

Unprotected Wild Lands In Washington State

**An Analysis of Their Current Status and
Future under Current Management Direction**

A report by

The Pacific Biodiversity Institute

February 1998

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In Washington State**

**An Analysis Of Their Current Status And
Future under Current Management Direction**

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Executive Summary

The Pacific Biodiversity Institute (PBI) has undertaken a comprehensive inventory and mapping project to identify and map the remaining wild areas in Washington. For the first time, all unprotected roadless areas of more than 1,000 acres have been identified through rigorous, scientifically based criteria. Using state-of-the-art computer mapping and analysis techniques - combined with detailed analysis of satellite imagery, high resolution digital aerial photography, and ground-based observations - this project has created a complete and highly accurate inventory of the state's remaining unprotected wild areas.

Our work has revealed the inadequacy of the Forest Service's inventory of roadless areas on National Forest land. We compared our mapping of all roadless lands to that done previously by the US Forest Service - which only mapped areas over 5000 acres in size. Despite the fact that the US Forest Service undertook a series of roadless area inventories during the last 20 years, it overlooked many areas and drew arbitrary boundaries around many other areas. The results of our independent inventory conclusively demonstrate that the US Forest Service ignored at least 860,000 acres of roadless land in National Forests in Washington State. These lands are roadless blocks over 5000 acres in size that meet official roadless area criteria. Had the Forest Service conducted an adequate inventory of roadless lands in several earlier attempts, these extensive wild lands would have been considered for Wilderness designation during several rounds of Wilderness legislation.

These overlooked roadless lands equal 78% of the land that was protected in the original four Wilderness areas in Washington State - Glacier Peak, Goat Rocks, Mt. Adams and Pasayten. Forest Service inventoried roadless areas have undergone extensive examination when resource extraction activities have been planned in them. Usually a federal Environmental Assessment or Environmental Impact Statement has been required before entry into an inventoried roadless area. But uninventoried roadless lands have never been given this kind of environmental review. Consequently, roads and logging have dramatically altered a substantial amount of these lands in the last 20 years, disqualifying them for Wilderness protection before they were ever inventoried.

Numerous problems with current Forest Service roadless area mapping were discovered as part of this study. Although the Forest Service started assessing and mapping the remaining roadless National Forest lands over 30 years ago, they have yet to present a reliable, consistent and scientifically repeatable map of these important areas. This situation exists despite many years of public review, comment and litigation that addressed many of the fundamental problems with the Forest Service roadless area inventory approach observed in this study. Several Forest Service officials acknowledged in the course of this study that they do not have a good definition for what a roadless area is - after over 30 years of effort. Most Forest Service roadless area boundaries were drawn in a very imprecise fashion, and often appear to wander across the landscape without any credible rationale for their location. In some places Forest Service roadless area boundaries come to the edge (or even cross) roads that bound them. In other places the boundary is kept over a mile away from any bounding road. Most of the National Forests studied contained individual roadless areas over 5000 acres in size that had never been inventoried by the Forest Service. There is little

consistency between roadless areas within a National Forest and even less consistency between forests. The only real consistency that we were able to find between all the National Forests in Washington State was that they all underestimated the acreage of roadless land in areas over 5000 acres in size.

There is considerable variation in the accuracy of Forest Service roadless area mapping between individual National Forests in Washington State. Some National Forests did a more comprehensive and accurate job in inventorying and mapping. Other National Forests apparently did not take this task seriously and mapped roadless areas in an arbitrary and incomplete fashion. For example, the Wenatchee National Forest's inventoried roadless areas compare favorably to roadless areas over 5000 acres mapped by PBI. Their inventoried roadless area acreage estimate is 91% of our estimate. In comparison, the Colville National Forest's inventoried roadless area acreage estimate is only 54% of PBI's estimate. They failed to map several larger roadless areas and drew boundaries around roadless areas in an arbitrary fashion. The Washington State portion of the Kaniksu National Forest has no Forest Service inventoried roadless areas, while we have identified 5 areas over 5000 acres in size comprising a total of nearly 48000 acres. No inventoried Forest Service roadless areas are mapped here in the data available from the Forest Service.

Our study identified over 3.7 million acres of roadless land not in designated wilderness within the eight National Forests in Washington State. About 113,000 acres of roadless land is contained within the Mt. St. Helens National Volcanic Monument (managed by the Forest Service) and is considered protected in this study. Over 2.9 million acres of unprotected roadless areas are over 5000 acres in size or adjacent to designated wilderness. National Forest roadless areas 1000 to 5000 acres in size comprise about 654,000 acres. There are also small roadless parcels on National Forest land less than 1000 acres that are adjacent to larger roadless areas on other ownerships. These small roadless parcels amount to 144,000 acres. The Wenatchee National Forest has the most roadless acreage - with over 844,000 acres (Table 1). The Umatilla and Kaniksu National Forests contribute the least to the statewide total, primarily because they span the state boundary and are largely within Oregon and Idaho (respectively). Wilderness and roadless parts of our National Parks total about 4.4 million acres in the state.

In a letter to constituents dated January 22, 1998, Mike Dombeck, Chief of the US Forest Service, announced a temporary suspension of road building in most National Forest roadless areas. In an Advanced Notice of Proposed Rulemaking (ANPR) published in the Federal Register, the Forest Service announced its intentions to revise its management of the National Forest Road System. In concert with this ANPR, the Forest Service proposed to temporarily suspend road construction and reconstruction in most roadless areas of the National Forest System. Their intended effect is "to safeguard the significant ecological values of roadless areas from potentially adverse effects associated with road construction, while new and improved analytical tools are developed to evaluate the impact of locating and constructing roads." The Forest Service announced "that the temporary suspension of road construction and reconstruction would expire upon the application of the new and improved analysis tools or 18 months, whichever is sooner."

This new Forest Service proposal is a result of mounting scientific evidence that roadless lands have significant ecological value and that Forest Service road building has resulted in serious ecological degradation. This new proposal offers a chance to reassess the status of roadless lands on National Forest land and to assess the relative merits of habitat protection versus continued road building.

Pacific Biodiversity Institute has analyzed the proposed road building moratorium in Washington State. The proposal excludes roadless areas within those portions of National Forests encompassed by the Northwest Forest Plan. Five of Washington State's National Forests - the Olympic, Mt. Baker - Snoqualmie, Gifford Pinchot, Wenatchee, and a majority of the Okanogan - are excluded from the proposed moratorium. In addition, the proposal does not give interim protection to many of the uninventoried roadless areas. Uninventoried roadless areas are excluded unless they are over 1000 acres in size and contiguous with existing inventoried roadless areas or Congressionally designated Wilderness. Most uninventoried roadless areas in Washington State do not meet these criteria. Consequently, only about 16% of our National Forest roadless areas are included in the proposed road building moratorium. Over 3 million acres of the state's most biologically significant unprotected wild lands will continue to be open to further road construction as a result of exclusions in the proposed moratorium.

