

## CURRICULUM SUPPLEMENT

**WHEN LIFE GIVES YOU LEMMINGS...****A POPULATION DYNAMICS ACTIVE ACTIVITY**For use with the **Background** section of *Eyes on Eiders*

**Overview:** Students will increase their understanding of the dynamics of population change on the tundra over time, according to predator/prey density through participation in a role-playing game and by graphing collected data.

**Learning Objectives:**

The student will:

- Explain how wild **Steller's Eider** reproductive success can be greatly impacted by the **breeding success of Lemmings** living in the surrounding tundra.
- Graph the data collected from each round of the activity and explain what the results mean for the **reproductive success of Steller's Eiders** in the wild.

**Standards Addressed:****Alaska Science GLES :**<https://education.alaska.gov/akstandards/standards/standards.pdf>5<sup>th</sup>: SA1.1, SA1.2, SA3.16<sup>th</sup>: SA1.1, SA1.2, SA3.17<sup>th</sup>: SA1.1, SA1.2, SA3.18<sup>th</sup>: SA1.1, SA1.2, SA3.1**Next Generation Science Standards:**<http://www.nextgenscience.org/search-standards-dci>

5. Matter and Energy in organisms and Ecosystems

5-PS3-1, Core Ideas: LS1.C, LS2.A

MS Interdependent Relationships in Ecosystems

MS-L-S2-2, Core Ideas: LS2.A, LS2.C

**Materials/Location Needed:**

- This activity works best in an area where students have room to move around actively – a school yard, multi-purpose room, or gymnasium for example. Cones, flags or similar markers to indicate a start line, end line and boundaries.
- Species identification photos, starting on page 5 of this lesson. Printed in multiple combinations for each species (e.g., for a class of 25 – 1 Arctic Fox, 10 Lemmings, 2 Snowy Owls, 3 Jeagers, 6 Steller's Eiders – be sure to have enough in reserve so you can vary the ratios by round), cut-out, hole punched, with lanyards attached. See directions on each species sheet.
- Species Life History sheets, found starting on page 13 of this lesson. Printed or e-copy available for students to reference when learning about the individual species.
- Pencils, journals or paper to record results from each round of the game
- Student worksheet, found on page 23 of this lesson.

**Teaching Time:** 60 minutes**Preparation Time:** 30 minutes

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### Background:

**Population Dynamics** or breeding success depends upon many factors: favorable weather conditions, available forage, safe breeding and brooding habitat, and of course the ability to find a viable mate. However, the simultaneous success or failure of other species in the same habitat, even ones who don't compete for the same resources, also plays a critical role in raising the next generation. For Steller's Eiders, the population of Lemmings from season to season plays a very important role in their breeding success. While the two species aren't necessarily competing for the same food or shelter, they are linked in the amount of attention each is paid by the environment's predatory species. In years when the Lemming population is high, researchers see increased numbers of Steller's Eider ducklings survive. Attention towards Steller's Eiders from predators like Arctic Fox, Jaegers, and Snowy Owls will decrease the more Lemmings are available as prey species. In lean Lemming years these predators are forced to look elsewhere and nesting birds, especially the eggs and hatchlings of these birds, make an easy alternative.

### Directions:

1. After completing the **Background** section of *Eyes on Eiders*, explain to your class that you'd like to play a game to help solidify their understanding of **population dynamics** or the complex relationships between predators and prey species.
2. Have your students take a closer look at each of the species involved in this dynamic by having them read and report, using the species life history sheets. For older students ask them to use at least one other source to find information on each of the species.
3. If you want, pass out the species identification photos and have students help prepare the photos for the upcoming activity. Cut out each animal from its sheet, single hole punch it, then take a length of yarn and attach as a lanyard. Note: the photos of the Steller's Eider ducklings and eggs do not need to be attached to lanyards, nor do the Lemmings as they serve as the 'currency' exchanged during the activity itself (see direction #10c below).
4. Introduce *When Life Gives You Lemmings Game*, explaining that **population dynamics** is the pattern of interrelationship of phenomena (animals, resources, weather, predators, etc.) which affects growth or change within a population. Let students know that, as part of the game, they'll all be taking on the role of one of the animals they have just learned about to learn how the number and distribution of wild animal species influences the breeding success or failure of other species in the same habitat.
5. If necessary collect the identification photos from the students for redistribution at the activity site.
6. Once at the activity sight be sure to explain the boundaries of the activity, safety rules, etc.
7. Explain to students that this activity will be conducted in multiple rounds or 'breeding seasons'. During each 'season' the ratio of Steller's Eiders to Lemmings will fluxuate (if you have already covered a unit on ratios and proportions this will be a good review) and the purpose of this activity is to see how those ratios effect the overall numbers of Steller's Eiders that survive the season.



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8. Distribute the photos and have each student assume their role as the species by wearing the lanyard around their neck. Students portraying Lemmings are given multiple photos they will use as 'currency' during the activity. In a similar fashion those acting as Steller's Eiders are given multiple photos of either, eggs (to go along with their photo of an incubating hen on the nest) or ducklings (to match the photo of a brooding hen). Likewise each predator is given one picture of their respective animal and it is placed around their neck to identify them to the other participants.
9. Place the students who are acting as Lemmings at one end of the activity area and those in the role as Steller's Eiders at the opposite. Students playing the Jeagers line up on one of the sidelines while the arctic Foxes and snowy Owls line up on the opposing sideline.
10. Explain to the students that upon your commencement of the game, the goal of the Lemmings and Steller's Eiders is to **walk** from their starting line and reach the line opposite them and the time it takes to complete this journey will constitute the "breeding season' on the tundra.
  - a. Lemmings and Steller's Eiders are just trying to get from one side to the other, while the predators are on the hunt.
  - b. As the two prey species **walk** towards their goal line the Foxes, Jeagers and Owls will try and intercept their prey by tagging either a Lemming or Steller's Eider.
  - c. Once tagged the prey species must stop and 'pay' the predator one of their 'currency photos'. For lemmings this is a photo of a Lemming for the Steller's Eiders this is a photo of their egg (if incubating) or a duckling (if brooding).
  - d. Predators who capture a photo of their prey must then walk back to their starting line before they can 'hunt' once again. Back and forth the predators go until either all prey species are caught or the breeding season ends and the prey have grown and migrated out of the area.
  - e. If a student playing a Lemming is caught by a predator and is without any cards, *they* are the prey and must accompany the predator back to the sideline.
11. Record the numbers of Steller's Eiders and Lemmings at the start and end of each 'breeding season'. This data will be used by the students to create their chart and graph once back in the classroom.
12. Play through *When Life Gives You Lemmings Game* for as many seasons as you see fit (we recommend at least 5 or 6 rounds) or as many as time will allow.
13. When the final 'breeding season' is complete collect the identifying photos from the students and ask for some immediate observations from the students. Did they see any patterns forming? What factors contributed to the success of the Steller's Eiders, or to the predators?
  - a. Explain that observations in the field can help researchers create hypotheses that they can later test against the data they have collected.
  - b. Observations are also critical to understanding the phenomenon more completely as new questions may arise that the researcher had not considered prior to the experiment, data collection or data analysis. (For more on this see the Curriculum supplement for the [Questions](#) section)
14. Back in the classroom hand out the student worksheet and have them complete it as you desire, individually, groups, as a class, etc.



