MAPPING OUR SHARED ENVIRONMENT

North American Environmental Atlas

www.cec.org/naatlas

Publication details

This portfolio was assembled by the Secretariat of the Commission for Environmental Cooperation as a supplement to the Executive Director's presentation to Council at the Seventeenth Regular Session of the CEC Council, 16-17 August 2010, in Guanajuato, Mexico. It was developed in partnership with the organizations listed below.

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Where We Are

Mapping North America's shared environment

This portfolio features a selection of maps that illustrate the unique and harmonized geographic information contained in the *North American Environmental Atlas*. Each of the 13 maps presented here is accompanied by a series of examples showing how other users have applied data from the map layers to analyze or synthesize environmental information. These examples are not exhaustive; rather, they provide samples of how these data can be used in a variety of practical applications.

A North American Partnership

The *North American Environmental Atlas* was created through a collaboration of the Commission for Environmental Cooperation and three national agencies: Natural Resources Canada, The United States Geological Survey and Mexico's *Instituto Nacional de Estadística y Geografía*. Scientists and mapmakers from these agencies, along with others in each country, produced the information contained in the Atlas. The collection of viewable maps, data and downloadable map files is available without cost online at: **www.cec.org/naatlas**.

Preface

Geospatial information provides decision makers with fundamental information about nearly every environmental issue.

The *North American Environmental Atlas* demonstrates how layers of data can be displayed seamlessly on maps, providing analytical tools to examine and confront environmental problems across North America. We count on this information to understand and manage the impacts of climate change, conserve key ecoregions and habitat, understand the distribution of pollutants and even inform our personal lives.

These maps from the *North American Environmental Atlas*—ranging from base maps of rivers and roads to detailed thematic maps—were developed through a trilateral partnership of national agencies and the Commission for Environmental Cooperation under the direction of the North American Atlas Coordination Group (NAACG). They show how third parties have applied these maps to their own analytical needs by layering the data in a variety of ways.

I invite you to examine this portfolio and learn more about how geospatial information can help us protect North America's shared environment.

For more information, please take a look at the full set of maps, data files and interactive map viewer at: **www.cec.org/naatlas**

Evan Lloyd

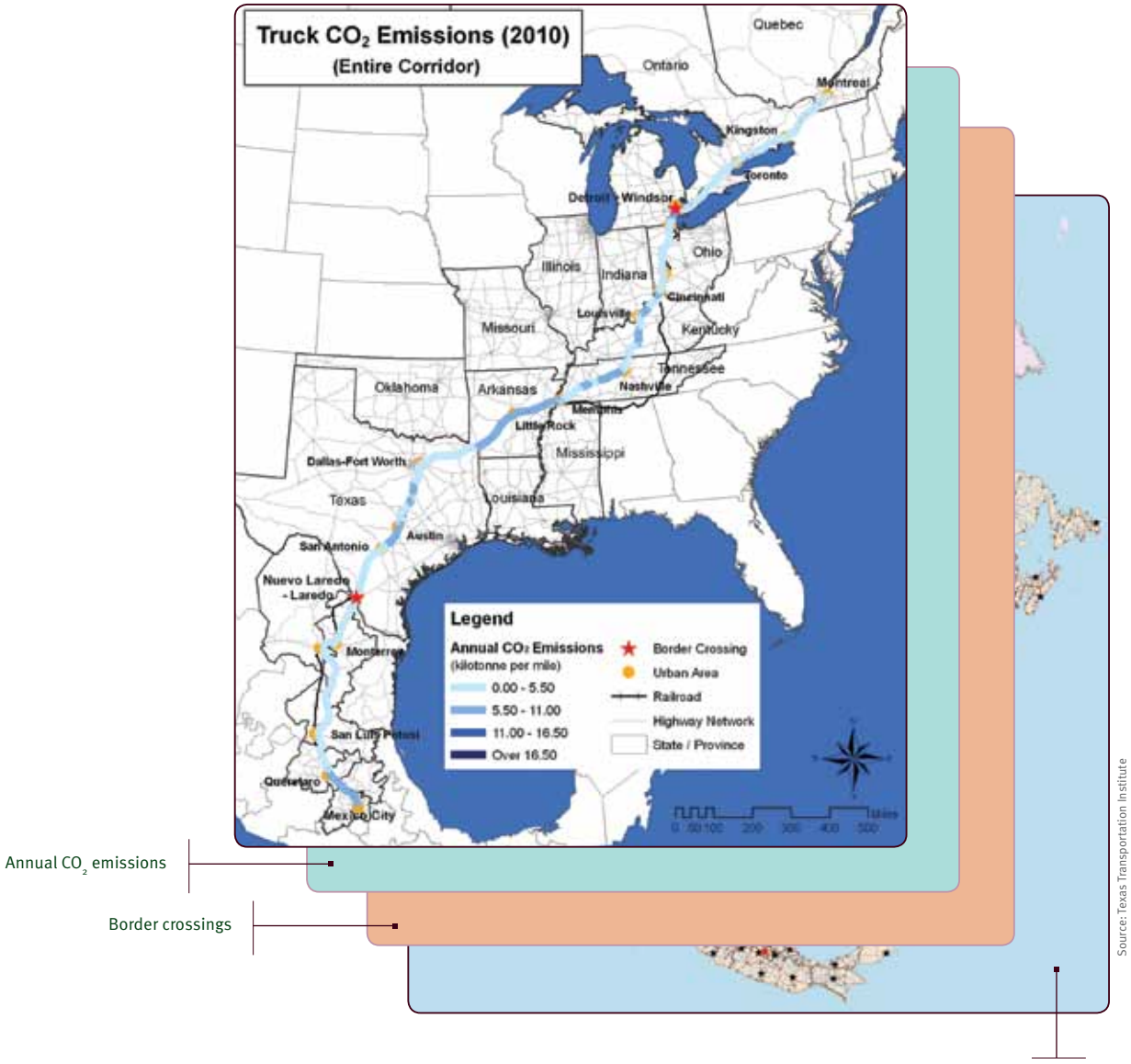
Executive Director
Commission for Environmental Cooperation


National Capital
State/Provincial Capital
Major City
Major Highways
Secondary Highways
Ferry Routes
Railroads
Rivers
Lakes and Reservoirs
Glaciers and Sea Ice
Hawaii (U.S.)
0 250 500 1,000 km
N

Base Map

CREATED 2004

This base map of North America was created in 2004 by harmonizing data between the three nations to depict natural and man-made features in a consistent manner across the North American region. The printed version was broadly distributed in the region. The map's layers include political boundaries (international and state/provincial), major roads, railroads, populated places, glaciers and sea ice, and bathymetry (the depth of water bodies). The base map thus forms the foundation upon which a variety of thematic data can then be laid for display and analysis at the North American scale, as demonstrated by the two examples on the next page.



Transportation

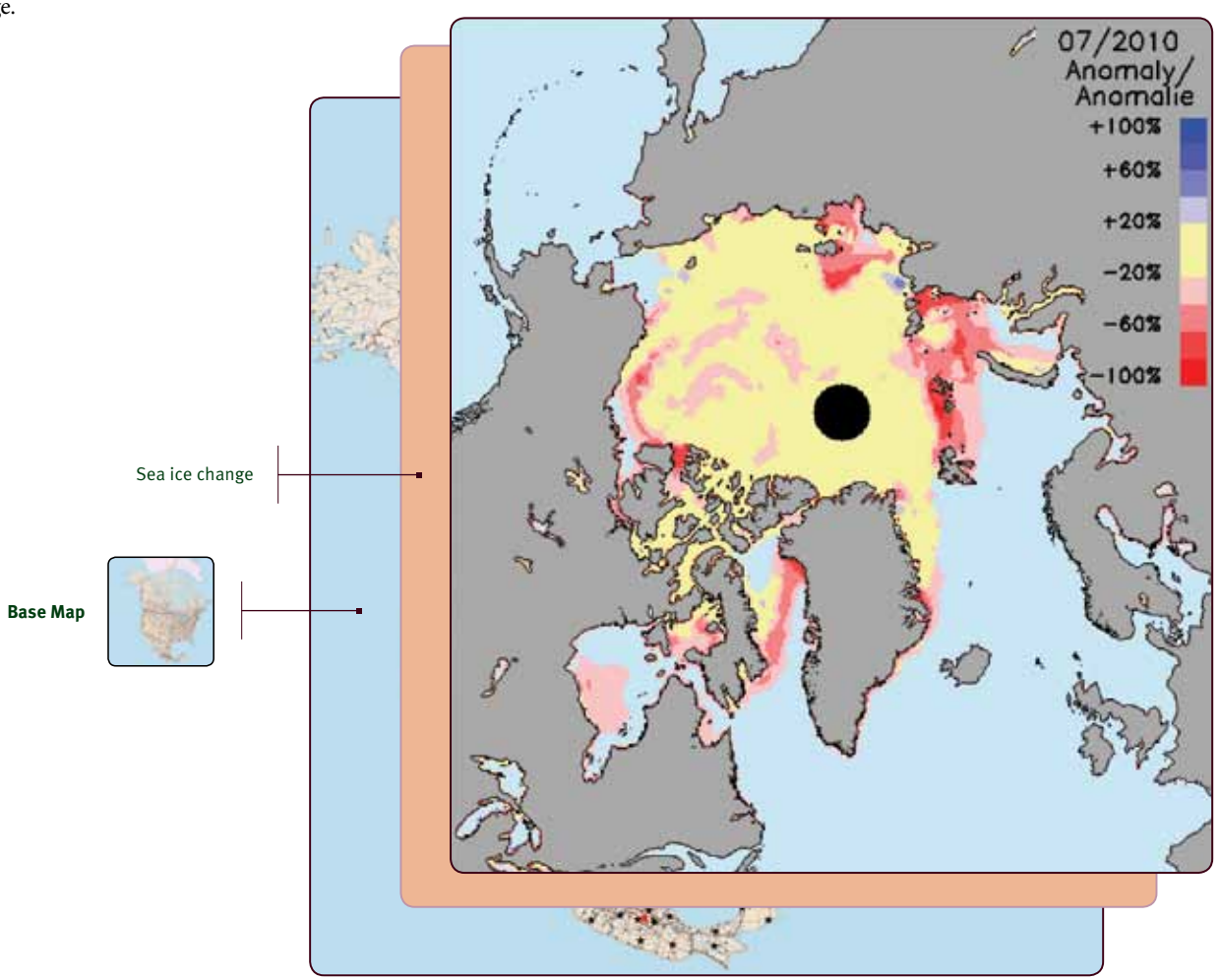
The base map's layer of data, indicating major roads across North America, is useful for transportation analysts and planners. In this example, the Texas Transportation Institute calculated estimated annual CO_2 emissions along the major highway corridor from Mexico to Canada.

■ This information can help planners and enforcement officers track the movement of goods across the continent and allow policy makers to plan for a more sustainable continental transportation system.

Sea ice

One of the North American base map's foundation features is the location and extent of sea ice. In 2009, Environment Canada's weather office used these data in its climate analysis and modeling. As shown in this image, it was able to map change by measuring the departure from normal (anomaly) of sea ice extent across the northern portion of North America and the Arctic Ocean.

■ This kind of information and the way it is displayed is useful to scientists who track climate and other environmental change.



Source: Environment Canada

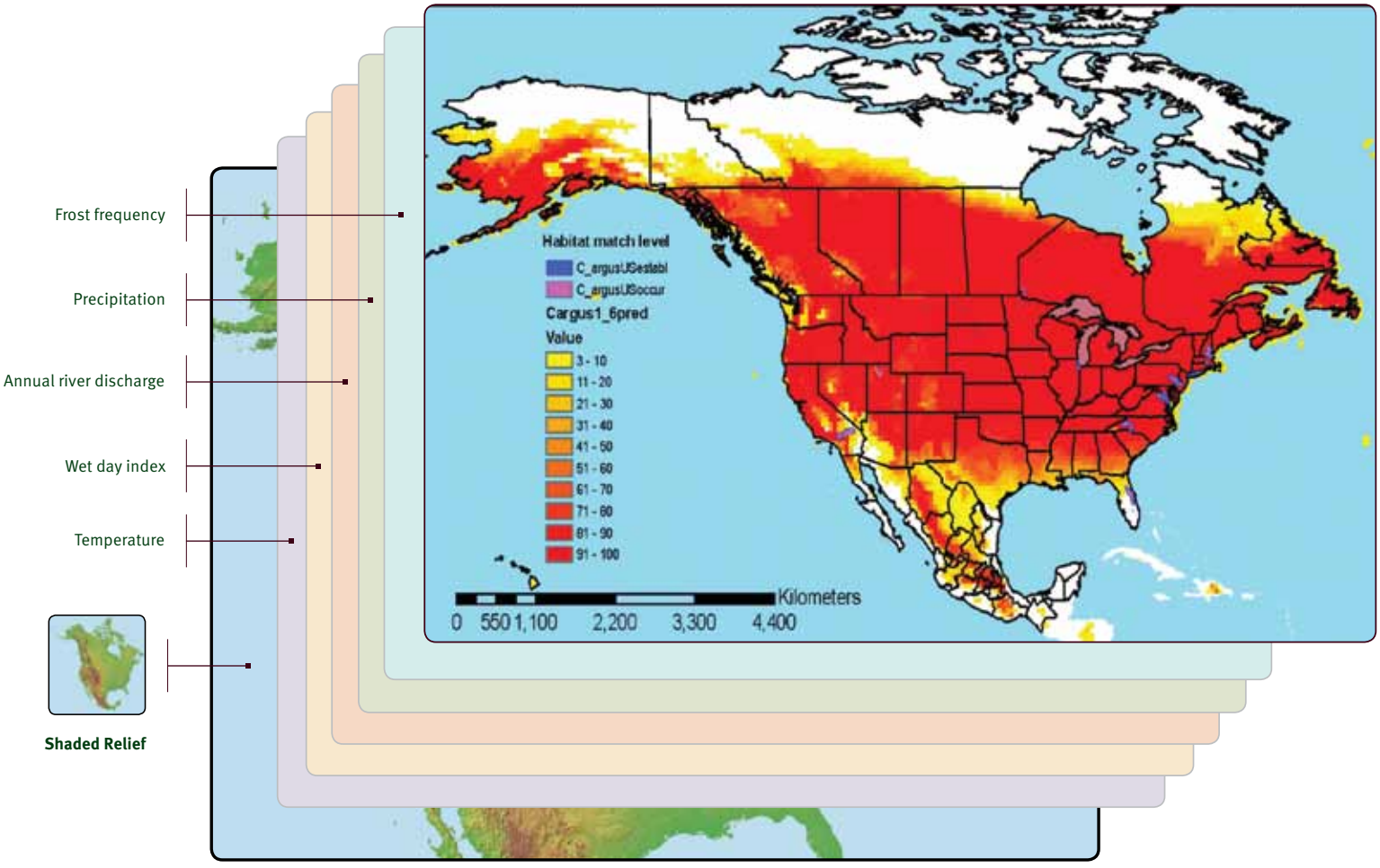

Elevation (meters)
High: 5930
Low: -76
Hawaii (U.S.)
0 250 500 1,000 km
N

Shaded Relief

CREATED 2007

This relief map uses data on elevation from mean sea level and 3D relief data to provide a striking image of North America's varied terrain. Shaded relief data and maps can be used in a number of ways; for example, wildlife managers can plot elevation preferences for certain species along with other habitat information to inform their decisions.

