Implementation and Effectiveness Monitoring for the Washington Conservation Reserve Enhancement Program (CREP) for Federal Fiscal Year 2022

CREP project in Jefferson County, WA, September 2022

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Brian Cochrane
Habitat and Monitoring Coordinator
Washington State Conservation Commission

Washington State Conservation Commission

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PROGRAM OVERVIEW

The Conservation Reserve Enhancement Program (CREP) in Washington State is a joint federal and state funded program that restores streamside habitat for salmon and protects that habitat for 10-15 years. Through CREP, participants plant native trees and shrubs to improve stream conditions and enhance wetlands along salmon streams. All of the costs for these improvements are paid by the program. In addition, the program provides oversight and maintenance for five years after planting to ensure success. Landowners are paid rent for allowing their land to be used for fish and wildlife improvements and receive a monetary bonus for signing up. In Washington, landowners directly work with their local conservation district on CREP projects. The Washington State Conservation Commission (SCC) provides technical support and resources to the conservation districts.

Under an agreement with the USDA Farm Service Agency (FSA) that administers the program at the federal level, the SCC must annually report on statewide implementation and efficacy of CREP. This report summarizes implementation measures and effectiveness monitoring for the period of October 1, 2021 through September 30, 2022, or the Federal Fiscal Year (FFY) 2022..

IMPLEMENTATION

Implementation data was sourced from two databases: GIS data supplied by FSA following the end of the FFY (Fisher, 2022), and SCC's Conservation Practice Database System (CPDS). Neither system is complete: the FSA GIS data tracks acres by FSA practice type, so no distinction is made between riparian forest buffer and hedgerow, nor does it contain information about ancillary practices and metrics such as length of stream protected, average buffer width, length of fence associated with the project or whether off-stream water or a stream crossing was provided as a part of the project. CPDS on the other hand, does not show all projects entered by FSA staff when contract information isn't shared, most notably in Whitman County where many filter strip projects were enrolled by FSA from expired CRP contracts without communicating to the local districts, or if communicated, weren't entered into CDPS. CPDS also shows contracts that don't show up in the FSA GIS data, likely a result of how the GIS data is queried, as it's hard to understand how the district data would show a contract and the participant not be in the FSA system. The lack of agreement between the FSA GIS data and state systems has and continues to compound the difficulty of extracting accurate information. The following analyses of new projects, re-enrolled projects, and net enrollment is an estimate based on primarily the FSA dataset. An estimate of length of stream, fence, number of off-channel water and stream crossings is based on the SCC data.

New Projects

New contract signups were the lowest since the program started, with only nine (9) new contracts enrolled during FFY22. The average for the period 2004

through 2019 is 51 new projects per year. This low number continues the trend observed since 2015 of declining new enrollments (Figure 1). While we've seen similar trends (2011 to 2015) we haven't seen values this low.

