

# Florida's Strategic Vision

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Creating a strategic vision for Florida is essential to implementing the Comprehensive Wildlife Conservation Strategy (Strategy). Fundamental to the strategic vision is the recognition that everyone who lives in Florida, visits Florida, or invests in Florida has a shared vested interest in the stability and the quality of Florida's environment. The overarching task ahead is to promote recognition of the shared advantages that accrue to all sectors of Florida by maintaining wildlife and its habitats. This should be self evident because many of the qualities and values that attract people to Florida are based in wildlife and habitat. Clean water, beautiful lakes, pristine beaches, fishing, hunting, and other recreational opportunities, retirement in natural surroundings, and the appealing climate are Florida's stock in trade.

To be successful, all partners, stakeholders, and individuals will need to work together in implementing Florida's Strategy. The Florida Fish and Wildlife Conservation Commission (FWC) has the capacity and resources to initiate and catalyze many of the proposed actions in the Strategy through its existing structure and new program, Florida's Wildlife Legacy Initiative (Chapter. Introduction). Appropriately integrating wildlife conservation into the planning, research, and action framework for all of Florida is the FWC's goal and the intent of the Strategy. This chapter will help realize that goal by highlighting the overall themes that become apparent when looking at Florida's Strategy from a higher level. The Strategy contains valuable information about the conservation needs of Florida's wildlife and habitats. Nearly 1,000 wildlife species are identified as Species of Greatest Conservation Need (SGCN) and are associated with 45 habitat categories representing the state's terrestrial, freshwater and marine resources. The Strategy has a clear articulation of the threats and actions, prioritization of the most urgent concerns, and a cooperative and incentive-based approach to address these issues. The Strategy demonstrates the great challenges we face in trying to conserve our natural resources and to keep common species common for the enjoyment and use by all Floridians.

## A Wildlife Species Endeavor

Florida's Strategy started with species as the initial building blocks and ultimately ends with wildlife as the determinant of success. Although the Strategy is organized around habitat categories and much effort has gone into identifying habitat-based conservation actions, it is intended to be a wildlife conservation endeavor. Many of the high-order issues that drive the threats and actions developed in the Strategy often are only secondarily related to the species they are intended to benefit. Accomplishment of these conservation actions is important and will lead to sustained wildlife populations. However, as Strategy completion, review, and revision progresses, focus must continually be placed back upon the species for which all this work is being done. Conservation of habitat alone is not enough without the wildlife that inhabits and defines it.

## Priority Habitats

Florida's Strategy uses a habitat approach to arrange wildlife species, and the conservation threats and actions needed to conserve them, into meaningful and manageable categories. These habitat categories are organized at the broad level and are intended to identify large-scale vegetation and structural associations across the state for terrestrial, freshwater and marine ecosystems. Although any such classification tends to become arbitrary at some scale, Florida's habitat categories provide a framework for grouping of wildlife, and categorizing and prioritizing conservation efforts. Florida is an interwoven and interdependent system of habitats. Therefore, while it is useful to work with the habitat categories individually, they should always be considered within the overall system, and it must be recognized that each habitat category will affect and be affected by other habitat categories, especially those geographically adjacent to each other. Additionally, many species move freely across the habitat categories and most are dependent upon a mix of habitat categories to provide the needed resources for life. The general concept presented in Florida's Strategy however, is that by taking actions that sustain the health and integrity of the habitat categories, the broad array of wildlife that lives within each will be conserved and maintained.

All 45 habitat categories identified in this Strategy are worthy of attention and conservation effort; however, several are identified as being under the greatest threat. Eight terrestrial habitat categories were identified as having the highest relative threat status (Table 2). (*Presented alphabetically*):

- Beach/Surf Zone
- Coastal Strand
- Dry Prairie
- Freshwater Marsh and Wet Prairie
- Natural Pineland
- Pine Rockland
- Sandhill
- Scrub

These terrestrial habitat categories generally were associated with coastal, wetland, and upland pine area.

Three freshwater habitat categories were identified as having the highest relative threat status (Table 3). (*Presented alphabetically*):

- Coastal Tidal River or Stream
- Softwater Stream
- Spring and Spring Run

These freshwater habitat categories coincide with and reinforce the coastal and upland pine areas identified under the terrestrial habitat categories. Additionally, Florida's unique springs and spring runs emerged as highly important for conservation attention.

Nine marine habitat categories were identified as having the highest relative threat status (Table 4). (*Presented alphabetically*):

- Beach/Surf Zone
- Bivalve Reef
- Coastal Tidal River or Stream
- Coral Reef
- Inlet
- Mangrove Swamp
- Salt Marsh
- Submerged Aquatic Vegetation
- Tidal Flat

Two of these marine habitat categories (Beach/Surf Zone and Coastal Tidal River or Stream) were also identified in the terrestrial and freshwater habitat categories. They were placed in both systems because of the process used to determine threats and actions and because of their importance to each ecosystem. Several of the highest ranking marine habitat categories coincide with coastal systems that transition between terrestrial/freshwater and marine systems. Other highly ranked marine habitat categories generally were associated with reefs and submerged vegetation, which provide structure and food for a vast multitude of marine species.

The relationships among habitat categories and associated threats may be visualized in tabular format. Three tables, one each for Terrestrial (Table 2), Freshwater (Table 3), and Marine (Table 4) habitat categories were created based on the 12 Threat and Action Workshop sessions across Florida (See Chapter Florida’s Approach to Meeting the Eight Required Elements). Each table shows the habitat categories across the top and the associated threats down the left side. The colored cells between them depict the relative rank of each threat within each habitat category. These threat ranks then are totaled across habitat categories to give an Overall Threat Rank on the right side of each table. The threat categories are ordered in descending Overall Threat Rank. The Overall Threat Rank was determined by a process that combined threat ranks across all habitat categories, and was not simply a reflection of the highest threat rank within any habitat category (Low 2003). Therefore, several “Low” scores could total to a “High” overall score and different combinations of “Low,” “Medium,” “High,” and “Very High” scores could result in different Overall Threat Ranks. These tables allow quick identification of those threat and habitat categories that are of highest relative rank. Additionally, for each habitat category, the level of each threat can be seen. An overall summary of the highest threat level for each habitat category is presented at the bottom of each table. Similarly, threat levels can be compared across all habitat categories for each threat category. Five habitat categories (Agriculture, Artificial Structure, Canal/Ditch, Disturbed/Transitional, Mixed Hardwood-Pine Forest, and Urban/Developed) were not addressed through the Threat and Action Workshop process and were not included in the summary tables.

Table 2. Overall threat rank across terrestrial habitat categories and collective threat status among terrestrial habitat categories.

