

Siskiyou Streamside Protections Review: Decision-making support

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1. Introduction: Context of decision-making on sufficiency of rules

The monitoring review of streamside rules (a.k.a. “water protection rules”) for small and medium type F (fish-bearing) streams in the Siskiyou geographic region (or “region”, OAR 629-635-0220)) focuses on goals for protecting stream temperature and desired future condition (DFC) of streamside stands. This review is specific to the general vegetation prescriptions for type F streams. OAR 629-642-0100. For the DFC component, the Board chose to focus rule review on meeting goals for shade and stand structure.

Streamside rules and determinations of sufficiency

For the Board’s decision-making process, it is helpful to understand the following legal construct:

- The streamside protection rules are designed to provide for the maintenance of water resources, fish, and wildlife (Oregon Revised Statutes [ORS] 527.710(2));
- These rules are also designed to insure forest practices achieve water quality standards to the maximum extent practicable (ORS 527.765(1));
- Monitoring of these rules is required, and the Board will consider the outcomes and recommendations of this monitoring, and take appropriate action (Oregon Administrative Rules (OAR) 629-635-0110);
- The Board can only change rules after they have made a finding of degradation. The Board must find that “If forest practices continue to be conducted under existing regulations, there is monitoring or research evidence that documents that degradation of resources maintained...is likely....” ORS 527.714(5)(a). In this case, the resource in question would be water (e.g. stream temperature water quality standards). Two main forms of evidence were sought in the Systematic Review (SR): (1) studies directly linking streamside forest management to temperature outcomes and (2) studies capturing the characteristics of DFC or linking streamside management to the likelihood of achieving conditions similar to the DFC on average across the landscape. The overall goal of the water protection rules, including DFC, is to insure that water quality standards are met. OAR 629-635-0100(7). “Ample” shade is an assumed outcome of achieving DFC. OAR 629-642-0000(2). Should the Board decide that current rules result in degradation to water resources, a rule analysis process would be initiated requiring additional findings.
- Contextual information on fish status and trend (Attachment 3), water quality evaluations (Attachment 4), and input from stakeholders and tribes (Attachment 2) are also provided to support the Board’s decision making process.

For more information about this, see Appendix 1.

2. Desired Future Condition: policy development and testing

To help the Board make a decision on sufficiency of the Desired Future Condition (DFC) rule of the Forest Practices Act (FPA), it is helpful to analyze the rule language and understand how it was developed.

OAR 629-642-0000 states:

- (2) *The desired future condition for streamside areas along fish use streams is to grow and retain vegetation so that, over time, average conditions across the landscape become similar to those of mature streamside stands. Oregon has a tremendous diversity of forest tree*

species growing along waters of the state and the age of mature streamside stands varies by species. Mature streamside stands are often dominated by conifer trees. For many conifer stands, mature stands occur between 80 and 200 years of stand age. Hardwood stands and some conifer stands may become mature at an earlier age. Mature stands provide ample shade over the channel, an abundance of large woody debris in the channel, channel-influencing root masses along the edge of the high water level, snags, and regular inputs of nutrients through litter fall.

Examining the excerpt "...over time, average conditions across the landscape..."

1. Figure 1 demonstrates how the basal area of a large, type F stream is anticipated to vary over time with harvest under the FPA. The rule implies that the basal area of a stand does not have to be similar to mature stands at all times, but, how much of the time, and when? Other stand characteristics are presumed to have the same pattern over time. This rule was developed by first determining the basal area of an "average" mature streamside stand (defined as a 120 year old, unmanaged conifer stand, namely Douglas-fir) given the average site index in a geographic region and adjusting the basal area for presumed effects of being in proximity to streams (Lorenson et al., 1994). This basal area forms the target for DFC. Since the intent was to have riparian stands average this target, it was used as the mid-way point of a harvest rotation (the authors assumed 50-year even-aged and 25-year uneven-aged rotations for the calculation) for medium-sized streams, and back-calculated to harvest time to determine the standard target for basal area (see below, Figure 10 from Lorenson et al., 1994). Small-sized streams share the same DFC conceptually, but do not have basal area targets explicitly described as being based on the same calculation. Regardless, we see immediately post-harvest, the assumption is that the stand will be on the *trajectory* to achieve DFC mid-way through the rotation for medium streams, not achieve DFC immediately post-harvest. The anticipated behavior of basal area over time for small streams is not described. To further complicate matters, the riparian rules acknowledge that some stands may be hardwood dominated and may become mature at an earlier age. The FPA does not describe what constitutes the DFC for a hardwood riparian stand other than to say it is a mature condition and that it may occur at a younger age than a conifer stand.

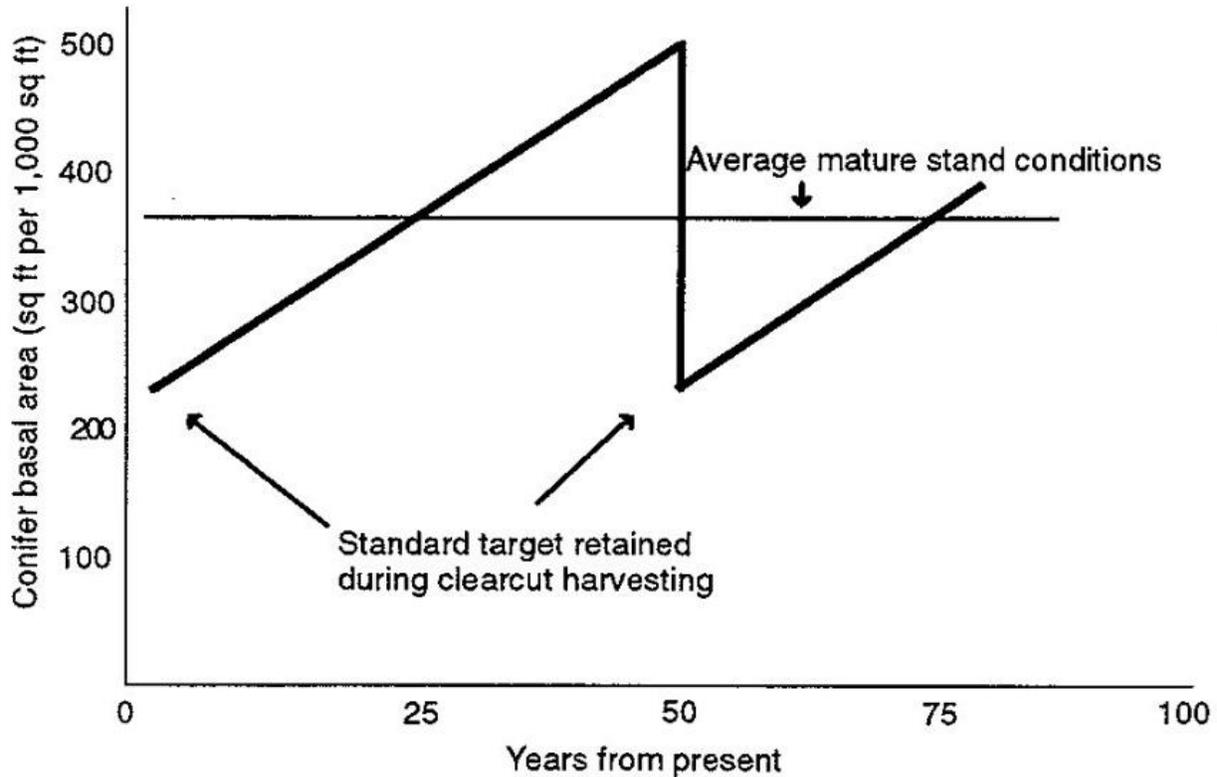


Figure 1. Foundational calculation for determining standard targets for large fish-bearing streams in the Coast Range geographic region: conifer basal area at the beginning, midpoint, and end of each 50-year rotation for clearcut harvesting. The same pattern is assumed for thinning but over a 25-year rotation. (Figure 10 from Lorensen et al., 1994)

2. Also inherent in this rule is the assumption of an approximately even distribution of streamside stand ages across the landscape, thus DFC is reached on average across the landscape.

Challenges with testing sufficiency of FPA rules to achieve DFC

There are four principal challenges to testing the sufficiency of rules to meet the DFC goals.

A. The “yardstick” of “...similar to those of mature streamside stands” is a narrative standard that lacks numbers against which to compare. The first challenge is quantifying this yardstick, against which achievement of DFC can be assessed.

B. DFC has a time component – the rule does not require achieving DFC immediately post-harvest, but needs to be on a trajectory to achieve DFC approximately 25 years after harvest (for clearcut harvest) or 12.5 years after partial harvest or thinning. However, the rule has been in place for 25 years, and most studies do not assess conditions 25 years post-harvest (especially ones that followed the FPA), thus finding data relevant to this analysis is challenging.