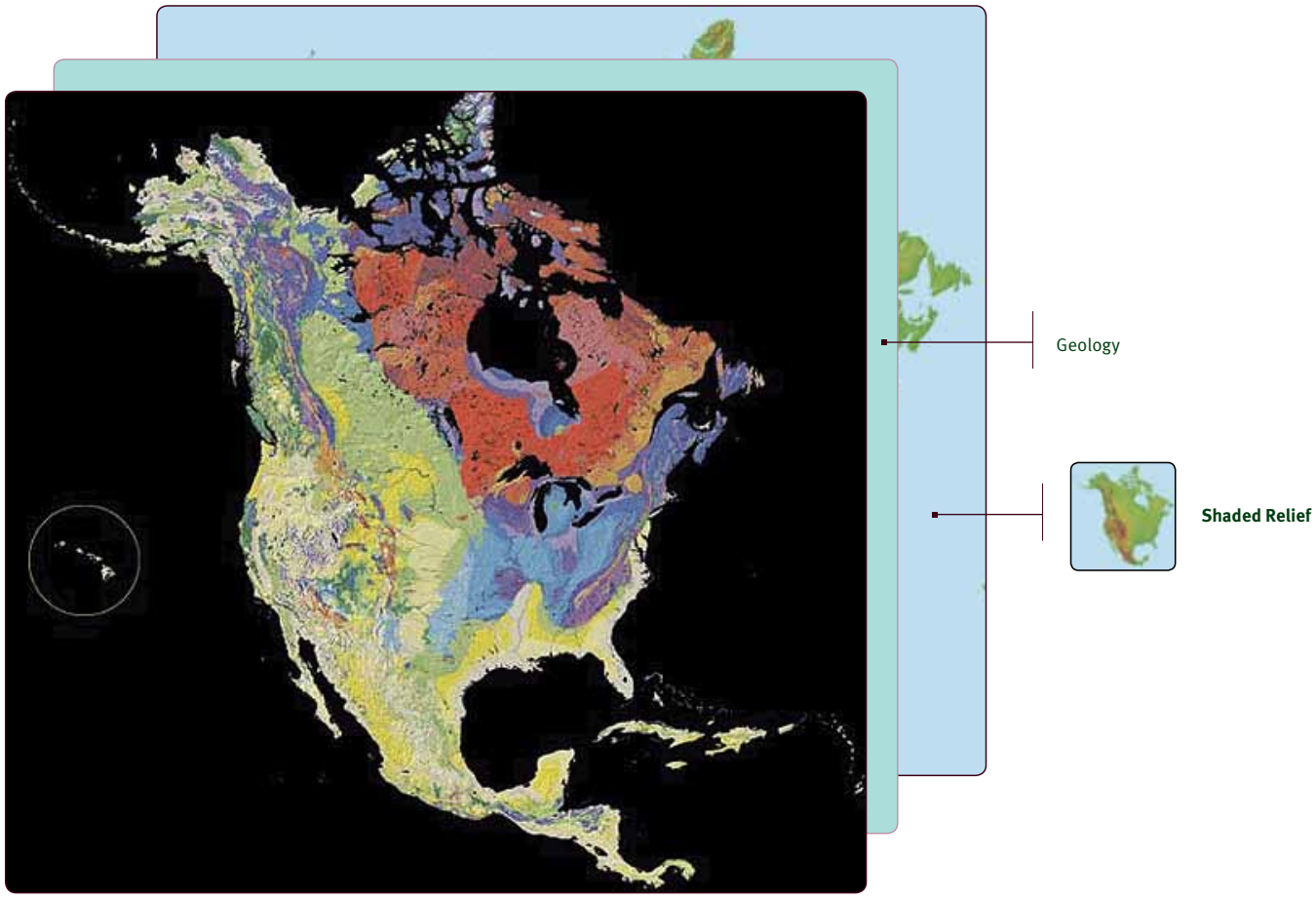
This map is from the GTOPO30 global digital elevation model with a resolution of approximately 1 kilometer.



Invasive species

In 2009, the CEC supported an exercise to model the potential North American distribution of the Northern Snakehead, an invasive species. Shaded relief was one of the necessary data layers, which included slope, a derivative of shaded relief. Other data were air temperatures, a wet-day index, annual river discharge, precipitation, and frost frequency.

■ Such maps, which show levels of habitat match for certain species, are important for wildlife managers in developing strategies and policies to combat invasive species and protect threatened ones.



Source: United States Geological Survey

Geology

This beautiful map is called the North America Tapestry of Time and Terrain. In 2000, the geological survey offices of the three countries created it by combining the shaded relief and geologic maps of North America. The resulting image shows the events and processes that shaped the continent over the last 2.6 billion years, including mountain-building, river erosion and deposition and ice-cap glaciation.

■ This information is useful for geologists, climate change modelers and hydrologists, among others.


Level II: Major River Basins
Arctic Ocean Seaboard
Mackenzie River
Atlantic Ocean Seaboard
St. Lawrence River
Gulf of Mexico Seaboard
Mississippi River System
Rio Grande
El Salado
Hudson Bay Seaboard
Nelson River
Pacific Ocean Seaboard
Yukon River
Fraser River
Columbia River
Colorado River
Great Basin
Caribbean Sea Seaboard
Foreign Areas
Level III: Mississippi Sub-Basins
Arkansas/Red River
Mississippi River (trunk)
Missouri River
Ohio River
Hawaii (U.S.)
0 250 500 1,000 km
N

Watersheds

CREATED 2006, UPDATED 2010

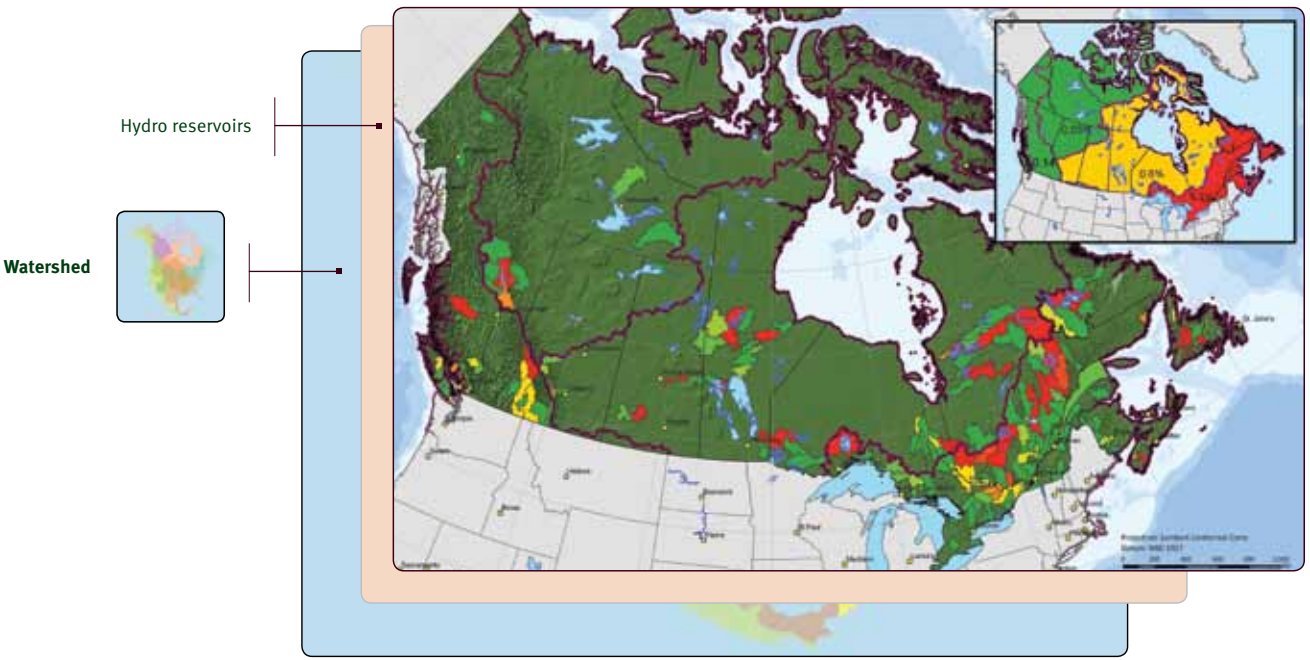
North American drainage basins or watersheds flow into the oceans, bays and seas that surround the continent: the Atlantic Ocean, Hudson Bay, the Arctic Ocean, the Pacific Ocean, the Gulf of Mexico and the Caribbean Sea. This map features four levels of watersheds that cover the continent in a hierarchy from the largest that drain into oceans and seas to smaller more detailed basins: there are six watersheds that drain into oceans, 20 major river basins and sub-basins and hundreds of local watersheds.

NASA

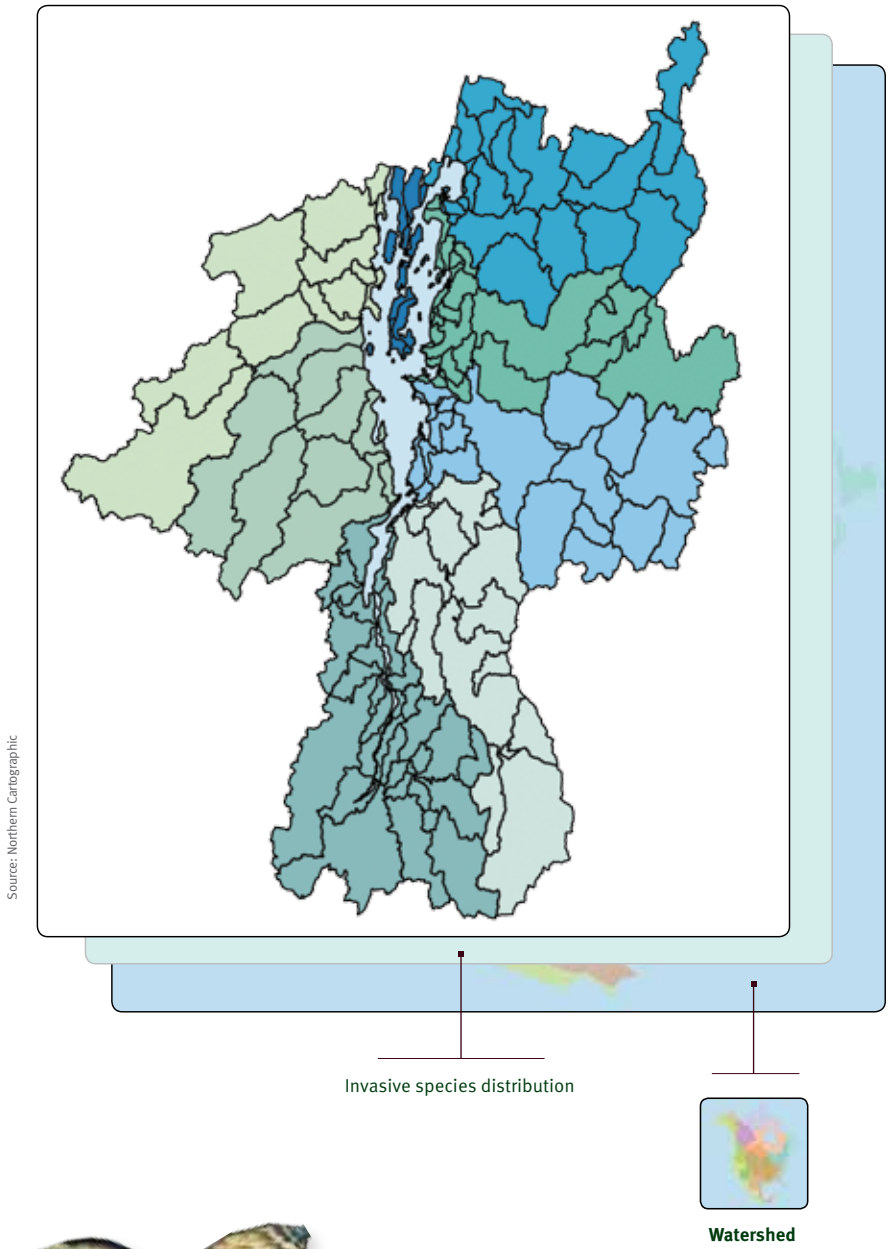
Hydro Power

In 2010, Global Forest Watch Canada created this image from jurisdictional data to display the proportion of the country's watersheds covered by hydro reservoirs. The North American watersheds map identified five major water basins in Canada; of these, the Atlantic Ocean and the Hudson Bay watersheds contain the vast majority (86.2%) of hydro power reservoirs and dams.

■ This type of information is important for flood control and irrigation management.



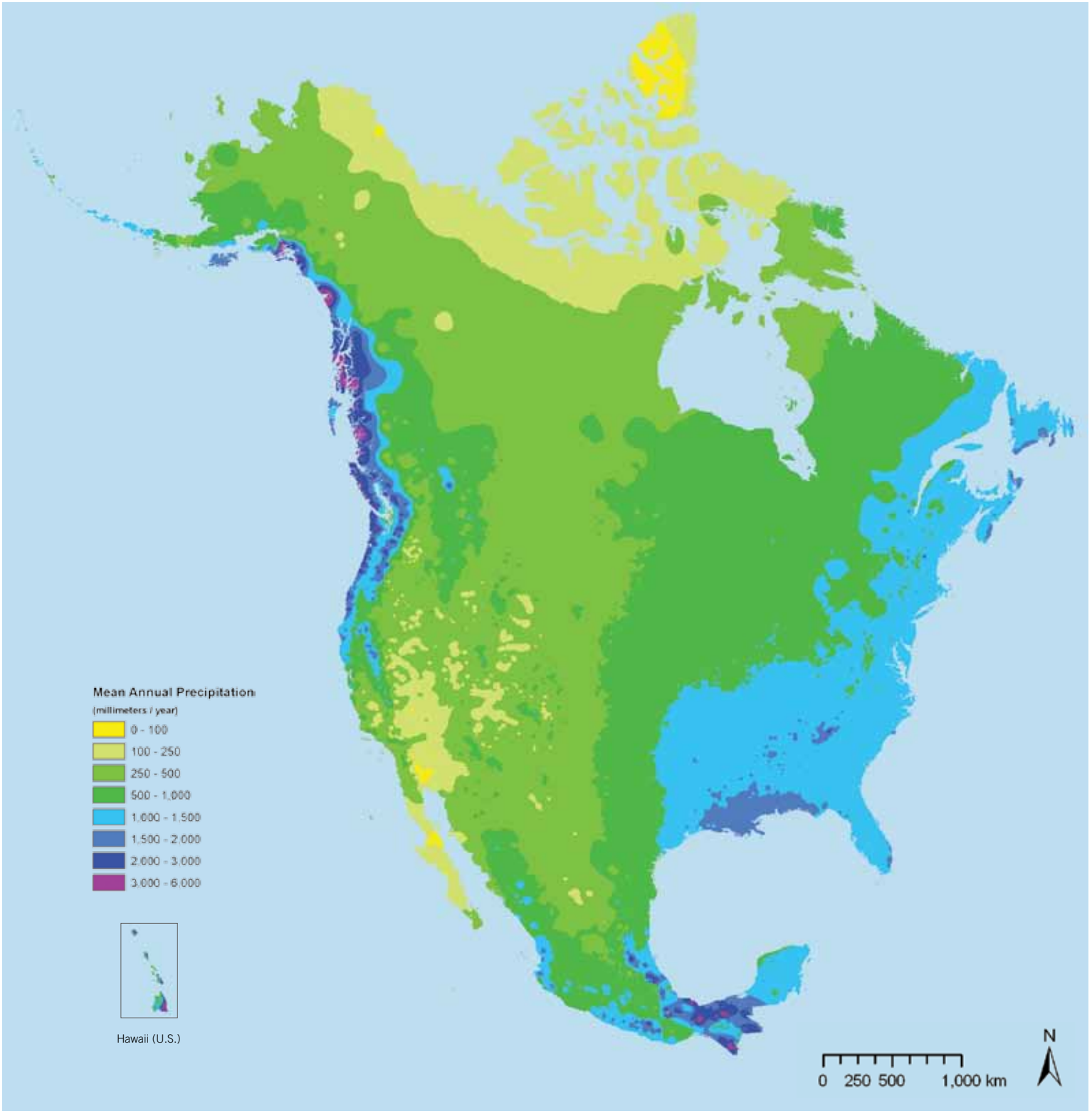
Source: Global Forest Watch Canada



Invasive species

This is an image of a single watershed, the Lake Champlain Basin, which crosses the U.S.-Canada border. The two countries cooperate in managing the watershed as a unit in their mutual effort to control the spread of invasive aquatic species such as the zebra mussel.

■ The map helps managers prepare and implement watershed-level action plans to locate invaders, control the damage and prevent further invasions.


Mean Annual Precipitation
(millimeters / year)
0 - 100
100 - 250
250 - 500
500 - 1,000
1,000 - 1,500
1,500 - 2,000
2,000 - 3,000
3,000 - 6,000
Hawaii (U.S.)
0 250 500 1,000 km
N

Precipitation

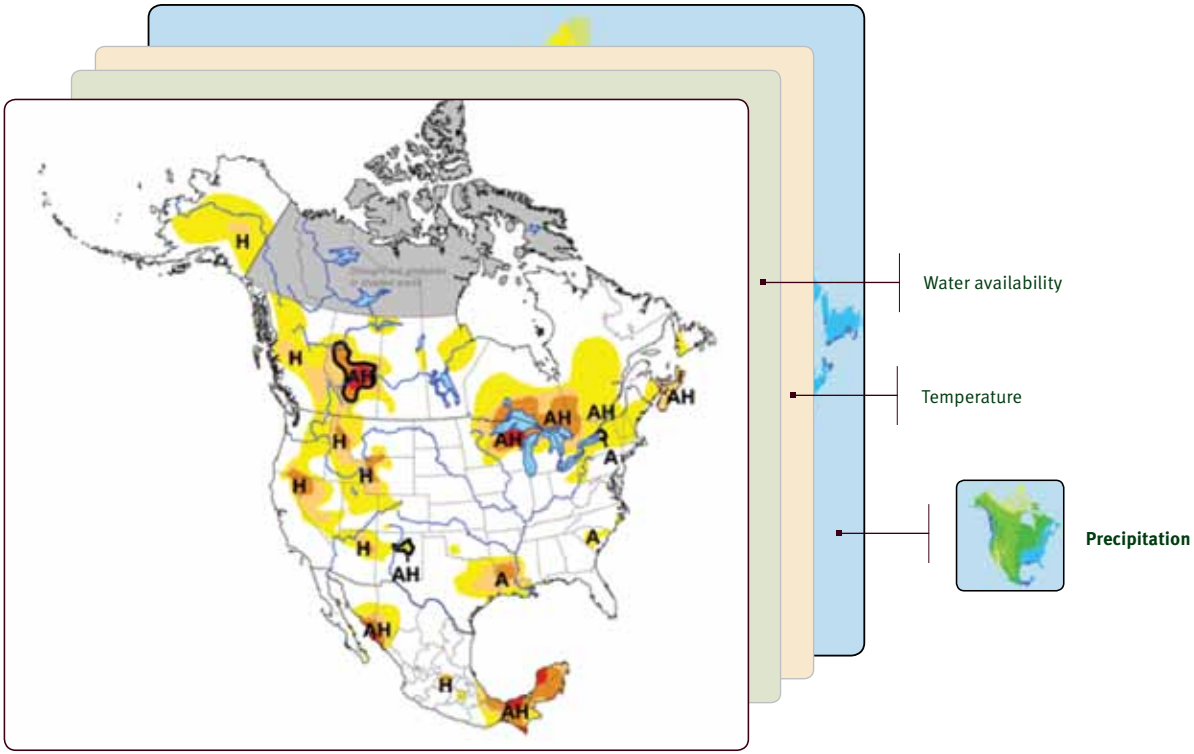
CREATED 2004

This map shows mean annual precipitation across North America for the period 1951–2000. As shown in the examples that follow, maps of precipitation distribution and trends, alone or overlain by complementary data, are useful for farmers, climate-change scientists and foresters, and for disaster preparedness (floods, droughts and wildfires, for example) and related policy making.

