

INVENTORY OF GIANT WESTERN REDCEDAR GROVES ON THE
CLEARWATER NATIONAL FOREST

by

Juanita Lichthardt
Conservation Data Center

January 1998

Idaho Department of Fish and Game
600 South Walnut, P.O. Box 25
Boise, Idaho 83707
Stephen P. Mealy, Director

Cooperative Challenge Cost-share Project
Clearwater National Forest
Idaho Department of Fish and Game

Purchase Order No.: 43-0276-6-0074

ABSTRACT

This report documents an inventory of stands of giant western redcedar (*Thuja plicata*) on the Clearwater National Forest. The inventory builds on previous work done on a regional basis. Generally referred to as “groves”, these rare stands are distinguished by groups of trees greater than five feet in diameter at breast height. Twenty groves were documented, 15 as potential conservation sites, and 5 that are already protected. Five groves were previously undocumented, and 15 were identified as potential groves in an earlier study by Tracy Parker. At each grove that was considered a suitable conservation site, a standardized form was used to record information including directions to the site, description of the site, a list of “elements” (plant communities and rare plants) occurring there, condition, disturbance, size, and landscape context. This information was then stored as a Site Basic Record (SBR) in the Conservation Data Center’s (CDC) conservation site database, which is used to track potential and established conservation sites. Photos were taken, and the precise location and boundaries of each grove were mapped on a 7.5 minute USGS quadrangle which were transferred to base maps at the CDC and digitized for a GIS data layer. Plant cover data were recorded to describe the major plant community present. This report summarizes the information collected on giant western redcedar groves and makes recommendations for managing these groves. SBRs, maps of conservation sites, maps of other potential groves, and completed plot forms are included in appendices to this report.

TABLE OF CONTENTS

ABSTRACT.....	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii
LIST OF APPENDICES	iii
INTRODUCTION.....	1
METHODS	2
RESULTS	3
Plant associations.....	3
Structure.....	7
Rare plants.....	7
Condition.....	8
Threats	8
RECOMMENDATIONS.....	8
Management	8
Priority groves	9
Can Creek South.....	9
Hidden Creek East #2	9
Cedars Campground South.....	9
Further survey	9
Pollock Creek	9
Can Creek South–east bank.....	9
East Fork Moose Creek.....	10
Bear Creek.....	10
ACKNOWLEDGMENTS.....	10
REFERENCES.....	11

LIST OF TABLES

	Page
Table 1. Western redcedar groves for which some form of information was obtained during the 1997 inventory. Those with site numbers have Site Basic Records (SBR) containing detailed descriptions, including plant community and rare plant elements present (Appendix C).....	4
Table 2. Plant associations and rare plants occurring at giant cedar groves visited in 1997.	6

LIST OF APPENDICES

Appendix A	Portions of the Clearwater National Forest map with new, 1997 groves added to Parker's (1986) grove locations.
Map 1	Lolo Ck., Eldorado Ck., and lower Lochsa River Drainages.
Map 2	Upper North Fork Clearwater–Kelly Ck.
Map 3	North Fork District–eastern portion
Map 4	Upper Lochsa River
Appendix B	Data forms used by the Conservation Data Center to document potential and established conservation sites
Form I	Site Survey Form
Form II	Community Survey Form
Form III	Plant Composition
Appendix C	Site basic records and specific grove locations
Appendix D	Completed plot forms (Forms II and III)

INTRODUCTION

Within the cedar–hemlock forests (Daubenmire and Daubenmire 1968) of the Pacific Northwest, there exist small enclaves of very old western redcedar trees that have escaped repeated, catastrophic fires and the logging that has characterized the region for a century. These trees occur largely as streamside stringers and small stands referred to as “groves”, that are characterized by individuals from 5 to 11 ft in diameter. Such groves are rare and represent an important resource for research, and habitat for rare plants, in addition to being highly valued by the public as campsites, nature trails, and natural areas.

