

**Walrus Islands State Game Sanctuary  
Annual Report 2002**

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## **Introduction**

### **Project goals**

A management plan for the Walrus Islands State Game Sanctuary was drafted in October 1992. The plan has not been finalized and no formal management goals have been developed by the Department. In the interim, the management goals for the Sanctuary are to:

- 1) protect walrus and other wildlife within the Sanctuary;
- 2) provide an opportunity for scientific and educational study of walrus; and
- 3) provide an opportunity to view, photograph, and enjoy walrus.

### **Methods and materials**

The Alaska Department of Fish and Game (ADFG) and the US Fish and Wildlife Service (USFWS) have cooperatively staffed Round Island since 1993. Under the terms of the cooperative agreement, each agency provides one wildlife technician and half the cost of transportation and supplies. This year, USFWS purchased the initial supplies and ADFG paid for additional supplies during the field season. ADFG paid for all fuel, and ADFG staff in Dillingham provided logistic support.

Steven Rice (ADFG) and Mary Cody (USFWS) were stationed on Round Island from May 13- August 12, 2002. The Sanctuary opened late this year because the Togiak herring season began suddenly and transportation to the island was not available. After a 10-day delay in Dillingham, ADFG chartered the *F/V Logan's Ark* for transportation rather than continue waiting for the ADFG Enforcement vessel typically used. Joe Meehan (ADFG) replaced Steve Rice during nine days of leave in early July and two Bristol Bay Native Association interns, Tim Dyasuk and April Alexie, assisted staff on the island between July 7- August 3, 2002. Duties included assisting and educating visitors; maintaining and improving island facilities; patrolling the island for access violations; monitoring walrus disturbance; and counting walrus, sea lions and seabirds. ADFG is primarily responsible for managing the Sanctuary, while USFWS takes the lead in walrus research; however, all responsibilities are shared. In addition, three USFWS and US Geological Service (USGS) biologists spent two weeks on the island in late May and early June, two ADFG administrative visitors each spent four days on the island, and a fourth USGS biologist spent six days on the island.

### **Visitor program**

Round Island has drawn visitors from around the world for more than 20 years, and enhancing the visitor experience while protecting the island's wildlife is one of our primary responsibilities. Visitor-related duties included monitoring the radio daily and providing would-be visitors with condition reports, authorizing visits, issuing permits and collecting user fees, explaining Sanctuary rules, answering visitor questions, maintaining facilities, and assisting visitors unprepared for the island's extreme conditions.

### **Access violations/disturbances**

Boat access is restricted within three miles (4.8 km) of Round Island, and airplane access is strongly discouraged within three miles and 5,000 vertical feet (1,524 m) of the island. In addition, visitors to the island are required to stay on the trails and are not permitted on the beaches except when arriving and departing the island at Boat Cove. Staff recorded all observed access violations and reported serious violations to ADFG staff in Dillingham. Staff also attempted to contact any boat or airplane within the restricted area. No further action was taken against vessels or aircraft which immediately and cooperatively responded.

Staff also monitored walrus response to both authorized and unauthorized disturbance. Staff recorded both the number of walrus affected and the degree of their response, using three distinct behaviors (head raising, reorienting, and dispersing) as measures of increasing disturbance (Kruse 1993).

### **Walrus counts**

Pacific walrus (*Odobenus rosmarus divergens*) were counted daily throughout the summer using a standardized methodology provided by USFWS (Cody 2002). This count methodology was initiated in 1998 and is similar to that used on the island in preceding years. Since 1998, counts have been conducted at 1400 hours every day, but this summer count times were randomly scheduled to begin at 0900, 1400, or 1730. The interval counts begun in 1998 were discontinued, but staff tested new counting techniques including counts from digital photographs, counts of Main Beach from Traverse Trail, and sampling animals using a grid (Cody 2002). This year, walrus on West Main were counted every day from May 26-August 10. Walrus on West Main and South West Main Beaches were also opportunistically counted from an inflatable skiff, as weather permitted.

### **Sea lion counts**

Steller's sea lions (*Eumetopias jubatas*) hauled out at the southeast tip of the island were counted at six-day intervals and opportunistically throughout the summer. Sea lions were typically counted from terrestrial observation points; however, counts were occasionally conducted from an inflatable skiff. In an effort to standardize terrestrial counts, staff used wooden stakes to mark three of the four observation points used to count sea lions; these points were designated OBP #2-4 from west to east. The area where visitors view sea lions (OBP #1) was not marked but should be used to count sea lions on the cobble beach at the southeast end of the haulout. Almost all of the sea lions that haul out can be counted from one of these observation points; however, at least two of the points are exposed and some observers may not be comfortable using them. Future observers should consider using climbing anchors to protect themselves at these points. If observers elect not to use a particular observation point for safety reasons, they should clearly report which points were used so that there is some basis for comparison to years when all observation points were used. Sea lions with identifying tattoos or tags were also recorded.

### **Seabird counts and research**

Counts of seabirds and seabird nests begun in 1997 were continued. All black-legged kittiwakes (*Rissa tridactyla*), common murre (*Uria aalge*), and pelagic cormorants (*Phalacrocorax pelagic*) on established plots were counted eight times. A subset of nests within these plots was selected and nesting chronology and productivity were monitored. These nests were checked approximately every other day from the time the first egg was seen through the end of the field season.

