



Photos: (left and on page 29) Ethan Meleg

Larger than

the Amazon rain forest, the great North American boreal forest (more than 5 million square kilometres) stretches from Newfoundland to Alaska. It represents one-quarter of the earth's surviving original forest, 750,000 square kilometres of which are within Ontario. Although the boreal ecosystem is austere, it is nevertheless a haven for billions of migratory birds and for the continent's largest populations of winter-adapted mammals: wolves, caribou, wolverines, lynx and moose.

Like the Amazon rain forest, the boreal is being rapidly altered on a vast scale. Roughly two hectares of Canada's boreal forest are clearcut every minute. In Ontario, logging clears an area up to three and a half times the size of Toronto every year; some 62,000 kilometres of logging roads have fragmented the southern half of the province's boreal region. With forestry operations nearing the current cutline, roughly along the 51st parallel north of Hearst in the east to Red Lake in the west, the province is considering extending logging into the largest block of intact boreal forest – 370,000 square kilometres of the province – remaining in Canada.

Approximately 4,400 mining claims have been staked across Ontario's northern boreal forests. More than 1,000 square kilometres in the Moose River basin in northeastern Ontario have been staked for possible coal bed methane wells. Our energy needs have spurred proposals for new generating dams on rivers in the far north and a hydro corridor spanning the region to bring electricity from northern Manitoba.

Ontario Nature and other groups campaigning to protect the boreal forest are demanding that Premier Dalton

McGuinty fulfill a pre-election pledge he made in March 2003 to "institute meaningful, broad-scale land-use planning for Ontario's northern boreal forest before any new major development" is permitted. The Boreal Forest Conservation Framework, drawn up by a coalition of national conservation organizations, First Nations communities and several resource companies, calls for approximately half of the northern boreal forest, both nationally and provincially, to be set aside in an interconnected network of parks, wildlife refuges and other protected areas. The remaining area would be managed under strict guidelines for sustainable development. At present, only 5 percent of the northern boreal forest is protected in Ontario.

Says Wendy Francis, Ontario Nature's director of conservation and science, "A lot of economic interests ... have their eyes on Ontario's remaining intact boreal forest. Economic development is not a bad thing, but it needs to happen in a way that protects global values."

The northern hemisphere's boreal zone contains 80 percent of the planet's unfrozen fresh water and sequesters 136 billion tonnes of carbon in its 8,000- to 10,000-year-old accumulations of peat, thus slowing climate change. The intense burst of plant and, especially, insect life during the brief growing season in Canada's boreal region draws one to three billion migrant landbirds from as far away as South America every year, including three-quarters of the country's warblers and two-thirds of its sparrows and thrushes. Every spring, one in three of all landbirds in the United States is a migrant headed for the boreal forest. Tens of millions of waterfowl, waders and shorebirds fly to the innumerable wetlands, rivers and lakes of Canada's boreal region to nest.



Photos: [this page] robertmccaw.com

The great gray owl (pictured left), designated as rare nationally, is a reclusive creature made even more vulnerable in logged areas

Frequent wildfires and outbreaks of defoliating insects renew huge swathes of the landscape. The result is a remarkably varied patchwork of habitats. Dense carpets of new growth mix with older stands of black spruce and fir, laced with mazes of grey-green lichen-covered clearings. There are pockets of aspen and birch, jack pine ridges, expansive open mats of bright green and yellow muskeg, wavy-lined sting bogs, beaver ponds, meadows, marshes and creeks, and rivers and lakes of every size and description.

Large-scale mechanized logging and fire suppression dramatically shift the natural pattern of the boreal mosaic. The University of Toronto's faculty of forestry conducted surveys in the Cochrane-Kapuskasing clay belt area and found that the tendency of clearcutting to convert black spruce forests into second-growth mixed or poplar woods usually eliminates less common conifer forest gems such as moccasin flower, rattlesnake plantain and pinedrops. Little of the immense variety of mosses, lichens and mushrooms that vibrantly colour a northern spruce forest floor is evident in woods in which deciduous trees are dominant. "Once a system shifted to a different state, it stayed like that," says U. of T. forest vegetation ecologist Terry Carleton, noting that the original spruce forest has rarely returned since mechanized clearcutting began in the area in 1922.

Logging can destroy an estimated 45,000 migratory birds' nests in a single year in Ontario, and new studies are also finding marked differences between avian communities located in regenerating clearcuts, and those located in young post-fire forests. "You certainly find more snag-nesting species [in a burn]," says Ryan Zimmerling, a research associate with Bird Studies Canada. "Timber operations can't leave as many snags as a wildfire would."