Re-enrolled and Expired Projects

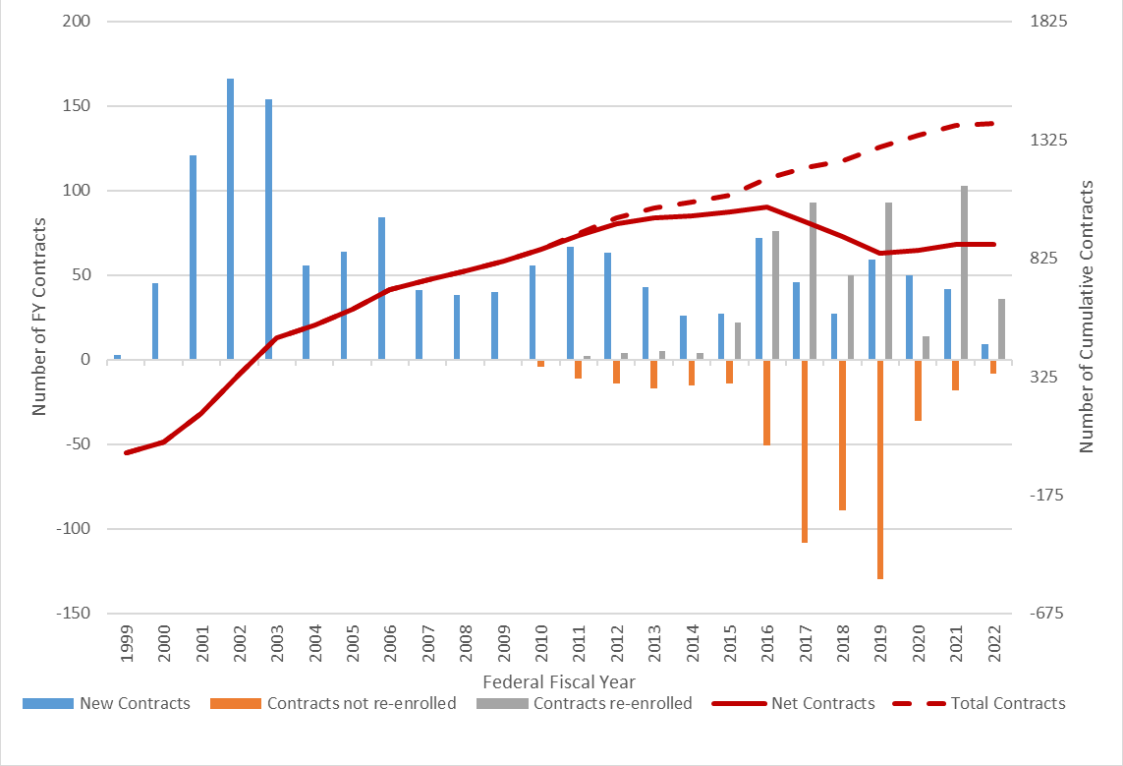
During FFY22, 36 CREP contracts were re-enrolled and retained in the program, of 44 that were expiring. This 83% rate represents the second-highest reenrollment rate since contracts began coming up for reenrollment in 2014 (last year saw 85%).

Net Enrollment

Total current enrollment at the end of FFY22 shows 884 current contracts, an increase of one (1) from last year.

In terms of acres, FSA reported 84.7 new acres enrolled and 511 acres re-enrolled for FFY22, for a total of 13,273.1 total acres under contract. Acres are up slightly from last year's amount of 12,935.5, indicating that the new acres were greater than the expired acres that did not reenroll. Hedgerow, counted under the same practice by FSA as riparian forest buffer, totaled 25.79 acres of the 10,220.32 acres under contract for riparian forest buffer.

Figure 1. CREP enrollment by federal fiscal year (FFY) since program beginning in 1999.



Fence, length of stream protected, number of trees planted, and number of stream crossings and off-stream water.

Based on SCC data, total fence under contract for FFY22 was 50.02 miles. Length of stream protected is estimated at 392.16 miles. Number of trees and shrubs planted under current contracts is estimated at 2,570,099. The program had two (2) stream crossings and 46 off-stream watering facilities under contract.

EFFECTIVENESS

Monitoring Methodology

Effectiveness monitoring was performed in September of 2022. Effectiveness monitoring is intended to determine how well the plants the program has installed are performing. To date, the way that determination has been evaluated has been to measure plant height and ask the question: how are the plants at this project growing compared to all the others we've planted on this side of the state?

The question can be reduced to a hypothesis:

> N_1: the growth rates of the plant types (conifers, deciduous, shrubs) at this project site are drawn from the same population of growth rates for the plant types already in the database for this side of Washington State.

Conversely, the null hypothesis can be articulated as follows:

> N_0: the growth rates of the plant types at this project site are not drawn from the same population of growth rates for the plant types already in the database for this side of Washington State.