Threat Category		Threat Rank By Habitat Category																		Overall Threat Rank
		Bay Swamp	Beach/ Surf Zone	Bottomland Hardwood Forest	Coastal Strand	Cypress Swamp	Dry Prairie	Freshwater Marsh and Wet Prairie	Grassland/ Improved Pasture	Hardwood Hammock Forest	Hardwood Swamp/ Mixed Wetland Forest	Hydric Hammock	Industrial/ Commercial Pineland	Natural Pineland	Pine Rockland	Sandhill	Scrub	Terrestrial Cave	Tropical Hardwood Hammock	
1	Conversion to housing and urban development	High	-	-	Very High	High	Very High	Very High	High	High	Medium	-	High	Very High	Very High	Very High	Very High	-	Medium	Very High
2	Roads	-	-	Medium	High	Medium	Very High	High	High	High	Medium	-	Medium	Very High	Very High	Very High	Very High	-	Low	Very High
3	Conversion to commercial and industrial development	-	-	-	-	-	High	-	-	High	-	-	High	High	Very High	High	Very High	-	-	Very High
4	Incompatible fire	Low	-	-	Low	Low	Medium	High	-	Low	Medium	-	-	High	High	High	Very High	-	Medium	Very High
5	Incompatible recreational activities	-	Very High	-	High	-	-	Medium	-	Low	-	-	High	-	Very High	Medium	High	-	-	Very High
6	Surface water withdrawal	Medium	-	-	-	High	Medium	High	-	Medium	High	-	-	High	-	-	-	-	Medium	Very High
7	Invasive plants	High	-	Medium	Medium	High	Low	High	-	Medium	High	Medium	-	High	Medium	Medium	Medium	-	High	Very High
8	Incompatible forestry practices	-	-	-	-	High	Low	Low	-	-	High	-	High	High	-	-	Very High	-	-	Very High
9	Conversion to agriculture	High	-	-	-	Medium	Medium	Very High	Medium	Low	Medium	-	-	Low	-	-	Very High	-	-	Very High
10	Invasive animals	Low	High	Medium	Medium	Medium	-	Medium	-	Low	Medium	-	-	Low	Medium	Medium	Medium	-	High	Very High
11	Incompatible resource extraction: mining / drilling	-	-	-	-	Low	Low	High	-	Medium	-	-	-	Low	-	Medium	Very High	Medium	-	Very High
12	Shoreline hardening	-	High	-	Very High	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Very High
13	Sea level rise	-	High	-	High	-	-	-	-	-	-	High	-	-	-	-	-	-	-	Very High
14	Conversion to recreation areas	-	-	-	High	-	-	-	Low	Low	-	-	-	Medium	-	Medium	Medium	-	-	Very High
15	Groundwater withdrawal	Medium	-	-	-	Medium	-	Medium	-	Low	Low	-	-	Medium	-	-	-	-	Medium	High
16	Light pollution	-	High	-	High	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High
17	Nutrient loads - agriculture	-	-	-	-	High	-	High	-	-	-	-	-	-	-	-	-	-	-	High
18	Utility corridors	-	-	-	-	-	-	-	-	-	-	-	-	Medium	-	High	-	-	-	High
19	Incompatible residential activities	-	-	-	High	-	-	-	-	Low	-	-	-	-	Low	-	-	-	Low	High
20	Climate variability	-	-	-	High	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High
21	Management of nature - inlet relocation and dredging	-	High	-	Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High
22	Military activities	-	-	-	Medium	-	Low	-	-	-	-	Low	-	-	-	Medium	Medium	-	-	High
23	Nuisance animals	-	Medium	-	Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	Low	High
24	Channel modification / shipping lanes	-	Medium	-	Medium	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	High
25	Management of nature - stormwater facilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High	-	-	-	High
26	Management of nature - dredge spoil deposition	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High	-	-	-	High
27	Parasites / pathogens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High	-	-	-	High
28	Nutrient loads - urban	-	-	-	Low	Low	-	Medium	-	-	-	-	-	-	-	-	-	-	-	Medium
29	Management of nature - water control structures	-	-	-	-	Low	-	Medium	-	-	Low	-	-	-	-	-	-	-	-	Medium
30	Incompatible grazing and ranching	Low	-	-	-	Low	Low	Low	-	-	Low	-	-	Low	-	-	Low	-	-	Medium
31	New dams	-	-	-	-	-	-	-	-	-	Medium	-	-	-	-	-	-	-	-	Medium
32	Incompatible agricultural practices	-	-	-	-	Low	Low	-	-	Low	-	-	-	Low	-	Medium	-	-	Low	Medium
33	Incompatible vegetation harvest	-	-	-	-	Low	-	-	-	-	Low	-	-	-	-	-	-	-	-	Medium
34	Chemicals and toxins	-	-	-	Low	-	-	-	-	-	-	-	-	Medium	-	-	-	-	Low	Medium
35	Solid waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Medium	-	-	Medium
36	Management of nature - beach raking	-	Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Medium
37	Incompatible wild animal harvest	-	-	-	-	-	-	-	-	-	Low	-	-	-	-	Low	-	-	Low	Low
38	Humidity and temperature changes	-	-	-	-	-	-	-	-	Low	-	-	-	-	-	-	-	-	-	Low
39	Dam operations	-	-	-	-	-	-	-	-	-	Low	-	-	-	-	-	-	-	-	Low
40	Degraded habitat	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
41	Altered wind due to buildings	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
42	Management of nature - renourishment	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
43	Management of nature - driving for maintenance	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
44	Key predator / herbivore / pollinator losses	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
<b>Habitat Category Threat Status</b>		High	Very High	Medium	Very High	High	Very High	Very High	High	High	High	Medium	High	Very High	Very High	Very High	Very High	Medium	High	Very High

Table 3. Overall threat rank across freshwater habitat categories and collective threat status among freshwater habitat categories.

Threat Category		Threat Rank By Habitat Category									Overall Threat Rank
		Aquatic Cave	Calcareous Stream	Coastal Tidal River or Stream	Large Alluvial Stream	Natural Lake	Reservoir/ Impoundment	Seepage/ Steephead Stream	Softwater Stream	Spring and Spring Run	All Habitat Categories
1	Invasive plants	-	High	Medium	-	High	High	-	Medium	Very High	Very High
2	Nutrient loads - urban	-	High	Medium	-	High	High	-	Medium	Very High	Very High
3	Surface water withdrawal	-	-	High	Medium	Medium	-	-	High	Medium	Very High
4	Invasive animals	-	Medium	Low	Medium	Medium	High	Medium	Medium	High	Very High
5	Nutrient loads - agriculture	-	High	Medium	-	Medium	Medium	-	High	High	Very High
6	Dam operations	-	-	High	High	High	-	-	Medium	-	Very High
7	Conversion to housing and urban development	-	Medium	High	-	High	-	Medium	High	-	Very High
8	Channel modification / shipping lanes	-	-	High	High	-	-	-	-	-	Very High
9	Roads	-	Medium	Medium	-	-	-	Medium	High	-	High
10	Chemicals and toxins	-	Medium	Medium	Low	Medium	Medium	-	Medium	-	High
11	Incompatible recreational activities	Medium	-	-	Low	Low	High	-	Low	Medium	High
12	Conversion to commercial and industrial development	-	-	Medium	-	Medium	-	Medium	Medium	Low	High
13	Management of nature - water control structures	-	-	-	High	-	-	Medium	-	-	High
14	Conversion to agriculture	-	-	-	-	Medium	-	-	High	-	High
15	Incompatible resource extraction: mining / drilling	Medium	Low	-	-	-	-	Medium	Medium	-	High
16	Shoreline hardening	-	-	High	-	-	-	-	-	-	High
17	Management of nature - veg clearing/snagging for water conveyance	-	-	Medium	-	-	-	-	-	-	Medium
18	Groundwater withdrawal	-	-	-	Low	Low	-	-	Low	Medium	Medium
19	Incompatible fire	-	-	-	-	-	-	Medium	-	-	Medium
20	Incompatible forestry practices	-	Low	-	Low	-	Low	Low	Low	Low	Medium
21	Incompatible agricultural practices	-	Low	-	-	Low	Medium	-	Low	-	Medium
22	Incompatible construction practices	-	-	-	-	-	Medium	-	-	-	Medium
23	Conversion to recreation areas	-	-	-	-	-	-	-	-	Low	Low
24	Management of nature - aquatic plant treatment	-	-	-	-	Low	-	-	-	-	Low
25	Sea level rise	-	-	Low	-	-	-	-	-	-	Low
26	Incompatible residential activities	-	-	-	-	Low	-	-	-	-	Low
27	Solid waste	Low	-	-	-	-	-	-	-	-	Low
<b>Habitat Category Threat Status</b>		Medium	High	Very High	High	High	High	Medium	Very High	Very High	Very High

Table 4. Overall threat rank across marine habitat categories and collective threat status among marine habitat categories.