The unprotected wild lands in the National Forests of Washington State represent some of the most ecologically significant parts of our Pacific Northwest landscape. These areas contain exceptional wildlife habitat and natural communities, which are not well represented in our existing National Park and Wilderness system. The large majority of the existing protected lands in the state are high elevation, mountainous lands, covered by a deep winter snow pack and inaccessible for most of the year to all except the hardest adventurers. While most of the alpine rock and ice has been protected in Washington State, the unprotected wild lands identified in this study are at the other end of the spectrum. These areas are vestiges of our biologically bountiful Pacific Northwest landscape. They contain extensive ancient forests, rivers and streams filled with salmon and trout, hundreds of resident and migratory bird species, large carnivores (including the grizzly bear, gray wolf, wolverine and cougar), rare vegetation types, and a host of endangered and threatened species. These unprotected roadless and wild areas are intact and fully functional ecological communities. Besides their ecological value, these areas are usually accessible to human visitors year round - unlike most Congressionally designated Wilderness. They are often near human settlement and are some of the most popular areas for afternoon or weekend hikes.

The unprotected wild lands usually have significant environmental constraints that make them ill suited for intensive management. Steep, unstable or highly erodible soils cover many of these areas, making them unusually susceptible to erosion that can result from road building, logging, grazing or other intensive uses. Soils covering these unprotected wild lands are often very thin and unproductive. Tree growth rates are so slow in many of these areas that many centuries are required to reestablish a healthy mature forest. Reforestation problems and slow growth rates contribute to unsuitable conditions for commercial forestry in many of these areas. These unprotected wild lands contain some of the most important aquatic refugia - areas that provide pristine habitat for dwindling fisheries, amphibian populations and other aquatic species. These aquatic refugia are particularly sensitive to disturbance.

Our inventory of unprotected wild lands in Washington State covers all ownerships. We have mapped roadless and undeveloped natural areas on federal, state, county, private and tribal lands, in addition to those areas in our National Forests. This is the first assessment of roadless, wild lands covering multiple jurisdictions - public, private and tribal - within the state. About 39 percent of the state remain in a relatively undeveloped condition. More than 2.3 million acres of relatively undeveloped land exists on public ownerships other than National Forests and National Parks. We have also identified about 4.4 million acres of relatively undeveloped private land in the state and more than 1.5 million acres of undeveloped tribal land in the state.

We did an initial assessment of the status of wild lands 100 years ago based on examination of historical maps made by the US Geological Survey and other sources. Based on this assessment we estimate that wild lands have been disappearing in Washington State at the average rate of between 200,000 and 250,000 acres per year over the last 100 years. Major changes in wildlife habitat have accompanied this disappearance of wild lands. This dramatic rate of habitat loss is a primary factor in the decline in numerous native species to the point that they have been listed as under the Endangered Species Act.

Often the unprotected wild lands on mixed ownerships are the parts of our original landscape that hold the greatest biological riches and the greatest concentration of rare species and ecosystems. They are at lower elevations or span a broad range of elevations, and they often contain ecosystems that are not represented in the existing reserve network. Our assessment of these areas is only beginning. Much work remains to be done to fully understand the complex ecology, conservation opportunities, and unusual management issues involving these areas. While this report presents an initial summary of the status of roadless and undeveloped natural areas in multiple ownership landscapes, these important areas will be the focus of a subsequent study by Pacific Biodiversity Institute.

Introduction

The Pacific Biodiversity Institute has completed the first comprehensive inventory of all roadless and undeveloped lands in Washington State. This work is a continuation of an independent evaluation of wild landscapes in eastern Oregon and Washington that Sierra Biodiversity Institute (Pacific Biodiversity Institute's parent organization) began in 1993 as part of the Eastside Forests Scientific Society Panel Study (Henjum et al 1994). It represents part of our effort to map the wildlands of the western United States. This analysis is the first detailed inventory of roadless and undeveloped lands across all ownerships (federal, other public, tribal and private). We have also compared this inventory with previous inventories.

History of Wild Land and Roadless Area Mapping

The decline of roadless areas in the United States can be told through the history of efforts to inventory and map these wild regions. Just as the protection of wild areas has been fraught with controversy and confusion, so have the attempts to identify and map these important areas.

The first major efforts to inventory roadless areas began in the mid-1920's, with assessments conducted by both the Forest Service and wilderness advocate, Robert Marshall. The Forest Service in 1926 found the largest roadless area to be 7 million acres in size. By 1936, Marshall had identified forty-eight forested areas larger than 300,000 acres and twenty-nine desert areas over 500,000 acres in size. His attempts to draw attention to these areas and the importance of their conservation, however, went largely unnoticed (Forman and Wolke 1992).

Meanwhile, roading and further development continued to shrink the amount of remaining wild areas. By 1961, the University of California Wildland Research Center found the largest roadless area to be 2 million acres in size, and only 19 areas of 230,400 acres or greater - down from 74 such areas in Robert Marshall's inventory (Forman and Wolke 1992).

It was not until passage of the 1964 Wilderness Act that further effort was made to identify and assess roadless areas, for potential inclusion as part of the Wilderness system. The Wilderness Act included a legal mandate for the Forest Service to evaluate all remaining "primitive areas" (i.e. roadless areas already inventoried but not included as wilderness under the Act) for wilderness designation. After the Wilderness Act, citizen initiatives gained momentum and forced the Forest Service to consider many of the *uninventoried* roadless areas. The federal agency attempted to head off any further initiatives by responding with the RARE I (Roadless Area Review and Evaluation) process - a supposedly objective and thorough identification of all remaining roadless areas 5,000 acres or greater. This mapping however, turned out to be highly incomplete, inconsistent, and inaccurate. Conservationists sued the Forest Service, settling out of court. In 1976, as conservationists again pushed Congress for further Wilderness designation, attempting to by-pass the Forest Service and its flawed mapping and inventory process, the Forest Service responded with its second attempt at

a comprehensive roadless inventory - RARE II. RARE II consisted of a more detailed review, but was still inaccurate and incomplete. Conservationists sued again, and the result was a compromise among competing interests - each state would develop its own National Forest wilderness designation.