A total of twenty-five (25) project sites were randomly selected from the SCC database for monitoring. As sites are evaluated, several do not lend themselves to efficient monitoring using a series of transects. Sites may have sparse survival or been planted in clusters, resulting in many transects without detection of plants of interest, or may be so dense that establishing the transect would be very time consuming and heights of trees from within the transect cannot be determined. Of the 25 sites selected, nine were not sampled for a net sample size of 17. This is consistent with past CREP monitoring. Last year's report noted 33 transects for two monitoring efforts in 2020 and 2021. The seventeen sites were spatially distributed as follows: three (3) were located in eastern Washington; five (5) sites were located in Whatcom County; two (2) each were located in Skagit, Mason and Lewis counties; and one (1) site each in Jefferson, Snohomish and Clallam counties (Figure 2). Field methods for CREP effectiveness monitoring followed that of previous Washington CREP effectiveness monitoring studies (Cochrane, 2020), as follows:

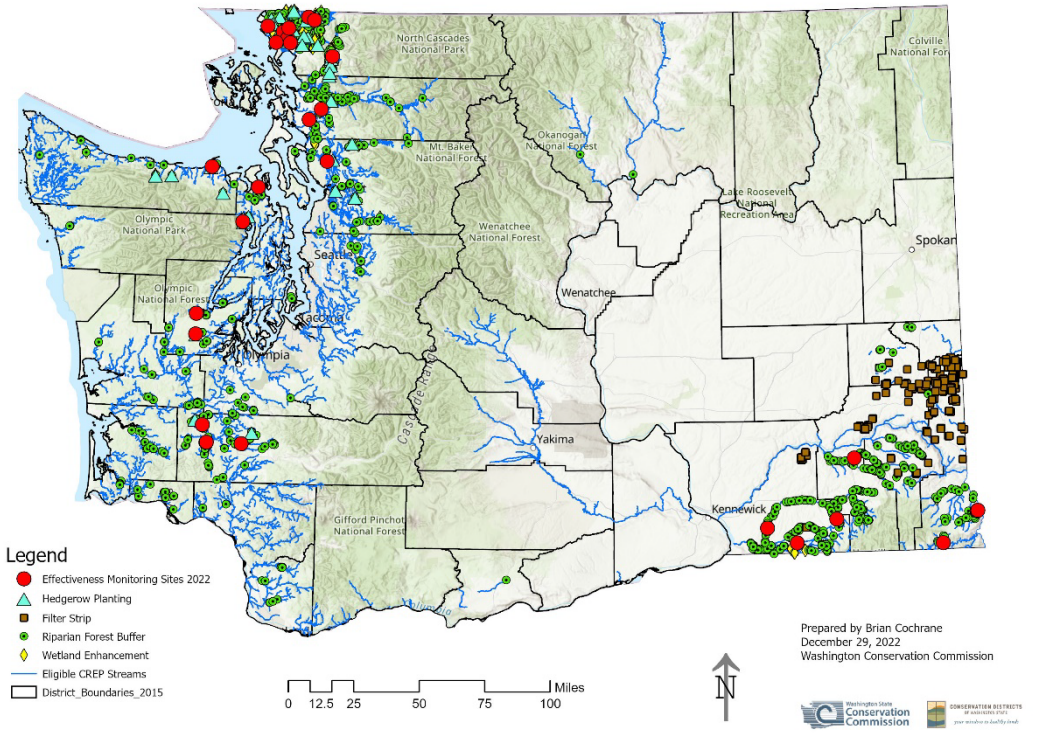
1) Each transects' beginning location was randomly drawn from along the length of the project buffer.
2) At each location, a tape measure was place perpendicular to the stream, from ordinary high water to the edge of the buffer or 180', whichever came

first. A strip 10-feet-wide on each side of the tape (total of 20') was surveyed for plants installed by the project. Each plant was identified to species and its height recorded.

