Kotzebue Marine Mammal News
May 2012

Kotzebue Sound Ringed Seals – what have we learned?

Background
In 2007 the Native Village of Kotzebue received a grant from the U.S. Fish and Wildlife Service to catch ringed seals in Kotzebue Sound and instrument them with satellite tags. The tags recorded movements, diving and hauling out behavior and sent this information to NOAA satellites. The project was officially called “Wintering areas and habitat use of ringed seals in Kotzebue Sound: a community-based study.” Kotzebue-area residents and biologists worked closely together to catch and tag seals, collect data, and take samples.

The ringed seal tagging study grew out of a previous project to attach satellite tags to young-of-the-year bearded seals. That project was the first of its kind in Alaska and was a huge success. Ten Kotzebue-area residents were involved in catching and tagging the seals. Twenty-one young bearded seals (10 males and 11 females) were caught and fitted with satellite tags during 2004-2006.

During the bearded seal project, ringed seals were sometimes also caught in the nets. This gave us the idea to develop a new project that focused on ringed seals. Up until that time there was almost no information about movements, habitat use and dive behavior for ringed seals in Alaska, despite their importance for subsistence, as a major prey of polar bears, and as a species likely to be greatly affected by climate change and loss of sea ice habitat.

Results of satellite tagging conducted by this project will be used to better understand the seasonal movements, habitat use, and diving behavior of ringed seals. This information can then be used to help manage human activities to minimize impacts to ringed seals. This includes things like shipping, oil and gas exploration activities in the Chukchi Sea, and Bering Sea fisheries that occur in ringed seal wintering areas. This information also contributes to the baseline for evaluating the effects of climate change on ringed seals and their environment and for improving seal census efforts.

Project Goals
1) Build tribal capacity to conduct research on a marine mammal species of tribal importance, and strengthen working relationships with federal and state management agencies;
2) Refine methods for catching ringed seals in open water through a partnership involving Kotzebue-area Tribal members/hunters and biologists;
3) Attach satellite tags to at least 20 ringed seals over a two year period;
4) Analyze movements, diving behavior, and habitat use of tagged ringed seals;
5) Share the results of this study with local hunters and residents
Through an extension of the project, the goals were expanded to include:
6) Attach satellite tags to both juvenile ringed and bearded seals (10-12 each) in the same year, to directly compare their movements and diving;
7) Involve Kotzebue high school students in activities associated with the project, and train young agency biologists in cooperative community research.

Participants
This project could not have succeeded without the cooperation and hard work by a lot of people. Kathy Frost, Alex Whiting (Native Village of Kotzebue) and John Goodwin (Kotzebue hunter) developed the idea for a project to satellite tag ringed seals in Kotzebue Sound and to share their successful model for cooperative hunter- biologist research with others. Kathy and Alex wrote proposals to obtain funding. Alex, Kathy and John worked together throughout the project to make it work administratively, logistically, scientifically and politically.

John Goodwin was the field leader at Sisualik for the 2007-2009 field seasons. There were two seal-catch crews each year, led by John Goodwin and Cyrus Harris. Crew members were: 2007 – Pearl Goodwin, Doc (Nerus) Harris III, Lee Harris and Jerry Jones; 2008 – Edward Ahyakak, Jeff Barger, Harris and Jerry Jones; 2009 – Brenda Goodwin, Pearl Goodwin, Levi Harris, and Boyuk (James) Monroe.

Kathy Frost was the chief scientist for the project. Other biologists who participated and observed the project were Justin Crawford (ADF&G) and Jason Herreman (NSB Department Wildlife Management). ADF&G, partnered in the research and helped in many ways by contributing satellite tags, data analysis, supplies, logistics support and help in the field. Selawik National Wildlife Refuge provided housing for the biologists during the field season.

Funding for the originally proposed project was provided by the USEFWS Tribal Wildlife Grants program, the Alaska Department of Fish and Game, and the Native Village of Kotzebue. Additional funding and support for satellite tags and field work was contributed by the National Fish and Wildlife Foundation (NFWF), Conoco Phillips, Shell, NOAA National Marine Fisheries Service/Alaska Region and the Selawik National Wildlife Refuge. Kotzebue area residents and biologists worked side by side in all aspects of the project, including field preparation, seal catching and tagging, sample and data collection, and interpreting the results.

