Monitoring, Modeling, and Conservation Planning: USACE Contributions to Recovery of an Endangered Species

How USACE R&D is providing science support and using interagency cooperation to delist the Interior Population of Least Tern

Dredging Operation and Environmental Research Program
Dredging Operations Technical Support Program

Richard A. Fischer, Ph.D.
ERDC Environmental Laboratory

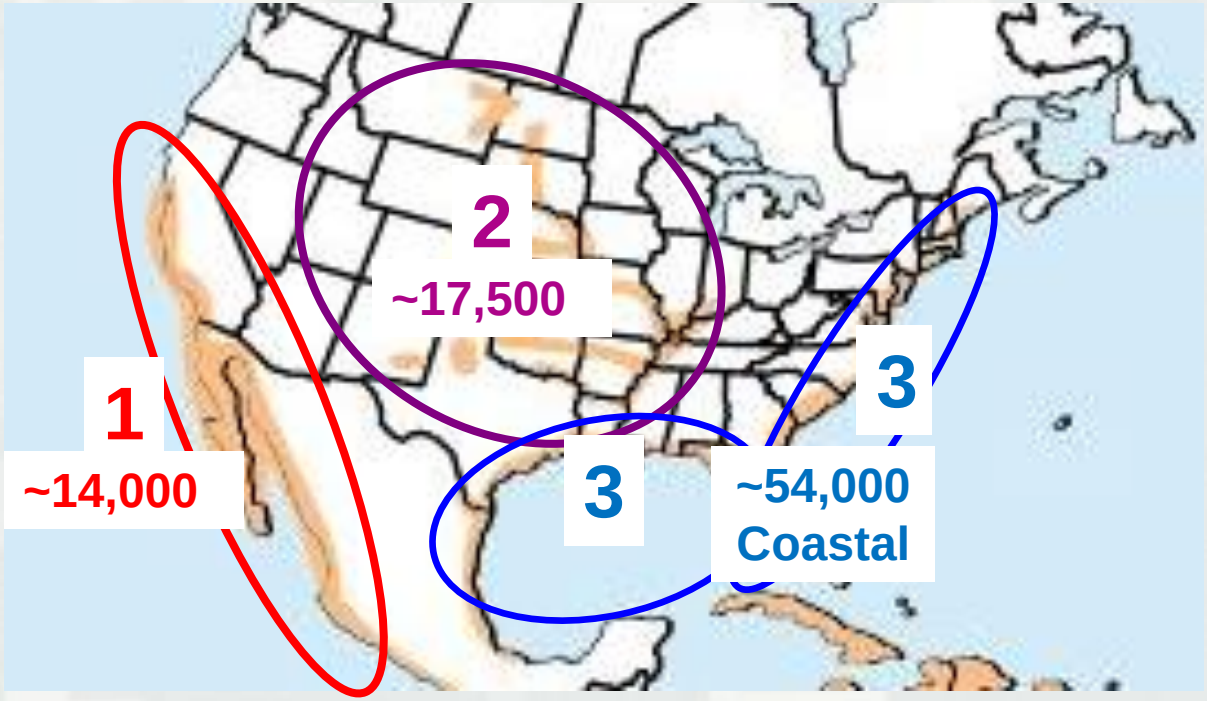
Overview

- Describe the history of collaborative work by ERDC, American Bird Conservancy, and USFWS to recover endangered least terns
- Provide an overview of Section 7(a)(1) of the Endangered Species Act and how we used the power of the Act to help achieve recovery

Least Tern (*Sternula antillarum*)

- Least terns are colonial, fish-eating migratory birds that nest on bare ground in a variety of open habitats on rivers and along coasts

Least Terns in North America



Three populations, two with federal ESA status

1. “California”- includes Western Mexico
2. “Interior” = all LETE > 50 mi. from Gulf Coast
3. “Atlantic Coast” – includes Gulf Coast, Caribbean

What is an “Interior” Least Tern?

Courtesy: C. Lott, ABC, 2012

- Any Least Tern nesting > 50 mi. from the Gulf of Mexico (USFWS 1985)
- Long lived (>20 years)
- Highly mobile
- Highly adaptable

“Interior” Least Terns

- ILT nest on or adjacent to large rivers of the Great Plains and in the Lower Mississippi Valley
- Eight rivers with ILT populations >500 adults: Mississippi, Red, Arkansas, Missouri, Platte, Cimarron, Canadian, Rio Grande/Pecos*
- Lower Mississippi has order of magnitude more birds/habitat than all other populations

Problem

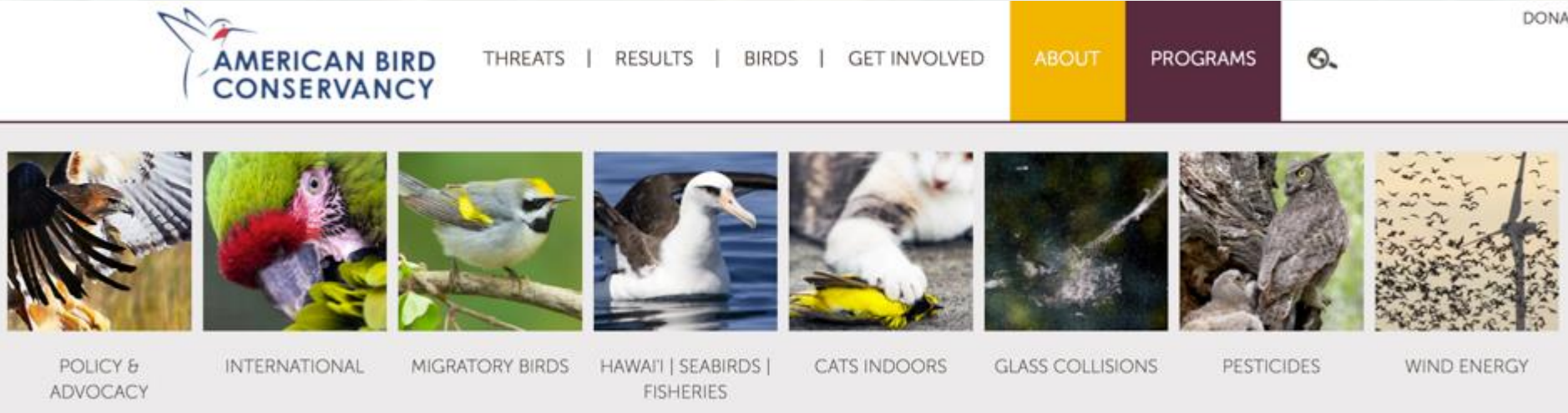
- ESA concerns have impacted USACE mission areas for >40 years
- ILT occur in 5 USACE Divisions and 11 Districts
- USACE costs to monitor ILT populations, manage habitat, and comply with Biological Opinions often exceed $10 million/year
- There has been no formal Recovery Team
- Recovery cannot be secured without evaluating the population consequences of multiple chronic threats under alternative management strategies

History

- 2016: Start with the end result –a petition to delist the Interior Least Tern appears imminent
  - ► If successful, removes ESA protection
  - ► Eliminates Section 7(a)(2) responsibilities and associated costs of compliance
  - ► Safeguards remain in place through ESA Section 7(a)(1) and post-listing monitoring plan
  - ► ILT would still receive federal protection (MBTA)

HISTORY

- Start with the end result –a petition to delist the Interior Least Tern appears imminent
- 2003-2005: Coastal engineering and shoreline-dependent birds (DOER)



AMERICAN BIRD CONSERVANCY

Dedicated to achieving conservation results for birds of the Americas.