3) Individual species were grouped by plant type (conifer, deciduous, shrub) and, within each transect, plant type was compared by using a z-statistic (similar to the Student's T test) to the others in the population already in the database for the appropriate side of the state and to other transects collected on the project site for the monitoring event. Data was entered in the field into an Excel spreadsheet on an iPad. The spreadsheet had the z-statistic formulas pre-loaded and updated the z-test metrics on-the-fly. A minimum of two transects was sampled. If between-transect mean and variability was comparable (calculated z less than z-table value) for all three plant types, no further transects were sampled. Additional transects were sampled until between-transect variability stabilized or until the field technician could determine why the variability was not stabilizing (i.e. extensive re-plant, low light within buffer, absence of a component in a mature site). This ensured adequate sampling of each site without oversampling.

Field estimates were also collected at each transect for bank erosion, percent bank un-vegetated, number of erosion slides, percent invasive species, and for stream canopy contributed by the CREP plantings, along wade-able streams using a spherical crown densiometer, again, following previous methods (Cochrane, 2022).

Figure 2. Location of effectiveness monitoring sites for FFY22.



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Modified Stream Visual Assessment Protocol

A new approach was added this year to test how well a functional assessment would compare to the performance metrics usually used for CREP monitoring. The Modified Stream Visual Assessment Protocol Version 2 (SVAP2) was developed by the National Resources Conservation Service (NRCS) to provide a simple, comprehensive assessment of stream condition on small streams (NRCS, 2009). The complete methodology assesses sixteen (16) elements of stream condition, each rated on a 1-10 scale based on descriptions describing conditions associated with the score. An average of all elements is calculated to arrive at a site score from 1-10, with seven (7) considered “functioning”. Of the sixteen elements, thirteen (13) were chosen that riparian buffers could impact over time. Those elements were: channel condition, hydrologic alteration, bank condition, riparian area quality, canopy cover, water appearance, nutrient enrichment, manure or human waste, pools, fish habitat complexity, and aquatic invertebrate habitat. Each element was assessed for the conditions on the site, regardless of contribution by FSA funded plantings. Large streams were not assessed, and sites selected, but not monitored using transects, were included if along a small stream. In total, 20 sites were assessed, with 13 of those also sampled using the traditional transect methodology.

Monitoring Results and Discussion

Plant Growth

Plant types at each project site were compared for growth rate to the larger population of the same plant type on that side of the Cascade Mountains. Plants were either a) drawn from the same population ("Yes" in Table 3), b) Not drawn from the same population ("No" in Table 3), or c) not present in sufficient quantity for the observed variation ("n too small" in Table 3). For observations in FFY22, plant types were predominantly drawn from the same population, indicating that sites were consistent with previous observations.

Table 3 Number of CREP effectiveness monitoring sites meeting statistical criteria for similarity to the population of growth rates already in the CREP database for the equivalent side of the state.

Is the site growth rate drawn from the same population of all growth rates sampled on CREP sites on the same side of the Cascades?	Conifer	Deciduous	Shrub
Yes, site drawn from the same population	14	10	12
No, site not drawn from the same population	1	3	2
n too small; not enough samples or too much variability to compare	2	4	3

Consistent with previous monitoring reports, the sites with plant type results classed as "n too small" doesn't necessarily mean the sites are unsuccessful. Typically it means that one class or another was shaded out as the stand matured. Figure 3 shows an example of a transect showing dominance by deciduous, lacking shrubs and conifers, yet still providing riparian buffer functions.

In six (6) cases, growth rates were not the same ("no" in Table 3) as the population of equivalent plant types for each side of the Cascade mountains. Of these, one occurrence was for a site in eastern Washington that showed conifer growth at more than 4 times faster than other conifers for the same side of the Cascade mountains (Figure 4). Three (3) sites showed deciduous growth different from equivalent sites. All of these sites had some degree of existing alder present on site initially, providing shade that slowed the deciduous growth. The remaining two (2) occurrences for shrubs that grew faster than the comparison group.