Catching & Tagging
Before this project, scientists in Alaska had never live-captured ringed seals in open water. A few ringed seals had been caught and tagged at breathing holes in the ice in spring. This disadvantage with spring tagging is that seals molt soon after and the glued-on tags fall off when the hair is shed. One of the goals of this project was to apply the methods developed in the previous effort for bearded seals to fall tagging of ringed seals.

It turned out that methods used for bearded seals worked well for ringed seals, too. Seals were caught using specially designed “seal” nets. The nets were 1.2 ft by about 250 ft. They were made of 12” stretch mesh with 1” diameter foam-core float line and a light lead line. Anchors were attached to the float rope and not briddled to the lead line to allow entangled seals easy access to the surface to breathe. The water where most of the nets were set was less than 5 feet deep.

Catching & Tagging: Ringed seal capture

All field activities were based out of the Tribal Elders Culture Camp on Sisualik Spit 10 miles north of Kotzebue. The base camp was made available to us by the Native Village of Kotzebue and included a frame building for eating and sleeping and a wall tent for seal tagging and sample processing. Access to camp was either by small boat or by fixed wing aircraft from Kotzebue, depending on ice conditions.

Ringing seals at Sisualik: Left to right: Doc Harris, Jeff Barger, Grover Harris Jr., Edward Ahyakak, Grover Harris Sr. and John Goodwin.

Two crews, each with a boat, set out and tended two 250-ft seal nets each, for a total of 1,000 feet of net in the water each day. The nets were set at different locations along Sisualik spit depending on water and ice conditions and where the seals seemed to be. Kotzebue hunters conducted all seal capture activities.

When a seal was caught, it was removed from the net and placed in a hoop net in the boat for transfer back to the
Native Village of Kotzebue Tribal Elders Culture Camp at Sisualik. Seal tagging activities were based out of this camp. Scientific Permit Nos. 358-1585 and 358-1787. were tagged under Alaska Department of Fish and Game using quick-setting epoxy. The tags stayed on until the SPLASH tags were glued to the hair on the back of the seal. A female. It was then sampled for blood, blubber and DNA, as Co-Investigators under ADF&G's research permit. They were Alex Whiting, John Goodwin and Doc Harris ill. Alex, John and Doc were authorized to tag and collect samples, making it possible for the project to proceed whether or not biologists were present. This is the first time that local area participants and Alaska Native hunters have received this official designation under a seal tagging permit. The tags we used were data-collecting satellite tags called "SPLASH tags." These tags were made by Wildlife Computers, a company that has been making satellite tags for about 30 years. They were the newest, smallest, and most streamlined tags available. The tags were about 2 ½ x 2 ¼ x ½ high and had a flexible whip antenna on top of the tag that was out of the water when the seal was at the surface. The tags were powered by three AA lithium batteries and generated ½ watt of power output. They could send up to 50,000 signals to the satellite before the battery ran out (about one year, or until the seal molted in the spring, unless something else happened to it). The tags sent up to 150 messages to the satellites each day.

The SPLASH tags not only told where the seals were located, but also how deep they dove, how long they dove, and how long they spent at the surface and at certain depths. The tags summarized the data they collected into four 6-hr periods called "bins" so that we could know what the seals were doing at different times of day (morning, day, evening, night). When the antenna was out of the water, the data were transmitted to Argos receivers on NOAA polar orbiting satellites. The Argos data collection and location system recorded the date and time of each signal received by the satellite and calculated a location for the tag whenever enough uplinks were received during a satellite pass.

What We Caught and Tag Performance

During 2007-2009, we caught and put SPLASH tags on 37 ringed seals (23 males and 14 females, 23 subadults and 14 adults) and 11 young bearded seals (5 males and 6 females). We tagged an additional three ringed seals in 2006 with older satellite tags and four in 2007 with location-only tags called SPOT tags.

Since the beginning of our project in Kotzebue Sound in 2004, we have tagged 76 seals: 44 ringed seals and 32 bearded seals. Here’s the breakdown of what we’ve tagged:

Tags for ringed and bearded seals transmitted for about the same length of time – about 4.5 months on average. The shortest failed after two days. The longest bearded seal transmitted for 251 days, until June 4th. The longest ringed seal transmitted for 297 days, or until August 13th. About one third of the tags transmitted for more than six months. Reasons for tags to stop transmitting include getting eaten by a polar bear, shot by a hunter, starving (many first year pups die from starvation), battery runs out, antenna breaks due to ice, tags fail for some other reason, or the seal molts and tag falls off in spring.

