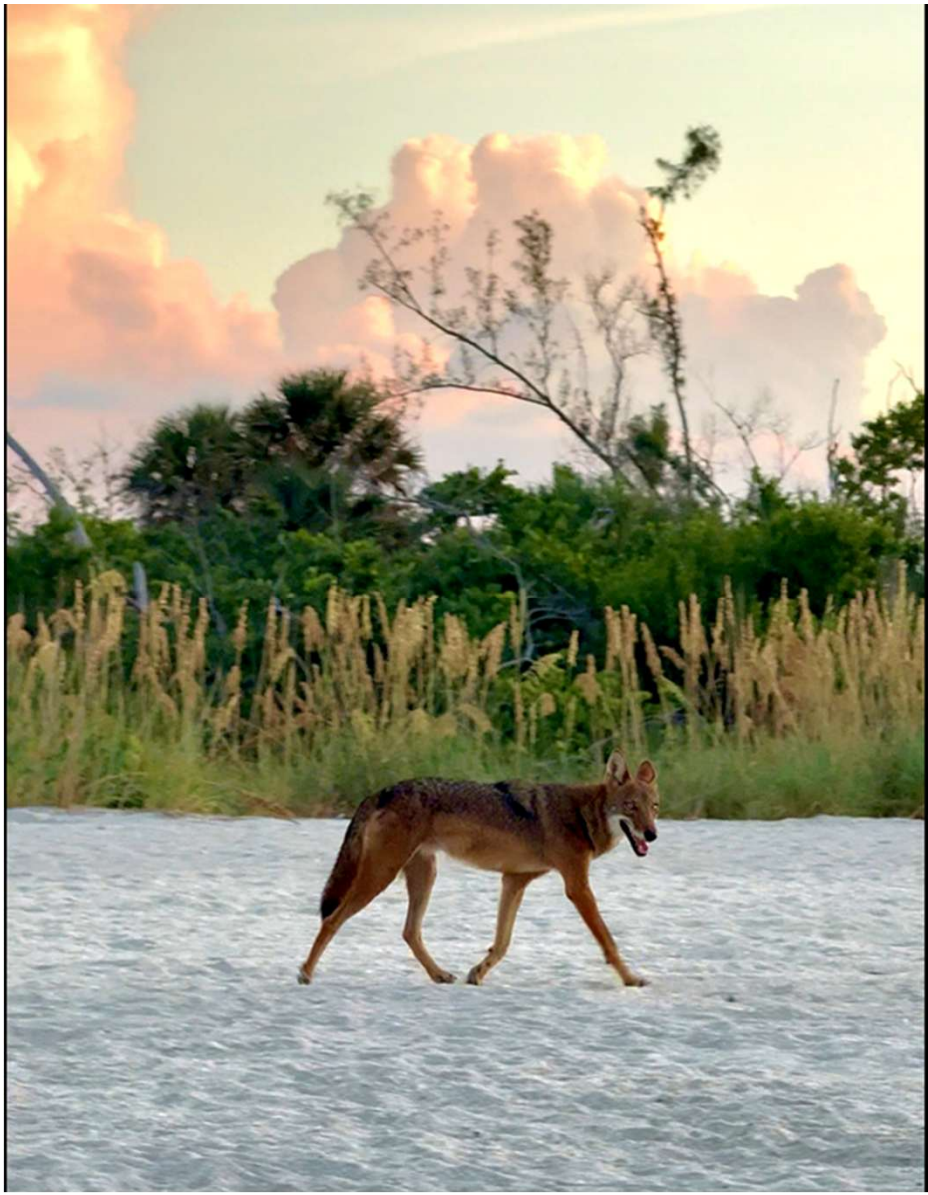
# Depredation Summary and Predation Management Strategies

Presented to Sanibel City Council
Tuesday, February 3, 2026



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# Summary of Coyote Depredation on Sea Turtle Nests


Jack Brzoza
Biologist, SCCF

# FWS/NMFS Federal Loggerhead Recovery Plan

- Lists recovery action to "*reduce nest predation*"
  - *"Reduce the annual rate of mammalian predation to at or below 10% of nests within each recovery unit using ecologically sound predator control programs."*