	Threat Category	Threat Rank By Habitat Category												Overall Threat Rank	
		Annelid Reef	Beach/ Surf Zone	Bivalve Reef	Coastal Tidal River or Stream	Coral Reef	Inlet	Mangrove Swamp	Hardbottom	Pelagic	Salt Marsh	Submerged Aquatic Vegetation	Subtidal Unconsolidated Marine/ Estuarine Sediment		Tidal Flat
1	Coastal development	High	Very High	High	Very High	Very High	High	Very High	-	-	Very High	Very High	High	Very High	Very High
2	Inadequate stormwater management	Low	Medium	Very High	Very High	Very High	-	Medium	Medium	High	High	Very High	High	High	Very High
3	Dam operations/incompatible release of water (quality, quantity, timing)	Medium	Medium	High	Very High	High	High	High	Medium	-	High	High	High	High	Very High
4	Incompatible industrial operations	High	High	Low	High	Medium	Medium	High	Medium	Low	High	High	Medium	Very High	Very High
5	Channel modification/shipping lanes	High	High	Medium	Very High	High	High	High	High	Low	High	Very High	Medium	Medium	Very High
6	Climate variability	High	Very High	-	Medium	Very High	-	High	Medium	-	High	High	-	Medium	Very High
7	Roads, bridges & causeways	-	Very High	High	Medium	High	Medium	High	Low	-	High	High	Medium	High	Very High
8	Management of nature (beach nourishment, impoundments)	High	High	Medium	High	High	High	Medium	Medium	-	High	Medium	Low	High	Very High
9	Shoreline hardening	Low	High	-	Very High	Medium	High	High	Low	-	Medium	High	-	Medium	Very High
10	Harmful algal blooms	-	High	High	-	Medium	Medium	High	Medium	High	-	Very High	-	Low	Very High
11	Invasive plants	-	High	-	High	High	Medium	High	Medium	-	Medium	High	-	-	Very High
12	Nutrient loads (all sources)	-	Medium	Medium	Medium	Very High	-	Medium	-	Medium	-	High	Low	-	Very High
13	Disruption of longshore transport of sediments	Medium	High	-	-	Low	High	-	High	-	High	Medium	-	Medium	Very High
14	Invasive animals	-	Medium	Medium	High	-	Low	High	Low	Medium	-	Medium	Low	High	Very High
15	Surface water withdrawal	-	-	Medium	High	-	Low	Medium	-	-	High	High	Low	Low	Very High
16	Incompatible fishing pressure	-	Medium	Low	Medium	Very High	Medium	Medium	Medium	Medium	-	Medium	-	-	Very High
17	Incompatible recreational activities	Low	Medium	Low	Medium	Medium	High	Medium	-	-	-	Medium	Medium	High	Very High
18	Chemicals & toxins	-	Medium	-	High	Medium	-	Medium	Low	-	Medium	Medium	Low	High	Very High
19	Large industrial spills	-	Medium	-	High	Medium	Medium	Medium	-	-	Medium	Medium	-	High	Very High
20	Parasites/pathogens	-	-	-	-	Very High	-	High	High	-	-	Low	-	-	Very High
21	Boating impacts	Low	-	Low	Medium	High	High	Medium	Low	-	Low	Medium	Low	Medium	Very High
22	Key predator/herbivore losses	-	Medium	-	-	High	-	-	Medium	High	-	Medium	-	-	Very High
23	Fishing gear impacts	Low	Low	-	Low	High	Medium	Low	Low	-	-	Medium	Medium	Low	Very High
24	Groundwater withdrawal	-	-	-	High	-	-	Medium	-	-	-	High	-	Low	Very High
25	Wildlife & fisheries management	-	Low	Low	-	-	-	High	Low	Low	High	-	-	-	Very High
26	Utility corridors	Medium	Low	-	Medium	Medium	Low	Low	Low	-	Medium	Medium	-	-	High
27	Vessel impacts	-	Low	-	Medium	High	Medium	-	Low	-	Low	Low	-	Low	High
28	Solid waste	-	Medium	-	Medium	Low	-	Medium	Low	-	-	Medium	Low	Medium	High
29	Incompatible resource extraction: mining/drilling	-	Medium	-	Medium	Medium	-	-	-	-	-	-	-	-	High
30	Incompatible aquaculture operations	-	Medium	-	-	-	-	Medium	-	Low	-	Medium	-	-	High
31	Sonic pollution	-	Low	-	Low	-	Medium	Medium	-	-	-	-	-	-	High
32	Light pollution	-	Medium	-	-	-	Medium	-	-	-	-	-	-	-	High
33	Placement of artificial structures	Low	-	-	-	Medium	-	Low	Low	Low	Low	Medium	-	-	Medium
34	Incompatible aquarium trade	-	-	-	-	Medium	-	-	Low	-	-	Low	-	-	Medium
35	Indadequate stormwater management	-	-	-	-	-	Medium	-	-	-	-	-	-	-	Medium
36	Thermal pollution	-	-	-	Low	-	-	Low	-	-	-	Low	Low	-	Medium
37	Military activities	-	-	-	-	Low	Medium	-	-	-	Low	-	-	-	Medium
	<b>Habitat Category Threat Status</b>	High	Very High	Very High	Very High	Very High	Very High	Very High	High	High	Very High	Very High	High	Very High	Very High

## Statewide Threats

This section synthesizes the highest priority common themes and briefly describes each. Many of the threats facing wildlife in Florida form common themes that affect multiple habitat categories and numerous species (See Chapter Multiple Habitat Threats and Conservation Actions). By focusing attention and efforts on these threats, benefits can be accrued to a wide variety of habitat categories and species. Although not encompassing all that needs to be accomplished, implementation of actions and projects that diminish these threats should have the largest positive impact for wildlife resources across the state.

### **Habitat Loss and Fragmentation**

The Strategy identifies habitat loss and fragmentation as one of the most pervasive threats to Florida's wildlife, reaching across habitats statewide. This threat primarily comes from residential, commercial and industrial development and is directly related to a subsequent array of threats from infrastructure or actions of Florida's residents (e.g., roads, surface water diversion and withdrawal, residential activities, and nutrient loads). Habitat fragmentation affects wildlife by isolating populations, altering the movement patterns of individuals, and increasing the negative aspects of edge effects. Development disrupts ecological connectivity and results in substantial loss of function of adjacent natural habitat including landscape-level functions (e.g., sediment movement, hydrology, fire regime, and wildlife movements). As the human population increases, more land will be developed with the highest pressure occurring on coastal and upland habitats.

### **Degradation of Water Resources**

Degradation of Florida's water resources, primarily from withdrawal and contamination, is another widespread threat to the state's wildlife throughout aquatic habitats. This threat includes groundwater withdrawal, drainage or channelization of wetlands, surface water diversion and withdrawal, diversion of rainfall due to impervious cover, contamination from industrial operations, and contamination from inadequate stormwater management. In many of Florida's springs, decline in water quality and reduced flow discharge have been detected. Contamination by nutrients and harmful chemicals such as pesticides, herbicides and petroleum hydrocarbons can degrade water systems to the point that they no longer support wildlife. Increased salinity levels are another source of water degradation. Economic impacts result from decreased associated revenues due to effects of water degradation including the degradation and loss of marine, freshwater fisheries and waterfowl. Diversion or withdrawal of surface water for consumptive uses is expected to increase in the immediate future as limits on groundwater withdrawals are reached.

