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USING THE CALIFORNIA HABITAT RESTORATION PROJECT DATABASE TO ESTIMATE HABITAT RESTORATION COSTS FOR ESA-LISTED SALMONIDS

K. Kelly Hildner
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NOAA-TM-NMFS-SWFSC-403

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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Southwest Fisheries Science Center

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Abstract

The California Habitat Restoration Project Database (CHRPD) is a central repository of project-level data (including costs) on salmonid habitat restoration projects in California. This document summarizes CHRPD data according to the geographic delineations (i.e., study areas and watersheds) used by NOAA Fisheries Technical Recovery Teams who are responsible for developing delisting criteria for California salmonid populations listed under the Endangered Species Act. In addition to demonstrating the types of information that can be obtained from the CHRPD, this document also identifies gaps and deficiencies in CHRPD data that, if addressed, could enhance the utility of the database for improving our understanding of where and how restoration monies are being spent, how cost-effectively the monies are being used, and what is being achieved by the restoration activities funded.

Background

The California Habitat Restoration Project Database (CHRPD) was established in 1999. The database, which was originally funded by NOAA Fisheries in Santa Cruz and more recently by the California Department of Fish and Game, is managed by the Pacific States Marine Fisheries Commission (see http://www.calfish.org/DesktopDefault.aspx?tabId=60). The objective of the database is to serve as a central repository of information on salmonid habitat restoration projects in California. The data contained in the CHRPD come from a variety of government and non-government entities that are involved in administering and/or conducting restoration projects. A unique aspect of the CHRPD is the inclusion of detailed project cost data. The database also contains geographic information in the form of digital project locations. The CHRPD is updated as data on newly funded projects become available from existing contributors to the database and as additional entities become interested in contributing their project data to the CHRPD.

A number of Evolutionarily Significant Units (ESUs) of chinook salmon *(Oncorynchus tshawytscha*), coho salmon (*O. kisutch*) and steelhead (*O. mykiss*) - including ten in California- have been listed as threatened or endangered under the U.S. Endangered Species Act (ESA). Recovery planning for these ESUs is proceeding in two stages: (1) Technical Recovery Teams (TRTs) are developing scientifically based criteria for delisting each ESU. (2) Using these delisting criteria, recovery plans are being developed that identify actions needed to achieve the criteria. An objective of this report is to inform the second stage of recovery planning for California ESUs by providing baseline information on the nature, extent, geographic distribution, and cost of salmonid habitat restoration projects in California. Consistent with this objective, the data summaries provided here are organized by geographic categories (e.g., TRT-delineated study areas and watersheds) that are meaningful for recovery planning.

Summarization of restoration project information is complicated by the often multifaceted nature of restoration work, issues pertaining to spatial characterization of projects, and the need to allocate project costs among multiple restoration activities. These problems are compounded by the fact that the project data provided to the CHRPD are typically collected for the purpose of administering restoration contracts/grants. While these data may be well suited for their intended purpose, they are generally not sufficiently standardized or detailed to provide a clear and comprehensive understanding of the types of restoration undertaken, the locations and costs of restoration, and what was accomplished as a result of restoration. This report identifies several problematic aspects of the CHRPD data and documents how those aspects were dealt with in order to produce the project summaries contained herein.

A central repository like the CHRPD is an invaluable source of information on salmonid habitat restoration projects. Establishment of the database has been useful for identifying the types of restoration project data that are available. It has also drawn attention to data gaps that need to be addressed in order to enhance the utility of the database for a wide range of applications. For instance, CHRPD data (used in

combination with other information) can improve our understanding of where and how restoration monies are being spent, how cost-effectively the monies are being used, and what is being achieved by the restoration activities funded. The final section of this report includes recommendations regarding ways in which restoration project data can be enhanced to allow the CHRPD to achieve this broader potential.

Introduction

The analysis of CHRPD data contained in this document is organized into three sections or tiers. Tier 1 includes a general description of the database and some general summaries of the data, including the spatial, temporal and categorical distributions of the projects and their costs. Tier 2 focuses on project types considered most important to the recovery of endangered salmonids (on the ground restoration projects and land acquisition projects), using categorizations available in the CHRPD. Tier 2 summarizes projects beginning in 1998 and forward. Tier 3 reclassifies the data into specific habitat restoration tasks (e.g. culvert replacement, instream structure installation, fencing) that can be used in cost modeling and summarizes the data by these tasks. Like Tier 2, Tier 3 focuses on projects beginning in 1998 and forward.

Data are continually being added to the CHRPD, and the structure of tables and fields in the database is occasionally changed, so any summaries of the data and database are necessarily just snapshots. This document presents such a snapshot based on the database as of March 14, 2005.

Tier 1: Complete Database

The data in the CHRPD are organized by project and by site. Projects are habitat restoration units for which cost data are available. A project consists of one or more sites (geographic locations). Each site is associated with only one project. The classification of projects was somewhat arbitrary, in that if separate cost information existed for each site of a project, each site was then classified as a separate project. This was done to maximize the specificity of cost information in the database.

Projects and sites each have specific variables associated with them. For example, the year the project began is a project level variable, along with the project participants (agencies, including the data source), project level measurement metrics, and project costs. Geographic information is stored at the site level, along with the restoration treatments, site level measurements, and habitat categories.

Having multiple levels of data organization (project and site) complicates analysis of the data. In order to conduct analyses using all variables, some variables at the site level need to be aggregated to make them apply at the project level or variables at the project level need to be disaggregated among sites.

Data Sources

Data sources are stored in the CHRPD in the MitPartRole table, which indicates all participants for a particular project including data sources, funders, on-ground implementers, primary coordinators, etc. (see MitRoleLU). The data sources are the participants with a RoleID of 7. Projects with only one data source assigned in the database are given that data source in tables in this document; those with more than one data source assigned are given a value of "Multiple" for data source in tables in this document. Information for each participant (e.g. agency name) is found in the MitAgencyLU table which links to the MitPartRole table through the ParticipantID (see schematic in Appendix 1).

The data source for each project is the entity from which the data were obtained. This is often not the entity that conducted the work. There are 10 data sources in this version of the database (see Table 1). The most common data source is the California Department of Fish and Game (CDFG) followed by the California Coastal Conservancy (CCC). Not counting projects with multiple data sources, these two agencies account for 77.3% of the projects in the database.

Most projects are also assigned a primary coordinator/grant recipient in the database (stored in the database the same way as data source except that RoleID is 6). For this release of the database, there were 912 such agencies. The two most common primary coordinators were the California Conservation Corps (168 projects; 4.0% of projects in the database) and the California Department of Fish and Game (153 projects; 3.7% of projects in the database).

Table 1. Number and Percent of projects from each data source in the CHRPD (3/14/05).

Data Source	Number of Projects	Percent of Projects	Number of Sites	Percent of Sites
California Department of Fish and Game	2352	56%	8800	70%
California Coastal Conservancy	805	19%	1482	12%
Wildlife Conservation Board	289	7%	410	3%
National Fish and Wildlife Foundation	238	6%	461	4%
Pacific States Marine Fisheries Commission	175	5%	382	3%
U.S. Fish and Wildlife Service	138	3%	635	5%
Multiple	102	2%	237	2%
NOAA Fisheries	49	1%	121	1%
CALFED	19	0%	49	0%
Cantara Trustee Council	11	.0%	14	0%
California Conservation Corps	5	0%	6	0%

Temporal Distribution

Projects in this version of the database have starting dates ranging from 1981 to 2006 and fiscal years of 81/82 to 04/05. New projects are added to the database each year, and old projects from additional data sources are also being added to bring the database up to date.

The begin year, end year, and fiscal year for each project are stored in the MitProject table (see schematic in Appendix 1). The number of projects by year (begin year for the project) is shown in Figure 1, and the number of sites by year is shown in Figure 2. The number of projects peaked between 2001 and 2003 and has been declining since then.

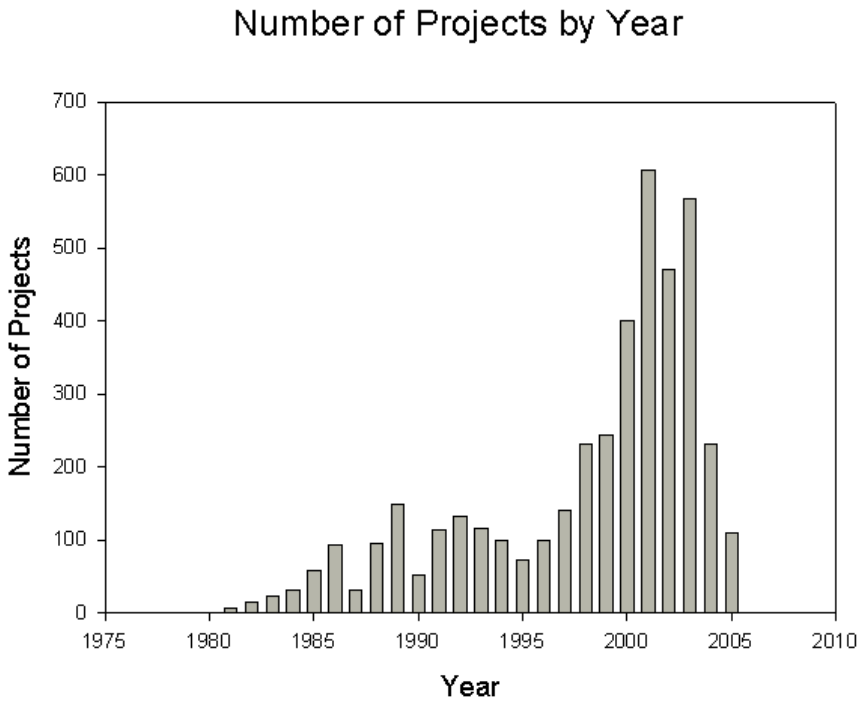


Figure 1. Number of projects by year for projects in the CHRPD (3/14/05).