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Tags transmitted longer than any other seal in our project (until August 2009) and the seal traveled about 5,450 miles while the tag was working. Because the Savoonga hunter told us about catching it, we know this seal was alive and healthy almost a year after the tag stopped.

Seal 781 – This yearling seal was tagged in October 2008, on the same exact day as seal 778. Its tag transmitted only 20 days, until it was shot by a hunter in Russia in early November. The hunters passed the SPLASH tag to the Russian border guard officer and it is almost certain we will never get the tag back. The Russians might investigate it as a spy technology! The location was Mechigmensky Bay about 2 miles from the coast and 18 miles from the village of Lorino.

Seal 788 – One satellite tagged seal was also recovered in Russia in fall 2010. This young male seal was tagged on September 29th, 2010. It was shot in Lavrentia Bay, southwest...
of Bering Strait. Its tag last transmitted on November 9th. We have no more information about the tag or the seal because the Russian special service took the tag away and did not return it.

### Ringed Seal Movements and Habitat Preferences

Our study has shown substantial differences in movements and habitat use by adult and subadult ringed seals during the winter-spring season when ice covers the Bering and Chukchi seas. In winter, adult seals stayed close to shore in shorefast or heavier pack ice in the Chukchi and northern Bering seas. Adults moved 14 miles a day on average and were usually less than 20 miles from shore in water shallower than 50 ft. Subadults followed the advancing seasonal ice south into the Bering Sea. They traveled about 22 miles a day and were usually more than 100 miles from land in water 130-160 feet deep. Seals of all ages moved around less in winter than in fall or spring.

The longest distance covered by a tagged adult seal was 6,260 miles in 247 days. He traveled extensively in the central Bering Sea. His tag failed in June when he was south of St. Lawrence Island. The maximum dive depth for an adult was 984 ft. This dive was made by a female on July 15th when she was in the far northern Chukchi Sea. The deepest dive by a subadult was 977 feet – by a young male in the southwestern Bering Sea south of Cape Navarin on January 17th. This was the same seal that had a packaging band on it when we caught it, and that was shot by a Savoonga hunter almost two years later.

The longest duration dives for both adult and subadult seals were at least 22 minutes. Two adult females made these long dives. One was near the Lisburne Peninsula and the other in outer Norton Sound when the dives were made. A single subadult male made a dive that lasted more than 22 minutes. He was south of St. Lawrence Island.

### Ringed Seal Diving and Hauling Out Behavior

The satellite tags that we used recorded how long and how deep the seals dove. Each tag had a small pressure transducer to determine the dive depth. There was a salt water switch on the side of the tag that let us know when the seal was under water and when it was hauled out. This diving information can be used to better understand how ringed seals feed, and whether there are differences between males and females, or adults and subadults.

Graph showing percent of time spent hauled out, by month, for adult and subadult ringed seals. Time spent hauled out was similar in October-April, and increased in summer during the molt.

Before the advent of satellite tagging, biologists thought that subadult seals overwintered in the flaw zone at the edge of the shorefast ice or in the adjacent pack ice. They thought that territorial adults excluded subadults from the fast ice. Fast ice was thought to be preferred habitat for all seals, not just adults. Our study has shown that the subadults we tagged did not remain in areas near the adults, but instead traveled far south to the Bering Sea ice edge. This required a long swim, but there may be many advantages to leaving the Chukchi Sea in winter. By staying in the thinner ice of the Bering Sea ice front, the subadults do not have to spend energy making breathing holes. There are few polar bears trying to eat them, and food fish may be more available there.

Tagging studies in the Mackenzie Estuary of Canada and at Barrow have also found that young seals move south to the Bering Sea ice edge in winter.

Map showing movements of tagged adult and subadult ringed seals, 2007–2010. Kotzebue Sound

*Legend*

- **Ringed seals**
  - **Adults**
  - **Subadults**

- **Depth**
  - 0 ft
  - 25 ft
  - 50 ft
  - 75 ft
  - 100 ft
  - 125 ft
  - 150 ft

Map showing movements of tagged adult and subadult ringed seals. Seals were tagged in Kotzebue Sound during September and October, 2007-2009. Subadults wintered near the Bering Sea ice front. Adults remained farther north in the shorefast or heavy pack ice. In spring when the ice broke up, the seals whose transmitters were still working moved far north into the Chukchi Sea.

