Voluntary Efforts by Forest Landowners To Restore Salmon Habitat and Watersheds in the Oregon Coast Range

Prepared by
The Oregon Department of Forestry
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EXECUTIVE SUMMARY

In the Pacific Northwest, salmon populations were historically more abundant than they are today. As a result, many populations have been the focus of habitat restoration efforts. A vital role in these restoration efforts is played by private landowners, who collectively manage one-third of the forestlands in Oregon. Crucial habitat for some salmon populations occurs predominately on lands that are privately owned.

This report describes the extensive restoration effort that has been made by forest landowners to recover salmon in the Oregon Coast Range as part of the Oregon Plan for Salmon and Watersheds ("Oregon Plan"). This Plan was initiated in response to declines in coho (*Oncorhynchus kisutch*) populations during the 1980's and 1990's. The Oregon Plan is a partnership between private landowners, communities, citizens, and industry to recover salmon species and restore watersheds. The plan emphasizes voluntary restoration efforts by landowners, recognizing these efforts are essential to salmon recovery.

Over the past 20 years, the Oregon Plan has facilitated substantial landowner contributions to salmon restoration. In the Oregon Coast Range, landowners have completed 5,639 voluntary restoration projects at a cost of over $162 million. Moreover, 84% of these projects received no incentive funding, and the costs of implementation were borne entirely by landowners.

Voluntary projects conducted by landowners in the Oregon Coast Range have translated into tangible benefits for coho that include: 1) improved fish passage for 1,400 miles of streams that were previously unavailable to coho; 2) improved water quality as result of more than 8,000 miles of roads that were surveyed, of which nearly 3,000 miles were treated; 3) enhanced habitat through the installation of over 11,000 instream structures, most of which were large wood placements; and 4) nearly 12,000 acres of riparian forests improved by planting trees, restoring conifers in hardwood dominated stands, and leaving trees that could otherwise be harvested.

Private industrial landowners have been leading supporters of the Oregon Plan, completing the majority (71%) of all reported projects. Specifically, industrial landowners conducted over 3,800 large wood placements, 1,300 miles of roads were treated based on over 6,000 miles surveyed, increased access to 900 miles of streams by improving fish passage.In the Oregon Coast Range, the majority of coho habitat is found throughout private nonindustrial forests, as such these lands play a pivotal role in coho restoration. When compared with industrial ownerships, the total financial contributions to projects and the number of implemented projects reported by nonindustrial private landowners was considerably lower ($10.9 million vs. $63.5 million; 373 projects vs. 4,033 projects). This suggests that there are still opportunities to restore coho habitat on nonindustrial private lands in Oregon Coast Range. However, it is important to note that we do not know if these lower numbers are due to implementing fewer projects or a lower rate of reporting. Recent landowner surveys detailed in this report indicate that landowners are primarily motivated by a strong desire for ecological uplift, also expressing interest in incentives and cost-sharing programs for restoration work (Appendix III).

Even though forest landowners have embraced the spirit of the Oregon Plan by completing thousands of restoration projects, coho were still listed as Threatened by the National Oceanic and Atmospheric Administration (NOAA) in 1998 and remain listed as Threatened in Oregon today. Coho populations, however, have rebounded substantially from record lows observed in the 1990s. The current state of coho populations in Oregon reflects reductions in fish harvest, improved hatchery management, and extensive restoration work conducted by forest landowners.

After two decades, the Oregon Plan remains relevant as a way to ensure that salmon populations continue to recover and thrive. To increase effectiveness, Oregon Plan efforts should involve more nonindustrial owners in implementing restoration projects. The Oregon Plan would benefit from outreach to increase landowners' reporting rates for restoration projects that do not involve incentives; and monitoring the effectiveness and implementation of restoration projects to improve the impact of their results on policy development.

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ACKNOWLEDGEMENTS

This report would not have been possible without the extradinary commitment of Oregon's forest landowners to conserve and restore salmon populations and their habitats. This study also benefited greatly from feedback provided by landowner groups such as the Oregon Small Woodlands Association and the Oregon Forest Industries Council. We also extend a special thanks to Bobbi Riggers and Troy Wirth at the Oregon Watershed Enhancement Board for maintaining and preparing the data used for this report.

INTRODUCTION

In the Pacific Northwest, salmon populations were historically more abundant than they are today. Declines in their populations over the past 150 years have been attributed to excessive ocean and freshwater harvest, hatchery practices, hydroelectric dams, mining practices, the degradation and loss of freshwater habitat, and other factors [1], [2]. While many of these factors have been eliminated or significantly curtailed, degradation and loss of freshwater habitat for salmon remains a concern [3].

Forestlands can provide high-quality freshwater salmon habitat by shading stream channels, stabilizing stream banks, and supporting insect populations that salmon eat. Additionally, downed trees in riparian areas create complex stream channels with pools, riffles, and waterfalls that enhance salmon habitat. The restoration of freshwater habitat for salmon generally includes the removal of barriers to fish passage (e.g., dams, inadequate culverts), reductions in erosion and sedimentation, construction of instream habitat structures, improvements to riparian function, the formation of off-channel habitat, and the reestablishment of stream flow regimes [4].

Habitat restoration by private landowners can play a key role in species conservation and recovery [5]. In Oregon, landowner involvement is essential because one-third of the states' forestlands are privately owned[6]. Additionally, habitat for some salmon populations is concentrated on private ownerships [7], [8]. Consequently, restoring habitat on private lands can be the most effective means to recover salmon populations [1].

In response to salmon population declines observed in the 1980s and 1990s, the state of Oregon began a program to involve landowners in salmon recovery in 1995. Coho salmon (*Oncorhynchus kisutch,* Fig. 1) were of particular concern because some populations had reached record lows. For example, Oregon Coastal coho had declined to fewer than 27,000 by the mid 1990's[9].

Figure 1. Coho salmon spawning in Oregon. Photo courtesy of the Bureau of Land Management.

The state of Oregon developed what was originally called the Oregon Coastal Salmon Restoration Initiative to focus on coho recovery [1]. The program received broad-based support from the citizens of Oregon as an alternative to potential federal regulations should coho be listed as Threatened or Endangered under the Endangered Species Act. Initially the effort focused on recovering coho in the Oregon Coast Range, but in 1999 the initiative was expanded to include all salmon and other native fish species in the state, and became known as the Oregon Plan for Salmon and Watersheds [10]. Today it is commonly referred to as the Oregon Plan.

At initiation, the Oregon Plan was unprecedented because it was one of the most ambitious state-led campaigns to recover a species ever attempted in the United States. The Oregon Plan was founded on four key principles: 1) increased coordination between agencies, 2) increased monitoring of salmon and their habitats, 3) scientific oversight of the Plan, and 4) voluntary efforts by landowners.

This Plan articulated the importance of both regulatory and voluntary efforts, and emphasized voluntary efforts by landowners by recognizing the great potential for their restoration activities to help salmon populations [1], [10], [11]. Voluntary efforts are actions done to benefit species or habitats that are not specifically required by local, state, or federal regulatory mechanisms [12]. In the context of the Oregon Plan, voluntary efforts on forestlands refer to

landowners doing more than required by the rules described in the Oregon's Forest Practices Act [11], which are the set of rules that regulate all forestry-related activities on nonfederal/nontribal lands in the state [13].

The Oregon Plan describes over 40 forestry-related activities that can be voluntarily done by landowners to recover salmon and improve watersheds. Examples of projects that landowners can implement include placing large wood in streams to create habitat for salmon, leaving trees in riparian areas (which could otherwise be harvested) to shade streams and create future large wood supplies, and removing and replacing culverts to restore habitat connectivity.

The purpose of this report is to describe the extensive effort that has been made by forest landowners over the past two decades to recover salmon in the Oregon Coast Range in support of the Oregon Plan. The report describes specific landowner contributions to restoration projects, listing the number of projects landowners have reported and implemented. The report also characterizes the types of treatments that are most commonly implemented by landowners. Additionally, trends in implementation of these different treatments are reported, enabling comparison of current program activities with those of the initial years.

STUDY AREA

The study focused on restoration projects that occurred within the Oregon Coast Range. The study area encompasses ~10,000 mi^2 in western Oregon (Fig. 3), and includes all of the North Coast and South Coast basins, as well as portions of the Lower Columbia (HUC 17080006), Umpqua (HUC 17100303), and Rogue (HUC 17100310) basins.

The Oregon Coast Range is characterized by steep slopes, high precipitation and dense over/understory vegetation [14]. Precipitation ranges from 45 to over 100 inches annually, the majority of which occurs as rainfall during the winter months [15]. Overstory species include alder (*Alnus spp.*), western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), Sitka spruce (*Picea sitchensis*), and Douglas-fir (*Pseudotsuga menziesii*). Common understory species are salmonberry (*Rubus spectabilis*) and sword fern (*Polystichum munitum*).

Conditions in the Oregon Coast Range are ideal for tree growth, and forestlands in this area are considered to be some of the most productive in the world [16]. As a result, timber harvest is one of the key industries in the region.

Land ownership within the study area is largely a mix of private, state and federal lands, much of which was historically or currently managed for harvesting trees.

The Oregon Coast Range study area is particularly important for the conservation of coho. Nearly two-thirds of the species habitat in Oregon occurs within the Coast Range [17], and the majority of the habitat within the study area is considered critical habitat.

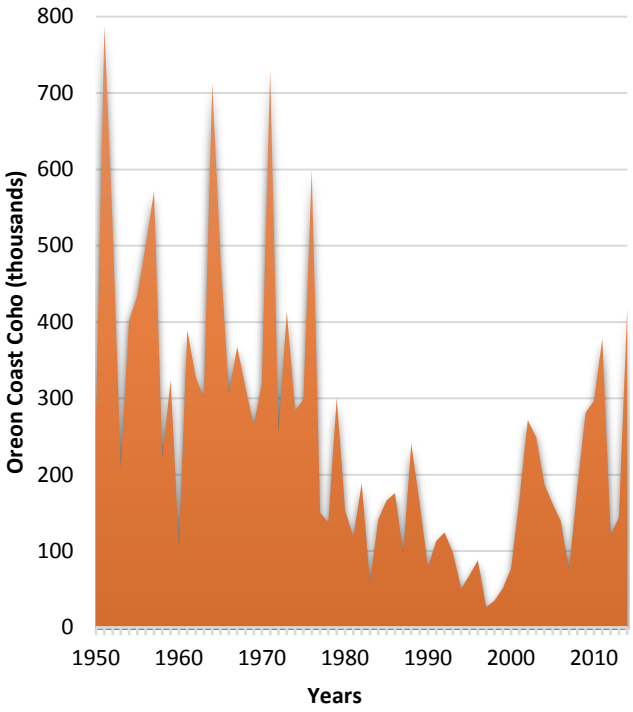

Figure 2. Coho population estimates (1950-2014) for the Oregon Coast ESU produced by the Oregon Department of Fish and Wildlife [9]