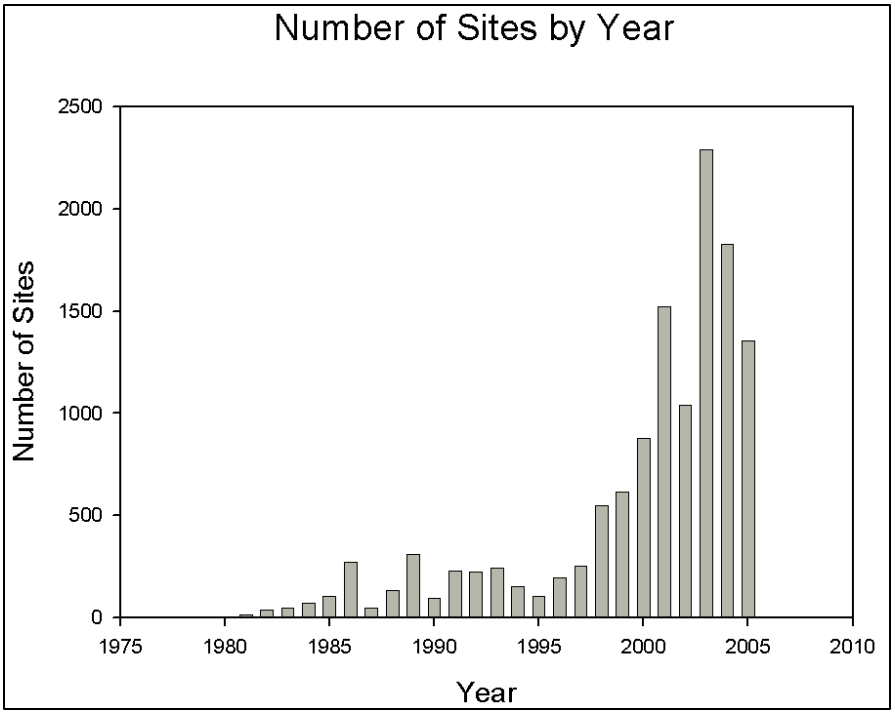


Figure 2. Number of sites by year for projects in the CHRPD (3/14/05).

Geographic Distribution

As mentioned above, each project in the database consists of one or more sites where the work was performed. There are a total of 4,183 projects in this release of the database, which consist of 12,597 sites. Of these projects, 3,806 have geographic information covering a total of 11,770 sites. Geographic locations of sites are recorded in digital shapefiles as points, lines, or polygons. Most projects in the database include geographic information for all associated sites, but for some projects geographic information is available for some but not all sites, and for others no geographic information is available (see Table 2).

Table 2. Number of projects by status of geographic information in the CHRPD shapefiles (3/14/05).

Geographic Data Status	Number of Projects	Percent of Projects
All project sites digitized	3719	89%
Some sites digitized	87	2%
No sites digitized	377	9%

Shapefiles require that points, lines, and polygons be stored separately, so these features must either be analyzed separately when doing geographic analyses with the database, or all features must be converted to points in order to analyze the features

together. Note that considerable geographic information is lost when converting lines and polygons to points, so this was done for visualization purposes only (see Figure 3). The highest density of projects in the database is along the coast, particularly in the northwest.

Point Locations of CHRPD Restoration Project Sites (3/14/05)

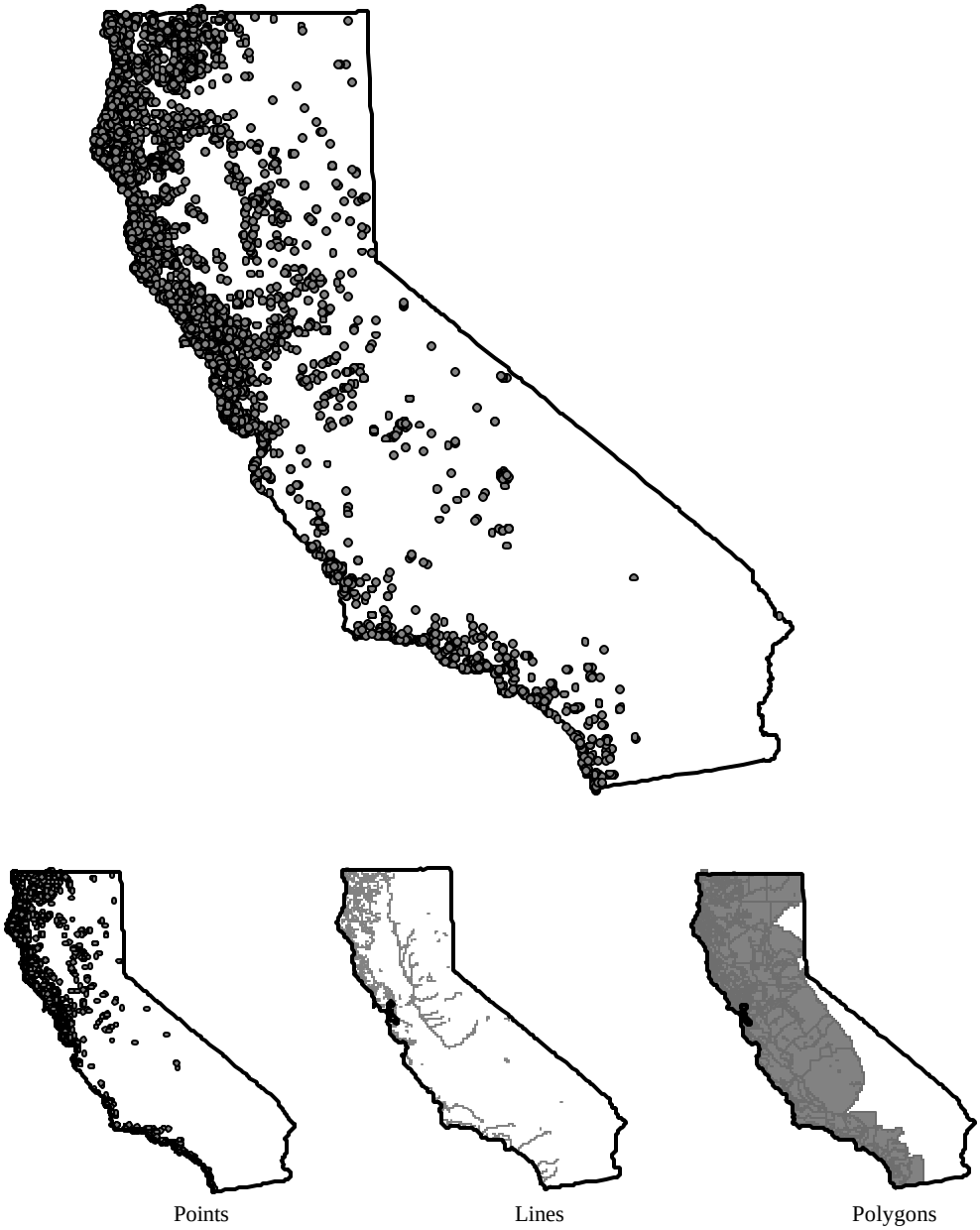


Figure 3. Locations of all CHRPD project sites as of 3/14/05 for which geographic locations were available. Large map includes the center points for all points, lines, and polygons.

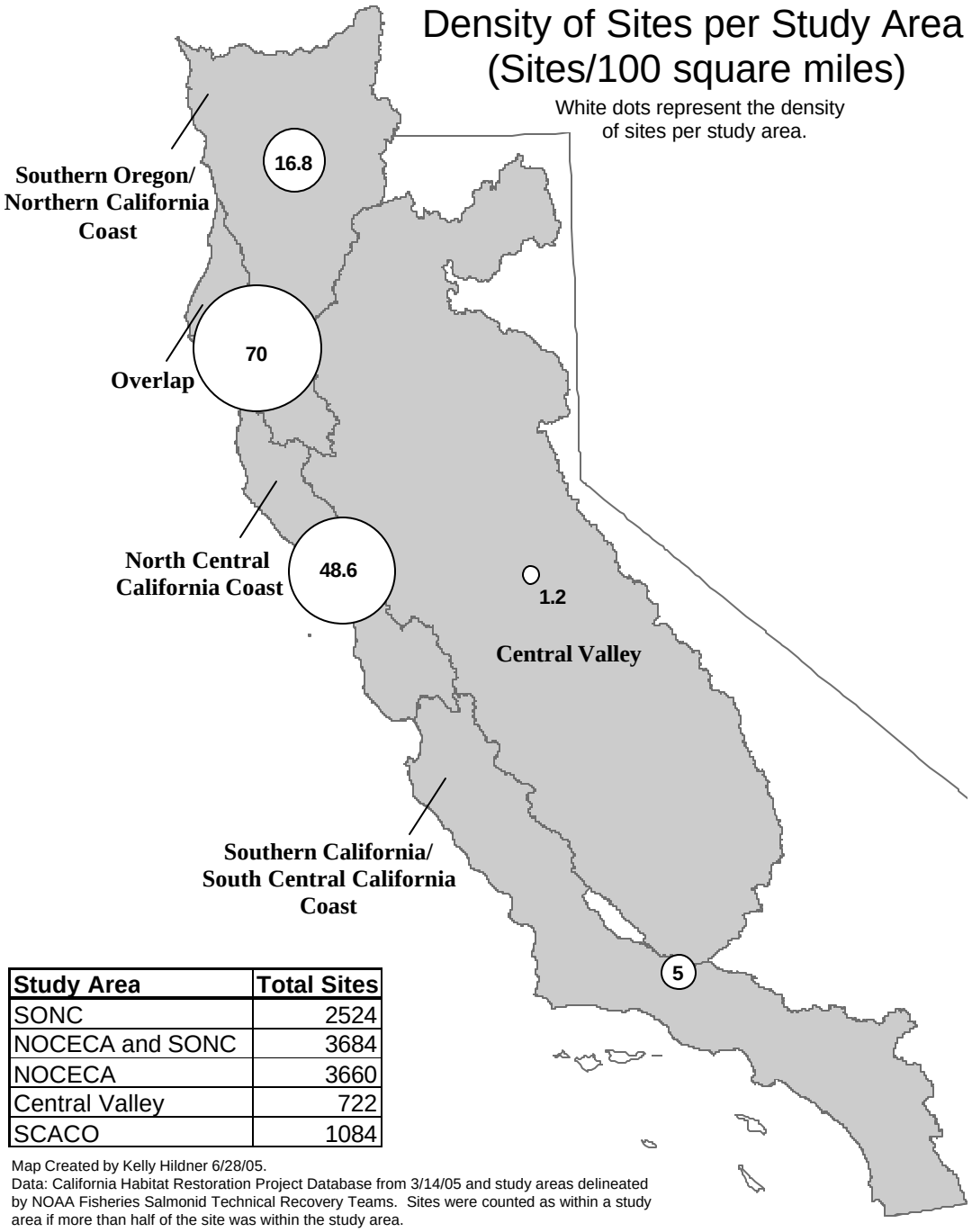
In order to break out data by geographic area, we used rules to assign sites to study areas and watersheds. Study areas are fairly large geographic areas designated by NMFS Technical Recovery Teams (TRTs) for studying salmonid populations in California. Sites that have more than half of their area (polygons) or length (lines) within the study area or watershed are counted as within the study area or watershed. Projects are counted as within the study area or watershed if more than 50% of their sites are assigned to the study area or watershed.