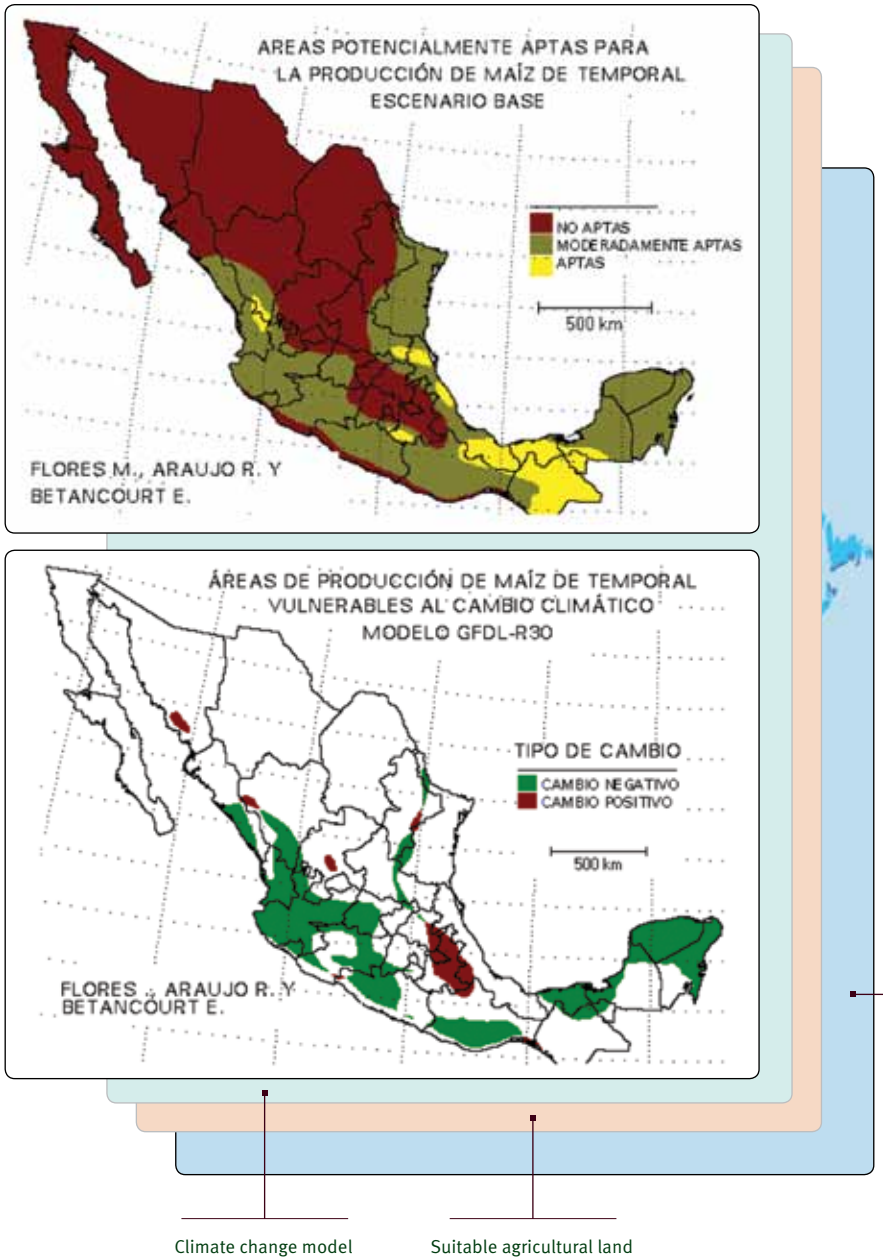
Drought

This is an example of a map from the North America Drought Monitor showing levels of drought severity across the continent on a particular day. The Drought Monitor, a cooperative effort between drought experts in Canada, Mexico and the United States, displays drought conditions across the continent on an ongoing basis. The maps use data on continental precipitation as one of the key input layers.

■ Information on drought levels is important to farmers, water experts and decision-makers.



Source: North America Drought Monitor



Source: Dr. Carlos Gay, Centro de Ciencias de la Atmósfera, UNAM

Climate change model

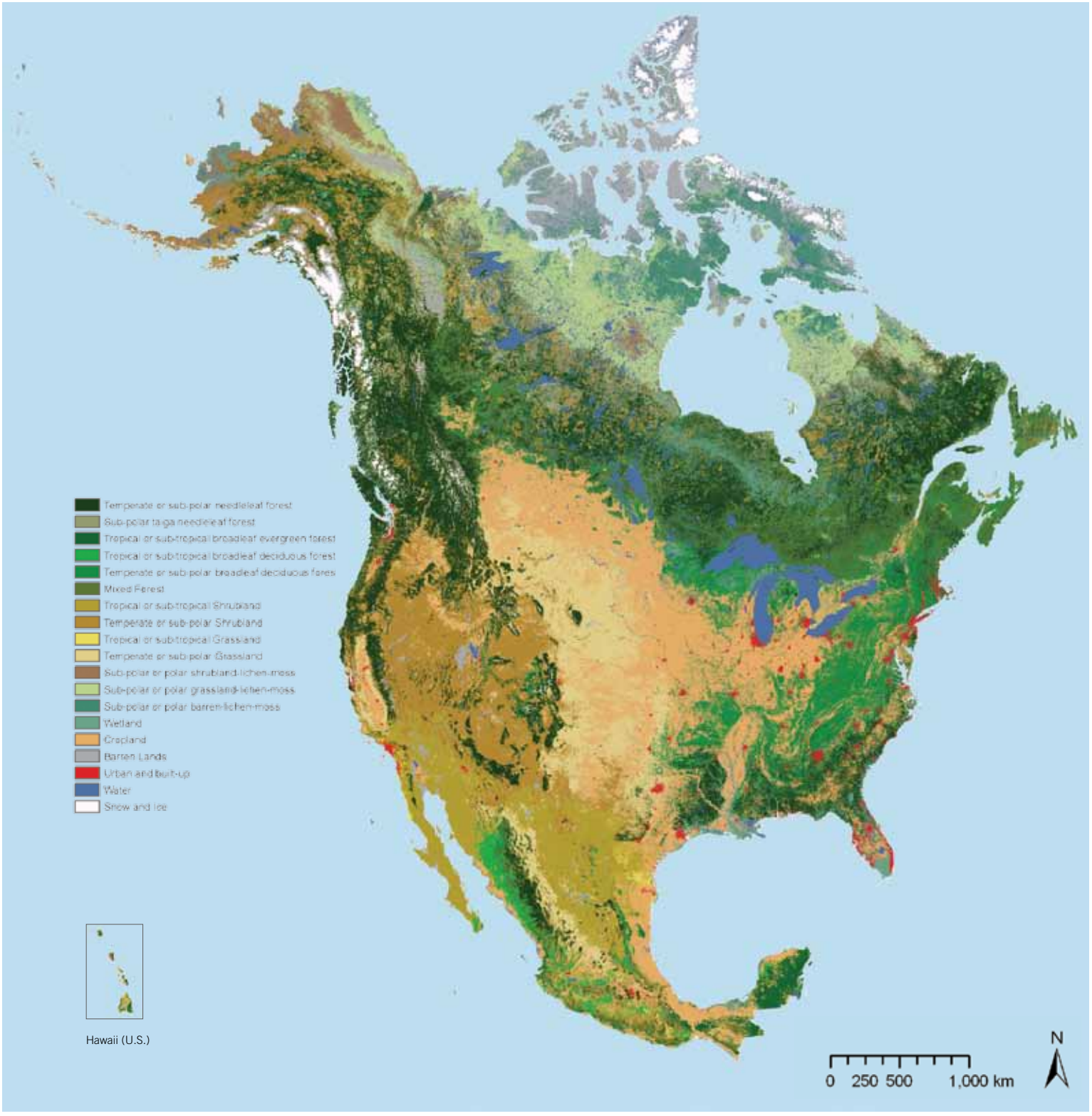
Suitable agricultural land

Precipitation

Food

Mapping precipitation data in Mexico was an essential component of these images that show areas of potential corn production and the negative and positive impacts climate change will have on harvests in those areas. Estimates of production change are based largely on predicted changes in precipitation patterns and amounts.

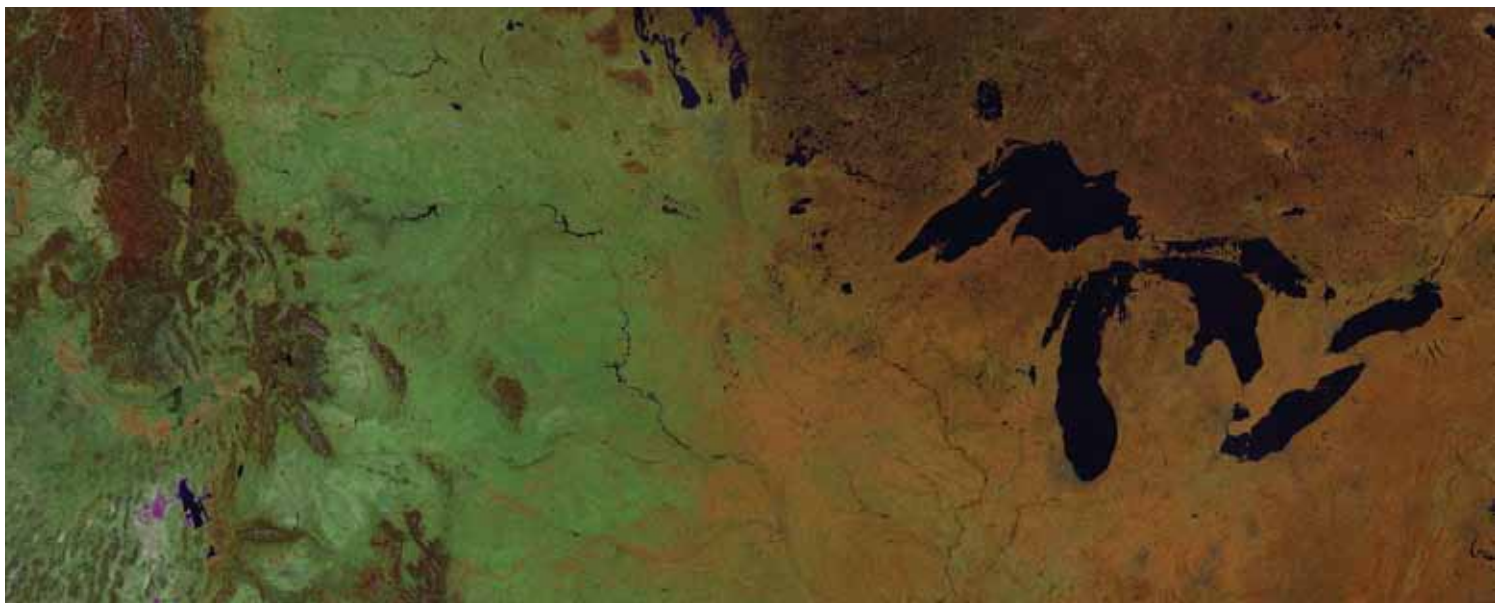
■ This information is essential for food security and agricultural planning.


Temperate or sub-polar needleleaf forest
Sub-polar taiga needleleaf forest
Tropical or sub-tropical broadleaf evergreen forest
Tropical or sub-tropical broadleaf deciduous forest
Temperate or sub-polar broadleaf deciduous forest
Mixed Forest
Tropical or sub-tropical Shrubland
Temperate or sub-polar Shrubland
Tropical or sub-tropical Grassland
Temperate or sub-polar Grassland
Sub-polar or polar shrubland-lichen-moss
Sub-polar or polar grassland-lichen-moss
Sub-polar or polar barren-lichen-moss
Wetland
Cropland
Barren Lands
Urban and built-up
Water
Snow and Ice
Hawaii (U.S.)
0 250 500 1,000 km
N

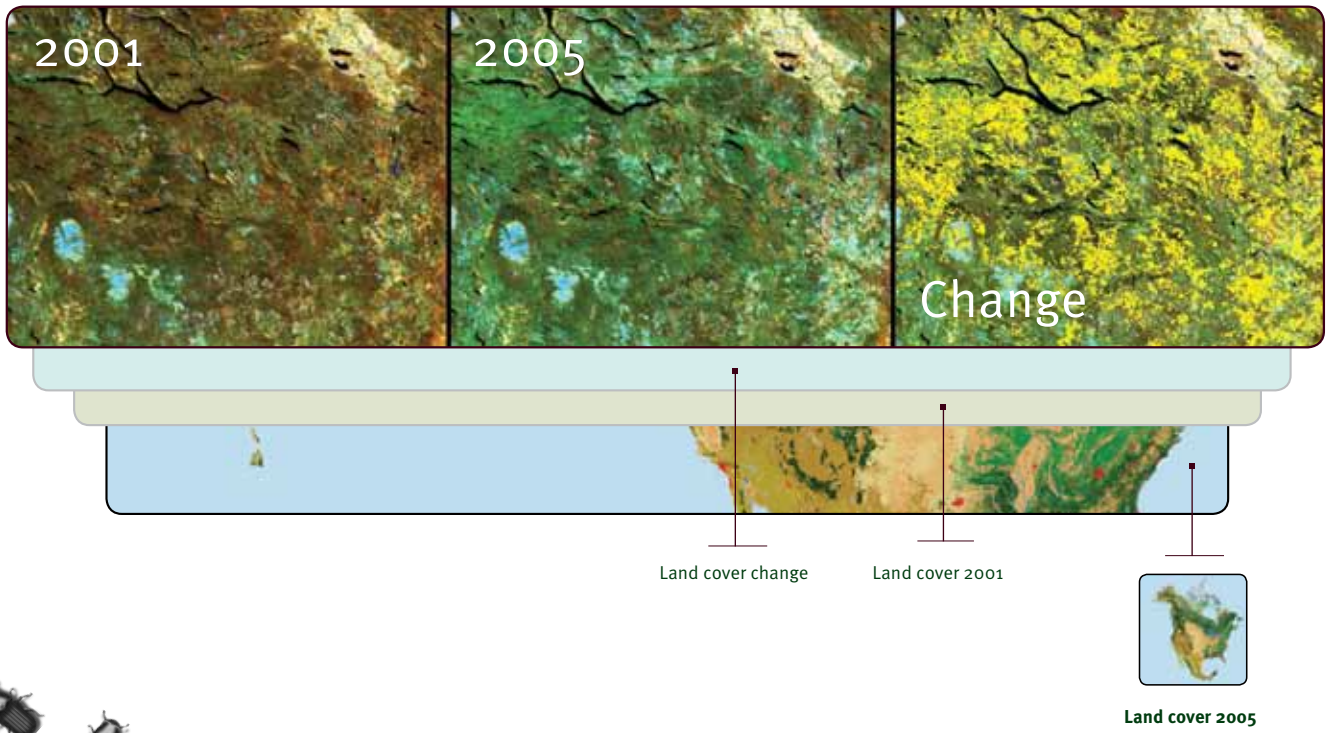
Land Cover 2005

CREATED 2009

This map was developed as part of the North American Land Change Monitoring System (NALCMS). There are 19 land uses shown in this image, as defined by the Land Cover Classification System (LCCS) of the UN Food and Agriculture Organization (FAO). Comparing land-cover maps over time is useful for noting changes from one use or landscape condition to another. It is especially important in identifying human-related impacts and providing crucial information to land managers and policy makers.



