Harbor seal movements in the Aleutian Islands: September 2016 through June 2017

The Polar Ecosystem Program at NOAA's Alaska Fisheries Science Center, Marine Mammal Laboratory continued our research efforts on harbor seals in the Aleutians Islands in 2016. Working with colleagues from the Alaska SeaLife Center and SeaWorld, we captured 35 seals at 5 locations in the central and western Aleutians Islands during 12-29 September 2016 (Fig. 1). All captured seals were examined, measured, and weighed to assess their physical condition, and blood and tissue samples were collected to analyze their health, diet, and genetic composition. "SPLASH[1]" satellite tags (Fig. 2) were glued to hair on the heads or backs of seals that had sufficiently completed their annual "molt" (shedding and regrowth of hair and skin). These tags are designed to transmit the seals' movement, dive, and haul-out behaviors for several months and then fall off during the seals' next molt. Seals that were large enough also received a smaller "SPOT[1]" satellite tag (Fig. 2) attached to the webbing in their hind flipper, which are designed to stay on the seals through their molt and transmit location and haul-out data during this important period of the seals' annual cycle. Ten seals were also selected to receive sets of 2nd generation life history transmitters, or LHX2 tags (Fig. 2). These tags were surgically implanted in the seals' abdominal cavities (Horning et al. 2017) and are designed to transmit data on survival, reproduction in females, and location and potential causes of mortality after the seals have died.

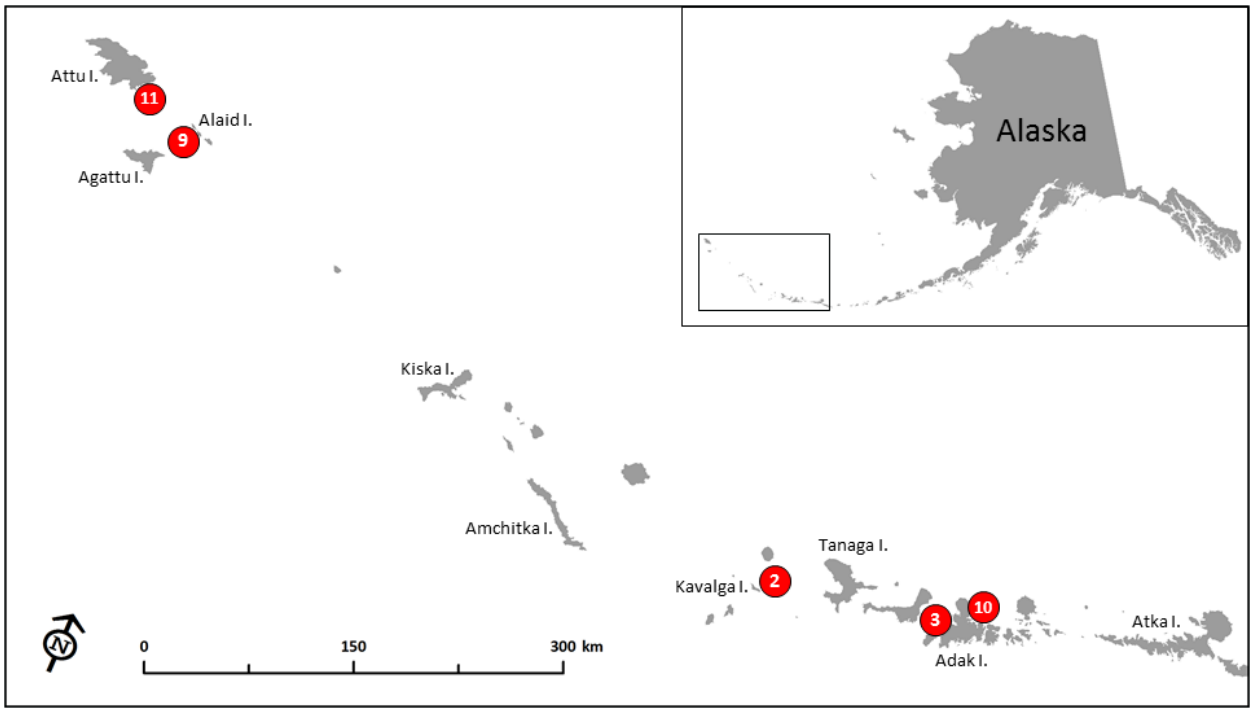

Figure 1. Locations and numbers of harbor seals captured in the central and western Aleutian Islands during September 2016.

