

**Sea Duck Joint Venture  
Annual Project Summary for Endorsed Projects  
FY04 – (October 1, 2003 to September 30, 2004)**

**Project Title:** (SDJV #43) Factors involved in population dynamics and delineation of North American mergansers

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**Project Description:** A three-year project (2004 – 2006) that will examine reproductive ecology and site fidelity of Common and Red-breasted mergansers in south-central Alaska. Genetic samples will be collected throughout Alaska and across North American for all 3 species of mergansers to examine population delineation.

**Objectives for 2004 – 2006:**

- I. Document general nesting ecology, estimate levels of fidelity, and examine how these influence population dynamics and structure of Common and Red-breasted mergansers in Alaska.
- II. Assess population genetics of Common and Red-breasted mergansers in Alaska.
- III. Assess phylogeography of all three merganser species across North America.

**Preliminary Results (ordered by objectives listed above):**

**I. General nesting ecology and demographics**

1. **Captures and marking.** We conducted field work in south-central Alaska (Anchorage, Seward, Soldotna, and Homer) from November 2003 to August 2004. Our efforts focused on determining the best timing and method of capture for an annual and consistent marking effort. Few females were captured during the pre-nesting period (Table 1) due to their ability to maneuver over mist nets and the higher number of males in flocks near Seward. A net gun was unsuccessful in capturing pre-nesting females and pairs on the Kenai River. Red-breasted mergansers were extremely rare in spring and isolated pairs were not observed until mid-June on lakes within the Kenai National Wildlife Refuge. Based on observations of downy Red-breasted merganser ducklings in late July, egg-laying is likely not complete until mid-June in this species. Captures of Common mergansers were most successful in late summer during brood-rearing on small creeks and rivers.

2. ***Reproductive ecology and population dynamics.*** None of the radio-marked females yielded nest site information as all 3 marked with subcutaneous radios in Seward went off the air within one week of instrumentation. Radio failure is not suspected since one female was recaptured 10 days after initial marking and the radio was firmly attached under the skin and transmitting. We conclude that Seward birds did not breed within the range of our detection (ground and aerial surveys). One female marked on the Kenai appeared to be a sub-adult (no male was present) and left the area shortly after marking. The second female marked on the Kenai River was observed with a male several times, up to 45 days after marking, but either did not attempt to nest or failed early.

**Table 1.** Dates and number of Common mergansers captured in south-central Alaska in 2003–2004.

Date	Location	Age & sex	Number & marker type
November 2003	Anchorage	Sub-adult female	1 banded
November 2003	Kenai River		None
April 2004	Seward	Adult females	3 radios
April 2004	Seward	Adult males	13 banded
May & June 2004	Kenai River	Adult females	5 radios
May & June 2004	Kenai River	Adult males	1 banded
July & August 2004	Anchor River	Adult females	3 radios
July & August 2004	Anchor River	Hatch year	1 radio and 10 banded
Total			12 radios & 25 banded

3. ***Analysis of historic North American banding data for Common and Hooded mergansers.*** Using band-recovery data from five locations across North America spanning the years 1938–1998, we found that migratory tendency (distance between banding and recovery locations) varied geographically. Similarly, all models accounting for the majority of variation in recovery and survival probabilities included location of banding. Models that included age and sex received less support, but we lacked sufficient data to adequately assess these parameters. Model averaged estimates of annual survival ranged from 0.21 (95% CI 0.10 – 0.38) in Michigan to 0.82 (95% CI 0.72 – 0.89) in Oklahoma. Heterogeneity in migration tendency and survival suggests that demographic patterns may vary across geographic scales, which has implications for the inter-population dynamics of this species, which will be further investigated with genetic markers (Objectives II and III). A manuscript describing these results was accepted in August 2004 (*Pearce, J.M., J. A. Reed, and P. L. Flint. 2005. Geographic variation in survival and migratory tendency among Common mergansers in North America. Journal of Field Ornithology 76: In Press.*). Prepublication copies of this manuscript are available upon request.

## II. Laboratory genetic data

A total of 474 DNA samples (148 Common, 127 Red-breasted, and 199 Hooded) are now archived at the Alaska Science Center, Molecular Ecology Laboratory. Samples were collected from several sites in Alaska, Canada, the lower-48 United States, Mexico, Greenland, and Russia. A similar number of additional samples are expected in 2005. Current lab activities include:

1. Screening all 3 species with > 70 nuclear microsatellite primers to determine a subset of 10 – 15 that will provide the best resolution of population genetic patterns.
2. Screening all 3 species for nuclear intron sequence variation using primers for Lamin-A, GadPH, Cmos, BF7, and OD7-8.
3. Developing mitochondrial (mt) DNA specific primers for Common and Red-breasted mergansers (completed for Hooded mergansers).

An initial analysis of 62 Hooded merganser samples from across North America was conducted during the summer of 2004 using 437 base pairs of the mtDNA control region. No differentiation was observed between the disjunct Pacific and Atlantic migratory flyways ( $\Phi_{ST} < 0.01$ ,  $P = 0.82$ ). Summary statistics for the Pacific flyway suggest a colonization event from the east coast or contemporary female-mediated gene flow between Pacific and Atlantic populations. High haplotype and low nucleotide diversity in the Pacific also suggests that this population is expanding relative to other areas. *For additional details, visit [www.absc.usgs.gov/research/birds/merganser/](http://www.absc.usgs.gov/research/birds/merganser/).*

### Project Status (including revised plans for 2005):

**Demographic data:** Aerial surveys for radio-marked females will be conducted throughout the winter of 2004 – 2005. In 2005, we will focus our efforts on smaller creeks on the Kenai Peninsula in both spring and late summer where Common mergansers are easier to capture. Lakes where Red-breasted mergansers were observed will also be targeted in late summer for brood-rearing females. We will continue to use banding and radio telemetry to examine reproductive ecology and fidelity. We will also use these techniques to evaluate brood survival since as many as 20 Common merganser broods can be marked and followed on the easily accessible small creeks of the Kenai Peninsula that we examined during 2004. Band-recovery data for Hooded mergansers will be examined during the winter and spring of 2005 in collaboration with Peter Blums (University of Missouri-Columbia) and Mark Lindberg (University of Alaska, Fairbanks) for geographic patterns in survival and migratory tendency.

**Laboratory genetic data:** Sample acquisition will continue in 2005 within Alaska and across North America. Numerous agencies have been contacted regarding sampling during the fall and winter hunting season. Requests for assistance with DNA sampling have also been made to agencies and members of the public that monitor nest boxes, which should yield additional breeding samples of Hooded mergansers. Laboratory analyses are on-going (see above).

**Project Funding Sources (US\$).**

SDJV (USFWS) Contribution	Other U.S. federal contributions	U.S. non-federal contributions	Canadian federal contributions	Canadian non-federal contributions	Source of funding (agency or organization)
<b>\$26,650</b>					
	<b>\$63,150</b>				U.S. Geological Survey
	<b>\$8,500</b>				Kenai National Wildlife Refuge
		<b>\$1000</b>			Various state wildlife agencies and private individuals
			<b>\$1000</b>		Canadian Wildlife Service

**Total Expenditures by Category (US\$).**

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
<b>Banding</b>	<b>\$15,000</b>				<b>\$15,000</b>
<b>Surveys</b>					
<b>Research</b>	<b>\$85,300</b>				<b>\$85,300</b>
<b>Communication</b>					
<b>Coordination</b>					