Synopsis: The Interior Least Tern:
How a small bird is changing our view of the big picture

No time to read the full article? Here's what you need to know about the Interior Least Tern Monitoring project:

- Using power analysis and a sampling plan in which all Interior Least Tern (ILT) nesting areas will be counted once every 3 years, an ILT monitoring strategy to detect a 50% rangewide decline over 20 years has been developed.
- The monitoring strategy, if implemented, would provide an annual savings of ~50% compared to past monitoring efforts.
- This strategy was only possible due to the rangewide approach to monitoring and conservation taken by five Landscape Conservation Cooperatives and their partners in this project: the American Bird Conservancy, the US Army Corps of Engineers, US Fish and Wildlife Service (USFWS), and US Geological Survey.
- If accepted in some form by all involved parties, this project will provide an important component required by the USFWS for delisting the Interior Least Tern under the federal Endangered Species Act.
- The US Army Corps of Engineers plans to use conservation planning under ESA Section 7(a)(1), along with the ILT monitoring plan, as a model for developing similar efforts under a new initiative called the Threatened and Endangered Species Team (TEST).
- Habitat monitoring results of this study will be released in late 2015 or early 2016. Stay tuned!

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If you are not interested in birds, but greater government efficiency gets you excited, this story is for you. If you care about wildlife and are heartened by news that a species may no longer be endangered, then read on. If you are a birder, then you probably know the Interior Least Tern (ILT), though you may not have heard of Landscape Conservation Cooperatives -- but it's about time you do.

It is rare that one project can provide such sweeping insights into how to make things better. That is precisely what the ILT project spanning 18 states has achieved, and it is a monitoring project to boot. Monitoring is probably one of the least "sexy" forms of wildlife science. People love to count birds, but the coordination that is required between scientists and managers to find the right balance of effort, costs, and accuracy is not at all easy.

The project, entitled "Standardizing and Coordinating Range-wide Monitoring of the Interior Least Tern (ILT) and its Habitat in a Metapopulation Context, was sponsored by five Landscape Conservation Cooperatives, or LCCs: Gulf Coastal Plains & Ozarks (lead); Great Plains; Plains and Prairie Potholes; Gulf Coast Prairie; and Eastern Tallgrass Prairie and Big Rivers with support from a U.S. Fish and Wildlife Service (USFWS) multi-LCC grant. Additional co-funders and collaborators were the U.S. Army Corps of Engineers (USACE) – Engineer Research and Development Center; U.S. Fish and Wildlife Service - Mississippi Ecological Services Field Office; U.S. Geological Survey (USGS) - Columbia Environmental Research Center; and the American Bird Conservancy (ABC).

Getting more for less: detecting a 50% decline at more than 50% savings

The least tern monitoring portion of the study was led by Casey Lott of American Bird Conservancy (ABC) working closely with Jon Bart, a retired USGS scientist with a long career in monitoring. The ILT is a priority species for ABC, an organization "dedicated to achieving conservation results for the birds of the Americas." Lott and Bart collaborated to design a strategy to monitor range-wide population trends for Interior Least Terns.

Lott, who has been working on ILT issues for more than 10 years, explains, "The Interior Least Tern occurs along large rivers in the central U.S., especially the Mississippi River and its major tributaries. In 1985, it was listed as endangered

under the Endangered Species Act (ESA) due to concerns that management of large rivers had led to population declines. In recent decades, many different entities have invested considerable resources counting birds, without a clear vision or infrastructure for turning these counts into information on population trends."

Detecting a population trend means seeing beyond natural and year-to-year fluctuations in numbers to detect an actual rate of population change over time. By analyzing historic count data using a statistical approach called "retrospective power analysis," Lott and Bart found that in many cases, count efforts had been far more intensive than necessary to accurately detect large magnitude trends. Using sampling theory – the same theory that guides our analysis of the effectiveness of most medicines – Bart and Lott developed a range-wide sampling plan to accurately detect population declines for ILT at half the cost of current field efforts.

How much is too much?

One way in which ILT counts were perhaps too intensive and costly was that many field crews were conducting a complete census of all possible nesting locations in every year. Using power analysis, Bart and Lott concluded that this resource-intensive approach was providing only marginally better information than what could be provided by sampling much smaller, but carefully chosen, river reaches once every 3 years. Interestingly, while some areas were being censused for ILT, other areas across their range were receiving no count effort at all. Since the USFWS monitoring objective for an ESA-listed species is to document a trend at the scale of the whole population, this approach was resulting in too much information in some locations and no information in others.

