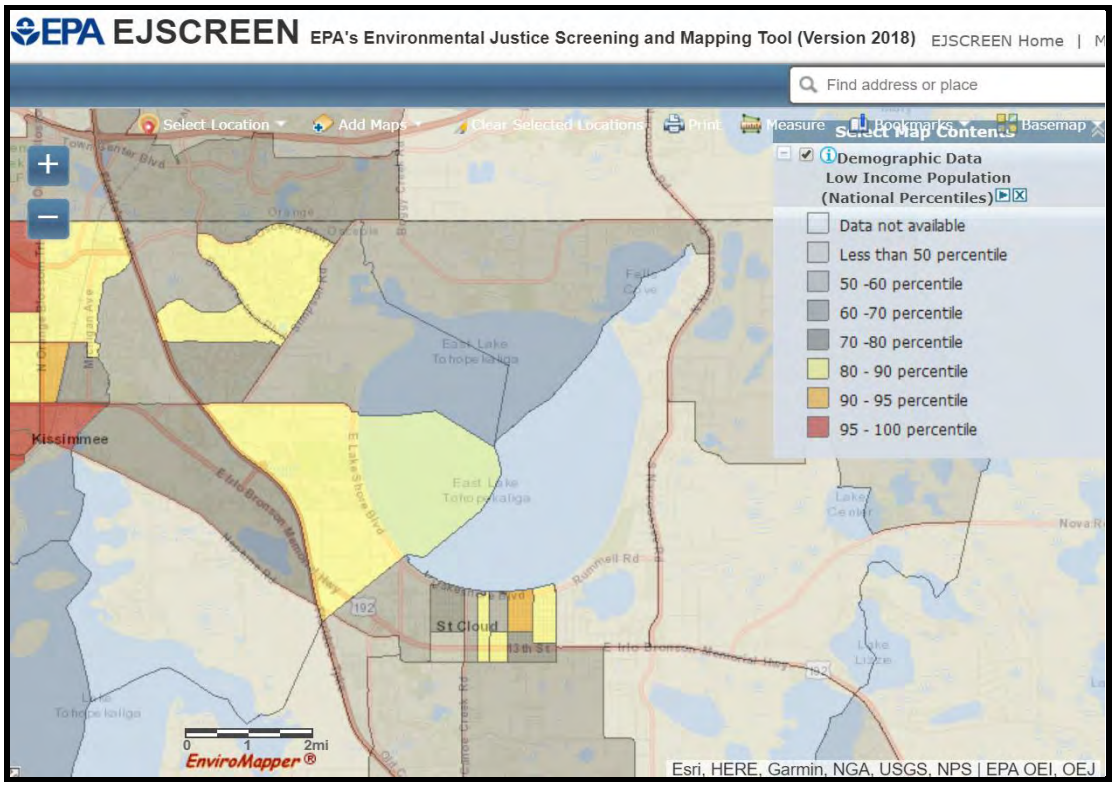
habitat enhancement of East Lake Toho would not occur. Implementation of the No-Action Alternative would not affect environmental justice populations (e.g., low income or minority population) in any manner.

3.19.2.2 Alternative A

Four aspects of the Project could potentially affect environmental justice populations as described below:

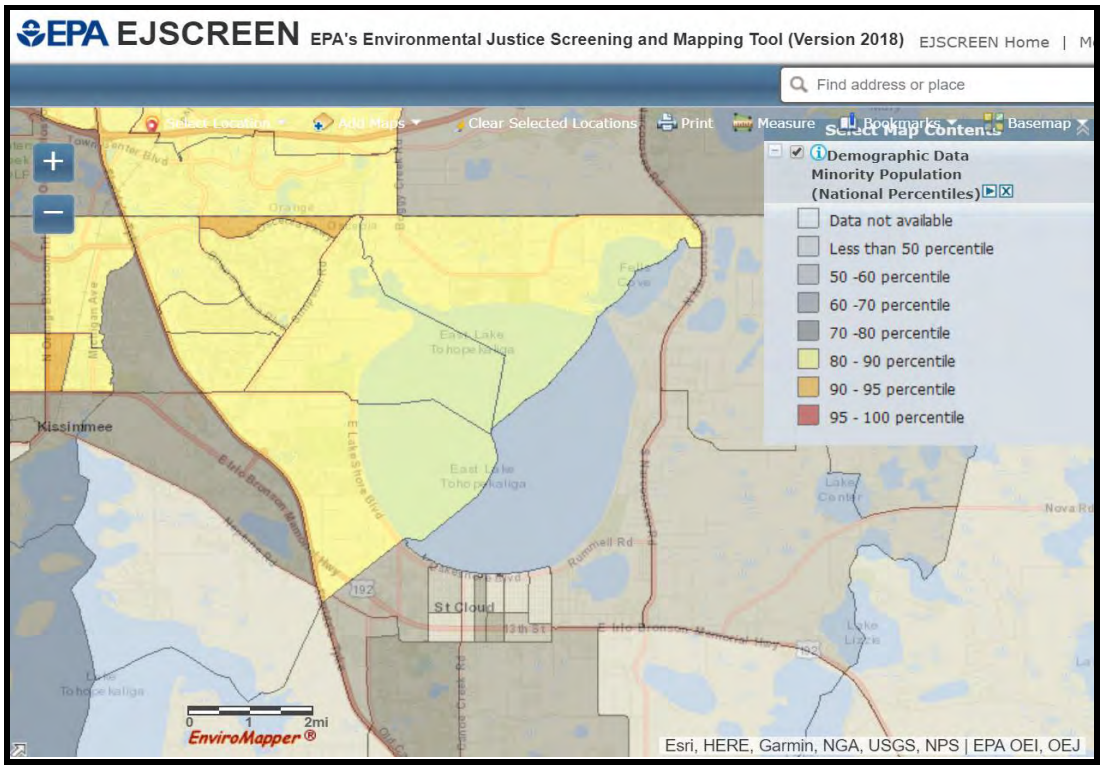
1. *Toxic effects of herbicide application (short-term*) – potential toxic fumes from herbicide application
2. *Smoke from vegetation burning (short-term)* – smoke from the burning of cattails along the western and northern edges of the lake and the burning of woody vegetation along the eastern shore may disturb residents who live in the general proximity of East Lake Toho.
3. *Disturbance from heavy equipment usage (short-term)* – for a period of six to eight weeks use of heavy equipment to scrape organic sediments, stack woody vegetation and transport organic sediments to the in-lake spoil islands may disrupt of the tranquil environment of lakefront and nearby resident.
4. *Creation of two in-lake spoil islands* – the spoil islands may be a visual intrusion of lake views for some residents along the eastern shore of East Lake Toho.