- And further states:
  - *"Both **nonlethal and lethal** predator control methods (e.g., nest screening, nest caging, humane trapping and removal) should be explored to determine which methods are the most ecologically sound and will work best for the target predators and the beach habitat under consideration. Individual problem animals can be targeted and removed without negatively affecting the local populations of native species."*

# Summary of nest protection methods used

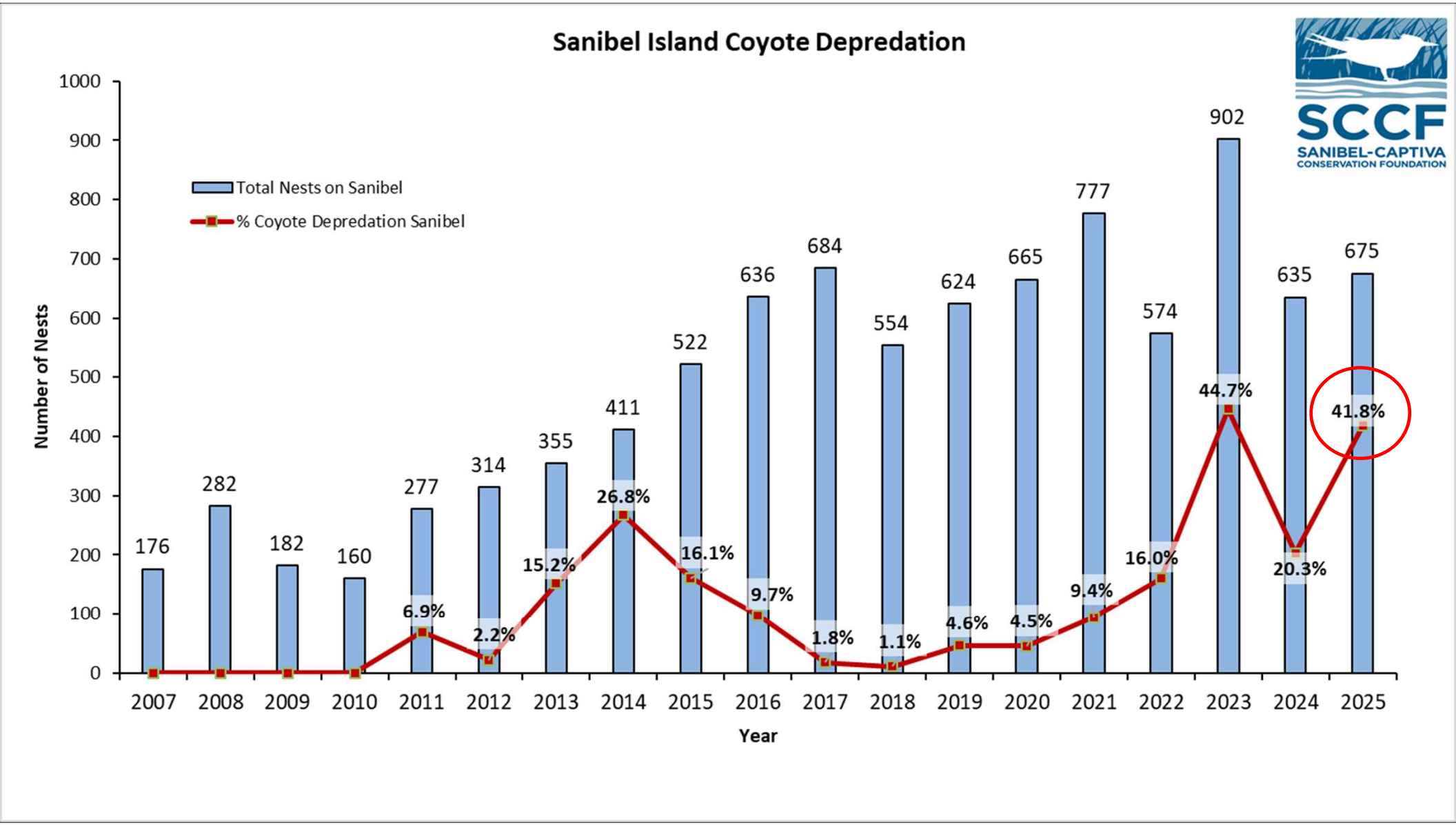
Self-releasing **SCREEN** (2015-2025)