Dr. David Pashley
Vice President of U.S. Conservation Partnerships

Casey Lott
Coastal and Waterways Program Coordinator

AMERICAN BIRD CONSERVANCY

BUILDING STRONG®

HISTORY

- Start with the end result – nearing a petition to delist the Interior Least Tern from ESA protection
- 2003-2005: Coastal engineering and shoreline-dependent birds (DOER)
- 2005: Interior Least Tern “Information Gathering Era” – coordinating monitoring efforts, rangewide workshops, rangewide survey

RECOVERY STATUS

Recovery Plan and Criteria (1990)

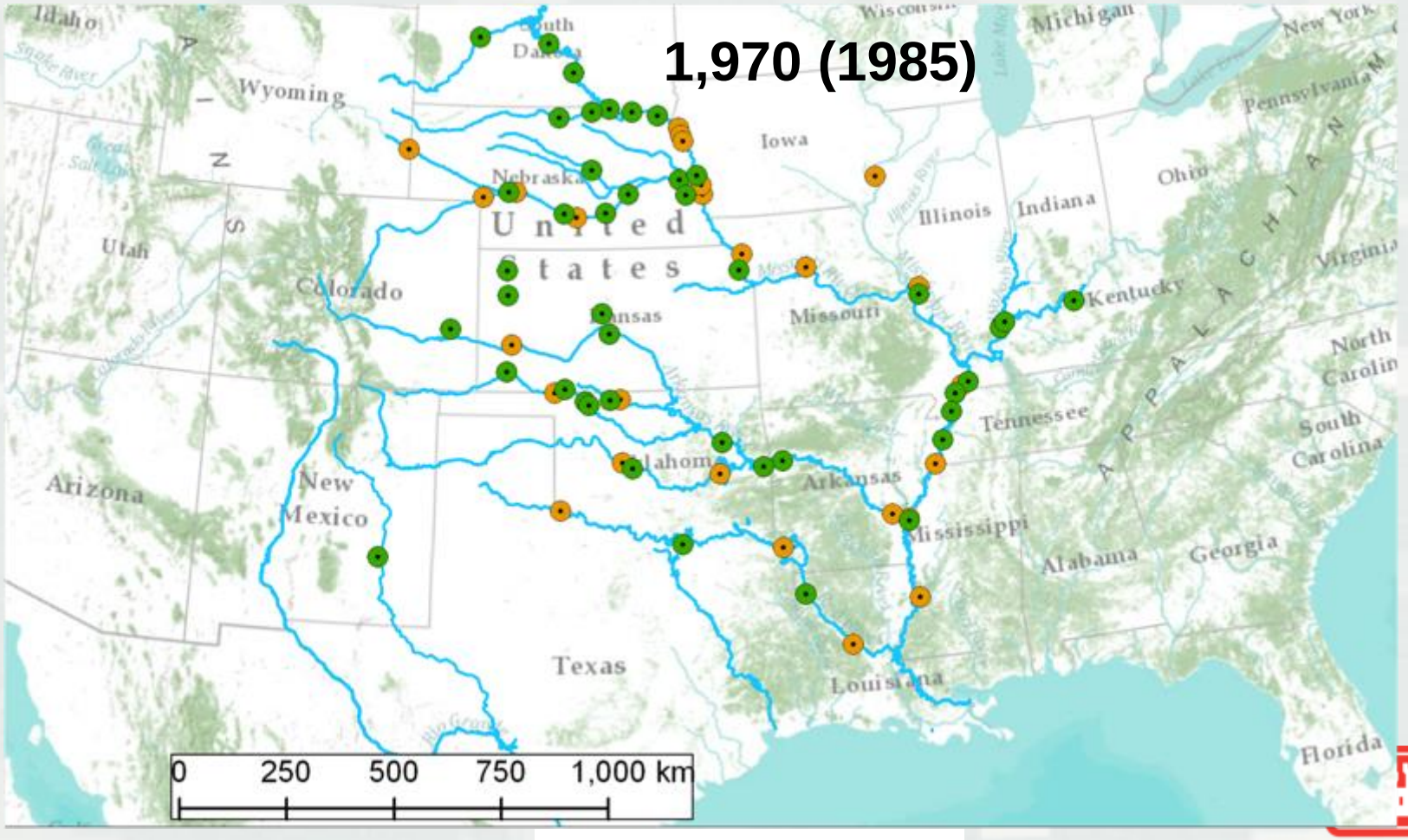
- When listed (1985), only 1,970 birds thought to comprise the interior population
- Protect habitat, establish management plans, increase ILT population to >7,000 birds range-wide and maintain for 10 years
- Requires active management/monitoring

Missouri River > 2,100
Lower Mississippi River = 2,500
Arkansas River > 1,600
Red River > 300
Rio Grande River = 500

Historical Distribution (Hardy 1957)

Courtesy: C. Lott, ABC, 2012

Abundance and Distribution When Listed (Ducey 1981)