These western redcedars are the oldest trees in the northern Rockies, with estimated ages of 1,000 to 2,000 years (Parker 1979). They can attain diameters greater than 10 ft—much larger than their largest conifer associates, western larch (*Larix occidentalis*) and western white pine (*Pinus monticola*). It is impossible to accurately determine the age of large western redcedar because heart rot fungi render them hollow. Using a conservative method based on growth rates of individuals of various sizes, Parker (1986) estimated the age of a western redcedar 8.9 ft in diameter to be 2,820 years.

The first inventory of western redcedar groves in the northern Rocky Mountains was conducted by Tracy Parker and Fred Johnson between 1979 and 1982 (Parker 1986). Through an exhaustive survey of land management agencies and timber companies, Parker documented the approximate locations of 166 western redcedar groves throughout northeastern Washington, northern Idaho, and northwestern Montana. Seventy-five of these groves were ultimately visited as part of the study, 46 of which met the minimum criteria of having several trees greater than 5 ft in diameter and an area of at least 0.1 acre. At each qualifying grove, condition, community composition, elevation, and landform were recorded. At 18 groves, detailed data on regeneration and stand structure were recorded.

The Heritage Program–CDC network recognizes the importance of seral and structural stages of forest community types in its work of inventorying vegetation types and setting conservation goals. Structural and compositional changes during forest succession occur over long time periods and are accompanied by changes in function. Groves of giant western redcedar represent a rare structural stage of the western redcedar series (Cooper *et al.*), even though the plant associations represented may be widespread and common. Because of the rarity of groves of this age, their occurrence should be documented and prioritized for conservation.

The method employed by the CDC to track potential conservation sites is the conservation site module within the Biological and Conservation Data System (BCD). A database record (“site basic record” or SBR) stores information on location, quality, and extent of a site and links it to records containing information on the plant communities represented, and any rare plants and animals that may be present. In 1997, the CDC, in cooperation with the Clearwater National Forest, set out to document Tracy Parker’s western redcedar groves by visiting as many groves as possible and collecting the

information needed for a site basic records. This inventory also provided the opportunity to survey for rare plants in the genus *Botrychium* (moonworts), which are often associated with moist old-growth cedar habitat.

METHODS

Potential western redcedar groves identified by Parker's survey of land management agencies are listed and numbered in Parker (1986), regardless of whether they were visited, and legal locations are given to section. Approximate locations are mapped on 1:126,720 National Forest maps on file at the Research Herbarium, College of Forestry, Wildlife and Range Sciences at the University of Idaho campus. Portions of the Clearwater National Forest map have been copied and included as Appendix A. Since only 10 out of 48 potential groves on the Clearwater National Forest had been previously visited, we attempted to visit as many additional locations as possible, with access being one of the primary considerations. In addition, we visited two groves on the Nez Perce National Forest, which contains the southern extent of western redcedar in Idaho, and one grove on State land (Moscow Mountain). Because only general grove locations were available, it was often difficult to know if we were looking in the right area. When we located a grove we adjusted its mapped location if needed, as shown on the maps in Appendix A.

Groves considered suitable as conservation sites were documented using Western Heritage Task Force Site and Community Survey Methods (Bourgeron *et al.* 1991). A suitable site met criteria of being at least a tenth acre in size and having several trees larger than 5 ft in diameter, while not having an overwhelming amount of human disturbance.

A Site Survey Form (Form I; Appendix B) was used to give directions to the site, describe it, list the "elements" (plant communities, rare plants, rare animals) occurring there, and rank it with respect to protection urgency, management urgency, and biodiversity significance. Other data fields include information on condition, disturbance, size, and landscape context. These data were then used to populate a Site Basic Record (SBR; Appendix C). The "site" could consist of only the grove itself, or could include adjoining old growth, buffer areas, or additional element occurrences. Boundaries of each site were mapped on USGS 7.5-minute quadrangle maps which are included with corresponding SBRs in Appendix C. The boundaries were digitized and added to the conservation site data layer in the Idaho Fish and Game GIS. Photos were taken at most sites and a set of slides is on file at the Idaho Department of Fish and Game, Conservation Data Center in Boise and at the Clearwater National Forest Supervisor's Office. Sites from a similar inventory on the Idaho Panhandle National Forests, will also be added to the Conservation Site Database.

