

DOWNLOAD PDF EVALUATION OF ALASKA HARBOR SEAL (PHOCA VITULINA) POPULATION SURVEYS

Chapter 1 : Wildlife Publications, Alaska Department of Fish and Game

A key factor governing the robustness and power of harbor seal population surveys is intersite variability in trend. This factor is well understood for sites within the Prince William Sound and Kodiak trend routes for which at least 10 consecutive annual surveys have been conducted, but additional annual counts are needed for other areas.

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Koyukuk River moose management plan Unit 24 and the northern portion of Unit 21D. Unit 24 and the northern portion of Unit 21D Kuiu Island black bear pilot study: Population estimation and sexual segregation Peacock, E. Kuiu Island black bear pilot study: Population estimation and sexual segregation.

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Chapter 2 : Harbor Seal Species Profile, Alaska Department of Fish and Game

Evaluation of the Alaska harbor seal (Phoca vitulina) population survey: A simulation study Article in Marine Mammal Science 19(4) - October with 23 Reads DOI: /j

Photo courtesy of the U. Fish and Wildlife Service. Background Harbor seals *Phoca vitulina* are found throughout temperate and arctic waters of the northern hemisphere, and inhabit coastal and estuarine waters along the eastern Pacific Ocean from Baja California north to the Gulf of Alaska and Bering Sea Carretta et al. They use hundreds of locations in Puget Sound to haul out or rest, including intertidal rocks, reefs, and beaches, logbooms, docks and floats. Harbor seals in Washington are considered non-migratory and display strong fidelity to haulout sites. Their local movements are associated with tidal cycles, time of day, weather, and prey availability Zamon , Carretta et al. Most individuals in the inland waters forage in close proximity to haulout sites, and return to the same areas for foraging and haulout Lance and Jeffries In general, harbor seals forage opportunistically on prey that are locally and seasonally abundant Lance and Jeffries , Map of harbor seal haulout sites and survey regions for Washington. Threats to harbor seals include incidental takes from drift gillnet fisheries, vessel strikes, and contaminants. Harbor seals are vulnerable to contamination by persistent organic pollutants POPs because they are long-lived, occupy a high trophic level, and have limited metabolic capacity to eliminate pollutants Ross et al. Exposure to contaminants has also been associated with immunotoxicity and outbreaks of infectious disease Mos et al. Status Harbor seal numbers were severely reduced during the first half of the twentieth century by a state-financed population control program. Based on morphological, phenological and genetic differences, the coastal and inland populations of Washing are considered to be two different stocks Carretta et al. Population count data collected using aerial surveys of haulouts conducted by WDFW in indicate both stocks to be within their Optimum Sustainable Population OSP ranges as defined by Jeffries et al. Trends It is estimated that 2., harbor seals resided in Washington in the early s Newby , and historic population levels prior to this are unknown. Beginning in , WDFW initiated consistent aerial surveys of harbor seal inland waters population, which continued through Thus, at the population levels of , Jeffries et al. The population count continues to be the most recent estimate of Washington harbor seal abundances Carretta et al. Uncertainties Harbor seal abundance estimates are based on aerial surveys of maximum haul-out counts, which can be complicated by spatial and temporal variability in the behavior of the seals and in the proportion of individuals that are observable i. To address uncertainty in the proportion onshore, current estimates of trends and population abundances Jeffries et al. To address variability in seal behavior, Hayward et al. The impacts of contaminant exposure on population status are not well known. Summary Harbor seals populations in Washington State have recovered since the s and population sizes may be near a stable equilibrium level, perhaps reflective of the current carrying capacity of the environment. Because of their high trophic position, harbor seal contaminant loads may be used as indicators of pollution levels in Puget Sound Ross et al. Literature Cited Carretta, J. United States marine mammal stock assessments: Pacific Marine Mammal Stock Assessments: A food basket approach. Environmental Toxicology and Chemistry Predicting numbers of hauled-out harbour seals: Journal of Applied Ecology Are seals a potential tool for monitoring change in marine systems? Page in N. Correcting aerial survey counts of harbor seals *Phoca vitulina richardsi* in Washington and Oregon. Marine Mammal Science Trends and status of harbor seals in Washington state: Journal of Wildlife Management Estimating importance of rockfish, lingcod and other bottomfish in the diet of harbor seals in the San Juan Islands. Temporal and spatial variability of harbor seal diet in the San Juan Island archipelago. De Guise, and P. Chemical and biological pollution contribute to the immunological profiles of free-ranging harbor seals. Changes in Washington State harbor seal population, Tidal influence on the haul-out behavior of harbor seals *Phoca vitulina* at a site available at all tide levels. Harbor seals *Phoca vitulina* in British Columbia, Canada, and Washington State, USA, reveal a combination of local and global polychlorinated biphenyl, dioxin, and