The Roadless Area Review and Evaluation processes applied only to Forest Service lands, and in 1976 the US Department of Interior's Bureau of Land Management (BLM) was also mandated to perform a roadless area review under the Organic Act. The BLM's attempt to identify "Wilderness Study Areas," like the Forest Service's RARE processes, was fraught with numerous problems and inconsistencies. One of the greatest failures of these two federal processes was their complete lack of coordination. Although the BLM and Forest Service administer adjacent lands and large contiguous roadless areas throughout much of the West, neither the RARE or Wilderness Study Area processes looked beyond their borders and adjusted their roadless mapping accordingly.

In 1989 Dave Foreman and Howie Wolke made the first attempt to map the remaining wild and roadless areas irrespective of ownership boundaries in *The Big Outside* (Foreman and Wolke 1992). This mapping included all other federal ownerships (e.g. military institutions), as well as non-federal lands (e.g. Indian reservations, state lands, private, etc.). Despite this greatly expanded view and definition of roadless areas, Foreman and Wolke found the largest remaining roadless area in the lower forty-eight states to be just over 3 million acres in size. Only sixteen wild areas of a million acres or greater remained by 1989. This effort was a broad brush assessment of the United States, excluding Alaska, and only considered areas over 100,000 acres in size in the western states and 50,000 acres in size in the eastern states. They also did not have the benefit of many new data sources and computer-based spatial analysis and mapping tools.

Clearly there has been a substantial loss of wild lands since Marshall first raised concerns about their decline back in the 1930's. Our ability to accurately identify and map roadless areas, however, has dramatically increased. As the remaining roadless areas continue to be threatened and entered, our vision has become more focused on the essential ecological role of small roadless areas of 1000 to 5000 acres in size. With the advent of computers and GIS (Geographic Information Systems), we now have the ability to produce highly accurate and detailed maps of these remaining wild areas. Reliable information on these areas is a critical element of sound conservation planning.

Methodology

The methods used in this study to delineate roadless and undeveloped lands are similar to those used by the Eastside Forests Scientific Society Panel Study (Henjum et al 1994), with a number of enhancements. All undeveloped lands (i.e. not urban, agricultural, or otherwise permanently developed) more than 100 meters from a road, and over 400 hectares (1000 acres) in size are designated as roadless areas.

Appendages and narrow connections less than 200 meters in width are eliminated from the roadless/undeveloped regions because these areas are dominated by edge effects. Small, irregular roadless/undeveloped regions that approach the minimum size but have

area/perimeter ratios of less than 80% of that of a circle are also eliminated because of the strong influence of edges on interior habitat conditions.

Complex GIS analysis was used to identify where landscapes met or did not meet these criteria, resulting in precise, repeatable, and consistent mapping across large regional landscapes.

Extensive editing and review of these maps using high resolution digital aerial photography was undertaken on the Colville, Gifford Pinchot, Mount Baker-Snoqualmie, Okanogan, and Wenatchee National Forests. Reviews of other roadless areas in Washington state was done using 1992 MSS Landsat satellite images. In addition, field examination of most areas in the Okanogan NF was undertaken. Draft maps were circulated to many volunteers around the state, and their comments and revisions were incorporated.

For the roadless area update procedure, digital orthophotos were examined at scales of 1:20,000 to 1:50,000, and when necessary for details, at 1:5,000. Satellite views were examined at 1:50,000 to 1:125,000. Working from previous maps of roads and roadless areas, areas that were no longer roadless were digitized as developed polygons, clearcut polygons, and/or linear roads, collectively referred to here as *roaded / developed areas*, defined by the following criteria.

All major roads were digitized if they were visible as existing breaks in soils or vegetation, while omitting logging skid roads, hiking trails, revegetated old roads, and short or broken traces of small roads. On public lands, smaller roads penetrating undeveloped areas were also digitized. Recently closed roads were digitized as a layer called *closed-roads*, and the layer was subtracted from the other roads. Digitizing precision of roads averaged approximately 50 feet.

Developed areas included man-made openings such as buildings, campgrounds, power line openings, clearcuts younger than 40 years old, and other heavily logged openings, but did not include natural openings such as burns, meadows, and rivers, nor revegetated, unroaded clearcuts over 20 years old. Sparsely roaded clearcuts were digitized in a layer called *clearcuts*, but heavily roaded or developed clearcuts were digitized primarily in the *developed* layer, in which case the roads were optionally not digitized. Selectively logged stands were considered roaded / developed if created openings were larger than approximately 5 acres, or 20 acres when digitizing from a satellite image. On private lands, unplowed pastures, old regrown clearcuts, lightly developed parks, and selectively logged stands without major roads were left as unroaded / undeveloped, unless there was extensive ground disturbance. Orthophoto digitizing precision averaged about 100 feet for developed areas and 50 feet for clearcuts. Satellite image digitizing precision averaged approximately 100 - 200 feet.

The Gifford Pinchot National Forest provided an activity layer that was used to delineate logged or developed areas. The remaining unroaded areas within the activities layer were digitized in a separate layer called *not-activities*, which was then subtracted from the activities layer.

Roadless areas in the south half of Mt. St. Helens National Monument were not updated due to the difficulty of recognizing roads built before the blast. Polygons representing

the Monument and nearby blast-damaged stands were used to treat these areas as special cases.

The source GIS data layers used in this analysis are:

Description	Scale	Date
Land use / Land cover data from the USGS	1:250000	1980's
TIGER road data from the US Dept. of Commerce	1:100000	1992
Colville National Forest road data	1:24000	1995
Gifford Pinchot National Forest road data	1:24000	1995
Gifford Pinchot National Forest activities data (<i>Gpveg</i>)	1:24000	1998
Mt. Baker - Snoqualmie National Forest road data	1:24000	1995
Okanogan National Forest road data	1:24000	1996
Olympic National Forest road data	1:24000	1995
Olympic National Forest activities data (<i>Olyveg</i>)	1:24000	1998
Umatilla National Forest road data	1:24000	1995
Wenatchee National Forest road data	1:24000	1995
Ownership data from the Interior Columbia Basin Ecosystem Management Project (ICBEMP)	1:100000	1995

The accuracy of the roadless/undeveloped region mapping is dependent on the accuracy of the source data layers. We used the most reliable data that was available for each area of the state. The mapping is more reliable on National Forest lands than other ownerships, due to the recent, small-scale source layers. Although no accuracy formal assessment has been made of this map, an internal and external review indicates that the accuracy of mapping on National Forest lands exceeds 90%. The accuracy on the Colville, Gifford Pinchot, Mt. Baker - Snoqualmie and Okanogan and Wenatchee National Forests probably exceeds 95%. The accuracy on other public and tribal lands is lower than that for mapping covering National Forests. Our mapping is least accurate on private lands - except for those near National Forests where we have used digital orthophotos for updating. A portion of the undeveloped areas we show on other public, private and tribal land is now probably developed.