In most cases, the dominant plant community making up a grove was also described. The community described was always that associated with the core area of giant cedars. A circular, tenth-acre plot was situated to be as representative as possible of the community, and ocular estimates of cover, by species, were recorded. Data forms used in documenting the location and physical parameters of the plot (Form II), and the plant cover data (Form III) are included in Appendix B.

To quantify the size and number of giant trees present, we measured and recorded the diameter at breast height (DBH ; approximately 4.5 ft) of individuals greater than 5 ft in diameter. Where these were especially numerous, we tried to measure the largest trees, then estimated the number of additional trees greater than 5 ft DBH. Trees with more than one bole were not measured, unless noted, even if they were attached more than 5 ft above the ground. These data are recorded in the “MA Comments” field in the SBR (Appendix C).

RESULTS

Table 1 lists all sites for which we acquired some form of information including those that we attempted to find with no success. Sites with no Parker site number are new sites found during our survey. In all, 23 groves were visited in 1997, of which 20 were entered into the conservation site database as Site Basic Records (Appendix C). Plant species cover data were collected at 11 groves and are included in Appendix D.

Very large western redcedar often occur as scattered individuals along river bottoms and streams. Such stands vary in their grove character depending on the concentration of large trees and their distance from the stream. So-called “stringer stands” were not considered groves for the purpose of this inventory.

Important parameters used to evaluate the conservation value of a site include: the rarity of the elements present (plant associations, plants, and animals), size, condition, and threats. The size of most groves is very small (Table 1), but many are surrounded or adjoined by old-growth cedar that serve as a buffer area and has trees that will potentially replace the current giants. No information on rare animals is available for the groves surveyed. Other parameters are discussed in more detail following.

Plant associations (Table 2). Western redcedar groves tend to occupy very moist or wet sites, generally on river terraces, toeslopes, and streamsides. An ample supply of moisture from the water table has likely protected them from wildfire. Because they are largely restricted to wet sites, the pervasive plant association is western redcedar/ladyfern (*Thuja plicata*/*Athyrium filix-femina*)—the wettest understory union associated with western redcedar. Of 20 groves documented, 13 included some western redcedar/ladyfern. Other associations and phases present include:

- western redcedar/ladyfern–maidenhair fern phase (*Thuja plicata*/*Athyrium filix-femina*-*Adiantum pedatum*),
- western redcedar/oakfern (*Thuja plicata*/*Gymnocarpium dryopteris*),
- western redcedar/wild ginger (*Thuja plicata*/*Asarum caudatum*),
- western redcedar/wild ginger–Pacific yew phase (*Thuja plicata*/*Asarum caudatum*-*Taxus brevifolia*),
- western redcedar/queencup beadlily–menziesia phase (*Thuja plicata*/*Clintonia uniflora*-*Menziesia ferruginea*).
- western redcedar/shield fern (*Thuja plicata*/*Dryopteris* spp.)

All but the western redcedar/shield fern association are widespread and common. Western redcedar/shield fern is a globally rare plant association described by Steele (1971) from the North Fork Clearwater River. The fern-dominated understory contains three members of the genus *Dryopteris*—male fern (*D. filix-mas*), shield fern (*D. carthusiana*), and mountain woodfern (*D. expansa*). This type is represented by the Aquarius Campground grove on the North Fork. This grove is located just across the road from the campground. Western redcedar/shield fern has a global rank of G1 (typically 5 or fewer occurrences).

Table 1. Western redcedar groves for which some form of information was obtained during the 1997 inventory. Those with site numbers have site basic records (SBR) containing detailed descriptions, including plant community and rare plant elements present (Appendix C).