The distribution of projects and sites among the TRT study areas is given in Table 3. 71% of the projects and 84% of the sites in the database occur in the Northern California/North Central California Coast (NOCECA) and the Southern Oregon/Northern California Coast (SONC) study areas (including the area in which they overlap).[1] The density and number of sites per study area are shown in Figure 4.

Table 3. Number and percentage of projects and sites per study area. The area of overlap between the Northern California/North Central California Coast study area and the Southern Oregon/Northern California Coast study area is treated as a separate area.

Study Area	Full Name	Number of Projects	Percent of Projects	Number of Sites	Percent of Sites
Not Assigned		125	3%	96	1%
SONC	Southern Oregon/Northern California Coast	758	20%	2524	21%
NOCECA and SONC	Overlap between NOCECA and SONC study areas	834	22%	3684	31%
NOCECA	Northern California/North Central California Coast	1107	29%	3660	31%
Central Valley	Central Valley	399	10%	722	6%
SCACO	South Central California Coast	583	15%	1084	9%

[1] Two of the TRT study areas (Northern California/North Central California Coast and Southern Oregon/Northern California Coast) overlap each other. We treat the overlapping area as a separate area to avoid double counting projects.



Study Area	Total Sites
SONC	2524
NOCECA and SONC	3684
NOCECA	3660
Central Valley	722
SCACO	1084

Figure 4. Density and number of sites per study area.

The numbers of projects and sites per watershed are provided in tabular form in Appendix 2. The watersheds used were those delineated by TRT staff to facilitate the identification of independent anadromous fish populations and characterize the geographic areas where those independent populations occur. The number of projects per watershed is depicted in Figure 5 and the number of sites per watershed is depicted in Figure 6. The density (number per 100 square miles) of projects and sites per watershed are depicted in Figures 7 and 8 respectively.

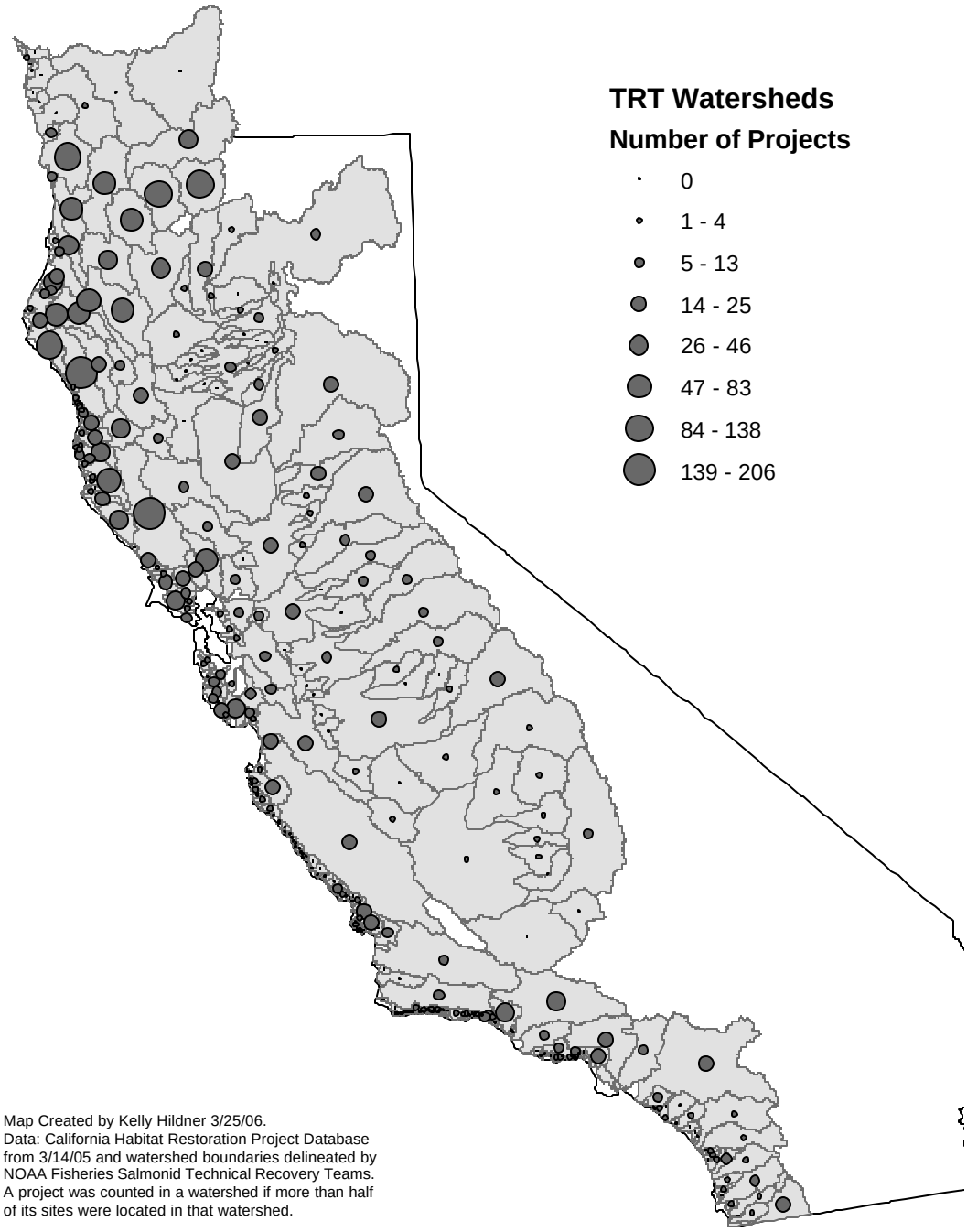


Figure 5. Number of projects per watershed. Watersheds are those delineated by NOAA Fisheries Salmonid Technical Recovery Teams. Projects were assigned to watersheds if more than half of their sites were assigned to the watershed, and the sites were assigned to watersheds if more than half of the site was within the watershed.

