

A close-up photograph of a speckled Arctic bird, likely a Red-throated Loon, sitting on a nest of several light-colored eggs. The bird has intricate brown and white patterns on its feathers and a dark eye. It is surrounded by tall, thin grasses. The background is a soft-focus landscape with a body of water and a pale sky.

During the frenzied Arctic bird breeding season, WCS biologists keep their eyes to the ground

**ONE NEST
AT A
TIME**

By Joe Liebezeit



AWY LEIS PAGES 42-43; JOE LIEBOEUF (CENTER BOTTOM AND FAR RIGHT); ANNAMARIA EASLEY (CENTER MIDDLE); STEVE ZACK (CENTER TOP)

It is early June in the Alaskan Arctic, and the treeless tundra is alive with the feverish activity of breeding birds. Each spring, species that winter in practically every part of the globe make a long, perilous migration back here to

their breeding grounds. The Arctic coastal plain of Alaska is a particularly important site for more than 25 species—mostly shorebirds and waterfowl, millions of them. Although the Arctic summers are brief, the combination of a new flush of plant growth, the emergence of abundant insects, and the ponds and lakes that dot this landscape make this region one of the most productive wetlands in the world. Here the birds quickly build up the energy reserves lost during the grueling migration, and once they have obtained enough nutrients, the females will lay a full clutch of eggs and begin the long incubation.

After a drive into the Prudhoe Bay-Kuparuk oilfield complex from our field station, a crew of three field biologists and I step out of the relative comfort of a warm pick-up truck into the brisk, cold air. It's hard to remember that it is early June. In fact, it can snow during any month of the year at this latitude.

Today our goal is to find as many nests as possible within our ten-hectare study

plots. We slowly pull on our hip boots, collect the rest of our field gear, and go our separate ways to our respective plots in the tundra.

The hike to my site is relatively short, but I have to ford a number of small shallow ponds, which can be deceptively slippery due to hidden permafrost below the top layer of thawed lake bottom. When I eventually reach my plot, I begin my nest search by following an imaginary transect, slowly walking back and forth systematically covering the entire area, all the while keeping my eyes peeled for any sign of a nesting bird.

As I skulk through the marshy tundra, I hear the frenetic courtship song of a male stilt sandpiper above me as he attempts to attract a mate. At the same time, two male Lapland longspurs hover in mid-air, just above my head, singing their complex songs in an apparent battle for an unseen single female. A male pectoral sandpiper approaches low above the ground, his head jerking back and forth

with intense effort as he utters his booming calls. Through this dizzying spectacle of testosterone-driven avian activity, I need to be attuned to cues, some of them quite subtle, indicating the presence of a nest. A big part of this skill, called “nest searching,” is being exceedingly patient.

In addition to the abundance of wildlife, the Arctic coastal plain contains some of the largest remaining oil reserves in North America. In 1968, oil was discovered near Prudhoe Bay. Since that time, there has been a steady progression of oil field development—a spider web of roads and facilities across a vast area of tundra. The impact of this development on the local wildlife has been studied, disputed, and studied even more intensely for more than 20 years.

Much of the previous research focused on the impacts of oil development on large “mega-fauna,” such as caribou, musk ox, and polar bear. There has been relatively little effort to investigate the potential human impact on shorebirds and

other small, less charismatic birds. Yet a number of threats to breeding birds from oil-development activities have already been identified: direct loss of habitat, noise disturbance, pollution, and accumulation of dust adjacent to heavily traveled roads. With regard to habitat loss, the actual land area that the so-called footprint of oil infrastructure destroys is relatively small compared to the available nesting habitat for birds. However, the “effect zone” of disturbances may extend much farther than the physical footprint.

Recently, there has been growing concern about an increase in the abundance of nest predators in developed regions of the Arctic coastal plain. Nest predators may have much more widespread impacts on breeding birds than some of the more localized effects. In fact, nest predation, in some cases, is known to regulate population trends for many bird species.

In 2001, the Wildlife Conservation Society helped initiate a collaborative study with government agencies, oil companies,

consulting companies, and other interested groups to examine this issue. Our main objective is to determine if there is, in fact, a link between human development, nest predators, and nest survivorship of tundra-nesting birds. Without the support of this collaboration we would not have been able to establish our large-scale study, which includes five sites spanning more than 100 miles of developed and undeveloped regions of the Arctic coastal plain.

Nest predators are species that at some point in their life cycle specialize or opportunistically prey on eggs and chicks at active bird nests. We think that the most important nest predators in our study site are Arctic foxes, glaucous gulls, and common ravens. Populations of these species are reported to have increased in developed areas of the North Slope because human-supplied food is readily available in the form of refuse at landfills, garbage at dumpsters, road kills, and other sources. The oil industry has tried to re-



In 1960, WCS efforts helped create the Arctic National Wildlife Refuge. Today, WCS is working with partners to examine the impacts of oil development on biodiversity across the North Slope. Pages 42-43: A female king eider guards her eggs laid at the edge of a tundra pond. This page: Caribou in the Central Arctic herd cross a road in the Kuparuk Oilfield (left). The long-billed dowitcher (top) commonly breeds here, as does the black-bellied plover (middle, newly hatched chicks and one egg). An Arctic fox peeks out from a road culvert in the Prudhoe Bay Oilfield (bottom). Opposite: A juvenile raven perches on a box in the Endicott Oilfield. Ravens and foxes do well in human-altered environments, but the effects of oil development on ground-nesting birds in the tundra are unknown.



duce the availability of such food, but the problem has not been entirely contained. As well, the availability of artificial den and nest sites has enabled some nest predators to raise their own young in relative safety.

