# SEA TURTLE NEST PREDATOR CONTROL PLAN

**on the**

# TEN THOUSAND ISLANDS NATIONAL WILDLIFE REFUGE

Collier County, Florida

For Further Information, Contact:
Refuge Manager
Ten Thousand Islands National Wildlife Refuge
Southwest Florida Coastal Refuge Complex
U.S. Fish and Wildlife Service
3860 Tollgate Blvd, Suite 300
Naples, Florida 34114

Prepared by:
Annjanette Greenwood, Joyce Palmer, and Larry W. Richardson
U.S. Fish and Wildlife Service
U.S. Department of the Interior
Naples, Florida
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## INTRODUCTION AND NEED FOR PREDATOR CONTROL

The 35,000 acre Ten Thousand Islands National Wildlife Refuge consists of marsh, estuarine, and mangrove habitats. The refuge is responsible for managing beaches that support nesting habitat for several species of threatened and endangered sea turtles on state (B, Gullivan, Turtle and Whitehorse Keys) and federal lands (Panther and Round Keys). Five species of sea turtle are known to occur along the coast of Florida, all of which are federally listed as threatened or endangered. Two of these, the loggerhead (*Caretta caretta*) and the green (*Chelonia mydas*), regularly nest on southwest Florida beaches, with the vast majority of nesting by the loggerhead turtle. The Kemp's Ridley (*Lepidochelys kempi*) forages in the waters surrounding TTINWR but does not use the islands for nesting. The U.S. Fish and Wildlife Service (USFWS) has documented substantial loggerhead nesting activity in the northern Ten Thousand Islands since 1991 (Edwards and Carnall 1991, Doyle and Magerowski 2002).

Substantial historical and anecdotal data references support the fact that Loggerhead and Green Turtle nests attract predators. One objective of the loggerhead sea turtle recovery plan is to implement appropriate nest protection measures to ensure that mammalian predation on nests is 10 % or below (USFWS 2008). Raccoon (*Procyon lotor*) predation was identified early on as the primary source of turtle nest failure in the Ten Thousand Islands (Edwards and Carnall 1991, Garmestrani 1995).

Between 1991 and 1994, raccoon depredation affected between 76 percent and 100 percent of the nests laid on Panther Key. Consequently, a raccoon control program was initiated on Panther Key in 1995 and 1996 to determine if such a program would improve sea turtle nesting success. This program showed that two successive years of raccoon control greatly increased hatch success on an island, especially during the second nesting season. Fourteen raccoons were captured on Panther Key in 1995, and two were captured in 1996. In 1995 and 1996, 0 percent of the nests were depredated on Panther Key; results believed to be a result of predator control. Since then, the intensity of raccoon trapping in the Ten Thousand Islands area has varied annually, depending on funding, staff resources and location. Raccoon trapping was discontinued in 1997, resumed in 1998 and continued through 2003. Trapping was resumed during 2008 on state-owned lands only

During 2008, 22 of the 24 nests laid on Gullivan Key were depredated (92%). Because the depredation rate was so high, raccoon control was reinitiated by Rookery Bay during the nesting season, and seven raccoons were trapped on Gullivan Key. Turtle monitoring and raccoon trapping did not take place on Whitehorse Key in 2008. In 2009, 17 raccoons were trapped before and during the nesting season on Gullivan and Whitehorse Keys. In that nesting season, 21 loggerhead and 5 green turtle nests were laid on these islands, and 17 of these were depredated by raccoons (65%). In 2010, 41 raccoons were trapped on the same two islands, 21 loggerhead nests were laid, and only 2 of these nests were depredated by raccoons (10 %). This is evidence that predator control is a long-term need. One or two years of predator control can reduce depredation to meet recovery objectives but is not sustainable without continued trapping objectives. Continuous

trapping can effectively bring the depredation down to 10 percent or less, one of the objectives listed in the Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (USFWS 2008).

In addition to raccoon predation, there are invertebrate species on the islands that could potentially predate on raccoon nests. Ghost crabs are common shore crabs of the genus *Ocypode* and occur within the refuge and adjacent lands. In the south eastern United States, ghost crabs tunnel down several feet into the ground at a 45° angle, creating 1 to 2 inch wide holes on the beach. Ghost crabs are effective scavengers of organic matter and it's believed that this may include eggs and nestlings of the loggerhead sea turtle (Dodd 1988). However, there is recent evidence that this level of predation is insignificant (Thompson 1995; Von Harten et al. 2002). Ghost crabs are currently not known to prey on sea turtle eggs or hatchlings in the Ten Thousands Islands. Also, the imported red fire ant, introduced from South America in the 1930s, is found throughout Florida. The occurrence of red fire ants in green and loggerhead sea turtle nests has been documented but few researchers have been able to document hatchling mortality due to fire ants. Fire ants are not currently known to prey on sea turtle eggs or hatchlings in the Ten Thousands Islands NWR.