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- a. Provide the students with the data set collected from the beginning and end of each 'breeding season'. Have them create a chart of the data either on the board or on computer spreadsheets (if they are familiar with that application). They will need this charted data to create their graph on the worksheet.
- b. Building a simple x/y graph the students can plot the data in a variety of ways, the easiest is to plot the breeding seasons along the x axis, and the numbers of Lemmings and Steller's Eiders separately along the y axis using either two different colors or symbols. When the correlating data points are connected they should form a wave shape.

### Optional:

This activity can be augmented to add other limiting factors in breeding success. For example you could add students who act as resources in the habitat: food (like crow berries and larvae), weather (like a violent storm with high surge waves), environmental change (like a shortened breeding season), or increased predation by allowing the predators to run instead of walk during the rounds.

### Assessment:

Students can be assessed on participation in many aspects of the activity and/or their success at completion of the worksheet.

*This activity has been adapted from "Oh Deer", a Project WILD activity. Project WILD is a national environmental education program, developed by the Western Regional Environmental Education Council. Find more on Project WILD at [projectwild.org](http://projectwild.org).*



SPECIES IDENTIFICATION PHOTO – ARCTIC FOX (*Alopex lagopus*)



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SPECIES IDENTIFICATION PHOTO – POMARINE JAEGER (*Stercorarius pomarinus*)



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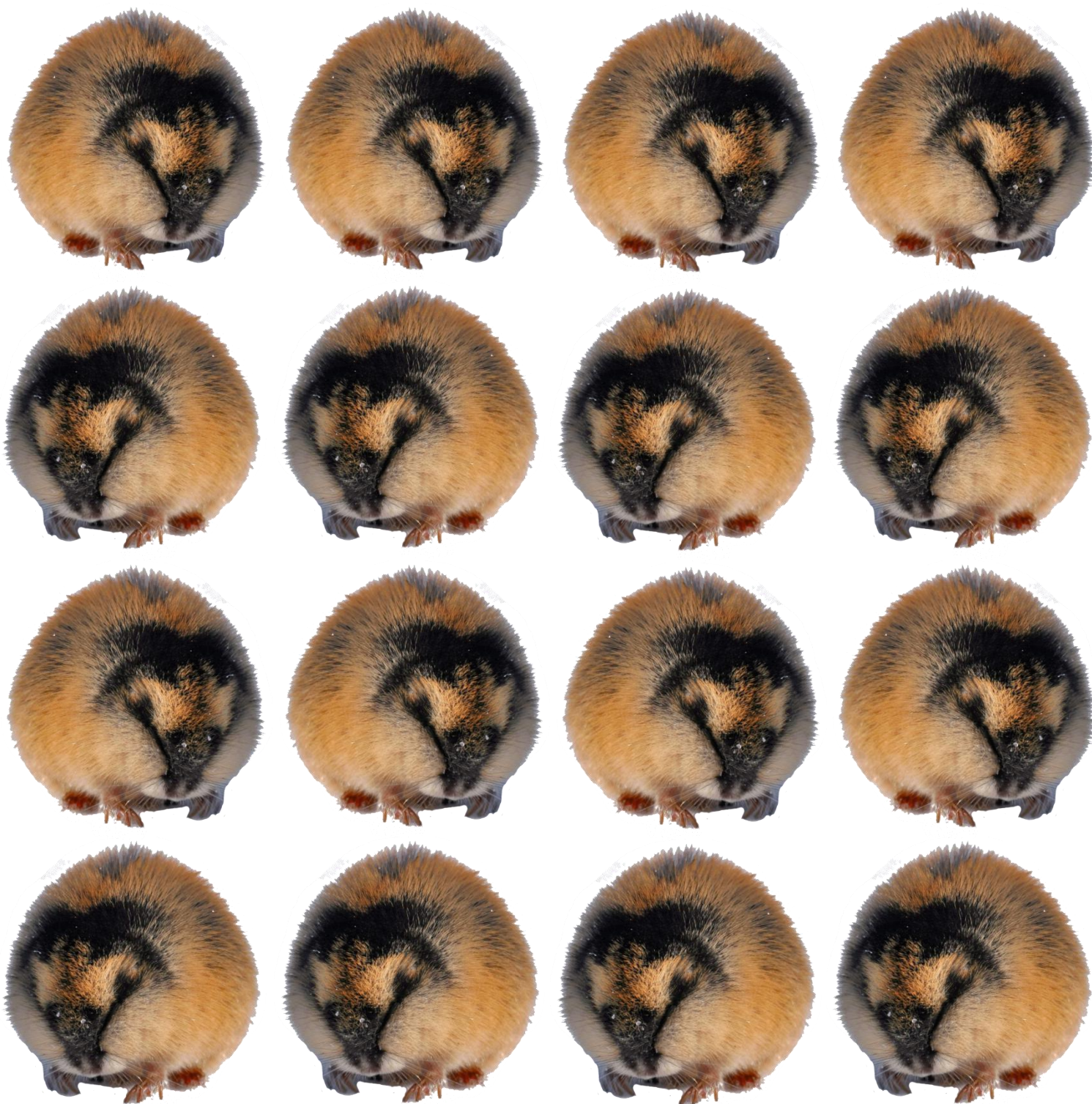
SPECIES IDENTIFICATION PHOTO – SNOWY OWL (*Bubo scandiacus*)



