

Kodiak Island Cooperative Goldeneye Nest Box Project



2013 Progress Report

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This project is a cooperative effort of the Alaska Department of Fish and Game, Kodiak National Wildlife Refuge, Lesnoi Corporation, U.S. Coast Guard - Integrated Support Command Kodiak, and various private individuals.

Cover photo- A video screen capture as one of 12 goldeneye young hatched from nest box OL-2 departs the box on the morning of June 24, 2013.

Executive Summary

Occupancy rate of available nest boxes used by Barrow's goldeneye (*Bucephala islandica*) hen was 40% (total, 18 boxes) in 2013, up from 35% and 19% occupancy rates seen in 2012 and 2011, respectively. The estimated 2013 average clutch size of 7.3 eggs was also an increase from 2012 and 2011 estimated averages of 5.7 and 6.1 eggs per nest box clutch.

During the period 6 May to 1 Aug, 2013, nest boxes placed on six different lakes along the Kodiak road system and Karluk Lake on the Kodiak National Wildlife Refuge were checked by the author(s). An additional road system nest box was placed on Caroline Lake on 4 April, while still ice covered, raising the total number of Project boxes available in 2013 to 45 nest boxes.

The Kodiak nest box project was initiated in the spring of 2010 in an attempt to provide additional goldeneye nesting habitat and collect basic nesting ecology information.

Introduction

Kodiak Island is located at the far western edge of Barrow's goldeneye (*Bucephala islandica*) range. The species is a common cavity nesting sea duck breeding throughout the archipelago's freshwater ponds, lakes, lagoons, and protected bays. Kodiak supports an extensive resident Barrow's goldeneye breeding population (primary author's unpub. data), and based on the large number of hunter band returns, a large migrant wintering population. Kodiak's wintering goldeneye are a highly prized target of both Kodiak subsistence and sport hunters. However, little is known of the resident breeding population's nesting ecology, size, or the contribution to the heavily hunted Kodiak wintering goldeneye population.

Study Area

Located in the northwestern Gulf of Alaska, the Kodiak Archipelago is separated from the Alaska mainland by 30 miles of water in Shelikof Strait. Kodiak National Wildlife Refuge occupies approximately 757,000 ha on Kodiak and Afognak Islands (Figure 1). The Archipelago is influenced by a maritime climate with an annual mean temperature of about 4 C°. Total annual precipitation varies from >250 cm along the eastern coast of the Archipelago to <60 cm over the western areas adjacent to Shelikof Strait. Mountains, several over 1220 m with permanent glaciers, traverse more than half the length of Kodiak Island. Vegetation ranges from Sitka spruce (*Picea sitchensis*) forest on the northern end of the Archipelago to treeless tundra on the southern end of the Archipelago. The approximate locations of the six Kodiak road system nest box lakes, Karluk Lake, and Hidden Basin are depicted in Figure 2.

Recommended Methods

1. An extension ladder is used to access the nest boxes to assess their status with the exception of the nest boxes at ground level at Lee and Caroline Lakes due to lack of large trees in the vicinity.
2. A minimum single annual nest box check for usage is recommended during the period 1 June to 15 August.
3. Banding capture of hens should be attempted during the period 15 May to 1 July which

increases the probability the clutch hasn't hatched out yet and the hen will still be occupying the box.

A small landing net attached to an adjustable pole (Figure 3) is used to capture incubating hens at occupied nest boxes for banding. Captured hens have standard body measurements taken and are banded with standard 7A stainless steel bands provided by the US Bird Banding Laboratory.

4. The number of eggs, young, or egg membranes from hatched eggs found in the nest boxes are used to estimate clutch size (CS) and hatching success (HS). Membranes estimated to be more than 60% the size of a whole egg are counted as a single egg (Figure 4).
5. Wood shavings are added to boxes as needed in order to maintain adequate amounts of nesting material in the box. When an early period box check is conducted and unhatched clutches are present in the boxes, shavings should still be added to the box beneath the eggs. A wood shaving depth in of >2 inches appears to be a major factor in the initial and continued use of a nest box.

The 2013 box checks on the 24 Kodiak road system nest boxes and 21 Karluk Lake boxes located on the Kodiak National Wildlife Refuge were conducted from 6 May to 1 Aug, 2013.