MODIS 2005 image processed by CCRS/NRCan



Source: CCRS/NR.Can

Lorraine MacLauchlan

Damage

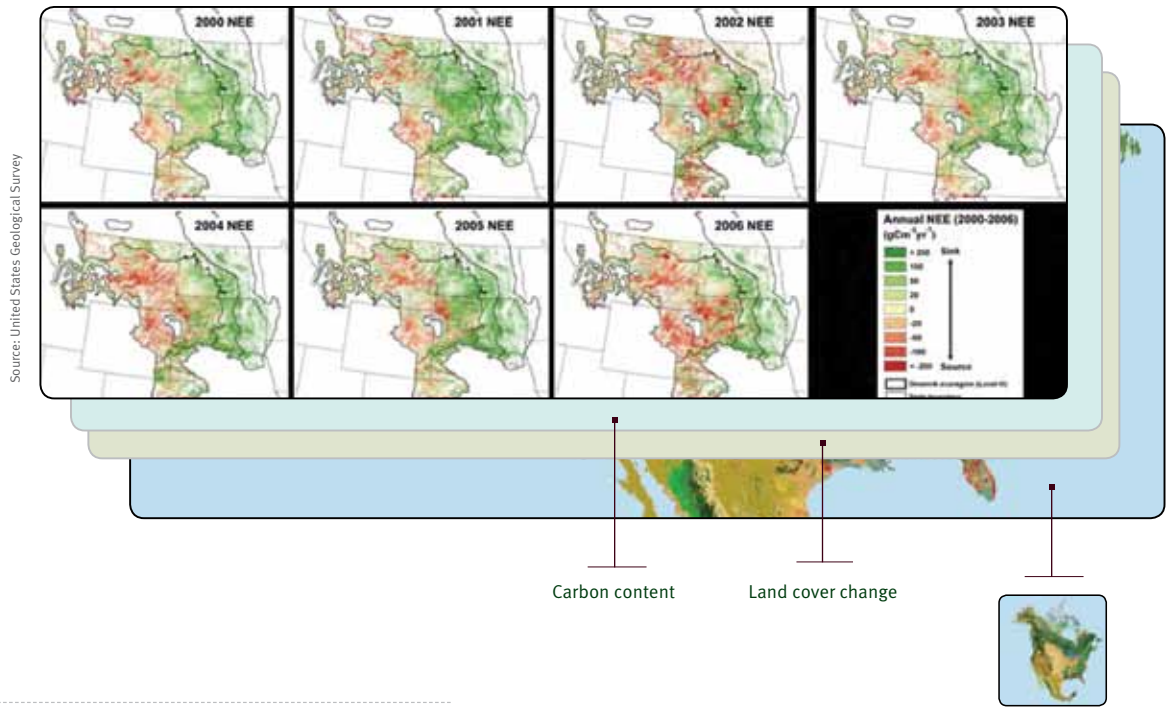
Displaying two or more satellite images of the same landscape at different time periods is a dramatic way to show accurate change on the ground. These two land cover images processed by the Canadian Centre for Remote Sensing (Natural Resources Canada/CCRS) in 2001 and 2005 reveal the extent of pine-beetle damage in Canada's temperate needleleaf evergreen forest.

■ Time-series images are important for tracking forest disturbance and to aid forest management and natural resource planning.

Carbon

Time-series images of land cover can reveal yearly differences in carbon exchange between the atmosphere and an ecosystem, which depends a great deal on variations in the climate. These images from the United States Geological Survey (USGS) show changes in grassland carbon content in the same area of the Northern Great Plains. They reveal when and how much the ecosystem is a sink or a source for atmospheric CO_2.

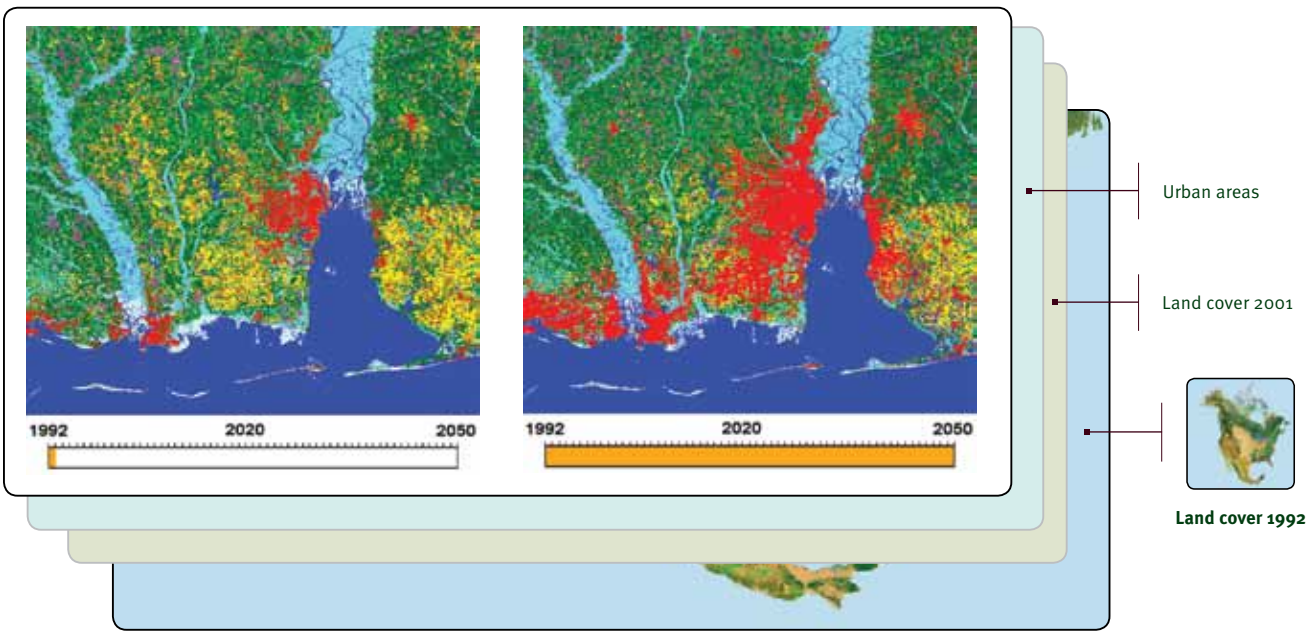
■ Estimates of net-carbon exchange across landscapes allow scientists to simulate climate-change scenarios that are important in informing policy.



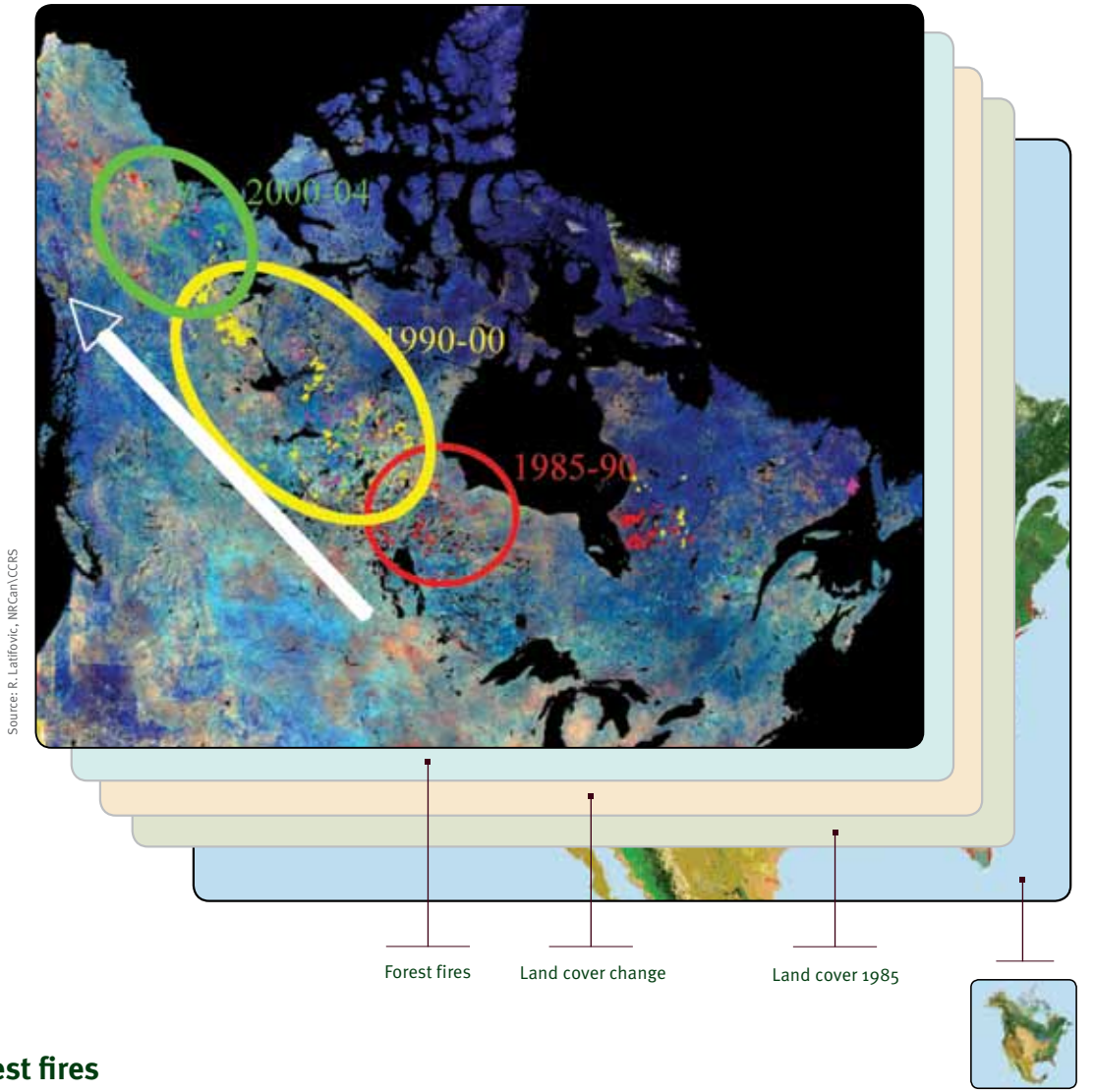
Urbanization

The United States Geological Survey (USGS) used real images of land cover change in Mobile, Alabama, starting in 1992 to predict future change extended out to 2050. Based on the present trajectory, they foresee a large increase in urban areas (red), especially along the coast.

■ Planners use such mapped forecasts to better understand and manage urbanization patterns.



Source: USGS



Forest fires

NR-Can/CCRS used land cover data from three time periods plotted on the same map to show the northward movement of boreal forest fires from 1985 to 2004.

■ This information is important for monitoring the effects of climate change and for predicting and managing forest fires.

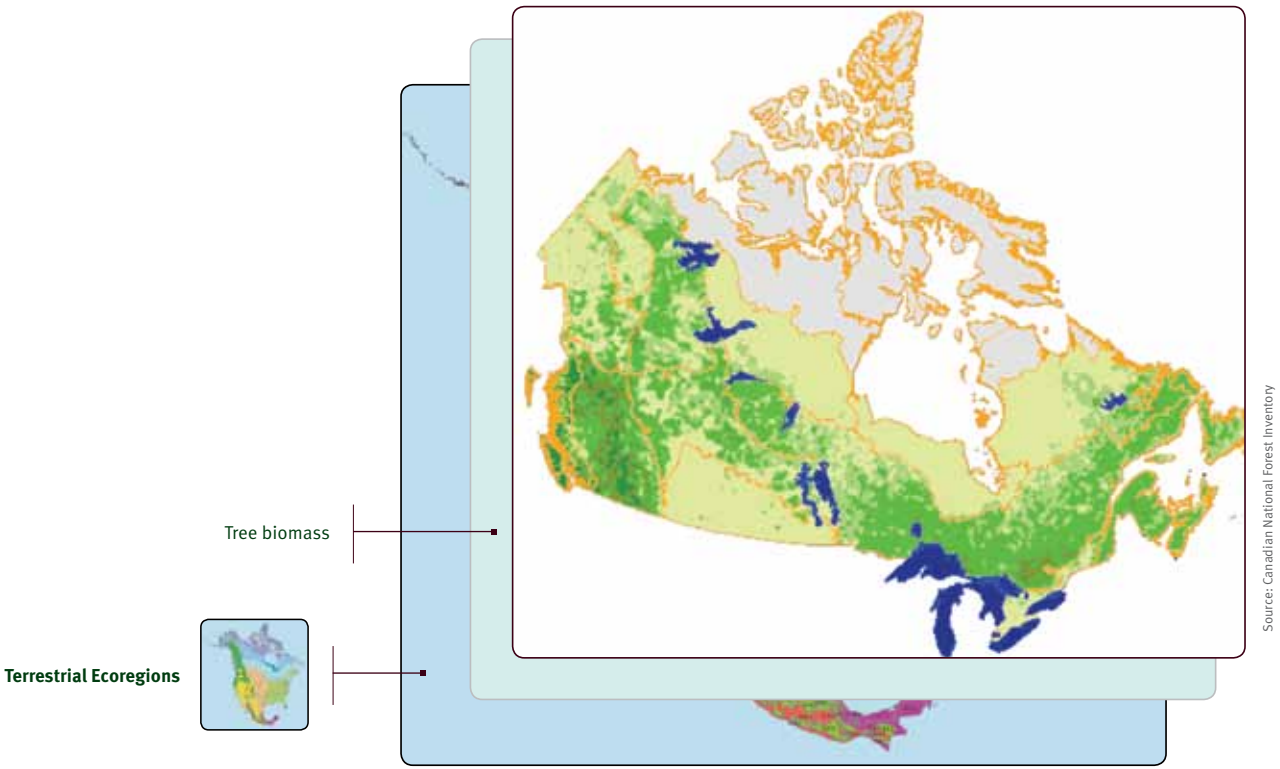

Arctic Cordillera
Tundra
Taiga
Hudson Plains
Northern Forests
Northwestern Forested Mountains
Marine West Coast Forests
Eastern Temperate Forests
Great Plains
North American Deserts
Mediterranean California
Southern Semi-Arid Highlands
Temperate Sierras
Tropical Dry Forests
Tropical Humid Forests
Hawaii (U.S.)
0 250 500 1,000 km
N

CONABIO

Terrestrial Ecoregions

CREATED 1997, REVISED 2006

Ecoregions are ecologically defined areas in which ecosystem resources are generally similar in type, quality and quantity. Level I, shown in this map, is the coarsest and divides North America into 15 broad ecological regions. Level II, describes in finer detail 52 ecological areas nested within the Level I regions. Level III, shown in this map, defines 182 even smaller ecological areas nested within Level II ecoregions. The maps, which reveal how ecosystems defy political boundaries, are useful for trilateral conservation efforts.



Source: Canadian National Forest Inventory

Forests

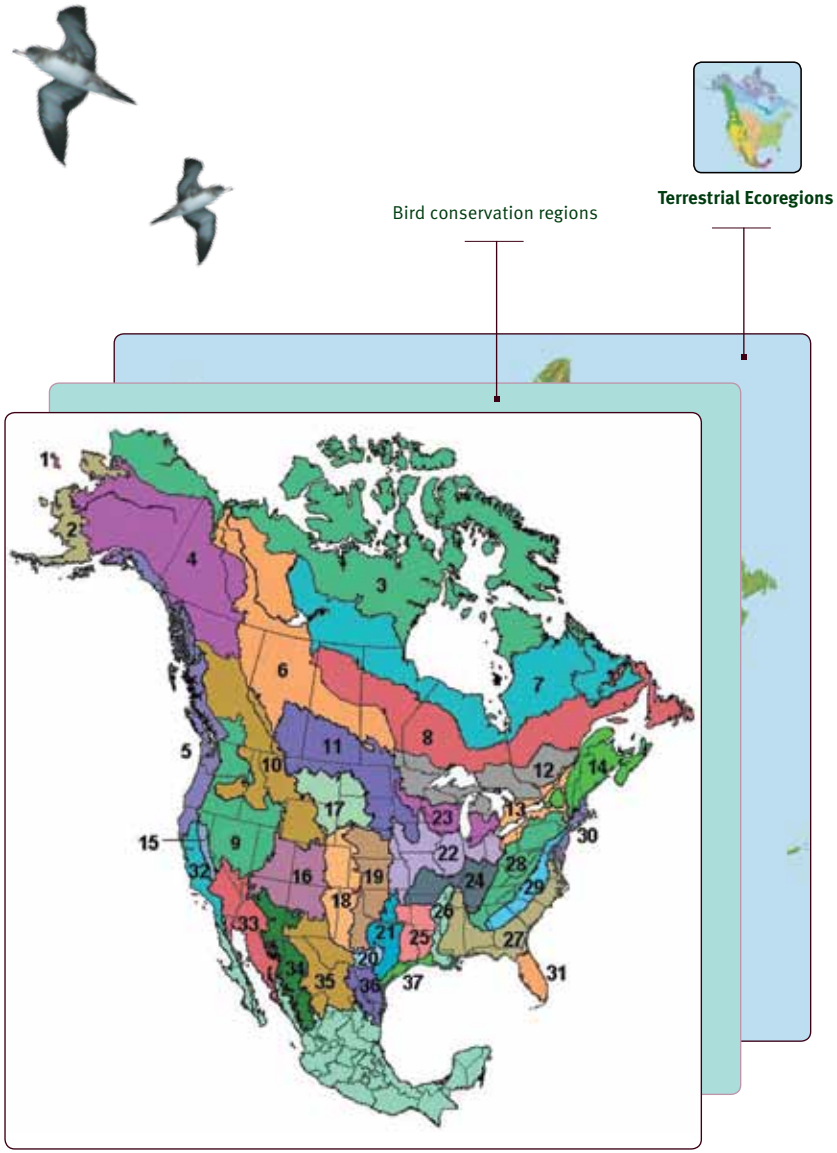
This image shows how the Canadian Forest Services has used terrestrial ecoregion divisions to organize 2006 National Forest Inventory data on biomass. The Forest Carbon Accounting program uses these data to model and report on forest carbon stocks as required under the Kyoto Protocol.