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SPECIES IDENTIFICATION PHOTO – BROWN LEMMING (*Lemmus trimucronatus*)

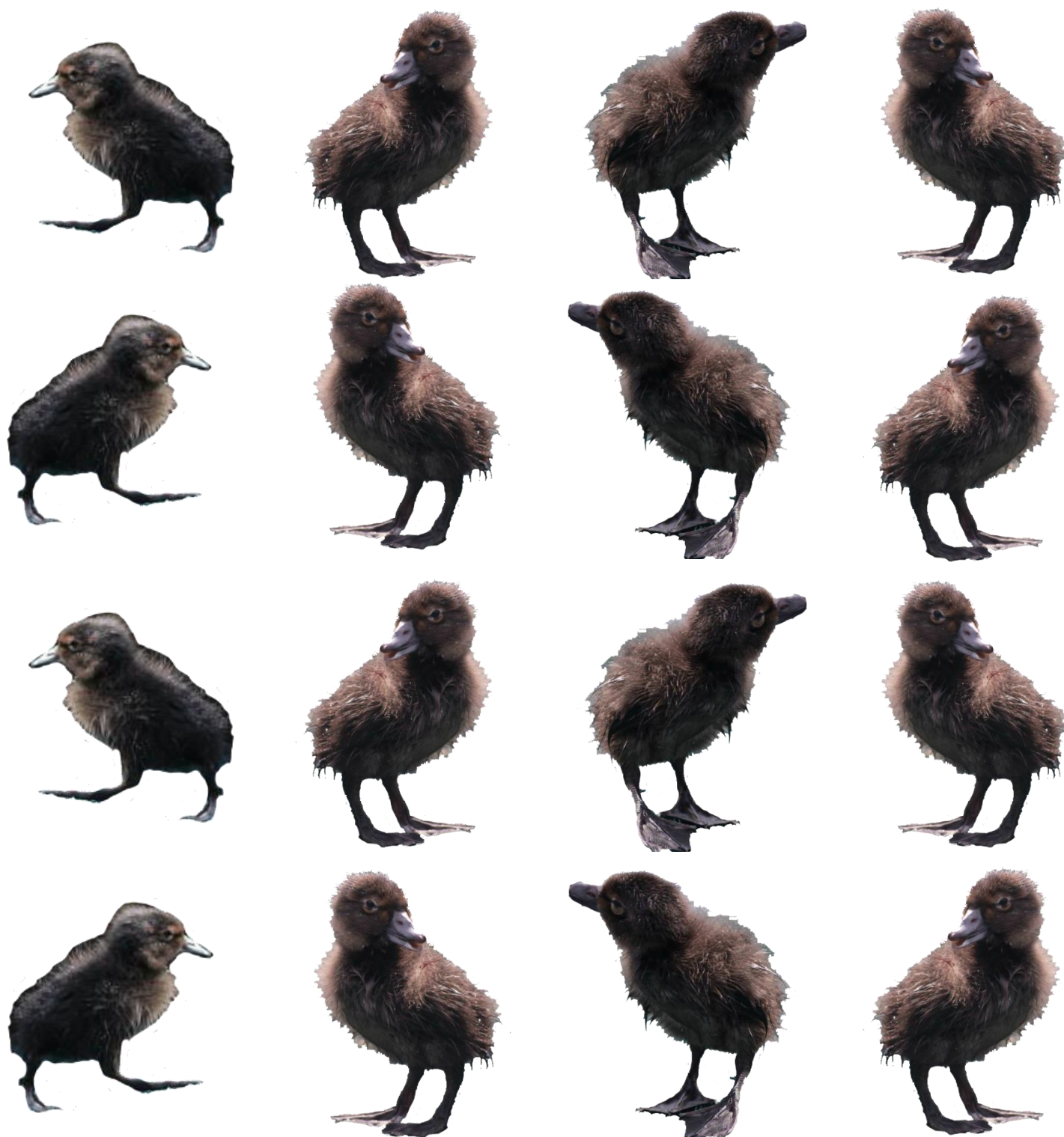


SPECIES ID PHOTO – STELLER'S EIDER – Brooding Hen (*Polysticta stelleri*)



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SPECIES ID PHOTO – STELLER'S EIDER – Ducklings (*Polysticta stelleri*)

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SPECIES ID PHOTO – STELLER'S EIDER – Incubating Hen (*Polysticta stelleri*)



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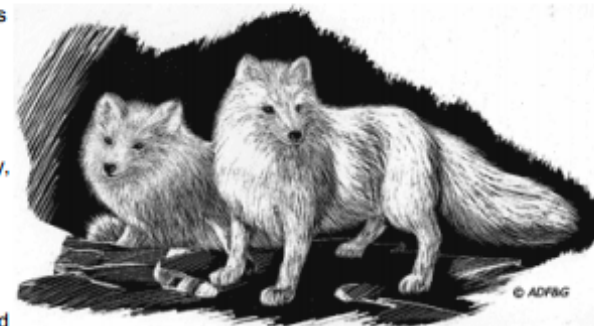
SPECIES ID PHOTO – STELLER'S EIDER – Eggs (*Polysticta stelleri*)

SPECIES LIFE HISTORY – ARCTIC FOX (*Alopex lagopus*)

## Arctic Fox

The **arctic fox** (*Alopex lagopus*) is found in treeless coastal areas of Alaska from the Aleutian Islands north to Point Barrow and east to the Canada border. Both blue and white color phases occur, with the blue phase more common on the Aleutian and Pribilof Islands. The white color phase is more common in northern populations. Young of each color phase may occur in the same litter.