Results

Of a total of 45 project nest boxes installed on the seven Kodiak lakes available for use by goldeneye in 2013, 17 clutches from the 18 occupied boxes (40%) contained an estimated average clutch size of 7.3 eggs/box (KL-18 had 0 eggs). Clutch size ranged from 3-15 eggs per box.

Estimated hatching success for the 17 boxes with clutches was 95% with five boxes having a total of seven unhatched eggs. Box KL-6 also contained the carcass of a single goldeneye duckling but cause of death could not be determined. Road system and Karluk Lake nest box installation dates and use histories from 2010-2013 nesting seasons are presented in Tables 1 and 2, respectively.

Orbin Lake

Nest box OL-1 was checked for activity on 6 May with 14 eggs and no hen was found in the box. The box was again checked on 31 May, capturing the incubating hen and confirming the same hen used box OL-1 in 2012. The clutch in box OL-1 had increased to a record 15 eggs, breaking the previous 14 egg record clutch which this box contained in 2012. Thirteen of 15 eggs were found to have hatched when OL-1 was again checked on 17 June (Table 1).

Nest box OL-2 was visited on 19 June with an unsuccessful attempt to capture the incubating hen in the box. While no hen was present in the box, a 13 egg clutch covered with down was found. A game camera setup was successful in capturing the departure of the hen and 12 of her newly hatched young over 15 minute period in early morning of 24 June. There was one unhatched egg remaining in the box when checked later that same day (Table 1; Figure 5).

No hens with broods or lone broods of Barrow's goldeneye were seen on Orbin Lake at any time during 2013.

Lee Lake

Nest box LL-1 was found to have been used containing five egg membranes and two unhatched eggs when inspected on 27 June (Table 1;Figure 5). A Barrow's goldeneye hen with a brood of four ducklings approximately three weeks old were also observed on the lake during the box visit. While there is no certainty this is the brood from nest box LL-1, the hen and brood were observed on the lake until a mid-August.

Caroline Lake

Nest box CL-1 was installed on Caroline Lake on 4 April 2013 when the lake was still completely covered with ice. Box CL-1 was checked again for use activity on 28 June. No down or egg remnants were found but a nest cup had been formed with what appeared to be a single goldeneye feather present in the box (Table 1;Figure 5).

A pair of red-throated loons along with a lone, approximately three-week old Barrow's goldeneye duckling were present on the lake during the June visit to the lake. No other waterfowl or waterbirds were observed on the lake at this time.

Buskin Lake

The eight Buskin Lake boxes were checked 17 July but no use activity by either goldeneye or red squirrels (*Tamiasciurus hudsonicus*) were found (Table 1;Figure 6). The wind-damaged door on BL-6 was repaired and shavings were added where needed.

Lake Rose Tead

Inspection of Lake Rose Tead boxes to determine activity status occurred on 19 July. All nine boxes were found to be void of prospecting or occupation by goldeneye hens. Unfortunately, as noted in previous annual reports, red squirrel activity was again found in seven boxes with RT-2 and RT-3 the only boxes spared from being stuffed with moss by the squirrels (Table 1;Figure 6).

Kalsin Pond

The Kalsin Pond nest box checks were carried out on 25 July with none of the three boxes having been occupied by goldeneye hens. Again as noted in previous annual reports, moss debris from a red squirrel was found in KP-1 but KP-2 and KP-3 were void of any use (Table 1;Figure 6).

Karluk Lake

The 21 Karluk Lake nest boxes were checked for activity from 31 July and 1 August. Fourteen of the 21 boxes had been used by Barrow's goldeneye during 2013, resulting in a box occupancy rate of 67%, up from 60% in 2012 (Figure 7). Nest box KL-18 contained abundant amounts of freshly pulled down but no eggs or egg remnants were found in the box. The hen may have been predated prior to starting her clutch or perhaps a prospecting hen got carried away with pulling down in anticipation of using these fine accommodations in 2014.