In South Florida, available sea turtle habitat continues to decline at an alarming rate due to development, storm erosion, and sea level rise. Therefore, maximizing nest production in existing nesting areas is essential to sea turtle recovery efforts. An active predator control plan will aid in reaching recovery goals. As such, the refuge will implement this predator control plan to reduce the number of sea turtle nests lost or damaged due to predation. 27 percent of the nests surveyed between 1991 and 2003 and 59 percent of the nests surveyed in 2009 in Ten Thousand Islands area were adversely affected by raccoon depredation.

## PURPOSE FOR PLAN

The purpose of the proposed plan is to improve sea turtle nesting success within the refuge and adjacent islands and reduce raccoon depredation to less than or equal to 10 percent of all sea turtle nests. The need for action stems from the low reproductive success recorded on the refuge due to predation by raccoons.

## AREA DESCRIPTION

The Ten Thousand Islands archipelago is a wide band of low lying mangrove islands of varying size extending 40 kilometers (km) along Florida's southwest coast, from Cape Romano to Pavilion Key. It is part of the largest mangrove forest ecosystem in the continental United States, and supports a rich diversity of wildlife, including a number of threatened and endangered species. The beaches found on these mangrove dominated islands are usually narrow and interspersed with coastal berms. Six of the most seaward islands have a combined total of 4.9 km of uninterrupted beach where sea turtles nest (Figure 1). They are uninhabited, vehicle free, and can only be reached by boat. These six islands (B Key, Turtle, Gullivan, Whitehorse, Panther, and Round Keys) have been

periodically surveyed since 1991. They have historically high sea turtle nesting activity and most of the islands have had raccoon trapping, of varying intensity, done in the past. This predator control plan would target these six islands, although only Panther and Round Keys are owned by the refuge. The remaining islands are owned the state of Florida and are managed by the Rookery Bay National Estuarine Research Reserve (RBNERR). However, the refuge has a management agreement with RBNERR which allows the refuge to implement management practices to protect and restore fish and wildlife resources including the enforcement of laws, control of nuisance and invasive plants and animals, conduct scientific research, manage visitor use, and conduct environmental education on state-owned lands.

## PLAN IMPLEMENTATION

The refuge will contract with the U.S. Department of Agriculture, Wildlife Services, to implement this plan to control raccoons. They will use a range of control techniques described below. Refuge staff will also supplement contracted efforts to trap predators independently when contracting the work in a given year is not feasible. Additionally, the refuge will control other predators as described below as necessary.

## APPLIED METHOD

**Population Reduction Using Lethal Control**- Lethal methods of wildlife control are very effective when used properly. Problem Animals can be targeted and their numbers reduced without negatively affecting the overall faunal community. Our plan is to trap raccoons on or near the beaches of the six islands in the spring months so as to maximize control of raccoons before the start of sea turtle nesting season. Concentrated trapping efforts would begin in early March and go through April, prior to the start of sea turtle nesting season (May - October). During this period, trapping efforts will continue if depredation is occurring. With this alternative, risk to non-target species is minimal. The traps are checked each morning to reduce the exposure of trapped animals to adverse weather conditions. Traps can only be checked once a day due to the challenging nature of getting to the nesting beaches (tides, weather, etc.). Trapped raccoons are shot at very close range (approx. 20cm) utilizing a .22 caliber round discharged into the cranium. In some cases, all of the raccoons from an island may be removed. To minimize exposure to the visiting public and their pets, all traps will be located among vegetated areas for enhanced concealment and further camouflaged with appropriate cut vegetation to disguise traps and provide shade to any trapped animals. The carcasses will then be buried in sandy areas behind beach vegetation, away from visitor use areas. Burial would not be done in areas with identified archeological sites or sensitive vegetation communities.

Human safety hazards associated with the use of live traps are minimal. Risk of human injury by live traps is generally limited to FWS, cooperators or designated contract employees. Additionally, traps are placed away from the public use areas in order to minimize perceived risks to the general public. Risk to domestic animals would be negligible because pets must be leashed and controlled at all times while on the refuge.

Great care will be taken to reduce the effects of our activities. Boats will not ingress and egress near designated areas where disturbance to feeding and loafing birds is likely to take place. Night vision lights and red lights will be used when on the islands at night to minimize any effects on nesting sea turtles if predator control needs to take place during sea turtle nesting season.