### **Incompatible Fire Management**

Many of Florida's habitats lie within fire-maintained ecosystems and many wildlife and plant species depend on periodic fires to maintain habitat conditions. Changes in vegetation structure and composition occur where fire frequency, seasonal timing, intensity, and extent are

altered. These changes have resulted in loss of habitat value for particular wildlife species, even in lands managed for conservation. Many of Florida's fire dependant habitats have become more fragmented due to urban development, making naturally occurring fire and prescribed fire more problematic and resulting in accumulation of fuels. When fire management does not keep pace with the accumulation of fuels, fire hazards increase and when fire does occur it can be severe and may result in destruction of the seed bank, sterilization of the soil, and jeopardize human health and safety. Lack of appropriate fire management is an established threat in many of the terrestrial habitats.

### **Invasive Plants and Animals**

While the distribution of invasive species differs regionally in Florida, the threat posed by these species occurs across all habitats. Invasive plants and animals change community structure and composition, alter hydrological and fire regimes, alter soil sedimentation and erosion processes, and modify habitat values for both wildlife and humans. Invasive species also pose direct threats to wildlife through competition, predation, and pathogen movement. New invasive species are identified regularly in Florida. Florida's mild climate has contributed to the establishment of numerous species of exotic fish, amphibians, and reptiles. Exotic marine species are introduced into Florida waters when vessels discharge bilge water and exchange ballast water in ports or in nearshore marine environments. Public and private land managers have identified the high ecological and economic costs of invasive species.

### **Management of the Physical Environment**

The threat of management of the physical environment (i.e. management of nature), including dams, shoreline hardening, dredging, beach nourishment, and impoundments is a concern for Florida's aquatic resources. These management actions often provide services necessary for human health and safety, including securing property from damage due to flooding or erosion, maintaining navigation, and creating reservoirs to meet water supply needs. While any one management action may not be significant, it is the cumulative effects of this threat that is important. Management actions can be incompatible with wildlife conservation due to altered water quality and hydrologic regime and overall degradation or destruction of habitats. Where these actions are necessary, additional management may be necessary to lessen affects to wildlife.

## **Statewide Actions**

Many tools are already available to address wildlife and habitat conservation on both public and private lands. These range from direct conservation efforts such as land acquisition, habitat restoration, and private landowner incentive programs, to indirect but important efforts such as conservation education, research and increased inter-agency coordination. The following are actions that are discussed repeatedly in the Strategy which would abate multiple threats within terrestrial and aquatic systems.

## **Develop Incentive-based Programs for Natural Resource Conservation**

Florida's Strategy is intended as an incentive-based, non-regulatory document and many of the actions are incentive-driven. Many current incentive programs on private lands, administered by state and federal agencies, encourage private landowners to implement land management actions that benefit wildlife and ecosystem functions. These programs provide technical and financial assistance to private landowners. Examples of these programs include Partners for Fish and Wildlife (USFWS), Landowner Incentive Program (LIP; USFWS/FWC), Cooperative Forestry Assistance Program (FDOF) and Farm Bill programs (NRCS/FWC) such as the Environmental Quality Incentives Program, Wildlife Habitat Incentives Program and Farm and Ranch Protection Program. Links for many of these programs are available on the FWC LIP web site, <http://www.myfwc.com/lip>.

### **High Priorities:**

- Maintain and enhance current private landowner incentive programs.
- Create the partnerships and cooperative efforts needed to establish and implement new incentive programs (e.g., explore creative private/public funding partnerships).

## **Acquire Lands and Waters Important to Wildlife Conservation**

Land acquisition and conservation easement programs at the federal, state, and local levels will continue to be essential to conserve areas important to wildlife and to ensure the public has access to quality conservation areas in order to hunt, fish, and participate in other recreational activities. Acquisition and easements are tools applicable to terrestrial and many freshwater habitats. This is not the case for many coastal or marine habitats where most areas are either sovereign commons or already developed. Land acquisition will become more challenging as land values increase, therefore new and enhanced strategies will be required (e.g., cooperative and incentive based programs).

### **High Priorities:**

- Continue support for acquisitions through the Florida Forever program.
- Emphasize the purchase of, and less-than-fee acquisition of conservation easements for, coastal lands and buffer areas.

## **Coordinate Natural Resource Conservation Efforts**

Coordination is critical to implementing many of the actions needed to conserve Florida's natural resources. Threats to wildlife and habitats are under the jurisdiction and responsibility of many agencies, but the challenges are beyond any one agency or organization. Therefore coordination, cooperation, and communication among federal agencies, state agencies, local governments, non-governmental organizations, and private entities are essential. Effective coordination is a formidable challenge due to the broad array of existing responsibilities and priorities, missions and visions, and historical interactions between agencies and organizations. The strategic vision for Florida is that these obstacles can and will be overcome through effective coordination and partnership development.

### High Priorities:

- Maximize conservation benefits on public conservation lands. The large land area and proportion of land surface in public ownership provides the most hopeful opportunity for implementing new and enhanced cooperative conservation actions identified in the Strategy (e.g., increasing the capacity, resources and coordination of prescribed fire efforts).
- Fund and ensure implementation of existing plans (e.g., Springs Task Force, Comprehensive Everglades Restoration Plan, Rural and Family Lands Protection Act, Weeds Won't Wait, and Southeast Florida Coral Reef Initiative).

### **Educate the Public about Florida's Natural Resources**

Education plays a vital role in conservation of Florida's wildlife and other natural resources. The goal of conservation education is to lead individuals from awareness to beneficial action and behavior. Many citizens know little about Florida's natural resources and do not realize how their individual actions collectively contribute to the threats to these resources. The future health of Florida's natural resources will depend on continuous and comprehensive educational efforts designed to promote ecological literacy and the balance between natural resources, wildlife conservation, economic productivity and development.

### High Priorities:

- Communicate the message that “natural resources are important and vital to your quality of life. We all benefit from it and need to work to maintain it” and “We need to invest in conserving wildlife and vital natural areas for the enjoyment and use by future generations”.
- Enhance and promote more broad and consistent education materials on water conservation.
- Facilitate the creation of "hands-on" educational opportunities to provide training on conducting successful restoration projects.
- Improve knowledge and awareness of marine, estuarine and coastal resource values and the cumulative effects of activities to marine, estuarine and coastal resources of the state, and the positive effects managed hunting and fishing can have on wildlife conservation and to the state's economy.

### **A Statewide Cooperative Conservation Effort**

One conservation action that was identified multiple times as a “Very High” or “High” priority was what experts identified as a need to develop a statewide, cooperative “ecological network”(Gordon et al 2005), referred to here as the “Cooperative Conservation Blueprint”. This

action then served as a starting point for development of several other actions that those experts identified and appears in the following multi-habitat threat categories: Conversion to Agriculture, Conversion to Housing and Urban Development, Conversion to Recreation Areas, Incompatible Recreational Activities, and Roads, Bridges and Causeways (See Chapter Multiple Habitat Threats and Conservation Actions). The FWC has modified the original stakeholder suggested “ecological network” concept and more fully described the proposed process.

Florida has previously developed several programs that represent a vast amount of information and useful planning tools; it would therefore be redundant to create a new conservation planning effort. The “Cooperative Conservation Blueprint” would not be a brand new, stand alone conservation effort, but rather a process which works to harmonize existing efforts into a single agreed upon and unified blueprint. The process would likely begin by integrating, updating, and unifying existing conservation planning efforts, such as the Strategic Habitat Conservation Areas (Cox et al. 1994), Florida Conservation Needs Assessment (Knight et al. 2000) and University of Florida’s Ecological Network (Hector et al. 2000). In addition, the process would seek to expand upon these existing efforts by more effectively incorporating social and economic factors in planning for conservation of Florida. For example, by acknowledging the benefits of rural and agricultural land to wildlife and taking further coordinated steps to preserve the values of Florida’s working landscapes.

