

Sea Duck Joint Venture
Annual Project Summary for Endorsed Projects
FY 2008 – (October 1, 2007 to Sept 30, 2008)

Project Title: Annual cycle connectivity, inter- and intra-annual site fidelity, and habitat use of Pacific Barrow's Goldeneye (SDJV Project # 85; Year 1 of 3)

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Project Description:

Connectivity among annual cycle stages, rates of site fidelity at all stages, and the geographic scale of dispersal are largely unknown for Pacific Barrow's Goldeneye (BAGO). This precludes managers and researchers from identifying demographically discrete units for population management, and from understanding the scale of inference from field studies. Further, habitats and specific sites that may be particularly important for BAGO are difficult to identify, as this species is not well covered by surveys for most of its annual cycle and most of its range. This proposal helps fill some of the more important information needs for BAGO in the latest SDJV Strategic Plan, namely population delineation, population dynamics and population ecology. In this study we mark individuals with satellite transmitters to quantify these important demographic attributes, and assume that the inferences we draw will have relevance for considering these issues on a range-wide scale. Our project is designed to generate information on seasonal connectivity, site fidelity and dispersal rates of all BAGO age and sex classes.

Objectives:

Our research addresses the following questions:

- 1) What are the rates, and geographic scale, of inter-annual site fidelity by different sex and age classes at various stages of the annual cycle (i.e., winter, breeding, molt)?
- 2) Do birds from the same breeding site occur in discrete areas during winter, or are they widely distributed, and vice versa?
- 3) How do the answers to 1 and 2 above combine to indicate demographically distinct management units?
- 4) Are there important habitats or specific sites that are used by a large proportion of marked birds, which would indicate their value for conservation?

Study Design:

This project is eventually intended to be a range-wide evaluation of Pacific BAGO population structure. However, satellite transmitters are expensive and relatively large sample sizes are needed to describe seasonal movements, especially when considering all sex and age classes. Hence, we have decided to mark birds primarily in one important breeding area in south-central BC, at Riske Creek where we already have a lot of experience in capturing and marking birds. Adult males are captured in May using underwater mist nets and decoys whereas females and their young are captured in late July using drive traps. Birds undergo surgery by a trained DVM to abdominally implant transmitters (PTTs). Measurements of body mass and morphology are taken.

Preliminary Results

Marking

During preliminary work to develop capture and marking techniques, we implanted 20 adult male BAGO at Riske Creek in May 2006 (see Table 1). Although many of the PTTs failed due to a programming error, we were able to obtain location data for a number of birds from May to October 2006, and data for a few birds into 2007 and beyond. In February 2007, we marked 20 adult BAGO (10 females and 10 males) wintering in Indian Arm near Vancouver and in May 2007 we marked another 15 adult males at Riske Creek. In the summer of 2008 we deployed 42 PTTs at Riske Creek (on adult males, adult females, and hatch year birds; see Table 1).

Table 1: BAGO PTTs deployed during 2006 - 2008.

	<u>Males</u>	<u>Females</u>	<u>HYS</u>
Indian Arm (near Vancouver), wintering area			
Deployed, Feb 2007	10	10	
Riske Creek, interior BC, breeding area			
Deployed, May 2006	20 (however most units failed within 6 months)		
Deployed, May 2007	15		
Deployed, May-Aug 2008	10	10	22

In addition to satellite-tagging different sex and age classes in 2008 we intended to mark paired males and females and their young, taking advantage of females that had been marked with nasal disks in 2007. Unfortunately, only a handful of nasal-marked females were present in May 2008 and we were able to capture even fewer of their mates and young; hence, we were able to tag only a few birds in which family affiliations were known or suspected. In any case, we met our goal of satellite-tagging at least 40 birds; these consisted of 10 breeding adult males in May 2008 and 10 breeding adult females and 22 hatch year birds in July 2008 (12 HY males and 10 HY females) belonging to some of the tagged females (see Tables 2 and 3).

We used PTT units manufactured by either Microwave Ltd or HABIT Research. Each unit weighed approximately 30-35g and each was programmed with a duty cycle of 4 hours on and 7 days off to achieve two annual cycles. Microwave Ltd transmitters were used for adult males in

May and primarily for adult females in July. Only HABIT units were used for hatch year birds in July (see Tables 2 and 3 below).

Movements

In Mays of 2006 - 2008, we marked only adult males at Riske Creek. From June to October each year these males showed the same general pattern of movement; i.e., almost all birds moved north to molt, with some migrating as far north as Great Bear Lake and Great Slave Lake, Northwest Territories (see temporary Argos map in Fig. 1). From early November to late April all birds were on the Pacific coast, from northern Washington State to southern Alaska.

In February of 2007, we marked both adult males and females wintering on the coast near Vancouver. At the start of breeding season in late April both sexes dispersed over a broad area, spanning from Washington State to northern BC and west-central Alberta. Based on location/movement data, several females appeared to breed successfully while the males departed their respective breeding areas during mid-incubation and flew north to molt.