### **Raven research**

Ravens visible from the Main Beach observation point were monitored for one hour each day between 0500 and 0000 using 10x42 binoculars and a 15x60 spotting scope. The identity and fate (eaten, cached, lost, etc) of each raven prey item, forage method (forced, opportunistic, etc.), and the total number of visible ravens were recorded with each observation. When items were cached within view, the slope of the surrounding area and dominant vegetation were recorded. Similar data was also recorded from all opportunistic observations.

### **Other work**

Other opportunistic observations were recorded in the Round Island Daily Logbook. These included the first sighting of birds and mammals for the season and subsequent unusual sightings, first sightings of blooming plants, beach-cast marine mammals, and environmental conditions.

Ivory from beach-cast walrus carcasses was collected to discourage off-season trespassers and supplement state and federal funding of the program at Round Island. The Eskimo Walrus Commission will sell this ivory to other Alaskan natives, and the proceeds will be used for future walrus research and management. Ivory was collected from all accessible carcasses, but weather and the presence of other walrus limited access in some areas.

This summer, staff completed construction of boardwalk through the last of the existing muddy areas, broadened and leveled parts of the trail, repaired the cabin deck, removed and repaired rotten decking around the hot tub, painted the exterior of the cabin and all outbuildings, varnished the front room of the cabin interior, and repaired two broken tent platforms.

## **Results**

### **Visitor program**

Visitors traveled to the island with either of two charter services or via an independent vessel. Pete Andrews made two trips to the island with three researchers and one day-visitor in late May and early June. Johnson Maritime/ Walrus Island Expeditions (JMWIE) made 23 trips between July 4 and August 11 and brought 34 day-visitors, 20 campers, and nine official visitors to the island. JMWIE made one additional trip on August 12 to pick up staff at the end of the season. The remaining three day visitors traveled to the island aboard the *F/V Kathleen K* shortly after the Togiak herring season ended.

The twenty campers spent a total of 139 days on the island, and the nine researchers, administrative visitors, and interns spent an additional 113 days on the island. Campers stayed on the island from three to fifteen days. Thirty-five percent of the campers were from Alaska, but visitors traveled from the continental United States and Europe (Table 1).

Thirty-nine day-visitors spent a total of 54 days on the island (seven, including the guide for JMWIE, made multiple day-visits). Thirty-seven percent of the day-visitors came from Alaska, but day-visitors also came from 11 other states and four other countries. Thirty-five day-visitors traveled with JMWIE; one with Pete Andrews, and the remaining three day-visitors via fishing vessel.

Total visitation to the island decreased this year, from 144 visitors in 2000 and 82 in 2001 to 59 in 2002. The decline in visitation this summer relative to 2001 was primarily caused by a decrease in visitation by fishermen. The delay in opening the Sanctuary this year may have caused confusion among some fishermen who visit the island immediately after the herring fishery closes. In addition, fewer fishermen participated in the salmon fishery this year and, unlike last year, none of the salmon fishermen visited the island between openers. Longer, less productive salmon openers (Palach pers. comm.) may have influenced their decision not to visit. Don Winkleman (owner of the charter operation historically used by most campers) retired this summer, but JMWIE began providing transportation for more campers and camper numbers were comparable to last year (n= 22). The number of JMWIE day-visitors actually increased from 29 in 2001 to 35 in 2002.

### **Access violations and disturbances**

Most of the walrus disturbances observed this season were caused by authorized activities within the Sanctuary (Appendix 1). These activities included visits by independent boats and charter operators and human activity at overlooks and on the beach at Boat Cove. Staff also used a 12-foot Achilles inflatable skiff with a 25 horsepower outboard motor to count walrus periodically, collect beach-cast ivory, and access beaches for other research-related activity. Walrus often appeared undisturbed by this traffic (e.g. when visiting boats used the access corridor and no walrus were present in Boat Cove), but other authorized activities caused significant disturbance.

Low-flying aircraft can cause major disturbances at walrus haulouts (Fay 1982), and this year saw a marked increase in this prohibited activity. Nine airplanes flew over the island on six occasions (Appendix 1); on three of these occasions, two planes flew over the island together. Several hundred walrus abandoned the haulout after each of these incidents (except the first, when animals were clearly disturbed but none were observed dispersing). Although ADFG does not have the authority to regulate airspace, pilots who harass walrus can be prosecuted under the Marine Mammal Protection Act (MMPA) and each pilot who displaced walrus this summer was cited by USFWS law enforcement officers. On June 16, another plane flew over the island at about 1650 m above ground level and caused about 150 walrus to raise their heads and about eight walrus to leave the beach; however, this pilot was above the elevation recommended by the Federal Aviation Administration so no further action was taken. Disturbances caused by aircraft outside the recommended boundaries are typically minor and tend to be rare (Rice pers. obs.). A helicopter was also used to transport staff and equipment to the island on May 13 (Appendix 1), but walrus were not observed during this disturbance.

