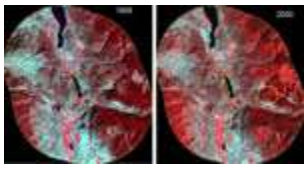
Canada's Wild Places Seen From Far-Off Spaces

The Kendall Island Migratory Bird Sanctuary in the Mackenzie River Delta is the site of two confirmed natural gas fields. It is also a seasonal sanctuary for more than 60,000 shorebirds. Photo: Steve Allan © Environment Canada, 2007. - Click to enlarge image.

Canada is large, nearly 10 million square kilometres of varied landscapes and population levels, and wilderness places are generally remote and rugged. These great distances prevent frequent visits by scientists to "spot-check" wildlife and habitat health. They also pose great challenges for enforcement officers trying to catch infractions of wildlife laws.

There is more going on in Canada's vast wilderness than you might expect. Nature is in a state of constant change, which is one of the challenges of protecting wildlife habitat. Over time, natural changes can be complicated by human changes such as new roads or agriculture. Land management decisions made today must account for potential changes in the landscape in coming years. And today, changes in climate add another element of uncertainty.

Wildlife habitat is under pressure from all sides and monitoring and law enforcement methods must keep up with increasing change even in the most isolated places. Canada needs a large presence to help watch over the land.



The Vaseux-Bighorn National Wildlife Area in British Columbia, habitat for many rare species, is affected by activities in the highly-populated south Okanagan Valley. The yellow circle in this satellite image indicates changes due to forestry. Photo: © Environment Canada, 2006. - Click to enlarge image.

Satellites, such as Canada's recently launched RADARSAT-2, can help. Information collected from space can provide reliable monitoring at a consistent level across the nation, from the crowded southern border to the most far-flung iceberg in the north. Satellite data also combines well with other digital data to create dynamic maps, images and charts, which can be used in research, or to guide management and enforcement planning. These images show the landscape

as it appears from space but can also include vital facts, such as elevation or the distance from a given point to a lake, grassland or other wildlife habitat.

Space for Habitat

Environment Canada and the Canadian Space Agency are taking steps towards a national program for landscape monitoring supported by satellites. The project, Space for Habitat, is a cooperative pilot that brings together knowledge from governments, universities, industry and environmental organizations. These partners hope to improve wildlife management and enforcement over Canada's multiple landscapes using space-based technology.

Space for Habitat partners are evaluating this technology as a tool to monitor Canada's protected areas for illegal activities and for violations by permit holders, and to support legislation such as the *Species at Risk Act* and the *Migratory Birds Convention Act*. They are also developing methods to map and monitor migratory bird habitat in managed forests, to ensure forestry is carried out in compliance with laws to protect wildlife.

Satellite-based monitoring has been tested and proven effective for enforcement and conservation in Canada. For example, the Integrated Satellite Tracking of Oil Pollution project, or ISTOP, watches over seabirds in Canada's oceans by using satellite-based information to direct surveillance aircraft to suspected oil spill sites.

Space for Habitat partners are demonstrating how satellite information can be united with air- and land-based monitoring information and then used to make land management decisions. Also in development are computer models that combine different kinds of data to predict where, within a landscape, particular plants or animals might be found by recognizing the conditions for their habitat.

Wildlife Habitat in Protected Areas

GPS-enabled tablet computers enable officers to digitally record the time and date of a rare species discovery, such as Small-flowered Sand-verbena, to support habitat protection. Photo: Gordon Cox © Environment Canada, 2006. - Click to enlarge image.

Environment Canada's protected areas average 2,000 square kilometres per wildlife enforcement officer. At this scale, patrols alone are not enough to monitor 51 National Wildlife Areas and 92 Migratory Bird Sanctuaries. Space for Habitat puts satellite technology into the hands of wildlife enforcement officers in the form of hand-held computers. The tablet-style computers join satellite images with geographic reference points, interactive maps and the ability to record site-

specific data. Hand-held computers can be used during routine inspections of protected wildlife habitat to record illegal activities (e.g., non-permitted camping), significant changes, or sightings of rare species (e.g., plants or nests).

Currently, 11 officers from across Canada are trained and equipped through the pilot project. Enforcement officers are more effective in the field when they can record verifiable facts, such as time and place. Any information they record during an inspection or while doing groundwork for an investigation can be made available digitally to the justice system or future investigators. Also, some data can be shared with wildlife scientists to play a role in research and management or to build national inventories of rare species.

Beyond Protected Areas: "Managed Landscapes"

Canada's natural resources are the basis for the nation's wealth - from minerals to energy to forests. We are the world's foremost exporter of newsprint, for example. At the same time, these resources are part of the basis for global environmental health. Another example: some three billion birds fly north to raise their young in Canada's boreal forests every spring. Protecting these assets is imperative.

A glance at Canada's forest sector hints at the extent of landscape change and its implications for wildlife management. More than 30 per cent of Canada's landscape is made up of forests. One million hectares of forest were harvested in Canada in both 2005 and 2006. Christmas trees alone accounted for one million harvested trees in 2005. There can be no doubt that industrial activity, not just forestry, is making changes to the landscape on a large scale.

Environment Canada has long-established experience in wildlife research and management for migratory birds. Space for Habitat partners are coordinating capacity, information and technology to design a system that works for regulators (e.g., federal or provincial legislation) and regulated industries (e.g., forestry or energy companies). This is an exercise in cooperation.

The forestry industry has provided test logging sites in three different forest landscapes. They are sharing or creating digital maps of the company's planned activities. Also needed are satellite images of the test sites and digital geographic information (i.e., GPS location) collected directly on site. This collection of data allows Space for Habitat partners to analyze the available data and develop test methods that will support a range of conservation goals, well beyond forestry.

In an unpredictable climate and shifting landscape, wild plants and animals need access to healthy wild places more than ever before. With the right tools and information, land management decisions can take into account current and possible change coming in the future. Satellite-based information supports those decisions and contributes to follow-up monitoring and evaluation. In uncertain times, Canada's wild places need a watchful presence and the power of technology to balance wealth and health.