		Parker's (1986) Study		1997				
SBR No.(1)	Site Name	#	Type of data	Size (ac)	Bio- diversity rank	Protec- tion (2)	Plot No.	Comments
Clearwater National Forest:								
<u>Palouse District</u>								
666	Giant western redcedar	CLR17	general	23.0	B3	SIA	-	
332	Morris Creek	CLR16	general	33.0	B3	SIA	-	
<u>Pierce District</u>								
---	Camp Moosehorn	CLR38	unvisited	-	-	-	-	Could not locate
341	Eldorado Creek	CLR26	unvisited	1.5	B3	none	-	
---	Lewis and Clark	CLR9	unvisited	-	-	-	-	Does not meet criteria
<u>Lochsa District</u>								
---	Daubenmire's Plot	CLR40	unvisited	-	-	-	-	Does not meet criteria
---	Green Flat	CLR39	unvisited	-	-	-	-	Could not locate
368	Pete King Creek	CLR3	general	4.5	B3	none	97TP003	
364	Walde	CLR4	general	5.0	B3	none	-	
<u>North Fork District</u>								
367	Aquarius Campground	CLR47	unvisited	0.4	B3	none	93LS011	
366	Aquarius Trail	CLR44	unvisited	0.4	B3	RNA	-	
261	Black Creek North	-	-	2.5	B3	none	97TP005	
274	Can Creek South	-	-	6.0	B3	none	97TP008	
275	Cedars Campground South	CLR15	unvisited	2.0	B3	none	97TP009	
448	Heritage	CLR5	general	50.0	B3	SIA	-	

Table 2. Plant associations and rare plants occurring at giant cedar groves visited in 1997.

Site No.	Site Name	Plant Associations (1)	Rare plants
Clearwater National Forest:			
<u>Palouse District</u>			
666	Giant Western Redcedar Thupli/Asacau	Thupli/Athfil, Thupli/Gymdry,	<i>Botrychium minganense</i> 045, <i>Corydalis caseana hastata</i> 069
332	Morris Creek	Thupli/Athfil, Thupli/Gymdry, Thupli/Asacau, Thupli/Asacau–Taxbre, Thupli/Asacau–Menfer	<i>Botrychium minganense</i> 038, <i>B. simplex</i> 001 <i>Corydalis caseana hastata</i> 037
<u>Pierce District</u>			
341	Eldorado Creek	Thupli/Athfil	
<u>Lochsa District</u>			
368	Pete King Creek	Thupli/Athfil, Thupli/Asacau	<i>Carex hendersonii</i> 035, <i>Cypripedium fasciculatum</i> 048
364	Walde	Thupli/Athfil, Thupli/Asacau–Taxbre	
<u>North Fork District</u>			
367	Aquarius Campground	Thupli/ <i>Dryopteris</i> spp.	<i>Carex hendersonii</i> 005
366	Aquarius Trail	Thupli/Athfil	<i>Cardamine constancei</i> 029
261	Black Creek North	Thupli/Athfil–Adiped	
274	Can Creek South	Thupli/Athfil, Thupli/Gymdry	
275	Cedars Campground South	Thupli/Athfil, Thupli/Asacau	
448	Heritage Cedar Grove SIA	Thupli/Asacau, Thupli/Asacau–Taxbre	<i>Cypripedium fasciculatum</i> 024, <i>Thelypteris nevadensis</i> 001, <i>Eburophyton austinae</i> 024
278	Hidden Ck Campground	Thupli/Athfil, Thupli/Gymdry, Thupli/Cliuni–Menfer	
281	Hidden Ck c.g. East #1	Thupli/Athfil, Thupli/Gymdry	
310	Hidden Ck c.g. East #2	Thupli/Athfil	<i>Botrychium minganense</i> 044, <i>B. lanceolatum</i> 042
363	Hornby Creek	Thupli/Athfil	
262	Isabella Creek	Thupli/Oplhor	<i>Thelypteris nevadensis</i> 002
360	Tumble Creek	Thupli/Athfil	<i>Corydalis caseana hastata</i> 068
Nez Perce National Forest:			
199	Falls Point	Thupli/Athfil	<i>Corydalis caseana hastata</i> 066
260	Falls Point South	Thupli/Athfil, Thupli/Asacau	<i>Corydalis caseana hastata</i> 067, <i>Syntheris platycarpa</i> 035
State land:			
012	Moscow Mountain	Thupli/Athfil, Thupli/Asacau, Thupli/Cliuni	