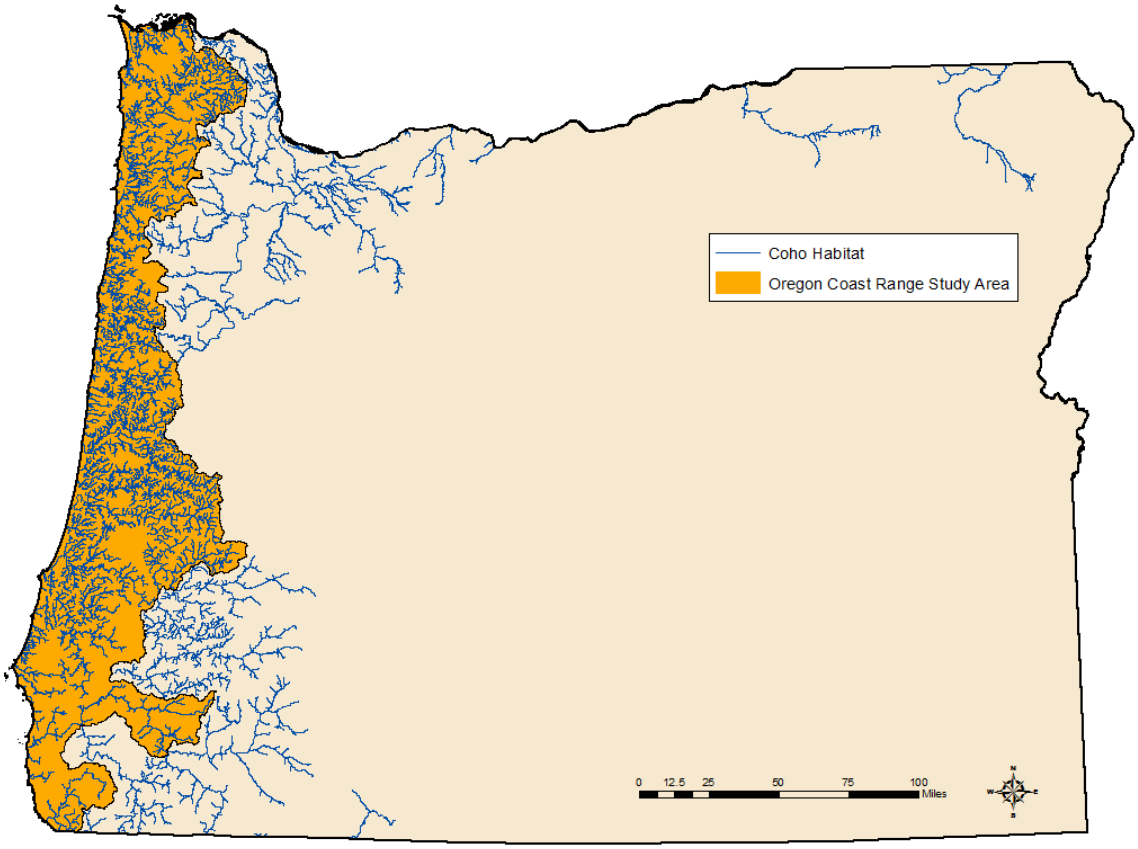

Figure 3. Streams and rivers in Oregon designated as current or historical habitat for coho salmon by the Oregon Department of Fish and Wildlife [17].

METHODS

OREGON WATERSHED RESTORATION INVENTORY

The information on restoration projects used for this study came from the Oregon Watershed Restoration Inventory (OWRI) database (https://www.oregon.gov/OWEB/MONITOR/pages/owri.aspx). OWRI is one of the largest restoration databases in the western United States, and over 15,000 projects have been reported to it since 1995. The database is actively maintained by the Oregon Watershed Enhancement Board (OWEB).

Landowners or those representing landowners can report detailed information on completed projects to OWRI using an online reporting tool application (http://apps.wrd.state.or.us/apps/oweb/owrio/default.aspx). Reported information includes spatial locations, financial contributions, treatment types and the participants involved in project.

For this study, the OWRI database was limited to projects reported between 1995 and 2014 within the boundaries of the study area. This query was performed by staff at OWEB using Microsoft Access. At the time of this analysis, the 2014 data were the most current available. The data were further processed using the statistical software R (version 3.1.0) to screen and format data, as well to create tables and figures that summarized results.

CONVENTIONAL AND INCENTIVE-BASED PROJECTS

All projects reported in OWRI are those in which landowners voluntarily participated. However, projects varied in the amount of grant assistance that was

provided to landowners and the permits that were required to complete the project. If a project was done with assistance from state grant programs (e.g., OWEB, Oregon Department of Fish and Wildlife) and/or required state permits (e.g., Department of State Lands), the landowner was required to report project information to OWRI. For the purposes of this study, these projects were classified as incentive-based projects. The reporting rate for incentive-based projects was assumed to be 100%, because reporting was required for landowners to receive financial assistance and permits.

Voluntary projects that were completed by landowners that did not receive grant funding were classified as conventional projects. Landowners were encouraged to report conventional projects to OWRI, although there was no requirement or formal incentive for landowners to do so. As a result, the total number of conventional projects reported by landowners may underestimate the number that they actually completed on their property. Because reporting rates for conventional projects are likely lower than those for incentive-based projects, care should be taken when comparing between these types of projects.

OWNER TYPES

OWRI records the type of landowners that participate in projects. Examples include federal, state, or tribal owners. There were a total of 15 different types of landowners that participated in voluntary projects within the study area. To simplify the analysis, we condensed ownership into five general types: industrial, nonindustrial, state, other and mixed.

The industrial owner type represented private landowners with greater than 5,000 acres, while the nonindustrial owner type was characterized by private landowners with less than 5,000 acres. The state owner type comprised state agencies and universities in Oregon. The other category incorporated a variety of landowners not included in the previous groups, and represented city, county, federal, and tribal ownerships, as well as local businesses and conservation groups.

The mixed owner type was used to describe projects that spanned multiple ownerships. For example, a project that occurred on federal, industrial, and nonindustrial ownerships would be reported as one project under the mixed category, because the proportional contribution of accomplishments by each individual landowner was not recorded in OWRI and could not be reported separately.

TREATMENT TYPES

A voluntary project reported to OWRI can consist of one to several treatments applied by the landowner. The OWRI online reporting tool allows landowners to enter detailed information about each treatment that was completed, and treatments receive several classifications within the database that allow the data to be summarized at different levels of detail.

At a coarse level, treatments can be summarized by "Activity Types", which are general themes such as roads, wetlands, fish passage, etc. Within each activity type, treatments also receive an "Activity" code which provides a general description of the treatment. At an even finer level of detail, there are "Treatment" codes. Figure 4 below provides a visual example of how the treatment coding is structured.

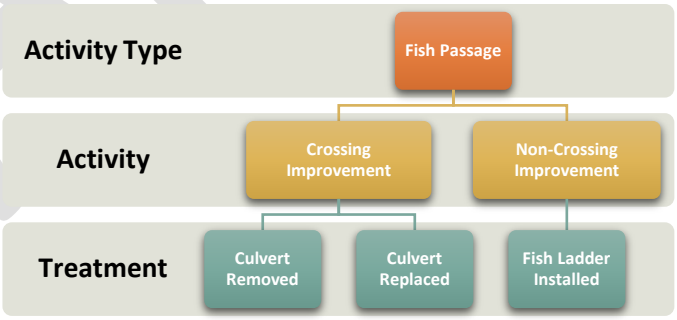

Figure 4. A simplified representation of the hierarchy of treatment codes for fish passage projects in the OWRI database.

The detailed nature of the OWRI information allowed us to aggregate treatment data to suit the objectives of the study. One of the objectives of the study was to summarize in general terms the types of treatments that are reported by landowners. To do this, we combined many of the categories at both the "Activity" and "Treatment" levels. For example, landowners that reported replacing a structure to improve fish passage have five options to describe what the structure was replaced with (e.g., bridge, ford,

culvert, arch culvert, weir). In this analysis, we combined all of these treatment options into one value called "structure replaced", which captures the general purpose of the treatment. Aggregating data in this manner allowed us to generate tables and figures with significantly fewer categories, which increased the interpretability of the results. The crosswalks that explain how treatments were aggregated are provided in appendix 1.

TRENDS

In addition to summarizing the number of projects and treatments reported by landowners, we examined the data for increasing or decreasing trends in those variables. Initially we summarized the data on an annual basis. There was, however, considerable annual variability in the time series data, especially at the treatment level. To help smooth out some of the variability that existed and make long-term trends more apparent, we chose to summarize the data at five year intervals (e.g. 1995-99, 2000-04, 2005-09, 2010-14). This significantly reduced the number of parameters in the summary tables, thus making the results easier to interpret.

To evaluate spatial distribution of projects within the study area, we created heat maps using the kernel density tool in ArcGIS (Fig 8). To effectively visually display project data in this format, the location data were extensively smoothed using kernel density tool, and as result the density values are best interpreted as relative project densities rather than absolute densities. The density maps were also created for each time period so changes over time could be evaluated.

It is important to note that the trends described in this report are a function of both the number of projects landowners completed and the rate at which landowners reported those projects. A declining trend through time could be the result of landowners conducting fewer projects or landowners reporting fewer projects, or both. Because the reporting rate was not quantified, it is difficult to determine the relative importance of that factor.

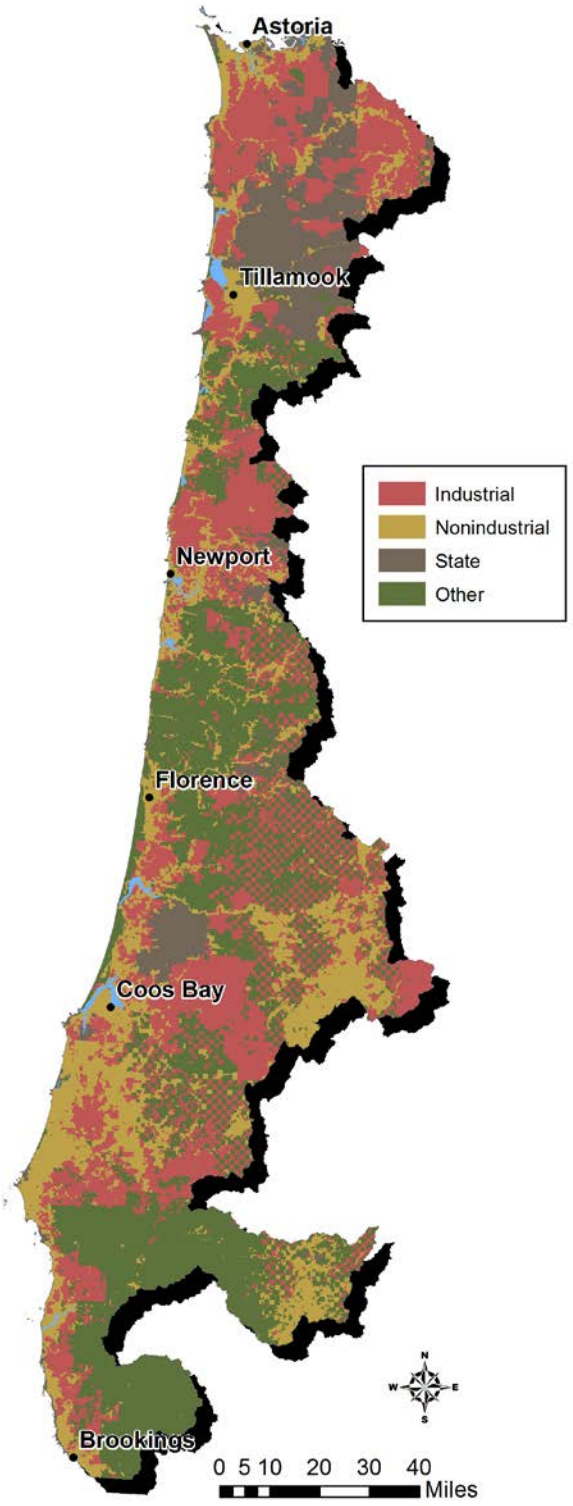

Figure 5. The distribution of landowner types within the Oregon Coast Range study area.