Figure 3. A Lewis County site showing dominance by deciduous trees. Site was one that conifers and shrubs were not sufficient to determine growth rates compared to other sites previously monitored west of the Cascades.

Figure 4. Site in Walla Walla County showing conifers growing at 4.17 feet/year compared to 1 foot/year typical of conifers on other CREP sites east of the Cascades.

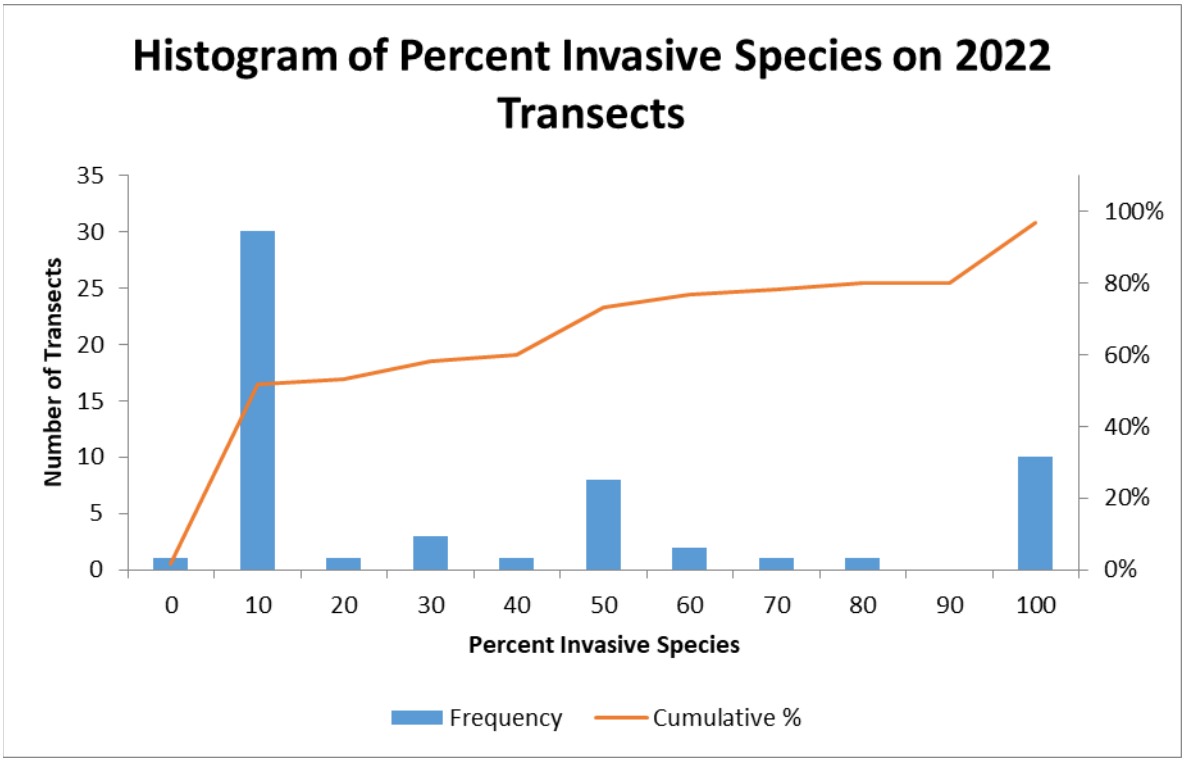
As noted in previous annual reports (Cochrane, 2022), sites with small sample sizes or growing significantly different from the rest of the monitoring observations still provide biological function to offset agricultural impacts in the form of a future source of large woody debris, bank stabilization, stream shade, and a buffer between agricultural activities and the stream.

Bank Erosion, Invasive Species, and Plant Survival

Bank erosion measurements were made at all sites. Only one of the 17 sampled showed evidence of bank erosion, and that was more due to geomorphic incision and lateral erosion on the main stem river the site was situated along. Overall, bank stability is consistent with previous results showing that CREP sites are stable with respect to bank erosion.