⁽¹⁾ Follows Cooper *et al.* (1991) except *Thuja plicata/Dryopteris* spp. which follows Steele (1971).

Structure. Forest communities are characterized by a combination of composition and structure. It is the structural stage of these groves that makes them so significant. Their structure is one of well-spaced trees exceeding 5 ft in diameter and commonly ranging to 8 ft. The upper canopy tends to be exclusively composed of western redcedar. Although the requisite 5-ft diameter criterion seems arbitrary, it succeeds very well in distinguishing these groves as a very rare subset of old-growth cedar.

The understory of cedar groves is dependent on the amount and nature of canopy openings, which are a function of disturbance as well as age of the trees. As the term “grove” implies, the understory is generally open. Classic, wet-site stands have an understory dominated by ferns and no significant shrub layer. Canopy openings are the size of a single tree crown, which is apparently too small to release the inconspicuous understory shrubs. Notable exceptions include Walde, Aquarius Trail, and Can Creek South. At these sites wind-throw or disease has opened the canopy sufficiently to produce a sub-canopy of shrubs and conifer regeneration, at least in parts of the grove. Structure of the groves visited is reflected in the plant cover data, especially where tree cover was recorded by size class (Appendix D).

One of the unique features of giant cedar groves is their lack of western redcedar reproduction, in spite of the fact that western redcedar is shade tolerant. This was recognized by Tracy Parker and Fred Johnson during surveys conducted in the 1980s. In our stands, regeneration of sapling size or greater often consists of grand fir (*Abies grandis*) or Engelmann spruce (*Picea engelmannii*). When western redcedar regeneration is present, it is primarily vegetative, through layering of lower branches or fallen boles (Parker 1979) and consists of sapling and smaller size classes (< 5” DBH).

Rare plants. In this part of Idaho, several rare vascular plants occur in old-growth cedar habitats, although they are not restricted to such habitat. Moist groves with fern understories are typical habitat for rare members of the genus *Botrychium*—fern allies known as grapeferns or moonworts. Several subgenera are recognized within the genus and all members in the subgenus *Botrychium* are inconspicuous and are rare in Idaho.

*Botrychium*s are extremely difficult to survey for because of their very small size and the fact that populations often consist of only a few individuals. Mingan moonwort (*B. minganense*) was already known from the Giant Western Redcedar Botanical Special Interest Area (EOR¹ #045), and both Mingan moonwort and least moonwort (*B. simplex*) from the Morris Creek Cedar Grove Botanical Special Interest Area (EOR #s 038 and 001). Our 1997 surveys located two additional *Botrychium* occurrences at the grove called Hidden Creek Campground East #2, in a western redcedar/ladyfern association on a terrace of the North Fork Clearwater River. Tentatively identified were Mingan moonwort (EOR #044), and lance-leaved moonwort (*B. lanceolatum*; EOR #042).

Another rare plant characteristic of wet, western redcedar habitat, especially above 3,400 feet elevation, is Case’s corydalis (*Corydalis caseana* var. *hastata*). Case’s corydalis is

¹ Element occurrence record

endemic to northern Idaho, with a global rank of G3 (rare or uncommon, but not imperiled) which generally denotes 21 to 100 occurrences. It occurs in four of the groves surveyed (Table 2). An exceptionally large population (EOR #067) occurs in a wet meadow associated with the Fall's Point South Cedar Grove on the Nez Perce National Forest. A local endemic, evergreen kittentail (*Syntheris platycarpa* 035), also occurs in this grove, but is not particularly abundant.