In addition to the above general movement patterns, the PTT data suggest a definite connection for adult males breeding at Riske Creek and a molting/staging lake in northern Alberta. Roughly 30-40% of all males marked at Riske Creek were found to consistently use Cardinal Lake AB from June to November each year (see example in Fig. 2). This finding, and a recent proposal to construct a nuclear power plant on or near Cardinal Lake, encouraged Ducks Unlimited Canada (J. Thompson) to undertake detailed waterfowl surveys in August 2008. These surveys determined that 90% of the 4-5,000 goldeneye on Cardinal Lake in August are BAGO, making this the most important (known) molting/staging lake for this species in NA outside of Old Crow Flats in the Yukon.

Project status:

As noted, we accomplished our goal of marking at least 40 BAGO during the breeding season at a key breeding area in south-central BC, including all sex and age classes. Each PTT has been programmed to generate location and movement data over two annual cycles. Argos data will continue to be downloaded and temporary map updates will continue to be generated and circulated. Once all PTTs have stopped transmitting after Year 2 of this study, we will develop more sophisticated, detailed maps using GIS and answer the questions posed in the Objectives section.

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)
\$43000					SDJV/USFWS
			\$108000		Environment Canada
				\$3000	SFU

ACTIVITY	BREEDING	MOLTING	MIGRATION	WINTERING	TOTAL
Banding					
Surveys					
Research	\$38500	\$38500	\$38500	\$38500	\$154000
Communication					
Coordination					

Table 2: Summary, PTT marking of adult male BAGO at Riske Creek B.C., 11-16 May 2008

D	M	Y	Site	Sex	Age	PTT	Comments
11	5	2008	RC 72.1	M	AHY	Mwave	Paired with unmarked female
12	5	2008	RC 14	M	AHY	Mwave	Paired with marked female (WSBY)
13	5	2008	RC 1	M	AHY	Mwave	Paired with unmarked female
14	5	2008	RC 74	M	AHY	Mwave	Paired with marked female (BYWC)
14	5	2008	RC 73	M	AHY	Mwave	Paired with unmarked female
14	5	2008	RC 74	M	AHY	Mwave	Paired with marked female (WOBR)
15	5	2008	RC 8	M	AHY	Mwave	Paired with unmarked female
15	5	2008	RC 13	M	AHY	Mwave	Paired with marked female (WSBT)
16	5	2008	RC 54	M	AHY	Mwave	Paired with unmarked female
16	5	2008	RC 30	M	AHY	Mwave	Paired with unmarked female or possibly unpaired

Table 3: Summary, PTT marking of adult females and young BAGO at Riske Creek B.C., 25-30 July 2008

D	M	Y	Site	Sex	Age/Class	PTT	Comments
25	7	2008	RC 70	F	AHY	Mwave	Hen with 8 HYs (IIB/C); 2 HYs marked
25	7	2008	RC 70	M	HY IIB/C	Habit	
25	7	2008	RC 70	M	HY IIB/C	Habit	
25	7	2008	RC 73	F	AHY	Mwave	Hen with 7 HYs (IIC); 4 HYS marked
25	7	2008	RC 73	F	HY IIC	Habit	
25	7	2008	RC 73	F	HY IIC	Habit	
25	7	2008	RC 73	M	HY IIC	Habit	
25	7	2008	RC 73	M	HY IIC	Habit	
25	7	2008	RC 73	M	HY IIC	Habit	
26	7	2008	RC 18	F	AHY	Mwave	Hen with 7 HYs (IIB/C) & 6 HYs (IIA/B); 6 HYs marked
26	7	2008	RC 18	F	HY IIB/C	Habit	
26	7	2008	RC 18	M	HY IIB/C	Habit	
26	7	2008	RC 18	M	HY IIB/C	Habit	
26	7	2008	RC 18	F	HY IIB/C	Habit	
26	7	2008	RC 18	F	HY IIB/C	Habit	
26	7	2008	RC 18	M	HY IIB/C	Habit	
26	7	2008	RC 18	M	HY IIB/C	Habit	
27	7	2008	RC 73	F	AHY	Mwave	Hen with 6 HYs (IIA); no HYs marked
27	7	2008	RC 71	F	AHY	Mwave	Hen with 5 HYs (IIA/B); no HYs marked
28	7	2008	RC 26	M	HY IIA/B	Habit	Hen not captured, with 3 HYS (IIA/B) plus 1 HY (IIA)
28	7	2008	RC 26	M	HY IIA/B	Habit	Hen not captured, with 3 HYS (IIA/B) plus 1 HY (IIA)
28	7	2008	RC 32	F	AHY	Mwave	Hen with 6 HYs (IIB/C); 3 HYs marked
28	7	2008	RC 32	F	HY IIB/C	Habit	
28	7	2008	RC 32	M	HY IIB/C	Habit	
28	7	2008	RC 32	M	HY IIB/C	Habit	
29	7	2008	RC 15	F	AHY	Mwave	Hen with 8 HYs (IIB); 3 HYs marked
29	7	2008	RC 15	F	HY IIB	Habit	
29	7	2008	RC 15	F	HY IIB	Habit	
29	7	2008	RC 15	F	HY IIB	Habit	
29	7	2008	RC 50	M	HY IIB/C	Habit	Hen not present; 1 HY (IC) + 1 HY (IIA/B) + 2 HYs (IIB/C)
29	7	2008	RC 50	F	HY IIB/C	Habit	Hen not present; 1 HY (IC) + 1 HY (IIA/B) + 2 HYs (IIB/C)
29	7	2008	RC 51	F	AHY	Mwave	Hen with 4 HYs (IIB); no HYs marked
30	7	2008	RC 53	F	AHY	Habit	Hen with 7 HYs (IIA/B); no HYs marked
30	7	2008	RC 39	F	AHY	Mwave	Hen with 9 HYs (IIA/B); no HYs marked