Two possible unauthorized visits by boats were observed this summer (Appendix 1); however, each of these boats was at least two miles (3.2 km) offshore. In the past, boat captains have complained that NOAA maps incorrectly indicate a 2-mile restricted area around Round Island, and the observed boats may have been using old charts. Walrus were not observed during either disturbance, but it is unlikely that the animals were significantly disturbed by these vessels. We were unable to hail the boats, and no further action was taken.

One major disturbance occurred on June 20 without any detected anthropogenic stimulus (Appendix 1); at least 400 walrus raised their heads and about 50 walrus left the haulout. These disturbances may be triggered by a minor rockfall or seabird activity and then exaggerated by the walrus's herd behavior. Walrus may also be responding to human observers, though in the incident described observers were not doing anything out of the ordinary to cause a disturbance. Walrus response to disturbance is unpredictable and probably influenced by group size, time spent hauled out, environmental conditions, and other factors.

#### **Walrus counts**

Walrus hauled out on the east-side beaches of Round Island were counted on 90 consecutive days between May 14 and August 11 (Figure 1). The peak east-side count of 2584 walrus (average count of walrus *on land* by all observers) occurred on May 29; there were also 787 walrus on West Main beach on this day. The minimum east-side count was zero walrus on June 9. The average east-side count for 2002 was 829 walrus.

West Main Beach was counted a total of 74 times between May 26 and August 10; counts were skipped on May 30, June 12, and June 13 (Figure 1). The peak West Main count of 1059 walrus was on May 28. No walrus were present on West Main Beach on 16 count days throughout the summer. The average West Main count was 246 walrus.

South West Main Beach was counted on June 2 (39 walrus) and July 6 (zero walrus).

#### **Steller's sea lion counts**

Steller's sea lions hauled out at the southern tip of the island (East Cape) were counted 18 times between May 14- August 6 (Table 2). The peak count of 449 sea lions (combined land and water count) occurred on May 17; the low count of 20 sea lions occurred on July 12; the mean count was 120 sea lions. At least four uniquely marked sea lions were observed and juvenile sea lions were observed nursing on two occasions (Table 2). Sea lion and walrus herds at Round Island are almost entirely segregated and do not generally use the same beaches; however, on May 29 a sea lion hauled out briefly on Flat Rock with seven walrus. The sea lion and several walrus (hauled out in Boat Cove) left within about half an hour when a visiting boat entered the cove.

## **Seabird research**

Cormorant productivity was monitored beginning May 14; kittiwake and murre productivity were monitored from the time the first kittiwake egg was observed on May 24 through the end of the field season. At the time this report was written, seabird population and productivity data had not been analyzed; however, kittiwake and murre productivity was relatively high this year. These results will be presented in the USFWS summer field report.

## **Raven Research**

Raven behavior data for 2002 has not yet been analyzed; however, preliminary analysis indicates that seabirds, seabird eggs and chicks comprise the bulk (up to 90%) of the summer diet of Round Island ravens. Black-legged kittiwake and common murre eggs were the most common prey items this summer. Total predation on Main Beach seabird nests by ravens was estimated to be at least 3000 eggs/chicks this summer; however, this is low relative to other years. Other food items included adult and chick kittiwakes and murre, kittiwake and cormorant eggs, adult puffins (*Fratercula* sp.), voles (*Microtus* sp.), walrus carcasses, dead fish, berries, and other unidentified items. This summer, ravens were also observed retrieving and eating murre eggs cached the previous summer.

At least seven raven pairs are believed to nest on the island, and five nest sites have been identified. The number of fledgling ravens at known nests this season ranged from zero to six with a mean of 3.5 fledglings (based on four monitored nests).

Raven research will be detailed in a thesis presented to the University of Arizona.

## **Other observations**

Foxes used the dens behind the cabin and near the sea lion observation point this summer; up to eight pups were seen at East Cape and 2-4 pups were seen behind the cabin. No kits were seen in the West Main observation area or on top of the island (infrequently visited) where dens have been reported in the past.

A walrus calf-of-the-year was observed at Round Island on June 2 and a second yearling walrus was seen on June 9. These immature walrus were each observed on several subsequent occasions and finally seen simultaneously hauled out on July 15. On each occasion, nearby walrus were checked, but no adult females that might have accompanied the immature animals were seen. No obvious deterioration in the condition of either walrus was observed over the 37-44 day period.

Approximately 10 walrus carcasses were observed this year. Sixteen carcasses were observed in 2001 and 10 in 2000, so this season's mortality seems to be normal. Cause of death was not apparent for any of the carcasses that washed ashore on Round Island, although one of the animals was emaciated. Another of the dead animals was young (10-15 years old), so its death cannot be attributed to old age. All of these carcasses had ivory when they washed ashore; staff collected ivory from eight carcasses but were unable to reach the other carcasses before they floated away. Several loose pieces of ivory were also found during beach-walks.