Proposed Forest Service Road Building Moratorium

In a January 22, 1998 letter to constituents, Mike Dombeck, Chief of the US Forest Service, announced a temporary suspension of road building in most National Forest roadless areas. In an Advanced Notice of Proposed Rulemaking (ANPR) published in the Federal Register, the Forest Service announced its intentions to revise its management of the National Forest Road System. In concert with this ANPR, the Forest Service proposed to temporarily suspend road construction and reconstruction in most roadless areas of the National Forest System. Their intended effect is "to safeguard the significant ecological values of roadless areas from potentially adverse effects associated with road construction, while new and improved analytical tools are developed to evaluate the impact of locating and constructing roads." The Forest Service announced "that the temporary suspension of road construction and reconstruction would expire upon the application of the new and improved analysis tools or 18 months, whichever is sooner."

This new Forest Service proposal is a result of mounting scientific evidence that roadless lands have significant ecological value and that Forest Service road building has resulted in serious ecological degradation. This new proposal offers a chance to reassess the status of roadless lands on National Forest land and to assess the relative merits of habitat protection versus continued road building.

Pacific Biodiversity Institute has analyzed the proposed road building moratorium in Washington State. The proposal excludes roadless areas within those portions of National Forests encompassed by the Northwest Forest Plan. Five of Washington State's National Forests - the Olympic, Mt. Baker - Snoqualmie, Gifford Pinchot, Wenatchee, and a majority of the Okanogan - are excluded from the proposed moratorium. In addition, the proposal does not give interim protection to many of the uninventoried roadless areas. Uninventoried roadless areas are excluded unless they are over 1000 acres in size and contiguous with existing inventoried roadless areas or Congressionally designated Wilderness. Most uninventoried roadless areas in Washington State do not meet these criteria. Consequently, only about 16% of our National Forest roadless areas are included in the proposed road building moratorium. Over 3 million acres of the state's most biologically significant unprotected wild lands will continue to be open to further road construction as a result of exclusions in the proposed moratorium.

Problems with Forest Service Roadless Area Mapping

Numerous problems with current Forest Service roadless area mapping were discovered as part of this study. Although the Forest Service started assessing and mapping the remaining roadless National Forest lands over 30 years ago, they have yet to present a reliable, consistent and scientifically repeatable map of these important areas. This situation exists despite many years of public review, comment and litigation that addressed many of the fundamental problems with the Forest Service roadless area inventory and mapping approach observed in this study. Accurate roadless area mapping is not a difficult technical task. There is no technical reason that the Forest Service could not have completed adequate roadless area maps at some point during the last 30 years. Several Forest Service officials acknowledged in the course of this study that they still do not have a good definition for a roadless area - after over 30 years of effort.

Problems found on all National Forests

Our analysis of roadless area mapping available from the Forest Service revealed several problems that are present to some degree on all National Forests. The most prevalent problem was great variation in where Forest Service inventoried roadless area boundaries are drawn. In some places Forest Service roadless area boundaries come to the edge (or even cross) roads that bound the roadless areas. In other places the boundary is kept over a mile away from any bounding road. Most Forest Service roadless area boundaries were drawn in a very imprecise fashion, and often appear to wander across the landscape without any credible rationale for their location. Forest Service roadless areas were delineated without any precise and repeatable criteria and methodology. There is little consistency between roadless areas within a National Forest and even less consistency between forests. The only real consistency that we

were able to find between all the National Forests in Washington State was that they all underestimated the acreage of roadless land in areas over 5000 acres in size.

Many unroaded, unlogged and completely wild areas have been excluded from Forest Service inventoried roadless areas for no apparent reason. It appears that the boundaries of Forest Service inventoried roadless areas were often drawn to minimize their size, particularly where substantial timber is involved. There is also no consistency regarding what is included and what is excluded from Forest Service roadless areas. In some cases Forest Service roadless areas (and some designated Wilderness Areas) include old roads, bulldozer trails, logged areas and other development. But in most cases even the slightest hint of old logging appears to be an excuse for excluding an area from a Forest Service roadless area.

There is a similar lack of consistency in how intermixed privately owned (or owned by another public entity) roadless lands are dealt with. In some cases these lands are considered as part of the roadless area - while in other cases these other ownership lands are excluded. No consistent rule appears to have been applied.

Most of the National Forests studied contained individual roadless areas over 5000 acres in size that had never been inventoried by the Forest Service. These areas meet the criteria necessary for consideration as designated Wilderness and roadless area designation but appear to have been excluded arbitrarily. Some of these uninventoried roadless areas are quite large. Many were much larger at the point the Forest Service conducted its RARE I and RARE II inventories - but have been significantly reduced in size by road building and logging in the intervening years.

Road building and logging has continued over the last 30 years in the Forest Service inventoried roadless areas (as well as uninventoried areas). But the Forest Service has often not updated its mapping of roadless areas to exclude areas where new roads have been built since the Forest Plans were prepared in the 1980's. Due to this fact, many Forest Service roadless areas contain new roads and recent logging and their mapped boundaries do not reflect current reality. In contrast, our roadless area mapping used the most up-to-date information available to insure that our roadless mapping reflects all developments - except for very recent ones for which no useable spatial information exists.

Variations between National Forests

There is considerable variation in the accuracy of Forest Service roadless area mapping between individual National Forests in Washington State. Some National Forests did a much more comprehensive and accurate job in inventorying and mapping their roadless areas. Other National Forests apparently did not take this task seriously or had other agendas and mapped roadless areas in an arbitrary and incomplete fashion. For example, the Wenatchee National Forest's inventoried roadless areas compare favorably to those that we have mapped that are over 5000 acres in size. Although many of the problems discussed above exist to some extent on the Wenatchee, their inventoried roadless area acreage estimate is 91% of our estimate. In comparison, the Colville National Forest's inventoried roadless area acreage estimate is only 54% of our estimate. The Forest Service failed to inventory many roadless areas on the Colville that are over 5000 acres in size and drew arbitrary boundary lines around the inventoried roadless areas. The Okanogan National Forest had an intermediate level of

roadless area mapping accuracy. Its inventoried roadless area acreage estimate is 69% of our estimate. The Washington State portion of the Kaniksu National Forest we identified 5 areas over 5000 acres in size comprising a total of nearly 48000 acres. No inventoried Forest Service roadless areas are mapped here in the data available from the Forest Service. Other National Forests roadless area estimates range from 68% to 79% of our estimates.