C. “Similar” to mature streamside stands is not defined, and thus is left for interpretation. There are numerous statistical tests for similarity of distributions that depend on the particular question

and dataset. Even with these tests, there are questions of what level of certainty to have – 95% confidence interval? One standard deviation?

D. The rule does not specify which mature streamside stands to use for comparison. The rule creates a basic dichotomy between a conifer- and hardwood dominated DFC, but does not specify whether this should also differ by stand type (i.e. a different “yardstick” for a mature Douglas-fir versus a true fir stand).

3. Water quality standards for stream temperature: policy and testing

In contrast to DFC, testing effectiveness of the FPA in meeting water quality standards to the maximum extent practicable is relatively straightforward. In part, this is due to the fact that the “yardstick” is clearly established (as described below). Additionally, the timeframe for any given site achieving the water quality standards is always, not just some portion of the time.

The Environmental Quality Commission (EQC) sets water quality rules, of which two criteria for stream temperature are addressed in this analysis:

- The Biologically-based numeric criterion (“NC”; OAR [340-041-0028\(4\)](#))
- The Protecting Cold Water criterion (“PCW”; OAR [340-041-0028\(11\)](#))

The Oregon Department of Environmental Quality (DEQ) implements these standards. DEQ directives specify the calculations used to determine whether or not the standards are attained. The FPA lays out the relationship between the FPA and these standards:

- FPA rules need to meet water quality standards to the maximum extent practicable (ORS 527.765).
- FPA rules require monitoring the effectiveness of rules achieving these water quality standards (OAR 629-635-0110).

In contrast with DFC, water quality standards are supposed to be achieved all the time, including immediately post-harvest. We therefore have a defined “yardstick” (water quality standards) for testing the FPA with respect to water quality standards, and a defined method for assessing whether or not we meet that yardstick.

4. Contextual Information

To aid the Board’s decision-making regarding sufficiency of FPA rules, the department worked with partners to develop information in which to place their decision in context. This information includes:

- GIS data on ownership, stream miles of small and medium fish streams, harvest types and voluntary measures
- Fish status and trends from the Oregon Department of Fish and Wildlife
- Water quality evaluations from the Oregon Department of Environmental Quality

GIS information

Department staff developed contextual information on ownership, harvest types, and types of streams in the Siskiyou region. These maps and additional information can be found in [Appendix 2](#). The maps provide the following contextual information:

- The Siskiyou region’s forested lands have multiple ownerships (Figure 2, Appendix 2). A look at ownership distribution is important for considering the amount of private

ownership, how the various ownerships neighbor one another, and how they might influence streams in this region. A distinct dynamic for the region are the O&C land¹ “checkboard” of private and BLM (Bureau of Land Management) ownerships.

- Distribution of anadromous fish in the Siskiyou region helps the reader understand the location and magnitude of streams that relate to fish species of concern in the region (Figure 3, Appendix 2).
- Streams that do not meet state water quality standards may be identified by the DEQ as a “303d-listed” stream, in reference to federal regulations concerning the Total Maximum Daily Load (TMDL) process. A TMDL establishes how much of a pollutant is allowed in a waterbody and serves as the starting point or planning tool for restoring water quality. A map of 303d-listed streams in the region demonstrates their overlap with small and medium fish streams (Figure 4, Appendix 2).
- A comparison of clearcut harvests (Figure 5, Appendix 2) and thinning (Figure 6, Appendix 2) in the region by private industrial and private non-industrial (Table 3, Appendix 2) demonstrates the greater number of acres thinned than clearcut.
- A consideration of the number of mills running and their location provides a look at how the region may be affected by reduced harvest or possibly influences why certain types and amounts of harvest occur in the region. (Figure 7, Appendix 2)
- Voluntary Measures (Figure 8, Appendix 2). Private forest landowners implement voluntary measures to assist the recovery of threatened and endangered fish species as part of the Oregon Plan for Salmon and Watersheds. The actions extend beyond the requirements of the Oregon Forest Practices Act and Rules (FPA).

Fish Status and Trend

The Oregon Department of Fish and Wildlife (ODFW) presented a synopsis of relevant fish status and trend information for the Board (Attachment 3), the highlights of which are:

- Relative to more northerly coastal basins in Oregon, the Siskiyou Region:
 - Tends to be warmer and drier (on an annual basis), and streams are generally characterized by steeper gradients;
 - Stream temperatures, instream water availability, and the ability of fish to move among habitats at multiple life stages (i.e., fish passage) take on increased importance ;
- The Rogue River has a history of substantial fish kills associated with disease outbreaks when low flows and high temperatures coincide with high fish densities;
- Spring Chinook salmon in the upper Rogue are achieving 2 of 3 of the measured desired status criteria described in the associated recovery plan. Fall Chinook are achieving 3 of 4 of the measured desired status criteria described in the associated conservation plan.
- ODFW is currently assessing status and trend of coho salmon, steelhead, and cutthroat trout in this region as a part of a Rogue/South Coast Multi-Species Management Plan (RSP, in progress).

¹ The Oregon and California Railroad Revested Lands (commonly known as O&C Lands).

Water Quality Evaluations²

The Oregon Department of Environmental Quality (DEQ) presented a synopsis of relevant water quality information for the Board (Attachment 4). One of the main reasons, identified in many TMDLs, for not meeting water quality standards for temperature is lack of shade, often from removing trees in the riparian areas. The following watersheds have temperature TMDLs:

- Applegate (issued in 2003, covers all streams)
- Bear Creek (issued in 1992 and again in 2007, covering all perennial and intermittent streams)
- Lobster Creek (issued in 2002, covering all perennial streams)
- Sucker Creek (issued in 2002, covering all streams)
- Rogue River Basin (issued in 2008, covering all perennial and intermittent streams)
- For all TMDLs in the Siskiyou region, the FPA is the means by which water quality goals are achieved. For example, the water quality management plan for temperature in the Rogue River TMDL states: “Private lands’ forestry uses are addressed in the Forest Practices Act. If additional actions are needed to meet the TMDL, ODF may revise statewide FPA rules and/or adopt sub-basin specific rules as necessary.”

5. Evidence and reasoning for determining sufficiency: Systematic Review

To assist the Board’s decision-making process, the department developed the following evidence and reasoning tables regarding sufficiency of FPA rules. Option A, B, C, and D reflect the sufficiency decision options the Board may choose for each decision topic (temperature and DFC). The left column follows a line of reasoning Board members may use to determine a best-fit option. Results from the SR report, in the right column, are coarsely summarized in order to identify which options the results align with. A more detailed summary table of results can be found in the SR report (Tables 9 and 10, Attachment 5). Board members may also consider the contextual information (Attachments 3, 4) and input from stakeholders and tribes (Attachment 2) when determining a best-fit option, as described above in section 1. The SR process was chosen over a traditional literature review in order to provide transparent and rigorous documentation of methods, data extraction, and synthesis. Methods used in the SR are described in the SR report (Attachment 5). The scope of the decisions below are focused on FPA general vegetation retention prescriptions for small and medium fish bearing streams in the Siskiyou³.

² For more information see DEQ TMDL webpage: <https://www.oregon.gov/deq/wq/tmdls/Pages/default.aspx>

³ We did not parse the evidence and sufficiency calls by stream size or harvest type.

Decision 1. Stream Temperature (See Table 9 in Attachment 5 for more information)

Using evidence from the SR summarized in the right column, the Board may use the logic statements outlined in the left column to conclude one of the following options (A through D):

1.A) FPA or rules meet the stated objectives		
<p>IF evidence reported in the SR indicates stream temperatures within or adjacent to forests managed per the Oregon FPA meet Oregon Department of Environmental Quality (DEQ) water quality temperature standards in the Siskiyou region’s:</p> <ul style="list-style-type: none"> • Small Fish streams, • Medium Fish streams • When clearcut or thinned <p>THEN forest practices conducted under existing regulation provide for the overall maintenance of evaluated resources for stream temperature (527.714(5)(a)),</p> <p>THEREFORE FPA or rules meet the stated objectives.</p>	<p>Results from SR⁴:</p> <p>Of sites with <i>narrower</i> no-cut buffers than FPA requirements:</p> <ul style="list-style-type: none"> • One site appeared to meet the water quality standard “biologically-based numeric criterion” (NC) • Two sites appeared to meet the water quality standard “Protecting Cold Water” criterion (PCW) 	<p><u>Quality & Relevance⁵</u></p> <p>Medium</p> <p>Medium</p>
1.B) FPA or rules do not meet the stated objectives		
<p>IF evidence reported in the SR indicates stream temperatures within or adjacent to forests managed per the Oregon FPA do not meet DEQ water quality temperature standards in the Siskiyou region’s:</p> <ul style="list-style-type: none"> • Small Fish streams, • Medium Fish streams • When clearcut or thinned <p>THEN forest practices conducted under existing regulation degrades evaluated resources for stream temperature (527.714(5)(a)),</p> <p>THEREFORE FPA or rules do not meet the stated objectives.</p>	<p>Results from SR⁴:</p> <p>Of sites with <i>wider</i> no-cut buffers than those required by the FPA:</p> <ul style="list-style-type: none"> • One site appeared to exceed the NC 	<p><u>Quality & Relevance⁵</u></p> <p>Medium</p>

⁴ Note: in the final Decision-making Framework, the evidence will be parsed by stream size and harvest type (clearcut vs. thin) when those data are available

⁵ Quality and relevance scores were combined and averaged for each paper; Low: 0-60%, Medium: 61-80%, High: 81-100%

1.C) Not enough information for sufficiency decision: Additional study prioritized

IF evidence reported in the SR *does not indicate* whether stream temperatures within or adjacent to forests managed per the Oregon FPA **meet or do not meet** DEQ water quality temperature standards in the Siskiyou region's:

- Small Fish streams,
- Medium Fish streams
- When clearcut or thinned

THEN there is insufficient evidence to determine if FPA practices conducted under existing regulation degrades or does not degrade evaluated resources for stream temperature,

THEREFORE there is not enough information for sufficiency decision and additional study for the Siskiyou Streamside Protection Review will be prioritized by the Department.