## **Discussion**

### **Visitor program**

Visitation to Round Island has been highly variable since the Sanctuary's inception. It is affected by the success and timing of commercial fishing in Bristol Bay, the number of charter operators and the amount of effort they put into attracting clients, ADFG budget and ability to staff the island, national and international economic conditions, and other factors. A peak of 305 visitors (including 14 campers and nine day-visitors, and >250 tour boat day-visitors) was reported in 1978 (summarized in Koenen 1996). Total visitation

fluctuated between 58 and 273 through the '80's, but was high near the end of the decade. Visitation dropped again to a low of 61 visitors (including 18 campers, 41 day-visitors) in 1994, and stayed low in 1995 and 1996. This slump was largely attributed to the uncertainty of transportation during this period when only one charter service was operating (Koenen and Spencer 1994; Koenen and Kruse 1995). In 1996, many foreign and out-of-state visitors cancelled their visits in response to the uncertainty of legislative funding for Round Island (Koenen and Rice 1996). The addition of a second charter service in 1997 and adequate state funding seemed to strengthen the Round Island visitor program, but visitation appears to be declining again and remains vulnerable to a number of factors currently beyond our control.

### **Walrus counts**

As many as 14,000 walrus have been counted at Round Island in a single day (summarized in Koenen, 1996). The peak east-side count in recent years was 9,550 walrus in 1995, but the peak count declined to a low of 1,746 walrus in 1998 (Raymond 1998). Peak east-side counts in 2000 and 2001 were 7573 and 4017 respectively (Rice 2001). Including walrus on West Main Beach, the peak island counts for 2000 and 2001 were 8716 and 4822 respectively (Rice 2001). The number of walrus using Round Island is affected by a number of diverse elements. One such factor is the increased use of other haulouts, including Capes Peirce, Newenham, and Seniavin. These haulouts had been all but abandoned by the time the Walrus Islands State Game Sanctuary was established, but they now rival Round Island as important walrus haulouts. Cape Peirce, in particular, reached a peak count of 12,500 in 1985. Walrus move between the haulouts and often peak at Cape Peirce after the Round Island field season; however, extremely high use of other haulouts may reduce walrus use of Round Island. At the time this report was written, Togiak National Wildlife Refuge and the Marine Mammals Management office of USFWS had not released final count data from these other haulouts for the 2002 season; however, to date the Cape Peirce and Newenham peak counts (119 and 15 respectively) are the lowest on record (MacDonald pers. comm.).

Since 1996, Bristol Bay area natives have also been given limited access to Round Island for a traditional hunt of up to 20 walrus, including struck and lost animals. In the fall of 2001, hunters from Clark's Point harvested one walrus at Round Island; a second hunting party from Twin Hills was unsuccessful because there were no walrus present on land when they arrived. The hunt occurs between September 20-October 20, and there are usually less than 200 walrus on the island during this period. Because disturbance is minimized in this manner, and because relatively high walrus numbers have been observed at Round Island since the onset of hunting, it seems unlikely that this limited hunt has affected walrus use of Round Island.

### **Other observations**

Fay (1982) presented multiple lines of evidence suggesting that walrus calves are wholly dependent on their mother's milk until they are approximately six months old and are gradually weaned during their second year, though some are "proficient at benthic feeding" after one year. This is consistent with other historic observations at Round Island. Miller and Hines (*in* Fay 1982) observed a healthy, unattended walrus yearling at Round Island in 1972 and believed that it had been feeding independently. Rice (pers. obs.) observed a calf on the island in 1997; however, the calf was only observed once and was believed to have died quickly. Our repeated sightings of a healthy calf in 2002 suggests that either an unnoticed female walrus was in the area, or that calves as young as one to two months of age are able to forage independently and survive for a time when food is abundant and conditions are mild. However, if this calf was orphaned, we consider it very unlikely that it will survive the coming winter.

### **Recommendations**

- 1) Continue to follow walrus count protocols initiated in 1998 and revised in 2002. Continue daily counts of walrus on West Main beach. Research remote sensing technologies that would allow daily counts of West Main and South West Main beaches, as well as provide a better view of Main Beach.
- 2) Use aerial photographs and walrus count data to generate a correction factor for each observer.

- 3) Weather permitting, initiate regular whole-island seabird surveys at five-year intervals.
- 4) Work with USFWS and the FAA to standardize an aircraft policy that will protect walrus from disturbance. We believe regulations currently in place at Round Island and other haulouts are inadequate.
- 5) Work cooperatively with other agencies to broaden the scope of Round Island research and better monitor the entire ecosystem.
- 6) Continue to protect walrus and other wildlife within the Sanctuary, while providing an opportunity for scientific study and enjoyment of the Sanctuary.
- 7) Build a visitor cook shelter near the visitor spring. A carpenter has evaluated the Round Island cabin and believes it should also be replaced soon.
- 8) Only activate one of the two ADFG handheld satellite telephones. The account card from the active phone can be used in either phone, so there is no reason to pay fees for both. The USFWS satellite phone is also available as backup.
- 9) Provide law enforcement training to staff.
- 10) Purchase a portable defibrillator. Defibrillators are available for approximately \$3000 and require little training to operate.