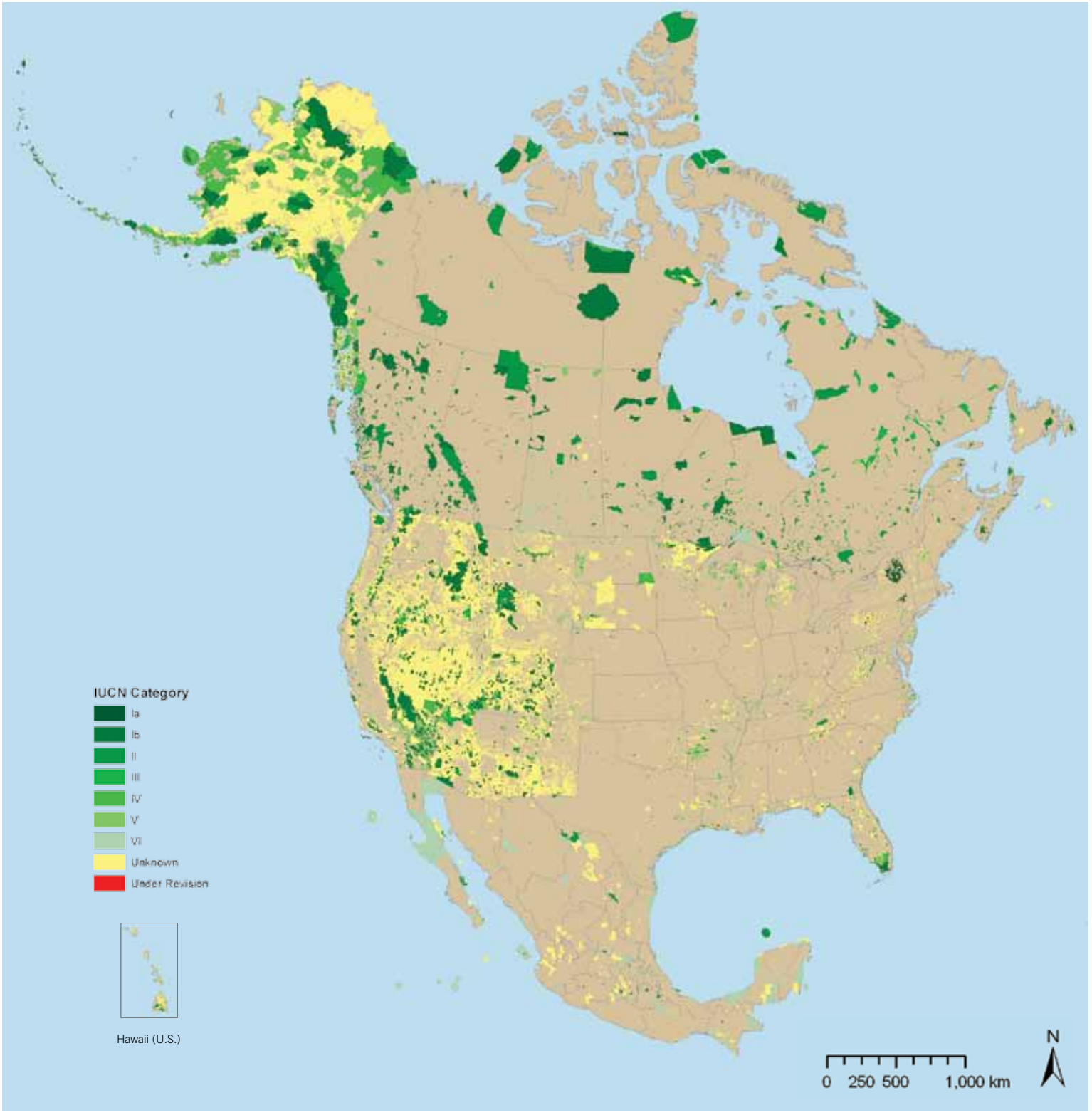
■ These data are also useful for managing forests, identifying human-induced disturbance and other land-use changes and developing forest-harvest schedules.

Bird distribution

This is a map of North American Bird Conservation Regions, laid upon Level III terrestrial ecoregions. These regions are ecologically distinct areas of relatively homogenous habitats and bird communities.

■ Because they cross state, provincial and national borders, the conservation regions and maps facilitate domestic and international cooperation in bird conservation.




IUCN Category
Ia
Ib
II
III
IV
V
VI
Unknown
Under Revision
Hawaii (U.S.)
0 250 500 1,000 km
N

Terrestrial Protected Areas

CREATED 2008, UPDATED 2010

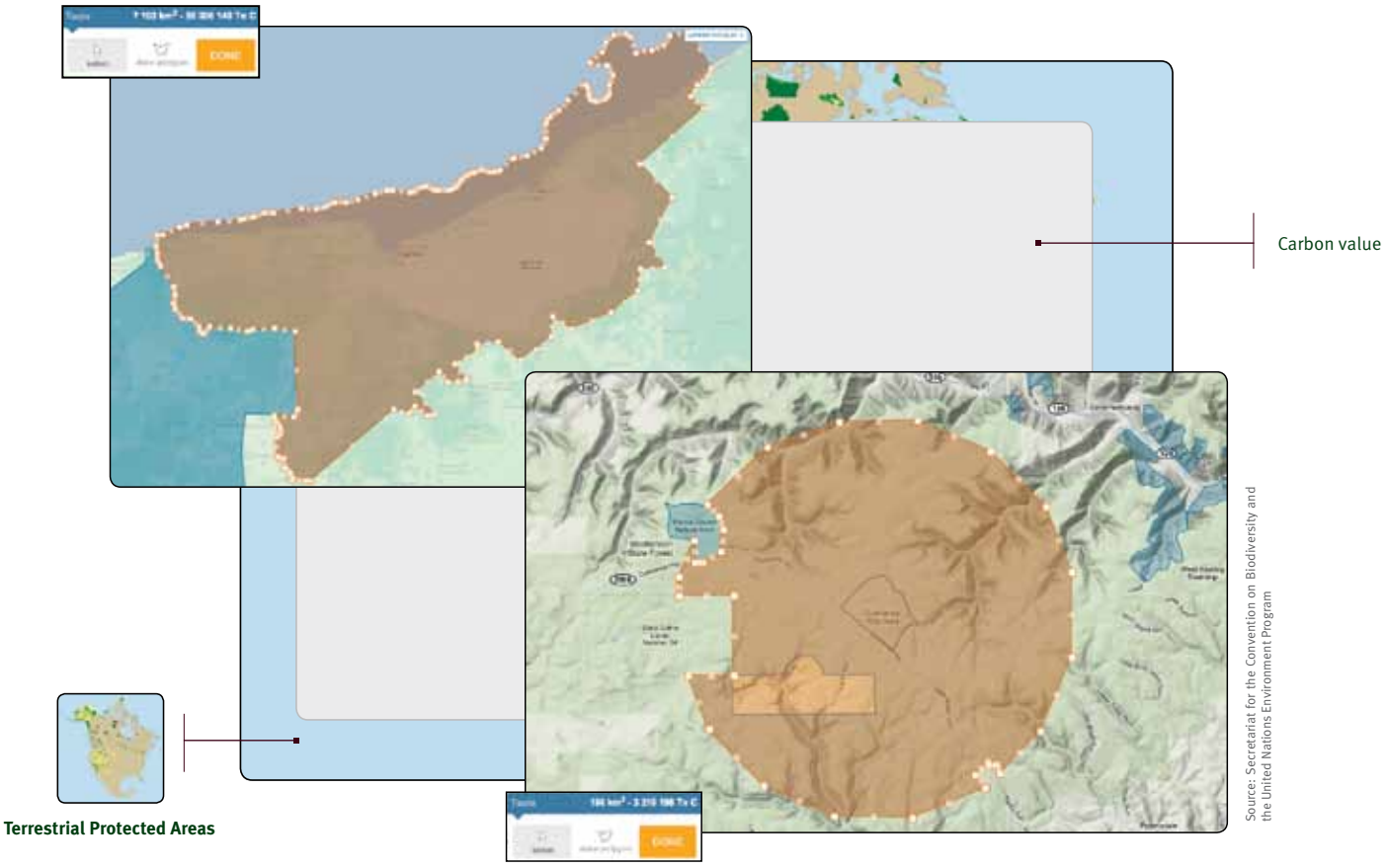
This is a map of protected areas in North America managed by national, state, provincial or territorial authorities. The International Union for the Conservation of Nature (IUCN) defines a protected area as an "area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means." Maps of protected areas can be combined with many other thematic layers to observe overlaps that inform environmental decision-making.

CONAFOR

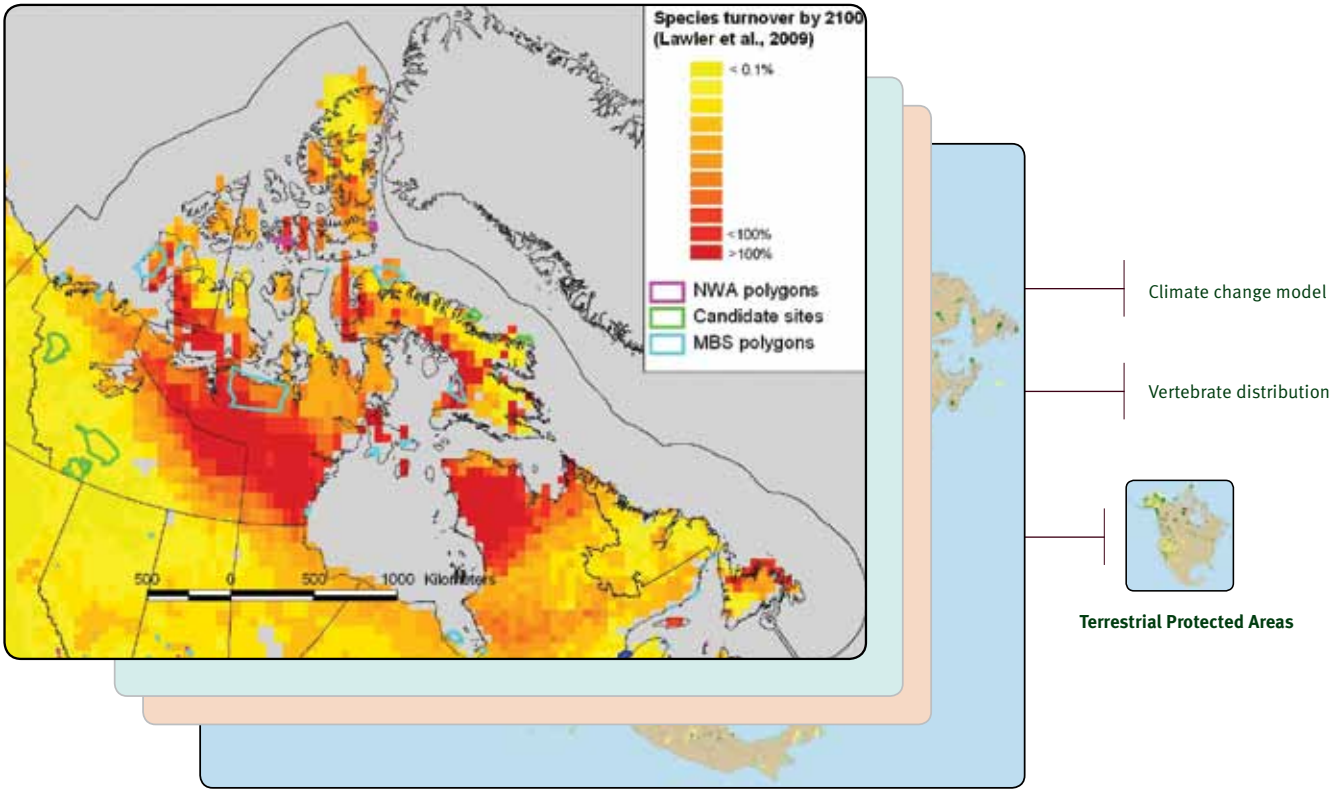
Carbon

In 2010, the Convention on Biological Diversity Secretariat's LifeWeb Coordination Office and UNEP's World Conservation Monitoring Centre used the terrestrial protected areas map to explore carbon density distribution relative to areas of high biodiversity. These images show initial carbon values for a protected area in Mexico and one in the United States. Estimates are based on carbon amounts stored in biomass above and below ground, combined with data on carbon stored in soil to a 1 meter depth.

■ This information helps efforts to maintain and enhance carbon stocks.



Source: Secretariat for the Convention on Biodiversity and the United Nations Environment Program



Source: Lawler *et al.* 2009

Climate change

In 2009, Environment Canada and Lawler *et al.* matched data on protected-area locations with data on the degree of local vertebrate-fauna loss related to climate change in northern Canada. It is predicted the tundra will suffer the largest changes in fauna; assuming no other dispersal constraints, turnover rates in specific areas are likely to be over 90%.

■ This kind of information mapping is important for identifying wildlife vulnerable to climate-change impacts and how best to protect and conserve it.

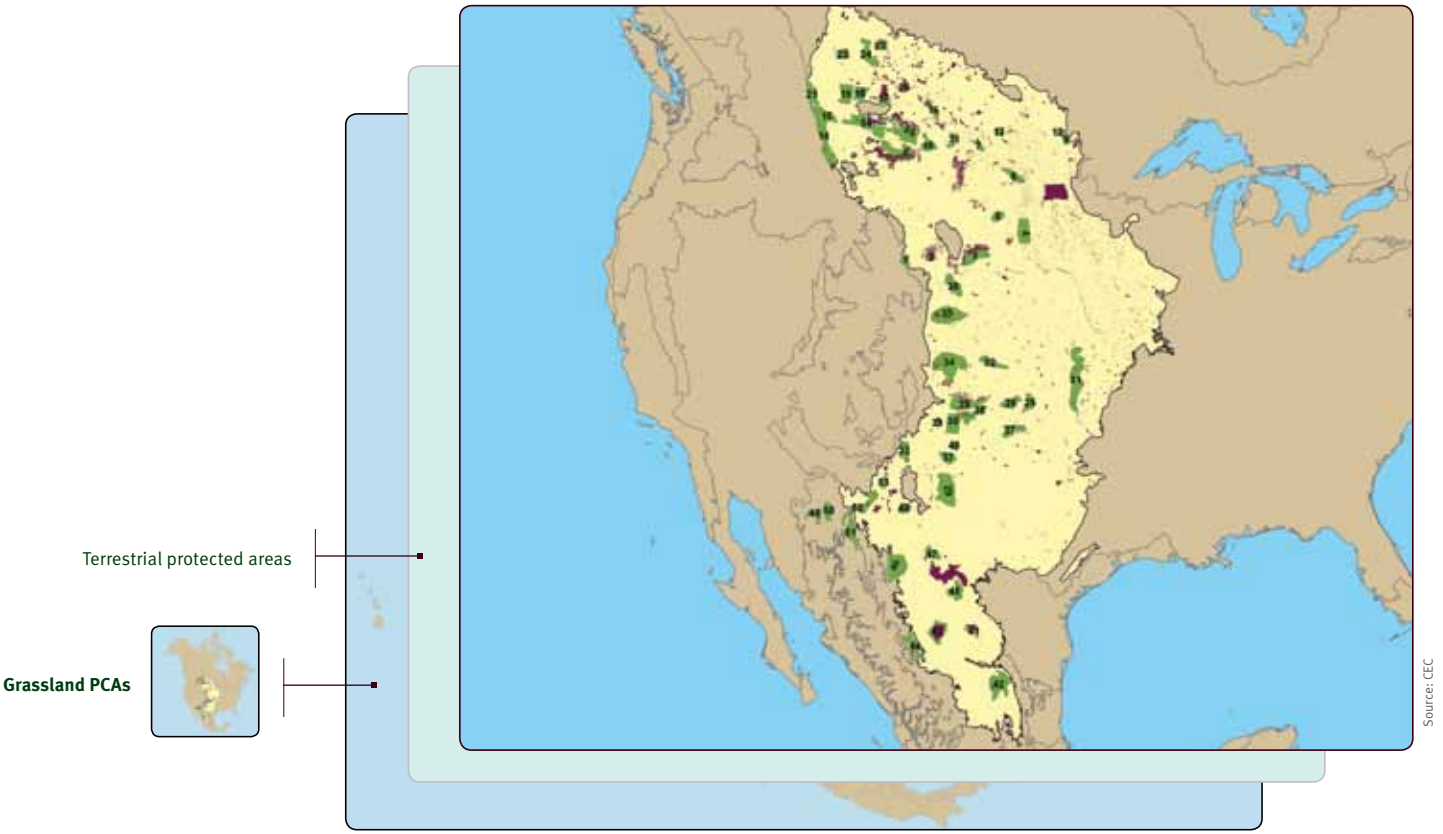

Grasslands Priority Conservation Areas
1. Hole in the Wall
2. Thunder Basin
3. Conata Basin
4. Southern Coteau
5. Cheyenne River
6. Chase Lake
7. Lostwood
8. Montana Glaciated Plains
9. Aspen Parkland
10. Prairie Montana
11. State-line Wetlands
12. Tall-grass
13. Poverty Plains
14. Rocky Mountain Front
15. Milk River Ridge
16. Cactus Hills/Dirt Hills
17. Great Sandhills
18. Suffield
19. Bow Island
20. Monet/Matador
21. Porcupine Hills
22. Rumsey Block
23. Manitou
24. Wainwright/Neutral Hills
25. Central Red Hills
26. Western Red Hills
27. Ellis
28. Cimarron
29. Mescalero Sands
30. Rita Blanca
31. Flint Hills
32. Chalk Bluff
33. Carrizozo
34. Thunder Basin, Bill
35. Pawnee
36. Sioux Box Butte
37. Roosevelt
38. Panhandle
39. Kiowa
40. Curry
41. Cuatro Cienegas
42. Tokio
43. Mapimi
44. Cuchillas de la Zarca
45. Valle Colombia
46. Valles Centrales
47. Marfa
48. Otero Mesa
49. Sonoita
50. Sulphur Springs
51. Janos
52. New Mexico Bootheel
53. Amendaris
54. Sage Creek Milk River
55. Frenchman River – Bitter Creek OMB
Hawaii (U.S.)
Grassland Priority Conservation Areas
North American Grasslands
0 250 500 1,000 km
N

