Status
Current condition: Good and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 1,510,216 acres (611,163 ha) of Natural Lake habitat exist.

Habitat Description

FNAI type: Clastic Upland Lake, Sandhill Lake, Sinkhole Lake

Florida has approximately 7,800 Natural Lakes with a surface area of one acre (0.4 ha) or more. Very few of these lakes were formed by riverine processes. However, the great majority were formed or enlarged by dissolution of the underlying limestone by acidic surface waters. Slumping of the overburden resulted in a surface depression. Most Natural Lakes in Florida retain an intimate connection with groundwater, and lack a natural surface outflow. They may be connected to aquatic caves by underground fissures or bedding planes, and thus provide additional habitat for animal species found in those subterranean habitats, or they may have bottom substrates of silt or sand. Most of these lakes have highly variable water levels. Despite their origin, many Florida lakes are not alkaline, and are vulnerable to acidification. They also commonly are nutrient-deficient, thus are vulnerable to nutrient inputs.

Florida’s lakes are usually less than 45 feet (14 m) deep, with sand, silt, or organic bottom substrates. Depending on the water chemistry, vegetation in the lakes can vary from nonexistent, to a fringe of emergent plants at the shoreline, to a complete covering of floating plants. Indeed, introduced aquatic weeds are a major threat to this habitat. Some Florida lakes have held water continuously for 8,000 years, and two exceed 30,000 years in age.
This habitat category is comprised exclusively of standing water bodies of natural origin, some of which have been altered by the construction of water control structures. Natural Lakes are essentially permanent, although many of them dry completely during droughts.

**Associated Species of Greatest Conservation Need**

**Mammals**

- Corynorhinus rafinesquii  
  Rafinesque's Big-eared Bat
- Eptesicus fuscus  
  Big Brown Bat
- Eumops floridanus  
  Florida Bonneted Bat
- Lasiurus borealis borealis  
  Red Bat
- Lasiurus cinereus cinereus  
  Hoary Bat
- Lasiurus intermedius floridanus  
  Northern Yellow Bat
- Lasiurus seminolus  
  Seminole Bat
- Myotis austroriparius  
  Southeastern Myotis
- Myotis grisescens  
  Gray Bat
- Perimyotis subflavus  
  Tricolored Bat
- Lontra canadensis lataxina  
  River Otter
- Trichechus manatus latirostris  
  West Indian Manatee

**Birds**

- Anas rubripes  
  American Black Duck
- Anas fulvigula  
  Mottled Duck
- Aythya marila  
  Greater Scaup
- Gavia immer  
  Common Loon
- Mycteria americana  
  Wood Stork
- Pelecanus occidentalis  
  Brown Pelican
- Botaurus lentiginosus  
  American Bittern
- Ixobrychus exilis  
  Least Bittern
- Ardea herodias  
  Great Blue Heron
- Ardea alba  
  Great Egret
- Egretta thula  
  Snowy Egret
- Egretta caerulea  
  Little Blue Heron
- Egretta tricolor  
  Tricolored Heron
- Egretta rufescens  
  Reddish Egret
- Butorides virescens  
  Green Heron
- Nycticorax nycticorax  
  Black-crowned Night-Heron
- Nyctanassa violacea  
  Yellow-crowned Night-Heron
- Eudocimus albus  
  White Ibis
- Plegadis falcinellus  
  Glossy Ibis
- Platalea ajaja  
  Roseate Spoonbill
- Pandion haliaetus  
  Osprey
- Rostrhamus sociabilis  
  Snail Kite
- Haliaeetus leucocephalus  
  Bald Eagle
- Falco peregrinus  
  Peregrine Falcon
- Rallus elegans  
  King Rail
- Porphyrio martinica  
  Purple Gallinule
- Aramus guarauna  
  Limpkin
- Grus canadensis pratensis  
  Florida Sandhill Crane
- Grus americana  
  Whooping Crane
- Tringa solitaria  
  Solitary Sandpiper
• *Tringa flavipes* Lesser Yellowlegs
• *Tryngites subruficollis* Buff-breasted Sandpiper
• *Limnodromus scolopaceus* Long-billed Dowitcher
• *Phalaropus tricolor* Wilson’s Phalarope
• *Chlidonias niger* Black Tern
• *Rynchops niger* Black Skimmer
• *Euphagus cyanocephalus* Brewer’s Blackbird