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Chapter 3 : Comprehensive Report Species - Phoca vitulina

Exxon Valdez Oil Spill Restoration Project Final Report Evaluation of Alaska Harbor Seal (Phoca vitulina) population surveys: A simulation study Restoration Project

Zoological data developed by NatureServe and its network of natural heritage programs see Local Programs and other contributors and cooperators see Sources. Revised checklist of North American mammals north of Mexico, The mammals of Canada. University of Toronto Press, Toronto, Canada. University of Toronto Press, Toronto. Pages in Ridgway, S. Handbook of marine mammals. Van den Bussche and B. Mitochondrial and microsatellite DNA analyses of harbour seal population structure in the northeast Pacific Ocean. Canadian Journal of Zoology Canadian Species at Risk: The mammals of Long Island, New York. Marine Mammal Science Wild mammals of New England. Johns Hopkins University Press, Baltimore. The fish and wildlife resources of the Middle Atlantic Bight. The Mammals of North America, second edition. List of mammals of Nova Scotia including synonyms used in the literature relating to Nova Scotia revision 2 24 July A Field guide to the whales, porpoises, and seals of the gulf of Maine and eastern Canada. Cape Cod to Newfoundland. Phylogenetic analysis of northern hair seals based on nucleotide sequences of the mitochondrial cytochrome b gene. Journal of Mammalogy Pacific Marine Mammal Stock Assessments, Checklist of the amphibians, reptiles, birds, and mammals of New York State, including their protective status. Ecosystems Branch, 25 Eddy St. A phylogenetic perspective on the evolution of reproductive behavior in pagophilic seals of the Northwest Atlantic as indicated by mitochondrial DNA sequences. Marine mammals of the world: Handbook of Marine Mammals. Seals, Sea Lions and Walruses. University of California Press, Berkeley, California. Species composition and distribution of marine mammals and sea turtles in the New York Bight. Final report to U. Okeanos Ocean Research Foundation Inc. Pages in Small, R. Harbor Seal investigations in Alaska, Annual Report: Macrogeographic structure and patterns of genetic diversity in harbor seals Phoca vitulina from Alaska to Japan. Mammal species of the world: The Smithsonian book of North American mammals. Smithsonian Institution Press, Washington, D. All species and ecological community data presented in NatureServe Explorer at <http://www.natureserve.com>: This report was printed on Trademark Notice: Any other product or company names mentioned herein are the trademarks of their respective owners. Each document delivered from this server or web site may contain other proprietary notices and copyright information relating to that document. The following citation should be used in any published materials which reference the web site. An online encyclopedia of life [web application].

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Chapter 4 : Phoca vitulina | Encyclopedia of Puget Sound

Harbor Seal (Phoca vitulina) population surveys: A simulation study, Exxon Valdez Oil Spill Restoration Project Final Report (Restoration Project), Alaska Department of Fish & Game, Division of Wildlife Conservation, Juneau, Alaska.