Grassland

Priority Conservation Areas

CREATED 2005

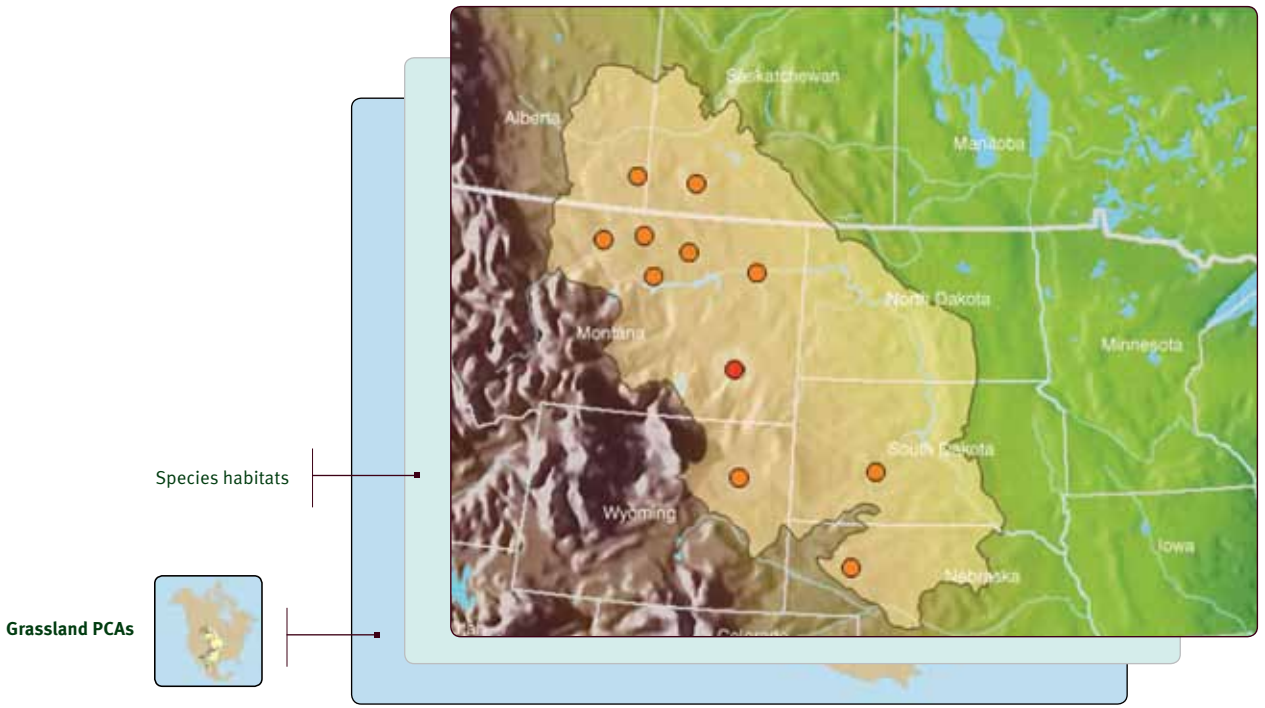
North America's Central Grasslands (in yellow) span all three countries and are one of North America's—and the world's—most endangered ecosystems. In 2004, the CEC helped experts identify 55 Grasslands Priority Conservation Areas (GPCAs). These areas are of trinational importance due to their ecological significance and threatened nature, and are in need of international cooperation to be successfully protected. Mapping such areas helps natural resource managers collaborate to protect endangered transboundary ecosystems and species.



Protection

This image shows the relationship between the location, size, and distribution of Grasslands Priority Conservation Areas (GPCAs, in green) and protected areas (as defined by the IUCN, in maroon). The two rarely coincide; in fact, only 1.5% of North America's Central Grasslands is protected.

■ Identifying the overlap of protected areas and a particular habitat or species can help increase efforts to set aside areas to protect biodiversity.



Transboundary cooperation

This map shows the Northern Great Plains on the US-Canadian border. It is the habitat for a number of ecologically important species. The World Wildlife Fund (WWF-USA) is fostering binational cooperation to protect their habitat through its Transboundary Prairie Conservation Project. To protect the contiguity of grassland habitat and restore species abundance, it establishes protected areas, connects well-managed wildlife corridors, and recognizes priority conservation areas.

■ The WWF's projects to analyze how climate change affects grasslands will help guide wildlife management and conservation.

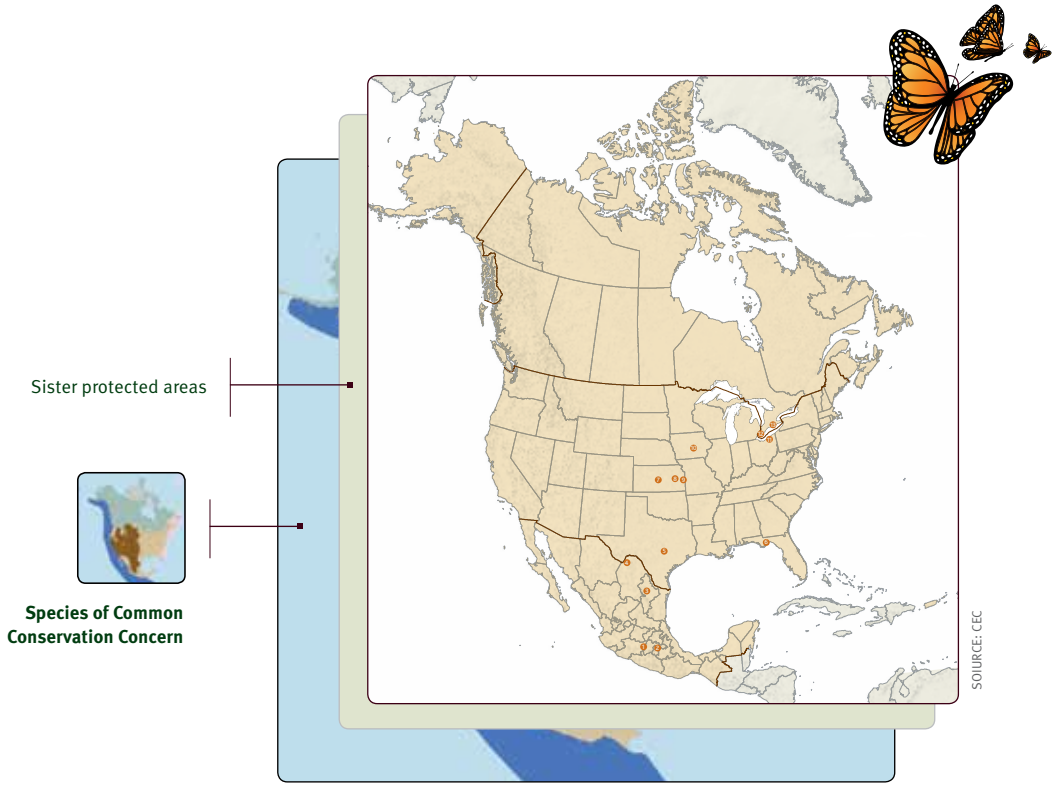

Buteo regalis
Canis lupus
Eubalaena glacialis
Puffinus creatopus
Hawaii (U.S.)
0 250 500 1,000 km
N

Mike Danzenbaker

Species of Common Conservation Concern

CREATED 2008

North American Species of Common Conservation Concern are important migratory, transboundary and endemic species that require regional cooperation for their effective conservation. This map, based on NatureServe data, shows the ranges of four of these species: the ferruginous hawk (*Buteo regalis*), the North Atlantic right whale (*Eubalaena glacialis*), the pink-footed shearwater (*Puffinus creatopus*) and the gray wolf (*Canis lupus*). Range maps for 30 others are also available. These maps help in trilateral cooperation to protect and conserve biodiversity.



Monarchs

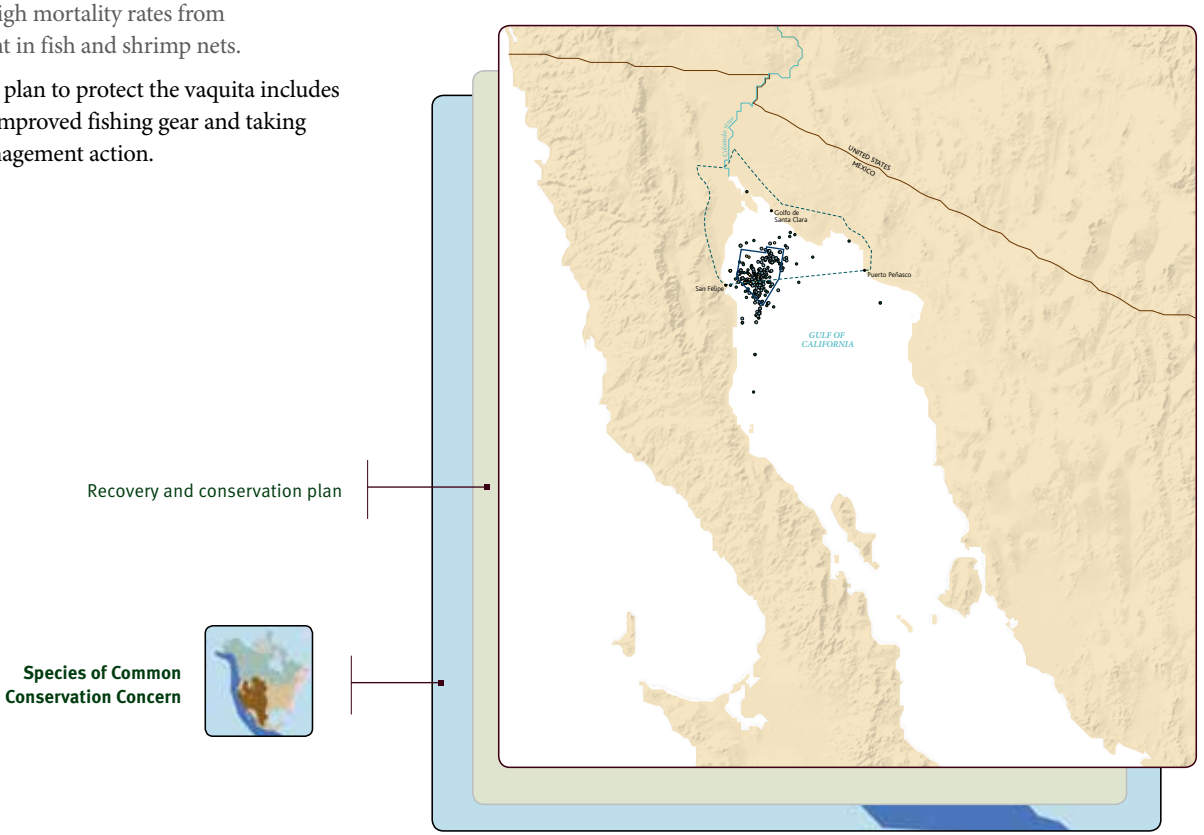
As they migrate across North America, monarch butterflies use this network of protected areas as refuges. In 2006, this map was the basis for a project initiated by the Trilateral Monarch Butterfly Sister Protected Area (SPA) Network. The project supports collaboration on monarch habitat preservation and restoration, research and monitoring and environmental education and public outreach.

■ Since temperature and precipitation changes can make overwintering sites unsuitable and shift breeding habitats, the network map can also help with climate-change adaptation planning.

Conservation

The North American Conservation Plan (NACAP) for the vaquita (*Phocoena sinus*) is using this distribution map to develop a recovery and conservation strategy for this species of porpoise. The vaquita is the world's most-endangered marine mammal, principally because of high mortality rates from entanglement in fish and shrimp nets.

■ Part of the plan to protect the vaquita includes developing improved fishing gear and taking focused management action.



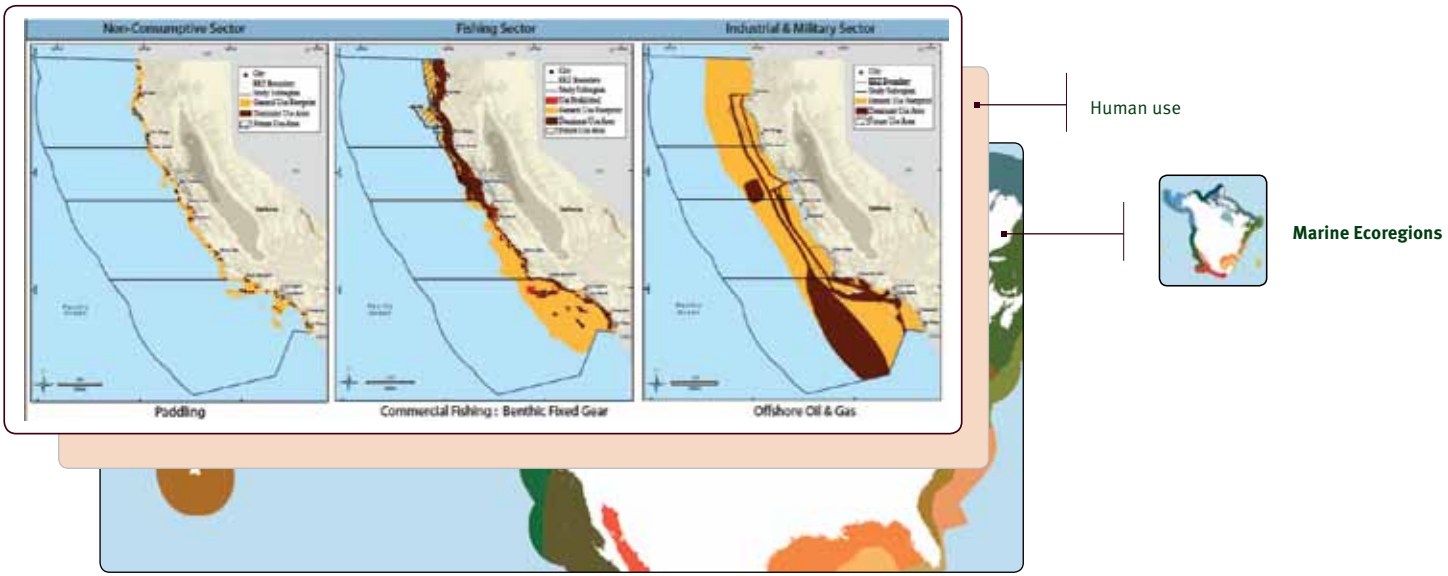

Bering Sea
Beaufort/Chukchi Seas
Arctic Basin
Central Arctic Archipelago
Hudson/Boothian Arctic
Baffin/Labradoran Arctic
Acadian Atlantic
Virginian Atlantic
Northern Gulf Stream Transition
Gulf Stream
Carolinian Atlantic
South Florida/Bahamian Atlantic
Northern Gulf of Mexico
Southern Gulf of Mexico
Caribbean Sea
Middle American Pacific
Mexican/Pacific Transition
Gulf of California
Southern Californian Pacific
Montereyan Pacific Transition
Columbian Pacific
Alaskan/Fjordland Pacific
Aleutian Archipelago
Hawaiian Archipelago
Hawaii (U.S.)
0 250 500 1,000 km
N

Marine Ecoregions

CREATED 2008

This is a map of marine ecoregions within the North American countries' Exclusive Economic Zones. Marine ecoregions are areas where physiographic, oceanographic and biological characteristics are similar, and they can be defined at increasing levels of specificity. The 24 Level I marine ecoregions, shown here, capture ecosystem differences at the broadest scale and classify marine areas characterized as large water masses and currents, enclosed seas and regions of coherent sea-surface temperature or ice cover. Levels II and III marine ecoregions represent 81 and 86 finer ecological areas respectively.