Figure 1: Example of BAGO locations during molt (12 August 2008). Almost all locations are from adult males marked at Riske Creek BC (most marked in May 2008 but a few in May 2007). This distribution pattern was similar to the patterns of 2006 and 2007. The map also shows the locations of the two main banding sites at Riske Creek and Indian Arm as well as Cardinal Lake, a key molting/staging site in northern Alberta. Most eventual molt locations for BAGO males are east of the Rocky Mountains.

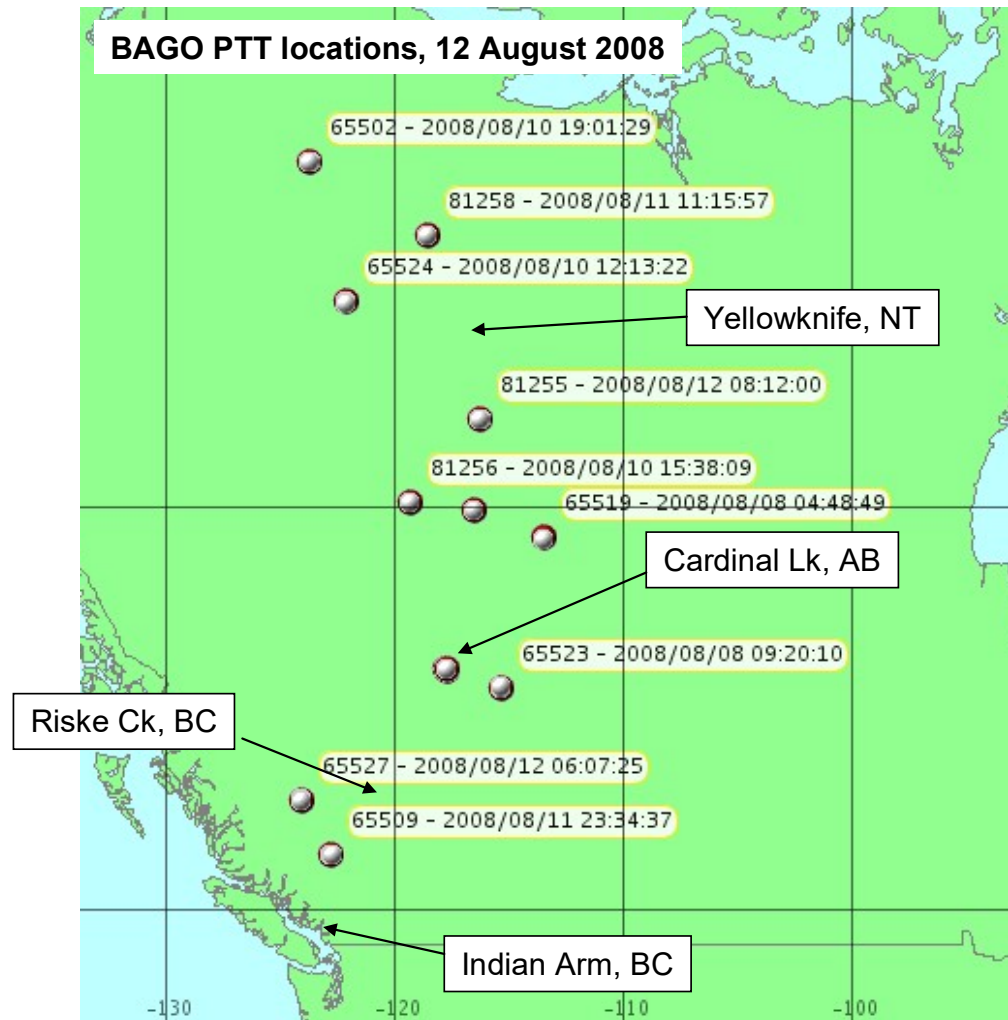


Figure 2: Example of BAGO locations on Cardinal Lake AB during molt (12 Aug 2008). Dark dots indicate latest locations. These 4 PTTs typically represent 30-40% of all males marked at Riske Creek BC each year. Similar patterns were achieved in 2006 and 2007.