Several of the low-elevation groves contain plants associated with the inland-maritime environment. Henderson's sedge (*Carex hendersonii*) and Sierra woodfern (*Thelypteris nevadensis*) are coastal disjuncts that are rare in Idaho, and Constance's bittercress (*Cardamine constancei*) is a north-Idaho endemic. The Sierra woodfern occurrence is one of only three known inland populations.

Condition. Easily accessible groves are popular with the public and often receive impacts from vehicles and camping. The understories and soil surface are especially affected. The Moscow Mountain grove has severe, localized disturbance from trampling and driving. Some groves have been altered from edge effects after the adjoining stand was clearcut (Walde, Falls Point). Hornby Creek is an example of a grove with severe natural disturbance from windthrow. Most of the groves along main roads or trunk rivers have very large, old cut stumps.

Threats. Western redcedar groves that remain are generally not susceptible to cutting because of policies mandating stream buffer zones. However, cutting up to the edge of a grove alters the understory composition and climate, and isolating a grove from other forest spoils its character and probably restricts its fauna. The use of groves for campsite development is not an imminent threat, but always looms as a possibility because of the proximity of many groves to main roads and their attractiveness to campers. Use of groves as undeveloped campsites is the more immediate threat. Can Creek South, a grove with high conservation value because of its size and age, could be susceptible to use and /or development as a campground because of its location on a large, roaded river terrace with areas of well-drained soils.

RECOMMENDATIONS

Although most sites surveyed were very small (5 acres or less), these western redcedar groves are irreplaceable and therefore worthy of preservation. They offer opportunities for research and interpretation, and are highly valued by Forest visitors. They provide habitat for rare plants and are, of themselves, important elements of biodiversity on the Forest. Five of the documented groves on the Clearwater National Forest have official status either as part of a Research Natural Area (RNA) or as Botanical Special Interest Areas (SIA). For the remaining groves some means of protection is needed.

Management. It is appropriate that certain highly accessible groves be developed for interpretive purposes. This function is already served by the DeVoto Grove, the Morris Creek Grove and the Giant Western Redcedar Grove which are all designated as botanical SIAs. SIA designation is also appropriate for the Heritage Cedar Grove on the North Fork District because it is not near a road, but is accessible by trail. I recommend this designation also for the Pete King Creek Grove (SBR #368), a classic old-growth cedar stand with a small core area of giant cedar. This site is currently accessible by foot along a closed logging road. This grove also includes two rare plant species and an historical grave site. Because Special Interest Areas are required to be managed for public enjoyment, this designation may conflict with preserving the special values of western redcedar groves. Since individual groves are too small to be considered for RNA status, there appears to be no means of permanent protection through current management designations.

In the current Forest Plan (Clearwater National Forest 1987) a Management Area designation of M2 is used to protect riparian values including old growth, aquatic ecosystems, water quality, fisheries, and wildlife habitats. Management practices such as timber harvesting, grazing, and recreation are allowed, but must protect and enhance these values. This designation should be considered for groves along the North Fork Clearwater River, Eldorado Creek, and groves located on smaller watercourses (e.g., Pete King Creek, Tumble Creek, and Walde). Unfortunately, no other management area designation seems suitable for these groves. Some National Forests in the Northern Region have specific programs designed to identify and reserve priority groves of giant cedar, using land classifications such as “Ancient Cedars” and “Old Growth Groves” (Parker and Johnson 1993). Without such a designation, management of groves will be left to the discretion of District Rangers, and Forest and District Biologists. My recommendation is that they consider such groves irreplaceable resources. Remaining, unprotected groves should not be developed except for low-impact nature trails, and when adjoining stands are harvested, a buffer zone equal to the diameter of the grove should be left between the grove and the project area.

Priority groves

The following groves in particular, have no special designation and deserve protection:

Can Creek South (#274). A large grove with numerous, very large trees and several different understory unions. It is very susceptible to use by vehicles and campers. It could be protected with a management designation of M2 as it is located on a terrace of the North Fork Clearwater River.