Results from SR⁶ and additional reasoning:

-A total of **3 sites** for sufficiency, and **1 site** for insufficiency is both an equivocal result, and inadequate to make a well-informed and high-confidence decision. Additionally, none of these sites had basal area information reported with which to compare with the FPA.

-Study results are contradictory. More consistent improvement in outcomes relative to water quality standards were expected with increasing riparian protection standards but were not observed.

-The test of the PCW was based on a lower quality test than that required by DEQ, thus alignment with this standard is not assured.

1.D) Not enough information for sufficiency decision: Other pending work prioritized at this time

IF evidence reported in the SR *does not indicate* whether stream temperatures within or adjacent to forests managed per the Oregon FPA **meet or do not meet** DEQ water quality temperature standards in the Siskiyou region's:

- Small Fish streams,
- Medium Fish streams
- When clearcut or thinned

THEN there is insufficient evidence to determine if FPA practices conducted under existing regulation degrades or does not degrade evaluated resources for stream temperature

AND existing monitoring topics are prioritized higher at this time,

THEREFORE there is not enough information for sufficiency decision and other pending work will be prioritized by the Department at this time.

Results from SR⁶ and additional reasoning:

-A total of **3 sites** for sufficiency, and **1 site** for insufficiency is inadequate to make a well-informed and high-confidence decision.

-Study results are contradictory. More consistent improvement in outcomes relative to water quality standards were expected with increasing riparian protection standards but were not observed. -The test of the PCW was based on a lower quality test than that required by DEQ.

⁶ Note: in the final Decision-making Framework, the evidence will be parsed by stream size and harvest type (clearcut vs. thin) when those data are available

Decision 2. DFC (including stand characteristics, i.e., ample shade/cover, basal area, species composition, tree regeneration; see Table 10 in Attachment 5 for more information)

Using evidence from the SR summarized in the right column, the Board may use the logic statements outlined in the left column to conclude one of the following options (A through D):

2.A) FPA or rules meet the stated objectives		
<p>IF evidence reported in the SR</p> <p>identifies the range of conditions from mature streamside stands (desired future condition) in the Siskiyou region</p> <p>AND</p> <p>indicates streamside stands managed per the Oregon FPA achieve or likely will achieve desired future condition for Siskiyou region’s:</p> <ul style="list-style-type: none"> • Small Fish streams, • Medium Fish streams • When clearcut or thinned <p>THEN forest practices conducted under existing regulation provide for the overall maintenance of evaluated resources for desired future condition (527.714(5)(a)),</p> <p>THEREFORE FPA or rules meet the stated objectives.</p>	<p>Results from SR⁸ and additional reasoning:</p> <p>Range of conditions from mature streamside stands identified for:</p> <ul style="list-style-type: none"> • Streamside canopy cover (3 sites) • In-stream shade (2 sites) • Basal area (2 sites) <p>Streamside stands managed with no-cut buffer widths <i>narrower</i> than FPA requirements achieved DFC goal for a given metric at time of study:</p> <ul style="list-style-type: none"> • In-stream shade was within identified range of <i>mature</i> streamside stands (3 sites) • Streamside canopy cover was at lower edge of identified range of <i>mature</i> streamside stands (3 sites) 	<p><u>Quality & Relevance</u>⁷</p> <p>Low</p> <p>Medium</p> <p>Low</p> <p>Medium</p> <p>Medium</p>
2.B) FPA or rules do not meet the stated objectives		
<p>IF evidence reported in the SR</p> <p>identifies the range of conditions from mature streamside stands (desired future condition) in the Siskiyou region</p> <p>AND</p> <p>indicates streamside stands managed per the Oregon FPA do not achieve or likely will not achieve desired future condition for Siskiyou region’s:</p> <ul style="list-style-type: none"> • Small Fish streams, • Medium Fish streams • When clearcut or thinned <p>THEN forest practices conducted under existing regulation degrades evaluated resources for desired future condition (527.714(5)(a)),</p> <p>THEREFORE FPA or rules do not meet the stated objectives.</p>	<p>Results from SR⁸ and additional reasoning:</p> <p>Range of conditions from <i>mature</i> streamside stands identified for:</p> <ul style="list-style-type: none"> • Streamside canopy cover (3 sites) • In-stream shade (2 sites) • Basal area (2 sites) <p>Streamside stand managed per FPA did not achieve DFC goal for a given metric at time of study:</p> <ul style="list-style-type: none"> • Basal area was below identified range of <i>mature</i> streamside stands (1 site) <p>Some streamside stands managed with no-cut buffer widths <i>wider</i> than FPA requirements did not achieve DFC goal for a given metric at time of study:</p> <ul style="list-style-type: none"> • Streamside canopy cover was not within identified range of <i>mature</i> streamside stands (4 sites) <p>Some streamside stands with greater basal area than FPA requirements at time of harvest did not achieve DFC goal for a given metric at time of study:</p> <ul style="list-style-type: none"> • Basal area was not within identified range of <i>mature</i> streamside stands (2 sites) 	<p><u>Quality & Relevance</u>⁷</p> <p>Low</p> <p>Medium</p> <p>Low</p> <p>Low</p> <p>Medium</p> <p>Low</p>

⁷ Quality and relevance scores were combined and averaged for each paper; Low: 0-60%, Medium: 61-80%, High: 81-100%

⁸ Note: in the final Decision-making Framework, the evidence will be parsed by stream size and harvest type (clearcut vs. thin) when those data are available

2.C) Not enough information for sufficiency decision: Additional study prioritized

IF evidence reported in the SR

does not identify the range of conditions from mature streamside stands (desired future condition) in the Siskiyou region

OR

does not indicate whether streamside stands managed per the Oregon FPA achieve or if not now then likely will achieve desired future condition for Siskiyou region’s:

- Small Fish streams,
- Medium Fish streams
- When clearcut or thinned

THEN there is insufficient evidence to determine if FPA practices conducted under existing regulation degrades or does not degrade evaluated resources for desired future condition

AND the Board wishes to prioritize the continuation of the Siskiyou Streamside Protection Review over other monitoring topics,

THEREFORE there is not enough information for sufficiency decision and additional study for the Siskiyou Streamside Protection Review will be prioritized by the Department.

Results from SR⁹ and additional reasoning:

Range of conditions from mature streamside stands NOT identified for:

- In-stream canopy cover (**0 sites**)
- Tree density (**0 sites**)
- DBH (**0 sites**)
- Tree species richness (**1 site**)
- Tree regeneration (**0 sites**)

No evidence for trajectory of streamside stands for any metric (cannot answer “likely will achieve”).

No information on streamside stands managed per FPA for:

- In-stream shade
- Tree species composition (including species richness)
- Tree regeneration
- Tree density

Quality & Relevance¹⁰

Low

2.D) Not enough information for sufficiency decision: Other pending work prioritized at this time

IF evidence reported in the SR

does not identify the range of conditions from mature streamside stands (desired future condition) in the Siskiyou region

OR

does not indicate whether streamside stands managed per the Oregon FPA achieve or if not now then likely will achieve desired future condition for Siskiyou region’s:

- Small Fish streams,
- Medium Fish streams
- When clearcut or thinned

THEN there is insufficient evidence to determine if FPA practices conducted under existing regulation degrades or does not degrade evaluated resources for desired future condition

AND the Board finds that other monitoring topics are more pressing at this time,

THEREFORE there is not enough information for sufficiency decision and other pending work will be prioritized by the Department at this time.

Results from SR⁹ and additional reasoning:

Range of conditions from mature streamside stands NOT identified for:

- In-stream canopy cover (**0 sites**)
- Tree density (**0 sites**)
- DBH (**0 sites**)
- Tree species richness (**1 site**)
- Tree regeneration (**0 sites**)

No evidence for trajectory of streamside stands for any metric (cannot answer “likely will achieve”).