As can be gleaned from the EPA environmental justice maps depicting low income populations (Figure 3-36) and minority populations (Figure 3-38) in the vicinity of East Lake Toho, these populations are primarily located to the west and north of the lake. Consequently the two activities (i.e., heavy equipment usage and creation of spoil islands along the eastern shoreline) can be dismissed as possibly disproportionately impacting environmental just populations. However, the other two activities as described above need to be evaluated in more detail.



Source: EPA 2018

FIGURE 3-37 MINORITY POPULATIONS IN THE VICINITY OF EAST LAKE TOHO



Source: EPA 2018

FIGURE 3-38 LOW MINORITY POPULATIONS IN THE VICINITY OF EAST LAKE TOHO

The project effect for further evaluation is the potential for smoke and particulate matter from the burning of woody vegetation and cattails to disproportionately affect environmental justice populations. The primary parameters of concern are wind speed and direction. Average wind speed near East Lake Toho experiences seasonal variation over the course of the year. The windier part of the year lasts for eight months, from September through May, with an average wind speed of 7.4 mph. During project implementation when burning activities would occur the wind is primarily from the east. Thus, based on the probably of high wind speeds with winds from east low income and minority populations immediately to the west of the lake could be impacted. However, FWC relies on guidance from the Florida Forest Service for the conduct of burning activities and only burns those areas that can be completed within a 24 hour period and wind speeds are low and no rain is in the forecast. The FWC project manager would terminate herbicide application or prescribed burning if sustained winds over ten mph are encountered on the designated date(s) for these activities. Herbicide application would be completed within less than a half day and the prescribed burn activities would occur over a two to five-day-period dependent upon local weather conditions.

Alternative A would not have a long-term disproportionately adverse effect on minority and low income populations within the project area. There is a chance that minority and low income populations located to the west and north of East Lake Toho could be impacted by smoke and particulate matter from burning activities, dependent on wind speed and direction. To mitigate these concerns, USACE would send notices of the public meeting for the draft EIS to additional residents of the environmental justice community within 1000 feet of the area to have herbicides applied and prescribed burns. USACE would address potential environmental justice concerns during a formal presentation at the draft EIS public meeting and be available to answer questions or concerns. Additionally, prior to implementing either herbicide application(s) or prescribed burns, the FWC project manager would release a news bulletin for public notification providing details regarding the herbicide application or burn activities including scheduled dates. A map depicting locations of herbicide application and prescribed burn would be posted at all public lake access points, including fish camps, marinas and other businesses. These businesses would also be notified in person by FWC staff at least 48 hours prior to implementing any of the stated activities.

There are no project features or resulting effects that would impede subsistence hunting or fishing activities that are used by some minority and low income population to supplement low incomes. Thus, the Project could have a low intensity short-term effect and negligible effects in the long-term on environmental justice populations (e.g., low income or minority population).

3.19.2.3 Alternative B

Direct and indirect effects of selecting and implementing Alternative B on environmental justice populations would be the same as those described above for Alternative A.

3.19.3 Effects Summary

Neither Alternative A nor Alternative B would have a long-term disproportionately adverse effect on minority or low income populations in the vicinity of East Lake Toho. However,

there is a possibility, dependent upon wind direction and velocity, that low income and minority populations could be subjected to smoke and particulate matter for a short period of time during burning of woody vegetation and cattails along the lake periphery. To mitigate this concern, USACE staff would send notices of the public meeting for the draft EIS to additional residents of the environmental justice community within 1000 feet of the area to be burned and have herbicides applied. The Project would not have a significant effect on environmental justice populations (e.g., low income or minority population).

3.20 NATIVE AMERICANS

This section describes Native American interests and concerns that have been identified to date near the project area and the potential consequences of implementing the East Lake Toho Project upon these interests and concerns.

3.20.1 Affected Environment

The USACE recognizes the importance of communicating with tribes on a government-to-government basis, in recognition of their sovereignty, and responsibilities derived from Federal trust doctrine (i.e., the trust obligation of the United States government to the Tribes (DOD 2006). There exists a unique and distinctive political relationship between the United States and the tribes that mandates that, whenever USACE actions may have the potential to affect protected tribal resources, tribal rights, or Indian lands, USACE must provide affected tribes an opportunity to participate in the decision-making process. This ensures tribal interests are given due consideration in a manner consistent with tribal sovereign authority. In addition to Federal trust doctrine, these responsibilities are derived from Treaties, Executive Orders, Agreements, Statutes, and other obligations between the United States government and tribes, to include:

- Federal statutes (e.g., Native American Graves Protection and Repatriation Act, American Indian Religious Freedom Act, National Environmental Policy Act, National Historic Preservation Act, Alaska National Interest Lands Conservation Act, Alaskan Native Claims Settlement Act, and Archeological Resources Protection Act,); and
- Other federal policies (e.g., Executive Order 12898, "Environmental Justice"; Executive Order 13007, "Indian Sacred Sites"; Executive Order 13021 "Tribal Colleges and Universities"; "Executive Memorandum: Government to Government Relations with Native American Tribal Governments," dated 29 April 1994; Executive Order 13084, "Consultation and Coordination with Indian Tribal Governments" and Executive Order 13175, "Consultation with Indian Tribes, Alaska Natives, and Native Hawaiians").
- 33 C.F.R. Part 325, Appendix C - Procedures for the Protection of Historic Properties; and 36 C.F.R. 800 – Protection of Historic Properties.

An e-mail from the Seminole Tribe of Florida (STOF), Tribal Historic Presentation Office, was received by USACE on December 15, 2017, during the official scoping period, expressing the following concerns regarding the Project (E-mail from Victoria Menehaca, Seminole Tribe of Florida, to Robin Moore, USACE, dated December 15, 2017):

- Proposed Project falls within the Seminole Tribe of Florida area of interest
- Request for continued consultation with Seminole Tribe of Florida regarding project development and implementation
- Drawdown and subsequent organic sediment removal may disturb unknown archaeological resources located within East Lake Toho
- Canoes or burial sites may be present near East Lake Toho

- Several burial sites around East Lake Toho shore contain human remains
- A Cultural Resources Assessment Survey (CRAS) should be conducted that consists of underwater surveying techniques such as magnetometry and side-scan sonar

Prehistoric dugout canoes are fairly common in Florida's wetlands, and more than 200 have been reported to the Florida DHR. Besides their intrinsic value, the canoes are considered indications that other wet site resources may be present. Canoes on lake bottoms are the property of the State of Florida and cannot be moved or disturbed without contacting the DHR.