Courtesy: C. Lott, ABC, 2012

2005 Range-wide Survey

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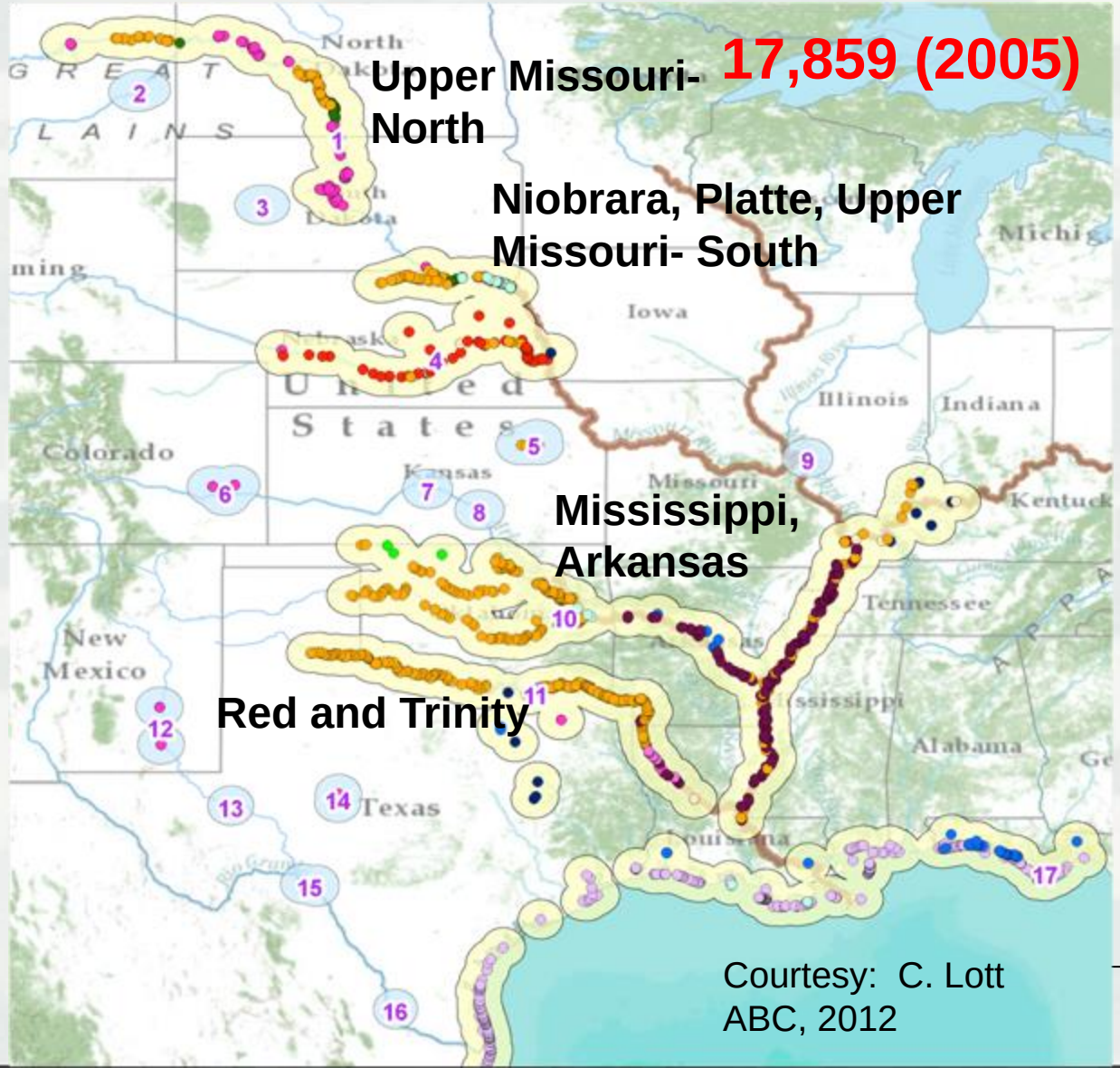
Range-wide Survey Results (Lott 2006)

Recovery Criteria (1990)

- Protect habitat, establish management plans, increase ILT population to 7,000 birds range-wide and maintain for 10 years.
- 2005 Range-Wide Total: 17,859 (Lott 2006)
  - Missouri River > 2,100 (2,044)
  - Lower Mississippi River = 2,500 (10,960)
  - Arkansas River > 1,600 (2,119)
  - Red River > 300 (1,821)
  - Rio Grande River = 500 (366)

2005 Abundance and Distribution



- **16** discrete ILT populations (96 km)
- 47 subpopulations (26 km)
- **4** main populations account for **97.8**% adults, **95.4**% sites
- 34 subpopulations within 4 main pops.

HISTORY

- 2007-2010: Addressing threats and improving understanding of tern ecology
  - ► Investigating sandbar nesting habitat relative to vegetation succession and hydrology
  - ► Development of an Individual-based Model of Least Tern Reproduction

Vegetation Succession and Hydrology

ERDC TN-DOER-R19
December 2012

Riparian Vegetation, Natural Succession, and the Challenge of Maintaining Bare Sandbar Nesting Habitat for Least Terns and Piping Plovers

by Robert L. Wiley and Casey A. Lott

BACKGROUND AND PROBLEM STATEMENT: This technical note provides a framework for effective (and cost-effective) management of pioneering vegetation on bare riverine sandbars that may provide nesting habitat for federally listed Interior Least Terns (ILT) (*Sternula antillarum*) or Great Plains Piping Plovers (GPPP) (*Charadrius melodus*).

The authors acknowledge that significant costs (and potential consequences) can be associated with vegetation management; the decision to actively manage vegetation on any one river will be made in full consideration of a range of management alternatives in the framework of meeting multiple objectives, many of which may have nothing to do with endangered species (Schultz et al. 2010). This technical note assumes that vegetation removal is at least being considered for an area and provides the basic principles necessary for a vegetation removal program to be successful.

It is also acknowledged that habitat-forming flows are less frequent than they were prior to dam placement on many rivers (Galat and Lipkin 2000; U.S. Fish and Wildlife Service (USFWS) 2003, 2005a; Parham 2007). When sandbar nesting habitat becomes degraded due to advanced vegetation succession (e.g., Johnson 2000) the only alternative to provide regional nesting habitat for the two listed bird species mentioned above may be mechanical sandbar restoration, which is extremely costly and may have undesirable ecological consequences (U.S. Department of Interior (USDOI) 2006, U.S. Army Corps of Engineers (USACE) 2011). Consequently, managers within systems where habitat renewal via flooding is infrequent may want to consider an approach of maximizing the number of years that new bare sandbars remain suitable for nesting. They may also want to consider managing vegetation early in the successional sequence to forestall the loss of depositional areas (which may be in short supply regionally) to late-successional forests that could provide future sandbar nesting habitat after future high-release events. This is a decision that managers will have to make on a case-by-case basis, given the knowledge that they are able to acquire about the frequency of habitat-forming (e.g., vegetation-removing) flows within their system (Sidle et al. 1992, Leslie et al. 2000, USACE 2011).

Ecological restoration programs are sometimes initiated for the exact opposite purpose, to encourage riparian vegetation recruitment. In some instances, this action occurs on the same rivers where maintaining bare sandbar nesting habitat is a condition of incidental take permits within USFWS' Biological Opinions regarding USACE dam operations (USFWS 2003, 2005a, 2005b, 2006). This document is focused on providing bare sandbar nesting habitat (SNH) for birds, and will be useful to managers with this objective. However, those engaged with riparian vegetation restoration are encouraged to become familiar with this issue and collaborate with biologists who are tasked with maintaining bare sandbars for nesting. Such collaboration will reduce potential

Approved for public release; distribution is unlimited.