Self-releasing **CAGE** (2023 –2025)

Ground **HABANERO PEPPER** Powder (2024)

**REBAR** anchor stakes (2024-2025)

**AUDIO DETERRENT** trials (2025)


Sanibel Island Coyote Depredation
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Total Nests on Sanibel
% Coyote Depredation Sanibel
Number of Nests
Year
1000
900
800
700
600
500
400
300
200
100
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
176
282
182
160
277
314
355
411
522
636
684
554
624
665
777
574
902
635
675
6.9%
2.2%
15.2%
26.8%
16.1%
9.7%
1.8%
1.1%
4.6%
4.5%
9.4%
16.0%
44.7%
20.3%
41.8%

# 2024 Multi-treatment Results

## depredation rates

38.2%

Depredated across entire range of incubation

9.0%

Rate higher than 2023

24.2%

25.0%

22.1%

36.7%

Neither rebar, nor pepper significantly more effective than screening alone

# Caging 2025

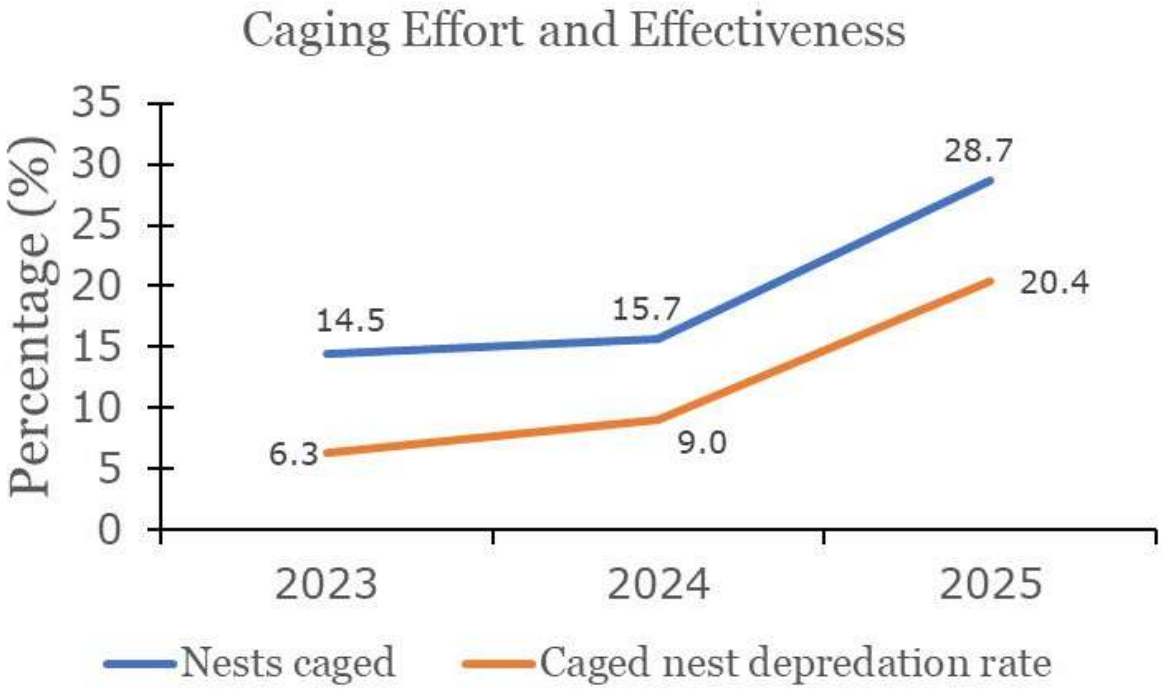
- Target 2024 red zones
- 255 nests caged (~640 staff hr.) on Sanibel & Captiva
- Red zones shifted
  - away from caging zones
  - selecting against cages