In three summers of field work in northern Ontario, Zimmerling found lots of grassland and open-habitat birds, such as alder flycatchers, ruby-crowned kinglets, and chipping and Lincoln's sparrows, in young post-harvest forests, but the number of species declined as the stands aged. No similar decline

occurred in aging post-fire forests, which had more snag- and shrub-loving birds, including winter wrens, brown creepers, red-breasted nuthatches and white-throated sparrows.

Zimmerling, who is now conducting northern waterbird research, says clearcutting – which accounts for 90 percent of all logging in Ontario – commonly causes increased runoff, erosion and raised water tables. Bogs scattered with small ponds and mossy hammocks – habitat frequented by greater yellowlegs, Connecticut warblers, yellow-bellied flycatchers and other wet-land nesters – are lost to cattail marshes and alder swamps.

Logging, mining and other resource extraction could even have long-term consequences for the boreal forest's invertebrate composition. U. of T. forestry department staff in north-eastern Ontario discovered that some 30 species of hoverflies, whose larvae feed in downed wood, were absent or significantly diminished at logged sites. The faculty's Jay Malcolm notes that their absence has a potential impact on their predators and parasites and on up the food chain.

"If you look at where we've already had development, south of the limit of logging, it's terribly fragmented and heavily roaded, and the impacts of that are seen in what's happened to the range of the endangered woodland caribou and the wolverine, both of which have been pushed further and further north," says Francis. "We have an obligation and the ability to do something different in Ontario."

Listed here are just 10 of the at-risk species that depend on an intact boreal forest ecosystem.



CARIBOU An iconic boreal forest species, the woodland caribou is listed as threatened both nationally and provincially. The extremely elusive, thinly spread "grey ghosts" of the north woods once lived as far south as Algonquin Park, but are retreating steadily north at a rate of 34 kilometres a decade to areas that have yet to be logged. The population appears to be declining by 11 percent a year, and the total left in Ontario's boreal forest is estimated to be about 5,000.

To survive in the boreal forest, woodland caribou wander widely. The home range of an individual animal is estimated to be about 4,000 square

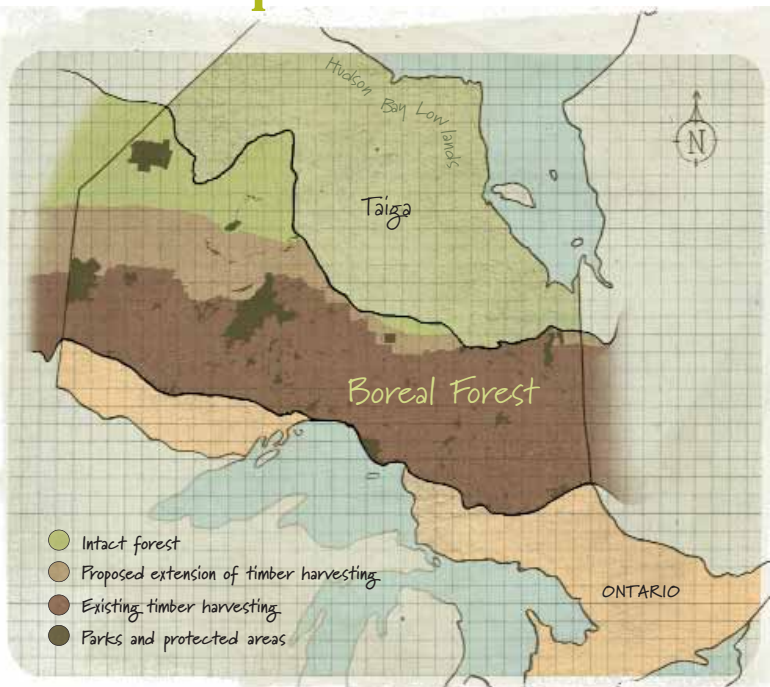
Photos: (left) robertmccaw.com; (right) Dave Taylor



The solitary sandpiper (left) has declined significantly. The endangered eastern cougar (right) once roamed dense boreal forests

Roughly two hectares of Canada's boreal forest are clearcut every minute. In Ontario, logging clears an area up to three and a half times the size of Toronto every year

Map: Marco Cibola



kilometres. Caribou herds, on average, need more than 12,000 square kilometres of undisturbed habitat. At freeze-up they move to sparsely treed bogs to feed on the arboreal lichens that drape black spruce and tamarack branches. Severe winters force the caribou to retreat to the oldest forests they can find, where the snow is softest and the slow-growing lichen layer thickest.

In late spring, females search out protected islands in lakes and peatlands on which to give birth and raise their calves through the summer. Each mother requires an average area of 15 to 20 square kilometres. At that time of year, the shy animals are most susceptible to habitat disturbance.



Research by Trent University biologist James Schaefer shows that caribou disappear within a couple of decades from any area that lies within 12 kilometres of logging operations. The young poplar stands that spring up after cutting are favoured by moose and white-tailed deer, which move in, as does another predator: the wolf. Brain worm parasites carried by white-tails are also fatal to caribou.

