

LOW ACCESS-FORESTS AND THEIR LEVEL OF PROTECTION IN NORTH AMERICA

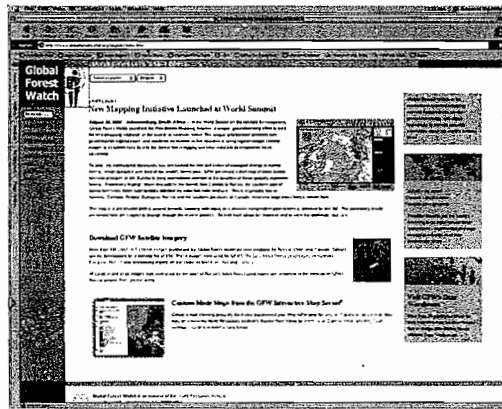


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The publication presents the results of a map-based analysis of the location and status of North American forests (excluding Mexico) that remain mostly undivided by roads and other access routes, so called low-access forests. This book provides a regional look at where large tracts (larger than 200 square kilometers (km²) of low-access forest are located, as well as an assessment of the degree to which these tracts are currently protected. The objective of the analysis is to provide a coarse-scale picture of the location of North American forests that have been only minimally disturbed by recent human activity, such as logging, other commercial-scale activities, or development-induced fragmentation. The results are useful for identifying forests that offer opportunities for expanding protected area networks and/or for restoration, as well as priority areas for future mapping to characterize intact forests at finer scales.

Why is the analysis relevant? Approximately 20% of North American forests have been permanently cleared for agriculture and other uses, primarily within the last two centuries. In most of the lower 48 states of the United States, and in southern Canada, remaining forests have experienced significant human disturbance and do not possess the same degree of ecological integrity as the original forest. As human populations grow, forest fragmentation and degradation continues. Remaining large tracts of relatively undisturbed natural forest are increasingly important for several reasons, among them:

1. Conservation value. Large patches of natural forest provide sufficient area for natural ecological processes which shape the forest ecosystem and that cannot be sustained across smaller areas. For instance, large forest areas are able to preserve some habitat intact in the face of periodic natural

disturbances, such as fires. Large tracts of forest also provide habitat for far-ranging species. Furthermore, these areas serve as a reservoir for the successful colonization of smaller patches of habitat, especially those too small to maintain themselves over the long term.

2. Ecosystem goods and services value. Forests provide a range of products and life support services essential to humans and other species. Among the ecosystem services provided by forests are the maintenance of water quality, storage of carbon (which might otherwise contribute to global climate change), and regulation of local climatic processes (e.g., rainfall patterns). Even intensely modified forests, such as plantations, supply such benefits, to some degree. However, because of their condition and extent, large tracts of relatively undisturbed forest possess the greatest potential value in terms of ecosystem services for a given forest type. In addition, these areas often include our greatest reservoirs of mature and old-growth timber stands and other commercially significant natural resources. In many countries, including Canada, the timber industry relies heavily on harvest of old-growth and primary forest stands, which are a dwindling resource. In order to balance timber needs with the need for non-market ecosystem services, many of which are associated with relatively undisturbed forests, it is important to know how much natural forest remains and where these areas are located.

3. Recreational, aesthetic, and heritage values. As populations grow and natural forest is converted to other uses, the remaining large tracts of relatively undisturbed forest are increasingly valued for their natural heritage and for the opportunities they afford in terms of recreation and the experience of wilderness.

As forests in North America continue to be fragmented and degraded, there is growing public debate concerning the management of large tracts of relatively undisturbed natural forest, particularly on public lands. Some argue that remaining areas should be closed to further development in order to maintain their biological diversity and for their recreational and wilderness values; others urge development and use of the natural resources these forests contain.

Currently, continental-scale forest monitoring efforts track only changes in forest cover. Little integrated information exists about forest condition, especially the location and status of large tracts of relatively undisturbed forest. In the absence of such information, two indicators provide a useful proxy for data on forest condition:

- Access. The presence of roads and other access routes is an excellent indicator of human disturbance of the forest. Roads, deforestation, and forest fragmentation are intimately related. Even more important than the direct damage to natural ecosystems, the access to forest areas provided by roads leads to subsequent human disturbances from activities such as logging, mining, grazing, agriculture, and urban development.

- Size of forest blocks. As noted above, large blocks of forest are more likely to contain and support a full complement of native species, including wide-ranging mammals.

Within this framework, using Geographic Information Systems (GIS), the analysis identifies low-access forests as being all forests at least 500 m from a road or other access route, excluding logging roads. Forested areas larger than 200 km² were also identified and classified as large tracts of low-access forest. The rationale for selecting a threshold of 200 km² is based on the following: 1) Because of the coarse scale of the analysis, small roads, logging roads, and other access routes are not included in the regional transport data. Thus, the actual extent of truly low-access forests is overestimated here. The use of relatively large block sizes in the analysis will tend to counterbalance this effect. 2) To maintain populations of far-ranging species and/or preserve some habitat intact in the face of periodic natural disturbance (e.g., fires in the boreal forests), forest areas must occupy a least 500 m from a road or other access route, minimum patch size, which varies considerably according to ecosystem type and species native to the area. Furthermore, this conservative threshold of 200 km² was chosen in part to account for the wide variety of ecosystem types and, as indicated above, to offset the impact of incomplete road-access data.

Finally, the degree to which the large tracts of low-access forest are protected was assessed using existing datasets that classify protected areas according

to internationally recognized World Conservation Union (IUCN) standards. IUCN Categories I-II were considered as strictly protected, while Categories III-V are moderately protected. This standard was chosen so that these results can be compared with those from other countries in which similar Global Forest Watch mapping is underway.

