Review of Sea Duck Monitoring Priorities in North America

Sea Duck Joint Venture Continental Technical Team
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Executive summary
In 2015, the Sea Duck Joint Venture (SDJV) Continental Technical Team's (CTT) Monitoring Subcommittee was tasked with reviewing and updating a 2007 report entitled, "Recommendations for Monitoring Distribution, Abundance and Trends for North American Sea Ducks". The current effort reviewed the surveys described in the 2007 report and prioritized sea duck monitoring that provides information to support management (e.g., harvest and habitat management, population status and trends). The CTT supports continuation of six surveys, which are currently funded by agencies and provide information for addressing management priorities of one or more sea duck populations (Table 2). If additional resources become available through the SDJV or partner agencies, seven other surveys would fill knowledge gaps and/or improve the quality or precision of data collected in existing or proposed surveys (Table 2).

Background
The Sea Duck Joint Venture (SDJV) was formed in 1999 under the auspices of the North American Waterfowl Management Plan (NAWMP) due to concern about declining populations of sea ducks. Its mission is to promote the conservation of North American sea ducks through partnerships by providing greater knowledge and understanding for effective management. High priority information needs that are identified in the SDJV strategic plan (SDJV Management Board 2014) include monitoring population size, estimating demographic parameters, and identifying important habitats.

Sea ducks inhabit vast areas during breeding, staging, and wintering, and often gather on large lakes and coastal waters that are remote and difficult to survey. Some groups of sea ducks are often not differentiated during surveys (e.g., scoters, goldeneyes, mergansers). There is an urgent need for more intensive, precise surveys that will provide estimates of population size, or reliable indices, for long-term monitoring and population assessments for all sea ducks. Recognizing the deficiencies in monitoring programs for sea ducks, the SDJV Management Board earmarked a portion of congressionally appropriated SDJV funds toward monitoring, and directed the SDJV Continental Technical Team (CTT) to form a sea duck monitoring working group to identify and prioritize monitoring needs for North American sea ducks. The working group's task was to develop a prioritized list of sea duck monitoring needs to help guide decisions about how to strategically allocate current and future funds.

In 2007, the SDJV produced a report, *Recommendations for Monitoring Distribution, Abundance and Trends for North American Sea Ducks* (hereafter 2007 report). The 2007 report focused primarily on monitoring at a population level or large geographic scale to provide the primary means of tracking changes in abundance and develop abundance objectives. The 2007 report identified priority sea duck populations and surveys that might meet population monitoring objectives. It also contained detailed descriptions of operational surveys that existed at the time and additional surveys that could be developed to address deficiencies or gaps in our knowledge of sea duck populations.

At the November 2015 SDJV meeting of the CTT and Management Board, the Monitoring Subcommittee was tasked with reviewing and updating the 2007 report. This effort would review and evaluate the surveys described in the 2007 report and identify monitoring surveys or projects that would provide information necessary to support management needs (e.g., harvest and habitat management, population status and trends).

OBJECTIVES

1. Identify information needs related to harvest management, habitat management, and population status and trends.
2. Provide an updated status of surveys listed in the 2007 report.
3. Identify additional surveys that might address sea duck information needs.
4. Suggest changes to survey design and implementation to better meet sea duck information needs.

METHODS

We restricted our review and recommendations to 10 populations identified by the SDJV as high priorities for research and monitoring: white-winged scoter, eastern and western populations of black scoter and surf scoter, long-tailed ducks, Atlantic and Pacific populations of king eiders, and American and Pacific populations of common eider. The Monitoring Subcommittee developed a set of monitoring priorities for each population. We prioritized a set of harvest and habitat variables (needed to complete harvest assessments and inform habitat management, respectively) and assigned, based on expert opinion of the committee, a priority level to monitoring population status and trends for the 10 sea duck species or populations.