No information on streamside stands managed per FPA for:

- In-stream shade
- Tree species composition
- Tree regeneration

Quality & Relevance¹⁰

Low

⁹ Note: in the final Decision-making Framework, the evidence will be parsed by stream size and harvest type (clearcut vs. thin) when those data are available

¹⁰ Quality and relevance scores were combined and averaged for each paper; Low: 0-60%, Medium: 61-80%, High: 81-100%

6. Scenarios

Board members requested information regarding how decisions on rule sufficiency or insufficiency could affect e.g., rule analyses or economics. Whereas there is insufficient time and resources to address this request in a rigorous manner (e.g., via detailed analysis or modeling), staff drafted some potential outcomes based on their best professional opinions in order to help the Board converse about their decisions in a larger context (Table 1).

Table 1. This table outlines possible outcomes from each sufficiency call option for various futuring aspects. It is designed to illustrate for the Board how the various options might play out, and is based on ODF staff’s best professional opinion (not any form of rigorous data analysis or synthesis). As both decisions relate to the overall maintenance of water quality (stream temperature), outcomes for each decision should be similar.

Futuring Aspect – Sufficiency Decision	Decision Options (Stream Temperature or DFC)			
	A. Sufficiency	B. Degradation	C. More info, additional study	D. More info, other monitoring priorities
Stream Temperature	No change	No change or improvement	TBD	TBD
Initiate Riparian Rule Analysis Process	No	Yes (1-5 year process)	TBD	TBD
CZARA lawsuit – resolution?	No change	No change, or EPA is satisfied	TBD	TBD
TMDLs	No change	No change, or DEQ is satisfied	TBD	TBD
Economics (Forestry)	No change	No change, or decrease in economics, scale unknown	TBD	TBD
Economics (Non-forest products, e.g., recreation)	No change	Change in economics with uncertain quantity and trend	TBD	TBD
Fish (status/trends)	Uncertain	Uncertain	TBD	TBD

7. Tradeoffs: Monitoring Staff Capacity

The Board will make one of four decisions (see above, Section 5, options A-D) regarding the sufficiency for each of rules to meet water temperature standards and those for the desired future condition.

After the Board selects one of these options for each topic of stream temperature and desired future condition, they may subsequently direct the department to do additional work. The Private Forests Division will set the direction for the Monitoring Unit's work, prioritizing projects as time and resources allow. If additional work products are chosen, the staff capacity guide discussed in the 2016 Monitoring Strategy will be used to evaluate what workload can be accommodated. It is summarized here.

The Strategy states:

Considering this ongoing workload and past monitoring projects and staffing levels, it is estimated that the monitoring team could accommodate the following additional workload without more resources:

- One (1) large project (e.g., Multi-year, multi-question effectiveness study with a complex field protocol, multiple field crews, a large sample size and complex analysis and report writing)
- Up to two (2) medium projects (e.g., 1-2 year, effectiveness or implementation study with targeted questions, one or more field crews, a moderate sample size, and a simple to moderate level of analysis and report writing)
- Up to three (3) small projects (e.g., 1 year implementation or effectiveness study with a targeted question, using existing ODF personnel or one field crew, small to moderate sample size, and a simple level of analysis and report writing)

Work capacity may temporarily be expanded through collaborative efforts, grants, out-sourcing, special funding, or other means.

Monitoring Unit work 2018-June 2019

To illustrate the Unit's capacity to complete work, and associated tradeoffs from prioritizing a particular project (Siskiyou Streamside Protections Review), it helps to examine our work over the past 18 months. The Unit has been working on four projects during this period. Each of these projects includes much work (e.g., meetings, field visits, presentations) with stakeholders and tribes that adds significant time and value to the projects, yet is not necessarily explicit in the outline below. These projects include:

1. **Siskiyou Streamside Protections Review** (effectiveness monitoring)
This project focuses on the effectiveness of riparian rules to meet water quality standards for temperature, and desired future conditions on small and medium Fish streams in the Siskiyou. It includes several components:
 - a. Systematic review
 - b. Contextual information
2. **Western Oregon Streamside Protections Review** (effectiveness monitoring)
This project focuses on the effectiveness of riparian rules to meet desired future conditions and large wood recruitment on small and medium Fish streams in the remainder of western Oregon. It includes several components:

- a. Systematic Review
 - b. Analysis of field data from RipStream (an extensive field-based study that ODF initiated in 2002, and we have 8 published peer-reviewed articles, with another 4 in development)
 - c. Potentially: modeling of RipStream riparian stand data, and associated large wood recruitment, into the future
3. **Reforestation Study** (implementation monitoring)
This project is in the design and testing phase.
 4. **Tethered Logging Review**
This project is in the internal review phase.

Additionally, Unit staff participate in other work such as fire assignments, representing the department on interagency workgroups, etc.

8. Departmental recommendation

The department recommends the Board select Board direction 1.C and 2.C:

1. Determine that for FPA rules on small and medium fish streams for clearcut and thinning harvest types¹¹ in the Siskiyou region using the general vegetation prescriptions, there is inadequate evidence to decide on sufficiency of these rules, in meeting water quality temperature standards and DFC.
2. Direct the department to assess the Monitoring Unit's workload in responding to the Coho petition¹², and then assess the timeframe of the Unit to formulate coarse-level approaches to conducting studies to test sufficiency of these rules¹³.

9. References

Lorensen, T., Andrus, C., Runyon, J., 1994. The Oregon Forest Practices Act Water Protection Rules. Forest Practices Policy Unit, Oregon Department of Forestry, Salem, OR

Oregon Department of Environmental Quality (ODEQ), 2004. Applegate Subbasin Total Maximum Daily Load.

ODEQ, 2007. Bear Creek Watershed Total Maximum Daily Load, Appendix A.

ODEQ, 2002. Lobster Creek Watershed Total Maximum Daily Load.

ODEQ, 2002. Lower Sucker Creek Total Maximum Daily Load and Water Quality Management Plan.

ODEQ, 2008. Rogue River Basin Total Maximum Daily Load, Appendix A.

ODEQ, 1999. Upper Sucker Creek Total Maximum Daily Load and Water Quality Management Plan.

¹¹ Clearcut (Harvest Type 2, 3) and thin (Harvest Type 1) as per OAR 629-600-0100(31), (32), (33).

¹² "Petition for Rulemaking to Identify and Develop Protection Requirements for Coho Salmon Resources Sites" (Agenda Item A, Attachment 1 from April 23, 2019 Board of Forestry meeting).

¹³ Note that the Coho petition includes much of the Siskiyou region, and thus addressing the Coho petition might address sufficiency of streamside protection rules in the region.

Appendix 1. Streamside statutes and rules

Statutory mandates for streamside rules

The basis for the streamside protection rules is found in Oregon Revised Statutes (ORS) 527.710(2):

The rules shall ensure the continuous growing and harvesting of forest tree species. Consistent with ORS 527.630, the rules shall provide for the overall maintenance of the following resources:

- (a) Air quality;*
- (b) Water resources, including but not limited to sources of domestic drinking water;*
- (c) Soil productivity; and*
- (d) Fish and wildlife.*

Stream temperature water quality standards have an additional basis found in ORS 527.765(1):

The State Board of Forestry shall establish best management practices and other rules applying to forest practices as necessary to insure that to the maximum extent practicable nonpoint source discharges of pollutants resulting from forest operations on forestlands do not impair the achievement and maintenance of water quality standards established by the Environmental Quality Commission for the waters of the state. Such best management practices shall consist of forest practices rules adopted to prevent or reduce pollution of waters of the state...

Requirements for monitoring streamside rules

This review was conducted to fulfill Oregon Administrative Rules (OAR) 629-635-0110:

- (1) Monitoring and evaluation of the water protection rules are necessary because of the innovative approach taken in the rules. Monitoring and evaluation are needed to increase the level of confidence of all concerned that the rules will maintain and improve the condition of the riparian vegetation and waters of the state over time.*
- (2) In cooperation with state and federal agencies, landowners and other interested parties, the State Forester shall conduct monitoring on a continuing basis to evaluate the effectiveness of the water protection rules. The monitoring shall determine the effectiveness of the rules to meet the goals of the Forest Practices Act and the purposes stated in the rules, as well as their workability and operability.*

And

- (4) The State Forester shall report to the Board of Forestry annually about current monitoring efforts and, in a timely manner, present findings and recommendations for changes to practices. The Board of Forestry shall consider the findings and recommendations and take appropriate action.*

To address this latter rule, the Board directed the department to conduct a literature review of relevant science, the results of which are summarized below in Section 5 and discussed in detail in Attachment 5.

Basis for determining sufficiency and degradation of streamside rules

To make a finding of degradation of resources (i.e., the rules are not effective “...to meet the goals of the Forest Practices Act and the purposes stated in the rules, as well as their workability and operability” [(OAR 629-635-0110(2))], the Board needs to address ORS 527.714(5)(a)

If forest practices continue to be conducted under existing regulations, there is monitoring or research evidence that documents that degradation of resources maintained under ORS 527.710 (2) or (3) is likely....”