#### **Acknowledgements**

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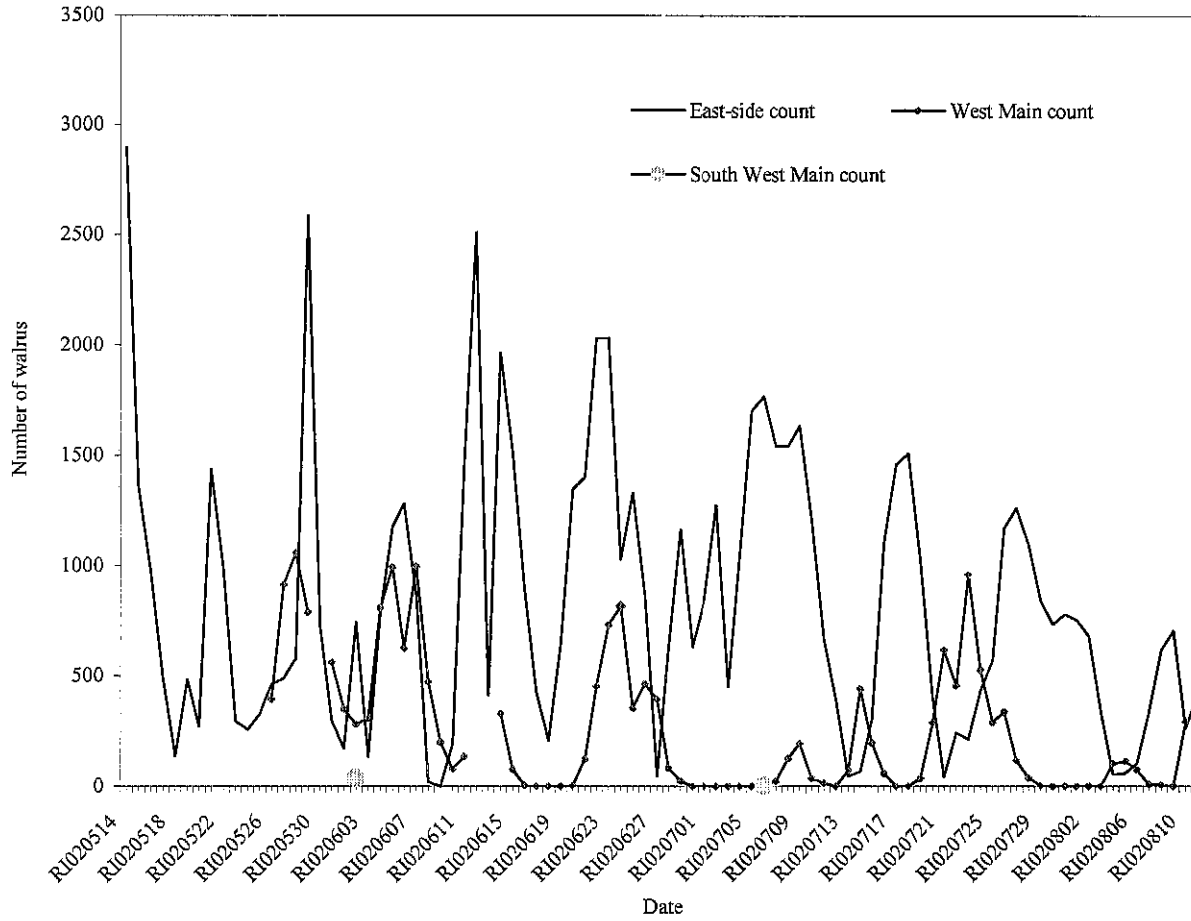
**Table 1. State or country of origin of Round Island visitors, summer 2002. Does not include researchers, administrative visitors, or interns.**

<b>Origin</b>	<b>Campers</b>	<b>Independent day- visitors</b>	<b>JMWIE day-visitors</b>
<b>Alaska</b>	8	2	4
<b>California</b>	2		9
<b>Connecticut</b>			2
<b>Florida</b>		1	4
<b>Georgia</b>			4
<b>Montana</b>			2
<b>New York</b>	2		8
<b>North Carolina</b>			2
<b>Washington</b>	1	1	
<b>Washington D.C.</b>	2		
<b>France</b>	2		
<b>Germany</b>	1		
<b>Switzerland</b>	2		
<b>Total</b>	20	4	35

**Table 2. Counts of Steller's sea lions at Round Island, Alaska; May 14- August 6, 2002.**

<b>Date</b>	<b>Land count</b>	<b>Water count</b>	<b>Total</b>	<b>Comments</b>
5/14/02	392	26	418	Juvenile seen nursing; second juvenile of same size also observed.
5/17/02	441	8	449	
5/19/02	326	15	341	
5/25/02	99	1	100	Relatively small sea lion with a burnt orange or faded red tag seen (number not legible).
5/31/02	87	16	103	Sea lion numbered A118 (or possibly A118) and nursing juvenile seen.
6/6/02	33	0	33	
6/7/02	44	2	46	Sea lion numbered A19 and second with unreadable square red tag in left front flipper seen.
6/12/02	44	18	62	Branded sea lion seen (number "A11-", but final digit not visible).
6/18/02	58	0	58	
6/24/02	31	4	35	Sea lions numbered A98 and A19 seen.
6/30/02	37	0	37	
7/6/02	43	13	56	
7/12/02	20	0	20	
7/15/02	63	-	63	Counted from skiff- unable to count animals in the water.
7/18/02	89	0	89	Sea lion numbered A98 seen.
7/24/02	87	0	87	Sea lion with unreadable red tag and second with unreadable tattoo (possibly A119) seen.
7/27/02				Sea lions not counted because foxes active between observation points; sea lion numbered A98 seen.
7/31/02	60	4	64	
8/6/02	87	3	90	Sea lion numbered A118 seen.
<b>Mean value</b>	113	6	120	

Figure 1. Daily walrus counts at Round Island, May 14- August 11, 2002. Counts are averaged from all observer's data, and only animals on land were included. The east-side count includes MB, NBC, FR, BC, CG, FB, FP, S, and SP beaches.