The 2013 estimated average clutch size for the 13 of 21 Karluk Lake nest boxes containing eggs was 7.4 eggs/clutch up from the 11 boxes in 2012 with 4.6 eggs/clutch and seven boxes with 5.6 eggs/clutch in 2011. Karluk boxes KL-9 and KL-12 each contained a single unhatched egg resulting in an estimated HS of 98% for the 13 nest box clutches. A carcass of a newly hatched Barrow's goldeneye was found in box KL-6 along with 12 egg membranes. The condition of the carcass prohibited any determination for cause of death.

Comparisons of goldeneye occupancy of each of the Karluk nest boxes and the boxes current

locations can be found in Table 2 and Figure 7.

Hidden Basin

The following information was provided by Lynne and Wayne Murphy and was collected at their Hidden Basin homestead from their seven nest boxes positioned within a 230 meter circle adjacent to salt water (Figure 4). They checked their boxes by ladder and photographed the box interiors to determine the extent of goldeneye use in early to mid-July. Two of seven boxes contained evidence of eggs or egg fragments resulting in an occupancy rate of 29%. Boxes HB1 and HB3 were used by goldeneye with HB1 having a minimum of four hatched membranes and HB3 one membrane.

A goldeneye hen and her brood of four (possibly hatched from HB1) were observed by the Murphys in the vicinity of their homestead throughout the summer of 2013.

Discussion

Barrow's goldeneye use of 2013 project nest boxes on the six Kodiak road system lakes continues to be dominated by the two smallest lakes (<20 acres) despite the inequity in total box numbers on the three larger lakes (Four boxes vs 20 boxes)(Tables 1). In contrast, Karluk Lake, even at over 9500 acres in size had well over half (67%) of the 21 nest boxes used in 2013 (Table 2). Lack of goldeneye use of project nest boxes located on Buskin Lake, Kalsin Pond, and Lake Rose Tead since 2011 continues to be problematic for the Kodiak road system boxes. The box use discrepancy between small and large lakes apparently does not apply to Kodiak's largest lake, Karluk, as nest box use increased again for the third year in a row. Since the project's 2010 initiation, the number of road system nest boxes occupied by goldeneye has increased from one box (5%) in 2011 to three boxes in 2012 (13%) and 2013 (12%), but only Orbin and Lee are the only road system lakes to have any nest box use over this period. What factors are responsible for the lake size preference demonstrated to date by Barrow's goldeneye nesting along the Kodiak road system are not clear. Nest box occupation by red squirrels cannot be totally dismissed as an factor in the road system lake use differences. Squirrel use has reduced availability of more than half the installed project nest boxes on at least two of the three large road system lakes since the project was started (Table 1).

An experiment to attract goldeneye hens to a project nest box was initiated 5 September with the addition of a nest box at Buskin Lake's outlet on the opposite side of the lake from the current Buskin Lake nest box locations. Goldeneye decoys were deployed in view of the new box with photographs taken by time lapse camera once every minute during the daylight hours. The experiment continued through September 2013 and is planned to be restarted for another 30 day period in late April or early May of 2014 (depending on when the lake becomes ice free) The decoys will hopefully attract any nest-prospecting goldeneye hens to stop by and check out the great new nesting cavity that has just "come on the market". The results of the experiment will be reported in next year's progress report.

Orbin and Lee lakes have had produced over 50 Barrow's goldeneye young in the past two years. Optimistically, if this production continues combined with high enough survival of the female offspring to enter into the local breeding population, an increased need for nesting habitat would force the goldeneye nesting population expansion to the larger lakes along the road system. Judging by the observed brood rearing use on these lakes over the last two years, this optimism is probably misplaced. Not only are these lakes constricted by overall

size, Orbin Lake has suffered from lack of water depth as inflow has been virtually nonexistent for much of the past two summers resulting in over half of the lake's surface covered by lily pads. In comparison, Lee Lake is slightly larger, deeper, and appears to have at least enough rearing habitat to support a single brood to flight stage the last two years.