The fact that one National Forest (the Wenatchee) was able to map roadless areas with a fairly high level of accuracy indicates that this level could have been achieved on all National Forests.

The Forest Service is usually very stringent with its size cut off criteria for roadless areas and normally excludes any areas that are not 5000 acres in size. But four National Forests (Colville, Mt. Baker - Snoqualmie, Olympic and Wenatchee) each have one small inventoried roadless area that their own data show to be less than 5000 acres in size. It is not apparent why these small roadless areas are included in their roadless area inventory.

A case study of the Granite Mountain Roadless Area, Okanogan National Forest

The Granite Mountain Roadless Area in the Okanogan National Forest in north central Washington state is an example of the long history of problems with roadless area mapping done by the Forest Service. The Forest Service has progressively revised its estimates of the area of the Granite Mountain Roadless Area over the last 25 years. They have deleted areas from the roadless area because of "logging with roads" – when in fact no such activities have occurred. Our recent evaluation of this area has revealed that over 54,000 acres of roadless land still exists in this area – which is nearly 26,000 acres more than the reported acreage for this roadless area in the latest Forest Plan for the Okanogan National Forest. The Forest Service has drawn arbitrary boundaries around this roadless area. In some places the boundaries include old fire roads or go right down to the edge of a road. In other places the boundary was arbitrarily drawn over a mile from the closest man made disturbance.

The table below depicts area estimates made at various times for the Granite Mountain Roadless Area, beginning with RARE I (Roadless Area Review and Evaluation I). Sources of National Forest data are the Okanogan National Forest Plan DEIS and Proposed Land and Resource Management Plan, Appendices pp. C-60 to C-70 (1986); and the Okanogan National Forest Plan FEIS and Proposed Land and Resource Management Plan, Appendices C-57 to C-65 (1989).

Changes in Granite Mountain Roadless Area Acreage

Year	Source of Data	Acreage Lost	Acreage Remaining
1964 - 1972	RARE I		54,100
1979	RARE II	12,320	41,780
1986	ONF Forest Plan DEIS	4,364	37,416
1989	ONF Forest Plan FEIS	8,556	28,860
1998	PBI Roadless Inventory		54,588

Historical Notes:

The following dates list reported changes in Granite Mountain acreage by date of occurrence:

1964 - 1972: Granite Mountain roadless area reported RARE I acreage was 54,100 acres in three areas, Beaver Creek, Granite Mountain, and Pebble Creek.¹

1970: ONF FP, DEIS, Appendix C, 3, Capability, b. Natural Integrity, Appearance and Surroundings. "The major impact on the natural integrity and appearance of the area are from the control efforts and timber salvage of the 1970 Forks Fire. A road was built into Beaver Meadows. Approximately 3400 acres have been precommercially thinned."¹

1972 - 1979: Timber sales and roads "reduced the size of the area by approximately 12,320 acres" to the acreage reported for RARE II, 41,780 acres.¹

1979 - 1986: The Forest Plan reported Granite Mountain roadless area as having 37,416 acres, down 4,400 acres from the 1979 RARE II review, due to "...roads and logging, mostly in the Scenic Viewshed Management Allocation".¹

1988, ONF FP, DEIS, Appendix C, 4. Availability. f. Timber: "A portion of 1 sale with a volume of 4.0 million board feet is planned in the area on the current Timber Sale Plan. Portions of 2 sales with a volume of 13.0 million board feet are planned during 1987-1988."¹

1989, ONF FP FEIS: The FEIS changes the DEIS claim that 4400 acres were roaded and logged between 1979 and 1986 to say that 12,900 acres were roaded and logged between 1979 and 1984. Granite Mountain is now listed as having only 28,860 acres, down from the previous 1986 acreage by 8556 acres due to "logging with roads". The additional 8556 acres lost between 1986 and 1989 versions of the EIS for the Forest Plan is at this point ascribed to historic events predating 1984.²

1989, ONF FP FEIS: "Comment: RARE II areas mapped do not constitute a complete inventory. The boundaries of these areas seem in many cases to have been drawn to minimize their size, particularly where there appears to be valuable timber involved. The RARE II survey serves as a good baseline, but it should be presented in the final EIS for the incomplete survey it really is.

Response: Roadless areas were mapped based on conditions that existed at the time of the inventory in 1984 (PL98-339). Boundaries differ from RARE II because of management activities and passage of The Washington Wilderness Act of 1984. Since 1984, additional acres have been impacted by management activities. The difference in acreage between RARE II Inventory, and 1989 Inventory is described in the final EIS, CHAPTER III - Physical Environment, Roadless Areas."³

1. 1986. ONF Forest Plan (FP), Draft Environmental Impact Statement (DEIS), Proposed Land and Resource Management Plan (LRMP), Appendices, pp. C-1, C-60 to C-70.

2. 1989. ONF Forest Plan (FP), Final Environmental Impact Statement (FEIS), Land and Resource Management Plan (LRMP), Appendices A-L, pp. C-5, C-57 to C-65.

3. 1989. ONF Forest Plan (FP), Final Environmental Impact Statement (FEIS), Land and Resource Management Plan (LRMP), Appendix M, pp. M - 3 - 125.

Roadless Areas in Individual National Forests

Okanogan National Forest

The Okanogan National Forest in eastern Washington State is 1.69 million acres in size and contains over 627,000 acres of Congressionally protected Wilderness. It has 765,486 acres of roadless and undeveloped land outside of Congressionally protected Wilderness. These roadless lands are largely in pristine condition, but have no permanent protection. Some roadless lands on the Okanogan National Forest are included in late successional reserves or key watersheds designated in the Northwest Forest Plan. These areas have increased management restrictions, but are not protected from resource extraction. Many of roadless areas are in zones that are managed for maximum timber production under the current National Forest plan.

The Okanogan National Forest has the largest unprotected roadless area in Washington State - the Sawtooth roadless area encompassing 197,625 acres (33,400 acres are in the adjacent Wenatchee National Forest). These wild lands are adjacent to the Chelan Sawtooth Wilderness. They comprise the lower elevation, biologically diverse areas that were left out of designated Wilderness because of their perceived timber values.

Another three of the ten largest roadless areas in Washington State also lie in the Okanogan National Forest - Pasayten Rim (129,240 acres), Liberty Bell (113,809 acres) and Granite Mountain (54,521 acres). The Pasayten Rim and Liberty Bell roadless areas are adjacent to the Pasayten Wilderness and were left out of designated Wilderness because of timber, mining and developed recreation interests. The Granite Mountain roadless area lies south and east of the protected Wilderness lands and contains lower elevation forest communities which are currently unprotected.