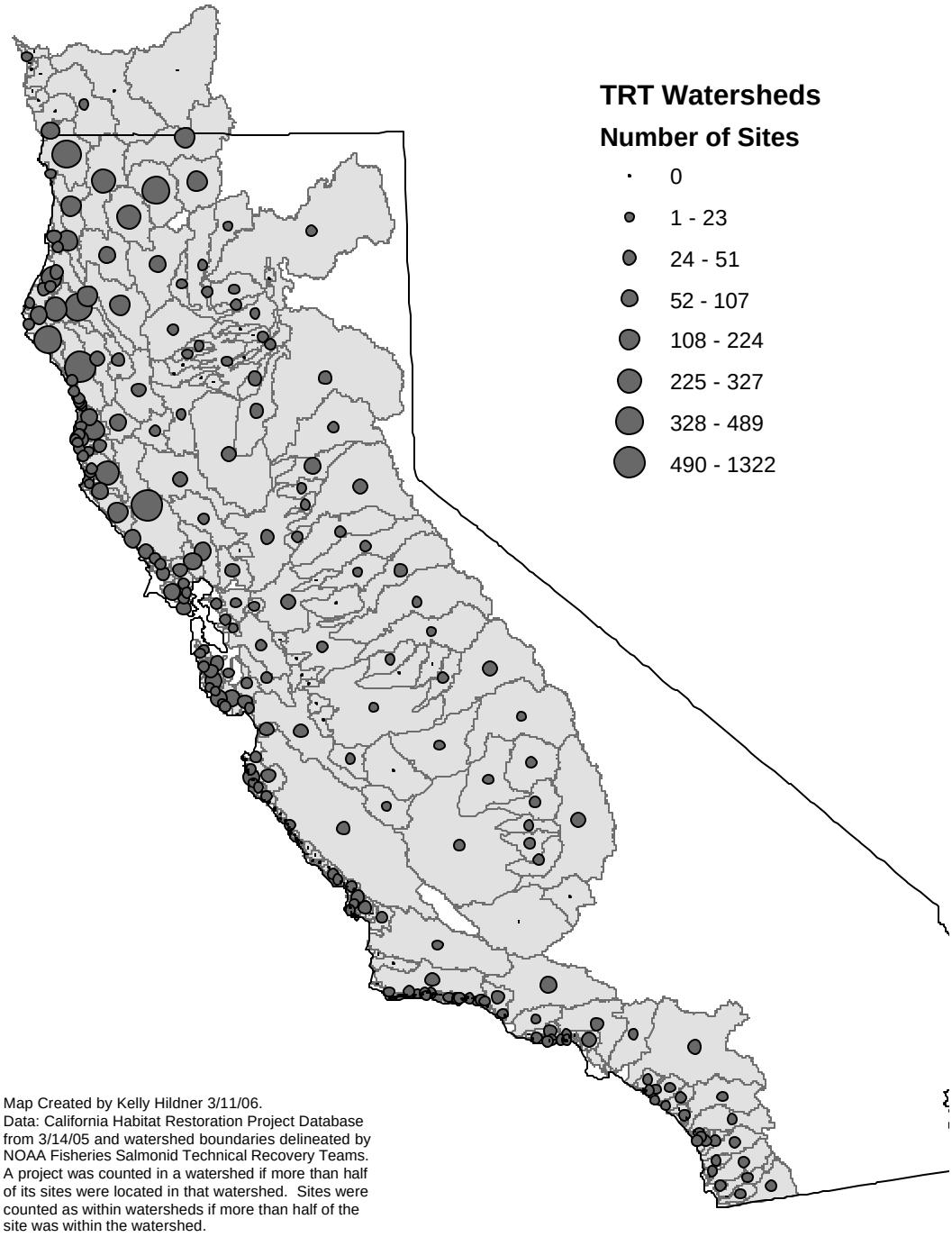


Figure 6. Number of sites per watershed. Watersheds are those delineated by NOAA Fisheries Salmonid Technical Recovery Teams. Sites were assigned to watersheds if more than half of the site was within the watershed.

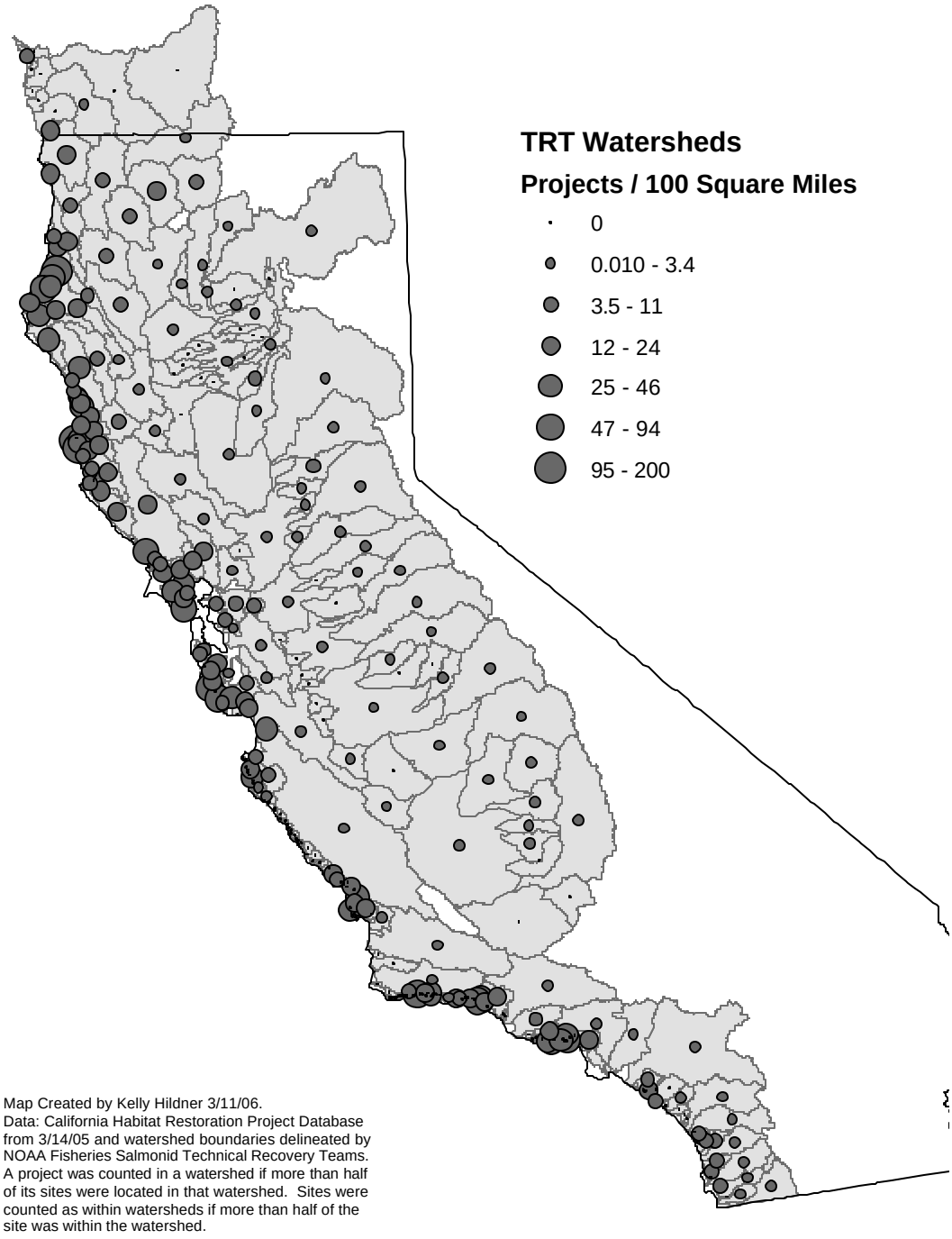


Figure 7. Density (number per square mile) of projects in each watershed. Watersheds are those delineated by NOAA Fisheries Salmonid Technical Recovery Teams. Projects were assigned to watersheds if more than half of its sites were assigned to the watershed, and the sites were assigned to watersheds if more than half of the site was within the watershed.

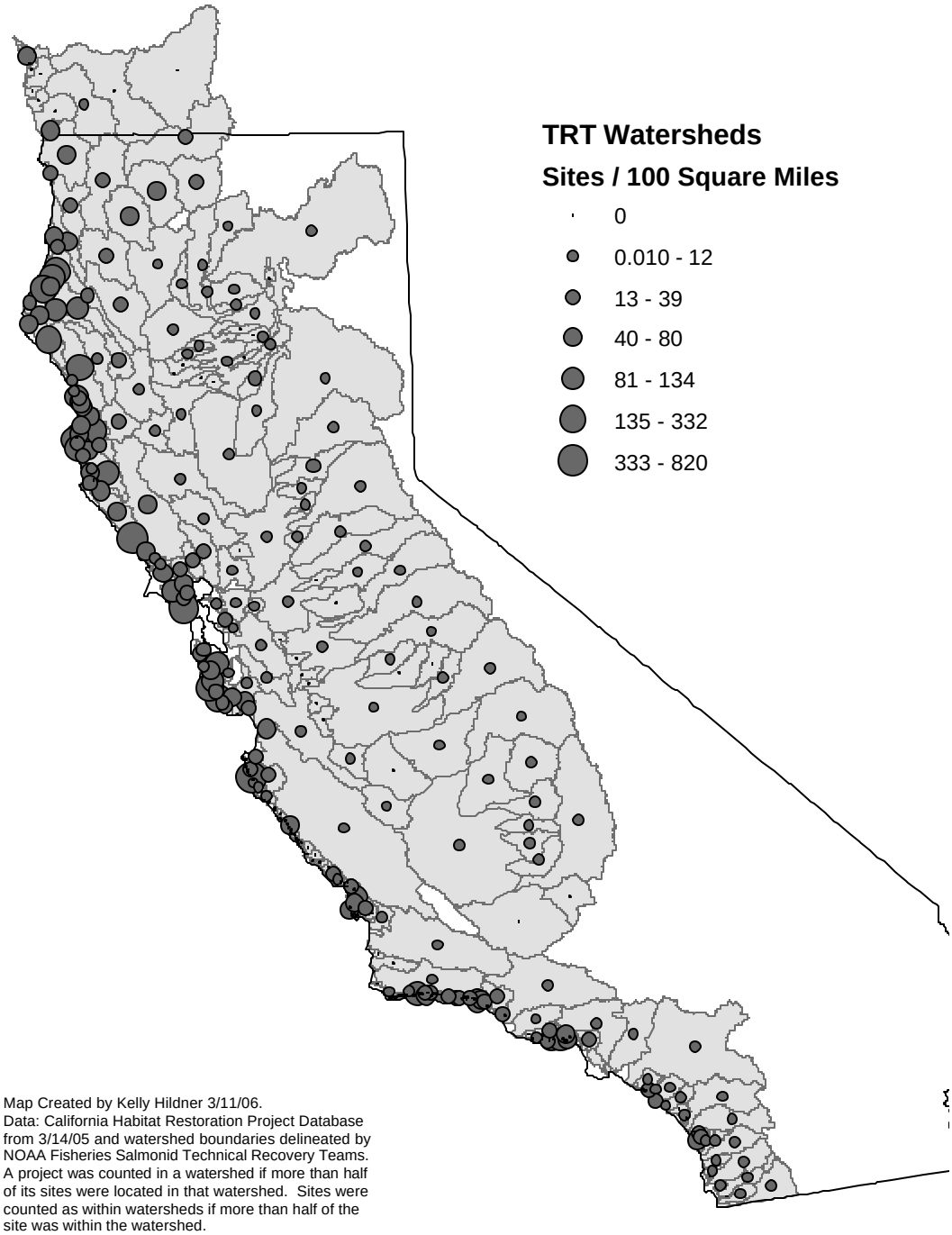


Figure 8. Density (number per square mile) of sites in each watershed. Watersheds are those delineated by NOAA Fisheries Salmonid Technical Recovery Teams. Sites were assigned to watersheds if more than half of the site was within the watershed.