The effort to capture and band goldeneye hens utilizing project nest boxes was limited in 2013 due to the bander's untimely bout of back problems in June. The single banding capture confirmed the hen banded from box OL-1 in 2012 returned to use the same box in 2013. The record clutches of 14 eggs and 15 eggs present in this box over the last two years not only illustrates impressive fecundity but also the potential for monitoring of individual reproductive efforts of the project's banded Barrow's goldeneye hens. Capture and banding of project hens is planned for the 2014 nesting season. Adding to the number of project banded goldeneye can only increase our capability in gaining knowledge of Kodiak's resident Barrow's goldeneye female nesting population reproductive capabilities and annual survival data.

Acknowledgment

We would like to acknowledge the following people and organizations: Lynne and Wayne Murphy for providing their 2013 nest box observations. Lesnoi Corporation and U.S. Coast Guard Integrated Support Command for allowing continued access to their lands for this project. The support provided by the Kodiak National Wildlife Refuge including air transportation and lodging at the Karluk Lake Camp Island field headquarters as well as providing equipment needed to check the Karluk Lake nest boxes. Lastly, the Alaska Department of Fish and Game, Division of Wildlife Conservation for their cooperation and expertise.

Table 1. Installation dates and goldeneye use of project road system nest boxes 2010-2013.

Nest Box	Install Date	Lake	2010	2011	2012	2013
CL-1	04/04/2013	Caroline	-	-	-	P
LL-1	06/19/2011	Lee	-	-	C5-H5	C7-H5
OL-1	02/25/2010	Orbin	NU	NU	C14-H12	C15-H13
OL-2	03/01/2011	Orbin	-	C8-H5	C7-H6	C13-H12
BL-1	07/13/2010	Buskin	-	NU	NU	NU
BL-2	07/13/2010	Buskin	-	P	NU	NU
BL-3	07/13/2010	Buskin	-	SU	NU	NU
BL-4	07/13/2010	Buskin	-	P	NU	NU
BL-5	07/13/2010	Buskin	-	P	NU	NU
BL-6	07/13/2010	Buskin	-	P	NU	NU
BL-7	07/13/2010	Buskin	-	P	NU	NU
BL-8	07/13/2010	Buskin	-	P	NU	NU
KP-1	05/10/2010	Kalsin	NU	SU	SU	SU
KP-2	05/10/2010	Kalsin	NU	P	NU	NU
KP-3	05/10/2010	Kalsin	NU	SU	NU	NU
RT-1	04/29/2010	Rose Tead	NU	P	SU	SU
RT-2	04/29/2010	Rose Tead	NU	P	NU	NU
RT-3	04/29/2010	Rose Tead	NU	NU	NU	NU
RT-4	04/29/2010	Rose Tead	NU	SU	SU	SU
RT-5	04/29/2010	Rose Tead	NU	SU	SU	SU
RT-7	05/04/2010	Rose Tead	NU	SU	SU	SU
RT-8	05/04/2010	Rose Tead	NU	SU	SU	SU
RT-9	05/04/2010	Rose Tead	NU	SU	SU	SU
RT-10	05/04/2010	Rose Tead	NU	SU	SU	SU

- = not installed

C# = estimated clutch size

H# = estimated number of eggs hatched

NU = not used

P = nest cup formed in box but no down

SU = Box used by red squirrel

Table 2. Installation dates and goldeneye use history of Karluk Lake project nest boxes 2010-13.

Nest Box	Install date	2010	2011	2012	2013
KL-1	06/19/05	NU	NU	3	4
KL-2	06/19/05	NU	NU	5	6
KL-3	06/19/05	NU	NU	4	6
KL-4	06/19/05	NU	NU	NU	NU
KL-5	06/26/05	U	NU	5	6
KL-6	07/11/10	-	NU	7	12
KL-7	06/26/05	NU	9	NU	8
KL-8	06/11/06	NU	NU	NU	NU
KL-9	06/11/06	U	NU	8	10
KL-10	07/08/10	-	6	12	12
KL-11	07/11/10	-	2	NU	3
KL-12	07/11/10	-	7	NU	8
KL-13*	07/07/10	-	NU	NU	NU
KL-14	07/11/10	-	NU	NU	NU
KL-15	07/11/10	-	NU	NU	13
KL-16	07/09/10	-	5	2	5
KL-17	07/09/10	-	NU	2	NU
KL-18	07/09/10	-	NU	NU	P
KL-19	07/09/10	-	NU	7	3
KL-20	07/10/10	-	4	NU	NU
KL-21	07/10/10	-	8	5	NU

* - moved to north end of Camp Island 7/3/12

- = not installed

U – used in 2010 no clutch data

NU = not used

= estimated clutch size

Figure 1. Location of the Kodiak Island Archipelago.