Ontario's Ministry of Natural Resources (MNR) released a long-delayed draft caribou recovery strategy for public comment last summer, but conservation groups worry about persistent bureaucratic foot dragging. "At the rate we're going, it's likely to be a five-year process," says Trevor Hesselink, forests program director for the Wildlands League, the Ontario chapter of the Canadian Parks and Wilderness Society. "The longer that these things take to put in place, the more logging occurs."

At the present rate of harvesting, Trent's Schaefer gives woodland caribou less than 90 years before they are gone from Ontario. Given that provincial forest management units and even the largest parks are smaller than the average caribou population's range, a radical change in planning and development is needed, he says. "The very window we are using to manage our forests is too small. It's destined to fail. The challenge is to scale up our thinking to match the woodland caribou's biology."

LAKE STURGEON Like many other large species in trouble, the lake sturgeon – the biggest freshwater fish in the northern hemisphere – has a low reproductive rate, making the species partic-



ularly vulnerable to exploitation and disturbance. Females usually spawn only once every four to nine years and not until they are 20 to 30 years old. Occasionally reaching up to two metres in length and exceeding 50 kilograms, the toothless bottom-



feeders have been known to live for more than 100 years.

Looking like relics of a prehistoric age, sturgeon were once numerous in large rivers and lakes throughout Ontario. Commercial fishing sent them into deep decline from the late 1800s onward. In 2005, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the lake sturgeon in central Canada as a species of special concern. Although the Province has not followed suit with a similar listing, last summer it proposed reducing the present angling catch limit from one sturgeon per day to one per year.

Sturgeon populations in northern rivers such as the Mattagami and Abitibi still haven't recovered from past commercial fishing, mill effluent discharges and stream damage from river log drives that ended 20 years ago.

Hydroelectric dams, however, are the greatest threat to the big fish in the north. Dams fragment populations, blocking spring spawning runs or flooding sturgeon breeding grounds below rapids. A number of new dam projects are proposed in the boreal region, including on the Kapuskasing and Mattagami rivers.

EASTERN COUGAR Eastern cougars once inhabited dense forests and wetlands from southern Ontario to at least Lake Timiskaming. Rural settlement in the 1800s led to the extirpation of elk, the cougar's main prey. Cougars began raiding livestock and were believed to have been persecuted into oblivion (see "The ghost cat," page 18).

Yet up to 100 cougar sightings a year are reported across the province, at least half of which are considered fairly credible. MNR staff say cougars spotted from Rainy River to Cochrane could be part of a remnant population or represent a range expansion from the west. Cats shot recently in Manitoba are suspected to have come from an established population in the Black Hills known to be expanding north-eastward. Sightings in southern Ontario are thought to be animals released from captivity.

A COSEWIC report in 1998 estimated that 120 cougars could be living in Ontario, and the Province still recognizes cougars as endangered.



OLIVE-SIDED FLYCATCHER

Roadside Breeding Bird Survey data show that olive-sided flycatcher numbers have decreased by 65 percent over the past 30 years and 46 percent in the last decade. Ontario Breeding Bird Atlas surveys indicate that the incidence of this species in the southern boreal forest has dropped by almost one-quarter over the past 20 years. COSEWIC is now compiling a status report to determine whether the flycatcher should be declared a species at risk.



The woodland caribou population appears to be declining by 11 percent a year and may be extirpated from the province in less than a century

To find out more

about boreal forest issues and how you can help, check out the following websites:

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| 1) Ontario Nature
www.ontarionature.org | 4) Canadian Boreal Initiative
www.borealcanada.ca |
| 2) Canadian Parks and Wilderness Society
www.cpaws.org | 5) ForestEthics
www.forestethics.org |
| 3) Committee on the Status of Endangered Wildlife in Canada
www.cosewic.gc.ca/eng/sct5/index_e.cfm | 6) Sierra Club of Canada
www.sierraclub.ca |
| | 7) Bird Studies Canada
www.bsc-eoc.org |
| | 8) Wildlands League
www.wildlandsleague.org |

A bird of bogs, burns and beaver ponds (areas with lots of snags to use as hunting posts), the olive-sided flycatcher seems to take readily to forest openings created by logging as well. Recent studies, however, suggest that harvested forests may represent “ecological traps” for the flycatchers, drawing them in but resulting in lower nesting success than in postfire forests, perhaps because of differing predator levels. Even under optimal conditions, olive-sided flycatchers, together with wood-peewees and other members of the *Contopus* genus, have the lowest reproductive rates of all passerines in North America.



GREAT GRAY OWL The reclusive great gray owl's breeding grounds are in bogs and low-lying woods, or near muskeg, fens and clearings. The owl is on Ontario's list of species of special concern, and, nationally, is designated as rare by COSEWIC.