In contrast, to make an affirmative finding of the sufficiency of these streamside rules for DFC, the Board would need to find that, based on evidence, the rules provide for the overall maintenance of resources, per ORS 527.714(5)(a) and 527.710(2).

For stream temperature rules, the Board would have to make the aforementioned finding, plus finding that evidence shows that the FPA does “... insure that to the maximum extent practicable nonpoint source discharges of pollutants resulting from forest operations on forestlands do not impair the achievement and maintenance of water quality standards established by the Environmental Quality Commission for the waters of the state.” [ORS 527.765(1)]

Appendix 2. GIS contextual information

GIS data

The department used several different GIS data sources to develop useful information for the Board. Figure 2 shows the ownership of forests in the Siskiyou region. This map is important for considering the amount of private ownership, how the various ownerships neighbor one another, and how they might influence streams in this region. Figure 3 shows small and medium type F (fish)¹⁴ streams in the region and anadromous fish distribution. This map helps to understand the amount and distribution of streams that relate to this review and how they relate to anadromous fish habitat. Figure 4 shows small and medium fish streams and 303d-listed streams based on TMDLs¹⁵ in the region. This map is useful for understanding the magnitude of 303d-listed streams and how they relate to stream size. Figure 5 combines information on stream size, 303d-listing, and where DEQ temperature monitoring sites exist that inform 303d-listing. This map demonstrates the overlap of small and medium fish streams that have stream temperature TMDLs. Figure 6 displays clearcut harvests in the region by private industrial and private non-industrial ownership. In contrast, Figure 7 shows the magnitude and location of thinning and selective harvests in the region. Figures 6 and 7 demonstrate the difference in harvest types of this region. Lastly, Figure 8 is a map of remaining mills in operation in and near the Siskiyou region. A consideration of the number of mills running and their location provides a look at how the region may be affected by reduced harvest or possibly influences why certain types and amounts of harvest occur in the region.

¹⁴ The map of small and medium fish streams was derived from the official ODF stream typing data. Stream segments officially typed as having “Unknown” fish use were provisionally assigned “Fish” or “Non-fish” status based on modeled data.

¹⁵ ODEQ, 2004. Applegate Subbasin Total Maximum Daily Load; ODEQ, 2007. Bear Creek Watershed Total Maximum Daily Load, Appendix A; ODEQ, 2002. Lobster Creek Watershed Total Maximum Daily Load; ODEQ, 2002. Lower Sucker Creek Total Maximum Daily Load and Water Quality Management Plan; ODEQ, 2008. Rogue River Basin Total Maximum Daily Load, Appendix A; ODEQ, 1999. Upper Sucker Creek Total Maximum Daily Load and Water Quality Management Plan.



Siskiyou Region Forest Ownership

Legend

- Cities
- Siskiyou Georegion
- Counties
- Highways**
 - Interstate
 - US Highway
 - State Highway
- Forest Ownership**
 - Oregon Department of Forestry
 - Other State of Oregon
 - US National Park Service
 - US Bureau of Land Management
 - US Forest Service
 - Other Federal
 - Tribal
 - Private Industrial
 - Private Non-Industrial

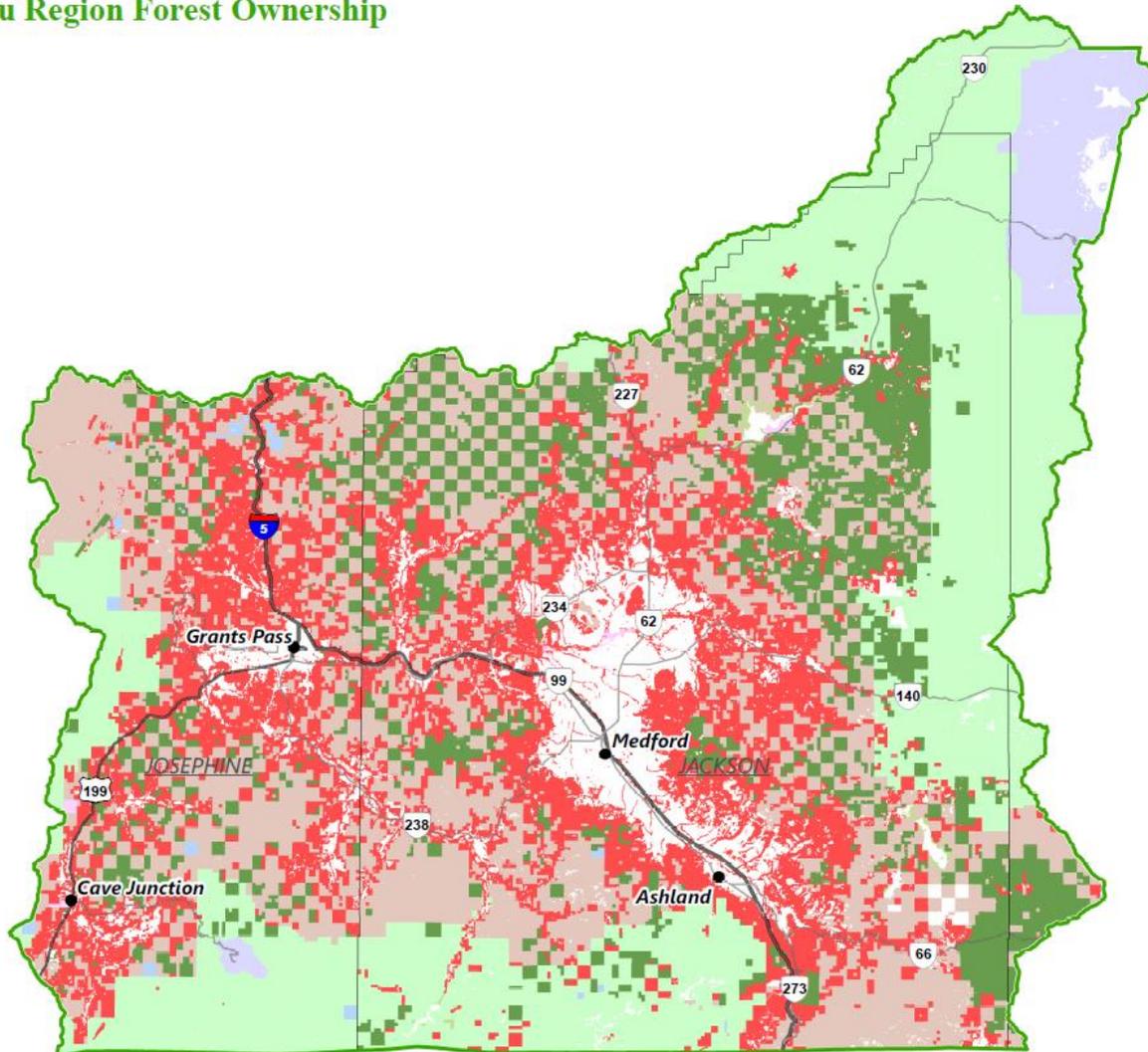


Figure 2. Siskiyou FPA geographic region by forests ownership.



Siskiyou Region Anadromous Fish Distribution and FPA Stream Type

Legend

- Small Fish Stream
- Medium Fish Stream
- Large Fish Stream
- Anadromous Fish Distribution
- Cities
- Siskiyou Georegion
- Counties