Once created, the “Cooperative Conservation Blueprint” could serve as a tool for state and local agencies, stakeholders, and nongovernmental organizations to help guide conservation efforts. Experts agreed that a cooperative conservation effort of this nature is needed to help improve and coordinate conservation efforts on public and privately owned lands that are managed primarily for use and conservation of natural resources and to help encourage new or additional conservation activities on other private lands. As a tool used in this manner, the blueprint could help to further prioritize and guide public conservation land planning and help to direct voluntary, incentive and outreach programs to private lands within the identified areas. Private landowners may benefit from this process through goals of outreach, stakeholder coordination, and improved access to information, technical assistance and streamline applications for federal and state programs that direct public funds to private landowners for conservation and restoration of natural resources on their lands. The adoption of this type of statewide cooperative conservation effort would improve the effectiveness of natural resource conservation at local and regional scales.

The “Cooperative Conservation Blueprint” would be an ongoing process, regularly updated by local and state government, stakeholder, public, and conservation organizations as conditions change or other conservation activities are successfully completed. The dynamic blueprints would serve as a temporary conservation tools to better identify data gaps, improve stakeholder involvement, increase planning efficiency or other, similar activities during a next phase of the process.

It is suggested that local and state government, stakeholder, public, and conservation organizations collaborate to adapt and continually change the “Cooperative Conservation Blueprint.” The process would then be steered by involvement and coordination with local and state government, stakeholder, public, and conservation organizations. By producing and continually adapting the “Cooperative Conservation Blueprint” wildlife and habitat conservation efforts could be more directed to high priority areas and be flexible to adapt to Florida’s changing landscape and land us.

## Priority Data Gaps

During the development of the Strategy, information gaps on species and habitat distribution, status and trends were identified. This section highlights the highest priority data and information gap of the Strategy. Some gaps may identify a need for an appropriate future conservation action and others may be limitations of time and resources. Information gaps for individual habitats are detailed in the TNC's Final Report (Gordon et al., 2005). Many of the gaps suggested in the report evolved into research actions within the Strategy.

Priority gaps include:

- A datum need identified in Threat and Actions Workshops was for improved mapping of the Strategy's habitats. While representing the best available land cover analysis at this time (See Chapter Habitats), the existing data layers for some of the habitats addressed do not adequately reflect their true spatial extent and/or configuration. In each workshop, the experts assessed threats based on the true distribution of the habitat as best they understood it, rather than restricting assessment to the cover as presented. Some of the experts' suggestions for improving the freshwater habitat mapping were incorporated into the freshwater habitat layers. Several of the terrestrial habitat covers should be revised. TNC was unable to complete the full stress and source of stress analysis in any workshop for the habitat category Mixed Hardwood-Pine Forest due to incomplete mapping and because the experts were unable to distinguish this habitat from several other habitat types. As a result, no actions were developed through the Threat and Action Workshops for this habitat. Additionally, marine and estuarine habitat data layers in some regions of Florida do not exist or are incomplete or outdated. For example, the Strategy has not yet identified sources for the mapping of the Pelagic or Subtidal Unconsolidated Marine/Estuary Sediments habitat categories, and mapping is not complete for several other marine habitats including Annelid Reef and Hard Bottom. Improved mapping of these habitats will be necessary to support future projects and conservation efforts.
- An important continuing data gap is accurate and up-to-date information on the life history, status and trend, population dynamics, and other aspects of all species, particularly those identified in this Strategy. Working to continue to fill this data gap must be a priority if practical and effective conservation measures are to be developed, undertaken, and assessed for success. Continuing research and monitoring of mammals, birds, amphibians, reptiles, fish, and invertebrates is needed, particularly for those SGCN whose status is unknown or low and whose trend is unknown or declining. Invertebrate groups in particular have received little attention because of lack of awareness and funding. These groups tend to include smaller species, however many perform critical ecosystem functions that need to be better understood.
- Conservation actions in the marine environment differ from terrestrial and freshwater in that all marine environments are in public ownership. Development of the Strategy re-emphasized the need for additional mapping and characterization of nearshore marine environments. There is also the need for information on basic life history, distribution, and status and trends of less well-known marine species. Monitoring of increased

numbers of marine species and habitats will help prioritize and focus conservation actions on the species at the highest risk. Awareness and education of the value of Florida's marine resources is critical. Increased partnerships and collaborative efforts with federal, state, and local agencies as well as public and private organizations will be necessary to successfully conserve marine fish and wildlife species.

- Genetic diversity emerged as an important data gap during the Strategy development process. While the Strategy currently does not address the issue in much detail, it is recognized as an integral piece of the conservation puzzle. Genetic diversity forms the foundation for the maintenance of individuals, populations and taxa through time and provides another field in which to explore population and ecosystem richness and function. An inventory of what is known about the population genetics of the SGCN is needed to better understand the geographical extent of interbreeding populations, levels and patterns of gene flow among populations, the degree of isolation of populations, and the levels and organization of genetic diversity within populations and species. Information on gene flow and genetic diversity of imperiled species is critical. Areas of genetic richness may or may not align with areas of species richness and may identify previously unrecognized areas of critical importance to conserving wildlife resources in Florida.

## Monitoring and Performance Measures

Monitoring, performance measurement, and adaptive management are integral components of Florida's strategic vision for wildlife conservation. Developing a comprehensive adaptive management scheme for a system as large as Florida is a daunting task; therefore, Florida has taken a flexible approach that targets multiple levels and systems. The basic approach is to implement projects focused on key actions and then to monitor changes in performance measures through time (See Figure 6. below). The actions will be based on information and needs identified in the Strategy and performance will be measured at the species, habitat, threat, and Strategy levels. Florida Wildlife Legacy Initiative projects will be evaluated on an annual cycle whereas the Strategy will be evaluated on a five-year cycle. Actions will be evaluated on both cycles, with the annual cycle focused mainly on whether actions are being completed successfully and the five-year cycle focused mainly on whether the appropriate actions have been identified and implemented. Performance measures at the species-, habitat-, and threat-levels collectively will be used to determine if the Strategy is being successfully implemented or needs review and revision. Monitoring and adaptive management efforts will be dependent upon cooperation and partnering at many levels by many organizations and individuals. To be successful, all those working in the conservation arena will need to work together to develop and track measures that can be used to monitor response to conservation efforts and adapt management as necessary to achieve the goals of the Strategy.

To maximize both effectiveness and efficiency, a principal goal of the Strategy is to concentrate conservation efforts at the habitat level to prevent additional SGCN from attaining imperiled status. Monitoring is focused at all levels (species, habitat and threats) within the Strategy as appropriate to assess consistency with performance measures established to determine

the effectiveness of conservation actions. Overall, successful implementation of key conservation actions would be expected to result in:

- Lowered biological scores and action scores for ranked SGCN (see Species Monitoring below).
- Increased percentage of lands and waters conserved through purchases, easements, or otherwise conserved in natural or semi-natural state (see Habitat Monitoring below).
- Reduced rate of habitat conversion or degradation (see Habitat Monitoring below).
- Achievement of major threat monitoring goals (see Threat Monitoring below).
- Decreased number of species lacking population trend and status information (see Priority Data Gaps above).
- Reduction in number of identified data gaps (see Priority Data Gaps above).
- Increased public understanding about the ecological importance of human impacts on habitats.
- A number of completed conservation actions.