RESULTS

OWNERSHIP

Within the Oregon Coast Range study area, industrial (34%) and other (35%) owner types represented the largest portion of the area (Fig. 4-5), while nonindustrial (21%) and state (10%) owner types represented a smaller fraction.

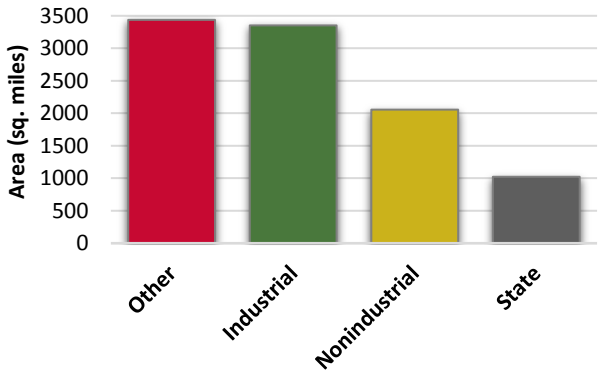

Figure 6. The area (mi^2) represented by each landowner type in the Oregon Coast Range study area.

PROJECTS

From 1995 to 2014, landowners reported that they completed 5,639 voluntary projects to benefit salmon and watersheds in the Oregon Coast Range (Table 1). Most (84%) were conventional projects.

Project totals varied markedly by owner type. Industrial ownerships accounted for 72% of all projects reported, and almost all (92%) were conventional projects. The state of Oregon was responsible for 16% of projects reported, and most projects (84%) were also conventional.

Nonindustrial ownerships represented only 7% of projects reported, but in contrast to industrial and state owner types, the majority of nonindustrial projects were incentive-based (66%). Mixed and other owner types were less than 6% of the total and were also primarily incentive-based.

Overall, the number of projects reported by landowners has declined. The period between 1995 and 1999 had the highest total number of reported projects (2,072). The following period, 2000-04, was slightly lower (1,957). However, the periods following 2004 show showed substantial reductions. For example, the number of reported projects declined 46% between the 2000-04 period and the 2005-09 period. There was a similar decrease (48%) between 2005-09 and 2010-14. The sharpest declines were in conventional projects (Table 1, Fig. 7), while the number of incentive-based projects have varied from year to year with no clear trend.

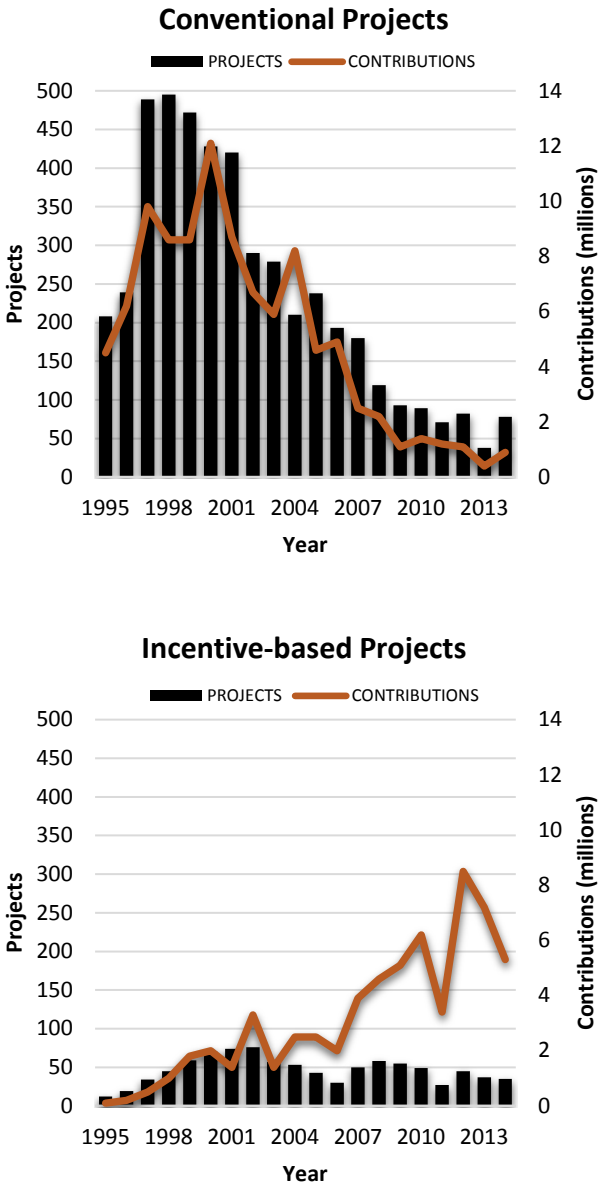

Figure 7. The total number of projects and contributions reported for conventional and incentive-based restoration projects in the Oregon Coast Range from 1995 to 2014.

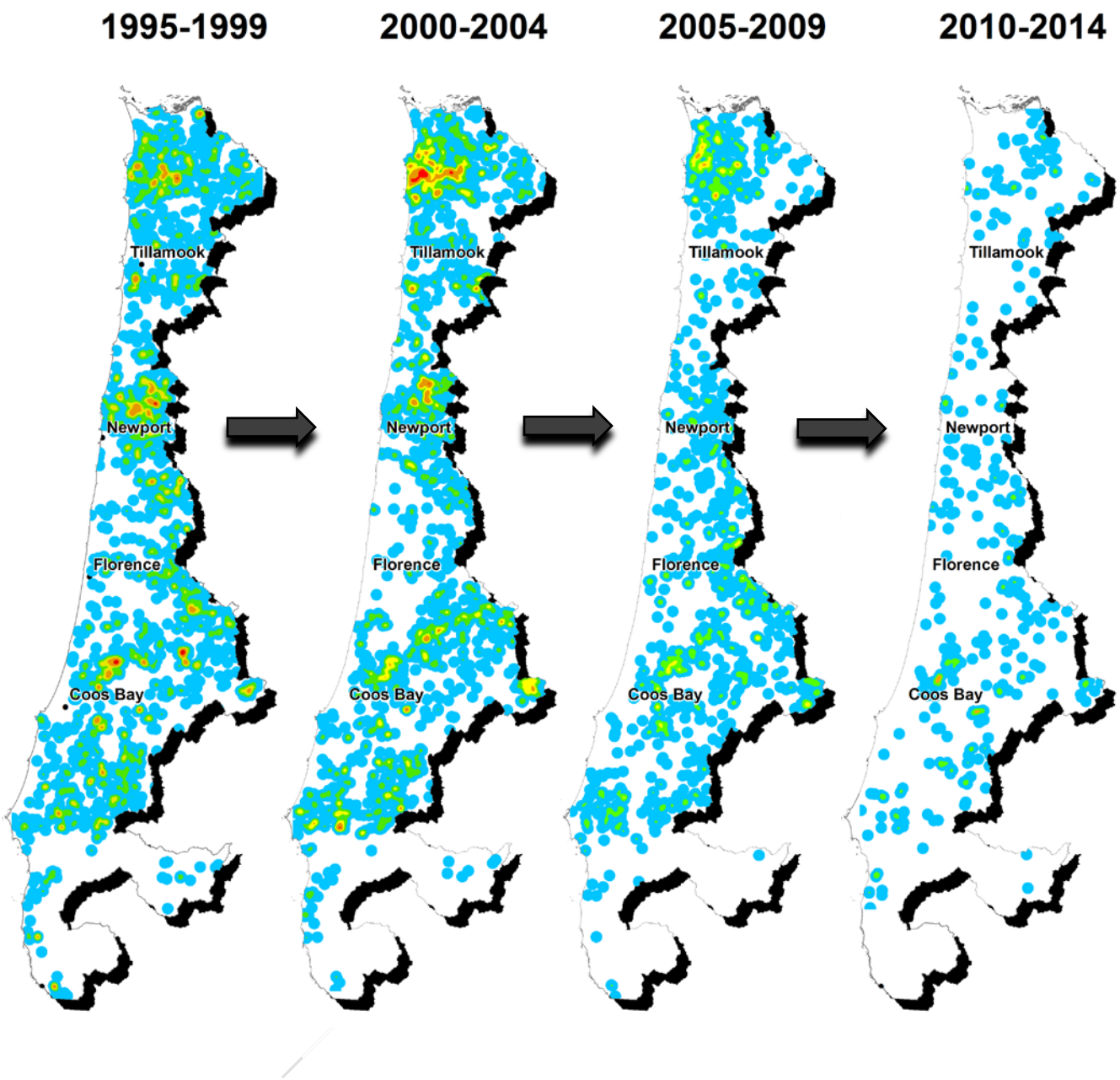

Figure 8. The relative density of voluntary measures projects in the Oregon Coast Range displayed by 5 year time intervals. Warmer colors (Red/orange/yellow) indicate higher densities and cooler colors (green/blue) indicate lower densities.

Project locations were distributed throughout the Coast Range study area (Fig. 8). However, there were some hot spots of activity in the North Coast, Mid Coast, and South Coast portions of the study area. As the numbers of projects have declined through time, the effect appears to be similarly distributed across the study area.

CONTRIBUTIONS TO PROJECTS

A total of $162.9 million was contributed to voluntary projects in the Oregon Coast Range (Table 2). Sixty percent of contributions were to conventional projects.

Similar to the number of projects, reported contributions also varied by owner type. The largest contribution to conventional projects was made by industrial landowners with 49% of the total reported. The state of Oregon also made significant contributions to conventional projects with 43% of the total. Nonindustrial, mixed, and other types all had relatively small contributions to conventional projects, ranging from 1 to 3% of the total.

Contributions to incentive-based projects were more evenly distributed among owner types. Industrial, mixed and other ownerships all had similar contributions that ranged from 23% to 28% of the total. Nonindustrial and state ownerships each represented 13%.

Contributions to incentive-based projects have steadily increased from $3.6 million during 1995-99 to $30.7 during 2010-2014 (Table 2, Fig. 7). Alternatively, contributions to conventional projects by landowners have declined to $5.1 million in 2010-2014, after peaking at $41.6 million during 2000-04.

Table 1. Voluntary projects reported by landowners in the Oregon Coast Range (1995-2014) displayed by project type, owner type and as time period.

		Time Period				
Project Type	**Owner Type**	**1995-99**	**2000-04**	**2005-09**	**2010-14**	**Total**
Conventional	Industrial	1,491	1,326	656	244	3,717
	Nonindustrial	79	24	13	10	126
	State	305	225	127	98	755
	Mixed	6	8	2	3	19
	Other	22	44	25	3	94
	Total	*1,903*	*1,627*	*823*	*358*	*4,711*
Incentive-based	Industrial	56	147	61	52	316
	Nonindustrial	56	81	66	44	247
	State	37	48	35	28	148
	Mixed	6	8	34	31	79
	Other	14	46	40	38	138
	Total	*169*	*330*	*236*	*193*	*928*
	Total	**2,072**	**1,957**	**1,059**	**551**	**5,639**

Table 2. Contributions ($ millions) to voluntary projects reported by landowners in the Oregon Coast Range (1995-2014) displayed by project type, owner type and time period.