Appendix

1. Round Island access violations and walrus disturbances. Unless otherwise noted, visiting boats were only monitored as they approached the island and not during departure. HR= head raising; OR= reorienting; and DS= dispersing. WM = West Main Beach; MB = Main Beach; NBC = North Boat Cove; FR = Flat Rock; BC = Boat Cove; CG = Campground Beach; FB = First Beach; FP = First Prime; S = Second Beach; and SP = Second Prime. Walrus response to boats or airplanes outside the restricted area was not recorded, unless walrus were obviously disturbed by clear stimulus. Behavior of walrus in the water was not recorded.

Date	Approximate start time	Disturbance type	Closest approach to island	Elevation	Walrus response	Comments
5/13/02	2030	Staff transport via helicopter and boat.	Boat anchored about 100m offshore; helicopter lands on island.	0 m	Unknown.	Staff arrive via helicopter, and helicopter slings loads ashore from boat. No walrus in BC area, and walrus not observed elsewhere.
5/13/02	2230	Possible unauthorized visit by independent boat.	3.2-5 km	N/A	Unknown.	Boat may have been within the restricted area, but radio not working yet so unable to hail. Walrus not observed.
5/14/02	1000	Authorized visit by independent boat.	175 m	N/A	≥ 13 HR at FR.	Vessel lacked skiff, and crew unable to come ashore. Sit quietly at anchor for about four hours and then depart.
5/17/02	0130	Possible unauthorized visit by independent boat.	3.2-8 km	N/A	Unknown.	Boat may have been within the restricted area, but unable to judge distance in the dark. The boat was clearly audible. Walrus not observed.
5/22/02	1430	Possible unauthorized visit by airplane.	Unknown.	Probably >1650 m AGL	Unknown.	Airplane not seen but clearly audible. Walrus not observed.
5/24/02	0930	Unauthorized visit by airplane.	0 m	< 330 m AGL	>20 HR on MB1.	Airplane flies around island and then makes multiple passes along MB. Only walrus at tip of MB visible from cabin area, and additional disturbance possible on MB2-12. No walrus present on other

						beaches earlier in the day. USFWS-LE notified.
5/29/02	1413	Authorized visit by charter operator.	<150 m	N/A	≥18 HR, 2OR, and ≥5 DS from BC and FR.	Sea lion hauled out on FR also DS.
5/30/02	1655	Authorized research activity.	7 m	N/A	88 HR and 2 OR at S.	USGS researchers collect tissue samples from live walrus using crossbow and biopsy dart. Darted animals typically raised their heads briefly but then relaxed quickly.
5/31/02	1015	Authorized staff skiff operations and research activity.	15 m	N/A	>70 HR and DS from MB5.	Approaching skiff caused most of the disturbance. USGS researchers test crossbow tagging system on carcass. No walrus in BC area and minimal disturbance to animals on MB1-4.
6/1/02	1300	Authorized research activity.	10 m	N/A	7 HR, 1 OR, 1DS from S.	USGS researchers collect tissue samples from live walrus using crossbow and biopsy dart. Darted animals typically raised their heads briefly but then relaxed quickly. Video available through USFWS.
6/1/02	1500	Authorized research activity.	10 m	N/A	4 HR and 3DS from FB.	USGS researchers collect tissue samples from live walrus using crossbow and biopsy dart. Darted animals typically raised their heads briefly but then relaxed quickly.
6/2/02	1105	Authorized staff skiff operations and research activity.	3 m	N/A	86 HR, 1 OR, and 35 DS from MB4-5.	Walrus on FR not obviously disturbed by skiff operations, but 11 walrus DS from MB4 shortly after skiff beached. Intermittent DS over next six hours as USGS researchers collect tissue samples from live walrus using crossbow and biopsy dart. Another group of about 7 walrus DS after skiff leaves beach. Commercial jet also passed overhead during activity and may have contributed to disturbance.
6/3/02	1345	Authorized staff	10 m	N/A	9 HR, 3 OR, 4 DS at FR and	USGS researchers collect tissue samples