The following methods will be used alone or in combination to effectively control the raccoon population.

Raccoon

a. **Walk-in Live Traps**: Walk-in Live Traps will be placed at predetermined intervals with additional traps placed in high predation areas. This trap line will be checked once per day. A variety of baits will be used including peanut butter, sardines, canned cat food, and chicken. The traps will be placed in areas where there is evidence of raccoons, but discretely hidden away from the public view to minimize the risk of vandalism. Trapped raccoons will be euthanized immediately and humanely; generally with a single .22 caliber round to the cranium. Non-target species will be immediately released. Traps will be checked early each day to minimize animal exposure to adverse weather conditions.

b. **Leghold Traps**: Leghold traps, including Egg Traps, are a versatile and widely used control method for capturing raccoons. Placement of these traps is contingent upon the habits of the target species, habitat conditions, and the presence of non-target animals. These traps would generally be set near partially depredated nests in order to target raccoons visiting or revisiting nests or in travel lanes used by raccoons. Leghold traps will not be used on predated nests close to hatching to avoid impacts to hatchlings. Traps will also be set using bait or lure as attractants. Common attractants will include peanut butter, sardines, canned cat food, marshmallows, meat scraps, and variations of the above. As with walk-in live traps, trapped raccoons will be euthanized immediately and humanely; with a single .22 caliber round to the cranium. Non-target species will be immediately released. Traps will be checked early each day to minimize animal exposure to adverse weather conditions.

   All leghold traps will be removed from visitor-use areas or covered during visitor-use hours. Setting and routine inspection of leghold traps located on the beach would be conducted during twilight hours to reduce potential impacts to sea turtles from the presence of humans. They would not be placed in areas where adult sea turtles or hatchlings could be affected. If nighttime activity is required, all efforts will be made to minimize disturbance to nesting sea turtles.

c. **Shooting**- Shooting, as a stand-alone control method, is highly selective for the target species; but is relatively expensive due to the staff hours required. Shooting, nevertheless, is a proven wildlife damage management method. Removal of problem animals can quickly stop extensive damage. Raccoons will

be shot on the beach during nighttime hours using a small caliber rifle or handgun. Every precaution will be taken to ensure that there is no risk to humans or non-target species. These precautions include using experienced marksmen, shooting in safe directions with appropriate back stops, shooting at close range to increase the negative angle of the trajectory to direct the projectile into the soil, and using night vision scopes or red filtered spotlights to positively identify the target. Red lights will be used selectively to minimize negative impacts to nesting sea turtles. Shooting may occur from boats or shore. Carcasses will be retrieved and buried.

Invertebrate Predators

Should ghost crabs prey on sea turtle eggs or hatchlings within the refuge or adjacent lands, a determination will be made if hatchling and/or egg loss is significant enough to warrant ghost crab control. If so determined, they will be captured using live traps and relocated or euthanized as necessary to meet the nesting success goal.

Should fire ants become a problem; the area surrounding the turtle nest will be searched to locate any ant mounds. Consistent with the 2011 Station Manager's approved list of pesticides, a commercial ant bait will be applied by hand directly to the ant mound, in accordance with State and Federal regulations, in order to avoid adverse impacts to turtles. This will be repeated as necessary.

**SPECIAL CONDITIONS**

**Field Records:** Accurate field notes will be kept to document trapping success. The number, location, and bait of each trap will be recorded for each trap. If a contractor is used, they will record and present data, compatible with the refuge's format, and provide a final report at the conclusion of the contract period. An annual summary report will be completed by refuge personnel at the end of each trapping season and submitted to the refuge manager.

**Contractor:** The refuge, whenever feasible, will employ the services of the U.S. Department of Agriculture, Division of Wildlife Services, or other contractor to remove sea turtle predators until such time that the predation rate drops to a manageable level (10 percent or less) (USFWS 2000). The annual contract period will run for approximately 30 days or until allocated funds are depleted. The contractor's services will supplement the refuge's predator control efforts and are not designed to completely replace them.

**Trapping Activity and Transportation:** Refuge and contracted personnel will conduct trapping activities in a discrete manner. Traps will be placed out of public view. Trapping efforts will not conflict with sea turtle nesting beach surveys. All guns will either be locked in a government vehicle, returned to headquarters, or maintained discretely in a gun case while stored on boats for as short a period as possible to avoid alarm to the public. Refuge and contract personnel will keep away from shorebird concentration areas identified in Figure 2 during low tide when traveling to and from

trapping sites to avoid disturbance to plovers and other shorebirds.