3.20.2 Direct and Indirect Effects

This section discusses the potential short-term and long-term direct and indirect impacts of the No-Action Alternative and Alternative A and B on Native American interests or resources. Definitions for duration are discussed in Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluation*, and descriptions of the three levels of intensity effects specifically developed for this Project are described below.

INTENSITY LEVEL	DESCRIPTION
Low	A signal resource of importance to Native American Tribes, such as a prehistoric canoe, would be affected, and impacts would be limited to a small geographic area within the APE.
Moderate	More than one Native American Tribal resource or interest would be affected within the APE.
High	Human remains would be affected and/or two or more Native American Tribal resources would be affected within the APE.

3.20.2.1 No-Action Alternative

Under the No-Action Alternative, USACE would not issue a permit to FWC for the placement of spoils materials in waters of the United States (East Lake Toho); therefore, drawdown and habitat enhancement of East Lake Toho would not occur. Implementation of the No-Action Alternative would not affect Native American interests or resources in any manner.

3.20.2.2 Alternative A

Most of the work within the APE, as described in Section 3.11 *Cultural Resources*, has a low potential for impacting tribal resources (e.g., water level, drawdown, organic sediment scraping, herbicide spraying and prescribed burning). Other than staging at Chisolm Park, all work would be conducted below the Ordinary High Water Mark, well removed from known cultural resource sites. The greatest potential for adverse effects on tribal resources exists where organic sediment removal activities would occur on the eastern shore of East Lake Toho. Given somewhat inaccessible site conditions (i.e., dense floating mats of vegetation with unstable sediments), it is doubtful a meaningful cultural resource survey could be conducted. As previously stated in Section 3.11 *Cultural Resource*, concern has been expressed by the Seminole Tribe of Florida

regarding the potential disturbance of prehistoric canoes on East Lake Toho's bottom. Given the potential for prehistoric remains on the lake floor, an archaeological monitor would be required to be present during scraping of the organic sediments to identify cultural resource discoveries. If a canoe or other potentially significant artifact should be uncovered, work would have to cease in that vicinity until a mitigation procedure could be arranged with the Florida DHR and consultation completed with STOF.

The direct effects of implementing Alternative A on Native American interest and/or concerns would be of low intensity for the short-term and negligible over the long-term.

3.20.2.3 Alternative B

In comparison to Alternative A, Alternative B would have less opportunity to encounter a prehistoric dugout canoe during scraping activities because fewer acres would be involved with this option; otherwise the direct and indirect effects would be the same as those described for Alternative A

3.20.3 Effects Summary

Implementation of either Alternative A or B would have low intensity effects for the short-term upon known Native American interests and/or concerns and negligible effects for the long-term. As described in the Cultural Resource section, there is concern that either Alternative A or Alternative B might have an effect on unknown prehistoric dugout canoes on the bottom of East Lake Toho. To avoid this, an archeological monitor would be present during the grading of the eastern shore littoral zone. In the unlikely event that a prehistoric canoe is discovered, a mitigation plan would be negotiated with the Florida DHR and STOF. No significant effects upon Native American interests or concerns are anticipated from implementing the Project. USACE would consult with both STOF and the Miccosukee Tribe of Indians of Florida regarding the proposed federal action.

3.21 OTHER IMPACT CONSIDERATIONS

3.21.1 Irreversible and Irretrievable Commitment of Resources

NEPA analysis requires that an EIS include identification of "…any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented." Irreversible resource commitments are related to the use of non-renewable resources, such as energy, minerals, and soils, and the effects that the uses of these resources might have on future generations. Such uses are considered irreversible because their implementation would affect a resource that has deteriorated to the point that renewal can occur only over long periods, or at great expense, or because they would cause the resource to be destroyed or removed. Irretrievable resource commitments mean loss of production or use of a resource. Irretrievable refers to the permanent loss of a resource, such as extinction of a species, destruction of a cultural resource site, or loss of soil productivity.

Under either Alternative A or Alternative B, most resource commitments would neither be irreversible nor irretrievable. Potential impacts on threatened and endangered species would be both short term and long term, but in both instances the effect would be of low intensity and would not be detrimental to existing populations (e.g., snail kite and whooping crane). Other resources that may have a possible irreversible or irretrievable commitment include wildlife and wetlands. Mortality of individual animals during organic sediment removal and disposal would represent an irretrievable commitment of resources. Additionally, some organisms may suffer mortality during burning of woody vegetation or spraying of invasive/exotic vegetation. However, these losses would not result in permanent changes at the population level and would not significantly alter ecosystem structure or population dynamics. Permanent loss or conversion of wetlands would also represent an irretrievable commitment of resources, but this loss would be minimal because only a small amount of wetlands would be permanently lost or converted to upland habitat (approximately two to four acres due to the creation of two spoil islands) under either Alternative A or Alternative B. Removal of vegetation through scraping of the eastern littoral zone, spraying and/or burning of woody vegetation along the western and northern shoreline would represent an irretrievable commitment of resources, but would not represent a permanent loss of vegetation as these areas would naturally restore themselves to a more desirable habitat type. Approximately 10 to 12 acres of natural habitat would be preserved within the area to be scraped under Alternative B.

The creation of the two spoil islands would permanently change the visual landscape for a few waterfront residents along the eastern shoreline of East Lake Toho. Additionally the scraping of the eastern shoreline could result in the irretrievable loss of unidentified cultural resources.

The construction of a weir between East Lake Toho and Lake Runnymede would require the irretrievable commitment of non-recyclable building materials. The heavy equipment used to scrape the littoral zone of the eastern shoreline and water pumps used during the drawdown would require the irretrievable use of fuel.

3.21.2 Relationship between Short-Term Uses of the Environment and Maintenance and Enhancement of the Long-Term Productivity

NEPA requires that an EIS describe "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity."

Construction of the East Lake Toho Project would have short-term impacts on environmental resources associated with implementation of the Project, including drawdown of East Lake Toho, mechanical scraping of East Lake Toho's eastern littoral zone, construction of two spoil islands, aquatic vegetation spraying and burning, placement of a sheet piling weir between East Lake Toho and Lake Runnymede, and modification of the Lake Tohopekaliga and East Lake Toho regulation schedules. For the purposes of this draft EIS, temporary (i.e., short term) is defined as the implementation period (estimated to be 10 to 12 months) as well as the transient ecological effects that can be expected to occur during the first one to three years, and permanent (i.e., long term) is defined as the time that effects might be expected to persist, which is up to ten years or more.