| Sanibel East | 2024 | 2025 |
|---|---|---|
| Zone 1 | 9.7% | 8.1% |
| Zone 2 | 26.7% | 15.4% |
| Zone 3 | 22.7% | 0.0% |
| Zone 4 | 57.1% | 0.0% |
| Zone 5 | 96.4% | 69.6% |
| Zone 6 | 56.4% | 37.8% |
| **Sanibel West** | **2024** | **2025** |
| Tarpon-Shalimar | 35.0% | 45.7% |
| Sandpiper-Island Inn | 50.0% | 42.1% |
| Seascape-Rabbit Rd | 36.4% | 79.3% |
| Beach Accesses | 29.3% | 55.4% |
| End of WGD | 17.6% | 61.8% |
| Gulf Pines/Shores | 43.9% | 64.5% |
| CSM-Seaspray | 60.7% | 47.1% |
| Gulf Ridge | 50.0% | 42.9% |
| Eastern Bowman's | 2.4% | 30.4% |
| Western Bowman's | 21.4% | 56.7% |
| Clam Bayou/Silver Key | 18.8% | 85.4% |
| Blind Pass | 35.9% | 84.6% |

| Captiva | 2024 | 2025 |
|---|---|---|
| SS GC - Plantation Road | 35.7% | 51.4% |
| Plantation Rd - SS Beach homes | 28.0% | 39.5% |
| SS beach homes -Bayside villas | 22.7% | 38.1% |
| Bayside Villas - Murmond Ln | 16.7% | 42.9% |
| Murmond Ln - 1591 Cap Dr | 28.6% | 58.3% |
| 1591 Cap Dr - 16334 Cap Dr | 39.3% | 75.0% |
| 16334 Cap Dr - 16660 Cap Dr | 40.6% | 50.0% |
| 16660 Cap Dr - Turner Beach | 40.5% | 79.2% |

# Caging Overview

- Caged nests on Sanibel & Captiva
- Caged nest depredation increased each year

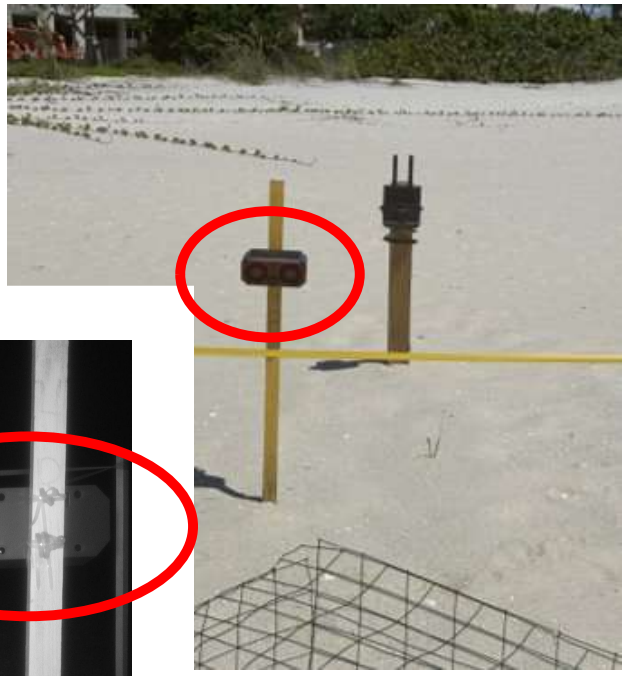



# Audio Deterrent #1

- Sporadic, pulsating noise (11-12 kHz )
- Tested on SCCF preserve
- Wildlife cameras captured images pre/post deployment & activation
- Coyote images highest during activation period (72 hr.)
  - higher post-sounding (3 & 14-day periods)
- Coyotes **did not avoid** area during or after activation

