United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
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Federal Subsistence Activity Report
Kodiak National Wildlife Refuge, September 2015 – January 2016

Subsistence Permit Summary

Federal Subsistence regulations allow for customary and traditional harvest of Roosevelt elk, Sitka black-tailed deer and brown bear on Kodiak Refuge lands. Rural residents qualify for federal elk and deer hunts, and a small number of brown bear permits are issued to village residents (Table 1). Federal designated deer hunter and subsistence elk permits can be obtained at the Kodiak Refuge headquarters and at some villages. Permittees are required to carry their Federal subsistence permits, current state licenses, harvest tickets, and lockin tags (bear) while hunting.

Table 1. Federal subsistence permits issued and estimated number of animals harvested based on harvest reports, Unit 8, 2008-2015.

Species	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Deer*	81(74)	56(38)	67(42)	70(52)	20(11)	46(21)	45(39)	39 (**)
Bear	6(1)	6(1)	7(1)	5(2)	2(0)	4(0)	3(0)	1 (**)
Elk	3(0)	5(0)	8(1)	6(0)	2(0)	5(2)	9(1)	4 (2)

*Multiple deer eligible to be harvested per permit
**Incomplete reporting. Season ongoing

Brown Bears

Population Assessment

The Refuge, in cooperation with ADF&G, tries to carry out an annual survey (the *Intensive Aerial Survey*) in late May to monitor brown bear population trends on Kodiak Island. No surveys were conducted in either 2014 or 2015 despite full preparation and agency commitments because high winter and spring temperatures triggered an early leaf-out of deciduous shrubs and trees in areas targeted for survey. Such advanced green-up is unacceptable for the survey because it would conceal bears, influence observation rates, and bias comparison of bear abundance among years. In cooperation with ADF&G we plan on carrying out these surveys in two areas during May 2016 – an area that includes the Frazer Lake and Red Lake watersheds and adjacent areas and an area that includes the Sturgeon River watershed.

Brown Bear Stream Surveys: Following established protocol, the Refuge aerially surveys bear usage of a network of six streams during July and August in southwest Kodiak Island. Bears seasonally congregate along these streams to feed on spawning sockeye salmon and chum salmon (Sturgeon River). A primary purpose of the survey is to estimate trend in composition of the bear population that uses these steams. In the case of this survey, composition refers to the proportion of bears observed in four categories: single bears, female bears with dependent cubs, cubs greater than one year old, and cubs less than one year-old. Results of composition monitoring can identify whether the pattern observed over several years is indicative of potential population stability, growth or decline. However, results of composition surveys do not measure population size, which is assessed separately.

In 2015, we conducted 16 surveys (average number of surveys is eight) between 9 July and 25 August. The highest number of bears was recorded during mid-July surveys. Thereafter, bear stream use slowly declined coincident with ripening of salmonberry and red elderberry. The average number of bears counted per survey on the Southwest Network was much less than the long-term average (1985 to 2005) - 23 bears/survey vs. 85 bears/survey. Single bears represented a slightly lower proportion of the population than the long-term average (41% vs. the long-term average of 47%). Maternal bears comprised 18% of all bears counted this year compared to the long-term average of 17%. Cubs of the Year (COY) made up 14% of all bears observed, while older cubs comprised 26% versus the long-term averages of 11% and 24%, respectively. Family groups made up 59% of all bear groups recorded versus the long-term average of 53%.

These data suggest that the bear population is correlated with the strength of salmon runs. This year's and last year's higher proportions of family groups compared to the period 2008-2013 (Figure 1); specifically, the proportion of maternal females (with cubs), old cubs, and new cubs returned to a level similar to 1985-2005. This appears to be strongly related to the relatively strong salmon runs in 2013 and 2014 and, possibly, good berry crops. The low numbers of bears counted since 2008 may suggest that the population may be lower than historic averages. Or there may be other reasons. Nevertheless, the Refuge is investigating this with ongoing research and monitoring.