Monitoring will be conducted to determine the effectiveness of the predator control efforts. Surveys will be conducted a maximum of once per week to determine the number of nests predated each year. Predation rates can then be calculated based on the average number of nests during the last three years (2008: 71; 2009: 66; 2010: 76).

Extensive monitoring will take place every five years to examine the overall health of the sea turtle populations on the refuge. This alternative monitors sea turtle nesting and false crawls daily between the beginning of May and the end of September. Nests and false crawls are identified, enumerated and evaluated. Clutches are found, marked with stakes as described in the FWC's Marine Turtle Conservation Guidelines (2007), and the position is recorded on a GPS. Depredation is recorded and nesting success is measured. Nests are excavated by hand with hatched eggs, live hatchlings, dead hatchlings, pipped eggs with live hatchlings, pipped eggs with dead hatchlings, and unhatched eggs inventoried. A nest inventory is conducted 72 hours after the first signs of emergence, or 70 days after the eggs are deposited (80 days for green sea turtles), whichever occurs first. If the nest has been subjected to inundation, excessive rainfall, shading or cool fronts, the nest is not excavated until after 80 days after eggs were deposited or 96 hours after the first signs of emergence.

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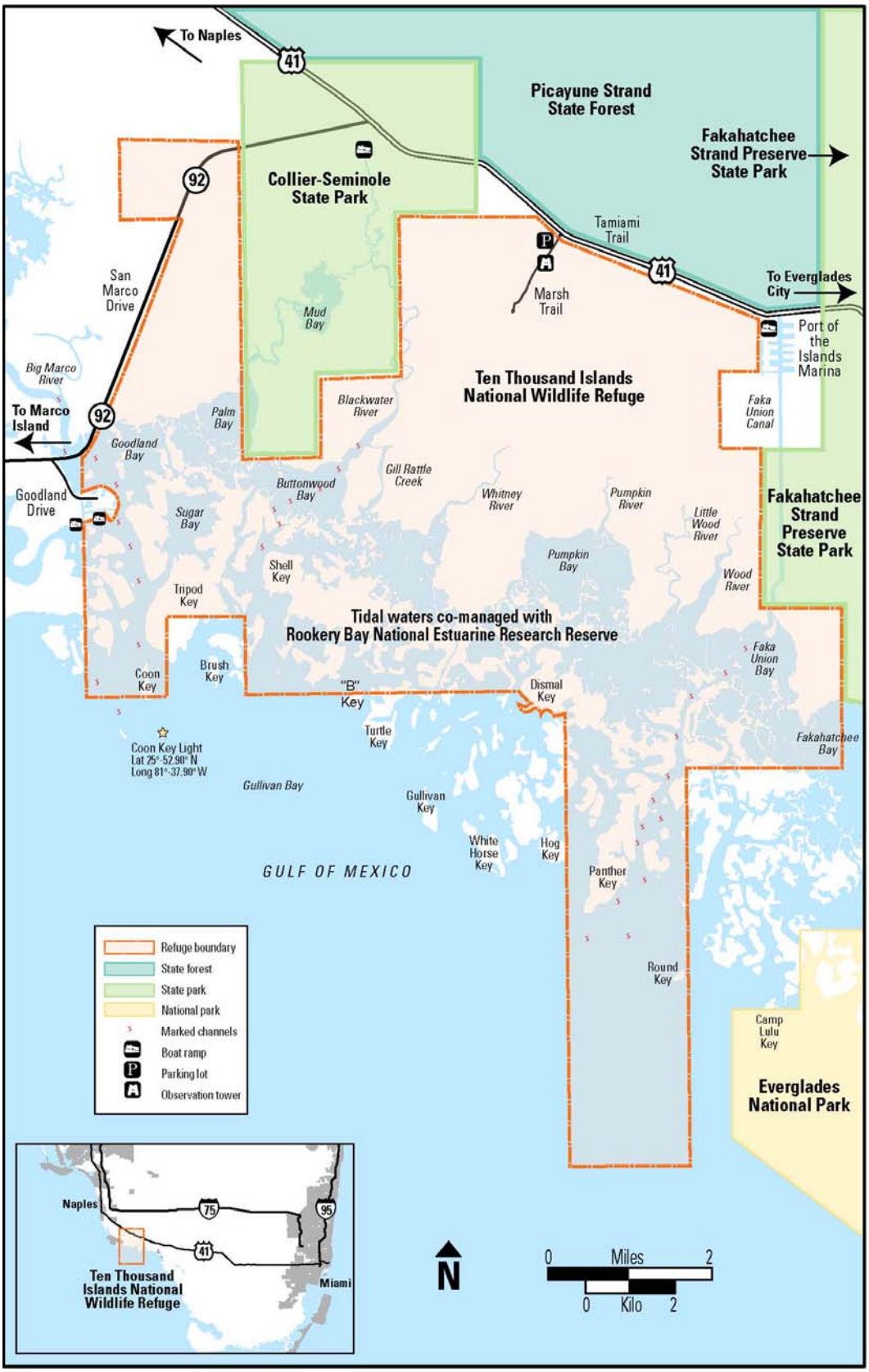


Figure 1. Ten Thousand Islands National Wildlife Refuge and surrounding area.