### **Species Monitoring**

Florida already has developed valuable tools for prioritizing the conservation of its fish and wildlife resources. The species ranking system, a peer-reviewed monograph publication of The Wildlife Society (Millsap et al. 1990), was developed to prioritize efforts for vertebrate conservation. The system ranks a total of 668 vertebrate taxa (both species and subspecies) according to biological vulnerability, population status (to the extent known), and management needs. For each taxon, the system assigns a biological score, which is the sum of factors that reflect distribution, abundance and life history, and an action score, which is the sum of factors reflecting the current knowledge of a taxon's distribution, population trend, current amount of conservation effort, and limiting factors to the population. The higher the biological score the more vulnerable a taxon is to declines in population. A high action score indicates that little is currently being done in the way of research or management actions for the taxon.

The FWC reevaluates and updates the species ranking list periodically to improve management of these species and adaptively plan necessary conservation efforts. This ranking system enables state conservation planners to track the status and trends of species (biological score), as well as monitor the implementation of conservation actions on a species by species basis (action score). Many of the SGCN will be monitored at a statewide level using the species ranking system. The FWC can measure the relative increase in implementation of conservation actions addressed in the Strategy by assessing the species ranking action scores; if action scores are lowered, that can demonstrate successful implementation of the Strategy. Similarly, lower biological scores for taxa can demonstrate that conservation actions have been effective.

Currently the ranking system is not inclusive of all SGCN identified in the Strategy. Certain species, namely invertebrates and marine species, are not yet included in the ranking system. A high priority monitoring action is to readdress the species ranking list to align it with the SGCN list.

## **Habitat Monitoring**

Public agencies and private entities involved in managing conservation lands currently utilize Geographic Information Systems (GIS) systems to monitor land use and habitat types or land cover on areas they manage. Use of the GIS systems makes it possible to more effectively plan management actions and monitor changes to habitats at the landscape scale throughout the state and at regional and local scales as well. One conservation goal for this Strategy will be to continue and expand use of these GIS systems to monitor habitats and more effectively and efficiently coordinate and integrate conservation actions at the landscape level and other levels, whenever appropriate.

Conservation actions undertaken through programs such as Florida Forever(FDEP), Florida Natural Areas Inventory (FNAI), and the Strategic Habitat Conservation Areas (SHCAs) help to ensure that high priority lands throughout Florida are conserved wherever possible (See Chapter State of the State). Through these programs, important natural areas can be conserved by direct land acquisitions, acquisition of conservation easements, and incentives and cost shares for conservation on private lands. Programs such as these have proven to be successful in the past and will continue to play an important role in the conservation of Florida's wildlife and their habitats as Florida implements this Strategy. The FWC can measure the relative increase in habitat conservation addressed in the Strategy by assessing the percentage of lands protected; if the percentage increases, that can demonstrate successful implementation of the Strategy. Ultimately, targets for evaluating success should be set, with conservation priorities for habitats identified and finalized. Use of these performance measures and targets will make it possible to produce reasonably accurate quantitative assessments of habitat conservation, in terms of preservation or loss.

In addition to monitoring areas of habitats that are conserved, it is important to monitor habitat conditions and the quality of those habitats. This monitoring need is addressed in conservation actions throughout the Strategy. The goal for these actions will be to ensure that suitable habitat management techniques are employed to maintain appropriate habitat quality. Currently, no statewide habitat quality performance measures exist, but work is underway on developing and testing schemes such as the FWC's Objective-Based Vegetation Management system (Florida Fish and Wildlife Conservation Commission 2004) and public (FDEP) and private efforts to monitor success in burning of fire-dependent landscapes.

A further subject for habitat monitoring will be to evaluate conservation actions addressing the issue of habitat conversion. Again, GIS is used for these actions to monitor habitat conversion at the landscape scale. The 2003 Florida Vegetation and Land Cover GIS Data, which was developed by the FWC (Stys et al. 2004), is the most comprehensive statewide assessment of current land covers and habitat conditions; this GIS coverage is based upon 2003 Landsat Enhanced Thematic Mapper satellite imagery (Stys et al. 2004). These GIS data, when combined with appropriate ground truthing, provide a useful tool by which to monitor relatively small-scale changes in habitat condition (land cover) that result from habitat conversion. The quantitative

nature of GIS makes it possible to measure amounts of land converted from one habitat type to another. Decreasing conversion rates of key habitats will be indicative of successful implementation of conservation actions. Although currently not available, similar mapping efforts can be developed for freshwater and marine habitats.

## **Threat Monitoring**

In the previous ‘Statewide Threats’ section of this chapter a set of five major threats affecting multiple habitats and many species was identified. Incorporated into those threats are issues related to the overall success of the Strategy. Monitoring the success of conservation actions directed toward abating those threats will provide a basis for evaluating overall success of action implementation. Listed below for each of the five major threats is the conservation goal developed as the principal solution for that threat and a series of performance measures proposed to evaluate the success of projects developed to achieve that goal.

### *Habitat Loss and Fragmentation*

Goal: Reduce habitat loss and fragmentation resulting from conversion of natural or semi natural habitats to minimize the effects of development

Performance Measures:

- Increased proportion of road, bridge, and/or causeway projects that are appropriately designed and located (i.e., sited)
- Reduced rate of conversion of natural habitats
- Reduced index of habitat fragmentation
- Increased human population density inside the development footprint

### *Degradation of Water Resources*

Goal: Improve the quality of Florida water resources

Performance Measures:

- Decreased per capita water use
- Decreased rates of ground water withdrawal
- Maintained or increased acres of ground water recharge areas
- Increased voluntary landowner participation in wastewater/fertilizer application wise use programs to control urban nutrient loads
- Increased amount of acres of stream and/or shoreline miles which meet minimum flow and water quality standards
- Increased number of stream miles and acres of designated high quality water bodies (e.g., Outstanding Florida Waters)

### *Incompatible Fire Management*

Goal: Increase the presence of appropriately applied fire on the Florida landscape

Performance Measures:

- Increased proportion of each fire-dependent habitat managed with an appropriate fire regime
- Increased area of appropriately burned land by habitat category

*Invasive Plants and Animals*

Goal: Reduce the presence of and impact of non-native, invasive plants and animals

Performance Measures:

- Decreased number of acres impacted by non-native, invasive animals
- Decreased number of acres dominated by non-native, invasive plants
- Decreased number of infestations of non-native, invasive plants
- Decreased number of newly introduced invasive animal and plant species

*Management of the Physical Environment*

Goal: Minimize the cumulative effects that management of nature, including dams, shoreline hardening, dredging, beach nourishments, and impoundments, have on Florida's habitat, especially in regard to aquatic resources

Performance Measures:

- Increased number of beach/shoreline acres/miles acquired or otherwise protected
- Increased tidal connections to isolated and impounded wetlands
- Increased proportion of beach nourishment or impoundment projects that are appropriately designed and located (i.e., sited)
- Increased usage of alternative methods for beach protection
- Increased number of naturally functioning inlets
- Decreased amount of adverse deposition and erosion of sediment, and more ecologically-appropriate flow rates around bridges and causeways
- Increased causeway replacement with bridges

## **Evaluating Success and the Effectiveness of the Strategy**

A major component of the monitoring program for the Strategy is evaluation and adaptive management (See Chapter Florida's Approach to Meeting the Eight Required Elements). Inputs (resources—e.g., money or time) are monitored at the individual project level and at the Strategy level to evaluate not only the effectiveness but also the efficiency of conservation actions and adapt changes as necessary. A database will be developed to track Strategy inputs from sources such as State Wildlife Grant (SWG) funds or matching and other funds associated with SWG-funded projects. Results or outcomes are monitored at several levels including: individual projects, specified conservation actions, and the overall Strategy. The database will assist in answering questions including: Are conservation actions focused in the appropriate directions to achieve larger-scale, Strategy, objectives? Are conservation actions achieving desired objectives in an effective and efficient manner? Evaluations also will be conducted along several time scales. Annual and final reports will be conducted for individual projects, annual and five-year assessments

will be conducted for conservation actions, and five-year assessments will be conducted for the Strategy. Project review will be based on performance measures appropriate to each project (Was it completed on time? Was it on budget? Did it have the desired outcome?, etc.). Action review will be based on assessment of all projects implemented under each action on an annual basis and on species, habitat, and threat performance measures tracked every five years. Strategy review will be based on assessment of all projects, actions, and performance measures. However, it is important to note that many variables and influences outside the control and influence of the Strategy may be affecting the performance measures regardless of the successful implementation of key actions. Therefore, the five-year review will assess Strategy success within the context of the global environment in Florida.