# Audio deterrent #2

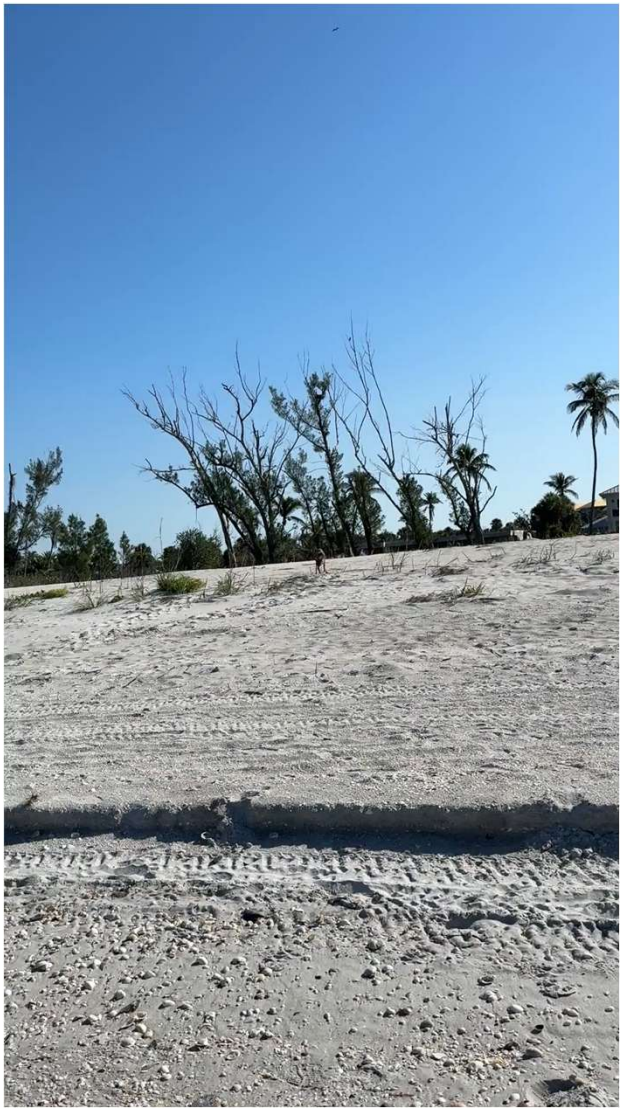
- Infrared solar alarm
- Motion-activated, flashing red lights,13 sounds
- Tested on two nests (23 & 26 days)
- Wildlife cameras captured coyote images



- **No strong evidence of avoidance**
  - images captured most nights
  - Some reaction/fleeing, but returned same night, subsequent nights

# 2025 Coyote Behavior

- More frequent daylight beach sightings
- Coyotes actively depredating nest on surveys
- Smashing down, chewing through, digging underneath buried flanges



# Depredation Causes Significant Egg Loss

## From 2021-2025:

Coyotes depredated:

**69,655** eggs*

Storm loss:

**50,952** eggs**

*Minimum estimation from egg counts
**Approx. based on no. of nests lost & avg. clutch size (2021-2025)