As indicated in the individual resource discussions, the small, permanent footprint of the spoil islands and limited resource effects indicate that implementation of the Project would not likely affect regional natural resources. However, the wetlands occupied by creation of the two spoil islands would be affected for the foreseeable future, possibly exceeding 50 years. Both Alternative A and Alternative B would require approximately the same amount of wetland habitat to create the two spoils islands; however, Alternative B would have approximately ten percent less organic matter placed on the islands; because Alternative A would have 112 acres scraped along the eastern shore while Alternative B would require scraping of approximately 10 to 12 acres less.

Temporary impacts from project implementation are discussed throughout Section 3 and Table 2-1 *Summary Comparison of Alternatives: Environmental Benefits and Adverse Impacts*. As one of the conditions of permit issuance by the USACE, FWC would agree to restore the scraped areas by disking and reseeding and monitoring to ensure desired vegetation is restored.

While the total acreage for Alternative A that would be temporally affected is approximately 312 acres (298 acres under Alternative B), much of this area would be returned to its original productivity, (e.g., littoral zone emergent vegetation) once the Project is completed and all the work areas have had time to establish vegetative cover. Thus, a minimal number of acres (two to four acres under Alternative A and/or Alternative B) would be permanently removed from productivity as wetland habitat by creation of the two spoil islands. This permanent impact to wetland habitat would be offset by the improved quality of wetland habitat surrounding the periphery of East Lake Toho.

Direct effects to listed species is anticipated to be negligible over the long-term; however, short-term negative impacts may occur to the snail kite. Snail kites would be exposed to the lake drawdown and habitat enhancement action and its environmental consequences. Unfortunately, all impacts to snail kites and their primary food source (apple snails) cannot be avoided. Furthermore, uncertainties including weather and other stochastic factors may interact with the Project thereby exposing snail kites to additional negative impacts. Over longer periods of time, three to ten years,

snail kites are expected to benefit from the Project, primarily by opening habitat to improved foraging.

Long-term impacts on wildlife would include the conversion of two to four acres of shrubby, wetland habitat to upland habitat which would slightly reduce available foraging, roosting and nesting habitat for several aquatic and wildlife species. Additionally, the quality of the created upland habitat would change over time as organic sediments oxidize and vegetative debris decays and compacts. Additionally, FWC would occasionally use the spoil islands to deposit additional organic sediments and vegetative debris during future lake management activities.

Once the Project is complete and water levels restored, East Lake Toho vistas would be improved for most lakefront residents, improving property values. However, creation of the two in-lake spoil islands may have a permanent impact on lake views, particularly for property owners on the eastern shore of East Lake Toho.

During project implementation, short-term use of the labor force could result in short-term productivity of the economic environment, including employment, personal income, and tax revenue. Short-term employment would be related to construction activities, either directly (construction workers) or indirectly (local businesses workers).

4 CUMULATIVE IMPACTS

A cumulative impact, as defined by the CEQ, is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 C.F.R. 1508.7). The analysis presented in this section places the impacts associated with Alternative A and Alternative B into a broader context that accounts for the full range of impacts of actions taking place in the project area in the foreseeable future. When viewed collectively over space and time, individual minor impacts could produce significant impacts. The goal of the cumulative impacts analysis, therefore, is to identify potentially significant impacts early in the planning process to improve decisions and move toward more sustainable development.

4.1 METHODOLOGY

The cumulative impacts analysis undertaken for this draft EIS encompasses the direct and indirect impacts associated with both the period of project implementation and post-recovery; and including the effects of activities associated with other past, present, and reasonably foreseeable future actions. Impact intensity levels (low, moderate, and high) used for the cumulative impacts analysis are the same as those used in Section 3 for the analysis of direct and indirect effects. Those resource categories with a potential for a cumulative impact either during project implementation or after the recovery phase are considered in the cumulative impact analysis and include: water resources, water quality, vegetation, fish and wildlife, threatened and endangered species, recreation and aesthetics and air quality.

Two factors are considered when establishing the affected environment for a cumulative effects analysis: the spatial/geographical environment and the temporal range of relevant past, present and reasonably foreseeable future projects. The spatial and temporal parameters for this cumulative effects analysis were developed from information provided in Section 2 *Alternatives*, and from the results of direct and indirect effects analyses presented in Section 3 *Affected Environment and Environmental Consequences*.

For the purposes of this EIS, present actions are those that are ongoing and have activities that contribute to potential cumulative effects. Future actions are those that are reasonably foreseeable within the life of the Project or the next 30 years. The estimates of future projects are more accurate for the next ten years, but where possible, the cumulative effects analysis extends for the life of these anticipated projects.

The spatial scope for analysis of cumulative effects varies by resource. For certain resources such as listed species, the area of consideration could be more extensive than the areas defined for direct and indirect impact analysis, Section 3.1 *Approach to Characterizing Baseline Conditions and Conducting Effects Evaluations*.

4.2 PAST AND CURRENT ACTIONS

The cumulative impact analysis includes those actions from the past that have had a long-term effect on conditions within the project area (Section 2 *Alternatives*). Major contributors to deteriorating habitat conditions within East Lake Toho, which drive the need for littoral zone rehabilitation, are water level stabilization, Section 3.2 *East Lake Toho Historical Conditions* for a detailed description of past actions, and pollution from watershed development. Negative environmental changes within East Lake Toho as a result of these past actions include an increase in aquatic plant density and biomass, accumulation organic sediments, and a shift to invasive species around the periphery of the lake. A decline in coverage of desirable aquatic vegetation has negatively impacted the diversity and abundance of forage organisms that depend on these plant communities. This change in vegetative coverage has contributed to reduced sport fish production and reduced use of the littoral zone by wading birds for feeding and nesting.

Past and current actions adjacent to East Lake Toho and within its watershed have contributed to these cumulative effects. Average annual population growth within the Osceola County and the Greater Orlando metropolitan area has been faster than the Florida average in recent years. Average annual population growth was four percent in the City of St. Cloud between 2010 and 2017, and three percent for Osceola County. Related development activities adjacent to the lake (e.g., construction of new homes, roadways, and related water infrastructure) have all contributed to the nutrient load received by East Lake Toho. Although development adjacent to the lake is likely to continue, there are just a few remaining properties adjacent to East Lake Toho and therefore future direct impacts are likely to be limited. Currently, a new housing development is being constructed on the north side of the East Lake Toho adjacent to Boggy Creek. Both short-term water quality effects and longer term land management effects would be expected. Given the change in land use and the rate of urban housing construction in the area, it is likely that the three remaining parcels adjacent to East Lake Toho would be developed. Hilliard Island, in northwest corner of the East Lake Toho is one of the last remaining large adjacent parcels. Another large parcel on the north side of East Lake Toho off of Boggy Creek Road would likely be developed in the near future.