We identified 616,735 acres of roadless lands in 21 areas greater than 5000 acres in size or adjacent to Wilderness on the Okanogan National Forest. The US Forest Service in either the RARE process or in the forest planning process did not inventory seven of these areas. The Forest Service has only identified 14 roadless areas comprising 427,738 acres on the Okanogan National Forest. Our mapping has identified an additional 188,998 acres of roadless lands that should have been included in the RARE process and evaluated for Wilderness potential in the forest planning process. These uninventoried areas were given no consideration for Wilderness potential even though they meet all the criteria for Wilderness and inclusion as official Forest Service roadless areas. We identified over 44% more roadless lands larger than 5000 acres than the Forest Service.

The areas that were not inventoried by the Forest Service are generally at the lower elevations and contain unique and pristine habitat not found in the protected reserve system. Many of these areas support well-developed late successional forests. The boundaries of the inventoried roadless areas seem in many cases to have been drawn to minimize their size, particularly where there appears to be valuable timber involved.

We identified another 127,481 acres of roadless land in areas between 1000 and 5000 acres in size. Although these areas may be too small for designation as Wilderness,

they provide important refugia for species with low tolerance for human disturbance. These areas often represent rare ecological communities that are not yet protected.

An additional 21,269 acres of federal roadless land occurs in smaller patches near the boundary of the Okanogan National Forest, adjacent to roadless/undeveloped land in other public or private ownerships. The federal portion of these patches is less than 1000 acres but the multiple ownership roadless patch exceeds 1000 acres in size.

**Comparison Of Actual Roadless Areas Over 5000 Acres
To Forest Service Official Roadless Areas
On The Okanogan National Forest**

Roadless Area Name	Actual Roadless Area (Acres)	Us Forest Service Official Roadless Area (Acres)
Black Canyon	16908	10079
Bodie Mountain	3848	3877
Clackamas Mountain	13020	12544
Dugout Mountain (uninventoried)	5689	(uninventoried)
Fawn Peak (uninventoried)	7695	(uninventoried)
Finley Mountain (uninventoried)	5158	(uninventoried)
Gold Ridge (uninventoried)	7648	(uninventoried)
Granite Mountain	54521	27696
Hungry Ridge	15380	9179
Jackson Creek	7865	7837
Liberty Bell	113809	108180
Long Draw	4826	3908
Long Swamp A & Pasayten Rim B	129240	82158
Long Swamp B	850	0
Lookout Mountain (uninventoried)	12344	(uninventoried)
McClure Mountain (uninventoried)	5941	(uninventoried)
Mt. Bonaparte	14905	11020
Pasayten Rim A	1270	(uninventoried)
Sawtooth	164171	123073
South Ridge*	7885	6115
Tiffany	23761	22072
TOTAL	616735	427738

* After executing the Little Lake timber sale the Forest Service no longer considers the South Ridge inventoried roadless area to be over 5000 acres in size and therefore is not currently considering it to be roadless. The Okanogan National Forest GIS data still shows it to be a roadless area.

Colville National Forest

The Colville National Forest in eastern Washington State is about 1.09 million acres in size and but only contains 31,438 acres of Congressionally protected Wilderness - the second lowest percentage (2.9%) of any National forest in the State. It contains 571,099 acres of roadless and undeveloped land outside of Congressionally protected Wilderness. These roadless lands have no permanent protection. Many of these areas are in zones that are to be managed for maximum timber production under the current National Forest plan.

The Colville National Forest has several roadless areas that are adjacent to the Salmo Priest Wilderness. These areas were left out of designated Wilderness because of their high timber values.

We identified 348,045 acres of roadless land in units over 5000 acres or adjacent to the Salmo Priest Wilderness on the Colville National Forest. In comparison, the Forest Service only identified 188,631 acres of roadless land on the Colville National Forest. There are thirteen individual areas over 5000 acres (not adjacent to Wilderness) that were not inventoried by the US Forest Service in the RARE processes or in the forest planning process. One of the Forest Service's inventoried roadless areas is less than 5000 acres and does not meet their own minimum size criteria. Our mapping has identified an additional 159,413 acres of roadless land (or 85% more roadless land than the Forest Service) that were never included as inventoried roadless areas in the RARE processes or in the forest planning process. These uninventoried areas were given no consideration for Wilderness potential even though they meet all the criteria for Wilderness. Most of these uninventoried roadless areas support mature forests with relatively high timber volumes.

We identified another 184,754 acres of roadless land in areas between 1000 and 5000 acres in size. Although these areas may be too small for designation as Wilderness, they provide important refugia for species with low tolerance for human disturbance. These areas often represent rare ecological communities that are not yet protected.

An additional 38,301 acres of federal roadless land occurs in areas of 1000 to 5000 acres size, near the boundary of the Colville National forest, adjacent to roadless/undeveloped land in other public or private ownerships. The federal portion of these patches is less than 1000 acres but the multiple ownership roadless patch exceeds 1000 acres in size.

Wenatchee National Forest

The Wenatchee National Forest in eastern Washington State is over 2.19 million acres in size - the largest National Forest in the State. It contains 845,905 acres of Wilderness - also the largest amount in the state. It has the second highest percentage of Wilderness lands in the state (38.5%). The Wenatchee National Forest contains 844,339 acres of roadless and undeveloped land outside of Congressionally protected Wilderness. This forest has the largest concentration of unprotected roadless land in the state. These roadless lands have no permanent protection. Many of these areas are in zones that are to be managed for maximum timber production under the current

National Forest plan. Some roadless lands on the Wenatchee National Forest are included in late successional reserves or key watersheds designated in the Northwest Forest Plan. These areas have increased management restrictions, but are not protected from resource extraction. A timber sale (the Sand Ecosystem Restoration Project) is currently planned in the Devils Gulch roadless area - which is in a late successional reserve.

The Wenatchee National Forest has many roadless areas that are adjacent to existing Wilderness. These areas were left out of designated Wilderness because of their timber and/or mineral values.

The Wenatchee National Forest has the distinction of containing part of the largest roadless area in Washington State. The Sawtooth roadless area encompasses 197,625 acres. The Wenatchee National Forest portion of this area includes 33,400 acres of pristine wild land. These wild lands are adjacent to the Chelan Sawtooth Wilderness. They comprise the lower elevation, biologically diverse areas that were left out of designated Wilderness. The Wenatchee National Forest also contains the second largest roadless area in the state. This area is south of Lake Chelan and adjacent to the Glacier Peak Wilderness, and it contains 160,805 acres of relatively pristine wild land.