## 2025 Sanibel Nest Counts

**41% Depredation**

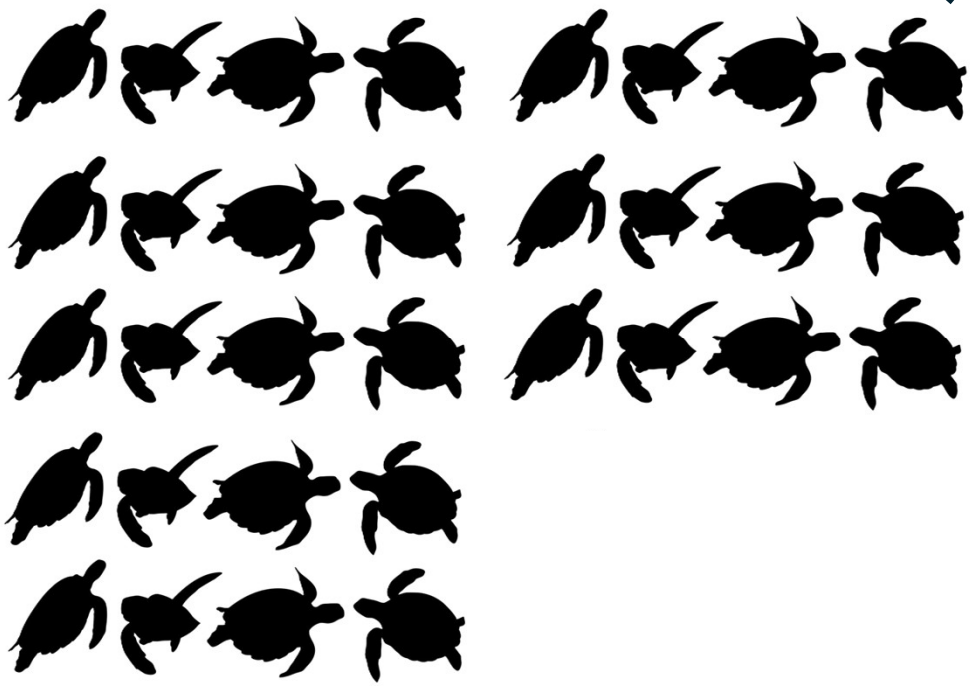
399 nests

2025 average 80 eggs/nest

31,920 eggs

31,920 hatchlings

1/1000 survive to adulthood



**Loss of 22,080 hatchlings in one year**

Hatchling loss with current rate and no intervention:

**5** years: **-110,400 (110 adults)**

**10** years: **-220,800 (220 adults)**

# Depredation and Hatchling Loss


- Depredation at emergence
- Cannot be reliably estimated
  - No physical evidence
- Hatchling & coyote track intersection indicates predation

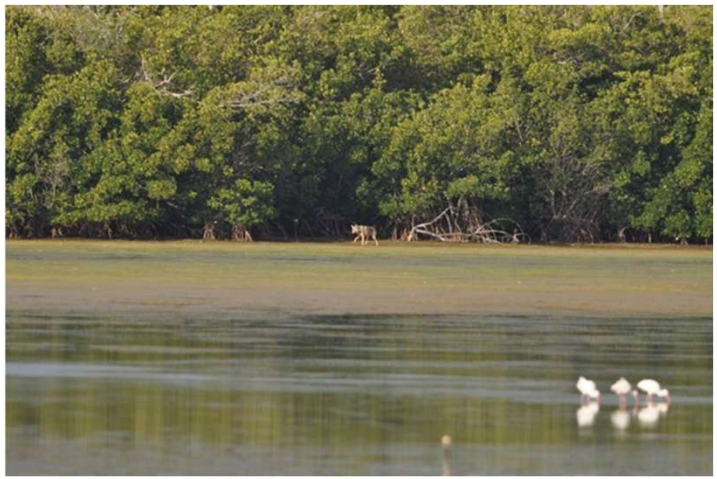
# Moving Forward

- SCCF tried more non-lethal treatment options than other FL beaches
- Standard FWC-approved treatments exhausted
- Depredation on cages has risen each year
  - Not a viable long-term solution

# Coastal Wildlife Predation Management Strategies

# Coyote Response on Sanibel

- March 2011 – City notified public and requested assistance in providing other reports to Sanibel Police Department
- 2011 to 2014 – public education efforts added to City website and coordinated efforts with conservation organizations begin




# Coyote Biologist Working Group (CWG)

- February 2014 – CWG meets for first time to discuss impacts
  - City of Sanibel
  - Sanibel-Captiva Conservation Foundation (SCCF)
  - Clinic for the Rehabilitation of Wildlife (CROW)
  - J.N. “Ding” Darling National Wildlife Refuge (USFWS)
- Working Group Objectives
  - Periodically share knowledge and data about coyotes and their impact
  - Develop CWG agreement and action plan for monitoring and management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CROW
Clinic for the Rehabilitation of Wildlife
www.crowclinic.org Sanibel Island, Florida

# Coyote Action Plan (CAP)

- Two Objectives of CAP
  - Minimize human-coyote conflicts.
  - Minimize predation by coyotes on wildlife, specifically nesting sea turtles, nesting shorebirds, and other protected species.
- Strategies to Accomplish CAP
  - Obtain ecological and population data on coyotes on the island.
  - Assessments of predation on vulnerable species mentioned above.
  - Review of regulatory guidelines and evaluation of management options
  - Consultation with subject-matter experts, including wildlife biologists, land managers, and relevant agencies.