Movements of male California sea lions captured in the Columbia River. *NW Science*, 84 1: Abundance and distribution of the eastern North Pacific Steller sea lion *Eumetopias jubatus* population. Assessment of harbor seal predation on adult salmonids in a Pacific northwest estuary. *Ecological Applications*, 17 2: Aging fish otoliths recovered from Pacific harbor seal *Phoca vitulina* fecal samples. Better seal and sea lion surveys through GIS. Pacific Harbor Seal *Phoca vitulina* and Salmon: Riemer , and J. Trends in abundance and current status of harbor seals in Oregon: *Marine Mammal Science* 21 4: Cetacean strandings in Oregon and Washington between and *Journal of Cetacean Research and Management* 6 1: Examination of the foraging habits of Pacific harbor seal *Phoca vitulina richardsi* to describe their use of the Umpqua River, Oregon, and their predation on salmonids. Correcting aerial survey counts to estimate the abundance of harbor seals *Phoca vitulina richardsi* in Washington and Oregon. *Marine Mammal Science*, 17 2: Isolation of reptilian calicivirus *Crotalus* type 1 from feral pinnipeds. *Journal of Wildlife Diseases*, 34 3: The northern elephant seal in Oregon: *Marine Mammal Science*, 14 4: Genetic substructure of the Pacific harbor seal *Phoca vitulina richardsi* off Washington, Oregon, and California. *Marine Mammal Science*, 12 3: A comparison of Steller sea lion, *Eumetopias jubatus*, pup masses between rookeries with increasing and decreasing populations. Research and management in the Northern California Current Ecosystem. Stress, Mitigation, and Sustainability. Techniques for capturing, handling and marking harbour seals. An outbreak of probable leptospirosis in California sea lions along the Oregon coast during Fall Abundance and distribution of harbor seals *Phoca vitulina* in Oregon, Antibodies to marine caliciviruses in the Steller sea lion *Eumetopias jubatus*. *Journal of Wildlife Diseases*, 23 1: First isolation of a calicivirus from the Steller sea lion *Eumetopias jubatus*. *Journal of Wildlife Diseases*, 23 4: Two sightings following release of rehabilitated harbor seals. *The Murrelet* 64 1: Pinniped predation on adult salmonids in the Alsea Estuary, Oregon, Monitoring pinniped predation on salmonids at the Alsea River, Oregon. Pinniped food habits and prey identification techniques protocol. Pinniped predation on salmonids: Monitoring human-wildlife interactions and disturbance of seabirds and pinnipeds at Three Arch Rocks National Wildlife Refuge, Prey of pinnipeds at selected sites in Oregon identified by scat fecal analysis, Assessment of the status of harbor porpoise *Phocoena phocoena* in Oregon and Washington waters. Food of pinnipeds collected during the Columbia River area salmon gillnet observation program, Preliminary report on estimated marine mammal mortality in Columbia River fall and winter salmon gillnet fisheries, Abundance of harbor seals *Phoca vitulina richardsi* in Washington and Oregon, Steller sea lion counts in Oregon during June and July, Assessment of pinniped populations in Oregon: April to April An acoustic harassment technique to reduce seal predation on salmon. Abundance of Pacific harbor seals *Phoca vitulina richardsi* in Oregon: Assessing the performance of a cost-effective video lander for estimating relative abundance and diversity of nearshore fish assemblages. Information Report number pdf:

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Chapter 5 : Harbor Seals | Encyclopedia of Puget Sound

evaluation of the distinctness of harbor seals (Phoca vitulina) in Iliamna Lake. Report from the NOAA Alaska Fisheries Science Center to the NOAA Fisheries Alaska Region Office.

They are covered with short, stiff, bristle-like hair. Coloration varies, but two basic patterns occur: They can be distinguished from other pinnipeds, such as fur seals and sea lions, by the absence of external ear flaps; only a small hole the external pinnae, or opening to the ear canal is visible on either side of their head. When on land, harbor seals move awkwardly by undulating in a caterpillar-like motion because their pelvic bones are fused, preventing them from moving their hind flippers under their pelvis to walk. In the water they are graceful and efficient swimmers, using their fore flippers as rudders and their hind flippers for propulsion by clasping both hind flippers together, splaying webbed toes and moving the large hind flippers side to side. Harbor seals weigh about 24 pounds 11 kg at birth and gain weight rapidly during a month-long suckling period; perhaps doubling their weight. They can reach five to six feet 1. Average weight for adults is about pounds 82 kg ; males are somewhat larger than females and can weigh up to pounds kg. Life History Diving Harbor seals are well adapted to life in the sea. They are able to dive to depths up to feet m and can remain submerged for over 20 minutes, although most dives are less than 65ft 20m and less than 4 minutes long. Oxygen-conserving adaptations that allow such dives include high blood volume, reduced peripheral circulation, reduced heart rate, and high levels of myoglobin oxygen-binding protein in muscle. Harbor seals haul out of the water periodically to rest, give birth, and nurse their pups. In spring and summer they spend more time hauled out during pupping and molt season. Harbor seals molt annually, usually in summer; timing of molt depends upon sex and age class. Young pups are able to swim almost immediately after birth. They normally remain with their mothers about one month, after which they are weaned and separate from their mother. At that time over half their body weight may consist of fat, providing them a head start on self-sufficiency. Sexual maturity occurs at between 3 and 7 years. Mature females mate shortly after weaning their pups. Development of the embryo is suspended for about 11 weeks; a trait called embryonic diapause i. Births of harbor seal pups are not restricted to a few major rookeries as is the case for many species of pinnipeds but occur at many haul-out sites. The sex ratio of harbor seals at birth is approximately equal and remains so until about 5 years of age. Thereafter mortality rates for males are higher, and females become relatively more abundant. Maximum ages estimated from annual rings in their teeth are 26 years for a male and 35 years for a female. Food Harbor seals are opportunistic feeders and likely take advantage of seasonally available prey resources. In Alaska, commonly eaten prey include walleye pollock, Pacific cod, capelin, eulachon, Pacific herring, sandlance, Pacific salmon, sculpin, flatfish e. Movement Harbor seals show variable movement patterns depending on their sex and age class, with some exhibiting considerable localized travel, but no seasonal patterns, while others show more extended movements, particularly during the winter. Behavior Harbor seals are usually solitary in water, but haul out in groups of a few to thousands. When they are in the water and not feeling threatened, they are inquisitive but elusive, often surfacing close behind boats. Because they move awkwardly on land, when they are hauled out they are quick to enter the water if they feel threatened, even when aquatic predators are present. Range and Habitat The harbor seal, is a widespread species in both the north Atlantic and Pacific oceans, and is found in Alaska along the coast extending from Dixon Entrance north to Kuskokwim Bay and west throughout the Aleutian Islands. Reefs, sand and gravel beaches, sand and mud bars, and glacial, pan ice, and sea ice are commonly used for haul-out sites. Harbor seals are sometimes found in rivers and lakes, usually on a seasonal basis present in summer, absent in winter. At Iliamna Lake, seals are present year-round and are probably resident. Seasonal use of glacial fjords, where many females aggregate to give birth on icebergs in the spring and summer, is common. Satellite tagging studies have shown that pups born at glacial sites may range up to miles km from their birth site, although most movements are less than 62 miles km away. Juvenile seals can make more extensive movements of up to