**General description:** Fully grown arctic foxes weigh from 6 to 10 pounds. They average 43 inches (109 cm) in length including the tail, which is about 15 inches (38 cm) long. Their short legs and body, short ears, and dense winter fur give them a stocky appearance compared to their relative, the red fox (*Vulpes fulva*). Arctic foxes molt twice each year. The white foxes begin to shed their long winter fur in early April. By late June the face, legs, and upper parts of the body are covered with short, brown summer fur. The fur of the lower sides and abdomen is yellowish-white. The change to winter pelage occurs in September and October. By November the luxurious white winter coat is complete. Foxes of the blue phase remain dark or charcoal colored year round but are somewhat lighter colored in winter.



Newborn arctic fox pups of both color phases are covered with short velvety dark brown fur. This fur lengthens and becomes lighter, especially on the flanks, after the pups reach 2 weeks of age. The contrast between the back and belly increases as the back darkens during their first three months. Blue phase pups acquire their characteristic dark color by the time they are 2 months old.

**Life history:** Arctic fox pups are born in dens excavated by the adults in sandy, well-drained soils of low mounds and river cutbanks. Most dens have southerly exposure. They extend from 6 to 12 feet underground. Enlarged ground squirrel burrows with several entrances are often used as dens. Mating occurs in early March and early April. Gestation lasts 52 days. Litters average seven pups but may contain as many as 15 pups. Arctic foxes are monogamous in the wild. Both parents aid in bringing food to the den and in rearing the pups. Pups begin eating meat when about 1 month old and are fully weaned by 1 1/2 months. They first emerge from the den when about 3 weeks old and begin to hunt and range away from the den at about 3 months.

Family units gradually break up during September and October. During midwinter, foxes lead a mostly solitary existence except when congregating at the carcasses of marine mammals, caribou, or reindeer. Arctic foxes attain sexual maturity at 9 to 10 months, but many die in their first year.

In summer, arctic foxes feed primarily on small mammals, including lemmings and tundra voles. Foxes denning near rocky cliffs along the seacoast often depend heavily on nesting seabirds such as auklets, puffins, and murre. When food is plentiful, it is sometimes cached among boulders and in dens for later use. Arctic foxes are omnivorous, and sometimes eat berries, eggs, and scavenged remains of other animals.

Many foxes venture out onto the sea ice during winter to feed on remains of seals killed by polar bears. Arctic foxes may move long distances over sea ice. A fox tagged along the coast of Russia was captured near Wainwright, Alaska, a year later.

In areas where lemmings and voles are the most important summer prey, numbers of foxes often rise and fall with cyclic changes of their prey. Fewer pups are successfully reared to maturity when food is scarce. There is evidence indicating that competition for food among young pups accounts for some of the heavy mortality in this age group.

**Human use:** Arctic foxes are abundant in many areas. Their numbers do not seem to be greatly affected by trapping. In the past 50 years, the annual harvest of white foxes in Alaska has ranged from a high of nearly 17,000 in 1925 to a low of 500 in 1956. The average is about 4,000 pelts per year. The demand for arctic fox fur has diminished in recent years, but the sale of their pelts is important to the economy of many coastal Native villages. Arctic foxes are generally less wary of humans than their close relative, the red fox, and sometimes become nuisances around settlements when fed. Arctic foxes are susceptible to canine distemper and rabies and the latter can be transmitted to humans and dogs through bites. Foxes that approach humans without fear or show aggression may have rabies and should be killed (without damaging the head) and wildlife authorities contacted. If a person or pet is bitten, the fox carcass must be submitted to health authorities for rabies testing. Contact with saliva and brain tissue of these foxes should be avoided.



Text: Bob Stephenson  
Illustration: Katherine Hocker  
Revised and reprinted 2008





SPECIES LIFE HISTORY – POMARINE JAEGER (*Stercorarius pomarinus*)*Alaska Seabird Information Series***POMARINE JAEGER** *Stercorarius pomarinus***Conservation Status****ALASKA: Low****N. AMERICAN: Low Concern****GLOBAL: Least Concern**

Breed	Eggs	Incubation	Fledge	Nest	Feeding Behavior	Diet
June-Aug	2	23-25 d	31-32 d	ground depression	piracy, hover, swoop	lemmings, voles, fish, birds

**Life History and Distribution**

Pomarine Jaegers (*Stercorarius pomarinus*) are the largest of the three species of jaegers, but they are still capable of amazing aerial maneuvers such as backward somersaults. Adults in breeding plumage are a spectacular sight with their long, spoon-shaped central tail feathers that are twisted 90 degrees. Both adults and juveniles have light and dark morphs or variation in plumage colors, but 90% of the adults are light. The light morph has a blackish cap and dark brown upperparts, white underparts and collar, a yellow wash on the sides of neck, and a bold brown band across the breast. The dark morph is similar except the underparts, sides of the neck, and collar are entirely dark brown. Juveniles are brown with a uniform head and neck and strongly barred coverts on the tail and underwing. After the breeding season, adults lose the long tail feathers and closely resemble immature birds. Identification of the three jaeger species in their winter plumage can be difficult.

The name "pomarine" is based on the scientific name which has Greek roots meaning "lid-nosed." It refers to a pale, saddle-like sheath covering the base of the upper bill giving it a bi-colored appearance. This feature is found in all three species of jaegers.

A highly specialized reproductive ecology makes the Pomarine Jaeger especially interesting. Successful reproduction is dependent on a single species of prey, the brown lemming (*Lemmus trimucronatus*). This rodent is the most abundant resident, small vertebrate in the arctic. Populations of lemmings grow and shrink cyclically, peaking every three to five years. Pomarine Jaeger reproduction occurs successfully only during the peaks of the lemming cycle. Nesting habitat is usually near the arctic coast in low-lying wet tundra in areas with high biomass, periodic irruptions of lemmings. In years when lemmings are in low abundance, most Pomarine Jaegers leave the arctic almost immediately.

This jaeger is the only avian predator that digs for lemmings. They will dig vigorously into the burrows, using the bill to pull away vegetation. When lemmings become scarce, later in the season, groups of as many as 20 jaegers may walk over the tundra digging into lemming burrows searching for nests with females and young.