# CWG Meeting Schedule Since Hurricane Ian

- The CWG has met 6 times since June 2023 to discuss different management options, including most recently on 11/13/25.
- Other agencies joined some of these meetings to provide feedback and additional guidance.
  - FWC - 6/29/23, 11/17/23, 3/14/24, 3/14/25
  - Sea Turtle Conservancy (STC) - 3/14/24, 3/14/25
  - USDA/APHIS - 3/14/24, 7/16/25
- Based on CWG consensus and partner agencies, targeted lethal removal (TLR) was determined to be the only precedented option remaining to reduce depredation rates.*

***CROW abstained from TLR discussion.**

# What is Targeted Lethal Removal (TLR)?

- Focused, science-based removal of specific individual predators that have been identified as causing significant, recurrent impacts on vulnerable wildlife populations.
- Selective and carefully regulated conservation tool (not broad-based predator removal) and used only when necessary.
- Per FWC, broad-based removal is ineffective and can create unintended consequences. USDA (Wildlife Services Program) also generally requires predator management efforts to be based in scientific findings and driven by conservation objectives.

# Unintended Consequences of Broad-based Removal

- **Broad predator removal** fails to reduce predation long-term and disrupts ecosystems and essential roles they serve, which can lead to other unintended consequences, such as:
  - Mesopredator population surges (e.g. raccoons, rodents), impacting vegetation and nutrient cycles as well as sea turtle nesting habitat quality.
  - Compensatory reproduction or rapid recolonization (transient individuals).
  - Increased instability in social structure, leading to unpredictable predator movements and inconsistent hunting/foraging behavior.

# Broad-based Coyote Removal Ignores Root Cause of Vulnerability

- **Broad predator removal** often addresses only the symptom (depredation) without fully understanding the underlying factors or conditions that initially led to the problem.
  - Habitat degradation from recent hurricanes (e.g. vegetation loss).
  - Other environmental stressors (e.g. alternative prey loss, island recovery).
- When these root causes are ignored, management may be ineffective or even counterproductive.

# Goal of Predation Management

- Protect sensitive species while maintaining the natural roles of predators. For sea turtles, federal and state recovery plans establish that excessive predation (>10% nest loss) threatens long-term population success and signals when additional predation management strategies are warranted.
  - US Fish and Wildlife Service (USFWS)
  - NOAA Fisheries (NMFS)
  - Florida Fish & Wildlife Conservation Commission (FWC)

# Key Characteristics of TLR Programs

- **Selective, not broad-based:** removal aims at problem individuals rather than reducing the entire predator population.
- **Evidence-driven:** action is taken only when there is clear, documented predation pressure on a protected species.
- **Time- and site-specific:** implemented in defined locations and during critical biological periods (e.g. nesting/hatching seasons).
- **Conducted by trained professionals** under regulatory guidelines and humane standards.
- **Integrated** with non-lethal tools, not used in isolation.

# Effective TLR Programs on Florida Barrier Islands

- Ten Thousand Islands (1995, 1996) - Raccoons
- St. Joseph Peninsula (1997) – Coyotes, Foxes
- Hobe Sound NWR (2004) – Raccoons, Armadillos
- St. Vincent Island (2019) – Feral Hogs, Raccoons

**Slide 26**

**RR1** Sea Turtle Nests.

Prior to removal (1991–1994), predation was very high, ranging roughly 70–95%.

During the targeted removal years (1995–1996), predation dropped to 0–very low levels.

After intensive removal ended, predation rebounded, increasing notably by 1997 and later years.
Rachel M. Rainbolt, 2025-12-15T21:45:28.213

**RR2** Sea Turtle and Shorebird Nests.

After the predator removal in 1997 (reducing sea turtle nest predation from ~52.8% in 1996 to ~6.3% in 1997), land managers and wildlife agencies in the Florida panhandle formed a coalition to continue predator control across multiple nesting beaches, including St. Joseph Peninsula.

The coalition, funded by USDA Wildlife Services, to conduct ongoing predator control and even stationed a full-time USDA biologist in the panhandle to coordinate predator control on public lands beginning in 1997.
Rachel M. Rainbolt, 2025-12-15T21:50:40.946

**RR3** Sea Turtle and Shorebird Nests.

Feral Hog Removal
By **2021, monitoring indicated that no feral hogs remained on the island, implying successful eradication.

Raccoon Control
Raccoons have been intermittently removed since 2015 as part of the project. Annual predator control reports (e.g., 2022) show active trapping of raccoons continued into subsequent years:

In 2020, USDA and refuge staff trapped 82 adult raccoons.