Lott and Bart reviewed data on the historic range-wide distribution of ILT, as well as all available historic count datasets, to develop a sampling plan where one-third of all river reaches are surveyed annually. Each reach is a discrete river segment with nesting terns that can be covered by different monitoring crews in one day. Following this protocol, all riverine nesting areas for ILT will be counted once every three years. Areas that have not historically been surveyed for terns will need to be covered by new partners, but costs will be relatively small due to the relatively low burden of surveying one small section of river once every 3 years. Bart and Lott found that this strategy provided almost 100% power to detect a 50% range-wide population decline over ~20 years (the target recommended by the USFWS), at an annual savings of more than 50%.

“The sampling method is fairly coarse,” says Lott, “but that is fine in this case, you just don’t have to do a perfect job of counting birds to detect a 50% rate of decline. In just about any type of wildlife survey in which decades of count data have been collected, there’s almost always a way to do some analyses that will improve sampling to save money without sacrificing objectives.”

Range-wide is key: How this ILT monitoring program improves our understanding of the links between species and ecosystem science

The origins of this project can be traced back to an effort in 2005, when the US Army Corps of Engineers (USACE) hired Lott to review historic data on ILT distribution and assess current efforts to survey the range of the listed populations. That year, he organized the first range-wide survey of the ILT, which took place over the course of three weeks in late June and early July. Pooling counts from locations across the entire known range of ILT, this survey estimated

a breeding population of at least 17,500 Least Terns, a number much higher than previously thought, mostly because thousands of river kilometers within the species range were not regularly being sampled (despite the existence of several monitoring programs in scattered locations).

A subsequent 5-year review of ILT status led by Paul Hartfield, Lead Biologist at the USFWS Mississippi Field Office, reviewed distribution, abundance, population trends, habitat conditions, and mortality threats across the full range of ILT and recommended delisting "due to recovery." However, initiation of the delisting process is contingent on three requirements, one of which is development of a post-delisting monitoring strategy for ILT population trends, and potentially trends in habitat conditions (the focus of this study).

According to Hartfield, the USFWS is required to monitor a species removed from the protections of the ESA, in cooperation with the states in which it occurs, for not less than five years. A monitoring plan is negotiated and becomes a part of the proposed delisting rule. "The multi-LCC grant has given us a great head start on these negotiations. We have developed a potential monitoring protocol that is reasonable and cost-effective," said Hartfield.

"When you only focus on one area in a species range you may come to the conclusion that the species is critically imperiled—as it might appear for ILT if you only look at the Central Platte River. However, when you put this area in context, and you can see that things are going well across most of the species' breeding range, and that range is large, your local crisis just doesn't rise to the same level of importance."

Richard Fischer, Research Wildlife Biologist with the USACE Engineer Research and Development Center agreed. "We are excited that our science-based approach showed that the ILT is recovered and no longer warrants protection under the ESA. The recommended monitoring plan developed by Lott and Bart is good news for the USACE. Our monitoring programs have been expensive, with varying methods and intensities, and we are excited to have a standardized protocol that can be applied across the ILT range in a consistent fashion, while still allowing for more intensive localized monitoring to address specific management issues."

"Furthermore," he added, "the work we have accomplished on the ILT is being used as a model for development of similar efforts under a new initiative called the Threatened and Endangered Species Team (TEST). TEST aims to use ESA

Section 7(a)(1), as was done for the ILT, to address endangered species issues as a means to improving operational flexibility, reducing costs, and recovering species."

Picking species targets for ecosystem restoration: the irony of the Interior Least Tern

A portion of this multi-LCC project also focused on developing a method for monitoring ILT habitat, i.e. riverine sandbars. Edward Bulliner, Ecologist with the U.S. Geological Survey (USGS), is the co-PI with Lott, and he led this portion of the project. The GCPO LCC will interview him on his habitat findings in several months after publication of his USGS Data Series Report (with the working title "ILT sandbar nesting habitat measurements from Landsat TM imagery").