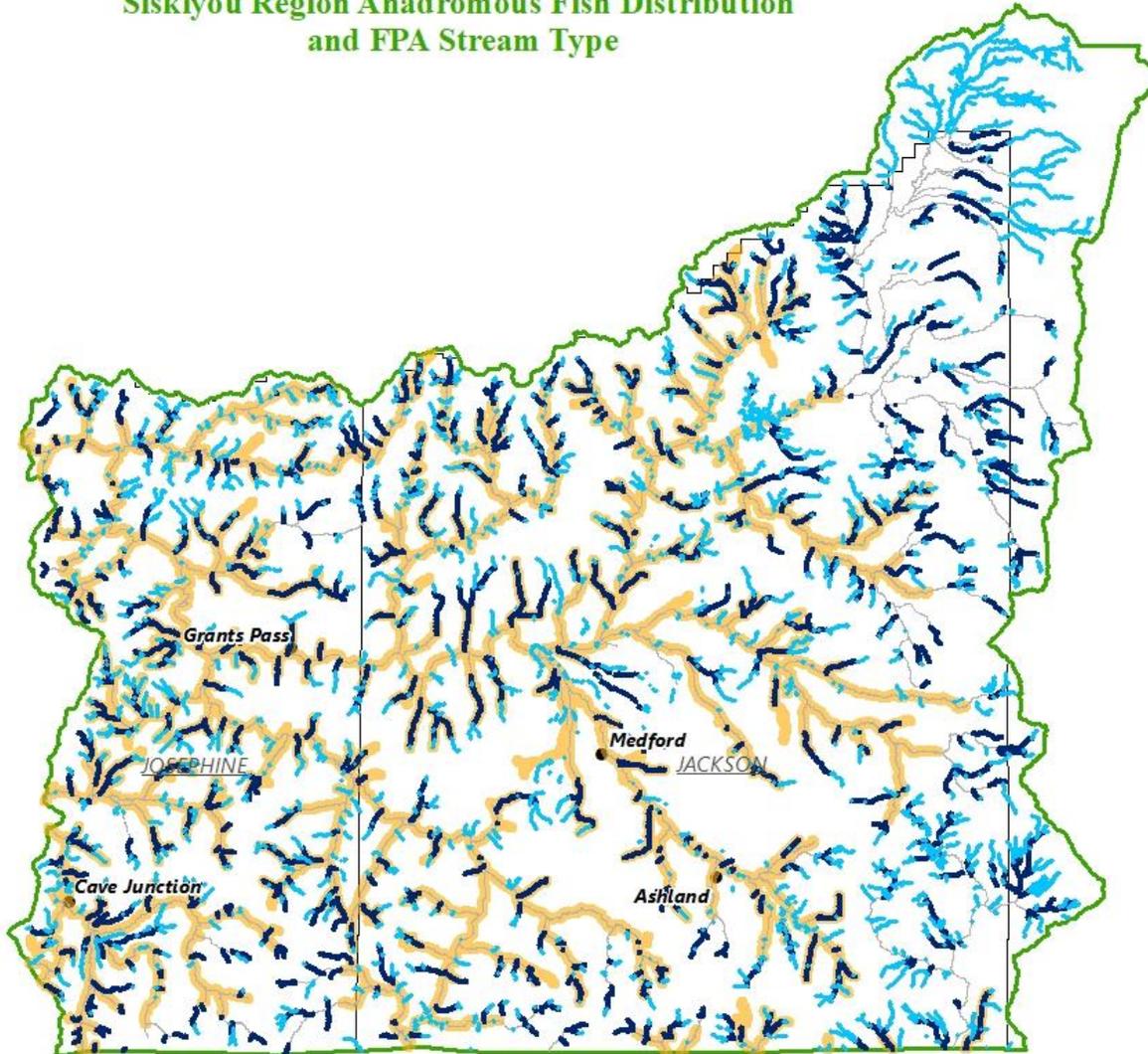


Figure 3. Small and medium Type F (fish) streams and anadromous fish distribution in the Siskiyou region. Note: No Bull Trout in the Siskiyou as of 2016 data.



Siskiyou Region 303(d) Listed Streams and FPA Stream Type

Legend

- Small Fish Stream
- Medium Fish Stream
- Large Fish Stream
- 303d Temperature Listed Stream (2012)
- Cities
- Siskiyou Georegion
- Counties

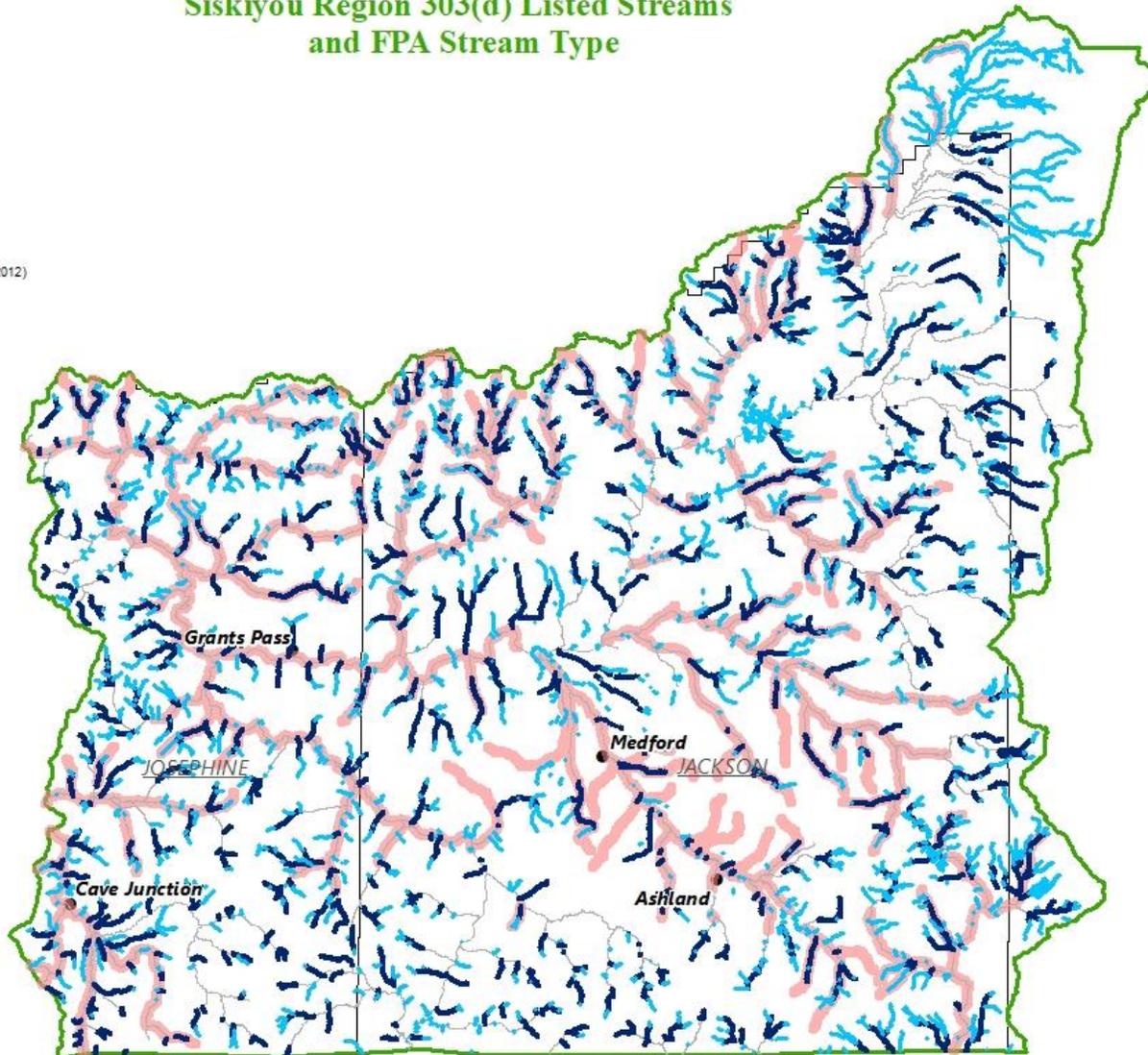


Figure 4. Small and medium Type F (fish) streams and 303d-listed streams in the Siskiyou region as of 2012.

Table 2. Length of Type F streams in the Siskiyou region by size, anadromous distribution, and 303d-listing as of 2012. Estimated by GIS overlay of ODF streams data, DEQ 303(d) data, and ODFW anadromous fish distribution data (coho and steelhead). For owner, PI= private industrial; PNI = private nonindustrial. “303(d)” are streams that are on the 303(d) list of streams for exceeding stream temperature standards.

Sum of Miles of FPA Type F (fish) Streams (acres) by Owner Type and FPA Stream Size with Percentage of Anadromous and 303(D) Temperature-Listed Stream Mileage by Ownership									
Owner	Large			Medium			Small		
	Total	Anadromous (% of total)	303(d) (% of total)	Total	Anadromous (% of total)	303(d) (% of total)	Total	Anadromous (% of total)	303(d) (% of total)
Federal	533	197 (37%)	130 (24%)	454	119 (26%)	74 (16%)	529	32 (6%)	40 (8%)
PI	113	58 (52%)	47 (42%)	148	54 (37%)	35 (24%)	130	10 (8%)	12 (9%)
PNI	515	475 (92%)	361 (70%)	320	206 (64%)	54 (17%)	273	39 (14%)	4 (2%)
State	6	4 (67%)	4 (67%)	1	1 (100%)	0 (0%)	2	1 (50%)	0 (0%)
Grand Total	1167	734 (63%)	542 (46%)	923	380 (41%)	164 (18%)	934	82 (9%)	57 (6%)

Percentage of Type F Stream Mileage in Each Owner Type, by FPA Stream Size, Anadromous and 303(d)-listing									
Owner	Large			Medium			Small		
	All	Anadromous	303(d)	All	Anadromous	303(d)	All	Anadromous	303(d)
Federal	46%	27%	24%	49%	31%	45%	57%	39%	71%
PI	10%	8%	9%	16%	14%	22%	14%	13%	21%
PNI	44%	65%	67%	35%	54%	33%	29%	47%	8%
State	1%	1%	1%	0%	0%	0%	0%	1%	0%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%