		Time Period				
Project Type	**Owner Type**	**1995-99**	**2000-04**	**2005-09**	**2010-14**	**Total**
Conventional	Industrial	18.5	19.7	8.3	2.5	49.0
	Nonindustrial	1.3	0.5	0.2	0.8	2.8
	State	16.8	19.6	5.4	1.5	43.3
	Mixed	0.6	0.2	0.1	0.2	1.1
	Other	0.6	1.6	1.4	0.1	3.7
	Total	*37.8*	*41.6*	*15.4*	*5.1*	*99.9*
Incentive-based	Industrial	0.8	3.1	4.2	6.4	14.5
	Nonindustrial	0.7	1.6	3.6	2.2	8.1
	State	1.1	0.9	1.9	4.3	8.2
	Mixed	0.2	1.2	5.6	7.5	14.5
	Other	0.8	3.7	2.9	10.3	17.7
	Total	*3.6*	*10.5*	*18.2*	*30.7*	*63.0*
	Total	**41.4**	**52.1**	**33.6**	**35.8**	**162.9**

TREATMENTS

Roads

Road treatments were the most commonly applied treatment type by landowners (Tables 6-7), both in terms of miles surveyed (8,600 mi) and number of structures installed (20,648). Road treatments types included:

1. road surveys
2. closing or decommissioning roads
3. reconstructing, relocating, or stabilized roads
4. improving surface drainage
5. seeding roadsides to prevent erosion

Road surveys represented the majority of treatment miles reported for conventional (72%) and incentive-based (93%) projects. Surface drainage improvements were also an important treatment type for conventional projects.

For road treatments, there were two basic types of structures that landowners installed: peak flow passage structures and surface drainage structures (Tables 8-9). Most structures associated with road treatments (70%) were installed to improve surface drainage. However, a large number of structures (6,137) were also installed to improve peak flow passage.

The majority of the road treatment miles (68%) and structures (72%) were on industrial ownerships, and were associated with conventional projects (~90%). Additionally, the state of Oregon also contributed considerably to improving roads by treating 2,817 miles and installing 5,164 structures.

Road treatments have declined significantly through time for both conventional and incentive-based projects. For conventional projects, road miles treated declined 99% following an initial peak in 1995-99. Road structures for conventional projects peaked in 2000-04 but have since declined 95%. For incentive-

based projects, road miles peaked in 2000-04 but have since declined 97%. Road structures peaked in 2005-09 but have also declined 45%.

Instream

In terms of structures, instream treatments were the second most common treatment type, and landowners reported installing a total of 11,471 structures (Tables 10-11). Options for instream structures included:

1. flow deflectors
2. large wood placements
3. v structures
4. weirs
5. other instream structures

Figure 10. Large wood placement in Oregon.

Most instream treatment structures were large wood placements (80%). All other instream structures were used to a much lesser extent. Additionally, the majority of instream structures (69%) were installed as part of incentive-based projects.

For conventional projects, most instream treatment structures were on industrial ownerships (66%), with a significant proportion on nonindustrial (14%) and state owned lands (14%). Instream structures associated incentive-based projects were more evenly distributed across owner types, and percentages ranged from 12 to 31%.

Conventional and incentive-based instream structures displayed different trends. Structures associated with conventional projects peaked during the 1995-99 period, but declined 95% during 2000-04 period and have remained at that level ever since. Conversely, the number instream structures associated incentive-based projects has consistently increased from 1,117 structures during 1995-99 period to 2,567 structures during 2010-14 period, which represents a 130% increase.

In addition to structures, landowners also reported the number of items that were placed in streams and features that were created as part of instream treatments (Tables 12-13). Instream items included logs, boulders, rootwads, and salmon carcasses. A total of 40,094 logs were added to streams as part of large wood placements. Additionally, 39,907 boulders and 11,036 salmon carcasses were placed in streams.

Creating instream features such as alcoves, ponds, pools and side-channels was relatively uncommon, with a total of 144 alcoves, 67 pools, 40 side channels and 27 ponds created.

Fish Passage

Fish Passage treatments were the third most common treatment type in terms of the number of structures. Work on over 1,600 crossing improved or opened access to aquatic habitat on over 1,400 miles of streams (Tables 14-17).

Most fish passage treatments were done as part of conventional projects (76%) on industrial ownerships (66%), and involved structure replacements (72%). The state of Oregon also reported many fish passage structures (264).

Figure 9. Voluntary culvert replacement to improve fish passage.

For conventional projects, the number of fish passage treatment structures has steadily declined from a high of 540 structures during 1995-99 to 71 structures during 2010-14, representing an 86% decrease. During that same period, however, the

number of structures associated with incentive-based projects increased 54% from 76 to 117 structures.

Riparian

Among the treatment types that were reported in terms of acres treated (e.g. riparian, upland, wetland), riparian treatments were the most common. Landowners reported treating 11,937 acres of riparian areas. Riparian treatments types included:

1. retaining trees that could be legally harvested
2. planting trees
3. restoring conifers in hardwood dominated standsplanting vegetation
4. installing livestock fencing to protect riparian areas
5. controlling invasive species
6. other riparian treatments

The most common riparian treatment type was retaining trees that could be legally harvested, which represented 64% of the total acres reported. Landowners also regularly planted trees as part of riparian treatments (21%). All additional riparian treatment types were used to a much lesser extent.

The majority of riparian treatments (78%) were associated with conventional projects, but riparian treatment acres associated with conventional projects have steadily declined since the 1995-99 period. Riparian treatment acres associated with incentive-based increased until 2005-09 but then decreased.

For conventional projects, the majority of acres (77%) reported were on industrial ownerships. However for incentive-based projects, nonindustrial ownerships represented the largest proportion of acres reported (60%).

Upland

In terms of acres treated, upland treatments were the second most common treatment type. Landowners reported that they treated 2,807 acres of upland habitat on their ownerships. Upland treatments included:

1. retaining trees that could be legally harvested
2. planting trees
3. installing livestock fences to protect uplands
4. controlling invasive plants
5. other upland treatments

The application of upland treatments was relatively infrequent across owner and treatment types, and trends were not readily apparent. It is also important to note that the vast majority of the upland treatment acres (2,489 acres) were associated with incentive-based projects that occurred on nonindustrial ownerships during 2010-14.

Wetland

Similar to upland treatments, wetland treatments were not commonly applied as part of voluntary restoration projects, and only 568 acres were reported by landowners as being treated. The types of treatments that landowners applied to wetlands included:

1. retaining trees that could be legally harvested
2. planting vegetation
3. creating or modifying wetlands
4. controlling invasive species
5. other wetland treatments

When wetlands were treated, the most commonly applied treatment was creating or modifying wetlands, which represented 82% of the reported acres. All other wetland treatment types were infrequent.

Wetland treatments were meager for all owner types, expect for the other owner type which reported 400 acres being treated during the 2010-14 period. Nearly all of those acres were result of incentive-based projects.

DISCUSSION

Habitat restoration by private landowners can play a key role in species conservation and recovery [5]. Private landowners in Oregon play a vital role in salmon restoration, because as a group, they manage one-third of the forestlands in Oregon [6]. Additionally, nearly all (~80%) coho habitat in the Oregon Coast Range is located on private lands [7], [8]. Because coho habitat is concentrated on private lands, efforts by landowners are potentially the most effective means to restore salmon populations [1].

Early on, those who crafted the Oregon Plan recognized the critical role that landowners could play in the restoration of salmon populations in Oregon. Engaging these landowners has been integral to

meeting the goals of the Plan. In Oregon, as in many places, landowners prefer voluntary options when it comes to the recovery and restoration of species [5], [12], [18]. The Oregon Plan asked landowners to consider an extensive list of projects that had the potential to directly benefit coho. Because the options were voluntary, landowners could choose the type of project to implement that made the most sense for their respective ownership and situation.

The response of landowners to the Oregon Plan has been remarkable. Considering just the voluntary projects that have been reported in the Coast Range over the past 20 years, landowners have completed at least 5,639 restoration projects at a cost of over 162 million dollars. Moreover, 84% of these projects received no incentive funding, and costs of implementation were bore entirely by landowners.

Voluntary projects conducted by landowners in the Oregon Coast Range have translated into tangible benefits for coho that include: 1) improved fish passage for 1,400 miles of streams, 2) improved water quality as result of more than 11,000 miles of roads that were surveyed and improved, 3) enhanced habitat through the installation of over 11,000 instream structures, most of which were large wood placements, and 4) nearly 12,000 acres of riparian forests improved by planting trees, restoring conifers in hardwood dominated stands, and leaving trees that could otherwise be harvested.

Private industrial landowners have been some of the biggest proponents of the Oregon Plan, and they have led the charge by implementing and reporting voluntary restoration projects for coho. Private industrial owners conducted over 4,000 projects, the largest of number of any of the groups considered. The cost of implementing these projects was over $63 million, most of which was for conventional projects, with industrial owners bearing the majority of the cost. As part of these projects, industrial landowners conducted over 3,800 large wood placements using more than 16,000 logs; surveyed and treated nearly 8,000 miles of roads; and replaced, removed, or improved over 1,000 structures that increased access to 900 miles of streams by improving fish passage.

In the Oregon Coast Range, the majority of coho habitat is found throughout private nonindustrial forests, so these landowners play a pivotal role in coho restoration. [7]. This suggests that voluntary projects implemented on private nonindustrial lands are likely to produce the greatest positive returns for coho. When compared with industrial ownerships, however, the number of projects implemented and reported by nonindustrial owners was considerably lower (373 projects), as was the total contributions to projects ($10.9 million). This indicates that there are still opportunities to restore coho habitat on nonindustrial lands in Oregon Coast Range. The key will be finding ways to involve more nonindustrial landowners in the effort.

Nonindustrial landowners, however, can be challenging to engage in conservation and outreach efforts. In this study, two-thirds of the voluntary projects completed and reported by nonindustrial landowners were incentive-based, suggesting that incentives are a key method for engaging nonindustrial landowners. Additionally, surveys of landowners' opinions on voluntary projects and species conservation in Oregon indicate that the majority of landowners support incentives and cost sharing for these types of activities [5], [18].

This study, which documents efforts by forest landowners to restore coho, only describes projects that were reported to the OWRI database. For incentive-based projects, the number reported accurately reflects the number implemented, because landowners are required to report incentive-based projects. For conventional projects, however, the relationship is less certain. In a recent survey, 58% of landowners in the Oregon Coast Range stated they had conducted at least one voluntary project that they did not report [18]. The survey result suggests conventional projects are underestimated in the database, possibly to a large degree. For landowner contributions to conventional projects to be accurately represented in future reports, more research about how to estimate reporting rates for restoration projects is needed.

The Oregon Board of Forestry uses information reported by landowners about their voluntary projects to develop policies that directly affect landowners. For example, information from this report will be presented to Board of Forestry so they can consider how voluntary and incentive programs will be used in the future. Additionally, information on voluntary projects in eastern Oregon and the Siskiyou areas is being compiled to help inform the Board of Forestry's

upcoming decision on what riparian protections issues to monitor in those areas. Furthermore, the total financial contributions to voluntary projects by landowners is a Key Performance Measure (KPM) for the Department of Forestry. The KPM is used to describe to the legislature, the Board of Forestry and the public the effectiveness of Oregon Plan in restoring salmon habitat and watersheds. When restoration projects are not reported, the efforts by landowners are underrepresented in these important discussions.

In addition to reporting, another key component of voluntary restoration programs is monitoring. Monitoring voluntary projects is important, because it provides verification that reported projects were completed. Additionally, monitoring can provide an assessment of how well projects were implemented by comparing them to current standards and guidelines. The effectiveness of restoration projects can also be evaluated directly by collecting data on conditions before and after the projects are conducted to estimate their impact.