		skiff operations and research activity.			MB.	from live walrus using crossbow and biopsy dart. Darted animals typically raised their heads briefly but then relaxed quickly. Walrus <i>in water</i> also darted from skiff.
6/3/02	1545	Authorized visit by independent boat.	100 m	N/A	29 HR and 1 OR at FR.	Boat anchors at about 200 m, but skiff to within about 100 m.
6/4/02	1200	Authorized research activity.	2 m	N/A	35 HR, 5 OR, 10 DS from FB.	USGS researchers collect tissue samples from live walrus using crossbow and biopsy dart. Darted animals typically raised their heads briefly but then relaxed quickly.
6/5/02	1220	Authorized staff skiff operations and research activity.	10 m	N/A	1 HR/DS from S.	USGS researchers collect tissue samples from live walrus <i>in the water</i> using crossbow and biopsy dart.
6/5/02	1600	Authorized staff skiff operations and research activity.	10 m	N/A	No obvious response.	USGS researchers collect tissue samples from live walrus <i>in the water</i> using crossbow and biopsy dart.
6/6/02	1200	Authorized staff skiff operations and research activity.	2 m	N/A	6 HR, 4 OR, 2 DS at FR and MB.	USGS researchers collect tissue samples from live walrus using crossbow and biopsy dart. Narrative seems to indicate more disturbance than summary. Walrus <i>in water</i> also darted from skiff.
6/10/02	2028	Airplane outside restricted airspace.	0 m	>1650 m	150 HR and 8DS from MB1.	Airplane clearly audible. Virtually all walrus on MB1 HR and several minutes later 8 DS.
6/14/02	1343	Staff counting from CG OBP.	15 m	N/A	1 DS from waterline at CG.	
6/16/02	1415	Unauthorized visit by two airplanes.	<1 km	165 m	≥350 HR and 85-125 DS from MB1-2.	Two planes fly from cabin along MB and one does two to three loops along beach. USFWS-LE notified.
6/20/02	Unknown	Authorized staff skiff operations.	Unknown	N/A	20 HR/DS from MB.	Took skiff to MB to collect ivory from carcass >150 m from herd. Stopped after group began to disperse, though activity did not necessarily cause.
6/22/02	1423	Staff counting from	15 m	N/A	3 HR and 1DS from CG.	

		CG OBP.				
6/22/02	1609	Unknown.	Unknown	Unknown	400 HR, 50 OR, and 50 DS from MB3-5.	No obvious cause. Staff observed from about 1 km away, and no boats or planes visible.
6/24/02	Unknown	Authorized staff skiff operations.	100 m	N/A	5-10 HR at FR.	Took skiff to collect ivory from MB. Walrus on MB and WM not obviously disturbed. Walrus on FR appeared mildly disturbed as skiff left BC but not by return.
6/25/02	1600	Authorized staff skiff operations.	100 m	N/A	<20 HR and 5DS from FR and CG.	Took skiff to WM to count walrus. Walrus at FR HR as skiff leaves BC; no obvious disturbance at MB or WM; small group of walrus DS from FR and CG as skiff returns to BC.
6/30/02	1330	Authorized visit by charter operator.	200 m	N/A	27 HR and 1DS from FR and BC.	Intermittent HR as boat arrives and unloads; 1 DS as boat leaves BC.
7/2/02	0800	Authorized visit by charter operator.	N/A	N/A	Unknown.	No walrus in BC area; walrus not observed elsewhere.
7/4/02	1700	Authorized visit by charter operator.	>100 m	N/A	3 HR at FR.	Boat anchored at BC for about five hours and departure not monitored.
7/5/02	1030	Authorized visit by charter operator.	>100 m	N/A	No obvious disturbance.	Walrus present at FR, but not obviously disturbed.
7/6/02	Unknown	Authorized staff skiff operations and visit by charter operator.	Unknown	N/A	5 HR and 4DS at FR and SB.	Took skiff around island to count walrus; met charter boat at BC. Boat pulling anchor as skiff reached BC and combined activity apparently caused three of the DS.
7/7/02	1108	Staff counting at CG OBP.	15 m	N/A	1 HR/DS at CG.	Staff backed off as walrus started to move, but animal continued to DS.
7/7/02	1330	Authorized visit by charter operator.	>100 m	N/A	No obvious disturbance.	Not clear from notes whether walrus present in BC area and not monitored elsewhere, but notes report "no response at BC and CG".
7/11/02	1230	Authorized visit by charter operator.	>100 m	N/A	3 HR/DS from BC and FR.	DS during boat activity and as gear carried up cliff.
7/11/02	1415	Unauthorized visit by airplane.	0 m	200-265 m	>84 HR and >80 DS from MB, FR, and FB.	Airplane flew from cabin to MB and then doubled back along MB toward sea lion haulout. Several thousand murre also



