

## **Sea Duck Joint Venture Progress Report – September 2009**

**Project Title:** Ecology and Population Affiliations of Molting and Fall Staging Barrow's Goldeneye at Cardinal Lake, Alberta (SDJV Project # 18).

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### **Additional Partners:**

Alberta North America Waterfowl Management Plan Partnership, Alberta Conservation Association, National Science and Engineering Research Council

### **Project Description:**

As a result of recent postbreeding waterfowl surveys and satellite telemetry research, several sites used intensively by molting and fall staging Barrow's Goldeneye (BAGO) were discovered in the Peace Parklands of northern Alberta. Most postbreeding BAGO were found on Cardinal Lake where fall staging numbers exceeded 4000 birds, placing Cardinal Lake among the most important sites currently recognized for this species. As a result of our work this year a nearby site, Leddy Lake, was discovered that hosted nearly 2000 postbreeding BAGO. The discovery of these significant post-breeding sites provides an important and readily accessible opportunity to investigate the poorly understood molting and fall staging ecology of this species. Furthermore, the ability to capture and mark large numbers of BAGO will help advance recent efforts to develop a better understanding of population structure and cross-seasonal habitat affiliations within the Pacific population of BAGO. Finally, it is also important to recognize that Bruce Power is currently considering several sites in the Cardinal Lake area as potential locations for western Canada's first nuclear power plant. It is essential to better understand the ecology of postbreeding BAGO in the Peace Parklands to accurately predict or assess the impacts of this proposed development on this species.

Through a combination of surveys, captures, an array of weights and measures, VHF telemetry, and satellite telemetry, we are addressing a suite of objectives related to the ecology of the wing

molt and fall staging periods, the importance of Cardinal Lake, and the wing molt stage in the context of population delineation and population dynamics throughout the annual cycle.

### **Objectives:**

Our research is addressing the following objectives:

- 1) Determine the sex and age composition of molting and staging BAGO at Cardinal Lake.
- 2) Determine the timing of arrival, phenology and duration of remigial molt, and timing of fall migration for BAGO age and sex cohorts using Cardinal Lake.
- 3) Determine habitat use and movement patterns of molting and staging BAGO at Cardinal Lake.
- 4) Determine season-specific survival rates of BAGO molting at Cardinal Lake and investigate whether survival rates vary between years.
- 5) Determine breeding and wintering population affiliations of BAGO molting at Cardinal Lake.
- 6) Determine fidelity of BAGO to molting and staging habitats at Cardinal Lake and potentially locate other key molting and staging areas that have yet to be recognized.
- 7) Quantify body mass variation of BAGO through wing molt.
- 8) Document foraging effort of BAGO during wing molt.

### **Preliminary Results:**

The first year of field work for the project is still underway. However, to date, data collection has gone very well and the project has been an enormous success. We describe, in brief, activities and results thus far.

While Cardinal Lake remains the core study area for this project, we conducted weekly surveys of BAGO use at Cardinal and Leddy Lakes to support a number of our objectives. These surveys are used to index BAGO abundance and determine sex ratios of molting and staging birds, as well as timing of components of molt and migration. Preliminary results suggest that while male BAGO use Cardinal Lake extensively throughout the molting and fall staging period, females use the lake more heavily during fall staging.

During remigial molt, the male to female ratio on Cardinal Lake was approximately 13:1 and 25:1 on Leddy Lake, however, the proportions of females increased as the season progressed. It is interesting to note that many male BAGO arrived on postbreeding habitats in the Peace Parklands by mid June and are not expected to depart until mid October. This indicates that postbreeding habitats are used by male BAGO for four months or one quarter of their annual cycle.

We also conducted drive trapping of flightless BAGO from the last week in July through early September. The modified harlequin duck moult trap worked well under the conditions at Cardinal and Leddy Lakes. We recorded 595 capture events, including 581 new bands deployed, 13 within-year recaptures, and a recapture of a bird originally marked at Riske Creek, BC. To our knowledge, this represents the second largest sample of BAGO ever banded during a specific project. The vast majority of captured birds were after-second-year males (n=400), but younger males (n=143), as well as both adult (n=18) and younger females (n=20), were represented in the sample. For all captured birds we measured an array of morphometrics and body mass.