Reporting and monitoring restoration projects enhances the credibility of conservation programs and increases the effect they have on policy discussions. In their book *The Endangered Species Act and Federalism: Effective Conservation Through Greater State Commitment* [2], Arha and Thompson capture the essence of why reporting and monitoring conservation projects is important:

> *"The more documentation state and federal agencies can acquire as to the effectiveness of how their efforts conserve and protect species, the more effective legislative or policy changes are likely to be, and the greater likelihood courts will defer to agency actions promised in such agreements"*

While monitoring projects is critical, only a small percentage of restoration projects are ever monitored in United States [19]. Furthermore, post-restoration effectiveness monitoring can be difficult because projects can be challenging to locate and assess [20]. However, Oregon Plan partners clearly recognize that monitoring is a critical step to increase the impact of its results on policy. In recent conversations, landowner groups in Oregon have acknowledged the importance of monitoring and expressed interest in monitoring future restoration projects.

In conclusion, forest landowners have embraced the spirit of the Oregon Plan by completing thousands of restoration projects to recover coho salmon. Notwithstanding their efforts, Oregon Coast coho were still eventually listed as threatened by the National Oceanic and Atmospheric Administration in 1998 [6]. Even though coho still remain listed as threatened in Oregon today, their populations have rebounded substantially from the record lows that occurred in the 1990s (Fig.2). The current state of coho populations in Oregon reflects reductions in harvest, improved hatchery management, and extensive restoration work conducted by the forest landowners [8]. There are still considerable opportunities to improve freshwater habitat for the coho, especially on nonindustrial ownerships. Future efforts should include outreach to improve public awareness of the Oregon Plan; research to understand reporting rates for restoration projects that do not involve incentives; and effectiveness monitoring of restoration projects to improve their utility in policy development.

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APPENDIX I: Treatment Crosswalks

Table 3. Crosswalks that describe how reported treatments types for roads were generated using information from the Oregon Watershed Restoration Inventory

Activity Type	Activity	Reported Values
Roads	Road survey	Surveyed
	Road closure	Closed/Decommissioned
	Road decommission	Closed/Decommissioned
	Road reconstruction	Reconstructed/Relocated/Stabilized
	Road relocation	Reconstructed/Relocated/Stabilized
	Road stabilization	Reconstructed/Relocated/Stabilized
	Road grass seeding	Grass Seeding
	Surface drainage improvement	Surface Drainage Improved
	Peak flow passage improvement	Peak Flow Passage

Table 4. Crosswalks that describe how reported fish passage and instream treatments types were generated using information from the Oregon Watershed Restoration Inventory.

Activity Type	Treatment	Reported Value
Fish Passage	Culverts/structures/fords replaced with bridges	Replaced
	Culverts/structures/fords replaced with culverts placed embedded or flat	Replaced
	Culverts/structures/fords replaced with ford	Replaced
	Culverts/structures/fords replaced with open bottom arch culverts	Replaced
	Culverts/structures/fords replaced with weir/baffle culverts	Replaced
	Culverts/structures/fords removed and not replaced	Removed
	Culverts with rock or log weirs installed below outlet	Repaired/Improved
	Culverts/structures repaired	Repaired/Improved
	Culverts/structures retrofitted with baffles or weirs (adding roughness into existing culverts)	Repaired/Improved
Instream	Alcoves created	Alcoves
	Alcoves created with tributary/spring input	Alcoves
	Alcoves created without tributary/spring input	Alcoves
	Alcoves enhanced	Alcoves
	Alcoves reconnected or access improved	Alcoves
	Alcoves treatment not specified	Alcoves
	Anchored habitat structures placed	Other Habitat Structures
	Habitat structures placed rootwads & boulders	Other Habitat Structures
	Habitat structures placed rootwads & brush bundles	Other Habitat Structures
	Habitat structures placed unknown type	Other Habitat Structures
	Flow deflector installed log	Flow Deflectors
	Flow deflector installed log and rock/boulder	Flow Deflectors
	Flow deflector installed rock/boulder	Flow Deflectors
	Flow deflector installed unknown type	Flow Deflectors
	Large wood placed	Large Wood Placements
	Main stream channel modified / created	Main Channel
	Off-channel ponds created	Off-channel Ponds
	Off-channel ponds created with tributary/spring input	Off-channel Ponds
	Off-channel ponds created without tributary/spring input	Off-channel Ponds
	Off-channel ponds enhanced	Off-channel Ponds
	Off-channel ponds treatment not specified	Off-channel Ponds
	Pool created (unknown method)	Pool
	Pool excavated or blasted	Pool

Activity Type	Treatment	Reported Value
	Rootwads placed	Rootwads
	Salmon carcasses placed	Salmon Carcasses
	Side channels created / excavated	Side Channel
	Side channels reconnected to stream or access improved	Side Channel
	Side channels treatment not specified	Side Channel
	Stream bank stabilized bank resloped	Stream Bank
	Stream bank stabilized bioengineering	Stream Bank
	Stream bank stabilized log and rock revetment installed' = 'stream bank	Stream Bank
	Stream bank stabilized log revetment installed	Stream Bank
	Stream bank stabilized riprap (rock revetment) installed'= 'stream bank	Stream Bank
	Other stream bank stabilization technique	Stream Bank
	Weir installed (not below culvert) log	Weirs
	Weir installed (not below culvert) log and rock/boulder	Weirs
	Weir installed (not below culvert) rock/boulder	Weirs
	Weir installed (not below culvert) unknown type	Weirs
	V structure installed log	V structure
	V structure installed log and rock/boulder	V structure
	V structure installed rock/boulder	V structure

Table 5. Crosswalks that describe how reported harvest, riparian and upland treatments types were generated using information from the Oregon Watershed Restoration Inventory.

Activity Type	Treatment	Reported Values
Harvest	Voluntary riparian tree retention	Trees Retained
	Riparian conifer restoration (hardwood conversion)	Hardwoods converted to conifers
Riparian	Riparian trees planted conifer	Trees Planted
	Riparian trees planted conifer and hardwood	Trees Planted
	Riparian trees planted hardwood	Trees Planted
	Riparian trees planted unknown type	Trees Planted
	Riparian fencing	Fencing
	Riparian treated for non-native or noxious plant species	Invasive Plant Control
	Riparian shrubs or herbaceous vegetation planted/reseeded	Shrubs and vegetation planted
	Changes in harvest/land management practices	Other
	Conservation easement	Other
	Nurse logs placed	Other
	Livestock stream access/crossing created or improved	Other
	Fence maintenance	Other
	Other treatment	Other
	Riparian erosion control	Other
	Debris/structures removal to allow riparian vegetation growth	Other
	Nursery operation	Other
	Other riparian vegetation management	Other
	Riparian plant establishment (not planting activities)	Other
	Riparian plant protection installed	Other
Upland	Upland fencing	Fencing Installed
	Upland trees planted	Trees planted
	Voluntary upland tree retention	Trees Retained
	Upland treated for non-native or noxious plant species	Invasive Plants Controlled
	Grazing management livestock removal	Other
	Grazing management livestock rotation (pasture forage improvement through rotational livestock grazing)	Other
	Constructed wetland for wastewater treatment or water quality improvement	Other
	Livestock manure management	Other

Activity Type	Treatment	Reported Values
	Gully/grade stabilization	Other
	Other upland erosion control practice	Other
	Other upland vegetation management	Other
	Upland shrubs or herbaceous vegetation planted/reseeded	Other
	Off-channel watering sites developed	Other
Wetland	Unknown	Other
	Wetland vegetation planted	Vegetation Planted
	Voluntary wetland tree retention	Trees Retained
	Wetland treated for non-native or noxious plant species	Invasive Plants Controlled
	Non-wetland created into forest wetland	Created/Modified
	Non-wetland created into grass/herb meadow wetland	Created/Modified
	Wetland created	Created/Modified
	Existing forest wetland improved	Created/Modified
	Existing grass/herb meadow wetland improved	Created/Modified
	Existing open water wetland (>6 ft. deep) improved	Created/Modified
	Existing shrub/scrub wetland improved	Created/Modified
	Existing wetland improved	Created/Modified
	Previously filled or drained wetland restored	Created/Modified
	Previously filled or drained wetland returned to forest wetland	Created/Modified

APPENDIX II: Data summaries

ROAD TREATMENTS

Table 6. Miles of roads surveyed or treated as part of conventional restoration projects.

Owner	Road Treatment	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Surveyed	5,591	792	32	0	6,416
	Treated					
	Closed/Decommissioned	105	101	18	3	227
	Reconstructed/Relocated/Stabilized	88	47	5	0	140
	Surface Drainage Improved	326	270	92	5	693
	Grass Seeding	71	154	18	2	244
	Total Treated	***590***	***572***	***133***	***10***	***1304***
Nonindustrial	Surveyed	0	0	0	0	0
	Treated					
	Closed/Decommissioned	1	0	0	0	1
	Reconstructed/Relocated/Stabilized	2	0	0	0	2
	Surface Drainage Improved	0	30	0	0	30
	Grass Seeding	1	0	0	0	1
	Total Treated	***4***	***30***	***0***	***0***	***34***
State	Surveyed	280	92	755	0	1,127
	Treated					
	Closed/Decommissioned	24	43	22	14	103
	Reconstructed/Relocated/Stabilized	23	22	11	0	56
	Surface Drainage Improved	396	447	157	1	1,001
	Grass Seeding	92	173	82	4	350
	Total Treated	***535***	***685***	***272***	***19***	***1,510***
Mixed	Surveyed	*0*	*0*	*0*	*0*	*0*
	Treated					
	Closed/Decommissioned	*0*	*0*	*0*	*3*	*3*
	Reconstructed/Relocated/Stabilized	*0*	*0*	*0*	*1*	*1*
	Surface Drainage Improved	*0*	*7*	*6*	*0*	*13*
	Grass Seeding	*0*	*0*	*0*	*3*	*3*
	Total Treated	***0***	***7***	***6***	***7***	***20***
Other	Surveyed	0	2	0	0	2
	Treated					
	Closed/Decommissioned	1	4	0	0	5
	Reconstructed/Relocated/Stabilized	0	0	0	0	0
	Surface Drainage Improved	0	7	2	0	9
	Grass Seeding	0	1	0	1	2
	Total Treated	***1***	***12***	***2***	***1***	***16***
	Total	**1,130**	**1,306**	**413**	**37**	**2,884**

Table 7. Miles of roads surveyed or treated as part of incentive-based restoration projects.

Owner	Road Treatment	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Surveyed	33	130	0	0	163
	Treated					
	Closed/Decommissioned	1	7	1	4	13
	Reconstructed/Relocated/Stabilized	0	0	0	1	1
	Surface Drainage Improved	1	10	0	0	11
	Grass Seeding	0	7	0	0	7
	Total Treated	***2***	***24***	***1***	***5***	***32***
Nonindustrial	Surveyed	33	42	0	0	76
	Treated					
	Closed/Decommissioned	0	0	0	1	1
	Reconstructed/Relocated/Stabilized	0	0	0	0	0
	Surface Drainage Improved	0	0	1	4	4
	Grass Seeding	1	2	0	1	4
	Total Treated	***1***	***2***	***1***	***6***	***9***
State	Surveyed	156	0	0	0	156
	Treated					
	Closed/Decommissioned	4	6	0	11	21
	Reconstructed/Relocated/Stabilized	0	0	0	0	0
	Surface Drainage Improved	0	0	0	0	0
	Grass Seeding	0	0	1	2	3
	Total Treated	***4***	***6***	***1***	***13***	***24***
Mixed	Surveyed	*40*	*5*	*0*	*0*	*46*
	Treated					
	Closed/Decommissioned	*0*	*0*	*5*	*1*	*6*
	Reconstructed/Relocated/Stabilized	*0*	*0*	*0*	*0*	*0*
	Surface Drainage Improved	*0*	*0*	*0*	*0*	*0*
	Grass Seeding	*0*	*0*	*2*	*0*	*2*
	Total Treated	***0***	***0***	***7***	***1***	***8***
Other	Surveyed	5	642	0	0	648
	Treated					
	Closed/Decommissioned	0	0	2	3	5
	Reconstructed/Relocated/Stabilized	0	0	0	0	0
	Surface Drainage Improved	0	3	0	3	6
	Grass Seeding	0	0	0	0	0
	Total Treated	***0***	***3***	***2***	***6***	***11***
	Total	**7**	**35**	**12**	**31**	**84**

Table 8. Peak flow and surface drainage structures installed on roads as part of conventional restoration projects.