Patricio Robles Gil



Source: Marine Protected Areas Center –National Oceanic and Atmospheric Administration /USA

Human use

The National Marine Protected Areas Center and the Marine Conservation Biology Institute created an atlas of nearly 30 significant human uses of state and federal waters off the coast of California. The three images of potential layers are examples of mapped data illustrating the location and extent to which the ocean environment is used.

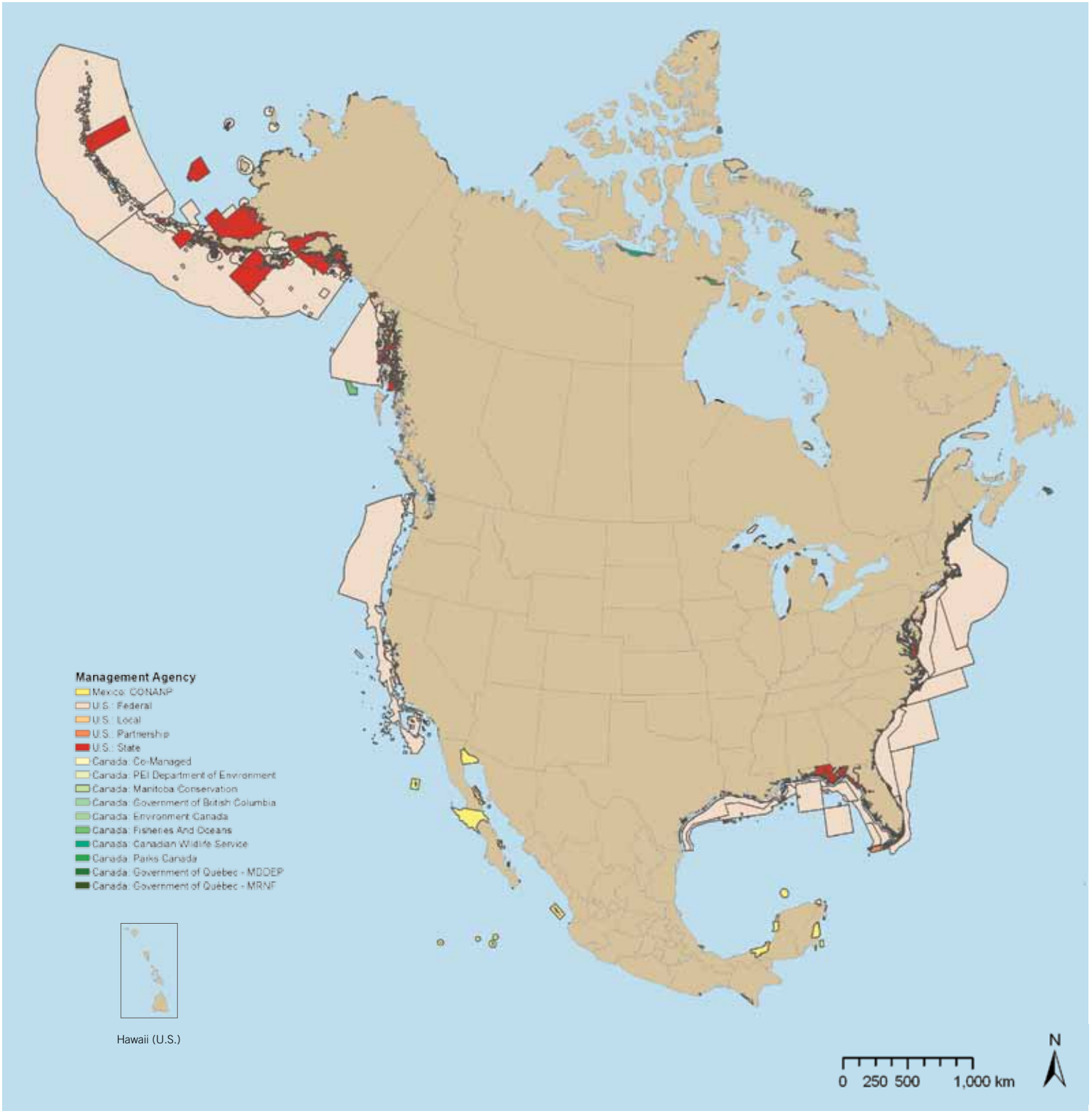
■ These maps are helpful for visualizing the potential spatial relationships between human uses and marine ecoregions.

Citizen scientists

A consortium of American organizations created the Mobile Gulf Observatory (MoGO) to respond to the April 2010 Deepwater Horizon oil spill. MoGO is a smart-phone application that enables citizen scientists to help wildlife experts find and rescue oiled birds, sea turtles and dolphins. The oil spill occurred in one of North America's most threatened marine ecoregions.

■ This is an example of how data collected in the Gulf's coastal and marine habitats can help guide restoration efforts in a marine ecoregion.

Source: Save Gulf Wildlife


Management Agency
Mexico: CONANP
U.S.: Federal
U.S.: Local
U.S.: Partnership
U.S.: State
Canada: Co-Managed
Canada: PEI Department of Environment
Canada: Manitoba Conservation
Canada: Government of British Columbia
Canada: Environment Canada
Canada: Fisheries And Oceans
Canada: Canadian Wildlife Service
Canada: Parks Canada
Canada: Government of Québec - MDDEP
Canada: Government of Québec - MRNF
Hawaii (U.S.)
0 250 500 1,000 km
N

Octavio Aburto

Marine Protected Areas

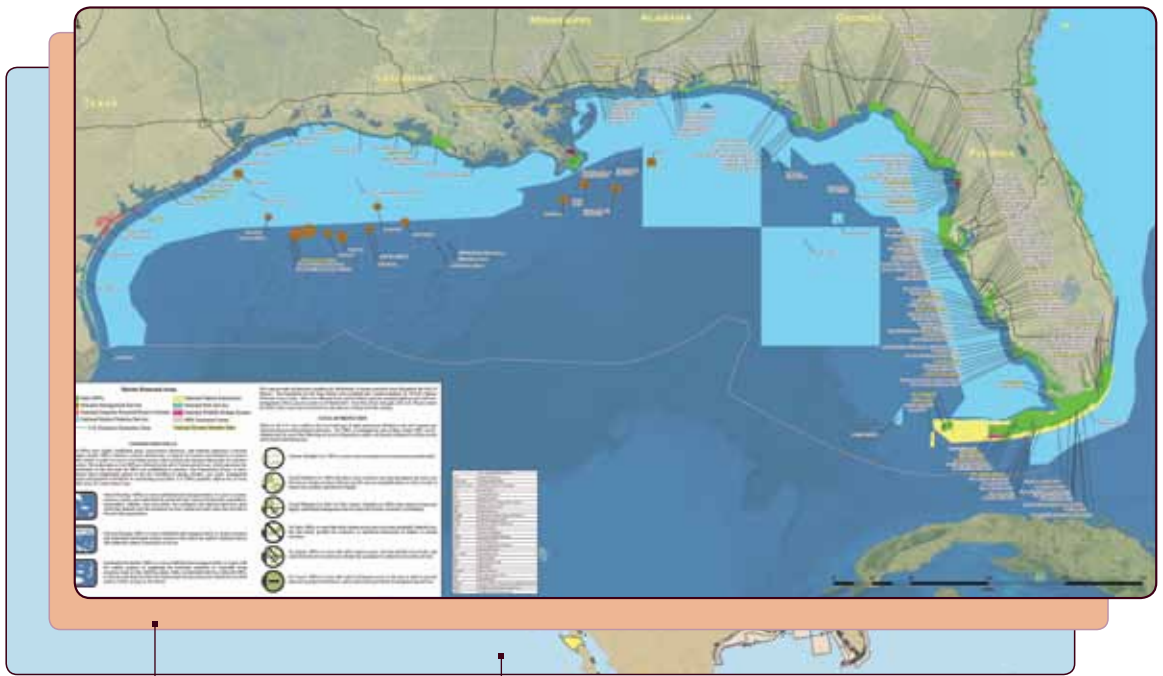
CREATED 2010

This map gives the location and size of publically managed North American Marine Protected Areas (MPAs). Setting aside and mapping the boundaries of MPAs is critically important to strengthening the conservation of marine ecoregions and the biodiversity they harbour.

Response

This map shows the boundaries of United States Marine Protected Areas near the Deepwater Horizon Oil Rig. Using MPA data, NOAA's National Marine Protected Area Center created this image in June 2010 to assist organizations engaged in responding to the Deepwater Horizon oil spill.

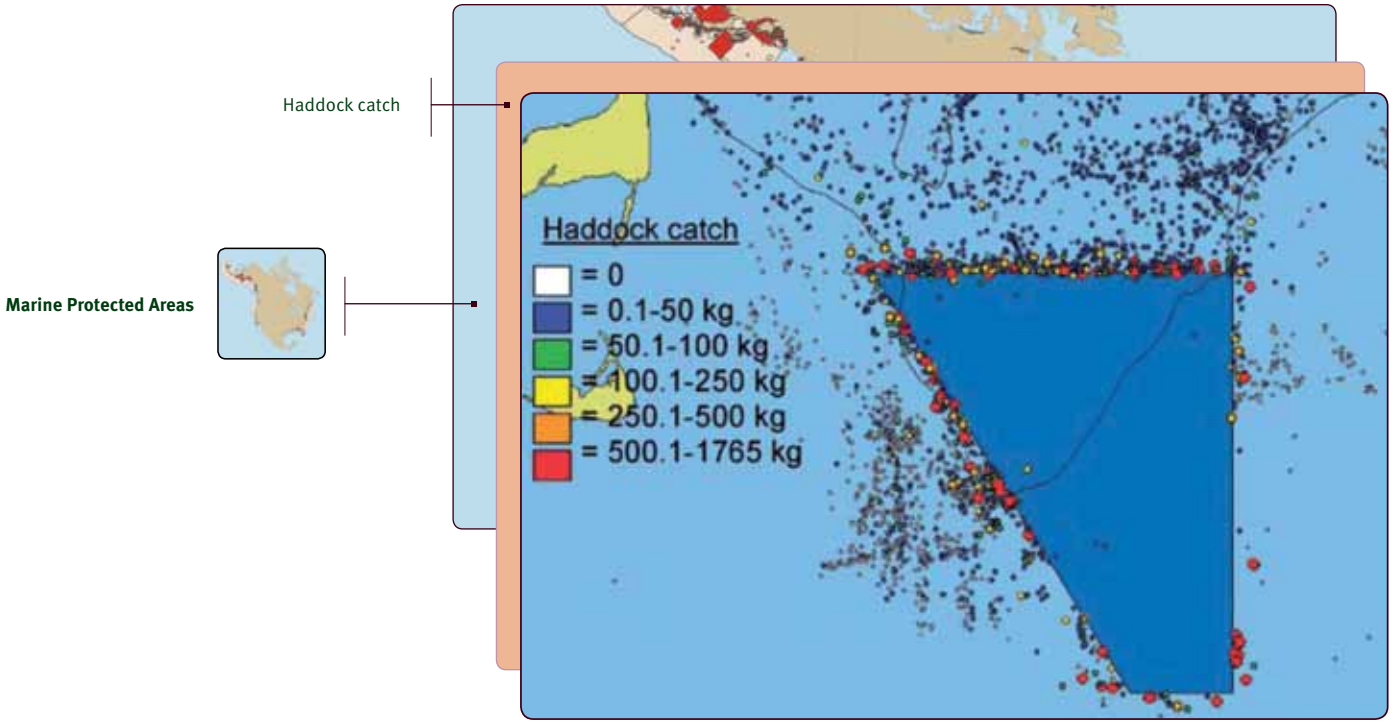
■ It alerts them to areas where the marine ecology is protected and where wildlife is therefore more abundant.



Source: National Marine Protected Area Center – National Oceanic and Atmospheric Administration

Deepwater Horizon Oil Rig

Marine Protected Areas

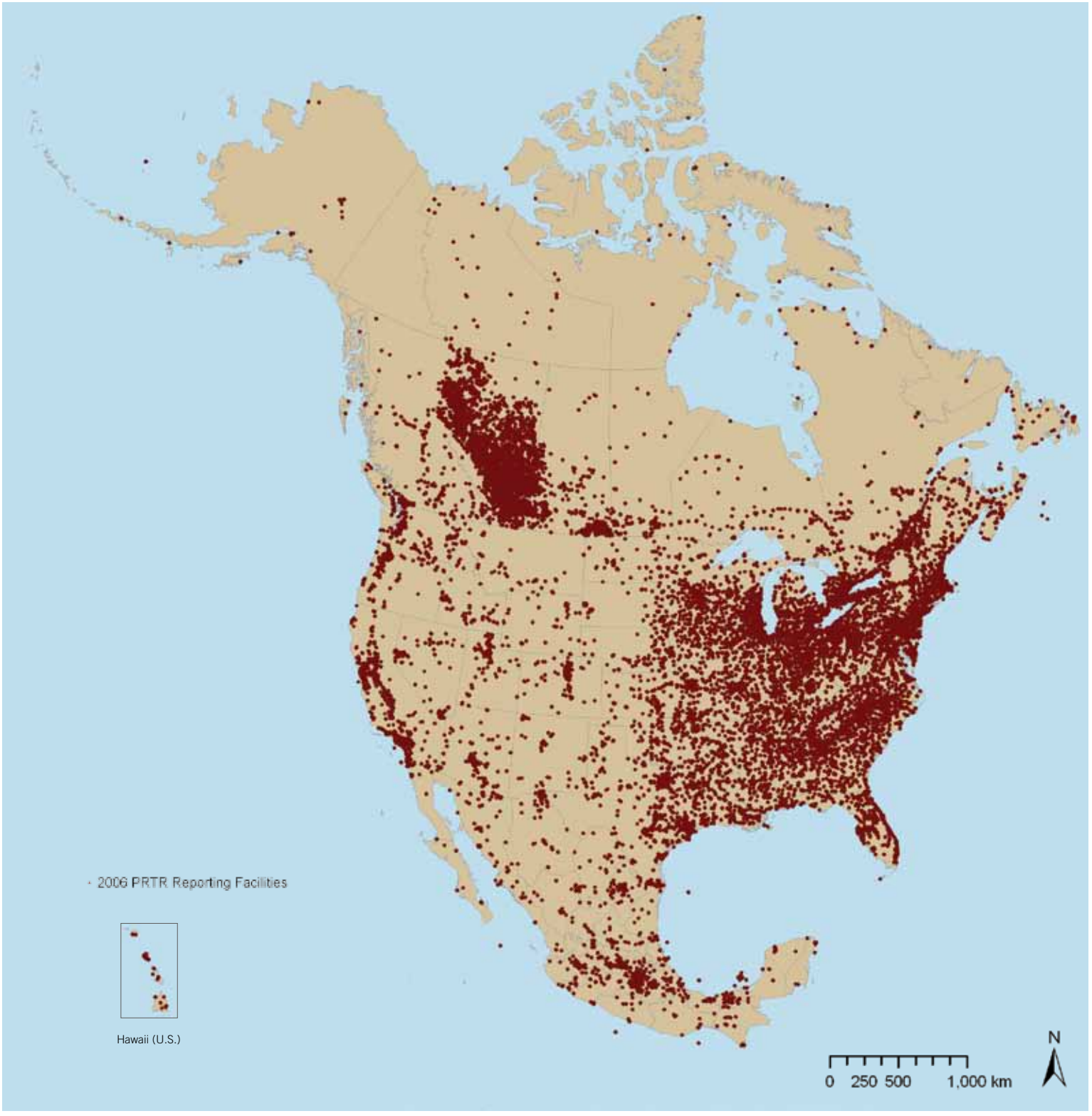


Source: Murawski et al. 2005 and Protect Planet Ocean

Fisheries

This image shows a Marine Protected Area, the Northeast Gillnet Water Area, in the U.S. Gulf of Maine and plots the amount of haddock caught around the MPA. It shows the high concentration of harvests within a 3-km radius of its margins, where 73% of the Gulf's haddock is caught. In MPAs closed to specific fishing activities, fish abundance, age and size increase. Marine biodiversity is also protected and scientific research can proceed undisturbed.

- Maps of MPA boundaries help users observe the limits required within them.