The flow chart in Figure 6 demonstrates how monitoring and evaluations are incorporated at multiple levels and how, together with reporting procedures, they will be applied to provide feedback on the effectiveness of the Strategy as it is implemented. This multi-level, overall evaluation scheme will help ensure that the Strategy is meaningfully implemented and will provide needed documentation of progress. The projected reporting and evaluation schedule for the Strategy over the next five years encompasses the following levels and time-scales:

- I. Individual projects
  - A. Annual (interim)—Reports
  - B. Final—Reports and evaluations
  
- II. Conservation Actions
  - A. Annual —Assessment and evaluation
  - B. Five-year—Assessment and evaluation
  
- III. Strategy
  - A. Five-year — Assessment, evaluation, and revision as needed

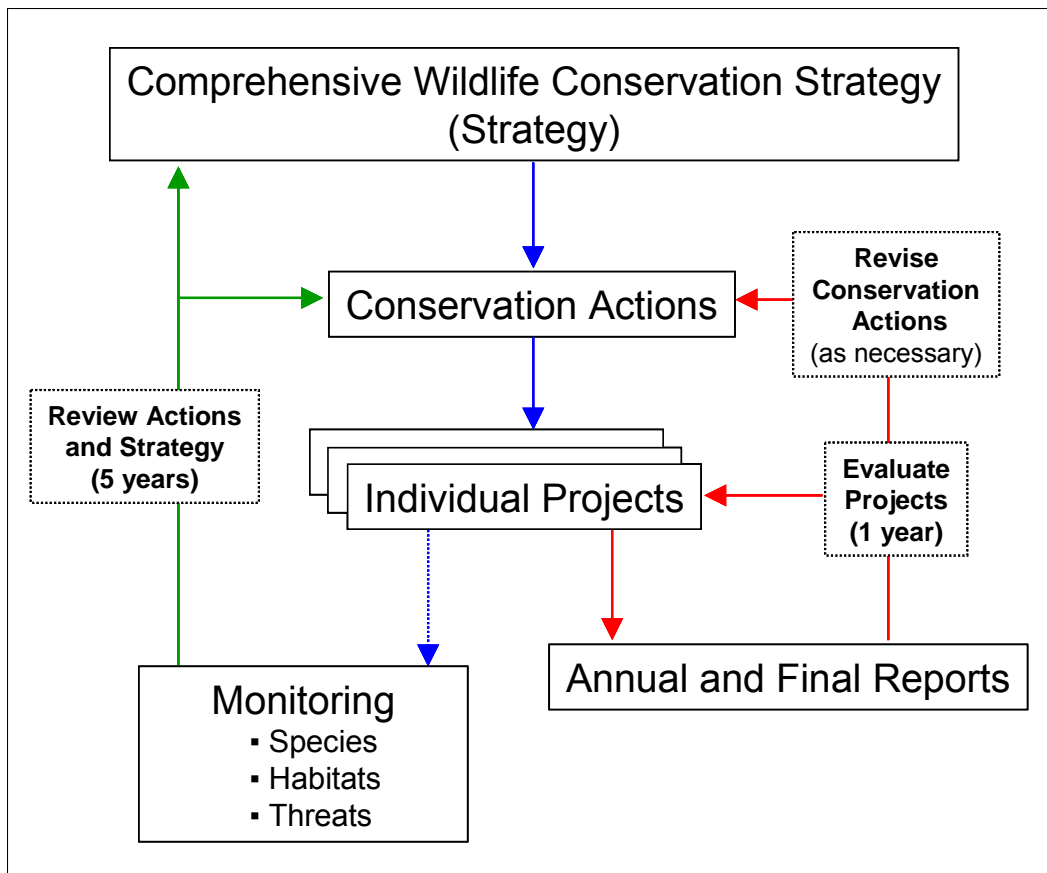


Figure 6. Flow chart showing the conceptual framework for how monitoring and evaluations will be applied to provide feedback at multiple levels as Florida's Strategy is implemented.

Even with the more formal five-year review, the Strategy is intended to be a flexible, living document and will be subject to continual revision and update as data gaps are filled, new information arises, and stakeholder and public input is received. Less formal Strategy updates may be produced at intervals shorter than the periods stated above in response to these matters or as newly emerging issues and needs arise. When determined to be necessary, such Strategy updates may be submitted to the U.S. Fish and Wildlife Service (USFWS) for review and comment.

## Monitoring Tools and Resources

### *Current Monitoring and Database Development*

A plethora of public and private organizations currently conduct a tremendous number of monitoring projects for both species and habitats within the lands and waters of Florida. The monitoring program administered by the FWC staff encompasses over 200 existing projects that are conducted throughout the state. Other major, ongoing monitoring projects include the Florida Springs Initiative (FDEP), the Comprehensive Everglades Restoration Plan (USACE and SFWMD), the Integrated Water Resource Monitoring Network (FDEP), and those undertaken by the National Coral Reef Institute. Additional current monitoring projects are identified throughout this Strategy.

As the initial step in implementing the monitoring program for the Strategy, FWC is developing a baseline inventory of existing monitoring projects to more effectively identify and coordinate data being collected through the multitude of current monitoring projects in Florida. Identifying existing projects helps to better-integrate new and existing monitoring projects. Data for the baseline inventory is recorded in a relational database. Data recorded in the database for each monitoring project include conservation threats addressed, conservation actions implemented, species and habitat monitoring techniques employed, and performance indicators and targets used to evaluate success. This baseline inventory covers public and private conservation and management entities around the state. Data are input to the database from existing management plans and similar documents, as well as from results of personal interviews of biologists and land managers who are implementing such plans. Compilation of this information in a searchable database form will assist future adaptive management efforts to improve protocols for monitoring projects and revise conservation actions undertaken, as appropriate. As implementation of the adaptive management process moves forward, the database can be used to track changes in monitoring as priorities for conservation actions are revised. The database will be available on the internet, so that the state's citizens and natural resource managers can benefit from the information archived there.

### *Species Monitoring Databases*

Numerous detailed monitoring databases have been developed to compile and archive data on the distribution, abundance, and status of particular populations, species, or species groups (e.g., nesting shorebirds). Databases are regularly updated to incorporate new data that become available from the results of conservation projects that are undertaken. Information from species monitoring databases is regularly imported into the central database for rare and imperiled species.

Although these databases were developed at different times and for different purposes, efforts are in progress to standardize formats and better enable linkage, including the use of common formats in fields for site, habitat, and spatial (location) data. Databases incorporating spatial data can be linked to GIS files, making it possible to more easily summarize all work that has occurred in a particular location. Currently these efforts apply primarily to species monitoring databases within the FWC, but could be expanded to include other existing databases in Florida.

### **Monitoring the Strategy in the Future**

Throughout the process of developing this Strategy, there has been an identified need for further improvement in, and coordination of, monitoring programs throughout the state. As implementation proceeds, evaluations that are undertaken will provide feedback to refine plans for future developments in the Strategy. In general, future goals for monitoring within the Strategy will include further development of databases for compiling and tracking data.