4.3 REASONABLY FORESEEABLE FUTURE ACTIONS

Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but likely to occur. Reasonably foreseeable future actions associated with the Project include those actions to be taken by individual property owners to improve their property during the drawdown period. For example, the lowering of East Lake Toho would expose some bulkheads located on lakeside properties. The period of low water levels would be a good opportunity for property owners to perform repairs on dilapidated structures and also repair deteriorating boat docks. Property owners may also use this time to construct new boat docks. During the public scoping meeting, several property owners inquired about the possibility of removing nuisance vegetation during the drawdown period (Appendix A). Landowners that wish to do work on their properties while the water levels are low must obtain appropriate permits from FDEP or the USACE Regulatory Division in Coco Beach, Florida. Provided below is a listing of reasonably foreseeable future projects that would add to the cumulative impacts of East Lake Toho (Table 4-1).

Approximately 23 percent of the Kissimmee Chain of Lakes watershed is wetland habit (i.e., approximately 576,000 acres). Currently 18 percent of the Kissimmee watershed is developed, but by 2040 approximately 28.3 percent of the watershed is projected to be developed, clustered in the northern half of Osceola County. This rapid pace of development activity is estimated to cause an additional 10,900 acres of wetland habitat to be filled through the year 2040.

A number of ecological restoration projects have been completed over the past 15 years to improve the health of Lake Okeechobee, with even more planned for the next ten years. These actions are being implemented by the SFWMD and USACE to reduce the quantity of nutrients reaching the lake and enhance its ability to support a healthy ecosystem and serve as a water supply and recreational resource.

Lake Okeechobee is a large, shallow eutrophic lake located in south central Florida and is the receiving waterbody for water flow from the Kissimmee Chain of Lakes, including East Lake Toho and the Kissimmee River (FDEP 2001). Lake Okeechobee is the largest freshwater lake in Florida and the second largest freshwater lake within the contiguous United States, covering approximately 730 square miles. Since 1992, the lake has had an average lake-wide depth of nine feet (FDEP 2001). The lake has a maximum storage capacity of 1.05 trillion gallons (at a depth of 19 feet NGVD). Lake Okeechobee's health has been threatened in recent decades by excessive nutrients from agricultural and urban activities within the lake's large watershed.

Water quality in Lake Okeechobee has been degraded by large-scale inflow from streams/rivers that drain agricultural land on the northern side of the lake; agricultural wastes are washed from farmlands into the watershed streams and rivers during heavy runoff (FDEP 2001). Recent occurrences of massive, lake-wide blooms of blue-green algae are viewed as another sign that the lake is receiving excessive amounts of nutrients, primarily phosphorus, which threaten the overall health of the lake resources (Bartlett 2018). Researchers have observed an increased rate of eutrophication in Lake Okeechobee from 1970 to the present. Symptoms of this eutrophication include the following: 1) increases in algal bloom frequency since the mid-1980s, 2) increases in the dominance of blue-green algae following a shift in the total nitrogen: total phosphorus ratio, 3) increases in the lake water concentration of total phosphorus, 4) and increases in average chlorophyll a concentrations (FDEP 2001). Phosphorus is considered the key nutrient contributing to the eutrophication of the lake (Bartlett 2018). Phosphorus contributes to blue-green algae blooms, which have occurred on Lake Okeechobee the past few years and plagued the northern estuaries when excess lake water is discharged. During the 2017 weather year, May 2016 to April 2017, the estimated phosphorus load into Lake Okeechobee was 369 metric tons, which is approximately 80 metric tons lower than it was when the restoration goal of 105 metric tons was adopted in 2001 (Bartlett 2018). There have been 166 projects completed (2018) to reduce phosphorus loading into lake with an additional 54 underway (Bartlett 2018).

TABLE 4-1 REASONABLY FORESEEABLE FUTURE PROJECT

REASONABLY FORESEEABLE FUTURE PROJECT IMPACTING EAST LAKE TOHO	DESCRIPTION SUMMARY
Chisholm Park Boat Access Improvements	During the drawdown period the City of St Cloud would improve the boat ramp and deepen the boat access as an independent action.
City of St Cloud Boat Ramp Improvements	Prior to the drawdown period, the City of St Cloud would improve the boat ramp and deepen the boat access channel to provide boat access during the drawdown period as an independent action.
Continued management of East Lake Toho	After completion of the Project, FWC would continue lake management activities which could include herbicide application and placement of additional organic sediments and vegetative debris on the two spoil islands.
East Lake Toho Lakefront Property Owner Improvements During Drawdown Period	As independent actions, individual lakefront owners would repair and/or replace boat docks, repair retaining walls, and remove undesirable vegetation within their property boundaries; as discussed at the public scoping meeting for the Project.
Development of Remaining East Lake Toho Lakefront Properties	Given the change in land use and the rate of urban housing construction in the area, it is likely that the three remaining parcels adjacent the lake would be developed. Hilliard Island, in northwest corner of the East Lake Toho is one of the last remaining large adjacent parcels. Another large parcel on the north side of East Lake Toho off of Boggy Creek Road would likely be developed in the near future.
Kissimmee River Restoration Program	As water volume is needed to support restoration efforts, water levels within the lake may vary from normal fluctuations.
Lake Okeechobee Restoration Projects	Additional ecosystem restoration projects are planned for the watershed north of the Lake Okeechobee to reduce phosphorous loading to the lake.

USACE is aware of the heightened public sensitivity with regard to how flows to and from Lake Okeechobee could be affected by the proposed Project. The Project would not be implemented if either extreme wet or extreme dry conditions exist throughout the Kissimmee Chain of Lakes. Extreme dry and wet conditions would be determined by the SFWMD and USACE water management teams prior to initiating a drawdown of the lake (see Section 2.3.8 *Implementation Schedule* for more detail). At the time to initiate the East Lake Toho drawdown, consultation would occur between USACE water managers to determine if the volume of water to be withdrawn would induce any additional estuary releases out of Lake Okeechobee. If it was determined by the water managers to cause additional releases, based on the 2008 Lake Okeechobee Regulation Schedule, the drawdown would not be implemented.

The timing of the drawdown would occur in the cooler months of October to March as opposed to the warmer months of March to June. During the gravity portion of the drawdown from 57 to 55 feet NGVD, 26,000 acre-feet of water would be discharged downstream between October and January ahead of the current regulation schedule (i.e., during a typical year between March and

June the drawdown is from 58 to 55 feet NGVD and consists of 38,000 acre-feet of water discharged). When the stage of East Lake Toho is at approximately 55 feet, water pumping would begin and an additional 22,000 acre-feet of discharge would occur as East Lake Toho is dropped from 55 to 53 NGVD feet. Assuming no storage is available in the Kissimmee Chain of Lakes downstream of East Lake Toho and no releases from Lake Okeechobee would occur, the additional 22,000 acre-feet of water could increase the Lake Okeechobee stage by 0.7 inches. In the following year, as East Lake Toho returns to normal, an additional 22,000 acre-feet of storage would be available in the upper Kissimmee chain of lakes (i.e., the amount of water required to refill East Lake Toho to 55 feet NGVD).