**Amphibians**
• *Lithobates capito* Gopher Frog
• *Lithobates virgatipes* Carpenter Frog
• *Ambystoma tigrinum* Eastern Tiger Salamander
• *Desmognathus auriculatus* Southern Dusky Salamander

**Reptiles**
• *Alligator mississippiensis* American Alligator
• *Farancia erytrogramma* Rainbow Snake
• *Nerodia cyclopion* Mississippi Green Watersnake
• *Seminatrix pygaea cyclas* Southern Florida Swamspsnake
• *Apalone mutica calvata* Gulf Coast Smooth Softshell
• *Apalone spinifera aspera* Gulf Coast Spiny Softshell
• *Deirochelys reticularia* Chicken Turtle
• *Macrochelys temminckii* Alligator Snapping Turtle
• *Pseudemys nelsoni* Florida Red-bellied Cooter (Panhandle Population)

**Fish**
• *Anguilla rostrata* American Eel
• *Cyprinodon variegatus hubbsi* Lake Eustis Pupfish
• *Acantharchus pomotis* Mud Sunfish
• *Enneacanthus chaetodon* Black Banded Sunfish

**Invertebrates**
• *Amblema plicata* Threeridge
• *Anodonta hartfieldorum* Cypress Floater
• *Anodonta heardi* Apalachicola Floater
• *Utterbackia peggyae* Florida Floater
• *Utterbackia peninsularis* Peninsular Floater
• *Cambarellus schmitti* A Crayfish
• *Macrobrachium acanthurus* Cinnamon River Shrimp
• *Macrobrachium carcinus* Big Claw River Shrimp
• *Macrobrachium ohione* Ohio River Shrimp
• *Anax amazili* Amazon Darter
• *Nehalennia pallidula* Everglades Sprite
• *Epitheca spinosa* Robust Tongtail
• *Gomphus vastus* Cobra Clubtail
• *Progomphus alachuensis* Tawny Sanddragon
• *Progomphus bellei* Belle, Belle’s Sanddragon
• *Lestes inaequalis* Elegant Spreadwing
• *Lestes spumarius* Antillean Spreadwing
• *Libellula jesseana* Purple Skimmer
• *Nannothemis bella* Elfin Skimmer
• *Hydroptila bernerii* Berner’s Microcaddisfly
- *Orthotrichia curta* (Short Orthotrichian Microcaddisfly)
- *Orthotrichia instabilis* (Changeable Orthotrichian Microcaddisfly)
- *Oxyethira florida* (Florida Cream And Brown Microcaddisfly)
- *Ceraclea limnetes* (Sandhill Lake Caddisfly)
- *Nectopsyche tavara* (Tavares White Miller Caddisfly)
- *Oecetis parva* (Little Oecetis Longhorned Caddisfly)
- *Oecetis porteri* (Porter's Long-horn Caddisfly)
- *Triaenodes dendyi* (A Caddisfly)
- *Triaenodes florida* (Floridian Triaenode Caddisfly)
- *Triaenodes furcellus* (Little-fork Triaenode Caddisfly)
- *Cernotina truncona* (Florida Cernotinan Caddisfly)
- *Poanes viator zizaniae* (Broad-winged Skipper)

**Conservation Threats**

Threats to the Natural Lake habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Chemicals and toxins
- Incompatible recreational activities
- Conversion to agriculture
- Invasive animals
- Conversion to commercial/industrial development
- Invasive plants
- Conversion to housing and urban development
- Nutrient loads–agriculture
- Groundwater withdrawal
- Nutrient loads–urban
- Incompatible recreational activities
- Surface water withdrawal and diversion

Many of the threats to this habitat stem directly or indirectly from lakefront development which is ubiquitous on natural lakes throughout Florida. Like many wetland habitats, Natural Lakes, even those relatively unaffected by direct threats, suffer from an altered landscape context as surrounding uplands have been developed for housing and agricultural development. Additional threats specific to this habitat include the operation of dams or control structures, especially on lakes in central and south Florida.