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miles km away from their tagging location; however, most remain within km. Adult seals typically make shorter movements and on average are found within 37 miles 60km of their tagging site. As more seals are being satellite-tagged, much more information is becoming available about winter and summer movements.

Status, Trends, and Threats The total Alaska harbor seal population is estimated at approximately , in non-glacial sites and approximately 15, in glacial fjords. Harbor seals are difficult to census because they can only be accurately counted when they are hauled out. They haul out at different times of the day at thousands of locations in Alaska; both at terrestrial sites and on glacial ice calved from tidewater glaciers. During any survey, some seals are in the water and not available to be counted while others are hauled out, but the proportion of the total population hauled out at any given time is unknown and must be estimated. One way to arrive at this estimate is to radio tag seals in the area, prior to conducting a survey. When the survey is conducted, the proportion of radio-tagged seals that are not hauled out provides a correction factor to estimate the total seal population e. Harbor seals are listed as an Alaska Species of Special Concern. A Species of Special Concern is any species or subspecies of fish or wildlife or population of mammal or bird native to Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. Dramatic declines in harbor seal numbers have been documented in Alaska, including a decline from approximately 11, seals to 1, seals during on Tugidak Island near Kodiak – a site previously considered to host one of the largest concentrations of harbor seals in the world. That decline resulted in the listing of Alaskan harbor seals as a species of special concern by the Marine Mammal Commission. Although seal numbers in the Kodiak area have been steadily increasing since the early s and seal numbers in PWS began to stabilize and show signs of increase in , both populations remain severely depressed compared to pre-decline population levels. Seals in Glacier Bay continue to decline at a precipitous rate despite conservation measures in place to control vessel traffic, commercial fishing, and subsistence harvest. The declines and lack of substantial recovery of some harbor seal populations in Alaska contrasts sharply with other parts of the world, where the species has proven to be resilient and capable of fairly rapid recovery from perturbations. There is no evidence that movements of seals between areas can explain these declines; the cause is unknown, but multiple factors are likely involved. Harbor seals appear to have responded severely to changes in carrying capacity and therefore may be particularly sensitive indicators of future change, such as ocean warming.

Predators The most common predator of harbor seals is the killer whale. Other predators include sharks, sea lions, land predators such as wolves, bears and coyotes, and bald eagles may take newborn pups. Harbor seals play a crucial role in the culture and diet of Alaska Natives; the annual subsistence harvest of harbor seals in Alaska is about 1, to 2, animals, with fewer seals harvested in recent years. This behavior creates economic losses for fishers and often fosters an antagonistic attitude toward seals. The Copper River Delta, the mouths of the Stikine and Taku rivers, and portions of Bristol Bay are areas with notable harbor seal-fishery conflicts. Sometimes seals are caught and killed or injured in fishing gear, primarily in gillnets and occasionally in crab pots. They are also found in the north Atlantic and Pacific oceans.

Chapter 6 : ODFW Marine Resources Publications

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