[1] "SPLASH" and "SPOT" are types of tags produced by Wildlife Computers, Redmond, WA. References to trade names does not imply endorsement by NOAA Fisheries.

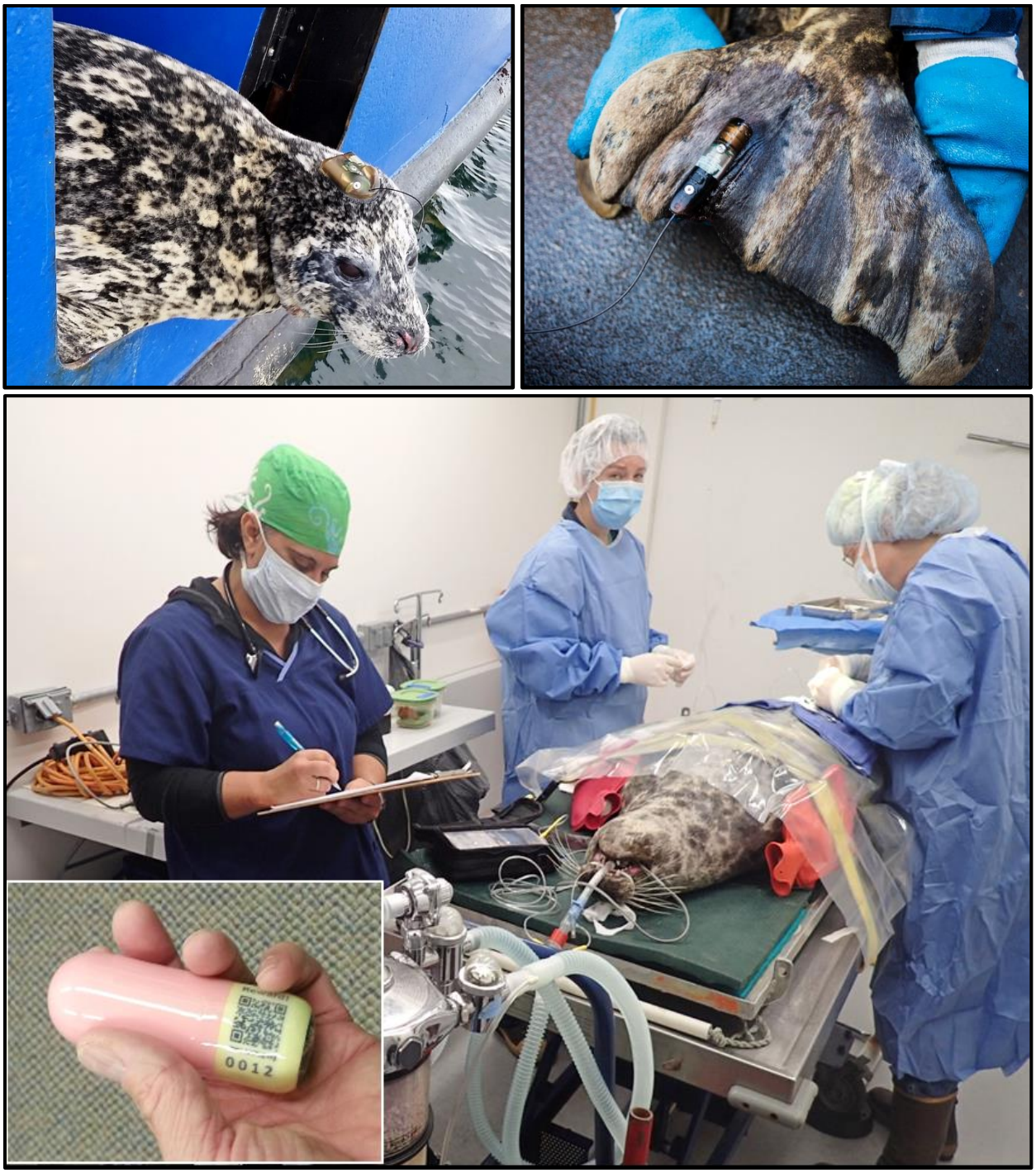

Figure 2. SPLASH tag (upper left) and SPOT tag (upper right) attached to an adult male harbor seal. Bottom: Surgical team implanting an LHX2 tag (inset) in an anesthetized harbor seal aboard the RV *Norseman*.

SPLASH tags were deployed on all 35 seals captured in 2016 (Table 1). The average SPLASH tag transmission duration was 85.5 days (SD = 83.9), which is significantly lower than in previous years. This is likely due to the use of a new formulation of adhesive (Loctite 4861) that apparently does not adhere to the seals' hair as consistently as a previously used formulation (Loctite 422). Figures 5 and 6 show the seals' preliminary movement tracks from the time they were tagged and released in September 2016 until their tags stopped transmitting, ranging from 0 to 287 days later.

Table 1. SPLASH tag information for harbor seals tagged in the central and western Aleutian Islands in September 2016. Shaded rows indicate seals that were also implanted with LHX2 tags. For Age-Sex: Ad = adult, Sub = subadult, YOY = young-of-the-year/weaned pups, F = female, M = male.

Seal ID	Age-Sex	Release Location	Tag Start	Tag End	Tag Duration (days)
3001	Ad-F	Finger Cove, Adak I.	13-Sep-16	27-Jun-17	287
3002	Ad-F	Finger Cove, Adak I.	13-Sep-16	30-Sep-16	17
3003	Ad-F	Finger Cove, Adak I.	13-Sep-16	27-Sep-16	14
3004	Sub-M	Finger Cove, Adak I.	13-Sep-16	14-Sep-16	1
3005	Sub-M	Finger Cove, Adak I.	13-Sep-16	13-Apr-17	212