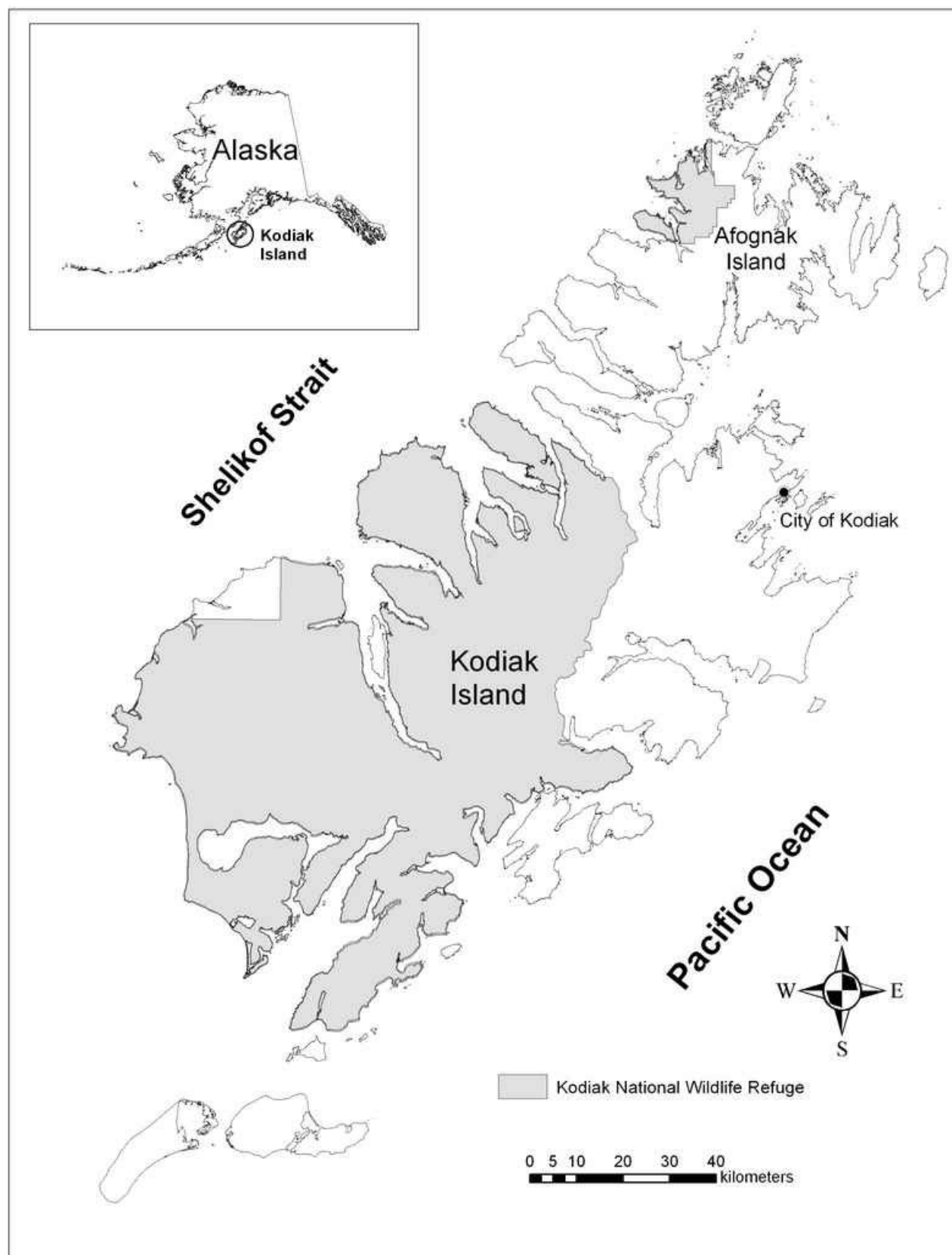


Figure 2. Kodiak Island Goldeneye Project nest box study locations in 2013.