Projects by Type

There are several types of project categorizations in the CHRPD (see schematic in Appendix 1). At the project level, the California Department of Fish and Game assigns project type codes (ProjTypeCode), but these have only been assigned to about half of the projects in the database. These codes can be found in the MitProject table, with the definitions of codes in the CalProjTypeLU table. As of March 14, 2005, there were 37 different project type codes in the database, of which 9 had unknown definitions (Table 4).

At the site level, treatments and habitat categories are assigned, both of which can be found in the MitDetails table. Treatments are assigned as DetailsIDs and habitat categories are assigned as HabCategoryIDs. Treatments refer to the specific types of restoration work that were done at the site. As of 3/14/05, there were 105 possible treatment types in the database. Definitions of these treatments can be found in the MitDetailLU table in the CHRPD (Table 11). Each site in the database is assigned one or more treatments depending on the types of restoration work that were done at that site for that project.

Habitat categories are broad categories of restoration work, some emphasizing location (such as instream) and others emphasizing type of work (such as roadwork). Including 'Unknown', there are 14 habitat categories in the database. Definitions of habitat categories can be found in the StrHabCategoryLU table in the database (Table 8). Each site is assigned one or more habitat categories.

Projects in the database have no more than one CDFG ProjTypeCode but can have multiple (in some cases many) treatments and habitat categories. Number of projects associated with each CDFG project type is given in Table 4.

Table 4. Number of projects by CDFG project type (CHRPD 3/14/05).

ProjTypeCode	Project Type	Number of Projects
HA	Habitat Acquisition and Conservation Easements	593
PL	Watershed Evaluation, Assessment and Planning	208
HU	Watershed Restoration (Upslope)	188
RE	Cooperative Rearing	165
HI	Instream Habitat Modification	151
ED	Public School Watershed and Fishery Conservation Education Projects	139
HR	Riparian Restoration	132
OR	Watershed Organization Support and Assistance	110
HB	Instream Barrier Modification	90
HS	Instream Bank Stabilization	86
MD	Monitoring Projects	81
TE	Private Sector Technical Training and Education Project	54

ProjTypeCode	Project Type	Number of Projects
	Grants	
HP	Instream Passage	41
PI	Public Involvement and Capacity Building	35
AS	Assessment	34
RH	Unknown	31
MO	Project Monitoring Following Project Completion	24
SC	Fish Screening of Diversions	17
PM	Project Maintenance	13
RP	Research Project	11
AC	Americorps Program only	6
ALL	All project types	5
TW	Tailwater Management	4
CC	California Conservation Corps only	4
FL	Fish Ladder	3
WC	Water Conservation Measures (Ditch Lining, Piping, Stock Water Systems)	2
DR	Unknown	2
EQ	Unknown	1
di	Unknown	1
WW	Unknown	1
SA	Unknown	1
FI	Unknown	1

Each site can have multiple treatments and habitat categories, and some projects have multiple sites (Table 5), so projects can have many treatments and habitat categories. The numbers of projects and sites with different numbers of treatments are given in Table 6, and the number of projects and sites with different numbers of habitat categories are given in Table 7. More than 60% of the projects and almost half of the sites in the database have more than one treatment type. 40% of projects and nearly 30% of sites have more than one habitat category.

Table 5. Number of projects by number of sites per project (CHRPD 3/14/05).

Number of Sites	Number of Projects	Percent of Projects
1	3057	73%
2	379	9%
3	207	5%
4	125	3%
5	81	2%
6-10	167	4%
11-20	84	2%
21-30	24	1%
31-40	22	1%

Number of Sites	Number of Projects	Percent of Projects
41-50	6	0%
51-100	19	1%
>100	12	0%

Table 6. Number of projects and sites by number of treatments per project or site.

Number of Treatments	Number of Projects	Percent of Projects	Number of Sites	Percent of Sites
1	1645	39%	6546	52%
2	1107	26%	3798	30%
3	552	13%	1259	10%
4	351	8%	507	4%
5	202	5%	244	2%
6	116	3%	117	1%
7	68	2%	52	1%
8	49	1%	36	0%
9	34	1%	15	0%
10	18	0%	12	0%
11	13	0%	5	0%
12	11	0%	2	0%
13	2	0%	2	0%
14	7	0%	1	0%
15	1	0%	1	0%
16	2	0%		
17	2	0%		
18	2	0%		
27	1	0%		

Table 7. Number of projects and sites by number of habitat categories per project or site.

Number of Habitat Categories	Number of Projects	Percent of Projects	Number of Sites	Percent of Sites
1	2506	60%	8918	71%
2	1142	27%	2974	24%
3	371	9%	553	5%
4	116	3%	116	1%
5	37	1%	27	0%
6	7	0%	5	0%
7	4	0%	4	0%

In examining projects with multiple habitat categories, we found a number of projects associated with both 'Instream' and 'Riparian' habitat categories, so we created a new category called 'Instream and Riparian' for these projects. The same was done for sites. The remaining projects with multiple habitat categories were not assigned to a habitat category. Number of projects and sites assigned to each habitat category are given in Table 8. Rather than double counting, projects and sites are only assigned to a habitat category if a unique assignment can be made. The number of sites in each of these habitat categories, by study area, is given in Table 9. Table 10 presents the number of projects and sites per habitat category for all projects and sites. Each project or sites is counted in every category that is assigned to it in the database, so some are double counted in this table. Table 11 is a similar table for treatments.

Table 8. Number of projects and sites per habitat category. Projects and sites with multiple habitat categories are not assigned, except those with instream and riparian habitat categories together.

HabCategoryID	Habitat Category	Number of Projects	Percent of Projects	Number of Sites	Percent of Sites
		1329	32%	3151	25%
1	Instream	814	19%	2098	17%
28	Monitoring and Research	414	10%	1755	14%
32	Acquisition of Land or Water	355	8%	531	4%
12	Instream and Riparian	348	8%	528	4%
29	Education	216	5%	493	4%
27	Rearing	214	5%	357	3%
2	Riparian	171	4%	469	4%
30	Watershed Assessment	155	4%	309	2%
31	Watershed Organization Support	55	1%	82	1%
26	Road	55	1%	2388	19%
3	Upland	27	1%	306	2%
24	Wetland	19	0%	47	0%
99	Unknown	10	0%	82	1%
25	Estuary	1	0%	1	0%

Table 9. Number of sites per study area and habitat category, without double counting.

Habitat Category	Study Area					
	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO
	125	509	1115	810	212	380
Instream	212	357	725	624	101	79
Riparian	70	113	103	129	37	17
Upland	10	86	22	184	3	1
Instream and Riparian	39	70	180	132	73	34
Wetland	10	3		23	9	2
Estuary			1			
Road	36	457	822	1038	5	30
Rearing	27	65	179	52	4	30
Monitoring and Research	140	738	318	322	78	159
Education	87	58	142	108	60	38
Watershed Assessment	12	29	37	101	28	102
Watershed Organization Support	21	13	8	22	2	16
Acquisition of Land or Water	118	26	31	94	106	156
Unknown	16		1	21	4	40

Table 10. Number of projects and sites by habitat category. Each project and site is counted in every category to which it is assigned in the database, so some projects and sites are counted multiple times.

HabCategoryID	Habitat Category	Number of Projects	Number of Sites
1	Instream	1537	3992
28	Monitoring and Research	1070	2803
2	Riparian	886	1542
30	Watershed Assessment	772	1330
29	Education	709	1203
32	Acquisition of Land or Water	416	603
26	Road	299	3848
31	Watershed Organization Support	285	359
27	Rearing	261	405
3	Upland	202	776
24	Wetland	125	175
99	Unknown	51	136
25	Estuary	9	10

Table 11. Number of projects and sites per treatment. Each project and site is counted for every treatment to which it is assigned in the database, so some projects and sites are counted multiple times.

DetailsID	Treatment	Number of Projects	Number of Sites
30000	Survey, study, research	949	2319
30008	Watershed assessment and planning	771	1329
30003	Education, training, workshops	642	1109
47	Large wood placement (not anchored, or not known if anchored)	429	696
501	Land purchased, leased, or easement acquired	412	598
7	Stream bank stabilized (unknown method)	374	609
105	Hardwoods planted	366	572
8	Boulders placed in stream	337	573
10002	Watershed organization support	282	356
21	Fish barrier removed (type unknown)	277	393
30007	Salmon enhancement: Collect/raise/transport/plant fish	258	387
30020	Pool created using scour structure	254	367
106	Fencing/livestock exclusion	226	310
56	Log jam removed	216	383
116	Stream bank stabilized: riprap (rock revetment) installed	191	371
101	Conifers planted	189	300
11	Rock weir installed (not below culvert)	185	241
51	Stream bank stabilized: bioengineering (living building materials)	179	371
117	Willows planted (simple planting, not bioengineering)	179	276
120	Stream bank stabilized: stream bank resloped	177	365
201	Road modified to reduce impacts to streams	176	1896
42	Planting (unknown type)	172	321
65	Invasive plant control	157	286
97	Other treatment (enter further information in comments)	145	198
30013	Monitoring of watersheds and fisheries	143	593
203	Road drainage culve rt installed/replaced/improved	141	657
5	Pool created (unknown method)	140	183
2	Rootwads placed in stream	135	226
115	Grass planted	123	164
206	Road decommissioned/obliterated	116	1609
302	Upland erosion control	109	720
10001	Restoration project effectiveness monitoring	100	241
30005	Educational video, display, interpretive facilities	99	121
40	Culvert or other stream crossing removed and not replaced	99	946
30021	Culvert/bridge upgraded (unknown method)	84	270