Hidden Creek Campground East #2 (#310). Although small, this is a classic, undisturbed grove with populations of two moonwort species. It is also on a terrace of the North Fork.

Cedars Campground South (#275). This grove, with many giant trees, is of interest because of its upland position.

Further survey

This survey should be completed for the Clearwater and Nez Perce National Forests, including the Selway-Bitterroot wilderness. The data should then be analyzed along with that from the Idaho Panhandle National Forests, to identify the highest priority sites in the State and/or ecoregion. To facilitate this process, standardized data must be collected from all sites.

Maps in Appendix A show the many groves left unvisited, most of which are difficult to access. If more of these can be surveyed, existing sites can be more accurately prioritized, and a better picture of the overall rarity and quality of western redcedar groves will emerge. Areas visited only during Parker's earlier work should be revisited to check their current status and take standardized data. The following areas in particular have potential for high-value groves, but were not surveyed in 1997, and have not been documented previously:

Pollock Creek. Chris Lorain noted western redcedar more than 6 ft in diameter at this Mingan's moonwort site (T40N,R12E, Sec. 30, NE 1/4) in 1989.

Hidden Creek Campground—east bank (Appendix C). The river terrace on the east side of the North Fork Clearwater River is remote and has greater potential as a conservation site than the campground area on the west side.

East Fork Moose Creek in the Selway–Bitterroot Wilderness (T33N, R14E sections 4 and 9, T34N, R14E section 23, and west half of 24, 27, 33) is an old-growth cedar stand that may qualify as a grove. It contains a Mingan's moonwort occurrence.

Bear Creek cedar grove is the southernmost large cedar grove in the Selway-Bitterroot Wilderness, occurring near the southern extent of the range of western redcedar in Idaho. The legal location is: T32N, R14E sections 23, 24, 27 and T32N, R15E sections 19, west half 20.

Other potential groves are indicated on the maps in Appendix A and on various National Forest and District Maps on file at the Research Herbarium, College of Forestry, Wildlife and Range Sciences at the University of Idaho campus.

ACKNOWLEDGMENTS

I would like to thank Carla Richardson who assisted me with this inventory, and Mike Hays of the Palouse District, who documented the Giant Western Redcedar and Morris Creek Botanical Special Interest Areas.

REFERENCES

- Bourgeron, P.S., R.L. DeVelice, L.D. Engelking, G. Jones, and E. Muldavin. 1991. WHTF site and community survey manual. Version 91C. Western Heritage Task Force, Boulder, CO. 24 p.
- Clearwater National Forest. 1987. Forest Plan. USDA Forest Service Northern Region.
- Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1991. Forest habitat types of Northern Idaho: a second approximation. General Technical Report INT-236. USDA Forest Service Intermountain Research Station, Ogden, UT.
- Daubenmire, R. and J.B. Daubenmire. 1968. Forest vegetation of eastern Washington and northern Idaho. Technical Bulletin of the Washington Agricultural Experiment Station. 60:104.
- Parker, T. 1979. Natural regeneration of western redcedar in northern Idaho. College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, ID. 50 p.
- Parker, T. 1986. Ecology of Western Redcedar Groves. Ph.D. Dissertation. College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, ID. 187 p.
- Parker, T. and F.D. Johnson. 1993. Cedar groves: the ultimate old growth. Proceedings of a symposium on Interior Cedar-Hemlock-White Pine Forests: Ecology and Management. March 2-4, 1993. Department of Natural Resource Sciences, Washington State University, Pullman, WA. p 53-55.
- Steele, R. 1971. Red alder habitats in Clearwater County, Idaho. MS Thesis, University of Idaho, Moscow. 88 p.

- APPENDICES NOT AVAILABLE ON WEB PAGE -

CONTACT IDAHO DEPARTMENT OF FISH AND GAME, CONSERVATION DATA
CENTER FOR THIS INFORMATION