The following stresses and sources of stress threaten this habitat:

<table>
<thead>
<tr>
<th>Stresses</th>
<th>Habitat Stress Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  Altered landscape mosaic or context</td>
<td>High</td>
</tr>
<tr>
<td>B  Altered hydrologic regime</td>
<td>High</td>
</tr>
<tr>
<td>C  Altered species composition/dominance</td>
<td>High</td>
</tr>
<tr>
<td>D  Altered water quality of surface water or aquifer: nutrients</td>
<td>High</td>
</tr>
<tr>
<td>E  Erosion/sedimentation</td>
<td>Medium</td>
</tr>
<tr>
<td>F  Altered community structure</td>
<td>Medium</td>
</tr>
<tr>
<td>G  Habitat degradation/disturbance</td>
<td>Medium</td>
</tr>
<tr>
<td>H  Insufficient size/extent of characteristic communities or ecosystems</td>
<td>Medium</td>
</tr>
<tr>
<td>I  Habitat destruction or conversion</td>
<td>Medium</td>
</tr>
<tr>
<td>J  Altered water quality of surface water or aquifer: contaminants</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Chapter 6: Habitats – Natural Lake
The sources of stress, or threats, were used to generate conservation actions.

<table>
<thead>
<tr>
<th>Sources of Stress</th>
<th>Habitat Source Rank</th>
<th>Related Stresses (see above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Invasive plants</td>
<td>High</td>
<td>C</td>
</tr>
<tr>
<td>2 Dam operations</td>
<td>High</td>
<td>B, C</td>
</tr>
<tr>
<td>3 Nutrient loads–urban</td>
<td>High</td>
<td>C, D, E, F</td>
</tr>
<tr>
<td>4 Conversion to housing and urban development</td>
<td>High</td>
<td>A, C, D, F, I</td>
</tr>
<tr>
<td>5 Surface water withdrawal</td>
<td>Medium</td>
<td>B, C</td>
</tr>
<tr>
<td>6 Nutrient loads–agriculture</td>
<td>Medium</td>
<td>C, D, E, F</td>
</tr>
<tr>
<td>7 Invasive animals</td>
<td>Medium</td>
<td>C</td>
</tr>
<tr>
<td>8 Conversion to commercial and industrial development</td>
<td>Medium</td>
<td>A, C, D, I</td>
</tr>
<tr>
<td>9 Conversion to agriculture</td>
<td>Medium</td>
<td>A, H</td>
</tr>
<tr>
<td>10 Chemicals and toxins</td>
<td>Medium</td>
<td>J</td>
</tr>
<tr>
<td>11 Groundwater withdrawal</td>
<td>Low</td>
<td>B</td>
</tr>
<tr>
<td>12 Incompatible recreational activities</td>
<td>Low</td>
<td>G</td>
</tr>
<tr>
<td>13 Incompatible residential activities</td>
<td>Low</td>
<td>G</td>
</tr>
<tr>
<td>14 Management of nature–aquatic plant treatment</td>
<td>Low</td>
<td>F</td>
</tr>
<tr>
<td>15 Incompatible agricultural practices</td>
<td>Low</td>
<td>B, C, D, E</td>
</tr>
</tbody>
</table>

Statewide Threat Rank of Habitat: High

Conservation Actions

Actions to abate the threats to Natural Lakes that were also identified as statewide threats (invasive plants, nutrient loads–urban, conversion to housing and urban development, surface water withdrawal and diversion, nutrient loads–agriculture, invasive animals, conversion to commercial/industrial development, conversion to agriculture, chemicals and toxins, groundwater withdrawal, incompatible recreational activities) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Natural Lakes and a few other habitats (i.e., Aquatic Cave, Calcareous Stream, Cypress Swamp, Freshwater Marsh and Wet Prairie, Reservoir/Managed Lake, Seepage/Steephead Stream, Softwater Stream, Spring and Spring Run, Terrestrial Cave, and Coastal Tidal River or Stream) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to improve the condition of lake-fringe wetland habitat by managing lake levels to more closely resemble a natural hydrologic regime, maintain the amounts of littoral vegetation on lake edges necessary to sustain ecosystem function, improve the compatibility of lakefront development with wildlife habitat conservation, and increase our knowledge of the impact of chemicals and toxins on lake ecosystems.
### Dam Operations