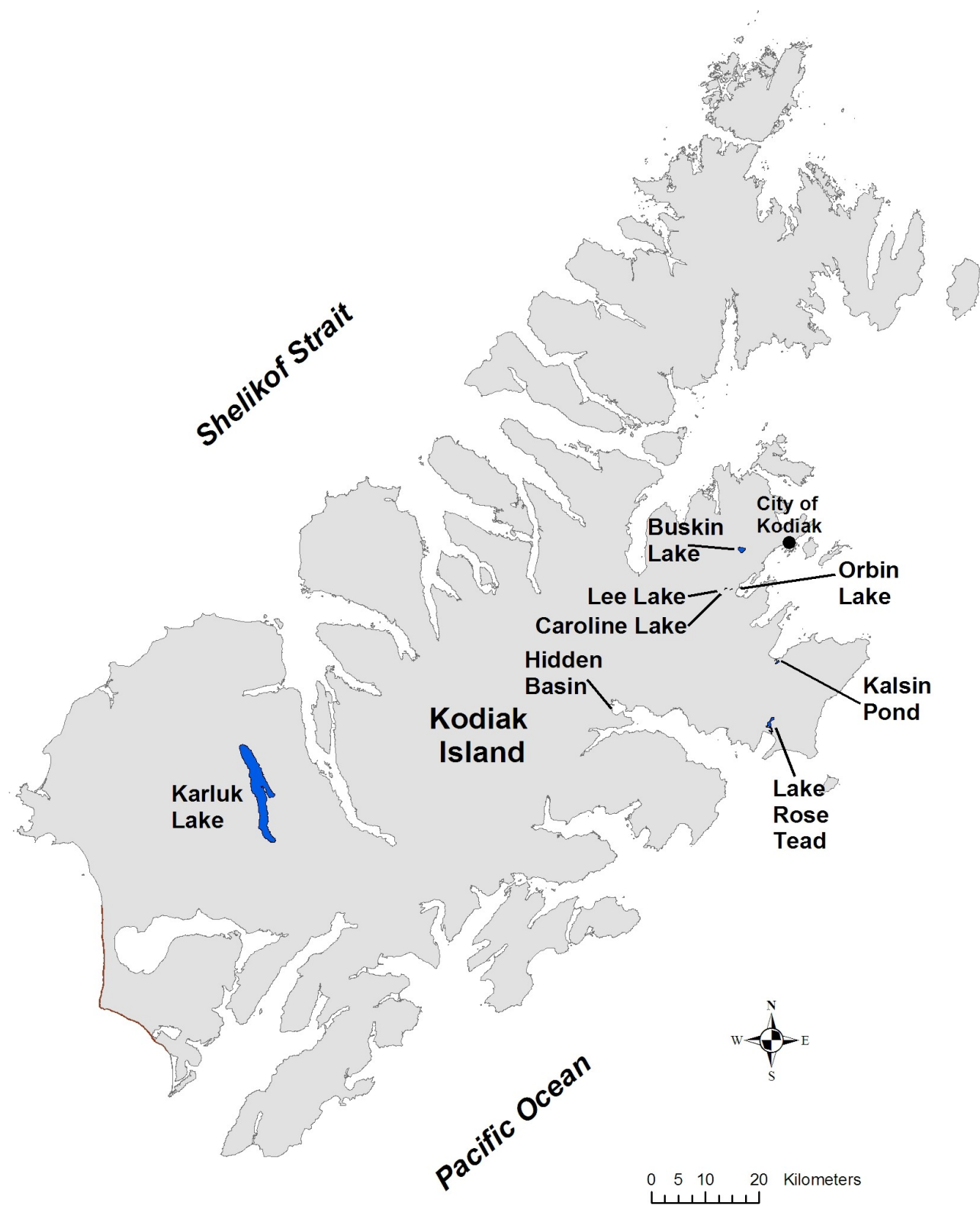


Figure 3. Landing net attached to the adjustable pole used to capture nest box hens.



Figure 4. Examples of a >60% Barrow's goldeneye egg membrane remnant's size. Each remnant of this size is counted as a single hatched egg.