Harvest priority rankings were derived from the 2016 assessment of harvest potential, "Implications of Demographic Uncertainty for Harvest Management of North American Sea Ducks" (hereafter 2016 report). All populations, with the exception of both king eider populations and Pacific common eider, were considered in the 2016 report. The committee ranked five priorities as very high, high, medium, low, or very low based on results of sensitivity analysis from that document. The five priorities were population size, recruitment, harvest rate, adult survival, and subsistence harvest. The parameter with the highest sensitivity was ranked as very high and subsequent parameters were ranked high down to very low. In some cases expert opinion altered the rankings or considered a parameter not represented in the 2016 report. For example, the 2016 report did not estimate the sensitivity of American common eider harvest potential to population size but we included that parameter in our rankings. Any population parameter linked to recruitment (nest success, duckling survival, etc.) that was listed as a high priority information need in the 2016 report was included under the recruitment priority. Using a similar process, information for habitat conservation was ranked as very high, high, medium, or low for four stages of the annual cycle: winter, breeding, molt/stage, and migration. Prioritization of habitat conservation monitoring needs was based solely on the expert opinion of the Monitoring Subcommittee. From the harvest and habitat prioritization lists we then selected the variables that ranked very high or high to identify a set of the highest priorities for monitoring. In addition, population status and trends was listed as a high priority for all populations. This resulted in five priorities for each population: two each from the harvest and habitat variables, as well as population status and trend, for a total of 50 sea duck monitoring priorities.

We focused our review on existing surveys that currently have strong agency support, or surveys that could be redesigned or restarted by the responsible agency. Therefore, we limited our consideration of surveys to those listed in Table 3 of the 2007 report, as well as any additional, currently funded, sea duck surveys. For each survey listed in Table 3 of the 2007 report we updated its current status (Appendix 1). We did not consider surveys primarily involving species federally listed in the US or Canada, consistent with the Management Board's policy of not duplicating conservation efforts through Endangered Species or Species at Risk programs. We note that some sea duck populations listed as Endangered Species or Species at Risk do not currently have funded monitoring programs and would urge rapid implementation of monitoring designed explicitly for those species or populations.

After developing the list of surveys to consider, the Monitoring Subcommittee assessed the ability of each survey to address each priority. This assessment was simply a yes/no as to whether a survey addressed one or more of the 50 monitoring priorities. Surveys in the 2007 report that did not address at least one priority as determined by the Monitoring Subcommittee were removed from consideration for recommendation, as were those considered to have no chance of becoming operational in the future. Past surveys should not be dismissed completely as they often provide invaluable data for use in designing a robust monitoring strategy, but we do not consider them to contribute to a monitoring program as a survey. We described how changes in survey design may increase the value of that survey to sea duck monitoring priorities (Appendix 1).

RESULTS AND DISCUSSION

High priority information needs for each population are listed below (Table 1). Population status and trends was a priority for each population, population size (relative to harvest) was a priority for 8 of the 10 populations, and monitoring winter habitat use was a priority for 9 of the 10 populations.

Table 1. Priorities for monitoring harvest and habitat management of 10 sea duck populations. In addition to priorities listed here, monitoring population status and trends was a priority for all populations.

Population	Priorities for Assessing Harvest	Priorities for Habitat Conservation
Pacific common eider	Population size, subsistence harvest	Molt/stage, breeding
American common eider	Population size, adult survival	Winter, breeding
Pacific king eider	Population size, subsistence harvest	Winter, molt/stage
Atlantic king eider	Population size, subsistence harvest	Winter, molt/stage
Eastern black scoter	Population size, adult survival	Winter, molt/stage
Western black scoter	Population size, subsistence harvest	Winter, molt/stage
Western surf scoter	Recruitment, adult survival	Winter, molt/stage
Eastern surf scoter	Population size, recruitment	Winter, molt/stage
White-winged scoter	Recruitment, adult survival	Winter, breeding
Long-tailed duck	Population size, adult survival	Winter, molt/stage

We added four on-going surveys that were not considered in the 2007 report: (1) the Parts Collection Survey (PCS) conducted by USFWS Division of Migratory Bird Management Branch of Monitoring & Data Management and the Canadian Wildlife Service National Harvest Survey Office, (2) the Puget Sound Assessment and Monitoring Program, (3) the Quebec/Newfoundland Common Eider Winter Survey, and (4) the Arctic Coastal Plain Survey. The latter survey was called Alaska North Slope Waterfowl and Waterbird Survey in the 2007 report but it was since re-designed by USFWS and re-named.

Nine surveys from the 2007 report did not meet at least one priority: Yukon-Kuskokwim Delta Breeding Pair and Nest Survey, Northern Alaska Coastal Pacific Common Eider Breeding Survey, Atlantic Black Scoter Spring Staging Survey, Avalon SeaWatch, Point Lepreau Spring Migration Count, Hudson Bay Common Eider Colony Counts, Northern Common Eider Nest Counts, Point Barrow Migration Counts, and Pacific Barrow's Goldeneye Breeding Survey. In addition, the Atlantic Surf Scoter Fall Staging Survey, the James Bay Atlantic Black Scoter Molting Survey, Northwestern Alaska Pacific Common Eider Breeding Survey, and the Waterfowl Breeding Population Survey for Central and Western Arctic Canada were considered to have no chance of becoming operational in the future and were removed from further consideration. After eliminating surveys that did not address any priority and those that had no chance of becoming operational we further considered a set of 7 surveys from the 2007 report.