The Wenatchee National Forest also contains the seventh largest roadless area in Washington State. This area is adjacent to the Alpine Lakes Wilderness along its southeast margin and contains 66,331 acres of wild land within National Forest ownership. Additional roadless lands in other ownerships are part of this multiple ownership roadless area - but these lands are not included in the acreage described above.

We identified 686,066 acres of roadless land in units over 5000 acres or adjacent to existing Wilderness on the Wenatchee National Forest. In comparison, the Forest Service identified 622,960 acres of roadless land on the Wenatchee National Forest. There are seven individual areas over 5000 acres (not adjacent to Wilderness) that were not inventoried by the US Forest Service in the RARE processes or in the forest planning process. Our mapping has identified an additional 63,105 acres of roadless land (or 10% more roadless land than the Forest Service) that were never included as inventoried roadless areas in the RARE processes or in the forest planning process. These uninventoried areas were given no consideration for Wilderness potential even though they meet all the criteria for Wilderness. Most of these uninventoried roadless areas support mature forests with relatively high timber volumes.

We identified another 102,590 acres of roadless land areas of 1000 to 5000 acres in size. Although these areas may be too small for designation as Wilderness, they provide important refugia for species with low tolerance for human disturbance. These areas often represent rare ecological communities that are not yet protected.

An additional 55,682 acres of federal roadless land occurs in smaller patches near the boundary of the Wenatchee National forest, adjacent to roadless/undeveloped land in other public or private ownerships. The federal portion of these patches is less than 1000 acres but the multiple ownership roadless patch exceeds 1000 acres in size.

Umatilla National Forest

This report covers only the portion of the Umatilla National Forest in Washington State. This portion of the Umatilla National Forest is 310,742 acres in size and contains 111,167 acres of Wilderness. It also contains over 138,452 acres of roadless and undeveloped land outside of Congressionally protected Wilderness. Other roadless lands exist in the Oregon portion of the Umatilla National Forest and are covered in a separate report for eastern Oregon. These roadless lands have no permanent protection. Many of these areas are in zones that are to be managed for maximum timber production under the current National Forest plan.

The Umatilla National Forest has several roadless areas that are adjacent to the Wenaha-Tucannon Wilderness. These areas were left out of designated Wilderness.

We identified 107,146 acres of roadless land in units over 5000 acres or adjacent to the Wenaha-Tucannon Wilderness on the Umatilla National Forest. In comparison, the Forest Service identified 85,068 acres of roadless land on the Umatilla National Forest. There is one area over 5000 acres in size (not adjacent to Wilderness) that was not inventoried by the US Forest Service in the RARE processes, nor in the forest planning process. Our mapping has identified an additional 22,077 acres of roadless land (or 26% more roadless land than the Forest Service) that were never included as inventoried roadless areas in the RARE processes or in the forest planning process. These uninventoried areas were given no consideration for Wilderness potential even though they meet all the criteria for Wilderness.

We identified another 26,506 acres of roadless areas between 1000 and 5000 acres in size. Although these areas may be too small for designation as Wilderness, they provide important refugia for species with low tolerance for human disturbance. These areas often represent rare ecological communities that are not yet protected.

An additional 4,800 acres of federal roadless land occurs in smaller patches near the boundary of the Umatilla National forest, adjacent to roadless and undeveloped land in other public or private ownerships. The federal portion of these patches is less than 1000 acres but the multiple ownership roadless area is large than 1000 acres in size.

Kaniksu National Forest

The Kaniksu National Forest at the far northeastern edge of Washington State is the only National Forest in the State that is a part of the Northern Region of the Forest Service (Region 1). All other National Forests are part of the Pacific Northwest Region (Region 6). The Kaniksu is Washington State's forgotten forest. The Washington State portion of the Kaniksu amounts to about 119,000 acres. None of this is Wilderness. It has the lowest percentage (0%) of Wilderness of any National Forest in the state. Little conservation attention has been focused on this forest. The headquarters of the Kaniksu National Forest, as well as the majority of the forest, is located in Idaho. A small portion of the forest is located between the Colville National Forest and the Idaho border.

Much of the Washington State portion of the Kaniksu is roadless land. Our study identified 65,863 acres of roadless land on the Washington State portion of Kaniksu National Forest. There appear to be no Forest Service inventoried roadless areas in this portion of the Kaniksu. Our study identified five uninventoried roadless areas that are over 5000 acres or are adjacent to Wilderness in size totaling nearly 48000 acres. It appears that the Forest Service forgot to inventory the roadless areas on the Kaniksu. The largest roadless area in the Washington State portion of the Kaniksu National Forest is 17,650 acres in size. One other roadless area of 17,615 acres is almost as large. There are an additional 16000 acres of roadless lands in areas over 1000 acres in size. Small roadless areas under 1000 acres that are adjacent to roadless lands on other ownerships amount to 1600 acres. Some of these roadless areas are contiguous with roadless areas in the Idaho portion of the Kaniksu National Forest. We did not map or analyze this portion in this study. Because of this limitation our estimate of the amount of roadless land in the Kaniksu which would qualify for Wilderness designation (areas over 5000 acres in size) is conservative.

Gifford Pinchot National Forest

The Gifford Pinchot National Forest in southwestern Washington is over 1.36 million acres in size and but contains only 179,194 acres of Wilderness. It is one of the most heavily roaded and logged forests in the Pacific Northwest. Intense forest fragmentation of late successional forests has resulted from past Forest Service Management (Morrison 1988, Morrison and others 1991). Intensely managed forests usually separate remaining roadless lands from other wild lands. Despite the degree of alteration of this National Forest, significant roadless lands remain. Our study determined that the Gifford Pinchot National Forest contains over 531,000 acres of roadless and undeveloped land outside of Congressionally protected Wilderness. Of this total 102,632 acres of roadless land is contained in the Mt. St. Helens National Volcanic Monument (MSNVM). Some roadless lands on the Gifford Pinchot National Forest are included in late successional reserves or key watersheds designated in the Northwest Forest Plan. These areas have increased management restrictions, but are not protected from resource extraction. Many other roadless areas are in areas managed for timber production.