Breeding jaegers rely almost exclusively on lemmings for food, but in August, when lemmings are less available, they also eat shorebirds (mostly chicks), ducklings, and



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passerines. Nonbreeders take a greater variety of food during summer, including rodents, birds, eggs, insects, marine invertebrates, and carrion. Even though Pomarine Jaegers do not prey much on other birds, they do appear to have a major impact on their populations. During years with high densities of lemmings, breeding of shorebirds and passerines is disrupted by the presence and activity of numerous jaegers, snowy owls (*Nyctea scandiaca*), and arctic foxes (*Alopex lagopus*).

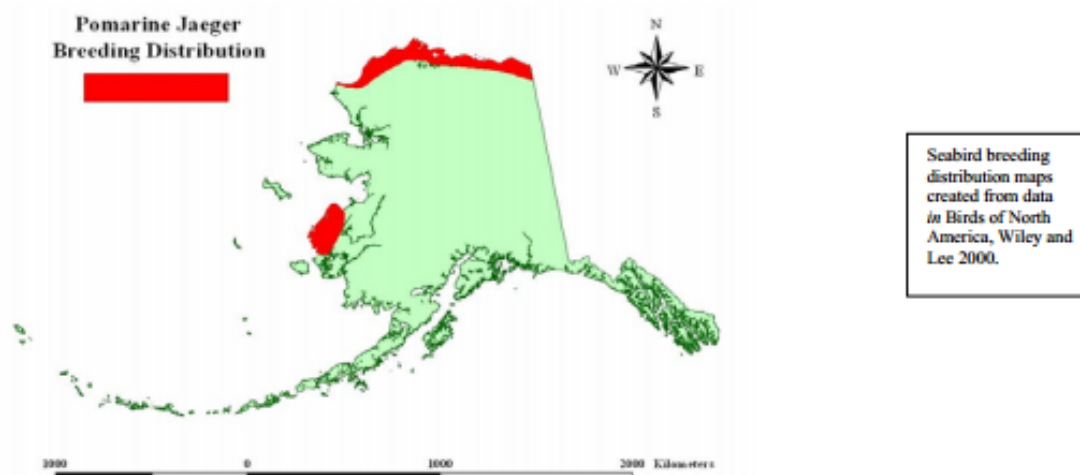
In northern Alaska, small numbers of Pomarine Jaegers also breed in localized areas with the presence of other small rodents such as tundra voles (*Microtus oeconomus*). When they are not breeding, Pomarine Jaegers spend their time at sea. They feed primarily by scavenging, predation on small seabirds, and stealing food from other birds.

Breeding distribution of this species is nearly circumpolar. They are only absent from eastern Greenland where *Lemmus* species do not occur and in northern Europe, west of the White Sea.

In Alaska, they are often present in summer from the Yukon Delta northward along the coast and on St. Lawrence Island in the Bering Sea. Breeding occurs along the arctic coast and on the Yukon Delta. They are found sporadically at any one site, but may be found sometimes in large numbers, especially near Barrow on the Beaufort Sea and in the outer Yukon Delta. Birds may wander widely in the arctic in summer, and presence of birds does not necessarily indicate breeding.



## SPECIES LIFE HISTORY – POMARINE JAEGER (*Stercorarius pomarinus*)



### Alaska Seasonal Distribution

AK Region	Sp	S	F	W
Southeastern	R	R	U	-
Southcoastal	C	R	C	-
Southwestern	C	U	C	-
Central	-	+	-	-
Western *	C	R	C	-
Northern *	C	U	C	-

C= Common, U= Uncommon, R= Rare, + = Casual or accidental, - = Not known to occur, \* = Known or probable breeder, Sp= Mar-May, S= June and July, F= Aug-Nov, W= Dec-Feb. © Armstrong 1995.

Wintering occurs in productive regions of tropical and subtropical oceans and concentrations form over upwellings and boundaries of currents. North American breeding birds winter in the Caribbean, in smaller numbers off Florida and probably southern Texas, and from California to Peru.

Birds that breed outside North America winter near the coast of northwest Africa and are common near fishing fleets in coastal waters off southwestern Africa. They are also regular in winter in the Persian Gulf, the Gulf of Oman and the Gulf of Aden in the Middle East. These jaegers are common in the tropical Pacific and are the most numerous jaeger wintering off the coast of southeastern Australia.

Recent evidence shows the Pomarine Jaeger more closely related to the large skuas (*Catharacta spp.*) than to the other two jaegers.

### Population Estimates and Trends

More often than not, ornithologists miss by chance, the peaks of lemming abundance in the arctic, thus missing the highest densities of breeding Pomarine Jaegers. This makes assessing population numbers and trends extremely difficult. The area near Barrow, Alaska is the only area where there is information about Pomarine Jaeger populations throughout an entire lemming cycle. No other neararctic area is known to support such high numbers of this species. Data are not available regarding population estimates or trends.

### Conservation Concerns and Actions

Pomarine Jaegers may be the most vulnerable of the three species of jaegers to human disturbance because of their reliance on sporadic populations of lemmings for successful reproduction. Because of this unique reproductive strategy, they are also one of the least studied birds of the arctic. Most of the young produced in the arctic probably come from occasional large colonies coinciding with outbreaks of brown lemmings. However, it is not clear in how many areas of the arctic (besides Barrow) or when this occurs.

Survival in wintering areas may regulate populations in the long term, yet very little is also known of the distribution and biology of this species away from the breeding grounds.

The unpredictable occurrence of the species' nesting continues to make them a challenge for study and management.

### Recommended Management Actions

- Develop standardized methods for censusing Alaskan breeding populations of Pomarine Jaegers.
- Establish a monitoring program.
- Measure productivity.
- Determine wintering areas and migration routes.
- Investigate links between lemming populations, Pomarine Jaegers, shorebirds, and Steller's Eiders (*Polysticta stelleri*) on the North Slope.
- Measure contaminants in Pomarine Jaeger eggs.

### Regional Contact

Branch Chief, Nongame Migratory Birds, Migratory Bird Management, USFWS, 1011 E. Tudor Rd., Anchorage, Alaska 99503  
Telephone (907) 768-3444

### References

Armstrong 1995; IUCN Internet Website (2005); Kushlan *et al.* 2002; U.S. Fish and Wildlife Service 2002; Wiley and Lee 2000.

Full credit for the information in this document is given to the above references.