Of the 11 surveys considered further (7 from 2007 report, 4 additional), 6 are considered funded and operational on a regular basis: the Waterfowl Breeding Population and Habitat Survey (WBPHS), Central Arctic Canada Pacific Common Eider Breeding Survey, Parts Collection Survey, Puget Sound Assessment and Monitoring Program, Quebec/Newfoundland Common Eider Winter Survey, and the Arctic Coastal Plain Survey (Table 2).

The set of 11 surveys had the potential to address 31 of the 50 priorities. Of the 19 priorities not met by the survey set, eight were molt/staging habitat of different populations, five were adult survival, and one each were winter habitat and subsistence hunting. None of the priorities for the Atlantic population of king eiders were met by any survey considered.

RECOMMENDATIONS

Updated survey descriptions of the seven surveys considered from the 2007 report, and new descriptions for the four surveys added, are presented in Appendix 1. We describe survey design changes that would be needed for each survey to meet current or additional priorities listed. Survey recommendations are summarized in Table 2.

The most common survey adjustments noted included an alteration of survey spatial coverage, the ability to accurately identify species (i.e., scoters), and accounting for detection and count bias. Alterations of survey coverage are survey specific and could be informed from satellite telemetry data, results of pilot/developmental surveys, or other relevant data. Species identification and detection problems are currently science priorities of the SDJV. We recommend managers consider altering survey designs or methodologies based on deficiencies in spatial coverage, species identification, and detection.

Recommendations for survey development

Current monitoring programs often fail to address adult survival and molt/stage habitat requirements for sea ducks. These priorities will require survey design and development outside of current options. We recommend development and funding of surveys or research that meet those needs. In addition, the Atlantic population of king eiders has no survey addressing any of the priorities for that population. We recommend development of a survey strategy to begin monitoring this population.

The 2012 NAWMP (NAWMP 2012) calls for increased waterfowl monitoring and assessment capabilities. However, federal funding for traditional migratory bird management activities of federal agencies has failed to keep pace with program cost increases, making it necessary to restrict some traditional monitoring activities and impeding implementation of new surveys. Additional federal agency support will be necessary to meet the NAWMP recommendation. It is important that wildlife agencies in the U.S. and Canada are able to justify requests for annual resource increases based on clearly articulated assessments of resource needs for waterfowl monitoring. We hope that this report contributes to those assessments.

Table 2. Recommendations from the Sea Duck Joint Venture on surveys that support sea duck monitoring needs.

Tier I: The SDJV supports continuation of these surveys, which are currently funded by management agencies, and provide information for addressing management priorities of one or more sea duck populations.

Survey name	Lead
WBPHS	USFWS/CWS
Central Arctic Canada Pacific Common Eider Breeding Survey	CWS
Parts Collection Survey	USFWS/CWS
Puget Sound Assessment and Monitoring Program	Washington Dept of Fish and Wildlife
Arctic Coastal Plain Survey	USFWS
Quebec/Newfoundland Common Eider Winter Survey	CWS

Tier II: If additional resources were available through SDJV or partner agencies, these surveys would fill knowledge gaps and/or improve the quality or precision of data useful for management and conservation of sea ducks.

Survey name	Lead	Status*	Limiting factors
Pacific Black Scoter Breeding Survey	USFWS	1	Funding
WBPHS - design changes	USFWS/CWS	2	Technical and staff capacity for review
Parts Collection Survey - design changes	USFWS/CWS	2	Funding, staff capacity
Atlantic Coast Wintering Sea Duck Survey	USFWS	3	Funding, flight capacity
Pacific Flyway Winter Sea Duck Survey	USFWS/CWS/States	3	Logistics, safety
Great Lakes Winter Survey	CWS/USFWS/States	3	Survey design, staff capacity, funding
American Common Eider Breeding Survey	CWS/USFWS/States	3	Flight capacity, design

* Status

1 = fully developed, not funded

2 = operational, needs design changes to meet sea duck needs

3 = needs funding and development