ERDC DOTS-EXX

Environmental Laboratory

US Army Corps of Engineers
Engineer Research and Development Center

Dredging Operations and Technical Support

Effects of dam operations on Least Tern nesting habitat and reproductive success below Keystone Dam on the Arkansas River

Casey A. Lott1, and Robert L. Wiley2

January 2012

In press

AMERICAN BIRD CONSERVANCY

DREDGING OPERATIONS TECHNICAL SUPPORT PROGRAM

DOER

16-01

an individual-based model of Least Tern reproduction

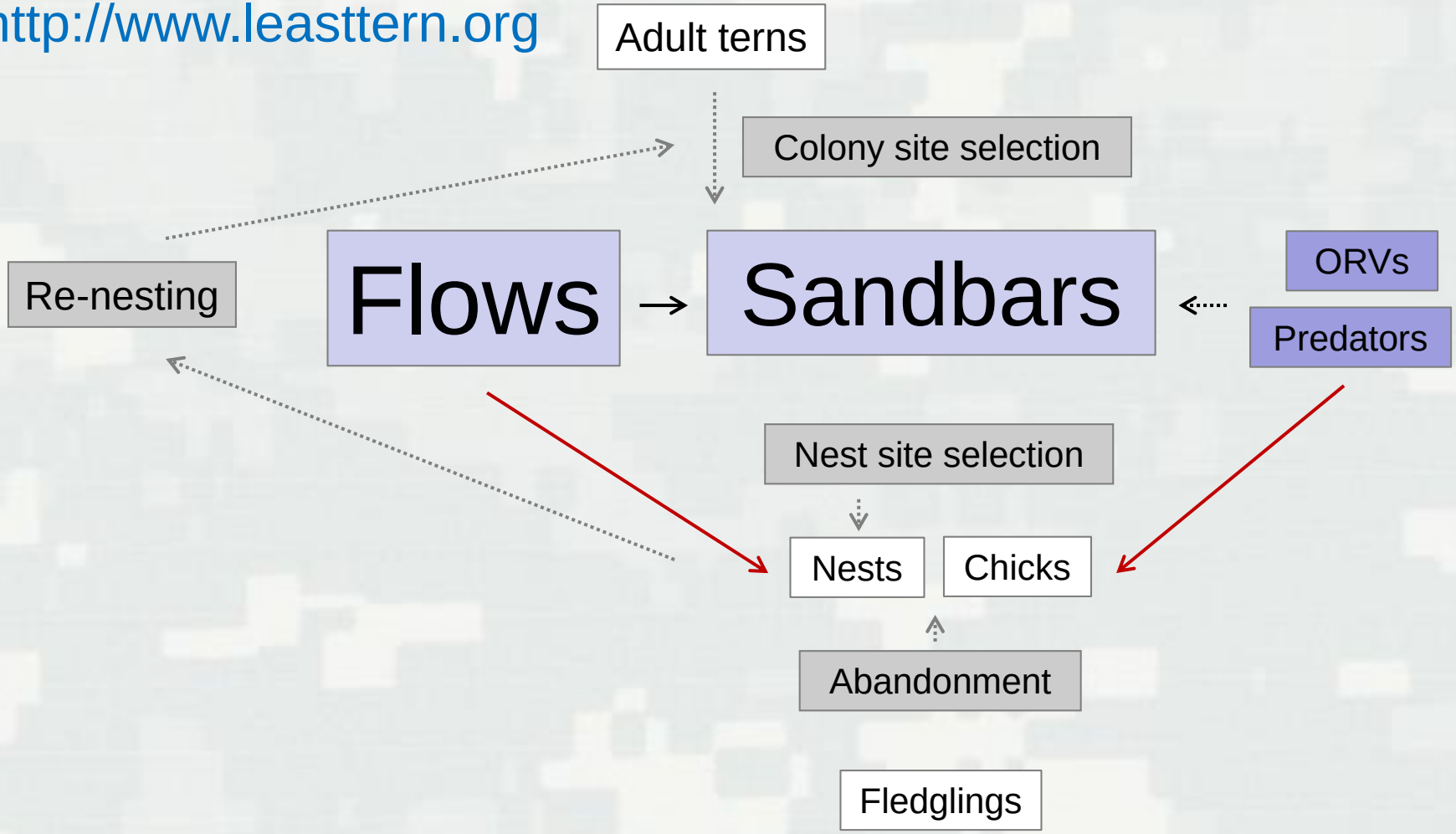
The TernCOLONY model simulates breeding seasons for virtual populations of Least Terns nesting on river sandbars.

Users design their own simulation experiments to understand which factors may limit tern reproductive success (e.g., predators, floods) or to compare different management approaches for increasing reproductive output.

- Getting Started
- Tutorials

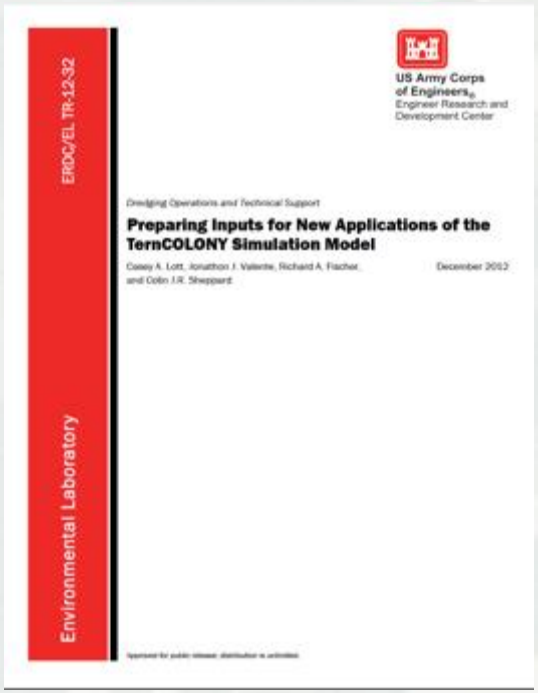
TernCOLONY model

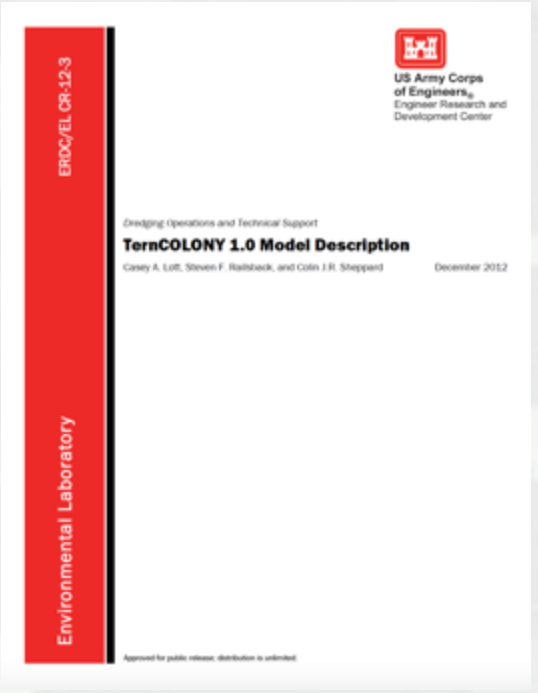
http://www.leasttern.org



Model input | Mortality agents | Tern object | Tern behavior submodel

TernCOLONY





AMERICAN BIRD CONSERVANCY

DREDGING OPERATIONS TECHNICAL SUPPORT PROGRAM

DOER

HISTORY

- 2011: The Paul Hartfield Era. In 2011, the Recovery Lead for the Interior least tern, and responsibility for finalizing the 5-year Status Review, was transferred to USFWS Region 4.

