Aleutian Tern Conservation Planning Meeting Framework
January 26-27, 2018

This document is a synthesis of ideas from Aleutian tern Technical Committee members, Conservation Planning Meeting Subcommittee members, as well as others. It aims to outline our goal for a 2-day conservation planning meeting to be held January 2018, the primary question we aim to answer, and how we will get there. It also addresses assumptions underlying larger objectives.

Meeting Goal

To facilitate a common understanding among Aleutian tern (ALTE) researchers and managers of alternative sampling and population estimation methods for ALTE, including assumptions, advantages, and limitations, which will lead to consensus recommendations of approaches for future population monitoring.

Primary Meeting Focus Question

How do we best estimate within-year population abundance at the local (i.e., colony) scale at Aleutian tern colonies and Arctic/Aleutian tern colonies?

Estimates of abundance can be divided into 2 general classes: estimates of population size (i.e., detection and availability probabilities estimated) or estimates of relative abundance. Methods, needed auxiliary data (other than counts), and assumptions differ to produce population estimates vs. relative abundance.

How to determine uniform survey methods to reliably measure abundance at the local scale is our primary focal question due to its fundamental nature in understanding the conservation status of a species or population, and thus it's utility from a research and management perspective. Furthermore, as a technical committee, we would like ***future directions*** for Aleutian tern conservation to be based principally on estimates of population size from the colony-level that can be combined to estimate population size at larger spatial and time scales. Estimates of either population size or relative abundance can be used to estimate population trends, either locally or regionally. We intend these estimates of population size and/or trend to be the basis for future conservation planning efforts and management actions.

Considerations for Data Collection

A number of considerations need to be discussed and resolved during the meeting in order to address our focal question, given what is known and unknown about Aleutian terns and their breeding biology.

Discussion will take place during the workshop to determine:

1. the best population variable to measure (e.g., number of: nests, breeding pairs, breeding adults, all adults, juveniles);
2. whether population estimates (need estimates of detection and availability probabilities) or relative abundance (make assumptions about detection and availability) is the optimal measure; and
3. what is the best time scale to assess (e.g., single time points, seasonal totals)?

Additional considerations for single-site-year estimates include assessment of the following factors

1. What is a colony (including 'colonies' without nesting)?
2. Habitat as it affects detection probability.
3. Colony configuration and density.
4. Short-term movement (e.g., foraging) as it affects availability to be detected.
5. Intra-annual movement among colonies (for season total estimates).

6. Spatial and temporal variation in nesting phenology (listed here and in Future Directions).
7. Researcher-caused disturbance.

Future Direction - Considerations for Producing Regional and Trend Estimates

As stated previously, we would ultimately prefer future directions for Aleutian tern conservation planning to be based on larger spatial and time scales than a single-season at a single colony. As we recognize the need to initially outline the approach to colony abundance assessment, we also recognize the need to be thinking about the future use of these data to ensure we select measures that can be incorporated at larger spatial and time scales. As such, we will devote a small section of the workshop to discussing these future directions, including the considerations below.

1. Potentially variable estimation quantities and methods.
2. The effects of unknown colonies on regional estimates.
3. Non-random selection of monitored colonies.
4. Inter-annual variation in colony occupancy and abundance.
5. Appropriate spatial and time scales (for regional abundance and trends, respectively).
6. Spatial and temporal variation in nesting phenology.

Process

A 2-day workshop will be held January 26-27, 2018 in order to bring researchers, managers, tern experts, and statisticians together to discuss the primary focal question regarding how to best count Aleutian terns and possible future directions. During this workshop we will achieve the following objectives:

- Share the current state of our knowledge regarding Aleutian tern colony counting methods, with a focus on range of habitats in which surveys have been conducted, and the pros and cons of the methods employed.

- Outside researchers will present their work relevant to the meeting question, challenges they have encountered and solutions, or processes they are undertaking to better understand the issues.

- We will hold panel/roundtable discussions to discuss the pros, cons, feasibility, efficiency, and effectiveness of different methods addressing the above considerations for data collection and future directions.

- We will employ the services of a facilitator and statistical consultant to ensure an efficient meeting, and efforts and discussion will be drafted into a monitoring framework with methodology recommendations for the Aleutian tern research and management community.

Summary

Ideally, as a primary conservation question we would like to assess the population abundance and trend for Aleutian tern colonies in Alaska. Realizing the vagile nature of Aleutian tern nesting within and among years, regional differences in nesting phenology, as well as the difficulty of obtaining accurate counts at a colony given the wide range of nesting habitats, at this meeting we will focus on how to best collect colony-level data. We will determine the appropriate parameter to assess and determine the best method(s) to assess that parameter. We will prioritize discussions of how to get appropriate estimates of abundance at individual colonies and, during a short, focused session, consider how to appropriately estimate regional and statewide populations, and determine population trends if feasible.

Possible Workshop Questions and Planning Scales, Considered for the Workshop

(Bolded items selected for workshop focus)

Workshop Focus Questions and Management Implications

What is the population abundance?

Possible parameters assessed: Number of breeding pairs, breeding adults, adults, other age classes

Management Implication: A measure of abundance and/or demography gives us information into robustness of the population to perturbations.

What is their population trend – stable, increasing, or declining?

Possible parameters assessed: Number of nests, pairs, breeding adults, adults

Management Implication: Declining trends could indicate a species of conservation concern. If a declining trend is present, why? What are the limiting factors so we can implement appropriate conservation actions?

What is their reproductive success?

Possible parameters assessed: Breeding propensity, nesting success (hatching), fledging, and recruitment

Management Implication: Identifying bottlenecks at certain stages, and their causes, can aid in development of appropriate conservation actions.

What is their survival?

Possible parameters assessed: Survival for adults, hatch years, other age classes

Management Implication: Identifying bottlenecks at certain stages, and their causes, can aid in development of appropriate conservation actions.

Connectivity among breeding areas

Possible parameters assessed: immigration and emigration among colonies, breeding regions within the state, or between Alaska and Russia

Management Implication: Measures of breeding season connectivity gives us information into robustness of the population to perturbations.

Planning Scale and Colony Composition

Geographic – Entire breeding range, Russian breeding, **Alaskan breeding**, migration, overwintering

Alaskan breeding aggregations – Statewide, Regional, **Colonies**, Dispersed breeding areas

Time – Historic versus **Current** (assess at a later time if we can make inferences to historic counts with current data collections)

Current – **intra-annual variation in colony presence and numbers,** inter-annual variations in colony presence and abundance, determine appropriate time needed for trend estimates

Species – **mixed colonies** versus **Aleutian tern-only colonies** and how to separate counts