2005	Ad-F	Finger Cove, Adak I.	13-Sep-16	3-Oct-16	20
3007	Ad-M	Finger Cove, Adak I.	13-Sep-16	20-Sep-16	7
3008	Ad-F	Finger Cove, Adak I.	13-Sep-16	16-Oct-16	33
3009	Sub-M	Finger Cove, Adak I.	13-Sep-16	8-Feb-17	148
3010	Ad-M	Finger Cove, Adak I.	13-Sep-16	7-Oct-16	24
3011	Sub-F	Massacre Bay, Attu I.	16-Sep-16	26-Nov-16	71
3012	Ad-F	Massacre Bay, Attu I.	16-Sep-16	9-Oct-16	23
3013	Ad-M	Massacre Bay, Attu I.	16-Sep-16	27-Jan-17	133
3014	Ad-M	Massacre Bay, Attu I.	16-Sep-16	16-Nov-16	61
3015	YOY-F	Massacre Bay, Attu I.	17-Sep-16	17-Sep-16	0
3016	Sub-M	Massacre Bay, Attu I.	17-Sep-16	22-Sep-16	5
3017	Sub-M	Massacre Bay, Attu I.	17-Sep-16	31-Oct-16	44
3018	Sub-M	Massacre Bay, Attu I.	17-Sep-16	17-Sep-16	0
3019	Sub-M	Massacre Bay, Attu I.	21-Sep-16	4-May-17	225
3020	YOY-F	Massacre Bay, Attu I.	21-Sep-16	20-Nov-16	60
3021	Sub-F	Massacre Bay, Attu I.	21-Sep-16	19-Mar-17	179
3022	Ad-M	Nizki Cove, Alaid I.	22-Sep-16	28-Oct-16	36
3023	Sub-M	Nizki Cove, Alaid I.	22-Sep-16	9-Oct-16	17
3024	YOY-F	Nizki Cove, Alaid I.	22-Sep-16	15-Feb-17	146
3025	YOY-F	Nizki Cove, Alaid I.	22-Sep-16	1-Oct-16	9
3026	YOY-M	Nizki Cove, Alaid I.	23-Sep-16	19-Oct-16	26
3027	Sub-F	Nizki Cove, Alaid I.	23-Sep-16	11-May-17	230
3028	YOY-M	Nizki Cove, Alaid I.	23-Sep-16	5-Mar-17	163
3029	YOY-M	Nizki Cove, Alaid I.	23-Sep-16	14-Dec-16	82
3030	Ad-F	Nizki Cove, Alaid I.	23-Sep-16	2-May-17	221
3031	Ad-M	Sea Otter Pass, Kavalga I.	26-Sep-16	8-Mar-17	163
3032	Sub-M	Sea Otter Pass, Kavalga I.	27-Sep-16	11-Mar-17	165
3033	Sub-F	Three Arm Bay, Adak I.	30-Sep-16	16-Jan-17	108
3034	Sub-M	Three Arm Bay, Adak I.	30-Sep-16	6-Oct-16	6
3035	Ad-F	Three Arm Bay, Adak I.	30-Sep-16	14-Nov-16	45