DetailsID	Treatment	Number of Projects	Number of Sites
53	Flow deflector installed: rock/boulder	84	115
12	Flow deflector installed (type unspecified)	78	102
121	Shrubs or herbaceous vegetation planted	75	98
404	Existing wetland improved	75	88
4	Log weir installed (not below culvert)	70	99
18	Fish trapped for survey or rearing	63	92
503	Repair/maintenance of existing restoration project structure (non-dam)	62	84
15	Fish screen installed	61	87
119	Sediment removed from stream	61	176
14	Fish ladder installed	60	70
32	Main stream channel modified/created	55	74
9	Brush bundles placed in stream	53	85
202	Road ditch and drainage culvert maintenance (removing debris)	53	99
30023	Irrigated new plantings	47	64
37	Culvert retrofitted with baffles or weirs	46	53
99	Unknown	46	127
16	Spawning gravel placed in stream	43	72
23	Fish ladder improved	39	41
118	Sediment-trap dam installed	37	43
34	Culvert replaced with bridge	36	40
41	Trees planted (unknown type)	35	48
39	Bridge installed	33	35
30019	Flow deflector installed: rock and log	31	40
107	Livestock off-channel watering facility developed	28	42
28	Water management (storage and release timing)	23	41
1	Large wood anchored in place (log, rootwad)	23	58
38	Weir installed below culvert outlet	22	26
403	Previously filled or drained wetland restored	22	44
402	Wetland created	22	27
35	Culvert replaced with open-bottom arch culvert	22	28
407	Wetland vegetation planted	21	38
57	Dam removed	20	22
50	Stream bank stabilized: rock and log revetment installed	19	24
304	Irrigation system improved	18	23
49	Stream bank stabilized: log revetment installed	17	32
52	Flow deflector installed: log	16	30
10	Off-channel habitat created (alcove, side channel, pond)	13	16
401	Dike breached	13	15
303	Upland vegetation management changed	13	54

DetailsID	Treatment	Number of Projects	Number of Sites
17	Stream bank stabilized: rock gabion installed	10	14
58	Fence maintenance	10	18
36	Culvert replaced with closed-bottom culvert (round or pipe-arch)	9	19
30011	Wildlife management, trapping, transport (except beaver introduction)	9	14
112	Dam repaired	8	8
61	Irrigation water recycled (tailwater recaptured)	8	8
33	Improve ford (low water crossing)	8	36
31	Concrete weir installed (not below culvert)	8	8
54	Pool excavated or blasted	8	8
102	Hardwood stand converted to conifers	7	9
24	Off-channel habitat reconnected or access improved (alcove, side channel, etc.)	5	6
306	Agricultural or grazing practices modified	5	5
30022	Salmon enhancement: facilities	4	4
502	Water right purchased or leased	4	5
29	Loosened/cleaned spawning gravels (gravel ripping)	4	6
205	Harvest/land management practices changed	4	4
20	Pushup dam permanently removed	3	4
59	Livestock access/crossing created or improved	3	4
603	Previously filled or drained estuary restored	3	3
30015	Salmon enhancement: Fish marking and technology	3	4
209	Mine site restored	3	3
63	Culvert replaced with open-bottom box culvert	2	3
602	Tidegate altered/removed	2	3
604	Freshwater flow in estuary increased	2	3
601	Estuarine area created	1	1
48	Weir installed (unknown type, not below culvert)	1	1
64	Culvert replaced with closed-bottom box culvert	1	1

Restoration Cost Data

As mentioned earlier, cost data are stored at the project level. Total cost values for projects are stored in the MitProject table in the fields ProposedTotalCost and ActualTotalCost (see schematic in Appendix 1). Proposed total cost is the expected cost of the project from the project proposal, whereas actual total cost reflects updated information based on final reports and should be used when available. All projects in the database have proposed cost values, but 7 of them have cost values of zero. This is either because there actually was no cost associated with these projects or because the cost was unknown. 2720 projects in the database have updated cost values, two of which are zero.

Projects with multiple sites do not have cost information broken out by site. To analyze costs at the site level, we assumed that project costs are apportioned equally among sites, so we divided the project cost by the number of sites to get an estimate of site level cost.

We corrected costs for inflation using GDP implicit price deflators from the Economic Report of the President, 2004. 2003 was used as the base year, and deflators for 2004 through 2006 were estimated using 'predict.lm' in the R statistical package (Ver 2.0.0), based on a linear model with year as the predictor and price deflators as the response variable ($P < 0.0001$, $R^2 = 0.992$).

The total amount spent on all sites in each study area is given in Table 12. The largest amount has been spent in the Southern California (SCACO) study area even though the number of sites there has been relatively small. This appears to be the result of the relatively large number and high cost of land acquisition projects in this area (Tables 9 and 13). The total cost of all sites per habitat category for each study area is given in Table 13.

Table 12. Total cost of restoration work at all sites, by study area.

Study Area	Total Cost	Number of Sites
None	$466,382,007	923
SONC	$180,361,729	2524
NOCECA	$621,724,193	3660
NOCECA and SONC	$116,125,782	3684
Central Valley	$326,344,565	722
SCACO	$1,169,915,084	1084

Table 13. Total cost ($1,000s) of restoration work, by habitat category and study area.

Habitat Category	Study Area						
	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO	Total Cost
	$49,715	$30,849	$29,910	$200,153	$109,507	$246,506	$666,641
Instream	$6,309	$13,884	$10,717	$18,719	$25,409	$20,732	$95,769
Riparian	$2,328	$2,087	$2,262	$4,093	$2,776	$5,902	$19,447
Upland	$255	$2,810	$1,189	$7,029	$117	$584	$11,985
Instream and Riparian	$4,028	$4,828	$8,218	$15,969	$2,813	$5,926	$41,782
Wetland	$1,419	$26	$0	$17,197	$881	$2,576	$22,094
Estuary	$0	$0	$2	$0	$0	$0	$2
Road	$320	$7,787	$6,573	$7,582	$724	$159	$23,145
Rearing	$1,013	$3,145	$3,810	$1,868	$61	$932	$10,830
Monitoring and	$9,843	$13,075	$4,338	$33,168	$21,254	$17,864	$99,541

Habitat Category	Study Area						
	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO	Total Cost
Research							
Education	$5,973	$1,781	$6,572	$20,758	$5,524	$6,131	$46,738
Watershed Assessment	$2,565	$1,368	$1,039	$11,058	$4,432	$18,982	$39,444
Watershed Organization Support	$7,863	$3,057	$678	$3,031	$43	$2,365	$17,037
Acquisition of Land or Water	$371,453	$95,665	$40,812	$280,009	$152,159	$839,848	$1,779,946
Unknown	$3,298	$0	$6	$1,090	$644	$1,414	$6,452

Project costs are highly positively skewed (Figure 9) because there are progressively fewer projects with higher dollar costs. For this reason, average cost values (Table 14) are not particularly informative. Median site cost is given in Table 15 for each habitat category and study area is given and in Table 16 for each study area overall. To graphically compare costs, we first log transformed the cost data (Figure 10) to eliminate skewness and then plotted parallel box plots[2] of the data. Figure 11 shows box plots of log transformed site cost for each study area. Median costs are highest in the Central Valley and Southern California study area. Box plots of log transformed site cost for each habitat category are presented in Figure 12. It is clear from this figure that land acquisition projects stand out as the most expensive projects in the database. Figures 13 through 17 present box plots of log transformed site cost for each habitat category for each study area separately.

[2] A box plot is a graphic representation of a frequency distribution of a set of data. The rectangle (or box) has upper and lower limits representing the interquartile range (IQR; 50% of the data), the horizontal line within the rectangle represents the median, and the vertical tails ("whiskers") extending above and below the rectangle extend to the most extreme data point which is no more than +/-1.5*IQR. Points outside of the whiskers represent possible outliers.