Graph showing how deep adult and subadult ringed seals dive. Subadults dive deeper than adults in all months except May-July. The difference is greatest in Jan-Apr when subadults are in the Bering Sea.

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Polar Bears and Seals

Throughout the Arctic, polar bears feed mainly on ringed seals and to a lesser degree on bearded seals. Bears catch their seal dinner by breaking into dens or pouncing after long waits on the ice surface. In some areas, polar bears may feed on a wider variety of species, such as belugas, walruses or other kinds of seals.

Because ringed seals are such an important food to polar bears, the abundance of seals and polar bears is highly correlated. There are more bears in regions where there are many ringed seals. The availability of ringed seals can change from year to year due to variability in pup births and survival. This can make it harder or easier for polar bears to find food.

In the Beaufort Sea in the 1970s, when the ice was heavy and ringed seal abundance declined, polar bear reproduction also declined.

Seal Whiskers – Did You Know?

Seals and sea lions (also called pinnipeds) have the largest whiskers of any mammals. They use them as sensors to navigate in water and detect prey. Seals can use their whiskers to track fish by sensing changes in water movement caused by a swimming fish. For example, harbor seals can follow the trail of disturbed water left by swimming fish or other seals, but if the whiskers are blocked by a mask over the muzzle, the seal cannot detect the trail. Whiskers are not shed all at once during a seal’s annual molt. Instead, they are shed individually and irregularly throughout the year.

The whiskers of most seals are beaded or bumpy. This includes ringed and spotted seals. Scientists think the bumps may help reduce drag, increase sensitivity and/or reduce signal interference. Bearded seal whiskers are very different – they are not beaded but are smooth and almost rectangular in cross-section.

Wintering Areas of Ringed and Bearded Seals

Since 2004, we have tagged both subadult ringed and bearded seals. We were curious whether they spent the winter in the same or different areas. This map of all the subadult seals we tagged shows that they winter in the same areas.

This map shows movements of subadult ringed and bearded seals tagged in Kotzebue Sound, 2004-2009. Subadults of both species overwinter in the same areas of the Bering Sea.

Sick Ringed Seals

Sick and dead ringed seals started showing up on the Beaufort Sea coast near Barrow in July 2011. Since then, more than 60 dead and 75 diseased seals, most of them ringed seals, have been reported in Alaska, with reports continuing to come in. Symptoms, but no deaths, were also observed in Pacific walrus in fall 2011. Walruses and ringed seals in Russia, and ringed seals in Canada, have reportedly suffered similar symptoms.

Tests so far indicate that a virus is not the cause. Radiation was considered because of the Fukushima nuclear power plant accident in Japan in March 2011. Preliminary screening of tissue samples from both healthy and sick ice seals and walruses showed that radiation levels were within the typical background range. Testing continues for other possible factors, including immune system-related diseases, a fungus, man-made and bio-toxins, contaminants, and stressors related to sea ice change.

NOAA has received only a few reports of sick seals in Alaska since November 2011. In January 2012, hunters in the North Slope Borough killed three ringed seals that had complete hair coats and looked healthy but had small lesions on their flippers, suggesting that the disease may remain. On the Russian side, Chukotka hunters did not report any sightings or harvest of sick or hairless seals in December or January, according to the agency.

Seals and walruses suffering from this unknown disease have skin sores, usually on the hind flippers or face, and patchy hair loss. Some of the diseased mammals have exhibited difficult breathing and appear sluggish. Necropsies of the dead ringed seals found a variety of skin lesions (sores). Some were hairless or the molt was delayed. Some had sores or bumps, often around the eyes, lips and hind flippers. Some also had wet heavy lungs, abnormal colored livers, and smaller than normal thymus and lymph nodes. Some others had very large lymph nodes which may indicate compromised immune systems. Scientists have not yet identified a single cause for this disease.

Polar bears eating a ringed seal. Photo by Ian Stirling.

In the Beaufort Sea, ringed seals make up about 70% of the polar bear diet, followed by bearded seals at 20% and belugas at 10%. These percentages vary somewhat by region and also by age and sex of the bear. In general, male polar bears eat more bearded seals than do females. This may be because male bears are bigger and stronger and more able to catch the larger bearded seals. In eastern Canada, some individual males ate up to 98% bearded seal, compared to females and subadults that never ate more than 40% bearded seal.