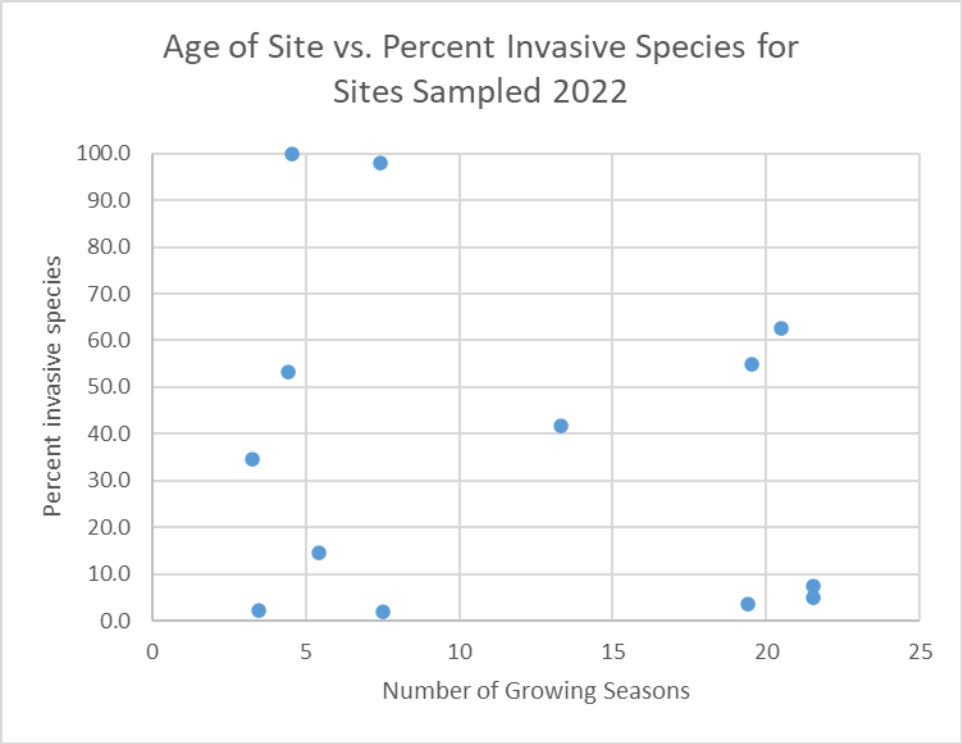
Median percent invasive species was 10%, the same as reported for FFY19. Like previous years, the dominant species were reed canarygrass and blackberry. A histogram of percent invasive species percentage for all sampled transects in 2022 is shown in Figure 5, showing that 60% of transects are relatively free of invasive plants, with percent invasive species at or below 40% (compared to 40% less than 10% reported for FFY 2020 and 2021).

Figure 5. Histogram of percent invasive species for CREP transects monitored for FFY 2022.



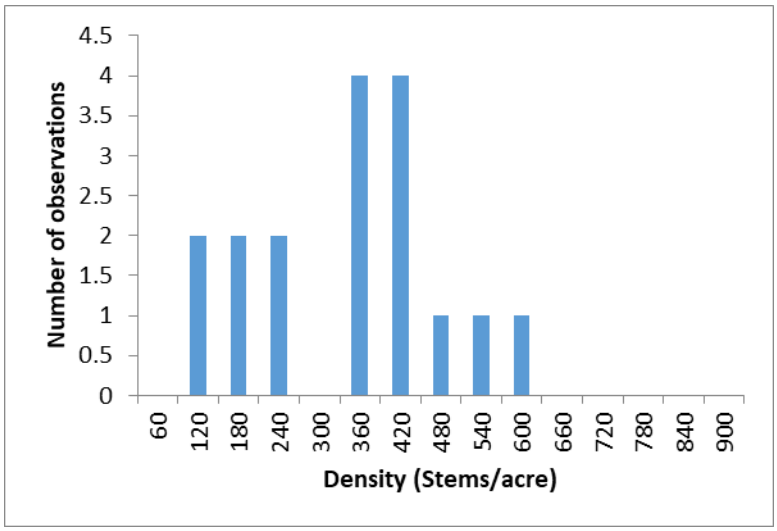
As in FFY20 and 21, we also looked at the relationship between invasive species on transects monitored for FFY22 and age of the site and again found no relationship (Figure 6). As concluded last year, this may indicate that the original CREP assumption that five years of state-sponsored maintenance is effective at controlling invasive species needs revisited and a change in the support model may be needed to achieve better weed control on CREP sites.

