



**Snowy Owl (SNOW).** The summer of 2013 marked the 22nd year of our SNOW Breeding Ecology and Lemming Population study in Barrow, Alaska. It was also a rather unremarkable year on the summer tundra, as breeding SNOWs were not observed within our study area. Correspondingly, Brown Lemming (BRLE) numbers were also very low. Although lemming numbers slightly increased in 2012, numbers were lower in 2013, yielding the sixth consecutive year of low lemming numbers. This was similar to the low lemming and SNOW years of 2001-2005.

There were approximately 15-20 SNOWs seen in the study area around Barrow. Most were adult males. Over the 22 years, we have found 239 nests and banded about 700 owls (Fig. 1).

We continue advocating the use of SNOWs and BRLEs as indicators of a healthy Arctic environment



Female SNOW with lemming

in our study area, and to monitor effects of Arctic climate change. Lemmings are dependent on Arctic grasses, sedges, and forbs for nesting and reproduction. Therefore, any changes to this vegetation due to climate change could affect SNOWs, and other Arctic species.

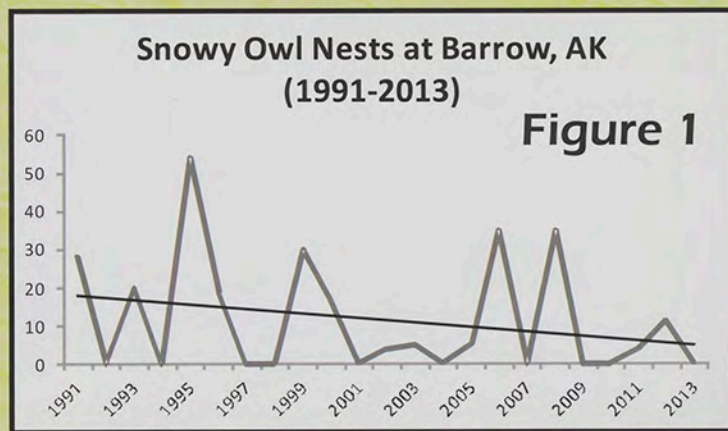
ORI staff and other co-authors are currently writing the SNOW species account for the American Ornithologists Union's "Birds of North America".



Female SNOW



Male SNOW at nest



**ARCTIC WILDLIFE CONSERVATION**

There is no doubt regarding climate change. How this will affect wildlife of the Arctic ecosystem is unknown. There is much conversation regarding Polar Bears and Snowy Owls. And this is okay, as they are two of the most high-profile species and can be indicators of Arctic health in both marine and terrestrial ecosystems. And they generate public interest, sympathy, and support.

However, there is much more to the story. It is about the Arctic ecosystem. The Arctic marine and terrestrial ecosystem maintains about 25-30 species of obligate Arctic animals, not including fish. These species rely on the Arctic for most of their lifetimes, and most are mammals. They do not migrate to warmer climates, such as most species of Arctic birds. Of these species, about half are terrestrial and half marine. Examples include: Alaska Marmot, Arctic Hare, Arctic Fox, Bearded Seal, Beluga Whale, Bowhead Whale, Caribou, Collared Lemming, Hooded Seal, Muskox, Polar Bear, Ringed Seal, Walrus, and others.

Additional species are also linked to the Arctic, yet have ranges that include the Arctic, Sub-Arctic and Temperate zones. These include: Arctic Ground Squirrel, Brown Lemming, Collared Pika, Dall Sheep, Ermine, Gray Whale, Wolverine, and others.

Birds, too, call the Arctic home. Many waterfowl and shorebird species breed during Arctic summer, yet migrate to avoid Arctic winter. Others, such as Snowy Owl, Willow and Rock Ptarmigan, Snow Bunting and Raven can do both. Nonetheless, all will feel the pinch of climate change. Some species may benefit from climate change, while others may not.

It's also not just about ice, but oceanic phytoplankton and terrestrial vegetation food webs, melting permafrost, changes in ocean and freshwater temperature and chemistry, vegetation changes, and other links.

How will climate change effect the many evolutionary adaptations that plants and animals have to survive Arctic conditions? Will Polar Bears and Snowy Owls overheat? Will white animals have to evolve darker colors again? Will plants get taller? These are just some of the things to think about.