Based on an initial summary of these data, average body mass ( $\pm$ SE) of adult males (n = 309) during remigial molt was  $1057.18 \pm 4.7$  g and ranged from 850 to 1268 g, while the mean body mass of subadult males (n= 159) was  $1034.54 \pm 6.4$  g and ranged from 778 to 1249 g. Adult female body mass (n =6) averaged  $766.33 \pm 20.7$  g and ranged from 713 to 848 g, while subadult female body mass (n=18) averaged  $749.22 \pm 19.0$  g and ranged from 621 to 882 g. Preliminary results suggest that there is no relationship between stage of remigial molt (i.e., 9<sup>th</sup> primary length) and body mass for any cohort. Furthermore, the average ninth primary growth rate for recaptured birds was  $3.46\text{mm/day} \pm 0.25\text{mm}$  (n=12). Also, recaptured birds had lost an average of  $41.1\text{g} \pm 17.1\text{g}$  since their first capture, with a mean weight loss of  $3.0\text{g/day} \pm 1.7\text{g}$  (n=13).

As part of captures, we deployed 50 subcutaneous-prong mounted VHF radios on moulting male BAGO to monitor local movements, survival and foraging effort. Given high numbers of BAGO on Leddy Lake this year (~1800 birds), we decided to mark 25 BAGO with VHF radios on this wetland and 25 on Cardinal Lake. Movements and survival of VHF radio-marked birds are being monitored on a weekly basis. These data will be useful in determining key areas for moulting and staging BAGO at Cardinal and Leddy Lakes and survival rates in two distinctly different postbreeding habitats. Preliminary assessment of the movement data suggest most areas of both Cardinal and Leddy Lakes are used by postbreeding BAGO, with particularly concentrated use occurring in the major northern bays and southwestern shoreline at Cardinal. Two VHF mortalities have occurred since deployment, one on each lake, with the Cardinal Lake bird being taken by a small mammalian predator. The Leddy Lake mortality is currently being tracked in order to determine a cause of death. One radioed bird has also disappeared on Cardinal Lake, either due to radio malfunction, or because the bird has flown to another location. Given these data, survival rates appear high during remigial molt this field season.

During remigial molt, BAGO spent a relatively low proportion of their time foraging. Furthermore, it appears that BAGO on Cardinal Lake forage primarily during the day, while BAGO on Leddy Lake are more prone to forage at night. Reasons for this apparent difference are still under investigation.

In addition, we deployed 20 satellite transmitters on molting male BAGO at Cardinal Lake to monitor larger-scale movements and breeding/wintering subpopulation affiliations of these birds. Satellite transmitters were implanted by wildlife veterinarian, Dr. Malcolm McAdie, during the second week of August. In the initial week following implantation, we lost 3 satellite marked birds to predators, including 2 to avian predators and 1 to a mammalian predator (likely a coyote). It is impossible to assess whether these mortalities were due to complications following

surgery, but it is interesting to note that mortality rates of the 50 birds marked with VHF radios are proportionately lower. Fortunately, efforts to recover the satellite transmitters were successful and we plan to refurbish and deploy them again during our 2010 field season. A 4<sup>th</sup> satellite marked bird mortality occurred on approximately September 10<sup>th</sup>, most likely due to predation or hunting pressure. Efforts are currently being made to retrieve this fourth satellite transmitter. At present, the 16 remaining satellite marked BAGO are still using postbreeding habitats at Cardinal Lake and generating local movement data. These birds will provide new insights into the timing and routes used to return to wintering areas along the Pacific Coast during fall migration. We will post locations of birds to a website once movements away from Cardinal Lake and to wintering areas have occurred. Given the success marking adult males with PTTs this year, and the knowledge that we can handle adequate numbers of females, we are considering marking some females with PTTs next season.

### **Project Status:**

We expect the remainder of the first field season to go smoothly. All captures and radio attachments have been successfully completed, and the remaining field work consists of radio monitoring and surveys of staging BAGO. The field season will end when most BAGO have departed for wintering areas.

Data entry, proofing, summarization, and analysis will be conducted following the field season. However, we are confident that the objectives of this study are being met and that the data collected provide numerous new insights in to the molting and fall staging ecology of BAGO.

**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 (name of agency or organization)
\$27,500					SDJV
				\$59,600	DU Canada
				\$18,000	ACA
			\$18,000		NSERC
				\$21,400	Alberta NAWMP
				\$18,000	SFU-CWE
			\$21,200		EC

**Total Expenditures by Category (SDJV plus all partner contributions; US\$).**

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
<b>Banding</b> (include only if this was a major element of study)					
<b>Surveys</b> (include only if this was a major element of study)					
<b>Research</b>		\$133,700	\$50,000		