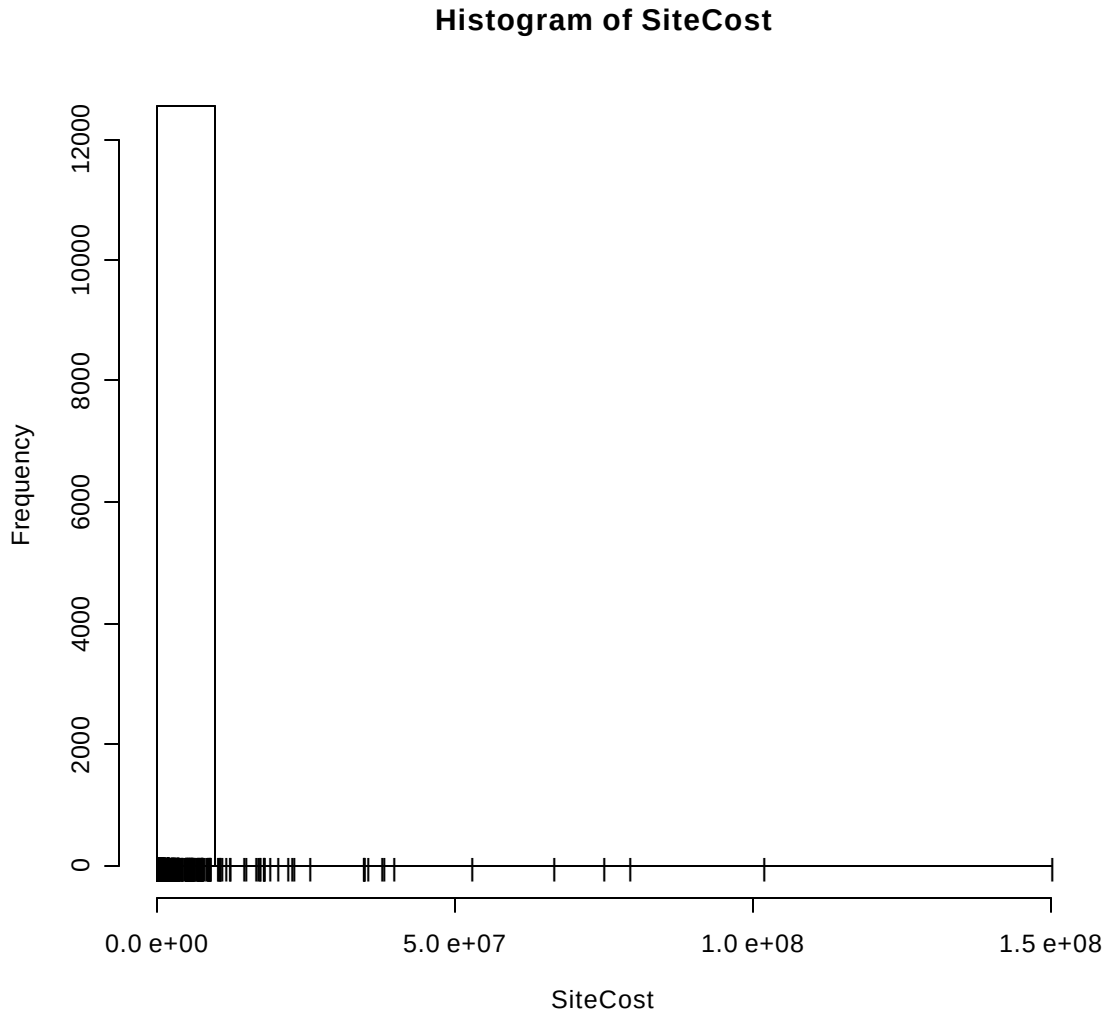


Figure 9. Histogram of site costs for all sites with markers showing the locations of data points.

Table 14. Average restoration site cost ($1,000s), by habitat category and study area.

Habitat Category	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO	Average Cost
	$398	$61	$27	$247	$517	$649	$212
Instream	$30	$39	$15	$30	$252	$262	$46
Riparian	$33	$18	$22	$32	$75	$347	$41
Upland	$25	$33	$54	$38	$39	$584	$39
Instream and Riparian	$103	$69	$46	$121	$39	$174	$79

Habitat Category	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO	Average Cost
Wetland	$142	$9		$748	$98	$1,286	$470
Estuary			$2				$2
Road	$9	$17	$8	$7	$145	$5	$10
Rearing	$39	$48	$21	$36	$16	$31	$30
Monitoring and Research	$70	$18	$14	$103	$272	$112	$57
Education	$69	$31	$46	$192	$92	$166	$95
Watershed Assessment	$214	$47	$28	$116	$158	$186	$130
Watershed Organization Support	$374	$235	$85	$138	$22	$148	$208
Acquisition of Land or Water	$3,148	$3,679	$1,317	$3,219	$1,435	$5,418	$3,403
Unknown	$206		$6	$52	$161	$35	$79

Table 15. Median restoration site cost, by habitat category and study area.

Habitat Category	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO	Median Cost
	$53,792	$1,667	$2,336	$5,506	$551,832	$28,788	$11,152
Instream	$10,263	$3,520	$11,619	$25,444	$88,449	$4,223	$9,493
Riparian	$4,161		$3,478	$3,100	$6,540	$110,092	$10,944
Upland	$39,358		$62,185	$12,065	$21,715	$94,784	$3,100
Instream and Riparian	$9,294	$32,388	$16,493	$9,697	$2,597	$7,032	$25,726
Wetland	$221,761			$2,336	$626,165	$30,080	$20,833
Estuary			$740				$2,336
Road	$7,032		$5,537	$41,282	$42,515	$1,285,789	$4,851
Rearing	$10,263	$8,724	$5,625	$6,047	$65,271	$49,308	$18,146
Monitoring and Research	$27,531	$48,703	$4,851	$3,673	$18,755	$584,459	$3,991
Education	$9,409	$5,453	$26,929	$27,530	$36,106	$19,513	$5,605
Watershed Assessment	$133,290		$1,816,000	$3,478	$17,570	$10,654	$39,455
Watershed Organization Support	$47,788		$37,613	$660,909	$21,382	$12,914	$64,854
Acquisition of Land or Water	$797,664	$35,448	$7,103	$9,131	$11,102	$30,423	$796,693
Unknown	$7,836		$86,871	$32,689	$26,361	$15,727	$7,032

Table 16. Median restoration site cost, by study area.

Study Area	Median Cost	Number of Sites
None	$13,282	923
SONC	$8,399	2524
NOCECA and SONC	$5,448	3684
NOCECA	$6,359	3660
Central Valley	$75,526	722
SCACO	$55,357	1084

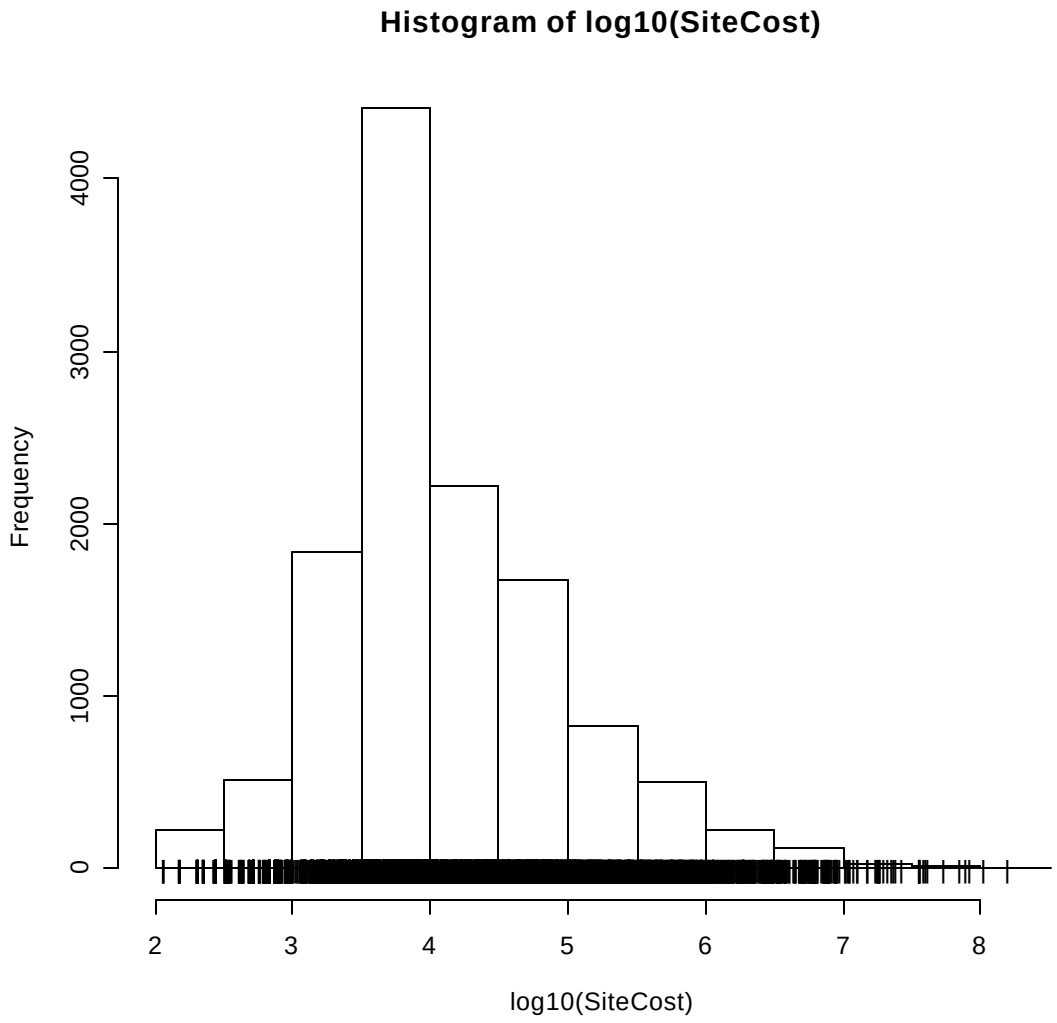


Figure 10. Histogram of log transformed site cost for all sites with markers showing the locations of data points.