Legend

- Cities
- ▭ Siskiyou Georegion
- ▭ Counties

Highways

- Interstate
- US Highway
- State Highway

**FERNS Clearcut/Overstory Removal (2014 - Present)
by Forest Owner (approx. acres)**

- State - 56ac
- Federal - 320ac
- Private Non-Industrial - 31,734ac
- Private Industrial - 19,600ac

Total Clearcut Acres:
approx. 51,712ac

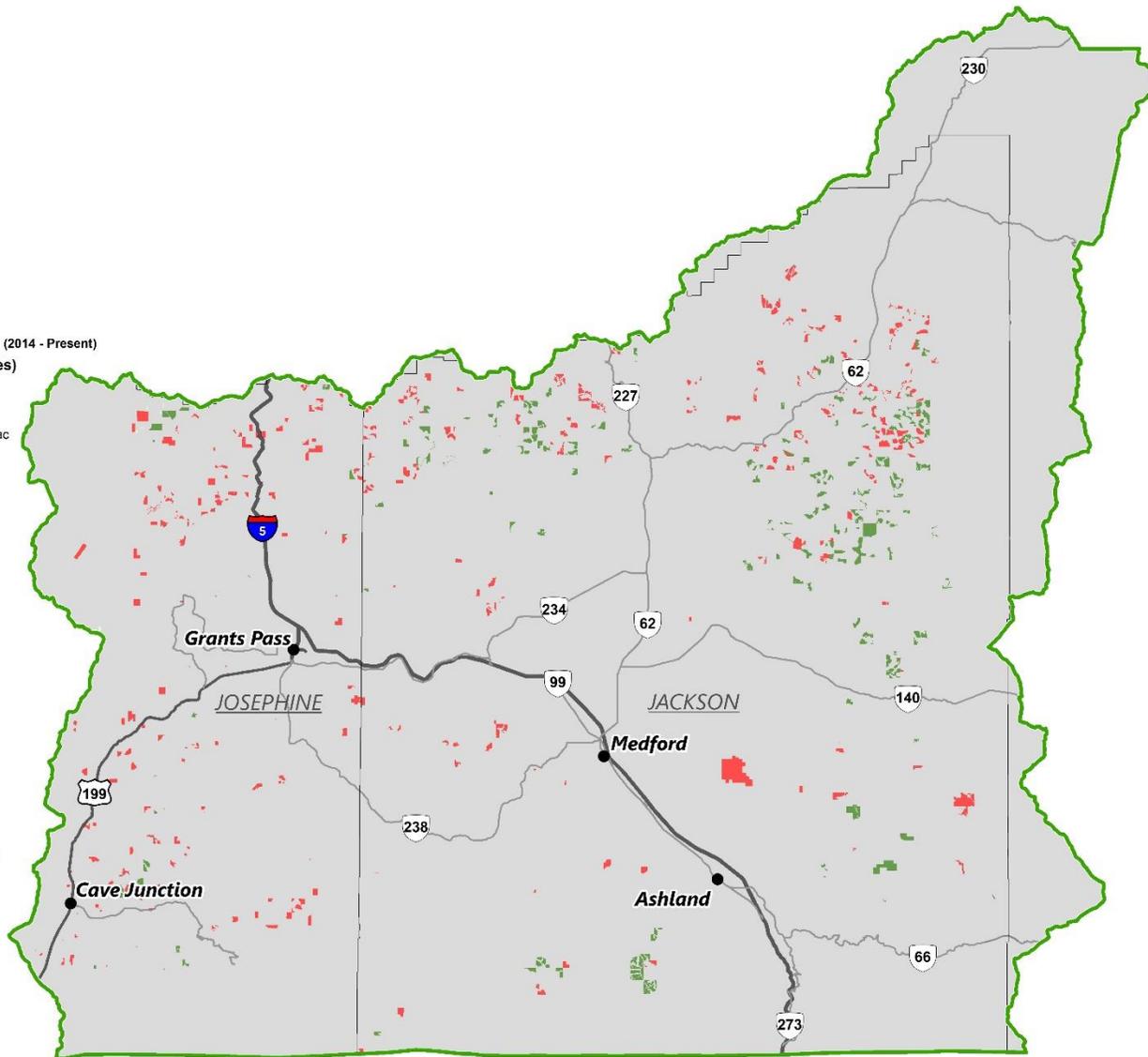


Figure 5. Private Industrial and Private Non-industrial clearcut in the Siskiyou region from FERNS notifications, 2014 to present.



Siskiyou Region Commercial Thinning/Selective Cutting

Legend

- Cities
- ▭ Siskiyou Georegion
- ▭ Counties

Highways

- Interstate
- US Highway
- State Highway

FERNS Commercial Thin/Selective Cutt (2014 - Present)

by Forest Owner (approx. acres)

- State - 73 ac
- Federal - 14,145ac
- Private Non-Industrial - 89,255ac
- Private Industrial - 8,162ac

Total Thinned Acres:
approx. 111,635 ac

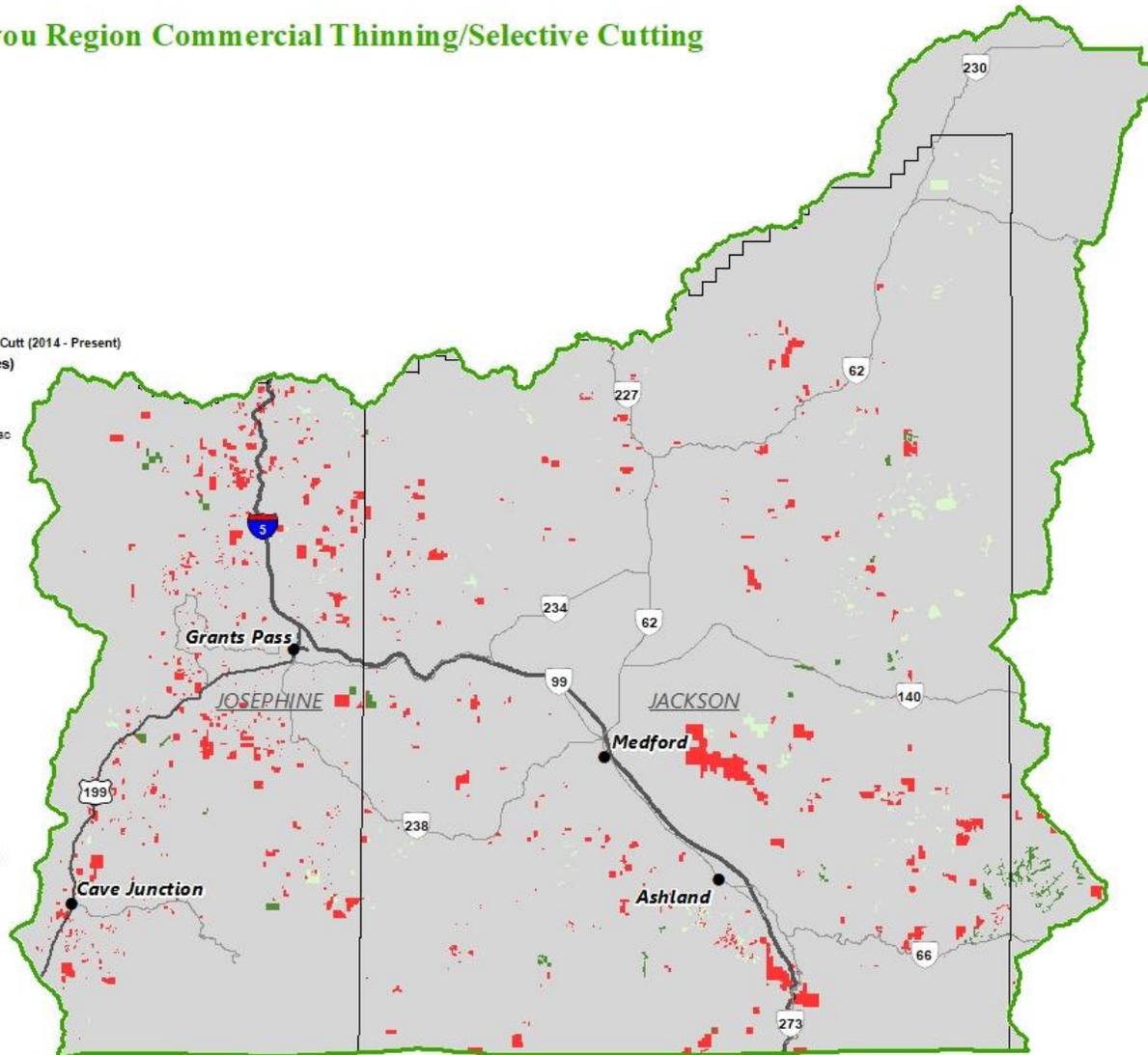


Figure 6. Private Industrial and Private Non-industrial thinning/selective cutting in the Siskiyou region from FERNS notifications, 2014 to present.