Figure 5. Orbin, Lee, and Caroline Lakes nest box locations with alpha code names on each of the lakes.

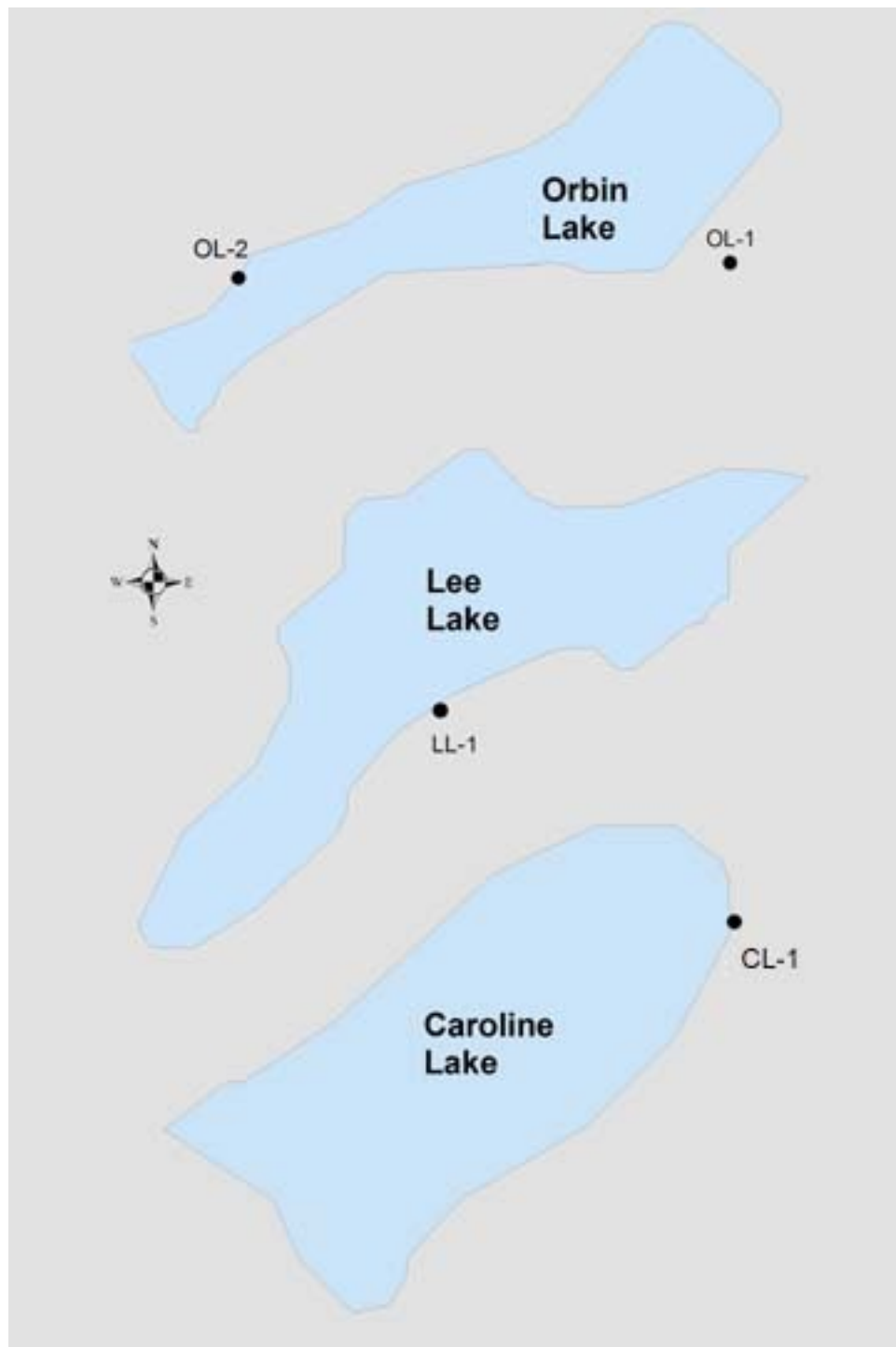


Figure 6. Buskin Lake, Kalsin Pond and Lake Rose Tead nest box locations with alpha code names on each lake.