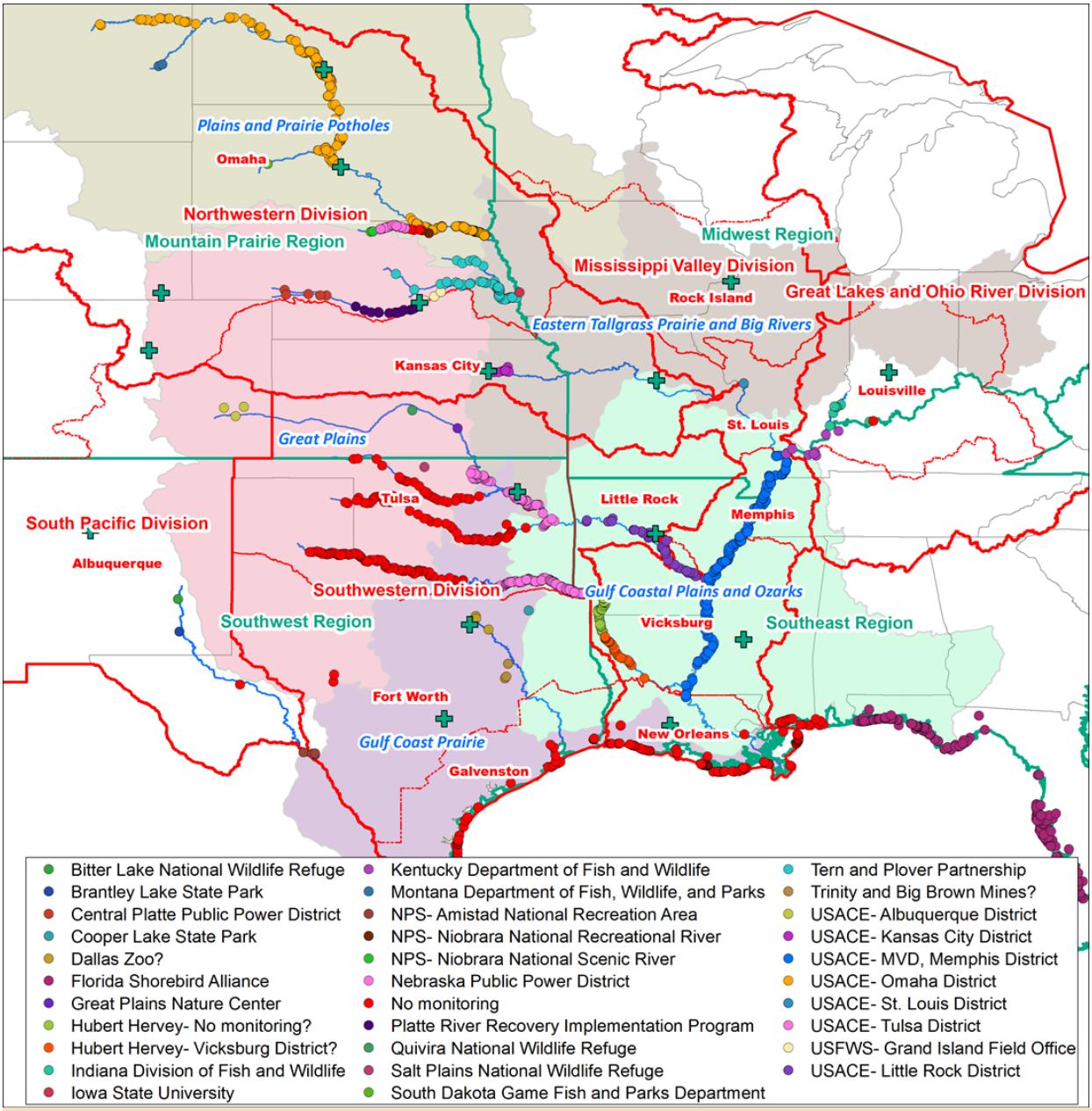
Bulliner and Lott did say that by covering the whole geographic range of the listed population, they were able to determine there are a "lot of sandbars in the range of the ILT." Lott points out that this contrasts with the results of several local studies that have voiced concern about habitat conditions and extrapolated these concerns out to larger areas.

"The abundance of ILT nesting habitat across nearly 6,000 linear kilometers of river, at >1,700 different potential colony locations, and the presence of this habitat across the past ~30 years of the river regulation era, suggests that nesting habitat may not be limiting ILT populations," said Lott. "Costly long-term habitat monitoring may not even be necessary."

"Our habitat work," Lott explains, "illustrates that the dynamic processes that create bare nesting sandbars for ILT on large rivers in the U.S. have not been lost due to dam construction and river regulation. Things have changed, for sure, but the system has not been so fundamentally altered that terns can no longer find places to nest. If we are concerned about how dams have affected flows and wildlife habitats in big rivers, the Interior Least Tern might not be the best umbrella species to detect these problems. As the past 30 years of river regulation have indicated, the ILT do not require a natural flow regime for their populations to flourish. If we are going to choose a species, or several species, to track biological conditions on large regulated rivers, it would make a lot more sense to select a suite of aquatic species based on their life history traits, across different levels of the food chain, as indicators of ecosystem health. For ecosystem restoration, we may be better off monitoring more direct indicators of

ecosystem function than long-lived, generalist predators at the top of the food chain."

This sounds like music right out of the LCC landscape conservation design playbook. Whether they are termed focal species, species endpoints, indicator species, priority species, surrogate species, or something else - Landscape Conservation Cooperatives are using ecological boundaries and drawing on the expertise of myriad partners to select species and habitats that will guide the development and management of an integrated and healthy network of lands and waters. The intention is that this network will support not only long-term biodiversity and abundant wildlife, but also the services from nature that are crucial to human communities and cultures, including water supply and navigable rivers.



Interior Least Tern range-wide nesting sites