Table 3. Thinning and Clearcut acreage by Private Industrial and Private Non-industrial ownership in the Siskiyou region. Acreages are based on notifications to harvest timber in the timespan Oct. 1, 2014 to March 31, 2019. The acreages do not necessarily reflect what was harvested in that timespan.

Harvest Type	Private Industrial		Private Non-Industrial		State		Federal		Total acres	% total harvest
	acres	% of total	acres	% of total	acres	%of total	acres	% of total		
Clearcut/Overstory Removal	19,600	38%	31,734	61%	56	0%	320	1%	51,710	32%
Thinning/Selective Cutting	8,162	7%	89,255	80%	73	0%	14,145	13%	111,635	68%
Total acres	27,762	17%	120,989	74%	129	0%	14,465	9%	163,345	100%



Siskiyou Region Mill Locations

Legend

Mill Type

- Board
- Plywood/Veneer
- Cities
- Siskiyou Georegion

Highways

- Interstate
- US Highway
- State Highway
- Counties

Forest Ownership

- Oregon Department of Forestry
- Other State of Oregon
- US National Park Service
- US Bureau of Land Management
- Federal Lands
- Tribal
- Private Industrial
- Private Non-Industrial

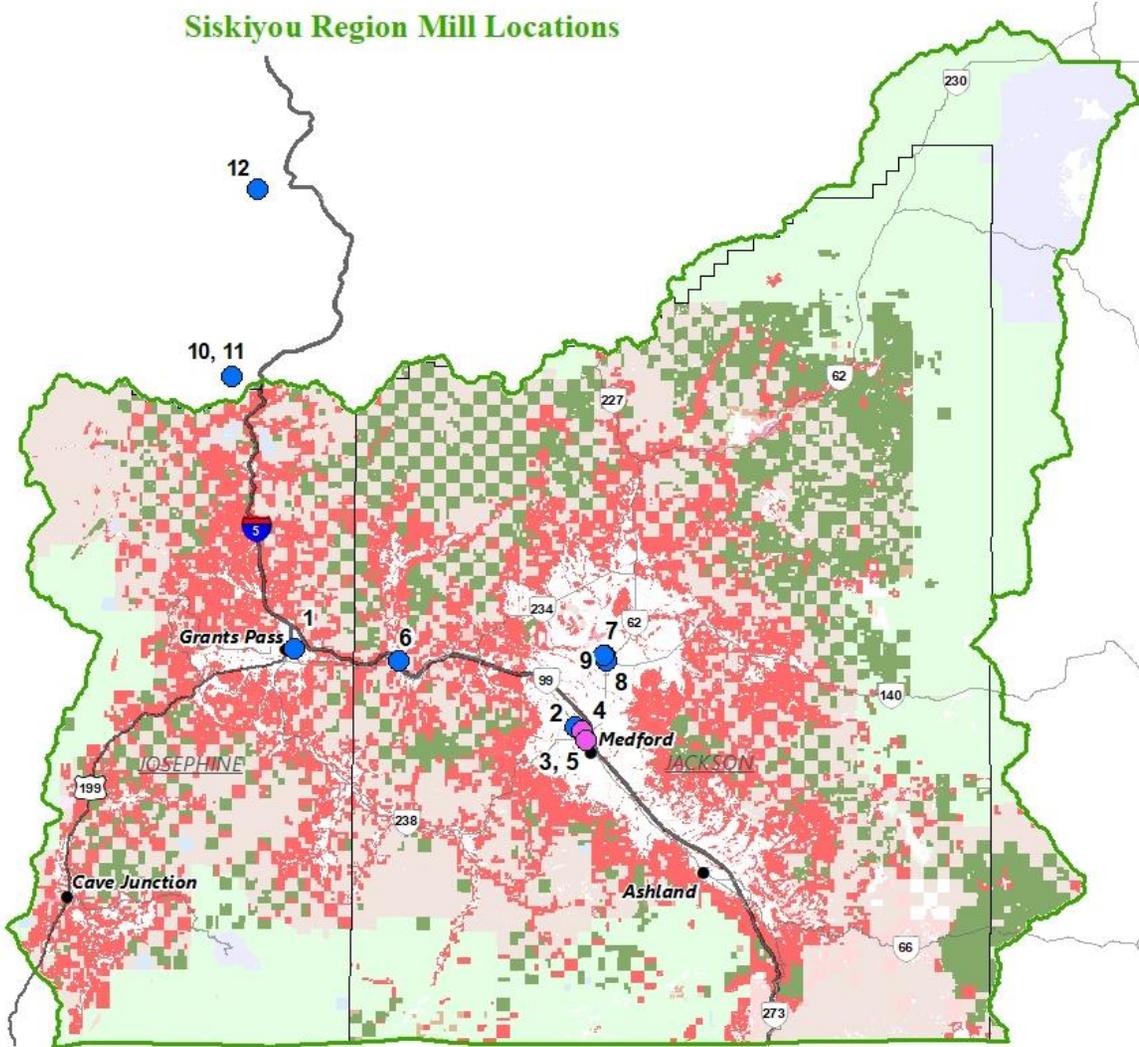


Figure 7. Mills in the Siskiyou region. Note: No data on northern California mills.



Siskiyou Region Voluntary Measures

- Legend**
- Cities
 - ▭ Siskiyou Georegion
 - ▭ Counties
- Highways**
- Interstate
 - US Highway
 - State Highway
- Project Density**
- Value**
- High
 - Low

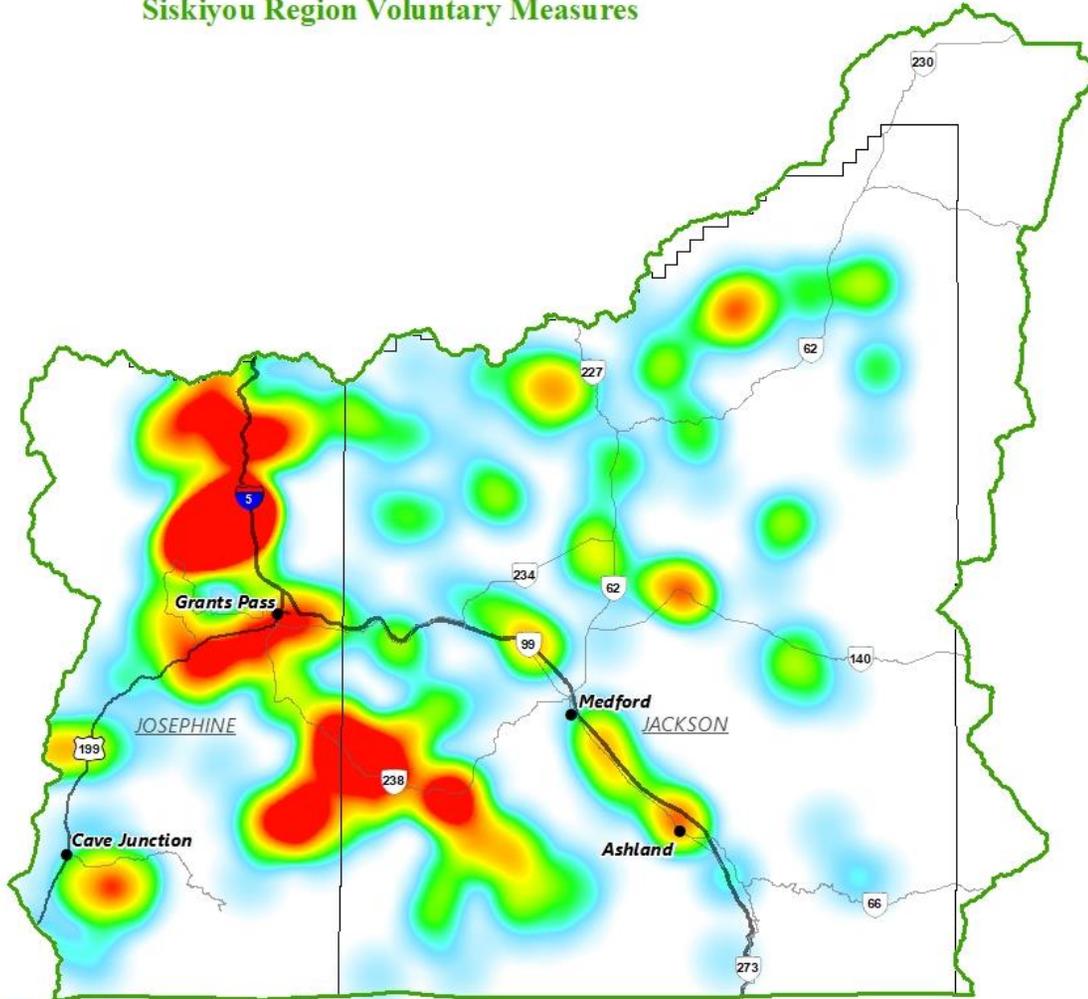


Figure 8. Voluntary measures reported from the Oregon Watershed Restoration Inventory from 1997 to 2014 (total number of projects: 409).