2012 Alton, IL ILT Workshop

Goal: Review current issues and options available to meet recovery goals and to promote the conservation of ILT populations.

Objective: to assemble an interdisciplinary group of ILT experts that could:

a) review the conservation status of ILT;
b) identify knowledge gaps for understanding factors that limit long-term population persistence, and
c) identify key research and monitoring needs that provide the science to support persistence.

Alton Workshop Results

Future work needed to promote ILT conservation included:

1) a rangewide metapopulation model to examine roles of main and subpopulations on the range-wide sustainability of the ILT population
2) need to compile and summarize existing monitoring data to develop better insights into the range-wide status of the species (including the creation of a centralized repository for ILT data)
3) determination of the role of dispersal (natal and adult) on breeding population dynamics (including the movements between coastal and interior populations)
4) examination of ecological needs and threats occurring to ILT during migration (e.g., key stopover areas) and over-wintering sites,
5) a range-wide assessment to understand abiotic factors impacting ILT populations and management actions, including the roles of river geomorphology, hydrology, and habitat variability.

2013 Status Review


Interior Least Tern
(*Sternula antillarum*)

5-Year Review:
Summary and Evaluation

Photo courtesy of Bill Stripling

U.S. Fish and Wildlife Service
Southeast Region
Mississippi Field Office
Jackson, Mississippi

Recommends delisting but this action requires three major actions:

1. A range-wide metapopulation model for ILT to evaluate population persistence across a range of scenarios
2. ESA Section 7(a)(1) Conservation Plans covering a majority of the range
3. A cost-effective post-listing monitoring plan

HISTORY
2014: Science support for ILT Recovery through ESA Section 7(a)(1)

- Assist USFWS ILT Recovery Lead in establishing a formal, cost-effective conservation management program with MVD, LRD, and SWD that would encompass >75% of the current ILT population.
  - Work directly with MSC's on Regional Conservation Planning for T&E Species Recovery through ESA Section 7(a)(1)

- Develop a spatially-explicit, range-wide metapopulation model for ILT.
  - Collaboration among USACE-ERDC, USFWS, American Bird Conservancy, USGS-Columbia, USGS-Mississippi State

- Complete efficient, low-cost Range-wide Post-listing Monitoring Plan

Endangered Species Act
A New Approach

Species Recovery through ESA
Section 7(a)(1)

SECTION 7 of ESA
INTERAGENCY COOPERATION

(a) *FEDERAL AGENCY ACTIONS AND CONSULTATIONS.- (1) ...All...Federal agencies* ***shall****, in consultation with and with the assistance of the Secretary,* ***utilize their authorities*** *in furtherance of the purposes of this Act* ***by carrying out programs for the conservation*** *of endangered species and threatened species*...

(b) Section 7(a)(2) states each Federal agency shall … insure that any action … is not likely to jeopardize the continued existence of any endangered species or threatened species...or result in destruction…of (critical) habitat…

- Minimize and permit "take" incidental to Federal agency actions
- Maintain status quo, at best

(c) Section 7(a)(1) addresses the conservation (recovery) needs of listed species relative to Federal Program impacts. These conservation programs are to improve listed species baselines within the scope of Federal action agency authorities.

New Approach

Section 7(a)(1)

- Allows USACE to be proactive in consultation and conservation processes rather than reactionary
- Reduces surprises and conflicts
- We commit to actions we would be predisposed to undertake anyway under 7(a)(2)
- Reduce future 7(a)(2) consultations
- Actions contingent upon availability of funds providing budget predictability
- Improves likelihood of species recovery

Paul Hartfield, USFWS

7(a)(1) for ILT Recovery

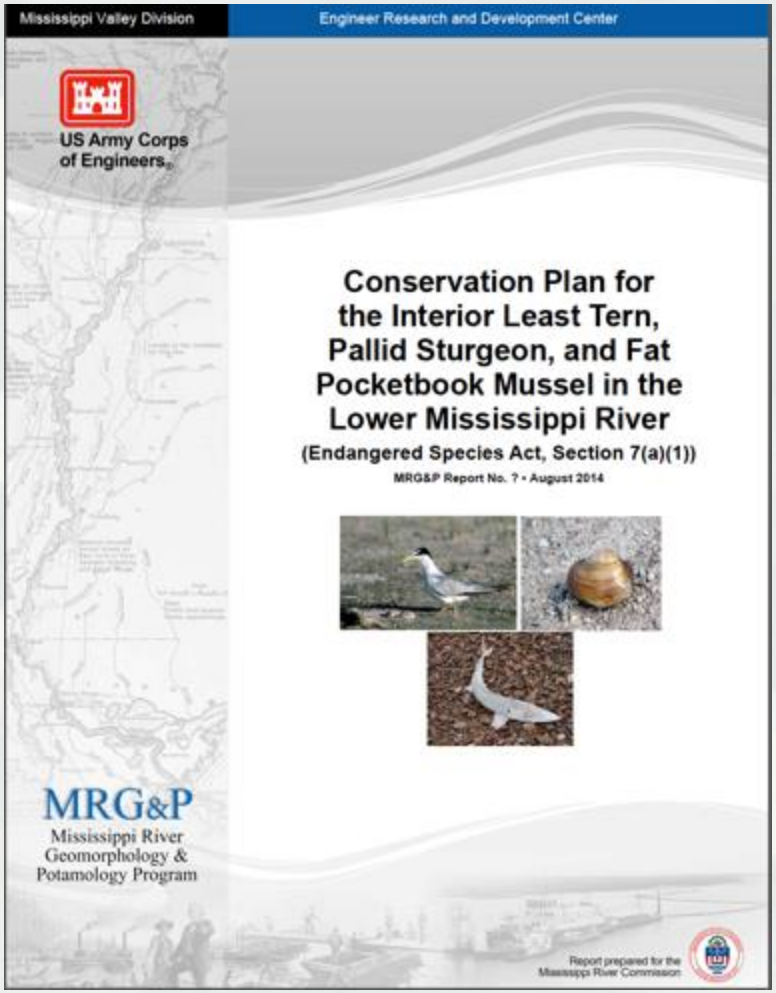
- In 2001, USACE Mississippi Valley Division initiated consultation with FWS Southeast Region under section 7(a)(1) of the ESA.
- This consultation culminated in a USACE conservation program which transformed the primary threats (channel engineering) to three endangered species, into the primary conservation tools for their recovery.