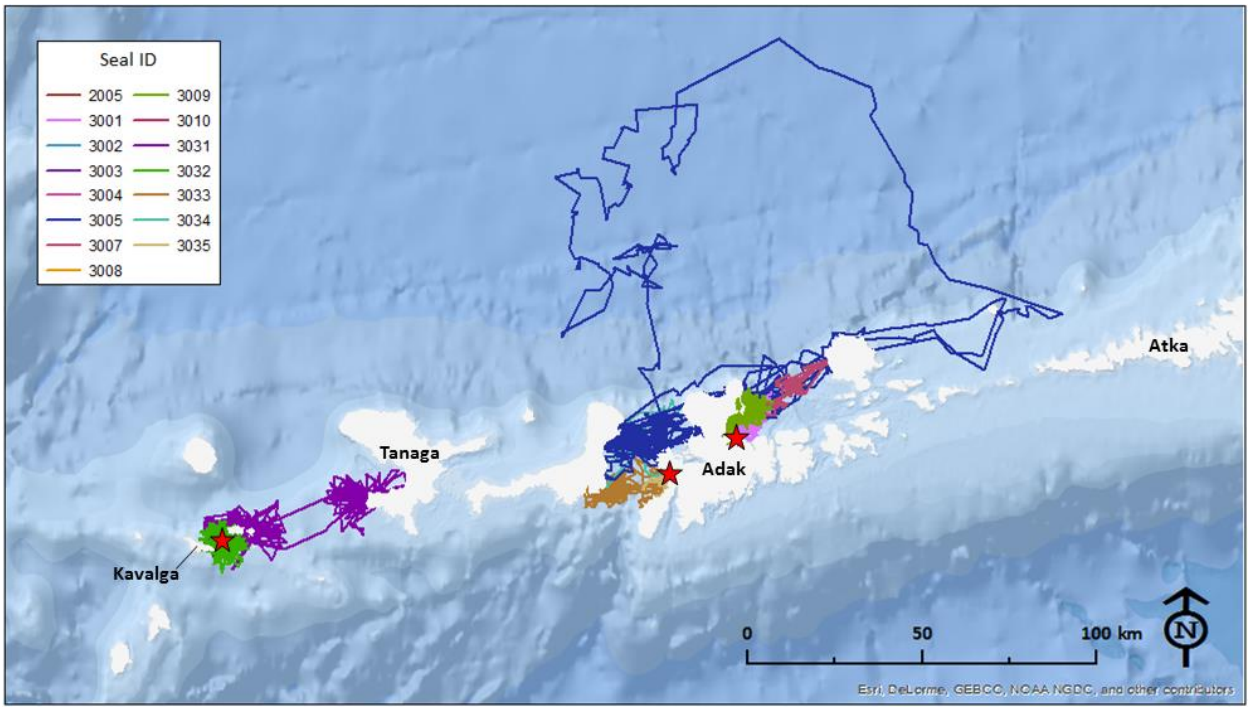

Figure 5. Movement tracks of 15 harbor seals in the central Aleutian Islands from September 2016 through June 2017. Release/starting locations are marked with a red star.