SPECIES LIFE HISTORY – SNOWY OWL (*Bubo scandiacus*)

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## SNOWY OWL

## Snowy Owl

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## Description

Snowy owls are the largest bird species in the Arctic. Snowy owls are predominantly white with dusky brown spots and bars. Females tend to have more markings than males, which may become nearly completely white as they age. Young snowy owls are generally darker and more heavily marked than adults. Snowy owls have yellow eyes and their legs and feet are covered in white feathers that protect them from the cold weather.

## Lifestyle

Snowy owls are generally solitary and territorial. Territory size varies with prey abundance; during years of abundant prey, as many as five pairs may hold territories within a square mile whereas pairs are much more widely spaced during years of scarcity. Snowy owls are migratory. However, migration in this species is unpredictable and likely related more to prey abundance than seasons or weather. In general, snowy owls move nomadically and breed when and where prey is abundant. Unlike most owls, snowy owls are largely diurnal, or awake, during the day.

## Food Habits

Snowy owls are carnivorous. They hunt by utilizing an elevated perch that provides them good visibility while waiting for potential prey to appear in the hunting area. Visual scanning of the hunting area is facilitated by their ability to swivel their head 270 degrees around. Their main prey is typically lemmings and mice, however, they also take rabbits, seabirds and fish opportunistically. Like other birds of prey, snowy owls regurgitate a small pellet containing undigested bones and hair after they eat.

## Lifecycle

Snowy owls are generally monogamous and usually breed between May and September. Individuals arrive on the breeding grounds beginning in late April, though breeding pairs may form earlier on the wintering grounds. The male of a pair establishes a territory and the female selects a nest site. The female constructs a nest by scraping out a shallow bowl in the turf or bare ground. The nest is not lined with any insulating materials. Clutch size is usually three to eleven white eggs depending on prey availability, but can be as large as 16 when prey are extremely abundant. Incubation by the female lasts 32 to 34 days. Both parents feed and protect the chicks which are covered with snowy white down. Chicks begin to leave the nest before they can fly, 14 to 26 days after hatching. The parents continue to feed them for five to seven weeks until they are able to hunt for themselves.

Adult snowy owls are able to breed annually if prey abundance allows. In years of low prey abundance, snowy owls forgo breeding. Snowy owls generally raise only one brood per breeding season. However, if a nest fails early in the breeding season, snowy owls may re-nest.

## Population Status, Threats &amp; Conservation

The global population of snowy owls is estimated at about 290,000 individuals and appears to be stable. They are protected under the Migratory Bird Treaty Act. The most common causes of mortality of snowy owls include collisions with vehicles, utility lines, airplanes, gunshot wounds, electrocution and entanglement in fishing tackle.



Scientific name:  
*Bubo scandiacus*

Weight:  
1600 - 2950 g

Length:  
20.5 - 28.0 inches

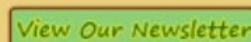
Wingspan:  
49.6 - 57.1 inches

Range:  
Have a circumpolar distribution

Habitat:  
Tundra, grassland or savanna,  
marshes

Diet:  
Carnivore

Life Expectancy:  
Up to 10 years in the wild,  
28 years in captivity





SPECIES LIFE HISTORY – BROWN LEMMING (*Lemmus trimucronatus*)

Alaska Department of  
**Fish & Game**

## Lemmings

One true lemming, as well as several closely related species commonly called lemmings, lives in Alaska. Distinguishing one from the other, or even lemmings from voles, is difficult. Many of the small rodents in the north have a similar appearance, especially during the summer months. The information below will help to identify lemming species in the field, but positive identification can be made only with the help of a mammalogy expert, text or field guide which gives detailed information on tooth structure and skull conformation.

The **brown lemming**, *Lemmus trimucronatus*, is the only true lemming in Alaska. Brown lemmings inhabit open tundra areas throughout Siberia and North America. They live in northern treeless regions, usually in low-lying, flat meadow habitats dominated by sedges, grasses and mosses. Their principal summer foods are tender shoots of grasses and sedges. During the winter they eat frozen, but still green, plant material, moss shoots, and the bark and twigs of willow and dwarf birch. There is some evidence that brown lemmings are cannibalistic when food is scarce.



True lemmings, the largest of the various lemming species, range from 4 to 5½ inches (100 to 135 mm) in length, including a 1 inch (12 to 26mm) tail. Adults weigh from just over an ounce to 4 ounces (40 to 112 g) but average 2¼ ounces (78 g). These lemmings are heavily furred, grayish or brownish above and buffy beneath, and are stockily built. They are well-adapted for their rigorous climate with short tails and ears so small they are almost hidden by fur. Lemmings are active both day and night and tend to follow the same routes from nests to feeding spots until their living area becomes a network of trails a couple of inches below the snow or land surface. Winter nests are commonly found in lowland areas where the snow, a good natural insulation, is deepest.

Breeding apparently begins before the animals are full grown. It may occur throughout winter under the snow but is usually restricted to the brief summer, June to September. Litter size averages four in summer, four to five in early and late winter, and three in mid-winter. There appears to be no reproduction during the period of spring snow melt (May through early June) nor during the period of fall snow pack formation (September through early October). Young lemmings weigh only a little over one-tenth of an ounce (3 g) at birth. They open their eyes at 11 days and can walk at 15 days.

Lemmings are known for their wide fluctuation in population numbers, reaching peak abundance in some areas every three to five years. The causes of population fluctuations are unclear, although some combination of predation, food quantity and quality, weather, or genetic change in individuals making up the population is probably involved. Actual migrations do not occur, although some lemmings may move into marginal or unsuitable areas during periods of population increase. This probably explains occasional sightings of lemmings on sea ice well beyond land.

**EYES ON EIDERS**  
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SPECIES LIFE HISTORY – STELLER'S EIDER (*Polysticta stelleri*)Steller's Eider (*Polysticta stelleri*)

## Species Profile

Jump to species:

Eider, Steller's ▼

Go

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The Steller's eider is the only species in its genus. The other three species are in different genera.