Paul Hartfield, USFWS

Lower Mississippi River
Dike Notch Construction

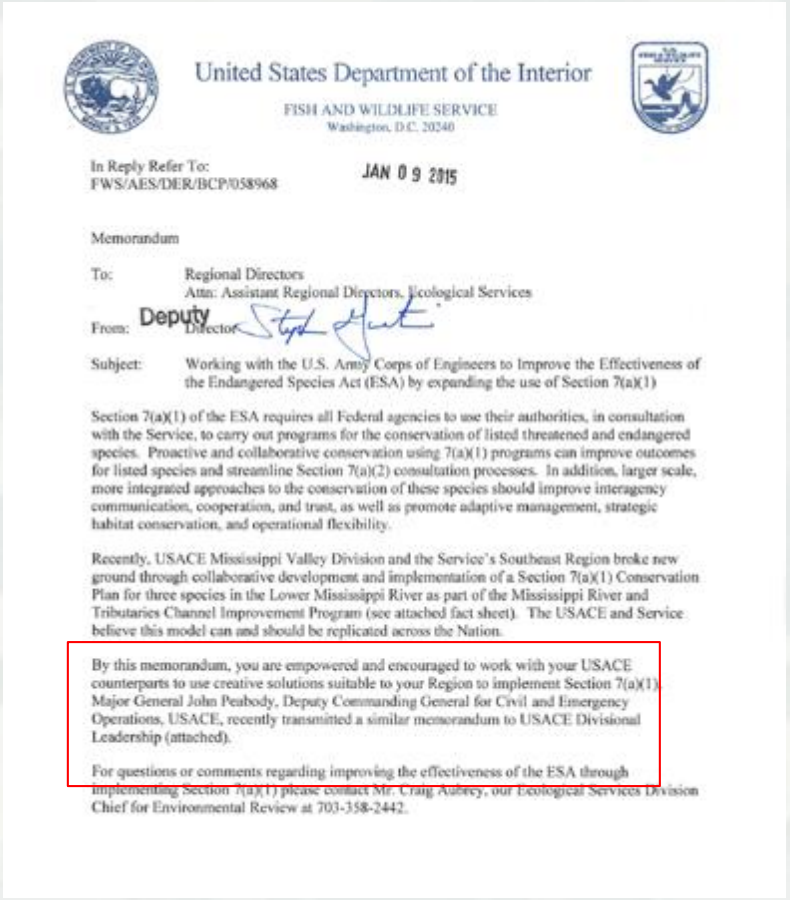
$167,000 to maintain island integrity in 11.25 mile reach
(Reduced predator/human access)

MS River Habitat Conservation Plan



- Proactive and innovative
- Creates “buy-in” from multiple agencies and organizations
- Addresses multiple species
- Conserves habitat in perpetuity for listed species
- Provides template for others to follow
- Long-term cost-savings to USACE
- Supports USFWS 5-Year Status Reviews for listed species

USACE/USFWS 7(a)(1) Coordination



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

In Reply Refer To:
FWS/AES/DER/BCP/058968

JAN 09 2015

Memorandum

To: Regional Directors
Attn: Assistant Regional Directors, Ecological Services

From: Deputy Director

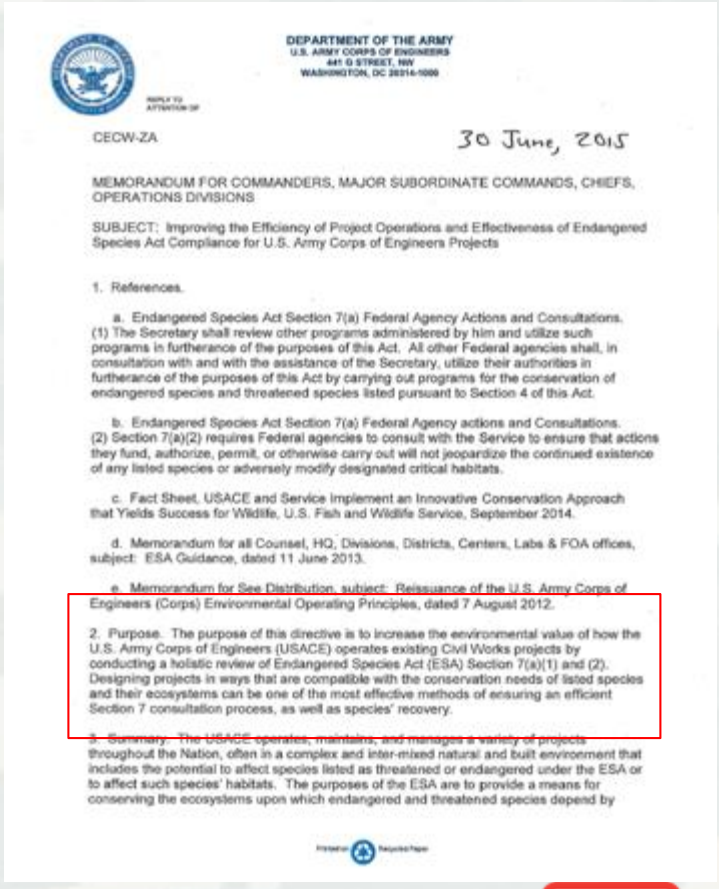
Subject: Working with the U.S. Army Corps of Engineers to Improve the Effectiveness of the Endangered Species Act (ESA) by expanding the use of Section 7(a)(1)

Section 7(a)(1) of the ESA requires all Federal agencies to use their authorities, in consultation with the Service, to carry out programs for the conservation of listed threatened and endangered species. Proactive and collaborative conservation using 7(a)(1) programs can improve outcomes for listed species and streamline Section 7(a)(2) consultation processes. In addition, larger scale, more integrated approaches to the conservation of these species should improve interagency communication, cooperation, and trust, as well as promote adaptive management, strategic habitat conservation, and operational flexibility.

Recently, USACE Mississippi Valley Division and the Service's Southeast Region broke new ground through collaborative development and implementation of a Section 7(a)(1) Conservation Plan for three species in the Lower Mississippi River as part of the Mississippi River and Tributaries Channel Improvement Program (see attached fact sheet). The USACE and Service believe this model can and should be replicated across the Nation.