2006 PRTR Reporting Facilities
Hawaii (U.S.)
0 250 500 1,000 km
N

PRTR

Reporting Facilities

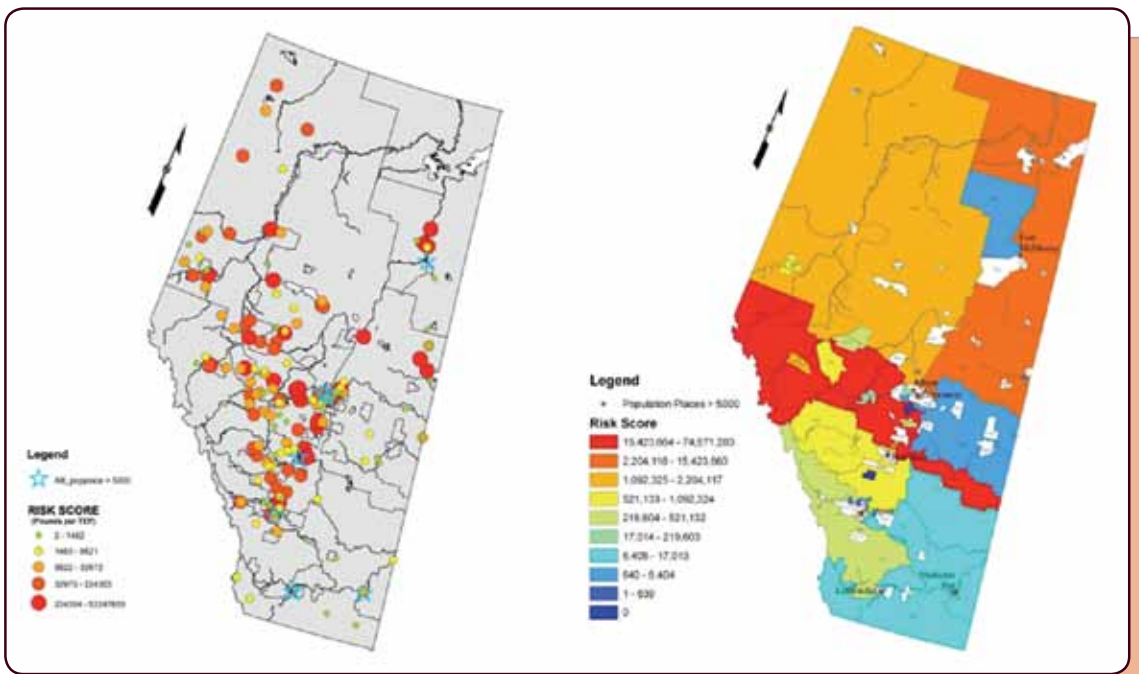
CREATED 2006

This map shows the locations of about 35,000 industries that report to a Pollutant Release and Transfer Register (PRTR) about the kind and amount of pollutants they release or send off-site. All three countries contributed data for this map from their own registers: the National Pollutant Release Inventory (NPRI) in Canada, the *Registro de Emisiones y Transferencias de Contaminantes* (RETC) in Mexico, and the Toxics Release Inventory (TRI) in the United States. Location maps are useful to show the distribution of different variables and the relationships to other data.

Health

A study of children's risk of exposure to environmentally related cancers used maps that plotted data from the PRTR reporting facilities in the Canadian National Pollutant Release Inventory (NPRI) alongside data about childhood cancer occurrence, population density and location. The study showed that 99% of the cancer-relative risk occurred in 20 areas identified by Canadian postal code areas, of which 8 were rural and 12 urban.

■ This information is important for health officials and in planning and regulating industrial sites.



Source: Dr. Alvaro R. Osornio Vargas 2009;
North American Pollutant Release and Transfer Register

Childhood cancer-relative risk

Forward Sortation Areas

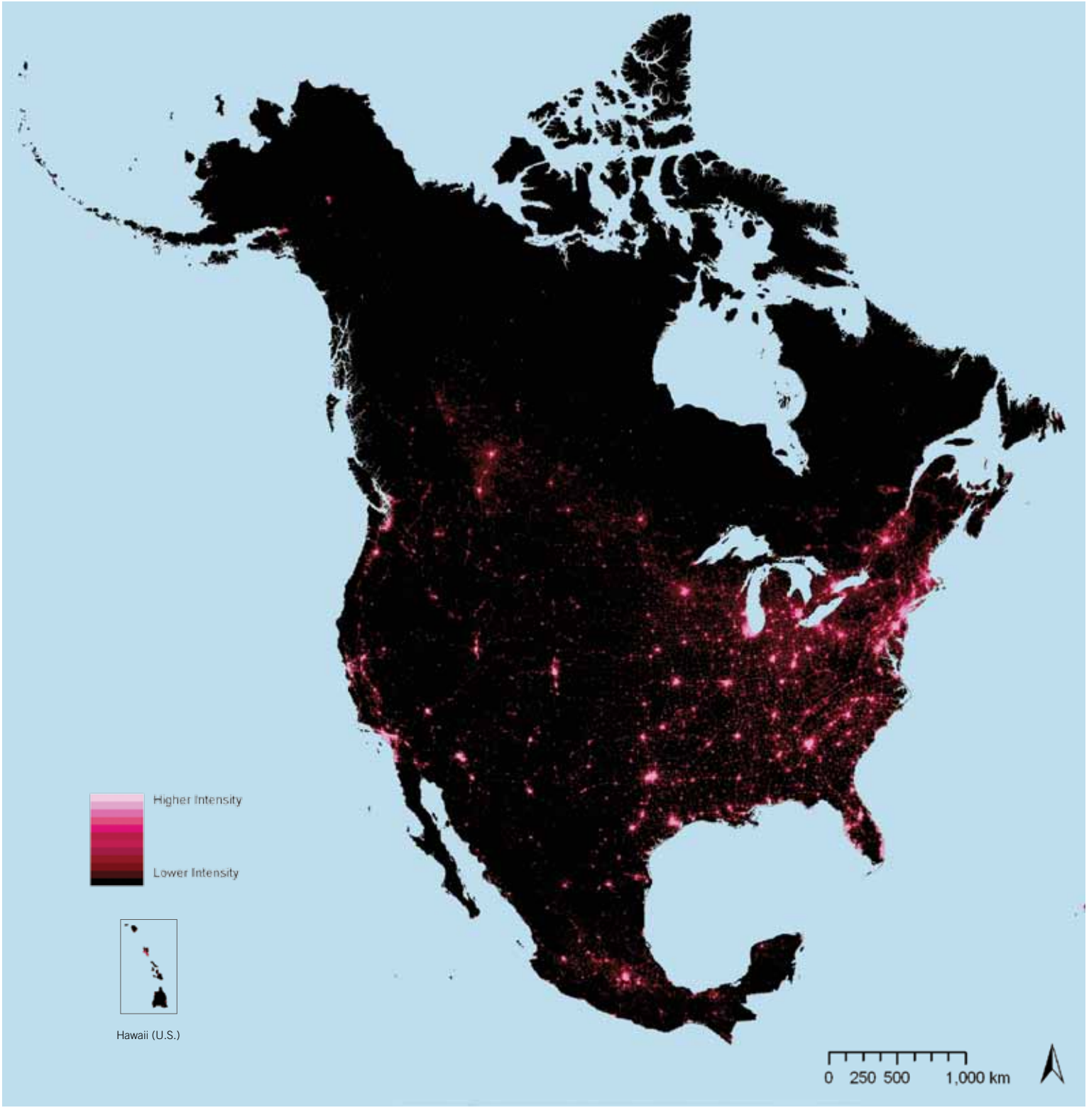
PRTR Reporting Facility

Source: Environmental Protection Agency

Chemicals

The US Environment Protection Agency (EPA) designed an application for mobile devices to help find information about nearby PRTR reporting facilities. It allows users to obtain environmental information that might concern them, including about the chemicals being released to the air, water and land and their associated health effects.

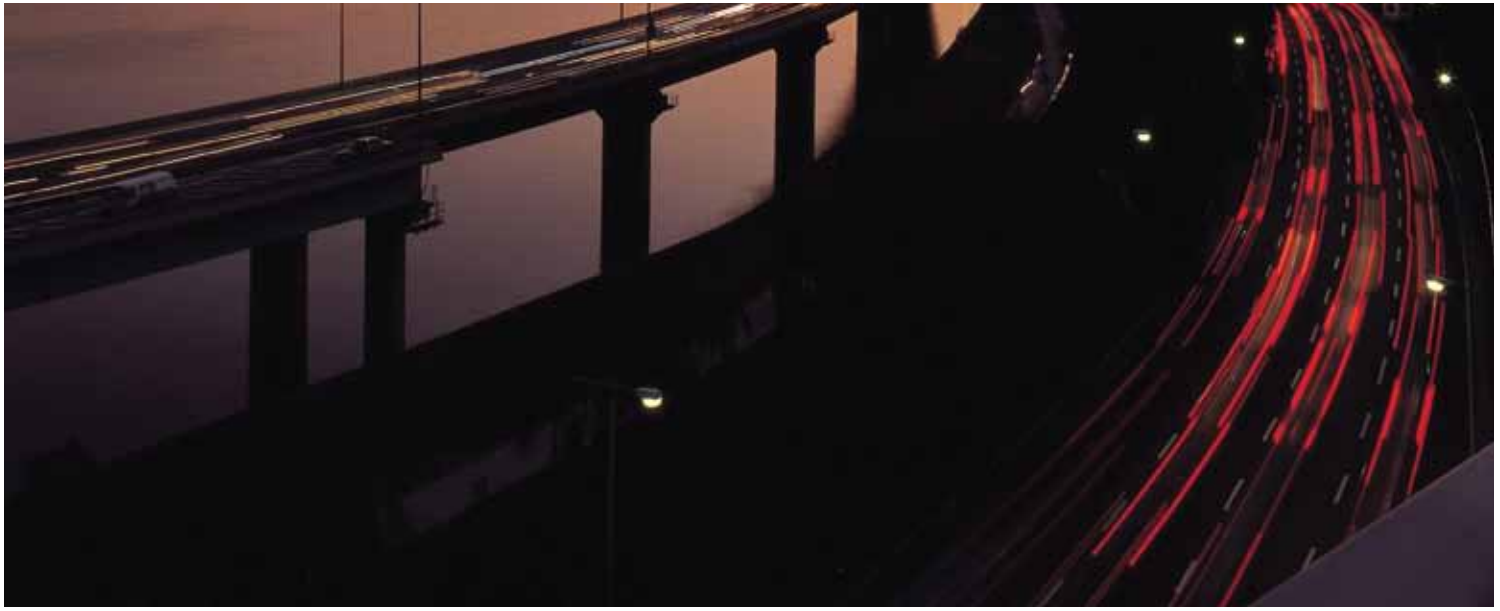
- This information is important to civil society and policy makers.

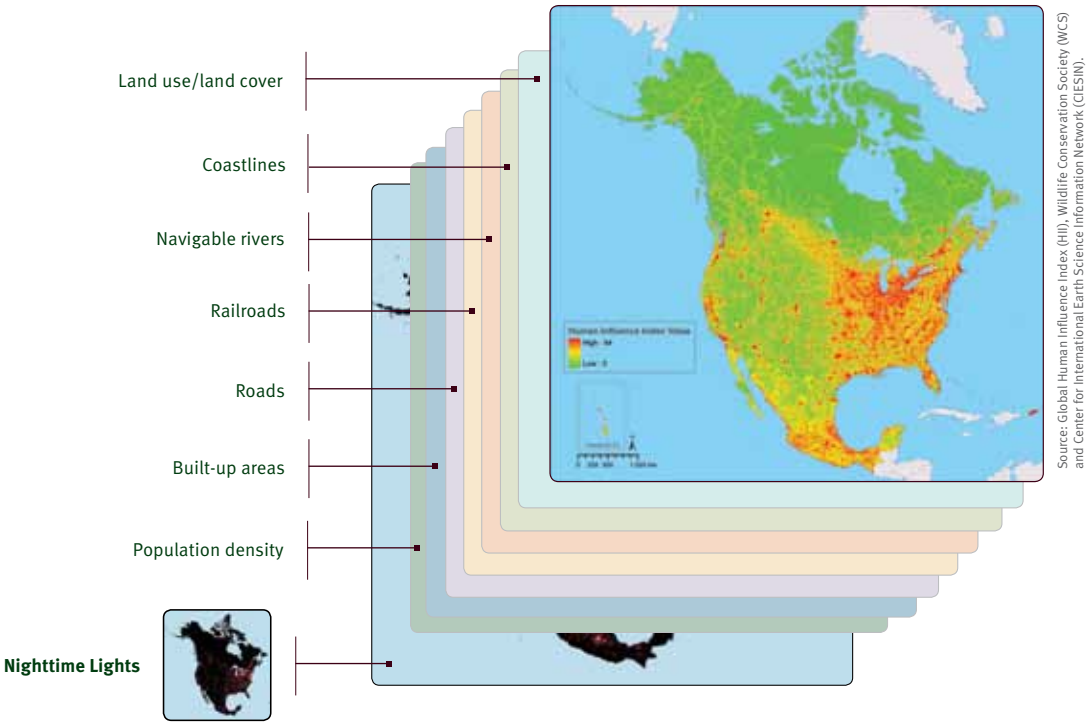

Higher Intensity
Lower Intensity
Hawaii (U.S.)
0 250 500 1,000 km

Nighttime Lights of North America

CREATED 2002

This image of nighttime lights of North America, including the Caribbean, is based on data collected in 1996 and 1997 as part of the U.S. Defense Meteorological Satellite Program (DMSP). Maps showing the intensity of nighttime lights are striking indicators of human presence and impact on the land, including population distribution, urban- and suburbanization, transportation routes, energy use and greenhouse gas emissions.



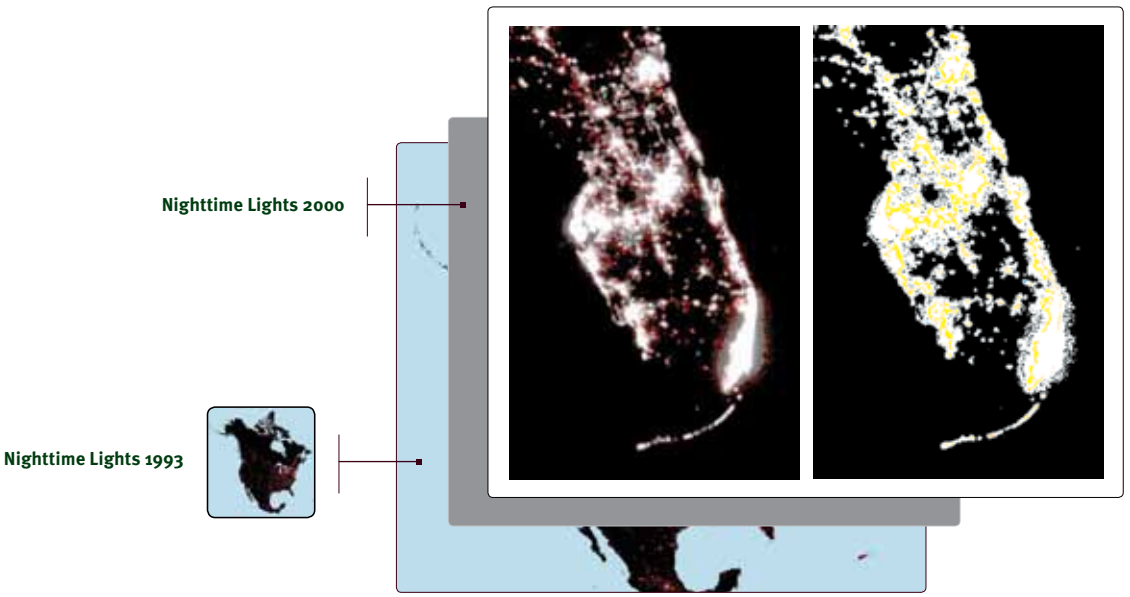


Source: Global Human Influence Index (HII), Wildlife Conservation Society (WCS) and Center for International Earth Science Information Network (CIESIN).

Footprint

This map combines nighttime lights data with several base maps (population density, built-up areas, roads, railroads, navigable rivers, coastlines and land use/land cover) to create the Global Human Influence Index (HII). The Wildlife Conservation Society (WCS) and the Center for International Earth Science Information Network (CIESIN) created the HII in 2005. By aggregating these indicators, one map can illustrate the degree of human impact on North America's terrestrial ecosystems.

■ It is useful for land-use planners, but also educates the public about our human footprint on the land.



Source: National Oceanic and Atmospheric Administration from EPA.

Growth

These images show the growth in nighttime lights across Florida from 1993 to 2000 as measured by the U.S. National Oceanic and Atmospheric Administration (NOAA). The increased light along the shoreline reveals the growth in coastal urbanization.

■ Trends in nighttime lights is thus an indicator of both the degree and direction of urban sprawl and is an important tool for urban planners and natural resource managers in promoting more sustainable settlement patterns.

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Image Source: Protect Planet Ocean. http://www.protectplanetocean.org/collections/successandlessons/casestudy/gulfofmain/caseStudy.html

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Nighttime Lights of North America

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A NORTH AMERICAN PARTNERSHIP

Created through the cooperation of three national agency partners, the *North American Environmental Atlas* combines harmonized data from Canada, Mexico and the United States to allow for a continental and regional perspective on environmental issues that cross boundaries. The Atlas continues to grow in breadth and depth as more thematic maps are created through the work of the Commission for Environmental Cooperation (CEC) and its partners. Scientists and map makers from Natural Resources Canada, United States Geological Survey and *Instituto Nacional de Estadística y Geografía* and other agencies in each country produced the information contained in the Atlas.

The collection of viewable maps, data, and downloadable map files is available without cost online at: www.cec.org/naatlas.

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Where We Are