We identified 303,693 acres (excluding MSNVM) of roadless land in units over 5000 acres or adjacent to existing Wilderness on the Gifford Pinchot National Forest. In comparison, the Forest Service identified 212,962 acres of roadless land on this forest. There are eight individual areas over 5000 acres (not adjacent to Wilderness) that were not inventoried by the US Forest Service in the RARE processes or in the forest planning process. All of these areas qualify for consideration as Wilderness - but have never been given such consideration because they have were not formally inventoried by the Forest Service. There are many more smaller roadless parcels that are adjacent to existing Wilderness that also qualify for Wilderness designation - but were excluded either because they were not mapped and/or because they contained high timber volumes. Our mapping has identified an additional 90,731 acres of roadless land (or 43% more roadless land than the Forest Service) that was never included in the RARE processes or evaluated for Wilderness potential in the forest planning process. These uninventoried areas were given no consideration for Wilderness potential even though they meet all the criteria for Wilderness and inclusion as official Forest Service roadless

areas. The roadless areas that the Forest Service did not identify support mature or old-growth forests with relatively high timber volumes.

We identified another 118,805 acres of roadless land areas of 1000 to 5000 acres in size. Although these areas may be too small for designation as Wilderness, they provide important refugia for species with low tolerance for human disturbance. These areas often represent rare ecological communities that are not yet protected.

An additional 6092 acres of federal roadless land occur in smaller patches near the boundary of the Gifford Pinchot National forest, adjacent to roadless/undeveloped land in other public or private ownerships. The federal portion of these patches is less than 1000 acres but the multiple ownership roadless patch exceeds 1000 acres in size.

Mt. Baker - Snoqualmie National Forest

The Mt. Baker - Snoqualmie National Forest in western Washington is the second largest National Forest in the state with over 1.71 million acres. It contains nearly 720,000 acres of Congressionally designated Wilderness. Nearly 42% of the Forest is Wilderness - the highest percentage in the state. The Mt. Baker - Snoqualmie National Forest contains the largest amount of remaining late-successional forest in the state (Morrison and others 1990, 1991). Our current study determined that the Mt. Baker - Snoqualmie National Forest contains over 658,000 acres of roadless and undeveloped land outside of Congressionally protected Wilderness. Some roadless lands on this forest are included in late successional reserves or key watersheds designated in the Northwest Forest Plan. These areas have increased management restrictions, but are not protected from resource extraction.

We identified 601,336 acres of roadless land in units over 5000 acres or adjacent to existing Wilderness on the Mt. Baker - Snoqualmie National Forest. In comparison, the Forest Service has mapped 441,813 acres within inventoried roadless area on this forest. Our mapping has identified an additional 189,553 acres of roadless land than that which is included in current Forest Service roadless mapping. This amounts to 46% more roadless land than currently included in inventoried roadless area by the Forest Service. All of these uninventoried lands qualify for consideration as Wilderness. The roadless areas that the Forest Service does not include in its inventory support mature or old-growth forests with relatively high timber volumes.

We identified another 34,153 acres of roadless land areas of 1000 to 5000 acres in size. Although these areas may be too small for designation as Wilderness, they provide important refugia for species with low tolerance for human disturbance. These areas often represent rare ecological communities that are not yet protected.

An additional 22,580 acres of federal roadless land occur in smaller patches near the boundary of the Mt. Baker - Snoqualmie National forest, adjacent to roadless and undeveloped land in other public or private ownerships. The federal portion of these patches is less than 1000 acres but the multiple ownership roadless patch exceeds 1000 acres in size.

Olympic National Forest

The Olympic National Forest partially surrounds the Olympic National Park in western Washington. It is 628,068 acres in size and contains 87,218 acres of Wilderness. Although over 76% the Olympic National Forests ancient forests have been cut and the landscape has been highly fragmented by road building and logging significant ancient forests and roadless areas remain (Morrison 1990). Most of its remaining roadless lands are wild extensions of the National Park and Wilderness Areas that form the core of the Olympic Peninsula.

Our study determined that the Olympic National Forest contains over 157,705 acres of roadless and undeveloped land outside of Congressionally protected Wilderness. Some roadless lands on this forest are included in late successional reserves or key watersheds designated in the Northwest Forest Plan. These areas have increased management restrictions, but are not protected from resource extraction.

We identified 123,142 acres of roadless land in units over 5000 acres or adjacent to existing Wilderness on the Olympic National Forest. In comparison, the Forest Service identified 87,979 acres of roadless land on this forest. Our mapping has identified an additional 35,163 acres of roadless land (in blocks over 5000 acres or adjacent to Wilderness or National Park) than mapped by the Forest Service. This is 40% more area than mapped by the Forest Service. These uninventoried roadless areas support mature or old-growth forests with high timber volumes.

We identified another 28,792 acres of roadless land areas of 1000 to 5000 acres in size. Although these areas may be too small for designation as Wilderness, they provide important refugia for species with low tolerance for human disturbance. These areas often represent rare ecological communities that are not yet protected.

An additional 5771 acres of federal roadless land occur in smaller patches near the boundary of the Olympic National forest, adjacent to roadless/undeveloped land in other public or private ownerships. The federal portion of these patches is less than 1000 acres but the multiple ownership roadless patch exceeds 1000 acres in size.

Unprotected Wild Lands in Multiple Ownership Landscapes

Pacific Biodiversity Institute's inventory of unprotected wild lands in Washington State covers all ownerships. Roadless and undeveloped natural areas were mapped on federal, state, county, private and tribal lands, in addition to those areas in our National Forests. This was the first assessment of roadless, wild lands covering multiple jurisdictions - public, private and tribal - within the state. Over 16 million acres - or about 39 percent of the state - remain in a relatively undeveloped condition. More than 2.3 million acres of relatively undeveloped land exists on public ownerships other than National Forests and National Parks. We have also identified about 4.4 million acres of relatively undeveloped private land in the state and more than 1.5 million acres of undeveloped tribal land in the state.

The unprotected roadless lands in private, state and other federal ownership are almost entirely located at lower elevations or span a broad range of elevations, and they often contain ecosystems that are not represented in the existing reserve network. Often the unprotected wild lands on mixed ownerships are the parts of our original landscape that hold the greatest biological riches and the greatest concentration of rare species and ecosystems. These areas deserve more conservation attention if we value the maintenance of ecological integrity and biological diversity. Our assessment of these areas is only beginning. Much work remains to be done to fully understand the complex ecology, conservation opportunities, and unusual management issues involving these areas. These important areas will be the focus of a subsequent study by Pacific Biodiversity Institute.

We did an initial assessment of the status of wild lands 100 years ago based on examination of historical maps made by the US Geological Survey and other sources. Based on this assessment we estimate that wild lands have been disappearing in Washington State at the average rate of between 200,000 and 250,000 acres per year over the last 100 years. Major changes in wildlife habitat have accompanied this disappearance of wild lands. This dramatic rate of habitat loss is a primary factor in the decline in numerous native species to the point that they have been listed as threatened or endangered under the Endangered Species Act.

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