Some individual males seem to be bearded seal “specialists.” However, as a group, adult males show the most dietary flexibility and are more likely to switch from one prey type to another.

Sick or dead marine mammals should be reported to the following agencies, based on where the animal is seen:

North Slope area – North Slope Borough Department of Wildlife Management (907-852-0350); Bering Strait region – Alaska Sea Grant Marine Advisory Program; NOAA Fisheries Alaska marine mammal stranding hotline (1-877-925-7773). For more in-depth information visit http://alaskafisheries.noaa.gov/.
Arctic cod (or blue cod) is one of the major foods of ringed seals. Although 155 different fish and invertebrate prey were identified, only a few of these made up most of the diet. The most commonly eaten fish in the Chukchi Sea were arctic cod and tomcod. Ringed seals in the Bering Sea also ate arctic cod. They ate less tomcod and more pollock than Chukchi Sea seals. The most common invertebrates were shrimps, amphipods (like sand fleas) and mysids. One surprise was finding that ringed seals changed what they ate most commonly over the last 40 years. Even though arctic cod and tomcod were frequently eaten in the 1970s, they were eaten more often during the 2000s. Smelt was rarely eaten in the 1970s, but showed up in more than one third of the stomachs in the 2000s. Ringed seals also ate more herring and capelin in the 2000s. They ate shrimps, mysids and amphipods less often in the 2000s than during the 1970s.

**Harvest Monitoring Studies**
The Arctic Marine Mammal Program of the Alaska Department of Fish and Game conducts an ice seal bio-monitoring project where measurements and samples from subsistence harvested seals are used to determine the health and status of seal populations. Measurements and samples are collected from ringed, bearded, spotted and ribbon seals from the subsistence harvest at Point Hope, Shishmaref, Diomede, Nome, Gambell, Savoonga and Hooper Bay. Measurements include length, girth and blubber thickness. Samples include a tooth (age), skin (genetics), stomach (diet), blubber, liver, kidney, muscle (contaminants) and reproductive organs from females (productivity). Additional collections are made from some seals for disease (blood) and parasite (lung, gall bladder, intestine) screening. For more information about ringed seals or other ice seals, you can contact Lori Quakenbush at (907) 459-7214 or lori.quakenbush@alaska.gov. The following are some of ADF&G’s results for ringed seals.

**Diet**
ADF&G has examined the stomach contents from 1,555 ringed seals collected between 1960 and 2009. Most of these were from seals harvested by subsistence hunters who cooperated with biologists to have their seals measured and the rest by ADF&G. Arctic cod and tomcod were the major food source for ringed seals, while chukchi sea pollock, herring, capelin, shrimp and mysids were eaten in significant quantities. In addition, there were 155 different fish and invertebrate prey items identified in the seal stomachs.

**Reproduction and Productivity**
The peak breeding season for ringed seals is in May and early June. Female seals do a very interesting thing when it comes to being pregnant. Although breeding takes place in May, the fertilized egg doesn’t implant into the uterine wall and begin to grow for about 3 months. This is called “delayed implantation.” It is very different than pregnancy in most mammals, where the fetus begins to grow immediately after it is fertilized. Most female ringed seals in Alaska become sexually mature (get pregnant for the first time) at 5 or 6 years of age. It is possible to know how old a female is when she first becomes pregnant and how many times she has been pregnant by counting the scars on her ovaries. Based on harvested seals sampled by ADF&G, the age at sexual maturity for ringed seals has been decreasing in the 2000s compared to the 1970s. Pregnant 3-year-old females are much more common now than in the past. If a female gets pregnant at 3, she will have her pup 11 months later when she is 4. After females become mature, they have a pup every year for the rest of their lives. Each year, about 80% of the mature females will have a pup. This varies from year to year depending on things like environmental conditions and food availability. Unlike humans, ringed seals do not quit having pups when they get old. Even very old females can have pups.