By this memorandum, you are empowered and encouraged to work with your USACE counterparts to use creative solutions suitable to your Region to implement Section 7(a)(1). Major General John Peabody, Deputy Commanding General for Civil and Emergency Operations, USACE, recently transmitted a similar memorandum to USACE Divisional Leadership (attached).

For questions or comments regarding improving the effectiveness of the ESA through implementing Section 7(a)(1) please contact Mr. Craig Aubrey, our Ecological Services Division Chief for Environmental Review at 703-358-2442.



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

CECW-ZA

30 June, 2015

MEMORANDUM FOR COMMANDERS, MAJOR SUBORDINATE COMMANDS, CHIEFS, OPERATIONS DIVISIONS

SUBJECT: Improving the Efficiency of Project Operations and Effectiveness of Endangered Species Act Compliance for U.S. Army Corps of Engineers Projects

1. References.

a. Endangered Species Act Section 7(a) Federal Agency Actions and Consultations. (1) The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act.

b. Endangered Species Act Section 7(a) Federal Agency actions and Consultations. (2) Section 7(a)(2) requires Federal agencies to consult with the Service to ensure that actions they fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

c. Fact Sheet, USACE and Service Implement an Innovative Conservation Approach that Yields Success for Wildlife, U.S. Fish and Wildlife Service, September 2014.

d. Memorandum for all Counsel, HQ, Divisions, Districts, Centers, Labs & FOA offices, subject: ESA Guidance, dated 11 June 2013.

e. Memorandum for See Distribution, subject: Reissuance of the U.S. Army Corps of Engineers (Corps) Environmental Operating Principles, dated 7 August 2012.

2. Purpose. The purpose of this directive is to increase the environmental value of how the U.S. Army Corps of Engineers (USACE) operates existing Civil Works projects by conducting a holistic review of Endangered Species Act (ESA) Section 7(a)(1) and (2). Designing projects in ways that are compatible with the conservation needs of listed species and their ecosystems can be one of the most effective methods of ensuring an efficient Section 7 consultation process, as well as species' recovery.

3. Summary. The USACE operates, maintains, and manages a variety of projects throughout the Nation, often in a complex and inter-mixed natural and built environment that includes the potential to affect species listed as threatened or endangered under the ESA or to affect such species' habitats. The purposes of the ESA are to provide a means for conserving the ecosystems upon which endangered and threatened species depend by

ILT Metapopulation Modeling

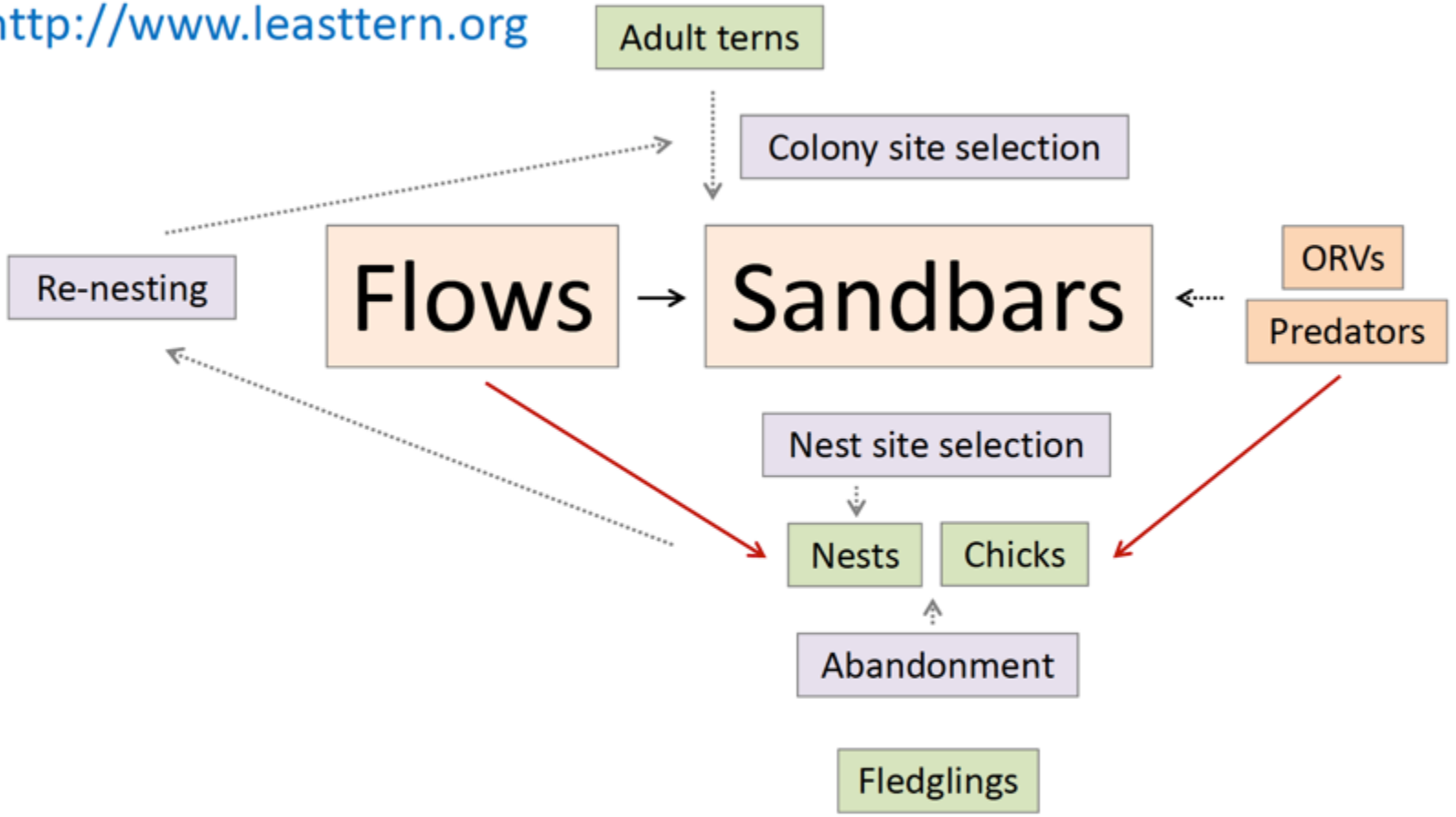
Based on the state-of-the-science, and the collective opinions of an independent science panel from the recent ERDC ILT workshop, a metapopulation model has high likelihood of providing the remaining information necessary to complete the ILT 5-yr status review and put USACE in the best possible position for a delisting petition.