[Photo Gallery](#)**Special Status Listing:** Yes, see Status, Trends and Threats.[Description](#)[Life History](#)[Range and Habitat](#)[Status, Trends, and Threats](#)[Fast Facts](#)**General Description**

Eiders are sea ducks, a group of diving ducks that breed inland but generally spend the rest of the year in coastal marine waters. The Steller's eider is the smallest of the four eider species. Males are unusually colorful but both sexes have an iridescent blue wing patch, lined above and below by white, which is unique for a sea duck and more similar to a dabbling duck such as a mallard. The male's white head has a black spot behind each ear and green shading at the back of the head. The eye is surrounded by black and the bill is bluish gray. The white head is offset by iridescent blue-black under the chin and in a broad collar pattern extending down the back. Large white shoulder patches and white-lined deep blue scapular plumes provide bold contrast on the back and sides. The light breast, sides, and belly of males is shaded front-to-back from a tan to deep rust.

**Similar Species**

The female Steller's eider is mostly brown and much less distinct than the male. The blue wing patches, blue-gray feet, white wing linings, and smaller size distinguish the female of this species from other eider species.



SPECIES LIFE HISTORY – STELLER'S EIDER (*Polysticta stelleri*)

**Special Status Listing:** Yes, see Status, Trends and Threats.

Description	Life History	Range and Habitat	Status, Trends, and Threats	Fast Facts
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## Life History

### Reproduction and Growth

Steller's eiders first breed at 2–3 years of age. Pair bonding occurs in the winter, and the eiders move to Arctic nesting grounds as the spring sea ice breaks up. They are solitary breeders that prefer to nest on islands or peninsulas in tundra lakes and ponds near the coast. The female selects a nest site while the male performs distraction flights. The nest is built out of grass then lined with down during egg laying. Females generally lay 5–7 olive-brown eggs. Males typically leave once incubation begins. Females incubate the eggs for 25–28 days until hatching.

Ducklings are precocial and hatch with open eyes and a dark brown layer of down. They can thermoregulate and walk soon after hatching, allowing them to leave the nest within 24 hours. Mothers stay with their young throughout brood rearing. Young birds can fly within 5–7 weeks of hatching.

### Feeding Ecology

Steller's eiders forage by diving or dabbling in shallow water. On the breeding habitats, Steller's eiders primarily eat insect larvae associated with freshwater wetlands but may also eat aquatic plants. In marine habitats they eat small fish and saltwater invertebrates, including snails, clams, worms, and echinoderms found in the bottom sediment. They forage singly or in large flocks that often dive and surface in unison.

### Behavior

Males perform courtship displays for females, with as many as 3–7 males following a single female. Courtship behaviors include a series of head-turns, shakes, and rearing out of the water. Males also perform aggressive displays towards other males, including chin-lifts which display the black chin-patch.

### Migration

Steller's eiders migrate long distances each year, up to 4,800 kilometers, between their breeding and wintering grounds. They migrate side by side in long lines only a few feet above the water. They generally travel along coastlines or follow open leads in the ice. Migration northward to the breeding grounds begins in late-April. They reach their nesting sites in the Arctic tundra in late May to early June. Males leave the breeding areas by early July to travel to molting areas. The females remain on the breeding grounds until the chicks fledge. Then they travel to molting areas or directly to wintering grounds further south.



SPECIES LIFE HISTORY – STELLER'S EIDER (*Polysticta stelleri*)

**Special Status Listing:** Yes, see Status, Trends and Threats.

[Description](#)
[Life History](#)
[Range and Habitat](#)
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[Fast Facts](#)

### Range and Habitat

The breeding range of Steller's eiders is the arctic coastal plain of northern Alaska and Russia. There are three recognized breeding populations of Steller's eiders worldwide. Two populations breed in Russia. The Russian-Atlantic population breeds in Russia and winters in the Barents and Baltic Seas of northern Europe, never associating with Alaska. The Russian-Pacific population breeds in Russia and winters in the Bering Sea and northern Gulf of Alaska and mixes with the Russian-Pacific population in the Bering Sea and northern Gulf of Alaska during the molt and winter. Alaska's breeding population occurs in two disjunct regions, the Yukon-Kuskokwim Delta in western Alaska, where only a few birds may nest, and the Arctic Coastal Plain, primarily near Barrow.

Almost all Steller's eiders nest in northeastern Siberia, with less than 1% of the population breeding in North America. In the winter, most of the world's Steller's eiders are found in the Alaska Peninsula and the Aleutian Islands. Others winter as far west as the Commander and Kuril Islands of Russia and as far east as Kodiak Island and Kachemak Bay in Cook Inlet, Alaska.





## SPECIES LIFE HISTORY – STELLER'S EIDER (*Polysticta stelleri*)

### Status, Trends, and Threats

#### Status

Historic numbers and distribution of Steller's eiders were significantly greater than current times. However, most information prior to the 1970s is anecdotal so it is difficult to accurately quantify the decline in numbers and the contraction of the breeding range. As of 2010, 600 Steller's eiders or less arrive on the Alaska breeding grounds each year with most near Barrow. The Alaska-breeding population is listed as threatened under the Endangered Species Act (ESA) and is a State of Alaska species of special concern. To learn more, visit the ADF&G [Special Status page for Steller's eider](#).

#### NatureServe:

Global – G3 (Vulnerable)

State – S2B, S3N (Imperiled breeding population, vulnerable nonbreeding population)

**IUCN:** Vulnerable

**ESA:** Threatened

#### Trends

The population of Steller's eiders may have declined by up to 50% between the 1960s and 1980s. Estimates of the wintering concentration of Steller's eiders along the Alaska Peninsula was 400,000–500,000 in the 1960s, and dropped to an estimated 200,000 in the 1990s, and 100,000–140,000 in the 2000s. The cause of this drastic decline is unknown.

#### Threats

Threats to the Steller's eider include predation, lead poisoning, contaminants, and long-term or cyclical changes in the marine environment. The effect of climate change on Steller's eiders is unknown. Steller's eider eggs and ducklings are vulnerable to predation by ravens, jaegers, snowy owls, Arctic and red foxes, and large gulls. On the wintering grounds, birds are vulnerable to bald eagles. Lead poisoning due to ingestion of spent lead shot was historically a significant source of mortality. However, lead shot was outlawed for the hunting of waterfowl in 1991 making it less of a threat today. Contaminants are also a concern for this species due to their habit of congregating in large dense groups in a few areas. Contamination, such as an oil spill, in a wintering or molting area, could have a major impact on the entire population.