Owner	Road Treatment Structures	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Peak Flow Passage	1,548	1,901	593	99	4,141
	Surface Drainage	3,264	4,577	1,524	77	9,442
	Total	*4,812*	*6,478*	*2,117*	*176*	*13,583*
Nonindustrial	Peak Flow Passage	0	24	5	0	29
	Surface Drainage	1	49	5	0	55
	Total	*1*	*73*	*10*	*0*	*84*
State	Peak Flow Passage	672	682	146	15	1,515
	Surface Drainage	1,412	1,597	342	224	3,575
	Total	*2,084*	*2,279*	*488*	*239*	*5,090*
Mixed	Peak Flow Passage	*0*	*8*	*0*	*0*	*8*
	Surface Drainage	*0*	*72*	*3*	*0*	*75*
	Total	*0*	*80*	*3*	*0*	*83*
Other	Peak Flow Passage	0	1	1	0	2
	Surface Drainage	0	41	7	0	48
	Total	*0*	*42*	*8*	*0*	*50*
	Total	**6,897**	**8,952**	**2,626**	**415**	**18,890**

Table 9. Peak flow and surface drainage structures installed on roads as part of incentive-based restoration projects.

Owner	Road Treatment Structures	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Peak Flow Passage	33	109	110	23	275
	Surface Drainage	8	446	413	133	1,000
	Total	*41*	*555*	*523*	*156*	*1,275*
Nonindustrial	Peak Flow Passage	4	2	28	44	78
	Surface Drainage	0	6	39	87	132
	Total	*4*	*8*	*67*	*131*	*210*
State	Peak Flow Passage	10	0	17	12	39
	Surface Drainage	0	0	35	0	35
	Total	*10*	*0*	*52*	*12*	*74*
Mixed	Peak Flow Passage	*0*	*4*	*8*	*0*	*12*
	Surface Drainage	*0*	*5*	*13*	*0*	*18*
	Total	*0*	*9*	*21*	*0*	*30*
Other	Peak Flow Passage	0	0	8	30	38
	Surface Drainage	0	85	2	44	131
	Total	*0*	*85*	*10*	*74*	*169*
	Total	**55**	**657**	**673**	**373**	**1,758**

INSTREAM TREATMENTS

Table 10. Structures installed in streams as part of conventional restoration projects.

Owner	Instream Structures	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Flow Deflectors	118	0	0	0	118
	Large Wood Placements	1,398	86	66	19	1,569
	V Structures	18	0	0	0	18
	Weirs	382	0	0	0	382
	Other Habitat Structures	234	0	0	0	234
	Total	*2,150*	*86*	*66*	*19*	*2,321*
Nonindustrial	Flow Deflectors	49	0	0	0	49
	Large Wood Placements	152	3	1	20	176
	V Structures	0	0	0	0	0
	Weirs	207	0	0	0	207
	Other Habitat Structures	63	0	0	0	63
	Total	*471*	*3*	*1*	*20*	*495*
State	Flow Deflectors	37	0	0	0	37
	Large Wood Placements	193	40	103	104	440
	V Structures	0	0	0	0	0
	Weirs	14	0	0	0	14
	Other Habitat Structures	0	5	0	0	5
	Total	*244*	*45*	*103*	*104*	*496*
Mixed	Flow Deflectors	0	0	0	0	0
	Large Wood Placements	60	0	0	1	61
	V Structures	0	0	0	0	0
	Weirs	12	0	0	0	12
	Other Habitat Structures	30	0	0	0	30
	Total	*102*	*0*	*0*	*1*	*103*
Other	Flow Deflectors	0	0	0	0	0
	Large Wood Placements	62	16	6	0	84
	V Structures	0	0	0	0	0
	Weirs	1	0	0	0	1
	Other Habitat Structures	9	5	0	0	14
	Total	*72*	*21*	*6*	*0*	*99*
	Total	**3,039**	**155**	**176**	**144**	**3,514**

Table 11. Structures installed in streams as part of incentive-based restoration projects.

Owner	Instream Structures	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Flow Deflectors	30	0	0	0	30
	Large Wood Placements	163	1,020	467	628	2,278
	V Structures	4	0	0	0	4
	Weirs	111	0	0	0	111
	Other Habitat Structures	66	0	0	0	66
	Total	*374*	*1,020*	*467*	*628*	*2,489*
Nonindustrial	Flow Deflectors	13	8	8	7	36
	Large Wood Placements	28	140	272	234	674
	V Structures	0	0	10	0	10
	Weirs	84	0	11	11	106
	Other Habitat Structures	62	52	24	20	158
	Total	*187*	*200*	*325*	*272*	*984*
State	Flow Deflectors	19	0	0	8	27
	Large Wood Placements	268	290	216	200	974
	V Structures	2	0	0	0	2
	Weirs	27	2	0	3	32
	Other Habitat Structures	152	0	0	0	152
	Total	*468*	*292*	*216*	*211*	*1,187*
Mixed	Flow Deflectors	0	0	0	0	0
	Large Wood Placements	64	192	776	911	1,943
	V Structures	0	0	0	32	32
	Weirs	1	0	16	13	30
	Other Habitat Structures	15	0	27	10	52
	Total	*80*	*192*	*819*	*966*	*2,057*
Other	Flow Deflectors	0	0	58	7	65
	Large Wood Placements	0	350	189	460	999
	V Structures	0	0	0	0	0
	Weirs	6	0	65	23	94
	Other Habitat Structures	2	2	78	0	82
	Total	*8*	*352*	*390*	*490*	*1,240*
	Total	**1,117**	**2,056**	**2,217**	**2,567**	**7,957**

Table 12. Features created or placed in streams as part of conventional restoration projects.

Owner	Instream Features	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Logs	4,954	238	198	132	5,522
	Boulders	706	0	0	0	706
	Rootwads	227	0	0	0	227
	Brush Bundles	141	0	0	0	141
	Salmon Carcasses	1,526	5,672	1,438	150	8,786
	Alcoves	94	0	0	0	94
	Ponds	21	0	0	0	21
	Pools	26	0	0	0	26
	Side-channels	17	6	0	0	23
	Total	*7,712*	*5,916*	*1,636*	*282*	*15,546*
Nonindustrial	Logs	469	6	3	159	637
	Boulders	3	0	25	0	28
	Rootwads	135	0	0	55	190
	Brush Bundles	60	0	0	0	60
	Salmon Carcasses	0	0	0	0	0
	Alcoves	3	0	0	0	3
	Ponds	5	0	0	0	5
	Pools	41	0	0	0	41
	Side-channels	14	0	0	0	14
	Total	*730*	*6*	*28*	*214*	*978*
State	Logs	892	149	0	0	1,041
	Boulders	0	40	0	0	40
	Rootwads	0	0	0	0	0
	Brush Bundles	0	0	0	0	0
	Salmon Carcasses	0	189	0	0	189
	Alcoves	8	0	0	0	8
	Ponds	0	0	0	0	0
	Pools	0	0	0	0	0
	Side-channels	0	0	0	0	0
	Total	*900*	*378*	*0*	*0*	*1,278*
Mixed	Logs	318	0	0	5	323
	Boulders	0	0	0	0	0
	Rootwads	0	0	0	0	0
	Brush Bundles	50	0	0	0	50
	Salmon Carcasses	331	405	1,022	0	1,758
	Alcoves	2	0	0	0	2
	Ponds	4	0	0	0	4
	Pools	0	0	0	0	0
	Side-channels	0	0	0	0	0
	Total	*705*	*405*	*1,022*	*5*	*2,137*
Other	Logs	145	30	2	0	177
	Boulders	0	37	0	0	37
	Rootwads	0	0	0	0	0
	Brush Bundles	30	0	0	0	30
	Salmon Carcasses	0	165	82	0	247
	Alcoves	1	0	0	0	1
	Ponds	0	0	0	0	0
	Pools	0	0	0	0	0
	Side-channels	0	3	0	0	3
	Total	*176*	*235*	*84*	*0*	*495*
	Total	**10,223**	**6,940**	**2,770**	**501**	**20,434**

Table 13. Features created or placed in streams as part of incentive-based restoration projects.

Owner	Instream Features	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Logs	543	2,981	2,251	4,826	10,601
	Boulders	120	3,580	501	340	4,541
	Rootwads	12	0	0	0	12
	Brush Bundles	0	0	0	0	0
	Salmon Carcasses	0	0	56	0	56
	Alcoves	4	0	0	0	4
	Ponds	2	0	0	0	2
	Pools	0	0	0	10	10
	Side-channels	2	0	0	6	8
	Total	*683*	*6,561*	*2,808*	*5,182*	*15,234*
Nonindustrial	Logs	217	429	974	594	2,214
	Boulders	40	5,060	1,574	35	6,709
	Rootwads	35	0	0	0	35
	Brush Bundles	0	0	0	0	0
	Salmon Carcasses	0	0	0	0	0
	Alcoves	8	4	5	0	17
	Ponds	9	0	0	0	9
	Pools	0	0	5	1	6
	Side-channels	2	0	3	0	5
	Total	*311*	*5,493*	*2,561*	*630*	*8,995*
State	Logs	926	909	762	996	3,593
	Boulders	0	0	104	35	139
	Rootwads	39	0	0	30	69
	Brush Bundles	0	0	0	0	0
	Salmon Carcasses	0	0	0	0	0
	Alcoves	16	0	0	0	16
	Ponds	6	0	0	0	6
	Pools	0	0	0	1	1
	Side-channels	5	1	1	1	8
	Total	*992*	*910*	*867*	*1,063*	*3,832*
Mixed	Logs	204	786	3,531	7,106	11,627
	Boulders	0	200	5,570	19,878	25,648
	Rootwads	0	0	7	0	7
	Brush Bundles	0	0	0	0	0
	Salmon Carcasses	0	0	0	0	0
	Alcoves	0	0	4	0	4
	Ponds	0	0	0	0	0
	Pools	0	0	0	0	0
	Side-channels	0	0	1	0	1
	Total	*204*	*986*	*9,113*	*26,984*	*37,287*
Other	Logs	0	1,535	900	1,924	4,359
	Boulders	0	0	1,430	629	2,059
	Rootwads	0	0	0	121	121
	Brush Bundles	0	0	0	0	0
	Salmon Carcasses	0	0	0	0	0
	Alcoves	0	0	0	0	0
	Ponds	0	21	1	0	22
	Pools	0	0	6	0	6
	Side-channels	0	20	6	1	27
	Total	*0*	*1,576*	*2,343*	*2,675*	*6,594*
	Total	**2,190**	**15,526**	**17,692**	**36,534**	**71,942**

Table 14. Miles of streams treated as part of conventional restoration projects.