Most Florida habitats require periodic or occasional management and virtually all the statewide threats have a spatial component. Expansion of spatial information (i.e., GIS) systems to enhance species and habitat evaluations will be another important future Strategy-level monitoring goal. An additional statewide GIS coverage of conservation threats and implemented management actions would be examined as a monitoring tool to assess success in addressing those elements of Florida's Strategy. For example, in the case of the 'Incompatible Fire' threat, a GIS coverage would be created to depict the current location and condition of Florida's fire-dependent habitat

categories; associated with that would be relational database tables containing fire history data including fields such as date of, and time since, last fire. As conservation actions are initiated, the data table and condition map would be updated. Desired performance measures would be included as data fields for use in evaluating the scope of the response and effectiveness of the management project or conservation action that was conducted. Data can be assessed from a statewide perspective to test for trends or spatial correlations. Although potentially powerful analytical tools for use in providing feedback on the effectiveness of the Strategy, development of GIS applications such as these would require major resource investments (e.g., time and funding). For development and maintenance of these GIS tools, effective cooperation, communication, and coordination among Strategy partners would be vital.

Another goal is to work with other public agencies and private organizations to create a statewide Monitoring Design and Coordination (MDC) team, which would include members representing agencies, private organizations and stakeholders. Objectives for this team would include developing recommendations by which to revise monitoring procedures as necessary for enhanced and better coordinated monitoring activities across the state. The team also could review, and develop recommendations for adopting, potential new monitoring strategies, such as the concept of an adaptive monitoring design (Ringold et al. 1996). Other objectives for the MDC team could include: improving monitoring efficiency, filling monitoring gaps, further refining performance measures, increasing rates at which monitoring data are shared among Strategy partners, and developing additional performance measures. Continued stakeholder and partnership involvement in the implementation and revision of this Strategy will ensure the best application of data gained through all monitoring efforts.

## Key Conservation Challenges

There are many obstacles to administering and monitoring the effectiveness of conservation programs. This is a problem faced by agencies and organizations statewide and across the nation. Florida's Strategy identified these key conservation challenges and highlights recommendations to collaboratively address these issues to improve the efficiency of conservation efforts in Florida.

### **Partnership Challenges**

Partnering is an integral component of both developing and implementing the Strategy. The FWC has the capacity and resources to initiate and catalyze the proposed actions, however successful and long term implementation will require the combined activity of the FWC and many partners in other agencies, conservation organizations and the private sector. In this first iteration the process has identified many potential partners (Appendix A. Identified Conservation Partners). Many of these are the result of organizations stepping forward to offer their assistance in principle to help implement the Strategy.

To develop these optimistic declarations of support into functional partnerships, several organizational and logistic issues will need clarification. Specific action items in the strategy need to be matched to specific partners who have the interest and capacity to assist their implementation. Partnerships will need to be based on clear statements of expectations and understanding of mutual

obligations. They will need to identify the strengths and resources that each partner brings to the project and mechanisms for mutual support and shared responsibility and credit. Partnerships will need to be multidimensional, with partners contributing in numerous ways including expertise, financial and in-kind support, political strength, public support, communications and policy development. Partnering becomes a way to involve different constituencies and promote the ideal of proactive efforts and implementation of conservation actions and ‘keeping common species common’ among diverse interests. Because the Strategy has been developed in close consultation with many potential partners, it should provide a valuable ‘action plan’ that the FWC and its partners can use to identify those common interests.

Several components of the Strategy will support partnership development. Funding, derived from State Wildlife Grants and applied following the Strategy’s guidance, will support partnering through matching fund requirements, initiating and catalyzing project direction and coordinating otherwise independent and discordant activities. Partnerships will be built on a project by project basis, focused on the immediate needs of strategic action and the recognition of common goals. The incentive driven nature of the Strategy provides additional opportunities to build partnerships, particularly with the private sector. The FWC envisions partnership building to be a continuous process, beginning with the consultations undertaken to develop this Strategy, and continuing as an integral component of Strategy implementation. The list of identified partners (Appendix A. Identified Conservation Partners) provides a view of the breadth of partners perceived as needed to achieve wildlife and habitat conservation in Florida.

### **Information Management Challenges**

Throughout this Strategy process, information needs and management were identified as key challenges and potential barriers to addressing important threats to Florida’s wildlife and habitats. Numerous entities across the state collect and manage ecological data. This information is compiled in different formats and systematically organized for various purposes. An even greater challenge is to acquire traditional knowledge that is generally passed orally through generations. It is only recently that our data management infrastructure has allowed GIS capabilities to capture vital data on species distribution, abundance, status and trends.

Agencies constantly face the challenge of limiting redundancy in acquiring data and improving means of sharing capabilities. This obstacle was encountered in our attempts to collect scientific data on a significant number of species. Had there been an integrated network of information, there would not be so many data gaps that could possibly be costly to address. One of the goals of Florida’s Strategy is to build capabilities to share the most accurate, updated information on species and habitats. This Strategy has initiated the steps necessary to identify the needs and the gaps; now there needs to be a collaborative effort to create a more unified database management system. This will allow for better informed management objectives and decisions, as well as incorporation of existing knowledge.

It is important to recognize the realm of knowledge base that exists and reach out to promote and facilitate meaningful participation by scientists as well as resource users. Recreational users (i.e., hunters, anglers, birders) possess a vast amount of knowledge that is not always integrated into statewide monitoring and survey analysis. This information provides a critical source of data that might otherwise be inaccessible. The overarching goal with information management is to share

information so the most accurate and recent data are available to better the conservation of Florida's wildlife and habitats.

### **Public Awareness Challenge**

Promoting informed decision-making and participation in Florida's conservation and management issues is imperative to achieving the goals of the Strategy and avoiding further exhaustion of opportunities associated with our fish and wildlife.

Conservation of Florida's fish and wildlife ultimately depends upon the commitment of Floridians to its protection. The key to instilling this commitment is through effectively designed conservation education programs.

Conservation educators must match target audiences with issues and craft messages and strategies that incorporate an understanding of public opinion, attitudes and demographic trends and are targeted at the appropriate stage of awareness (little or no awareness, awareness, appreciation, understanding, concern, action). Today's challenge is bringing citizens from the concerned stage to the action stage. Previous research has shown that while many Floridians were concerned about the loss of Florida's wildlife, very few were acting on its behalf, largely because they did not know what to do. Knowledge of action strategies is one of the most important variables in beneficial behavior and responsible action. Developing programs that focus on teaching citizens the appropriate action they can take to assist in wildlife conservation will be key.

Implementation of Florida's Strategy offers opportunities for outreach and contribution of many constituencies. Successful and effective conservation requires integrated and interdisciplinary efforts. The development and implementation of programs that raise awareness and motivate helpful action behaviors among the various target publics are key goals. Educational programs increase public involvement, furthering support of our fish and wildlife and the habitats upon which they depend. This would also allow an avenue for gathering information and knowledge on species status and trends. Conservation education programs will increase knowledge of and concern for the conditions of our terrestrial, marine, freshwater, and estuarine ecosystems and the relationships of their use. It is essential that education efforts support other actions already taking place and integrate accordingly. Florida's goal is to encourage everyone to become involved in a pro-active manner for the benefit of all fish and wildlife populations.

## **Conclusion**

In order to meet and overcome challenges to conservation, it is important that significant portions of this Strategy be implemented and the Strategy be revised and updated continually. It is beyond the scope of the FWC to comprehensively address all of the complexities facing Florida's wildlife. There are numerous other agencies at the federal, state and local level, and public and private organizations addressing different components of the issues or that have the responsibility and mission to do so. Partnering is therefore an integral aspect of implementing the Strategy. Successful and long-term implementation will require the combined activity of the FWC and many partners in other agencies, conservation organizations and the private sector.