SPECIES LIFE HISTORY – STELLER'S EIDER (*Polysticta stelleri*)

**Special Status Listing:** Yes, see Status, Trends and Threats.

Description Life History Range and Habitat Status, Trends, and Threats Fast Facts

### Fast Facts

- **Size**  
18 inches long, 27 inch wingspan
- **Lifespan**  
16–21 years
- **Range/Distribution**  
Coastal Alaska, northern Russia, and northeastern Europe
- **Diet**  
Small aquatic animals and insects
- **Predators**  
Foxes, jaegers, snowy owls, gulls, ravens, eagles
- **Reproduction**  
Annually monogamous, 5–10 eggs per clutch, 1 brood per year
- **Remarks**  
Nesting triggered by lemming density



## STUDENT WORKSHEET

Name \_\_\_\_\_ Date \_\_\_\_\_ Class \_\_\_\_\_

1. Graph the data collected from the Population Dynamics activity.

[illegible]

2. What are two factors that influenced the success or failure of Steller's Eiders hatchlings from one season to the next? \_\_\_\_\_  
\_\_\_\_\_
3. What season do Steller's Eiders pair up to find a mate?
  - a. Winter
  - b. Spring
  - c. Summer
  - d. Autumn
4. Describe any trends you can identify from the data displayed on your graph. What predictions might you be able to make for future seasons from the results of the activity? \_\_\_\_\_

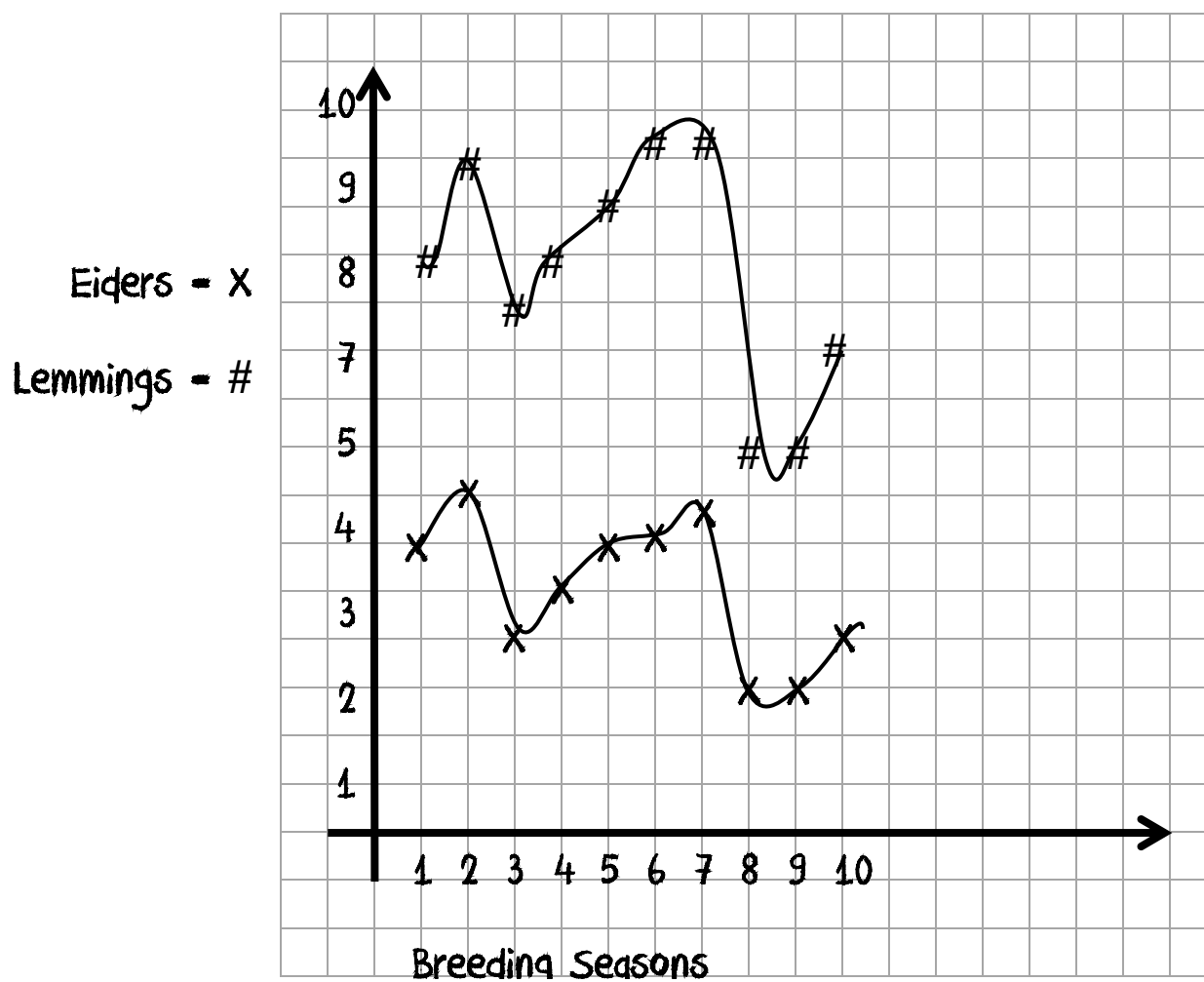




## STUDENT WORKSHEET – Teacher's Copy

Name Example Graph Date \_\_\_\_\_ Class \_\_\_\_\_

5. Graph the data collected from the Population Dynamics activity.



6. What are two factors that influenced the success or failure of Steller's Eiders hatchlings from one season to the next? \_\_\_\_\_

Answers may vary : number of lemmings & increased predation

7. What season do Steller's Eiders pair up to find a mate?

a. Winter      b. Spring      c. Summer      d. Autumn

8. What kinds of other phenomenon might influence the success of Steller's Eider breeding from one season to the next? \_\_\_\_\_

Answers may vary : climate change, severe weather event, human interference