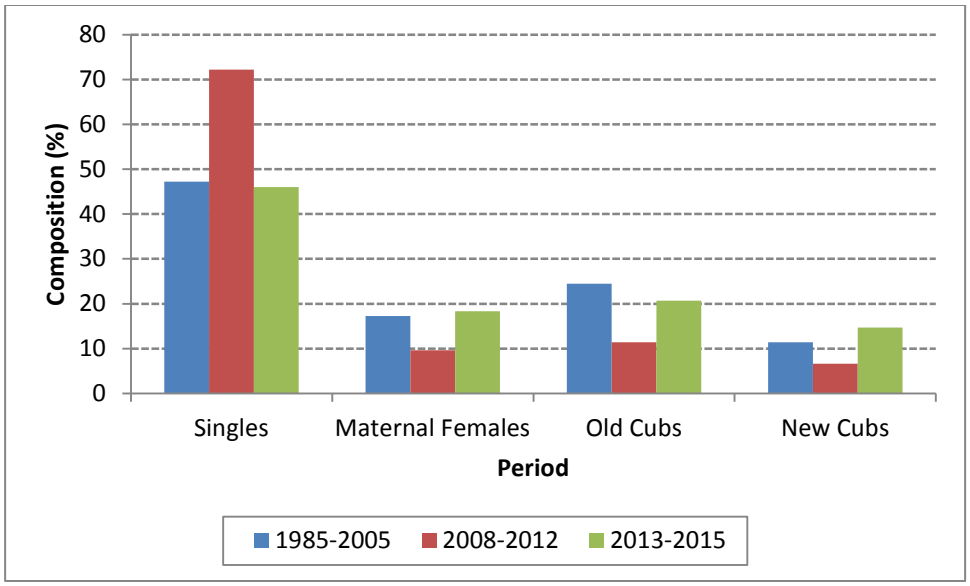

Figure 1. Percentage composition of four classes of a brown bear population observed along selected streams of southwestern Kodiak Island over three time periods.

Bear Mortality

Analysis of ADF&G records indicated mortality of 106 bears within the Refuge boundary during 1 July 2014 through 30 June 2015. Of this total, 102 were recreational hunter-harvested and four will killed in defense of life and property. Total documented bear mortality in the archipelago was 190, lower than average mortality of 217 bears recorded during 2006-2010. About three-quarters of the hunter harvest has been composed of adult males in the archipelago and within the Refuge boundary.

Bear-Salmon Research

In 2015, the Refuge concluded fieldwork on a three-year cooperative study of brown bear-sockeye salmon foraging ecology in southwestern Kodiak Island. This cooperative project with the University of Montana-Flathead Lake Biological Station, University of Wyoming, and the U.S. Geological Survey (USGS) investigates how fluctuations in sockeye salmon abundance and timing in spawning streams influences brown bear movements, distribution, and exploitation. The study involved multi-year monitoring of abundance and timing of migration on selected spawning streams and stream-specific and regional monitoring of bear movements (Figure 2).

Fieldwork began in mid-May. Radio-collared bears were monitored from June through early November. Salmon abundance and bear density was monitored at nine streams using time-lapse camera monitoring systems. Nine remote time-lapse camera monitoring systems were used to monitor salmon runs on nine streams. Total escapement in the nine streams was 448,082. We deployed 39 remote time-lapse camera systems to monitor bear use of these streams. Bears began to show up in earnest on streams in early July. By the third week of July many bears disappeared from the streams despite an abundance of salmon. Elderberry ripened early this year – beginning around the 19th of July. This is the same time that bears began leaving salmon streams. Our radio-telemetry data confirms that they had indeed moved

to elderberry patches where they stayed until the third week of August when most returned to the salmon streams.

An Annual Progress Report is available and a technical paper entitled *Kodiak Brown Bears Surf the Salmon Red Wave: Direct Evidence from GPS Collared Individuals* was accepted for publication in the journal Ecology. To optimize nutrition, brown bear not only require abundant salmon but also sustained availability of salmon over time. Study results described in the Ecology paper show how radio-collared bears maximized their use of sockeye salmon by visiting a variety of streams that differed in the chronology of salmon spawning. The greater number of sites visited; the longer bears utilized salmon. The PhD student affiliated with the project and University of Montana is scheduled to conclude his dissertation in May.