**Pupping and Pups**
Ringed seals usually have their pups in early April, although some pups are born from late March until late May. The pups are born in snow caves, or lairs, on top of the ice. These lairs are in snow drifts that accumulate behind pressure ridges. The entrance to the lair is through a hole dug by the female with the claws on her front flippers. Ringed seals can make and maintain breathing holes – and lair entrances – through 6 feet of ice! When the pups are born, they weigh about 10 pounds and are about 15% fat. When they are weaned six weeks later, they weigh about 30 pounds and are 40% fat. That means they grow almost a half a pound a day and store a lot of it as fat! By August ringed seal pups may weigh 45 pounds. About 30% of the pups born each year die before their first birthday due to starvation, predation, or some other factor. Ringed seal pups are more active before weaning than many other seal pups. They spend about half of their time swimming and diving. Even small pups can dive to about 300 feet.

**Growth and Body Condition**
ADF&G analyzed length and age data for more than 2,000 ringed seals to understand their growth rates. In general, growth rates and body condition are expected to be correlated. Good conditions likely lead to longer, fatter seals. Seals were aged either by counting rings in the claws or rings in the teeth. Because ringed seals wear down their claws by digging breathing holes, claw ages are only accurate until about age 9. Seals born after 1976 tended to be larger than seals born before 1976. Seals harvested before and after 1976 reached similar maximum length, but the seals harvested after 1976 grew at a faster rate. By age 6, seals born after 1976 were about 2½ inches longer. Maximum lengths of males and females and of seals from the Bering, Chukchi and Beaufort seas were similar. The largest ringed seal ever weighed in Alaska was a pregnant female in March. She weighed 244 pounds. The average adult ringed seal weighs about 110 pounds. The largest ringed seal weighed during this project was a 140 pound male tagged in 2007.

**May 2012**

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**Left:** Albert Simon from Hooper Bay and Mark Nelson, ADF&G with first ever tagged ringed seal at Hooper Bay. Right: Mark Nelson and Flo Nunasuk ready to release tagged ringed seal.

**Inside view of a ringed seal lair. Pups live in these lairs when they are young.**

**Regarded seal pup in collapsed snow lair. The lairs keep the pups warm and provide some protection from polar bears and foxes.**

**Table. Major prey items from 1,043 ringed seals harvested in the Chukchi Sea during the 1970s and 2000s.**

<table>
<thead>
<tr>
<th>Fish</th>
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<td>Mysids</td>
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<tr>
<td>Tomcod</td>
<td>38%</td>
<td>65%</td>
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<tr>
<td>Amphipods</td>
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<td>Herring</td>
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<tr>
<td>Smelt</td>
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<td>36%</td>
</tr>
<tr>
<td>Shrimp</td>
<td>65%</td>
<td>43%</td>
</tr>
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**Ringed seal pup on a sheet of ice. The minimum water depth is 10 feet!**

**Ringed seal pup in the snow near Cape Espenberg in southern Kotzebue Sound.**

**Cape Espenberg in southern Kotzebue Sound. For more information contact Lori.Quakenbush@alaska.gov. The following are some of the more information about ringed seals or other ice seals, collections are made from some seals for disease (blood) and parasite (lung, gall bladder, intestine) screening.**

**A bearded seal. Left to right: Brenda Goodwin, Susan Herreman, John Goodwin (back) and Levi Harris.**

**Pup size varied annually. Pups were shorter than expected, given their date of harvest, in six of ten sample years between 1960 and 1979. In contrast, pups were shorter than expected in only three of nine sample years between 2000 and 2009. They were smallest in 1961 and 2005. Usually years with shorter than average pups also had shorter older seals, too.**

**Grover Harris, Jr. and Doc Harris with ringed seal pup.**

**Angela Guinan from Nome with a ringed seal pup.**

**A pregnant ringed seal.**

**Dietary a headache.**
Traditional Knowledge

ADF&G has distributed and analyzed 176 traditional knowledge questionnaires about seal hunting from five Bering and Chukchi sea villages. Examples of information collected from the questionnaire are shown in the table below.

Hunters were asked whether they thought the numbers of seals had increased or decreased since they began hunting. Hunters in most villages thought ringed seal numbers had stayed about the same as in the past, although some thought numbers had decreased. Not very many thought ringed seals had increased. Based on the people interviewed, there did not seem to be any strong trend in abundance. Most respondents from all villages reported that ringed seals are found in the same locations as in the past. Similarly, the timing of ringed seal hunting hasn’t changed for the five villages included in the survey.