- Objective - Develop a model that will facilitate understanding of underlying ecological processes for ILT so managers can evaluate consequences of management actions and how they affect long-term conservation of the ILT

- **Description: A population model, incorporating site availability, river stage inputs, range-wide habitat availability, nesting behavior and productivity, and dispersal characteristics of the ILT to investigate Least Tern responses to landscape changes, interactions among sub-populations, and population stability.**

TernCOLONY model

http://www.leasttern.org



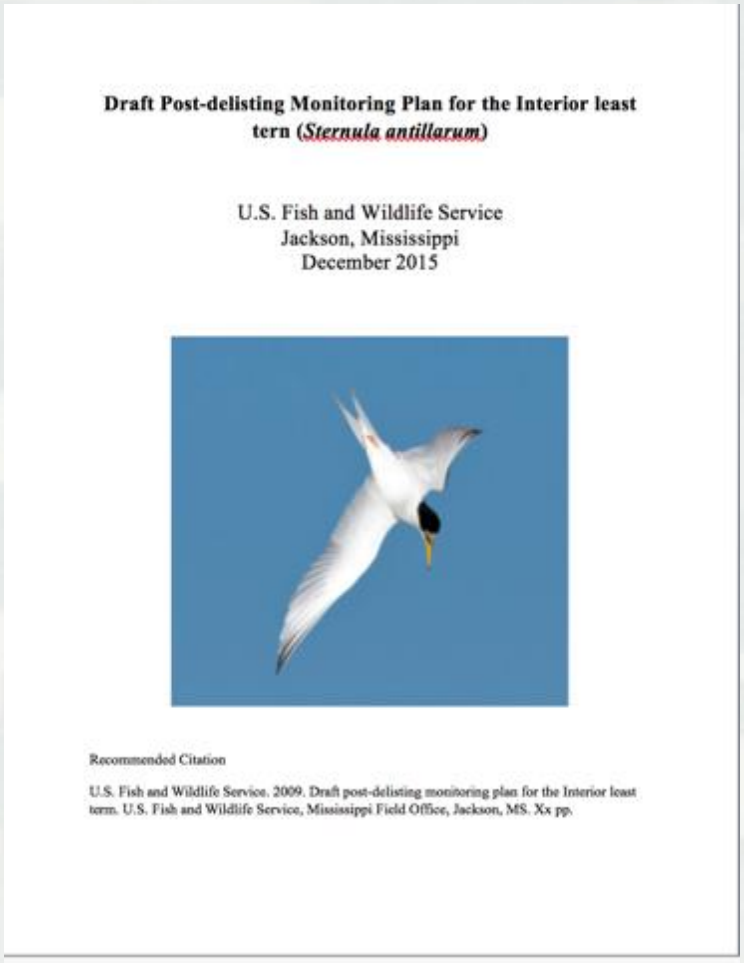
Model input

Mortality agents

Tern object

Tern behavior submodel

Post-delisting Monitoring Plan



Draft Post-delisting Monitoring Plan for the Interior least tern (*Sternula antillarum*)

U.S. Fish and Wildlife Service
Jackson, Mississippi
December 2015

Recommended Citation

U.S. Fish and Wildlife Service. 2009. Draft post-delisting monitoring plan for the Interior least tern. U.S. Fish and Wildlife Service, Mississippi Field Office, Jackson, MS. Xx pp.

- Final Plan in Review
- Plan recommends standardizing survey methods at small colonies and using an “intensive” survey method at large colonies
- Our design has nearly 100% power to detect a 50% decline occurring in 21 years and will reduce costs of the ILT survey by 50%.

Interior Least Tern – An Action Plan for Delisting

- Delisting the Interior Least Tern
  - Complete testing of TernPOP model and provide to USFWS
  - Complete 7(a)(1) Plans for SWD, LRD
  - Publish monitoring plan in PR literature
  - USFWS proposes delisting rule in Federal Register
  - USFWS receives comments from federal agencies, species experts, etc.
  - Final Rule

U.S. Fish & Wildlife Service

Delisting a Species

Section 4 of the Endangered Species Act

Delisting is the removal of species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from Endangered to Threatened. Delisting and downlisting actions result from successful recovery efforts. To delist a species, the Service must determine that the species is not threatened based on a number of factors, such as population size, recruitment, stability of habitat quality and quantity, and control or elimination of the threats. If some of the threats have been reduced and the population has met its recovery objectives for downlisting, we may consider changing the species status from Endangered to Threatened. Delisting species is the ultimate goal of implementing the Endangered Species Act (ESA).

Why, when, and how are species removed from the list of endangered and threatened species?

Recovery plans, developed by the Service and stakeholders for listed species, identify delisting and downlisting goals. When a species reaches its delisting goals, the Service considers removing it from the Federal Lists of Endangered and Threatened Wildlife and Plants. Likewise, when a species reaches its downlisting goals, the Service considers changing its status from Endangered to Threatened.

To delist or downlist a species, the Service follows a process similar to when we consider a species for listing under the ESA: we assess the population and its recovery achievements; we assess the existing threats; and, we seek advice from species experts in and outside of the Service. To assess the existing threats, the Service must determine that the species is no longer threatened or endangered based on five factors:

- Is there a present or threatened destruction, modification, or curtailment of species' habitat or range?
- Is species subject to overutilization for commercial, recreational, scientific, or educational purposes?
- Is disease or predation a factor?
- Are there inadequate existing regulatory mechanisms in place outside the ESA (taking into account the efforts by the States and other organizations to protect the species or habitat)?
- Are other natural or manmade factors affecting its continued existence?

If the Service determines that the threats have been sufficiently reduced, then we may consider delisting or downlisting the species. When delisting or downlisting a species, the Service first proposes the action in the *Federal Register*. At this time, we also seek the opinion from independent species experts, other Federal agencies, State biologists, and the public. After analyzing the comments received on the proposed rulemaking, we decide whether to complete the proposed action or maintain the species status as it is. Our final decision is announced in the

American peregrine falcon, delisted in 1999 because of recovery. Craig Koppie, USFWS

USACE Science Support for ILT Recovery

Benefits of R&D to USACE

- ✓ *Return on Investment* – USACE and USFWS funding provides critical science support with future ROI in the millions of $$
- ✓ *Potential Delisting and Mission Support* - reduced costs of ESA compliance enhance USACE ability to meet mission requirements
- ✓ *Modeling* - allows USACE and others to understand the population consequences of alternative management strategies on rivers
- ✓ *Improved Management* – R&D promotes adaptive management strategies that are measurable; also promotes ILT metapopulation persistence
- ✓ *Conservation Planning* - 7(a)(1) approach allows USACE to be proactive in consultation and conservation processes rather than reactionary (similar approach for other spp. may reduce likelihood of a non-jeopardy BiOp).

Questions?

Our Mission: *To guide the effective, efficient, and productive execution of science partnerships to assess ILT conservation status and deliver conservation planning with high ROI and that inspire confidence that a potential ILT legal status change will not result in negative impacts to ILT populations.*

Richard A. Fischer, Ph.D.
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