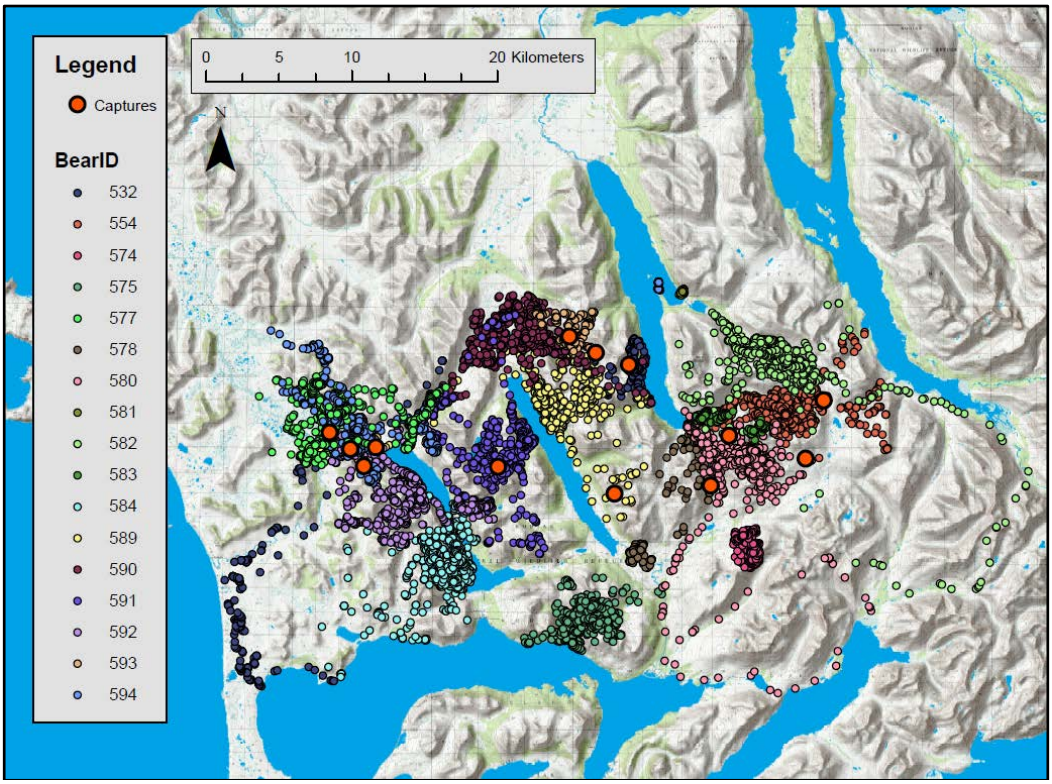

Figure 2. Movements of radio-collared brown bear during summer 2015, southwestern Kodiak Island.

Bear-Berry Research

In 2015 the Refuge, in partnership with the ADF&G and Kodiak Brown Bear Trust, initiated a two-year pilot study. The primary goal is to develop, test, and select repeatable standard methods for monitoring year-to-year variation in relative abundance and phenology of selected berry-producing species important to brown bear. Fieldwork in 2015 involved plot- and camera-based sampling of red elderberry, salmonberry, blueberry, and devils-club (Figure 3). Good progress was made in development and testing of potential sampling approaches at four study sites, ranging from Red Lake to the roaded area near Kodiak, Kodiak Island. Results indicated that berry abundance was relatively high in 2015 notwithstanding the absence of a comparative baseline. For example, elderberry averaged 45 fruit clusters/plant among three study sites and the

percentage of fruit in fruit clusters ranged from 73% at Uganik Lake to 86% at Karluk Lake. Density of salmonberry fruit averaged 36–39/m^2 among three study sites, while relative size of salmonberry fruit averaged 77–79% between two study sites in southwestern Kodiak Island, but smaller (44–52%) in two plots of the road system area. Perhaps the reduced salmonberry size was due to incomplete pollination associated with prolonged cool and wet weather during the flowering period. Results of camera-based phenology monitoring indicated an apparent tendency of early initial fruit ripening of salmonberry (early July) and elderberry (mid- July), possibly associated with prolonged and consistent above-average air temperatures between winter and summer.

Figure 3. A fieldworker samples abundance of salmonberry on a study plot.

Sitka Black-tailed Deer

In May 2014, Refuge biologists expanded upon a new approach to aerially survey Sitka black- Due to reduced staff capacity no survey will be conducted during 2015. Anecdotal observations suggest that populations have continued to increase throughout the archipelago in response to consecutive mild winters.