Owner	Instream Miles Treated	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Main Channel	0.0	0.0	0.0	0.0	0.0
	Salmon Carcasses Placed	2.9	8.0	14.5	3.0	28.4
	Side Channel	0.0	0.0	0.0	0.0	0.1
	Stream Banks	0.1	0.0	0.0	0.0	0.1
	Total	*3.0*	*8.0*	*14.5*	*3.0*	*28.5*
Nonindustrial	Main Channel	0.0	0.0	0.0	0.0	0.0
	Salmon Carcasses Placed	0.0	0.0	0.0	0.0	0.0
	Side Channel	0.0	0.0	0.0	0.0	0.0
	Stream Banks	0.0	0.0	0.0	0.3	0.3
	Total	*0.0*	*0.0*	*0.0*	*0.3*	*0.3*
State	Main Channel	0.0	0.0	0.0	0.0	0.0
	Salmon Carcasses Placed	0.0	3.5	0.5	0.0	4.0
	Side Channel	0.0	0.0	0.0	0.0	0.0
	Stream Banks	0.2	0.0	0.0	0.0	0.2
	Total	*0.2*	*3.5*	*0.5*	*0.0*	*4.2*
Mixed	Main Channel	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	Salmon Carcasses Placed	*12.2*	*2.2*	*15.0*	*0.0*	*29.4*
	Side Channel	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	Stream Banks	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	Total	*12.2*	*2.2*	*15.0*	*0.0*	*29.4*
Other	Main Channel	0.4	0.0	0.0	0.0	0.4
	Salmon Carcasses Placed	0.0	1.0	1.0	0.0	2.0
	Side Channel	0.0	0.1	0.0	0.0	0.1
	Stream Banks	0.0	0.0	0.0	0.0	0.0
	Total	*0.4*	*1.2*	*1.0*	*0.0*	*2.5*
	Total	**3.6**	**12.7**	**16.0**	**3.3**	**65.0**

Table 15. Miles of streams treated as part of incentive-based restoration projects.

Owner	Instream Treatment	Time Period				Total
		1995-99	2000-04	2005-09	2010-14	
Industrial	Main Channel	0.0	0.0	0.0	0.0	0.0
	Salmon Carcasses Placed	0.0	0.0	0.5	0.0	0.5
	Side Channel	0.1	0.0	1.5	0.1	1.7
	Stream Banks	0.0	0.0	0.0	0.0	0.0
	Total	*0.1*	*0.0*	*2.0*	*0.2*	*2.3*
Nonindustrial	Main Channel	0.0	0.0	0.0	0.1	0.1
	Salmon Carcasses Placed	0.0	0.0	0.0	0.0	0.0
	Side Channel	1.1	0.0	0.1	0.0	1.2
	Stream Banks	0.1	0.0	0.3	0.5	0.9
	Total	*1.2*	*0.0*	*0.3*	*0.6*	*2.2*
State	Main Channel	0.0	0.0	0.0	0.1	0.1
	Salmon Carcasses Placed	0.0	0.0	0.0	0.0	0.0
	Side Channel	0.0	0.1	0.1	0.2	0.3
	Stream Banks	0.0	0.0	0.0	0.0	0.0
	Total	*0.0*	*0.1*	*0.1*	*0.3*	*0.5*
Mixed	Main Channel	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	Salmon Carcasses Placed	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	Side Channel	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	Stream Banks	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	Total	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Other	Main Channel	1.0	5.0	0.1	1.0	7.2
	Salmon Carcasses Placed	0.0	0.0	0.0	0.0	0.0
	Side Channel	0.0	0.2	1.0	0.0	1.2
	Stream Banks	0.0	0.0	0.0	0.0	0.0
	Total	*1.0*	*5.2*	*1.1*	*1.0*	*8.4*
	Total	**2.4**	**5.3**	**3.5**	**2.2**	**13.4**

FISH PASSAGE TREATMENTS

Table 16. Structures that were removed, improved, or replaced to improve fish passage as part of conventional restoration projects.

Owner	Fish Passage Structures	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Removed	131	81	34	12	258
	Repaired/Improved	38	13	3	0	54
	Replaced	252	227	102	33	614
	Total	*421*	*321*	*139*	*45*	*926*
Nonindustrial	Removed	2	2	0	1	5
	Repaired/Improved	2	1	0	0	3
	Replaced	12	6	3	1	22
	Total	*16*	*9*	*3*	*2*	*30*
State	Removed	13	45	6	4	68
	Repaired/Improved	23	2	0	0	25
	Replaced	51	43	22	15	131
	Total	*87*	*90*	*28*	*19*	*224*
Mixed	Removed	*1*	*0*	*0*	*2*	*3*
	Repaired/Improved	*0*	*0*	*0*	*0*	*0*
	Replaced	*3*	*3*	*0*	*3*	*9*
	Total	*4*	*3*	*0*	*5*	*12*
Other	Removed	2	4	0	0	6
	Repaired/Improved	0	2	0	0	2
	Replaced	10	27	21	0	58
	Total	*12*	*33*	*21*	*0*	*66*
	Total	**540**	**456**	**191**	**71**	**1,258**

Table 17. Structures that were removed, improved, or replaced to improve fish passage as part of incentive-based restoration projects.

Owner	Fish Passage Structures	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Removed	6	15	16	18	55
	Repaired/Improved	9	4	0	0	13
	Replaced	18	23	29	24	94
	Total	*33*	*42*	*45*	*42*	*162*
Nonindustrial	Removed	0	5	4	2	11
	Repaired/Improved	0	2	1	0	3
	Replaced	12	21	19	20	72
	Total	*12*	*28*	*24*	*22*	*86*
State	Removed	0	5	1	3	9
	Repaired/Improved	4	3	0	0	7
	Replaced	5	8	6	5	24
	Total	*9*	*16*	*7*	*8*	*40*
Mixed	Removed	*0*	*0*	*4*	*18*	*22*
	Repaired/Improved	*0*	*0*	*0*	*3*	*3*
	Replaced	*3*	*0*	*13*	*10*	*26*
	Total	*3*	*0*	*17*	*31*	*51*
Other	Removed	0	2	3	1	6
	Repaired/Improved	4	1	0	0	5
	Replaced	14	17	9	13	53
	Total	*18*	*20*	*12*	*14*	*64*
	Total	**75**	**106**	**105**	**117**	**403**

Table 18. Estimated miles of aquatic habitat made accessible to fish as the result of fish passage treatments.

Type	Owner	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Conventional	Industrial	334	285	98	51	768
	Nonindustrial	8	5	4	1	17
	State	78	70	19	22	189
	Mixed	2	1	0	2	5
	Other	9	31	16	0	56
	Total	*432*	*392*	*136*	*76*	*1,036*
Incentive-based	Industrial	20	35	45	37	137
	Nonindustrial	12	27	22	18	78
	State	4	7	9	5	25
	Mixed	3	0	26	18	46
	Other	37	19	15	28	99
	Total	*76*	*88*	*117*	*105*	*386*
	Total	**507**	**479**	**253**	**181**	**1,421**

RIPARIAN TREATMENTS

Table 19. Acres treated in riparian areas as part of conventional restoration projects.

Owner	Riparian Treatments	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Trees Retained	1,913	2,306	1,502	505	6,227
	Trees Planted	417	162	12	2	592
	Hardwoods Converted to Conifers	135	6	14	5	159
	Shrubs/Herbaceous Vegetation Planted	6	2	0	0	8
	Fencing Installed	0	4	4	0	8
	Invasive Plants Controlled	0	7	0	0	7
	Other	0	96	31	0	127
	Total	*2,471*	*2,582*	*1,563*	*512*	*7,127*
Nonindustrial	Trees Retained	0	0	0	0	0
	Trees Planted	152	9	79	158	399
	Hardwoods Converted to Conifers	121	0	0	0	121
	Shrubs/Herbaceous Vegetation Planted	0	0	0	73	73
	Fencing Installed	100	0	0	0	100
	Invasive Plants Controlled	0	0	0	49	49
	Other	1	0	0	0	1
	Total	*374*	*9*	*80*	*280*	*743*
State	Trees Retained	365	368	311	306	1,351
	Trees Planted	12	9	0	0	22
	Hardwoods Converted to Conifers	5	0	0	0	5
	Shrubs/Herbaceous Vegetation Planted	0	0	0	0	0
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	4	0	1	0	5
	Other	0	0	0	0	0
	Total	*386*	*378*	*312*	*306*	*1,382*
Mixed	Trees Retained	0	0	0	0	*0*
	Trees Planted	37	0	0	0	*37*
	Hardwoods Converted to Conifers	0	0	0	0	*0*
	Shrubs/Herbaceous Vegetation Planted	0	0	0	0	*0*
	Fencing Installed	0	0	0	0	*0*
	Invasive Plants Controlled	0	0	0	0	*0*
	Other	0	0	0	0	*0*
	Total	*37*	*0*	*0*	*0*	*37*
Other	Trees Retained	0	0	0	0	0
	Trees Planted	18	2	0	2	22
	Hardwoods Converted to Conifers	0	0	0	0	0
	Shrubs/Herbaceous Vegetation Planted	0	0	0	2	2
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*18*	*2*	*0*	*4*	*24*
	Total	**3,286**	**2,971**	**1,955**	**1,102**	**9,313**

Table 20. Acres treated in riparian areas as part of incentive-based restoration projects.

Owner	Riparian Treatments	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Trees Retained	0	0	0	0	0
	Trees Planted	29	51	54	76	210
	Hardwoods Converted to Conifers	24	0	0	0	24
	Shrubs/Herbaceous Vegetation Planted	0	0	9	13	22
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	2	14	16
	Other	0	30	4	2	36
	Total	*53*	*81*	*70*	*104*	*308*
Nonindustrial	Trees Retained	0	0	0	0	0
	Trees Planted	126	337	203	64	730
	Hardwoods Converted to Conifers	24	0	0	0	24
	Shrubs/Herbaceous Vegetation Planted	0	4	87	10	101
	Fencing Installed	246	90	29	35	400
	Invasive Plants Controlled	0	0	165	19	184
	Other	1	6	133	2	142
	Total	*397*	*437*	*618*	*129*	*1,582*
State	Trees Retained	0	6	0	0	6
	Trees Planted	6	11	28	263	308
	Hardwoods Converted to Conifers	0	0	0	0	0
	Shrubs/Herbaceous Vegetation Planted	0	0	0	4	4
	Fencing Installed	6	0	0	0	6
	Invasive Plants Controlled	0	0	5	2	6
	Other	0	0	30	0	30
	Total	*12*	*17*	*63*	*269*	*361*
Mixed	Trees Retained	0	0	0	0	*0*
	Trees Planted	0	1	66	23	*90*
	Hardwoods Converted to Conifers	0	0	0	0	*0*
	Shrubs/Herbaceous Vegetation Planted	0	0	15	14	*29*
	Fencing Installed	2	0	0	0	*2*
	Invasive Plants Controlled	0	0	6	2	*8*
	Other	0	0	95	0	*95*
	Total	*2*	*1*	*182*	*39*	*224*
Other	Trees Retained	0	0	0	0	0
	Trees Planted	1	37	56	8	102
	Hardwoods Converted to Conifers	0	0	0	0	0
	Shrubs/Herbaceous Vegetation Planted	1	0	1	2	4
	Fencing Installed	0	0	0	3	3
	Invasive Plants Controlled	0	0	21	14	35
	Other	0	0	2	0	2
	Total	*2*	*37*	*80*	*27*	*145*
	Total	**465**	**573**	**1,013**	**569**	**2,620**

UPLAND TREATMENTS

Table 21. Acres treated in upland areas as part of conventional restoration projects.