4.4 CUMULATIVE IMPACT ANALYSIS

This section analyzes the impacts of the identified past, present, and reasonably foreseeable future actions on each resource category, in combination with the impacts of Alternative A and Alternative B for the East Lake Toho Project, resulting in the total cumulative impact. In accordance with CEQ guidance, this list primarily includes present and reasonably foreseeable future actions in the cumulative impact assessments. The analysis of cumulative impacts considers the resources that could be affected by the incremental impacts from the Project, when considered in addition to the impacts from past, present, and reasonably foreseeable future actions. The units of analysis for this assessment of cumulative impacts are the individual resource categories described in the affected environment sections in Section 3 and include those resource categories listed below in Table 4-2.

TABLE 4-2 CUMULATIVE IMPACT SUMMARY FOR EAST LAKE TOHO

RESOURCE CATEGORY/SPATIAL BOUNDARY FOR CUMULATIVE IMPACT ANALYSIS FOR EACH RESOURCE	CUMULATIVE EFFECTS SUMMARY FOR EAST LAKE TOHO (BOTH ALTERNATIVE A AND ALTERNATIVE B)
Water Resources (Including regulation schedule, water supply, flood control and navigation) Project area down to Lake Okeechobee	Short-term low intensity impacts and negligible intensity impacts for the long-term as the Project would not be implemented if either extreme wet or extreme dry conditions exist throughout the Kissimmee Chain of Lakes. These conditions would be determined by the SFWMD and USACE water management teams prior to initiating a drawdown of East Lake Toho. If it is determined that the volume of water to be withdrawn from East Lake Toho would induce any additional estuary releases from Lake Okeechobee, the drawdown would not be implemented. Assuming no storage is available in the Kissimmee Chain of Lakes downstream of East Lake Toho and no releases from Lake Okeechobee would occur, the water pumped from the lake could increase the Lake Okeechobee stage by 0.7 inches, but that water volume would be offset during refill of the lake. Navigation on East Lake Toho during the drawdown period would be limited to the St Cloud Marina boat access ramp but would result in improved boater access conditions following the refill of the lake.
Water Quality Project area down to Lake Okeechobee	The contribution of the Project to nutrient loading of the Kissimmee Chain of Lakes and Lake Okeechobee would be negligible in both the short-term and long-term. Nutrient loading from the drainage of the large watershed stretching from Orlando to the lake would continue to exceed the restoration target of 108 metric tons of phosphorous per year by at least 200 metric tons even with the addition of another 54 restoration projects. The increased nutrient loading associated with the water volume at the beginning of the Project would be offset during the refill of East Lake Toho. Nutrients released during the scraping of the littoral zone and creation of the spoils islands would generally be retained within the lake and would not be anticipated to exceed values in the current condition.
Vegetation (Including Wetlands) Project area down to Lake Okeechobee	Low intensity long-term negative and beneficial cumulative effects from the Project, including the permanent loss of four acres of wetland habitat contributing to a general trend of wetland loss due to development in the region. The removal of vegetation by individual property owners during the drawdown period would be a low intensity cumulative impact and could either be adverse or beneficial dependent upon the type of vegetation removed. Less dense vegetation would likely promote native plant growth and provide

RESOURCE CATEGORY/SPATIAL BOUNDARY FOR CUMULATIVE IMPACT ANALYSIS FOR EACH RESOURCE	CUMULATIVE EFFECTS SUMMARY FOR EAST LAKE TOHO (BOTH ALTERNATIVE A AND ALTERNATIVE B)
	opportunities for submerged aquatic vegetation expansion in areas of appropriate habitat.
Fish and Wildlife Resources Project area	Low intensity long-term beneficial cumulative effects from Project; nuisance vegetation removal by individual land owners would improve aquatic habitat conditions and would be a beneficial cumulative impact. Organic material removal would improve conditions for several sport fish species.
Threatened and Endangered Species Project area downstream to Lake Okeechobee	Long-term improved habitat conditions for the snail kite and wood stork would occur from the Project, such as better foraging habitat for snail kites due to lower exotic vegetation density and improved littoral zone conditions for wood stork foraging. These improved conditions would be a beneficial cumulative impact. Actions of individual land owners during the drawdown period would have minimal cumulative effects upon threatened or endangered species.
Aesthetics Project area	Low intensity long-term beneficial and adverse cumulative effects from Project; actions by individual landowners during the drawdown period such as removal of nuisance vegetation and repair of boat docks would improve aesthetics for other landowners and would represent a beneficial cumulative impact but localized.
Recreation Project area	Low intensity long-term beneficial cumulative effects from Project; individual land owners improvement of bulkheads, seawalls, and boat docks during the drawdown period would represent a beneficial cumulative effect. Nuisance vegetation removal would represent a beneficial cumulative effect. All above actions would improve boater access for an improved recreational experience by waterfront property owners and other recreationalists.
Air Quality Global	The GHG emissions from the Project generated during heavy equipment usage and water pumping would persist in the atmosphere for the long-term; and while slight would be a contributing factor to global climate change.

5 REGULATORY COMPLICANCE AND MITIGATION

5.1 COMPLIANCE WITH ENVIRONMENTAL LAWS, STATUTES AND EXECUTIVE ORDERS

Table 5-1 provides a summary of environmental compliance with each environmental law, statue or Executive Order.

TABLE 5-1 COMPLIANCE WITH ENVIRONMENTAL LAWS, REGULATIONS AND EXECUTIVE ORDERS

LAW, POLICY AND REGULATIONS	STATUS	COMMENTS
Anadromous Fish Conservation Act	In compliance with this Act.	Proposed Action would not adversely affect anadromous fish species.
Archaeological Resources Protection Act of 1979	The preferred alternative is in compliance with this act and would continue to comply throughout project implementation.	No further need for detailed investigations are anticipated as all recorded archaeological sites are at least 200 feet from the littoral zone.
American Indian Religious Freedom Act	In compliance with this Act.	The policy of the United States is to protect and preserve for American Indians, Alaska Native Groups and Native Hawaiians, their inherent rights of freedom to believe, express and exercise traditional religions. These rights include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremony and traditional rites
Bald and Golden Eagle Protection Act	In compliance with this Act.	Project would not adversely affect the bald eagle and would assist to improve forage opportunities for this protected species. No permits for take are required.
Clean Air Act of 1972	In compliance with this Act, no permit required.	No potential permanent source of air emissions from project implementation.
Clean Water Act of 1972	Compliance with this Act would be obtained prior to any construction activities through receipt of WQC from the state of Florida, as well as any required National Pollutant Discharge Elimination System permits or permit modifications.	
Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990	These Acts are not applicable to this Project.	There are no designated coastal barrier resources in the project area that would be affected by this Project.