Kotzebue High School Students Observe

Ten students from the Field Biology class at Kotzebue High School were present when one ringed and two bearded seals were tagged during 2009. The first two bearded seals were tagged and sampled by Kotzebue participants John and Pearl Goodwin and Alex Whiting. The ringed seal was tagged by biologist Kathy Frost, who discussed ringed seal biology, how samples are used, and what kind of data the tags collect.

Students were also present when the seals were released. Maps of seal movements were provided to the Kotzebue High School biology class teacher Lance Westing. Students particularly followed movements of seals they saw tagged. A discussion about ice seals was held when a new map was received. As a science fair project, one student (Landon Eck) used these maps to correlate seal movements with weather. Landon placed high enough at the district science fair to go on to state.

Participating in projects like this helps young people care about and better understand their resources. It was good for them to see a diverse group of people, including people they personally identify with, all working on a scientific project together.

The Future

The future of cooperative research like this project is with our youth – young biologists, hunters and students still in school. For that reason we made it a project goal to involve the youth in as many ways as we could.

We invited two young agency biologists – Justin Crawford and Jason Herreman – to go into the field with us and see the power of teaming up with local people to do research. Justin was hired by ADF&G in 2008 to work on ice seals. Jason was hired by the NSB Department of Wildlife in 2009. Both helped to catch and tag seals and spent time at camp in Sisualik. Justin also videotaped the Kotzebue seal team at work. Since 2009, both Jason and Justin have started cooperative ice seal tagging projects of their own.

Average blubber thickness of subadult and adult ringed seals varies seasonally, as seal hunters know. Maximum blubber thickness occurs in January or February and declines until July or August. Blubber thickness declines rapidly in May, June and July. The blubber thickness for ringed seals of all ages varied by year, but these doesn’t appear to be any long term trend in blubber thickness.

Table. Summary of some questions about ringed seal harvest. The first line is the number of respondents in each village. Other numbers are the percentage of respondents answering “yes” to questions. Summary was compiled by ADF&G.

<table>
<thead>
<tr>
<th>Point Hope</th>
<th>Diomede</th>
<th>Shishmaref</th>
<th>Gambell</th>
<th>Hooper Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents</td>
<td>16</td>
<td>29</td>
<td>14</td>
<td>44</td>
</tr>
<tr>
<td>Numbers stayed the same?</td>
<td>31%</td>
<td>55%</td>
<td>43%</td>
<td>63%</td>
</tr>
<tr>
<td>Have numbers decreased?</td>
<td>31%</td>
<td>40%</td>
<td>36%</td>
<td>22%</td>
</tr>
<tr>
<td>Have numbers increased?</td>
<td>13%</td>
<td>5%</td>
<td>7%</td>
<td>14%</td>
</tr>
<tr>
<td>Are seals in the same areas?</td>
<td>74%</td>
<td>67%</td>
<td>85%</td>
<td>84%</td>
</tr>
<tr>
<td>What is the hunting season?</td>
<td>Jan-Aug</td>
<td>Sep-Jun</td>
<td>Jun, Sep-Nov</td>
<td>Aug-May</td>
</tr>
</tbody>
</table>

Samples collected from subsistence-caught seals. These samples are used to study things like diet, reproduction and contaminants. Photo by ADF&G.

Age of Harvested Seals

Almost 6,000 harvested ringed seals have been aged from either their teeth or their claws. On average (not including pups), seals harvested in the 1960s were older (8.5 years) than those harvested in the 1970s (6.0 years). Seals harvested in the 2000s averaged 6.8 years. Pups made up a larger part of the harvest in the 2000s. In the last 10 years they’ve made up more than half the harvest, compared to less than a quarter in earlier years.

Several younger Kotzebue hunters were part of our research team. Grover Harris Jr. joined us in 2008 and Levi Harris in 2009. Levi also helped us to collect important samples from harvested seals to determine what they ate.

Tagging programs involving local participants have been initiated in other regions as a direct result of the collaborative model developed in this project. Adult bearded seal tagging projects in Kotzebue and Barrow have been developed by NOAA to involve local participants as key members of the field team. A new ringed seal tagging project involving local people has been developed by the NSB in Barrow. ADF&G is developing a similar collaborative project in Hooper Bay. Three NOAA ice seal research cruises have involved local participants trained by this study, and other Alaska Native hunters not from Kotzebue have been included in other cruises. It has become quite “standard” to include Alaska Native participants in all such cruises.