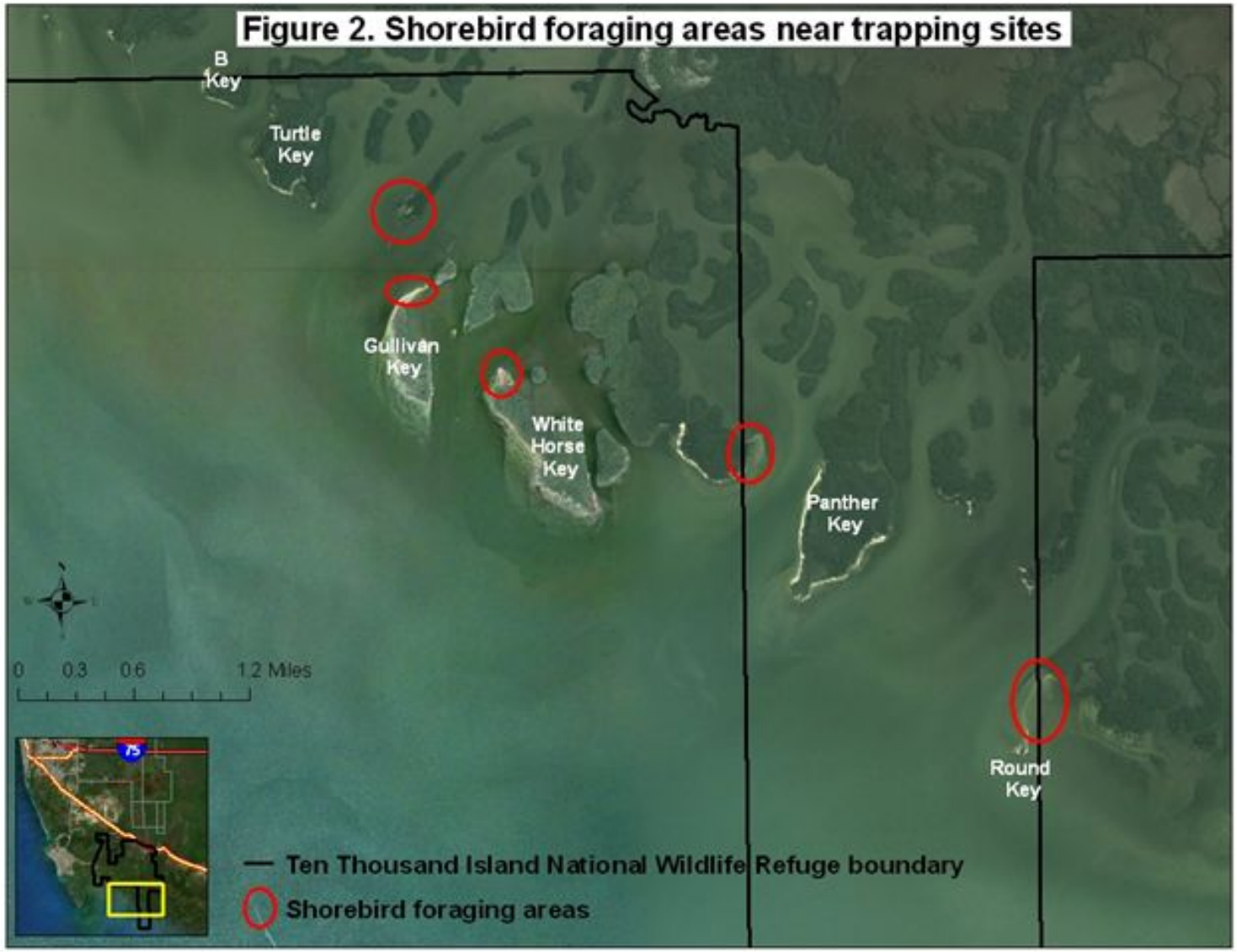
Figure 2. Shorebird foraging areas near trapping sites
B Key
Turtle Key
Gullivan Key
White Horse Key
Panther Key
Round Key
0 0.3 0.6 1.2 Miles
75
Ten Thousand Island National Wildlife Refuge boundary
Shorebird foraging areas