Figure 6. Graph of number of growing seasons vs percent invasive species found on all transects sampled during FFY22. Note overall absence of trend and relatively lower values at either end of the x-axis.



Density was calculated for all transects measured in 2022. As noted in 2020, considerable difficulty detecting dead plants in mature stands skews data as projects age, thus the value of percent survival is less meaningful than plant density. Density at all sites monitored for this report ranged from 89 plants per acre to 561 plants per acre, with a mean of 310 plants per acre. This compares to a range of 60 -678 stems/acre reported for FFY 2020 and 2021. Distribution of site density for all sites monitored in 2022 is shown in Figure 7, below. Plant density measured for this report are consistent with previous CREP report densities of less than 100 plants per acre to greater than 600 stems per acre with a mean near 250 plants per acre.

Figure 7. Histogram of site overall (conifer, deciduous, shrub combined) plant density at monitoring sites sampled in 2022.



Canopy Cover

Canopy cover measurements were physically collectable from mid-channel on wadeable streams at three (3) of the 17 sites monitored this year. Average canopy cover on these smaller, wadeable streams from project trees, was 72 percent, consistent with what has been previously reported (39% for FFY20&21, 83% for FFY19, 35% for FFY2018, 72% for FFY2016, 68% for FFY14). The small sample size is also consistent with previous reporting indicating that canopy from CREP project plantings is only present on a few projects, but when present, does effectively shade the stream.

Modified SVAP

Average score for all sites sampled was 6.34, with a range from 4.46 to 7.75. Seven (7) sites of 20 sampled were assessed at seven (7) or higher, indicating functioning habitat. Interestingly, three (3) of those were from streams not sampled using the traditional transect method. Two of the sites were not sampled due to density of plantings and the closed canopy that prevented measurement of tree heights; one was in eastern Washington that had good function, but was interplanted with conifers to achieve greater function. Interplants were not uniformly distributed, so random transect locations would yield few (or no) trees sampled unless the random transect went through a clump of plantings.

Conversely, on the low end, four (4) sites overall scored less than 5.5 indicating a degraded function. In one case, there was significant evidence of livestock grazing that resulted in bare ground, no shrub component, and a low score for waste and nutrients. That site was referred to the local FSA by the district for violation of the contract terms. Another site in eastern WA was planted in the early 2000's, and only shrubs survived. Little benefit was provided to the stream for canopy and incision, so the site scored low. That site will be evaluated by the

local conservation district and a revised conservation plan proposed to put the site on a corrective path.

All other sites, those between 5.5 and less than 7, generally had a stream habitat condition (fish habitat, aquatic invertebrate habitat, pools) absent, or an invasive species condition present that brought scores down below that considered functioning. Both of these situations likely will resolve with time. As buffers mature, more woody debris with enter the stream, providing fish and aquatic insect habitat, and introducing stream complexity (more pools). More buffer growth should also shade out the invasive plants and provide better canopy, so those elements should score better with more growing seasons as well.

LITERATURE CITED

Cochrane, B. 2021. Implementation and Effectiveness Monitoring for the Washington Conservation Reserve Enhancement Program (CREP) for Federal Fiscal Years 2020 and 2021. Washington State Conservation Commission, Olympia, WA. 23 pp.

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