The nesting habits of this owl probably limit its numbers and may also make the species more vulnerable in logged areas. Rather than building their own nest, great gray owls use the old nests of hawks, osprey and ravens or the broken tops of snapped off poplars. Because of competition for such nest sites, male great grays often risk starvation to guard their territories during winter food shortages while their mates travel hundreds of kilometres in search of better pickings.

AMERICAN MARTEN

Though it is not officially considered a species at risk, the American marten is drawing increasing concern. One of the most arboreal members of the weasel family, the marten is a secretive inhabitant of mature forests full of deadfall and tree cavities in which it dens (see Field Trip, page 40). Martens were once nearly trapped out in central Ontario but have since recovered. Now logging is the greatest threat to their numbers.

Logging and logging roads have destroyed marten habitat and also provide trappers easy access to the remaining fragmented



forest. “Trapping pressure is quite phenomenal on these animals. If there is a large amount of access to an area, then you can count on 50 to 100 percent of them being taken a year,” says Ian Thompson, a research scientist with the Canadian Forest Service.

Thompson is nearing the end of a seven-year joint study with MNR and the University of Guelph on martens in post-logging and fire-regenerated forests near Kapuskasing and Ear Falls. In both areas, each covering a couple of thousand square kilometres, marten numbers continue to dwindle, according to Thompson, and the boreal forest now contains less marten habitat than it did 30 years ago. “It really becomes a question of how much older forest is out there for their use,” says Thompson. “How much habitat is needed to maintain the species?”



RUSTY BLACKBIRD

In April 2006, COSEWIC designated the rusty blackbird as a species of special concern on the basis of evidence of one of the steepest population declines of any boreal bird. North American Breeding Bird Survey trends show that the population of this northern wooded wetland nester has been decreasing in the eastern boreal region by an average of 12 percent a year over the past three decades. Researchers for the forthcoming *Atlas of the Breeding Birds of Ontario* found evidence of the blackbird breeding in 17 percent of squares surveyed, compared with 22 percent 20 years ago.

Three-quarters of all rusty blackbirds nest in the boreal forest, and ongoing clearcutting in the north could further damage the vulnerable population by opening up their habitat to competition from red-winged blackbirds and grackles.

SHORTJAW CISCO Living in the deepest waters in at least 12 large lakes in northern Ontario, shortjaw ciscos are relatives of lake whitefish and grow up to 35 centimetres in length. Though they once accounted for 90 percent of the commercial catch on Lake Superior, overfishing nearly wiped them out on the Great Lakes and put them on the list of threatened species both nationally and provincially. Invasive rainbow smelt are





also believed to harm cisco, both through competition for food and possibly by eating their young. Logging road access increases the possibility of smelt being transferred to northern lakes via bait buckets or roe-contaminated boats and equipment.

WOLVERINE Like caribou, wolverines travel great distances. Males roam up to 50 kilometres a day and occupy home ranges of 500 to 3,000 square kilometres of relatively undisturbed habitat. Females have a low reproductive rate, not mating until they are about three years old.

The wolverine's once nearly Ontario-wide range has been reduced to the most remote corner of the province, around

Red Lake and Sioux Lookout to the northwestern shore of James

Bay. The population, estimated at anywhere from in the hundreds to the low thousands, was designated as threatened provincially in 2004 and as of special concern nationally in 1989. Although wolverines aren't quite as shy of

human encroachment as caribou, little is known of their precise habitat needs or the point at which forest fragmentation and increased pressure from wolves, trappers and snowmobiles will drive this species away. "It's really a hard puzzle to work out and we're not there yet," says Justina Ray, director of the Wildlife Conservation Society Canada and one of the chief



researchers in the Ontario Boreal Wolverine Project, the first field study of wolverines in the lowland boreal forest.

In October 2005, MNR established a wolverine recovery team, charged with drawing up a strategy for conserving the species. Ray believes that for such recovery strategies to be effective, however, their recommendations need to be made binding, rather than advisory. An improved Endangered Species Act, she adds, would have a cumulative effect for all species at risk. "If we do a good job with caribou, given the extreme needs they have, it will do a lot for wolverines."

SOLITARY SANDPIPER

Scattered throughout inaccessible spruce and musket ponds and lakes, the solitary sandpiper is an enigmatic boreal bird that seems to be receding even further into obscurity. While the reclusive wader has not been assessed as a species at risk, its incidence in the southern portion of the boreal forest region has declined significantly. It is not known whether the cause of the decline is to be found in the north, or in the birds' wintering grounds, which stretch as far south as Argentina. But because this species is the only sandpiper in the western hemisphere to nest in trees, in the old nests of rusty blackbirds, robins and other songbirds, it may be particularly vulnerable to wide-scale forestry operations.



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