LAW, POLICY AND REGULATIONS	STATUS	COMMENTS
Endangered Species Act of 1973	In progress.	The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. The USACE submitted a Biological Assessment to USFWS on January 4, 2019 to comply with formal consultation. The BA included a May Affect, Not Likely to Adversely Affect determination for Audubon's crested caracara, wood stork and the eastern indigo snake. USACE determined that the Project May Affect, and Likely to Adversely Affect the Everglades snail kite. A Biological Opinion from the USFWS is anticipated on or before July 15, 2019. The USACE will conclude consultation with USFWS prior to commencement of the Project and will continue consultation as appropriate throughout drawdown period. Consultation with the National Marine Fisheries Service is not applicable for this Project
Federal Water Project Recreation Act/Land and Water Conservation Fund Act	In compliance with this Act.	Effects of the Project on outdoor recreation have been considered in Section 3.12 *Recreation*. Project would not adversely affect existing recreational opportunities and additional recreational opportunities would likely be realized.
Fish and Wildlife Coordination Act of 1958, as amended.	In compliance with this Act.	The USFWS signed a Memorandum of Agreement on January 22, 2003 to use the NEPA and ESA processes to meet the intent of the Act. This Project is in compliance.
Farmland Protection Policy Act of 1981	In compliance with this Act.	No farmland involved with the Project.
Marine Mammal Protection Act of 1972	This Act is no applicable.	East Lake Toho and adjacent canals lie outside of the areas mapped as being accessible to manatees.
Marine Protection, Research and Sanctuaries Act	This Act is not applicable.	Project does not consider ocean disposal of organic sediments.
National Environmental Policy Act of 1969	In progress, the Project will be in full compliance with the Act prior to implementation.	The USACE sent scoping notices and published the NOI in the Federal Register on November, 2017. The Notice of Availability for review of the draft EIS is planned to be released on February 7, 2019 for a 45 day public review period. Public meetings will be held late March 2019.
National Historic Preservation Act of 1966	The Project is currently in compliance and will continue to meet the requirements of this Act throughout the drawdown period	A cultural resource monitor would be present during project implementation. Consultation has been initiated and is ongoing with the Florida SHPO and the appropriate federally-recognized tribes pursuant to the Act

LAW, POLICY AND REGULATIONS	STATUS	COMMENTS
Resource Conservation and Recovery Act, as Amended by the Hazardous and Soils Waste Amendments of 1984, CERCLA as Amended by the 5.26.21 Superfund Amendments and Reauthorization Act of 1996, Toxic Substances Control Act of 1976.	A limited desktop environmental assessment of the proposed project area; no existing contaminated sites within 500 feet of the project area were identified.	Procedures would be implemented during project implementation to ensure compliance with the acts' requirements specifically those actives associated with hazardous and toxic chemical documentation, communication, handling, storage and disposal. In the event that any activities or materials that are regulated are discovered during project implementation, appropriate actions would be taken.
Rivers and Harbors Act of 1899	In compliance with this Act.	The Project would not obstruct navigable waters of the United States.
Submerged Lands of 1953	In compliance with the goals of this Act.	The Project would only temporarily effect submerged lands and only a four acre alteration is expected on submerged lands.
Wild and Scenic River Act of 1968	This Act is not applicable.	No designated wild and scenic rivers are located within project area.
E.O. 11514 Protection of the Environment.	In compliance with this E.O.	The objectives of the Project are focused on environmental protection.
E.O. 11593 Protection and Enhancement of the Cultural Environment	In compliance with this E.O.	The area of potential effect for cultural resources for this Project includes state, county, city and private owned lands. A cultural resource monitor would be present during project implementation.
E.O. 11988 Flood Plain Management	In compliance with this E.O.	Purpose of the E.O. is to discourage federally induced development of floodplains. Components of the E.O. include: 1. Determine if the Proposed Action is in the base floodplain. Yes, the proposed spoil islands would be located in the base flood plain (Zone AE based on FEMA maps). 2. If the action is in the base flood plain, identify and evaluate practicable alternatives to the action or to location of the action in the base flood plain. 3. If the action must be in the flood plain, advise the general public in the affected area and obtain their views and comments. 4. Identify beneficial and adverse impacts due to the action and any expected losses of natural and beneficial flood plain values. Where actions proposed to be located outside the base flood plain will affect the base flood plain, impacts resulting from these actions should also be identified.

LAW, POLICY AND REGULATIONS	STATUS	COMMENTS
		5. If the action is likely to induce development in the base flood plain, determine if a practicable non-flood plain alternative for the development exists.
E.O. 11990 Protection of Wetlands	In compliance with this E.O.	The primary object of the Project is to improve wetland habitat quality within the littoral zone of East Lake Toho.
E.O. 12962 Recreational Fisheries	In compliance with this E.O.	The Project is expected to have a beneficial effect with improvements to sport fisheries of East Lake Toho.
E.O. 12898 Environmental Justice	In compliance with this E.O.	The Project does not present any environmental impacts that are high, adverse and disproportionate to low income, or minority populations as discussed in Section 3.19 *Environmental Justice*.
E.O 13007 Indian Sacred Sites	This E.O. is not applicable.	This E.O. is directed towards executive branch agencies with statutory or administrative responsibility for the management of federal lands. The Proposed Action would not affect Department of Defense owned or USACE-managed lands.
E.O. 13045 Protection of Children	In compliance with this E.O.	The Project is not expected to have environmental or safety risks that may disproportionately affect children.
E.O. 13089 Coral Reef Protection	This E.O. is not applicable	Coral reefs are not affected.
E.O. 13122 Invasive Species	In compliance with this E.O.	A primary objective of the Project is the treatment and control of nuisance and invasive plant species with the littoral zone of East Lake Toho.
E.O. 13175 Consultation and Coordination with Indian Tribal Governments	In compliance with this E.O.	Consultation with the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida has been initiated and is ongoing.
E.O. 13186 Responsibilities of Federal Agencies to Protect Migratory Birds	In compliance with this E.O.	The Project would not adversely affect migratory bird species. The Project is expected to benefit wildlife species by improving habitat and increasing availability of foraging opportunities.
Memorandum on Government to Government Regulations with Native American Tribal Governments	In compliance with this memorandum.	USACE has consulted with both the Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida.