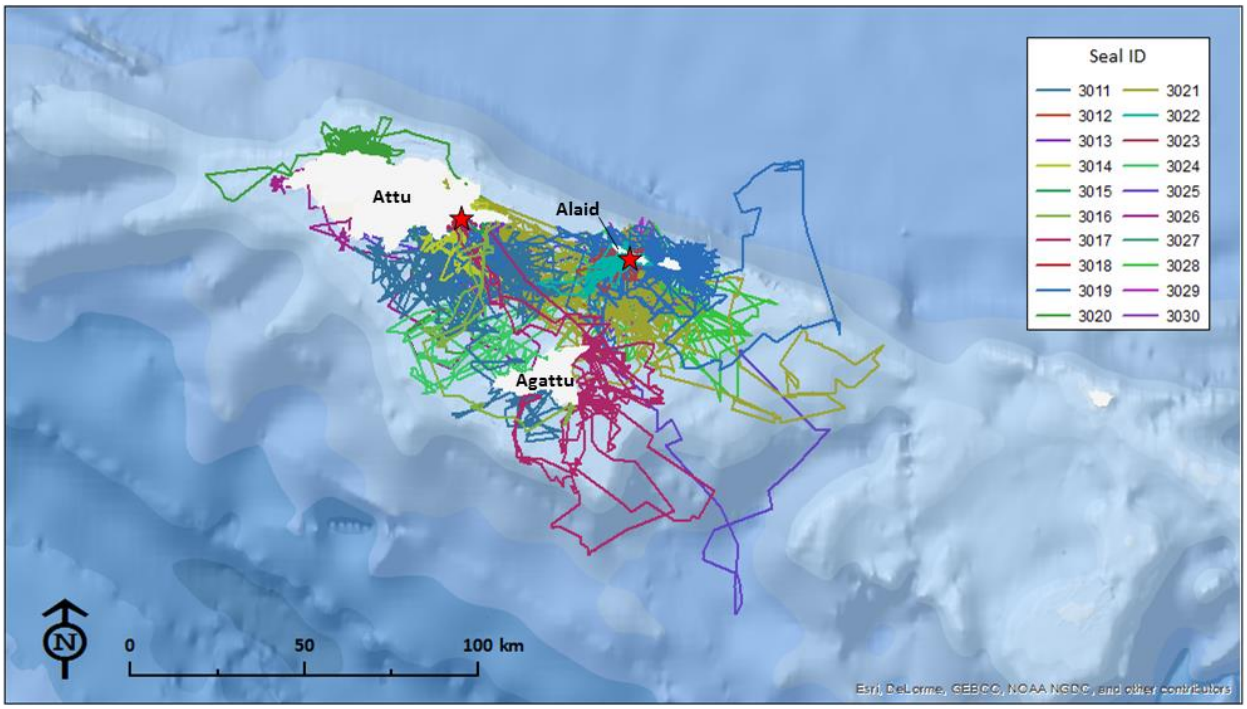

Figure 6. Movement tracks of 20 harbor seals in the western Aleutian Islands from September 2016 through May 2017. Release/starting locations are marked with a red star.

Although it is difficult to see in the figures due to the overlapping tracks, most of the seals' movements consisted of highly localized foraging trips in nearshore areas over the continental shelf, or short-distance movements to haul-out sites on nearby islands. A few seals made more extensive foraging trips which extended into deeper waters over the continental slope or north into the Aleutian Basin. No seals traveled south over the Aleutian Trench or made crossings of the major passes between Aleutian island groups. Quantitative analyses of the seals' foraging behavior and habitat use will be made available in future publications.

Acknowledgments

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Citations

Horning, M., M. Haulena, J. F. Rosenberg, and C. Nordstrom. 2017. Intraperitoneal implantation of life-long telemetry transmitters in three rehabilitated harbor seal pups. BMC Veterinary Research 13:139.