Roosevelt Elk

Radio-collared elk provide a basis for ADF&G's efforts to track herd locations and estimate herd composition and population size for harvest management. Results from the ADF&G's fall 2015 elk survey indicated a population size of 972 elk, which is near the population

objective of 1,000 animals. A total of 80 elk were harvested under state regulations during the 2015 season. The Waterfall herd, which summers in the vicinity of Refuge lands on Afognak Island, increased from 80 to 100 elk between 2014 and 2015. Three elk were harvested in 2015 from the Waterfall herd, including two harvested under federal subsistence regulations.

Mountain Goat

Biologists with the ADF&G and Refuge cooperatively survey the mountain goat population of Kodiak Island in August. Results of the survey have facilitated harvest management by providing information on trend in herd composition (e.g., kids/100 adults) and herd sizes by hunt area. Though the majority of hunters probably hunt goat primarily for recreation purposes, a number of Kodiak Island residents hunt goat for subsistence purposes, particularly goat habitat occurs near several village communities, and where the harvest is managed as a registration permit hunt (hunt area 480, largely Refuge lands).

In 2015, we conducted aerial surveys of approximately 40% of known goat summer range on Kodiak Island. A total, of 777 adults and 236 kids, was counted. The ADF&G issued 294 drawing permits and 1,496 registration permits. A total 105 goats was harvested during the drawing hunts and 208 goats were harvested during the registration hunt. It is expected that an additional 15-25 goats may be harvested in registration hunt 480 between now and mid-March when the season closes. Hunter harvest of goats in 480 increased after state regulations extended the hunting season 95 days and increased the bag limit from one to two goats.

Reindeer

Distribution of reindeer is restricted to southwestern Kodiak Island where suitable habitat occurs. Over the past 20 years, herd size has fluctuated between 300 and 335 animals. In late May 2015, the ADF&G counted a total 375 reindeer consisting of 291 adults and 84 calves. Preliminary results indicated that 33 reindeer were harvested in 2015, which is the highest recorded, and is about twice the level of recent annual harvests following prohibition of an allowance to hunt the same day a hunter is transported to the field (i.e., same-day airborne).

Migratory Birds

Nearshore Marine Bird Surveys

In summer 2015, the Refuge continued a survey initiated in 2011 focusing on marine nearshore birds in the intertidal zone and shallow inshore waters. We conducted surveys in June and August, when the majority of resident breeding birds had established nests and populations were relatively stable. August surveys allowed us to estimate productivity of species with distinctive juvenile plumages, including marbled murrelets and pigeon guillemots. Surveys were conducted from small skiffs using the Refuge research boat, the M/V Ursa Major II, as a mobile home base. In summer 2015, Refuge staff surveyed the northern end of Kodiak Island and Afognak and Shuyak Islands, completing 101 transects along approximately 1,243 miles of shoreline. This region was last surveyed in June and August 2012. The most commonly encountered species included: black-legged kittiwakes, glaucous-winged and mew gulls, tufted and horned puffins, common murres, marbled murrelets, pigeon guillemots, and harlequin ducks (Table 2).

This season's marine bird surveys documented a tremendous increase in the number of common murre in the region. We counted over 25 times the number of common murres in 2015 compared to 2012 (an increase from 292 murres in 2012 to 7,667 in 2015). Murres were also observed much closer to shore than is typical, in 2012 only 6% of common murres were counted within a quarter mile of shore, but that percentage increased to 57% in 2015. Additionally, we have not observed such a major change in murre distribution in surveys of other regions adjacent to Kodiak Island during 2011-2014. The inshore movement by these murres, which prefer deeper water for diving, preceded the major die-off event in the Gulf of Alaska. Analysis of population estimates based on transect densities is still ongoing and Table 2 compares preliminary transect counts from 2012 and 2015.

Table 2. Preliminary counts for select marine bird and mammal species surveyed on transects in June and August, 2012 and 2015 by Kodiak Refuge on the north end of Kodiak Island and Afognak and Shuyak Islands.