						displaced. USFWS-LE notified.
7/11/02	1630	Unauthorized visit by two airplanes.	0 m	< 330 m	≥200 HR and ≥50 DS from MB1.	First plane circled island and made two passes along MB; second plane flies from cabin area to MB once. USFWS-LE notified.
7/11/02	Unknown	Authorized visit by charter operator.	Unknown	N/A	No obvious response.	Walrus on FR not obviously disturbed as boat powers up and leaves BC, but not monitored as boat arrived.
7/11/02	1852	Trail maintenance.	50 m	N/A	≥14 HR and 14 DS from FP.	Walrus apparently disturbed by noise of wooden stakes being hammered into ground along trail. Seem very skittish since airplane incidents.
7/12/02	0930	Authorized visit by charter operator.	150 m	N/A	4 DS from FR.	Captain reports 3 DS as boat drops anchor and 4 <sup>th</sup> DS as skiff returns to boat. Boat anchored until about 1800. Unknown disturbance during departure.
7/13/02	1915	Authorized staff skiff operations.	>100 m	N/A	4 HR, 1 OR, and 1 DS at BC and FR. Walrus at MB and WM not obviously disturbed though a few raised their heads as skiff passed.	Took skiff to WM to count.
7/14/02	2025	Authorized visit by charter operator.	150 m	N/A	3 HR and 3 DS from FR.	All on FR DS.
7/15/02	1130	Authorized visit by charter operator.	100 m	N/A	5HR and 1 DS from FR.	Walrus that DS had just hauled out.
7/15/02	1705	Authorized staff skiff operations.	200 m	N/A	No obvious disturbance.	No walrus in BC area; walrus at other beaches not obviously disturbed.
7/16/02	1050	Authorized visit by charter operator.	300 m	N/A	> 80 HR, 1 OR, and 3 DS from FR and CG.	All on CG DS. Boat not monitored during four-hour interval between arrival and departure.
7/16/02	1230	Trail maintenance.	>200 m	N/A	No obvious disturbance.	Using gas-powered weed cutter to trim trails. Walrus at FB and FR not obviously disturbed.
7/16/02	1610	Authorized visit by charter operator.	300 m	N/A	26 HR and 2 DS from FR.	Boat not monitored during four-hour interval between arrival and departure.
7/20/02	1745	Authorized visit by	Unknown	N/A	Unknown.	No walrus in BC area; walrus elsewhere

		charter operator.				not observed. Group of walrus gather in water 200 m from boat. Very low tide, so fortunate no walrus on top of FR.
7/24/02	1128	Authorized visit by charter operator.	150 m	N/A	25 HR at FR and BC.	Boat anchors 300 m out, but skiff approaches closer to walrus.
7/25/02	1250	Authorized visit by charter operator.	250 m	N/A	40 HR and 2 DS from FR.	
7/28/02	1136	Authorized visit by charter operator.	250 m	N/A	12 HR at FR.	
7/29/02	1410	Unauthorized visit by airplane.	<1 km	330-660 m	≥ 100 HF and ≥ 50 DS at MB and FR.	Plane made one quick pass along MB, but may have also flown over the island earlier in the day.
7/30/02	0833	Authorized visit by charter operator.	>100 m	N/A	≤ 35HR and 1 DS at FR and BC.	
7/30/02	1324	Authorized staff skiff operations.	<100 m	N/A	15 HR, 1 OR, and 2 DS from FR and BC. No obvious disturbance at MB.	Took skiff to MB to collect ivory; beached >200 m from MB walrus.
7/31/02	1045	Authorized visit by charter operator.	250 m	N/A	No obvious disturbance.	
8/2/02	1625	Unauthorized visit by two airplanes.	100 m	3 m	400 HR and DS from MB.	Two planes fly over the tip of the island and circle MB; one drops to only about 3 m above the water as if preparing to land. USFWS-LE notified.
8/3/02	0735	Authorized visit by charter operator.	Unknown	N/A	Unknown.	No walrus in BC area; walrus not observed elsewhere.
8/3/02	1330	Authorized visit by charter operator.	Unknown	N/A	Unknown.	No walrus in BC area; walrus not observed elsewhere.
8/4/02	1445	Authorized visit by charter operator.	Unknown	N/A	Unknown.	No walrus in BC area; walrus not observed elsewhere.
8/5/02	1200	Authorized staff skiff operations.	>200 m	N/A	Not obviously disturbed.	Took skiff to MB to collect ivory. No walrus in BC area; walrus on MB not obviously disturbed.
8/6/02	1530	Authorized staff skiff operations.	200 m	N/A	2 HR on MB.	Took skiff to MB to investigate injured walrus (approached on foot to within 15 m).
8/7/02	0905	Authorized visit by	Unknown	N/A	Unknown.	No walrus in BC area; walrus not observed

		charter operator.				elsewhere.
8/7/02	0955	Staff counting at FB OBP.	40 m	N/A	10 HR and 9 DS from FB.	
8/8/02	1202	Authorized visit by charter operator.	400 m	N/A	Unknown.	Two walrus present on FR but not monitored.
8/11/02	0848	Authorized visit by charter operator.	200 m	N/A	40 HR and 1 OR at FR.	Inconnu anchored for several hours but departure not monitored.
8/12/02	1935	Authorized visit by charter operator.	>100 m	N/A	Unknown.	≥4 walrus on FR but not monitored,

7/4/2002	1048	0	
7/5/2002	1702	0	
7/6/2002	1766	0	0
7/7/2002	1541	22	
7/8/2002	1542	126	
7/9/2002	1633	192	
7/10/2002	1204	35	
7/11/2002	665	15	
7/12/2002	385	1	
7/13/2002	43	68	
7/14/2002	68	439	
7/15/2002	301	194	
7/16/2002	1105	59	
7/17/2002	1459	0	
7/18/2002	1509	0	
7/19/2002	1026	35	
7/20/2002	402	284	
7/21/2002	42	616	
7/22/2002	240	454	
7/23/2002	213	958	
7/24/2002	429	527	
7/25/2002	571	287	
7/26/2002	1172	338	
7/27/2002	1261	115	
7/28/2002	1100	37	
7/29/2002	841	2	
7/30/2002	732	1	
7/31/2002	779	0	
8/1/2002	753	0	
8/2/2002	681	0	
8/3/2002	333	0	