Kotzebue High School field biology class observing tagging of a bearded seal. Left to right: Lance Westing (teacher). Heather Gallahorn, Eryn Schauff, Catherine Crane, Chelsea Hadley, Grant Madganz, Landon Eck, Sonny Chan and Jared Miller.
Final Thoughts

In 2003, when we first came up with the idea to tag seals in Kotzebue Sound, we weren’t sure it could be done. The methods for live capture of ice seals in the fall time hadn’t been developed. No tagged seals and only a few ringed seals had ever been tagged in Alaska. The usual way of doing field science at that time was for a team of biologists to come to an area, bring their own supplies and equipment, and mostly work on their own. Sometimes they rented local boats or talked to local people about the animals and the conditions. People then were talking about cooperative management and incorporating traditional knowledge into science, but no one really knew how to put it in practice in the field.

This project led the way and set an example for future projects. Biologists and Kotzebue hunters worked side by side. Everyone came to the project with different skills, experiences and knowledge – but we all shared an interest and concern about seals. We wanted to learn more about the seals so we can take care of their habitat, manage them well and make sure they are wanted to learn more about the seals so we can take care of their habitat, manage them well and make sure they are around in the future.

Cooperative research involving local residents and scientists is a powerful model for conducting marine mammal research in the Arctic. It is more likely to succeed because it involves people with extensive knowledge about local movements and behavior of marine mammals, as well as local environmental conditions and the skills needed to operate in these conditions. Through training and team work, all members of the research team become qualified to conduct project activities such as catching, tagging, collecting blood, samples, and measurements. Local participants become integral members of the research team, not only providers of logistics. When this occurs, scientific personnel no longer always need to be present for field work to occur. Local participants can take advantage of windows of opportunity – either due to weather or unexpected presence of animals – and greatly extend a field season. Biologists were present for only half of the days we conducted field work, and more than half of the seals tagged were caught when a biologist was not in camp. This effectively doubled the efficiency of the project.

Effective marine mammal management in Alaska requires that resource users trust the information being used in management decisions. There is no better way to develop this trust than by undertaking cooperative projects to acquire the needed information.

Acknowledgments

This project could never have taken place without the great cooperation between all participants. Alex Whiting with the Native Village of Kotzebue, retired ADF&G biologist Kathy Frost, and Kotzebue hunter John Goodwin conceived the idea for the ringed seal project. Alex made the project happen administratively, Kathy was the “chief scientist” and John ran the field camp and catching activities. John was instrumental in developing and improving methods for catching seals. Cyrus Harris led the second seal catching team. Edward Ahyakak, Jeff Barger, Brenda Goodwin, Doc (Nereus) Harris III, Gower Harris, Gower Harris Jr., Lee Harris, Levi Harris, Jerry Jones and Boyuk (James) Monroe helped to catch, sample and tag seals. Pearl Goodwin kept the crew well fed and recorded all data, as well as helping with seal catching and being the official project photographer.

The original proposal to tag ringed seals identified funding for 20 satellite tags to come from Tribal Wildlife Grants and ADF&G. By the time the project was complete we had attached 56 tags, almost triple the number originally proposed. This was only possible through additional funding provided by the Native Village of Kotzebue, Shell, the National Fish and Wildlife Foundation, Conoco Phillips and NMFS Alaska Region. ADF&G provided Argos data acquisition costs for all 56 tags. ADF&G Arctic Marine Mammal Program Leader Lori Quakenbush was an “ex officio” member of our team. She assisted with funding, data acquisition costs, field supplies and logistics, permits and by making her staff available for many aspects of the project. Justin Crawford was a great help in setting up tags, field work, map preparation, data analysis and reporting. Justin is analyzing the movements and dive data and preparing it for publication in scientific journals. Anna Bryan helped with expediting, all things to do with samples, and last minute emergencies. She never complained no matter what we asked. The Selawik National Wildlife Refuge made their bunk house available to project biologists. This was indeed a team effort.

Tagging in October only took place because local team members were willing to work in cold and icy conditions when boating was difficult, at best.
This community report newsletter was prepared by Kathy Frost. It was funded by the U.S. Fish and Wildlife Service Tribal Wildlife Grant Program, grant U-17-NA-1, to help federally recognized Alaska Native tribes conserve and recover endangered, threatened and at-risk species and other wildlife on tribal lands. For more information about this project go to our web site at www.kotzebueira.org.