Owner	Upland Treatments	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Trees Retained	0	0	0	0	0
	Trees Planted	9	0	0	0	9
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	10	0	0	10
	Total	*9*	*10*	*0*	*0*	*19*
Nonindustrial	Trees Retained	0	0	0	0	0
	Trees Planted	0	0	0	0	0
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	1	0	0	1
	Total	*0*	*1*	*0*	*0*	*1*
State	Trees Retained	0	0	0	1	1
	Trees Planted	0	0	0	0	0
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*1*	*1*
Mixed	Trees Retained	0	0	0	0	0
	Trees Planted	0	0	0	0	0
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*0*	*0*
Other	Trees Retained	0	0	0	0	0
	Trees Planted	0	4	0	0	4
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	85	85
	Total	*0*	*4*	*0*	*85*	*89*
	Total	**9**	**15**	**0**	**86**	**109**

Table 22. Acres treated in upland areas as part of incentive-based restoration projects.

Owner	Upland Treatments	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Trees Retained	0	0	0	0	0
	Trees Planted	0	0	0	0	0
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*0*	*0*
Nonindustrial	Trees Retained	0	0	0	0	0
	Trees Planted	0	0	0	21	21
	Fencing Installed	0	0	0	313	313
	Invasive Plants Controlled	0	0	0	1,361	1,361
	Other	7	9	164	794	974
	Total	*7*	*9*	*164*	*2,489*	*2,668*
State	Trees Retained	0	0	0	0	0
	Trees Planted	0	0	0	0	0
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*0*	*0*
Mixed	Trees Retained	0	0	0	0	0
	Trees Planted	0	0	0	0	0
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	14	14
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*14*	*14*
Other	Trees Retained	0	0	0	0	0
	Trees Planted	0	0	0	1	1
	Fencing Installed	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	10	10
	Other	0	0	0	5	5
	Total	*0*	*0*	*0*	*16*	*16*
	Total	**7**	**9**	**164**	**2,519**	**2,698**

WETLAND TREATMENTS

Table 23. Acres treated in wetlands as part of conventional restoration projects.

Owner	Wetland Treatments	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Trees Retained	4	15	0	0	19
	Vegetation Planted	0	0	0	0	0
	Wetland Created/Modified	57	0	0	0	57
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*61*	*15*	*0*	*0*	*76*
Nonindustrial	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	0	0
	Wetland Created/Modified	20	0	0	0	20
	Invasive Plants Controlled	0	0	0	0	0
	Other	2	0	0	0	2
	Total	*22*	*0*	*0*	*0*	*22*
State	Trees Retained	0	1	0	0	1
	Vegetation Planted	0	1	0	0	1
	Wetland Created/Modified	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*2*	*0*	*0*	*2*
Mixed	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	0	0
	Wetland Created/Modified	9	0	0	0	9
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*9*	*0*	*0*	*0*	*9*
Other	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	3	3
	Wetland Created/Modified	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*3*	*3*
	Total	**93**	**17**	**0**	**3**	**112**

Table 24. Acres treated in wetlands as part of incentive-based restoration projects.

Owner	Wetland Treatments	Time Period 1995-99	2000-04	2005-09	2010-14	Total
Industrial	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	4	4
	Wetland Created/Modified	0	0	0	4	4
	Invasive Plants Controlled	0	0	0	4	4
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*12*	*12*
Nonindustrial	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	0	0
	Wetland Created/Modified	0	13	31	0	44
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*13*	*31*	*0*	*44*
State	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	0	0
	Wetland Created/Modified	0	0	3	0	3
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*0*	*3*	*0*	*3*
Mixed	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	0	0
	Wetland Created/Modified	0	0	0	0	0
	Invasive Plants Controlled	0	0	0	0	0
	Other	0	0	0	0	0
	Total	*0*	*0*	*0*	*0*	*0*
Other	Trees Retained	0	0	0	0	0
	Vegetation Planted	0	0	0	44	44
	Wetland Created/Modified	0	30	0	300	330
	Invasive Plants Controlled	0	0	0	22	22
	Other	0	0	0	0	0
	Total	*0*	*30*	*0*	*366*	*397*
	Total	**0**	**43**	**34**	**379**	**456**

APPENDIX III: Survey of Forest Landowners

[Excerpted from "Survey of Forest Landowners Engagement in Voluntary Practices in the Oregon Coast Range"]

Introduction & Methods 1

From May 19- June 15, 2016, DHM Research conducted an online survey of private forest landowners owning 10 or more acres in Oregon's Coast Range on behalf of the Oregon Department of Forestry (ODF), the Oregon Watershed Enhancement Board (OWES) and the Oregon Forest Resources Institute (OFRI). The purpose of the survey was to determine landowners' current engagement with completing and reporting voluntary projects to improve watershed conditions in response to the Oregon Plan for Salmon and Watersheds, and to identify barriers to engagement.

Research Methods: The survey was focused on forest landowners in the Oregon Coast Range with names drawn from county records maintained by the Partnership for Forestry Education (PFE) and persons who had previously reported voluntary projects to the Oregon Watershed Restoration Inventory (OWRI). The invitation to participate in the online survey was mailed by postcard to all 2,385 private forest landowners on the PFE list and sent by email to 100 landowners on the OWRI list. A reminder postcard and email were also sent. In all, 236 private forest landowners completed the survey- nearly a 10 percent response rate. To ensure confidentiality, each participant was assigned a unique password.

A majority of the survey participants were males (77%), older than 55 years (75%), and have more than 10 years of experience managing forest resources (77%). One half (48%) of the participants managed 70 acres or less of forestland, and the other half (52%) managed more than 70 ac res.

In gathering responses, a variety of quality control measures were employed, including questionnaire pre-testing and live-monitoring of results. In the annotated questionnaire, results may add to 99% or 101%.

Statement of Limitations: Any sampling of opinions or attitudes is subject to a margin of error. The margin of error is a standard statistical calculation that represents differences between the sample and total population at a confidence interval, or probability, calculated to be 95%. This means that there is a 95% probability that the sample taken for this study would fall within the stated margin of error if compared with the results achieved from surveying the entire population. In this case, the population at hand is all of those included on the initial outreach lists provided by ODF, OWES and the Oregon Forest Resources Institute. The margin of error for this survey is ±6.1%.

While the results of this survey will assist in understanding the decline in reporting of voluntary projects and planning initiatives that seek to mitigate this decline, some qualifiers should be noted. Due to the engagement approach of the survey there is an unavoidable amount of self-selection bias at play, leading to a potentially biased sample. While it is impossible to say exactly how the population of those who chose to participate differs from the population of small forest landowners at large, we know enough to caution that all findings from this survey should be taken as instructive, rather than prescriptive.

DHM Research Background: DHM Research has been providing opinion research and consultation throughout the Pacific Northwest and other regions of the United States for over three decades. The firm is nonpartisan and independent and specializes in research projects to support public policy making.

Summary & Observations 2

While participants are only somewhat familiar with the Oregon Plan for Salmon and Watersheds, commonly called the "Oregon Plan," they are knowledgeable and well-aware of the types of improvements considered to be voluntary projects. Many are completing these projects as part of their management practices.

- Slightly over half (53%) were at least somewhat familiar with the Oregon Plan.
- Almost all landowners were able to list enhancements that would be considered voluntary projects, but those who had completed such projects did so with more specificity.
- Three quarters (75%) had completed voluntary projects.
    - Almost all (94%) of those managing plots over 370 acres had done so, and 69% of those landowners had completed more than 10 projects.
    - Those who had not completed a project often said that their land was not suitable for any voluntary projects. Others were unaware that voluntary projects were an option.

Landowners largely consider voluntary projects the "right thing to do" when it comes to managing their land. The primary factor in deciding to complete projects was ecological benefit, while other specifics played a supporting role.

- Open-ended responses often noted the common sense nature of making improvements to one's land with a variety of motivations: ecological, economic, personal. Others focused on the nitty gritty requirements including cost, time, and difficultly.
- Some 62% listed ecological benefits as an important deciding factor, followed closely by financial costs (56%) and probability of successful completion (52%).

Relatively few landowners had reported voluntary projects to the Oregon Watershed Restoration Inventory, with many explicitly noting that they had completed and not reported projects. While lack of awareness of the option to report was the most frequently mentioned reason, there were a variety of other explanations given for this behavior.

- Just 20% of all survey participants had reported a voluntary project. A majority (58%) said they completed a project they did not report.
    - Some 79% of those who had completed and reported a project, and 72% of those who had completed but not reported a project said they completed a voluntary project that went unreported at least once. This suggests that reporting is an inconsistent practice.
- The most common reason given for not reporting was lack of awareness (56%), with an additional 29% saying that they were unsure of how to report. On the other side, some questioned the value of doing so, or the efficacy or trustworthiness of the agencies in charge of the process.

Survey participants were asked about initiatives to increase their willingness to complete and report voluntary projects. Initiatives that reduced costs or provided financial benefits tested well. That said, when landowners were asked about incentives in an open-ended fashion, they focused on other motivation strategies such as education, training, a simplification of the process, and effectively communicating the value of completing and reporting projects.

- The two most popular initiatives to increase willingness to complete voluntary projects were cost sharing (55%) and tax incentives (50%).
- Equal proportions said incentives would be effective in increasing reporting (42%) or were uncertain (43%). As such, they should be viewed as a secondary tactic to encourage reporting.

Very few landowners had used the Oregon Watershed Restoration Inventory's online reporting tool. Suggestions for improvement focused on clarity and simplification. Complexity in the reporting process was seen as a barrier for doing so.

Conclusions and Recommendations

While many have completed voluntary projects (75%), relatively few have ever reported them to OWRI (20%).Even among those who have ever reported at least one project, a strong majority (79%) had completed projects that they did not report. Although landowners see the inherent value to completing these types of enhancements to their land, they do not always connect them to the Oregon Plan, instead viewing them as "the right thing to do." Connecting this sentiment – tied to the ecological, economic, and social value of preserving and improving one's land – to the mission and specifics of the Oregon Plan serves as a valuable avenue. Many, especially newer and smaller landowners, are unaware of the plan details, and may be encouraged to complete more projects through education, training, and outreach efforts

Getting buy-in for reporting projects is a larger hill to climb. Two distinct camps emerged. On one hand, less experienced and smaller landowners are by and large unaware of the Oregon Plan, let alone the reporting process. Educating and supporting these landowners could prove invaluable in encouraging a new wave of project completion and reporting. One strategy may be to target those with new land holdings who might be easily encouraged to make improvements. These landowners were more likely to respond well to the idea of online resources.

Landowners with more experience and larger ownerships were more aware of the Oregon Plan, and more likely to have completed and reported projects. That said, many noted reasons for a decline in both of these practices. For some, what had once been voluntary projects had become best practices. Through this process of normalization, they had ceased reporting, often citing the difficulties of reporting. These landowners preferred initiatives that lowered the barriers to project completion and reporting, such as tax breaks, cost sharing, and regulatory assurances. With this group, lowering perceived barriers will help to increase buy-in to the Oregon Plan. Much of this work should focus on building and strengthening relationships with landowners across the state. They value honest, forthright, and conciliatory communication, and ODF is well regarded despite general gripes toward government. Some were skeptical about sharing their information with government, and doubted the efficacy of governmental organizations.

Across both of these groups, many made note of the fact that they were unsure of the value of reporting projects (to themselves and in general). Educational efforts about the successes of past projects and of the value of reporting could prove helpful in convincing landowners to report. Participants mentioned the Oregon Small Woodland Association, watershed council publications, Stewardship Foresters, and soil and water conservation districts as possible outreach partners.

Some said they believe the drop in project completion and reporting was a result of all the low-hanging fruits having been picked already. In their mind, the easiest or most impactful projects had already been completed. Communicating about the importance of smaller projects, and continuing to improve upon one's land may prove effective with these landowners.