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Capacity Building</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H</strong></td>
<td>Coordinate interstate Action Plan actions to ensure that all fish and wildlife resources in all states are protected when changing dam operations in shared basins (USFWS).</td>
<td>M</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Coordinate multiagency review of USACE activities, including biological aspects (fish spawn guidelines, protection of fish and wildlife resources) of water control plans for interstate water projects, fish spawn guidelines, re-establishing natural seasonal fluctuation of flows.</td>
<td>H</td>
<td>L</td>
<td>M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Land/Water/Species Management</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
<td>Integrate lake management activities to coordinate multiple species and habitat conservation, restoration, and invasive plant management (FWC).</td>
<td>H</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Policy</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H</strong></td>
<td>Continue developing and implementing hydrologic management plans that restore the natural seasonal fluctuation to lakes in order to successfully manage sediment-dwelling wildlife.</td>
<td>M</td>
<td>H</td>
<td>L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Research</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L</strong></td>
<td>Develop a position paper on the impacts of lake level stabilization and absence of dry-season drawdown on littoral zone vegetation and dependent wildlife, and sediment accumulation in managed natural lakes.</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Evaluate feasibility of incentive programs to remove small rural impoundments.</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

### Conversion to Housing and Urban Development

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Economic and Other Incentives</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L</strong></td>
<td>Encourage conservation of lake frontage, riparian habitats and their floodplains.</td>
<td>M</td>
<td>L</td>
<td>VH</td>
</tr>
</tbody>
</table>

### Conversion to Agriculture

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Economic and Other Incentives</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
<td>Create incentives for maintenance and conversion of lands to agricultural uses that use less water and result in lower nutrient outputs into Florida's waters and wetlands, and create market-based incentives to compensate private landowners for the environmental services they provide to the state through management that increases water storage and nutrient reduction.</td>
<td>M</td>
<td>M</td>
<td>H</td>
</tr>
</tbody>
</table>

### Chemicals and Toxins

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Planning and Standards</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L</strong></td>
<td>Develop management techniques and recommendations for private landowners that minimize runoff of chemicals and toxins into wetlands and aquatic systems.</td>
<td>H</td>
<td>L</td>
<td>M</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Develop management techniques and design protocols to minimize exposure of wading birds and other wetland wildlife to contaminants.</td>
<td>H</td>
<td>L</td>
<td>M</td>
</tr>
</tbody>
</table>
### Chapter 6: Habitats – Natural Lake

#### Research

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Research</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Conduct research defining appropriate sediment quality standards for the various aquatic and marine systems. Fund research defining the relationship between sediment contamination (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.</td>
<td>M</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>L</td>
<td>Conduct research defining standards for persistent organic contaminants for the various aquatic and marine systems. Fund research defining the relationship between contamination from organics (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.</td>
<td>M</td>
<td>L</td>
<td>H</td>
</tr>
</tbody>
</table>

#### Incompatible Recreational Activities

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Policy</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Identify a specified percentage of littoral vegetation clearing that does not reduce lake ecological integrity, and explore incentives for reaching that percentage on public and private lands.</td>
<td>M</td>
<td>H</td>
<td>M</td>
</tr>
</tbody>
</table>

#### Incompatible Residential Activities

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Economic and Other Incentives</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Expand the scale of the <a href="http://example.com">Florida Yards and Neighborhoods</a> program from certifying individual landowners to whole neighborhoods; certification should be renewed biennially and any time property ownership changes.</td>
<td>M</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>Support incentives for residential property owners to resolve issues of incompatible use of Natural Lakes, including pesticide use, pet control, feeding of wildlife, household or yard waste disposal, landscape plants, irrigation use, prescribed fire tolerance, and lighting in coastal areas.</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>Identify and promote effective reward models for homeowners, maintenance companies, and municipalities for reducing impacts on neighboring conservation areas.</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>L</td>
<td>Develop a voluntary program directed at developers to provide on-site site-specific educational materials and recommendations to homeowner associations about incompatible residential activities.</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Education and Awareness</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Encourage and support continuing education opportunities for landscape maintenance industry that includes appropriate use of chemicals, irrigation, plants, and disposal of yard waste.</td>
<td>H</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>L</td>
<td>Develop and implement management techniques for management of shoreline vegetation to reduce movement of sediment into water bodies.</td>
<td>M</td>
<td>L</td>
<td>M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall Rank</th>
<th>Policy</th>
<th>Feasibility</th>
<th>Benefits</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Develop and promote management techniques that allow homeowners not to exceed recommended safe pesticide levels.</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>