In 2021, they trapped 53 adult raccoons.
Rachel M. Rainbolt, 2025-12-15T21:58:54.380

**RR4** Sea Turtle Nests.

• Historically, up to 95% of sea turtle nests at HSNWR were lost to predation by raccoons and armadillos. Predator control has been applied to the HSNWR beach since 2000, whereby the control efforts were optimized using information on timing and location of predation.

**Slide 26 (Continued)**

• Between 1999 and 2004, nearly 50 raccoons and over 40 armadillos were removed from HSNWR.

Rachel M. Rainbolt, 2026-01-22T18:45:49.642

# Current Information Gaps

- Coyotes Generally
  - Total Population on Sanibel?
  - How many individuals are contributing to sea turtle depredation?
  - How do foraging behaviors and/or dietary choices vary outside of sea turtle nesting season?
- Proposed Targeted Lethal Removal on Sanibel
  - How many individuals would be captured?
  - Anticipated cost and the funding source?
  - Will it need to be repeated, and if so, how often?

# Conservation Research Initiatives

- Previous
  - Island-wide genetic analysis of scat/tissue samples (CWG, SCWDS)
- Ongoing
  - Trail cam surveys of city-owned lands (City)
  - Trail cam and drone surveys of beaches (FWC)
  - Necropsy exam for general body condition and gut content analysis (CROW)
- Potential
  - GPS/radio telemetry collaring to determine population size & habitat range (CWG)
  - Beach-specific genetic analysis of scat/tissue samples (CWG)
  - Targeted fertility control (CWG)

# Previously Proposed Projects

- UF GPS Radio Collaring Coyotes (UF, 2015)
  - Trapping, collaring, and releasing coyotes to determine population size, habitat range, and impact to beach use.
  - Projected Budget Costs - $169,400
- UF Sanibel Coyote Proposal (UF/USDA, 2020)
  - Trapping, collaring, tagging, and releasing coyotes to determine resource use and dietary selection before and during sea turtle/shorebird season.
  - Projected Budget Costs - $131,293
- UGA Coyotes on Sanibel (UGA, 2020)
  - Install scent stations around island to determine coyote population size, movement, and land use around the island. Project included sterilization.
  - Projected Budget Costs - $137,884

# Summary of Predation Management Strategies

| Predation Management Strategy | Description | Benefits | Limitations / Considerations |
|---|---|---|---|
| Passive Management **(No Action)** | Refrain from human interventions and/or predator deterrents | No direct benefit | Depredation rates of nests already >10%; threatens overall sea turtle recovery |
| Non-Lethal Management **(Used Since 2015)** | Nesting exclusion devices, auditory and/or sensory deterrents, hazing, habitat modification | Reduces impact on protected species while preserving predator populations | Has not demonstrated sufficient success in recent nesting seasons; costly; labor-intensive |
| Targeted Lethal Removal **(Proposed for Consideration)** | Lethal removal of specific problem individuals at designated site(s) | Reduces predation; preserves broader predator populations; help maintain ≤10% nest loss | Current information gaps mean predation reductions may be short-term; future removals may be necessary |
| Integrated/Combined Management **(CWG Recommendation*)** *CROW abstained from TLR discussion. | Non-lethal deterrents, targeted lethal removal, and larger conservation research initiatives | Balanced approach; aligns with federal recovery plans; adaptive to meet current island conditions | Requires community support and commitment to funding research and monitoring programs |

# Recommended Action

- Authorize the City Manager to execute an agreement with USDA-Wildlife Services to conduct a targeted lethal removal program for the purpose of reducing coyote depredation during the 2026 sea turtle nesting season
  - Nighttime removal of sea turtle nest-predating coyotes utilizing suppressed firearms equipped with night vision & thermal imaging technology
  - Operations to be conducted from City and County-owned lands in the vicinity of Bowman's Beach Park
    - Areas of highest depredation during the 2025 nesting season
    - Agreement with Lee County required
  - Subject to funding (~$20,000); no expenditure of City funds
- Approve a limited exception to Sec. 74-182 (17) of the Sanibel Code to permit the discharge of firearms within or on the beach dune for the sole purpose of conducting the proposed USDA-WS predation management activities for the 2026 sea turtle nesting season