LAW, POLICY AND REGULATIONS	STATUS	COMMENTS
Seminole Indian Claims Settlement Act of 1987	In compliance with the Act	This Act also involves an agreement known as the Water Rights Compact, which specifically defines tribal water rights.

5.2 MITIGATION

As defined by the CEQ, (C.F.R. §1508.20), mitigation requirements include the following:

- Avoid the impact altogether by not taking a certain action or parts of an action;
- Minimize impacts by limiting the degree or magnitude of the action and its implementation;
- Rectify the impact by repairing, rehabilitating or restoring the affected environment;
- Reduce or eliminate the impacts over time by preservation and maintenance operations during the life of the action; and
- Compensate for the impacts by replacing or providing substitute resources or environments.

Under the CWA Section 404(b)(1) guidelines implemented through 40 C.F.R. Part 230, the FWC shall be required to avoid and minimize impacts to waters of the United States, or provide compensatory mitigation for unavoidable adverse impacts. Mitigation measures for the Action Alternatives were identified as BMPs and compensatory mitigation, which are discussed in the following sections.

5.2.1 Best Management Practices

During implementation of the East Lake Toho Project, FWC would implement standard construction BMPs to avoid affecting the surrounding environments. These BMPs are itemized in Appendix F by project component.

5.2.2 Threatened and Endangered Species of Concern

Although specific details will be developed as consultation occurs between the USACE and the USFWS, it is anticipated that at a minimum, the following measures would be incorporated during project implementation to minimize effects on any threatened or endangered species that may occur at the Project site:

- Standard Protection Measures for the Eastern Indigo Snake (2004);
- Habitat Guidelines for the Wood Stork in the Southeast Region (2009); and
- Everglade Snail Kite Management Guidelines (2009).

Specific requirements for minimizing impacts to Everglade snail kite would be stipulated in the Biological Opinion. Modeling conducted by SFWMD that resulted in the proposed

drawdown rate of East Lake Toho was purposely selected to reduce impact to the Everglade snail kite. Reducing the drawdown rate would help ensure Everglade snail kite nests were not stranded landward of the 53 feet NGVD elevation, occurring at the peak of the drawdown. Additional details and management measures are discussed in the Biological Assessment submitted to USFWS (Appendix B).

5.2.3 Hazardous and Toxic Waste

For Alternative A and Alternative B, there would be no dumping of oil, fuel or hazardous wastes in the work area; safe and sanitary measures for disposal of solid wastes would be required. A spill prevention plan will also be required.

5.2.4 Compensatory Mitigation

In accordance with the CWA Section 404(b)(1) Guidelines 40 C.F.R. Part 230, wetland and aquatic resource impacts are first avoided, then minimized to the maximum extent practicable. Section 404 of the CWA requires compensatory mitigation to replace aquatic resource functions unavoidably lost or adversely affected by authorized activities. Mitigation must meet the requirements of the 2008 Mitigation Rule, 40 C.F.R. Part 230 and 33 C.F.R. Parts 325 and 332. The following sections discuss the East Lake Toho Project's impacts to wetlands and the compensatory mitigation proposed.

The Project would result in the permanent conversion of two to four acres of open-water/wetland habitat to upland habitat as two in-lake spoil islands would be created to accommodate the disposal of organic sediments accumulated from the scraping of the eastern littoral zone.

5.2.4.1 Wetland Impacts

The Project would result in the permanent conversion of four acres of degraded palustrine emergent (littoral zone) wetlands to upland habitat as two in-lake spoil islands would be created to accommodate the disposal of organic sediments accumulated from the scraping of the eastern littoral zone.

5.2.4.2 Assessment of Wetland Function

The Uniform Mitigation Assessment Method (UMAM) is a wetland condition assessment used by the State of Florida to provide a quantitative assessment of wetland function. In this methodology, descriptors of a wetland's location/landscape, water environment and community structure are evaluated as surrogate measures for determining wetland function. UMAM is used for both determining the functional loss associated with wetland impacts and functional gain resulting from compensatory mitigation activities.

For both Alternatives A and B, the four acres of spoils islands would result in a functional loss of two functional units given the existing (degraded) condition of the proposed spoil island locations. Implementation of Alternative A or B could result in improved wetland function to

approximately 312 acres of palustrine emergent habitat, and a functional gain of approximately 28 functional units.

TABLE 5-2 WETLAND CONDITION ASSESSMENT

AREA/ ACTIVITY	HABITAT	ACRES	PRE-PROJECT UMAM	POST-PROJECT UMAM	DELTA	TIME LAG	RISK	FUNCTIONAL LOSS OR GAIN
Disposal Islands	Palustrine emergent	4	0.5	0	-0.5			-2
Organic Sediment Removal	Palustrine emergent	112	0.63	0.8	0.17	1.0341	1.25	14
Spray/Burn North and West Shore	Palustrine emergent	200	0.63	0.73	0.1	1.0341	1.25	16
							Net Total	**28**

5.2.4.3 Compensatory Mitigation Compliance

In accordance with the CWA Section 404(b)(1) Guidelines 40 C.F.R. Part 230, the loss of two functional units (i.e., four acres of wetland fill) would require compensatory mitigation. Typically, this would be satisfied by the purchase of two mitigation credits with a service area that includes the project area. However, FWC did not propose a mitigation bank credit purchase in their application.

The USACE's' assessment of project activities indicates the implementation of Alternative B (preferred alternative) would have a net total gain of approximately 28 functional units. This assessment include a three-year time lag, allowing for revegetation of the scraping and burn areas. While these areas may continue to degrade slightly over time, the USACE would not expect these areas to lose so much function that they would not be able to compensate for the 2.0 functional loss resulting from creation of the two spoil islands. In other words, UMAM provides a qualitative estimate of this habitat enhancement project and project benefits provide compensatory mitigation for proposed wetland fills.

In addition, the project would meet the intent of the 2008 Mitigation Rule, 40 C.F.R. Part 230 and 33 C.F.R. Parts 325 and 332. The project is consistent with a watershed approach, and efforts to improve water quality and habitat in the upper Kissimmee River watershed. Long-term lake management would continue to be provided by FWC, as funded by the State of Florida.

6 LIST OF PREPARERS

This section provides a list of individuals involved in the preparation and review of this draft EIS (Table 6-1). This draft EIS was prepared under a third party arrangement with the SFEC team (consisting of SFEC, LLC. and Louis Berger US) preparing the document and the USACE staff responsible for NEPA and regulatory input, technical direction and review.

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