Contrary to its name, the common raven historically was a relatively uncommon inhabitant of the Arctic coastal plain. Ravens naturally rely on outcroppings, trees, and other vertical structures for constructing nests to rear their young. Prior to the discovery of oil and the surge in human presence, vertical structures were rare in this region. Now, ravens exploit the support struts for pipelines, ledges on buildings, and other human-made structures that serve as good nesting sites.

Off in the distance, I see another pectoral sandpiper. This time it's a female, and she is sneaking warily through a clump of grass. I use my binoculars to get a closer look. She quickly flies off, and I

make a mental note of the location. On my last visit to this plot, I saw a female pectoral sandpiper in the same spot. This makes me suspicious, and I decide to check the area more thoroughly when I get there. First, however, I must systematically search for nests in the immediate vicinity along my transect route.

As I proceed, an explosion of wings and feathers erupts practically under my feet. I have flushed a long-billed dowitcher off its nest. I make sure not to move for fear of stepping on the nest as I search the surrounding tundra for the clutch of four speckled eggs that this species typically lays. All the while, the flushed adult feigns injury, as many protective birds do when their nests are disturbed, attempting to draw attention away. After a moment, I locate the nest and quickly make reference to its location with a GPS (global positioning system) unit. Sometimes you get lucky and find nests without even trying.

Usually, it's much more difficult, and often the bird outwits you.

In addition to recording the dowitcher's nest location, I also determine the age of the eggs using the "egg flotation" technique. Bird eggs are heavier than water when they are first laid, but as the developing embryo gives off water vapor and carbon dioxide through respiration, the egg slowly loses mass and eventually floats at the surface. By examining the exact position of an egg in a column of water, we can usually determine its age to within a few days.

After floating the eggs, and recording that they are about six days old, I place them back in the nest and leave, so the adult bird will return and resume incubating. I will come back to this nest and monitor it every three or four days until it is no longer active. Because I know the age of the eggs and other researchers have previously recorded incubation periods

I use the "egg flotation" technique to determine the age of bird eggs. When first laid, the eggs are heavier than water. We can determine the age of most eggs to within a few days.



JOE LIEBEZEIT: STEVE ZACK (BELOW CENTER AND LEFT)



There is growing concern that increasing numbers of nest predators, such as ravens and Arctic foxes, due to development may result in reduced productivity among shorebirds and other wildlife. In addition, there is pressure to drill for oil in the protected coastal plain of the refuge, and to expand drilling outside the refuge. Proponents of oil development claim that the impacts of drilling on wildlife would be minimal. However, there is little information available to evaluate such a claim, especially as it relates to tundra-nesting birds. (opposite, the author measures the angle and buoyancy of an egg of a pectoral sandpiper, top and above, to help estimate nest survivorship).

for most bird species, I can estimate when the eggs are likely to hatch. For the long-billed dowitcher, incubation is typically 21 days. If I visit the nest and the eggs are gone well before the estimated hatch date, I can safely assume a predator took them. Collecting this vital information for each nest enables us to obtain an overall estimate of nest survivorship.

After leaving the dowitcher nest, I eventually reach the area where I saw the sneaky female pectoral sandpiper. The location appears quiet. There are no birds in sight. Instead of moving on, I walk back about 100 feet and sit down on the tundra with my eyes focused on the spot I suspect may house a nest.

As I wait for an indication of an active nest, around me I hear the sounds of oil-field activities. A jet takes off with a load of weary oil workers heading home. An oil-processing center hums industriously in the distance. An occasional truck passes on a nearby road, stirring up a cloud of dust. I think about the nearby Arctic National Wildlife Refuge and how tranquil nest searching must be without the hubbub of human activity. It is times like this when I realize the importance of protecting undisturbed portions of the Arctic coastal plain, not just for the sake of birds, but also for other wildlife, for the local people who subsist on the wildlife, and for the purely

aesthetic value of wild places that are becoming rare on our planet.

I have been sitting on the cold, wet tundra for almost ten minutes, waiting for a bird to show up. I am about to move on when, out of the corner of my eye, I see a blur of a bird flying a few feet off the ground. The bird lands abruptly within my field of view. It's a female pectoral sandpiper! She slowly walks, all the while, pivoting her head back and forth, keeping an eye out for any danger. I remain as motionless as possible. Eventually she settles down and disappears in the grass.

Now is my chance. Without taking my eyes off this spot, I stealthily crawl toward it. When I am about 30 feet away, I slowly stand up and continue to approach. Suddenly, the female rises and begins to walk away. I lock my eyes onto the spot she first appeared and, within a few minutes, discover her nest, with four beautifully dark-blotched tan eggs.

I have discovered two new nests in one hour. I am having a good day. But it will take a lot more nest findings over a number of seasons before we can start to tease apart the puzzle of how development may be impacting these incredible birds.

Joe Liebezeit has been working in the Alaskan Arctic region as a WCS conservation biologist since 2001.