	June 2012 Counts	**June 2015 Counts**	**August 2012 Counts**	**August 2015 Counts**
Nearshore Transects				
Harlequin Duck	447	423	1,387	908
Barrow's Goldeneye	21	54	37	18
Common Merganser	13	61	123	32
Bald Eagle (Adult)	257	181	194	209
Bald Eagle (Subadult)	66	25	39	74
Black Oystercatcher	129	179	242	395
Nearshore & Offshore Transects				
Pelagic Cormorant	290	516	209	687
Red-faced Cormorant	8	3	20	6
Mew Gull	166	406	1,302	749
Glaucous-winged Gull	3,148	1,976	3,662	2,762
Black-legged Kittiwake	4,629	8,602	8,504	15,908
Arctic Tern	102	88	36	20
Aleutian Tern	2	12	0	0
Common Murre	34	2,045	258	5,622
Pigeon Guillemot	1,347	1,088	1,548	702
Kittlitz's Murrelet	1	0	12	0
Marbled Murrelet	1,513	1,529	3,362	689
Tufted Puffin	1,260	1,339	1,429	1,445
Horned Puffin	330	374	681	535
Marine Mammals				
Sea Otter	1,163	1,111	1,570	1,172
Harbor Seal	340	203	266	180

Seabird Die-off Event 2015-2016

We have had very high numbers of common murres in the Kodiak Archipelago since early spring, averaging 20-60 times higher than normal. They are deep diving seabirds usually found in the 150-300 foot depth zone, and it is very unusual to see them in shallow water close to shore and at the heads of bays. In early April 2015 we started receiving reports of dead common

murres on beaches. In August the number of dead murres washing up on beaches all over Kodiak increased dramatically. Refuge biologists have been monitoring murre numbers and the die-off and we shipped over 40 carcasses to the National Wildlife Health Center in Madison, WI for evaluation. Results indicated that the birds were emaciated; starvation was the probable cause of death. Investigations are ongoing but the birds have been tested for Avian Influenza and West Nile Virus, examined for parasites, and routine bacterial and fungal cultures have been conducted and the findings have been negative or unremarkable. Samples will be sent to outside labs to screen for toxins related to harmful algal blooms.

Common murres are estimated to number 13-20 million globally. Previous large-scale die-off events of this species have occurred in the Gulf of Alaska with death attributed to severe storms or warming sea surface temperatures in association with extreme El Nino events impacting the distribution and/or species composition of forage fish. An unusual aspect of the current die-off is its large-scale. Beginning this past spring dead birds have been seen on beaches throughout the Gulf of Alaska with reports from the Kenai and Alaska Peninsulas and into the eastern Aleutian Islands. Citizen Science beach combing programs operated along the Washington-Oregon-California coasts also reported significantly higher than normal numbers of dead common murres. This may be the first time a simultaneous die-off event has been recorded in Alaska and along the Pacific coast in the lower 48 continuous states. For more information on the murre die-off see the Coastal Observation and Seabird Survey Team (COASST) blog: http://blogs.uw.edu/coasst/

In addition, the Service's Alaska Migratory Bird Management Office has produced a very useful one-page fact sheet on the Alaska Seabird Die-off that can be viewed at:

http://www.fws.gov/uploadedFiles/Region_7/NWRS/Zone_1/Alaska_Maritime/PDF/Seabird%20Dieoff%20Fact%20Sheet%20010716.pdf

Sea Duck Banding

In 2006, Refuge biologists discovered a group of over 100 female Barrow's goldeneye molting in Blue Fox Bay, an area adjacent to Kodiak Refuge on Afognak Island. Although Barrow's goldeneyes are considered a common breeding bird in the Kodiak area, generally they molt at other locations, particularly on large freshwater lake complexes in the interior boreal forest of Alaska. Blue Fox Bay, where the group of females have been banded in three previous years (2006; 2010; 2012), may be one of the few locations where this species molts in the marine environment. In August 2015, we captured and banded 32 female Barrow's goldeneye in Blue Fox Bay and recaptured another 11 goldeneye previously banded at this location. Recaptures included a female banded in August of 2006 that is at least10 years-old based on her age when first captured.

Fisheries

Outcome of Karluk Lake Nutrient Enrichment Proposal

On January 22, the Refuge released its Environmental Assessment and announced its final decision regarding a special use permit request by the Kodiak Regional Aquaculture Association (KRAA) to conduct nutrient enrichment to restore productivity in the Karluk Lake watershed.