The analysis provides only one measure of forest condition. For other useful indicators—such as, stand age, tree species types, patch size, and patch shape—continental scale data are difficult to acquire. The results of the analysis show that almost half of today's forests and woodlands in North America (excluding Mexico) still qualify as large tracts of low-access forest; however, all but a fraction (5%) of this area is located in the northern most regions of the continent, namely boreal Canada and Alaska. Most forests of southern Canada and the lower 48 states of the United States have been extensively disturbed by human activity. In the lower 48 states of the United States, only 6% of forest cover remains in large, low-access tracts, mostly located in the Rocky Mountains and the Pacific Northwest. Relatively undisturbed large tracts of dense forest, generally the most productive, account for 15% of all remaining forests in the United States and Canada. Some other major findings for the United States and Canada include the following:

- Excluding Alaska, about three-quarters of low-access woodlands and forests in the United States are in tracts smaller than 100 km².

- Two-thirds of all large tracts (larger than 200 km²) of low-access forests in the United States are found in Alaska. About one-quarter (26%) has protected status, either moderate or strict. Close to 11%—including wilderness areas—are found within the Tongass and Chugach national forests (74% of the Pacific Coast forests in Alaska is managed by the US Forest Service).

- Two-thirds of Canada's forests remain in large, low-access tracts. Much of this area is in the central and northern portions of the country, characterized by slow-growing forests and open woodland. Alberta, British Columbia, and Ontario house over half of Canada's large, low-access tracts of dense forests, i.e., those with greatest potential timber value.

- Only 4% of large, low-access forest tracts are strictly or moderately protected.

In relation to the protected Status of the large tracts of low-access forests, at the regional level most (91%) of these tracts in Canada and the United States are located outside strictly or moderately protected areas, i.e., parks and reserves classified in IUCN categories I-V. About 36% of large tracts dominated by dense forests are strictly or moderately protected. However, as indicated above, the degree to which these tracts are protected varies significantly between the United States and Canada. Although vast areas of these forests remain in the far northern regions, most of these tracts are threatened not only by logging but also by mining and oil and gas development. In the United States as a whole, about 34% of large tracts of low-access forests are strictly or moderately protected.

The results of this analysis support findings from other researchers that conclude that the current system of protected areas in the United States fails to preserve a representative sample of the country's biological richness.

In the context of the current debate in the United States about the Clinton Administration rule to preserve roadless areas in National Forests. By definition, many of the large, low-access forest tracts are included within Inventoried Roadless Areas (IRAs). The analysis suggests that National forests contain almost a third of all remaining large, low-access forest tracts in the United States excluding Alaska. Although some such tracts are already strictly or moderately protected, granting permanent status to IRAs would significantly extend protection of large, low-access forests in the United States. Because of their size and distance from transport routes and associated human pressures, large tracts of low-access forest often offer important conservation opportunities. For example, significant areas of low-access forest—in the Cascades and the Rocky Mountains of Washington as well as in parts of northern Maine and northern Minnesota—remain outside of the protected areas system. Here, wilderness, recreational, and biodiversity values might be further enhanced through establishment of new parks and reserves or through management regimes that emphasize conservation values as well as extractive activities (e.g., certified logging operations).

As a coarse-scale analysis, this study attempts to provide only a rough picture of forest areas that are potentially intact and to assess their protection status. The accuracy of the results is affected by the limitations of those input datasets available for use in a continental-scale assessment. For example, the analysis also fails to pick up disturbance from non-linear features, such as clearcuts and mines. There are no existing comprehensive datasets, at a national or regional level, that depict the location of forests that have been impacted by such disturbances. Also, because of the input datasets and scale, the analysis does not evaluate disturbances from small roads, logging roads, and seismic lines, which significantly degrade and fragment forests. This is particularly important for rural areas of the United States, where existing transportation data, in many cases, underestimate the presence of roads.

Because the land cover used for this assessment depicts percentage of woody vegetation per grid cell, pixels do not depict patterns at a finer scale (resolution below 1 km). Consequently, when examined at a finer scale, some areas showing a high percentage of tree cover might prove to be highly fragmented; to the extent that this is true, the area of low-access forests is overestimated. Moreover, since the dataset was created (1992-3), the distribution of forest cover has changed, due to recent agricultural, urban, and other development.

As stated before, this book provides only a coarse picture, using proxy measures, of the location and status of large, relatively undisturbed forests in North America. Careful management and steward-

ship of those forest areas in North America and elsewhere that are not yet significantly degraded or fragmented requires data of greater accuracy at a much finer resolution. To address this information gap, Global Forest Watch is in the process of mapping forest conditions in several global regions. The first step in a two-phased approach entails identifying large, low-access forest blocks (as was done in this assessment), using existing datasets on land cover and roads and other transport routes. Similar analyses have been completed for forests in Canada, Central Africa and Indonesia. These coarse-scale assessments provide a rough picture, comparable across major regions.

Coarse-scale assessments provide a starting point for the second phase of GFW mapping efforts, which feature finer-scale analysis. This second-phase work usually incorporates high resolution satellite imagery, which is used to identify logging and other transport routes not shown in existing roads datasets and then further eliminate forest tracts accessed by these logging roads, including those that have undergone recent logging and other extractive activities (e.g., oil and gas development). Final maps depict at detailed scales what we refer to as "intact natural forests"—i.e., forests with few or no signs of recent, commercial-scale human activities and of sufficient size to maintain viable populations of resident species in the face of periodic natural disturbance. Such mapping has been completed for Chile and Russia and is now underway for Alaska and Canada. Similar work is planned for portions of the lower 48 states of the United States.