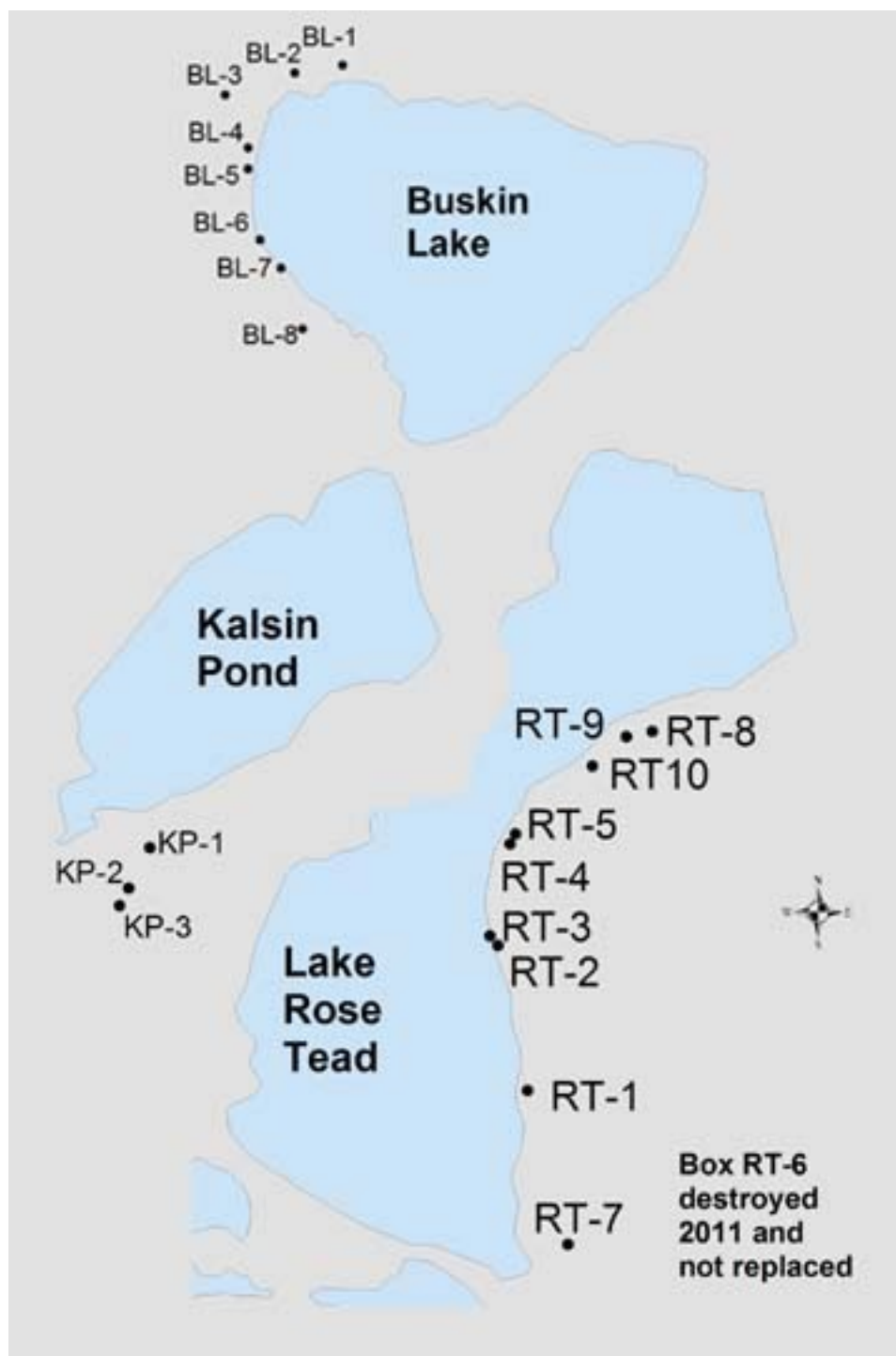


Figure 7. Map of Karluk Lake nest boxes with individual box labels, locations on the lake, and graph of box goldeneye use history from 2011 through 2013.