The Service evaluated KRAA's proposal and after examining the long term record, found that the Karluk sockeye runs are within their historical range of abundance and not "severely adversely affected", therefore the need for a fishery restoration project on Kodiak NWR was not demonstrated. The Service then selected the Current Management (No Action) Alternative as the best way to conserve the abundance of natural salmonid populations and their habitat for continued human and wildlife use over the long term. Copies of the Environmental Assessment and Finding of No Significant Impact (FONSI) can be found on the Kodiak Refuge website: www.fws.gov/refuge/Kodiak.

Refuge Sockeye Population Monitoring Project

In 2015 we initiated a project to monitor escapement of sockeye salmon returning to Akalura Lake. Field methods involved subsampling salmon passage at the monitoring site with a time-lapse camera programmed to record a burst of three images per minute between late June and mid-October. Additionally, passage was continuously monitored with a video camera between 9:00 AM and 6:00 PM after 21 July. Video data are used to calibrate the subsample of passage data collected from the time-lapse camera. In the office, photos and video were reviewed and fish were enumerated. We recorded a total of 2,206 sockeye salmon in the subsample of images from time-lapse camera, not included a 10-day gap of missing data between 27 July and 6August. Initial review of video data revealed passage of 3,127 sockeye salmon. After review of video data concludes, we will estimate (minimum) escapement for the late July to mid-October period.

Networked Monitoring of Salmon Habitat Temperatures

Supported by a grant from the Western Alaska Landscape Conservation Cooperative (LCC), The Refuge coordinated implementation of a collaboratively-developed strategic plan for automated, hourly monitoring of temperature of important salmon streams and lakes. The purpose of the network is to coordinate temperature monitoring in accordance with identified data collection standards and to make these data publically accessible. Presently, network partners include the Refuge, USFWS/Office of Subsistence Management, U.S. Geological Survey, Alutiiq Tribe of Old Harbor, Larsen Bay Tribal Council, Sun'aq Tribe of Kodiak, ADF&G, and KRAA. Fieldwork by network partners in 2015 focused on establishment of monitoring sites, which collectively now comprise 27 streams and 25 lakes.

Education, Outreach, and Other Noteworthy Activity

Proposed Changes to Regulations on Alaska National Wildlife Refuge Lands

On 8 January, the U.S. Fish and Wildlife Service published a proposed rule to clarify that predator control is not allowed on national wildlife refuges in Alaska, unless necessary to meet refuge purposes, federal laws or Service policy, and is consistent with the agency's conservation mission. The rule was developed in response to public interest and concern about predator control and recent liberalization of predator harvest within the State of Alaska. The proposed rule would also prohibit certain methods and means for non-subsistence harvest of predators, as well as update procedures for closing an area or restricting an activity on refuges in Alaska. These proposed changes would not apply to harvest of fish or wildlife under federal subsistence regulations. A 60-day public comment period on proposed regulations ends on 8 March, 2016. For details on the proposed regulation changes see:

http://www.fws.gov/alaska/nwr/ak_nwr_pr.htm

Alaska Migratory Bird Calendar Contest

Tonya Lee is currently working with teachers and students of village communities on the 2017 Migratory Bird calendar contest for the theme "Working Together to Save Migratory Birds". The purpose of the contest is to encourage local children to learn about bird conservation. Student entries will be submitted in mid-February followed by Refuge-sponsored judging of entries in Kodiak in late February. Highest ranked entries will be forwarded for final judging in Anchorage. . The 2016 calendar features several entries from Kodiak Island students.

Invasive Plant Management

Since 2003, the Refuge has consistently operated an integrated pest management (IPM) program to address the threat that highly invasive plants pose to native fish and wildlife habitat resources. In 2015 we applied IPM methods in partnership with landowners and the Kodiak Soil and Water Conservation District to control highly invasive plants in 10 areas (Akalura Cannery, Alitak Cannery, Buskin River, Camp Island vicinity, Garden Island, Harvester Island vicinity, Uganik Cannery, and Refuge, Coast Guard, and State Park properties in Kodiak). In partnership with the District, we conducted surveys and outreach during July at remote residences in Kiliuda and Ugak Bays. The Canada thistle investigation at Garden Island in Uganik Bay apparently was eradicated following five control missions. For more on the Refuge's IPM strategy see:
http://www.fws.gov/refuge/Kodiak/what_we_do/resource_management.html.