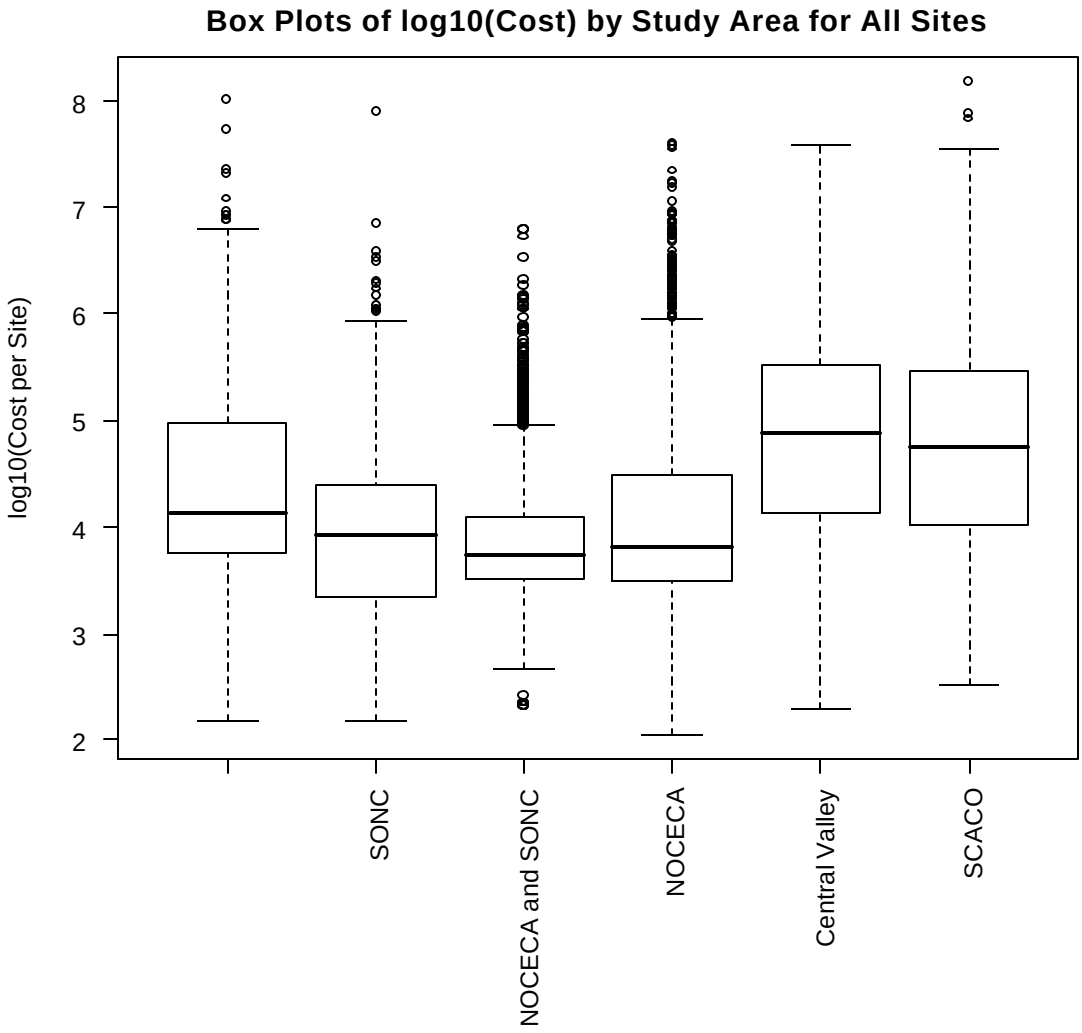


Figure 11. Parallel box plot of log transformed site cost for each study area.

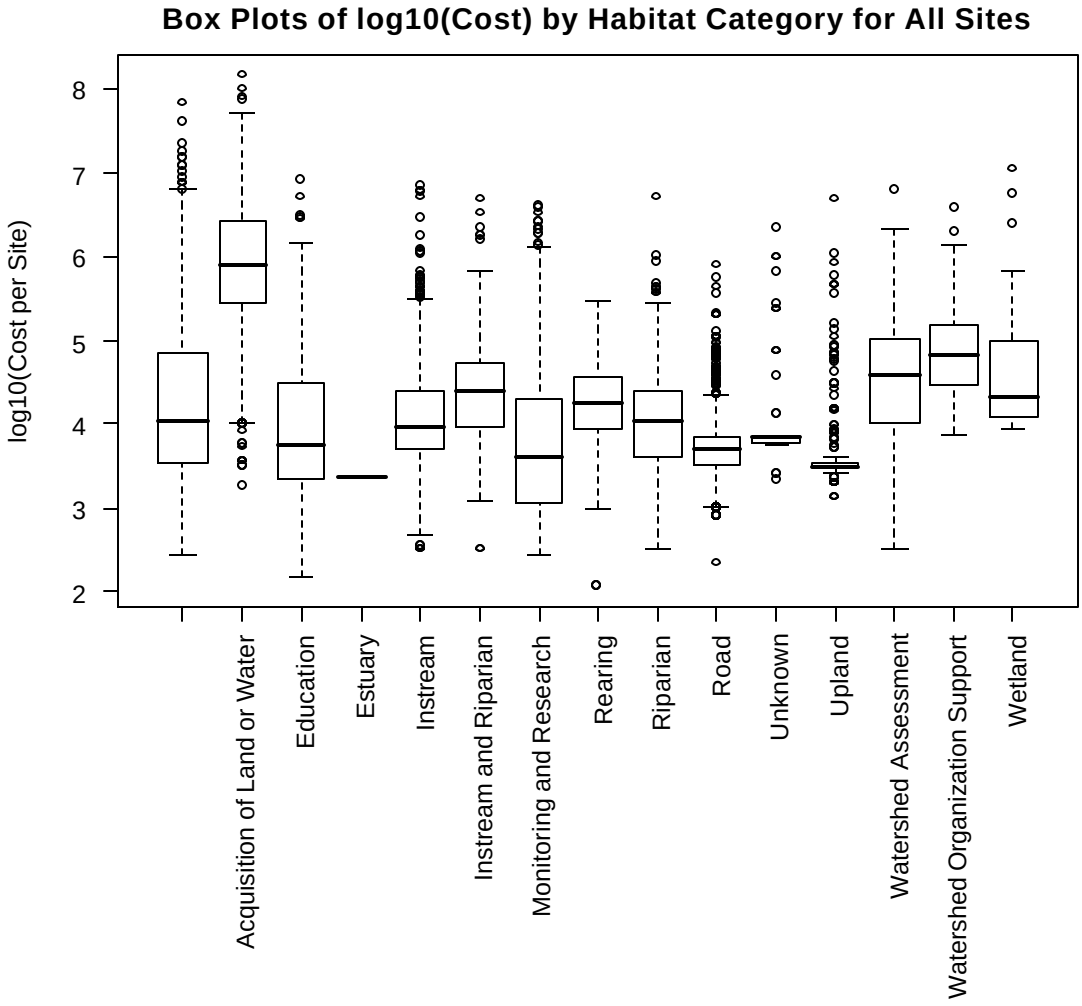


Figure 12. Parallel boxplot of log transformed site cost for each habitat category

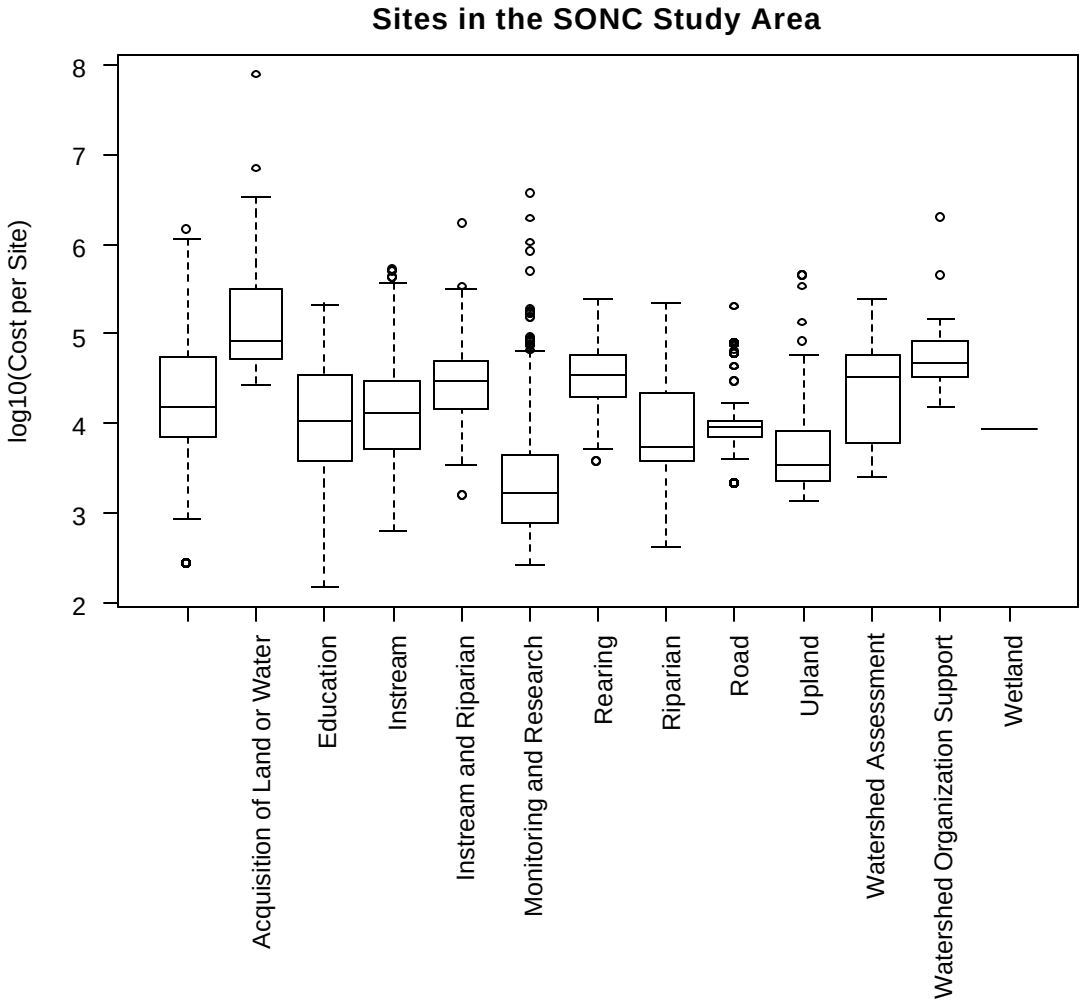


Figure 13. Parallel boxplot of log transformed site cost for each habitat category for sites in the SONC study area.

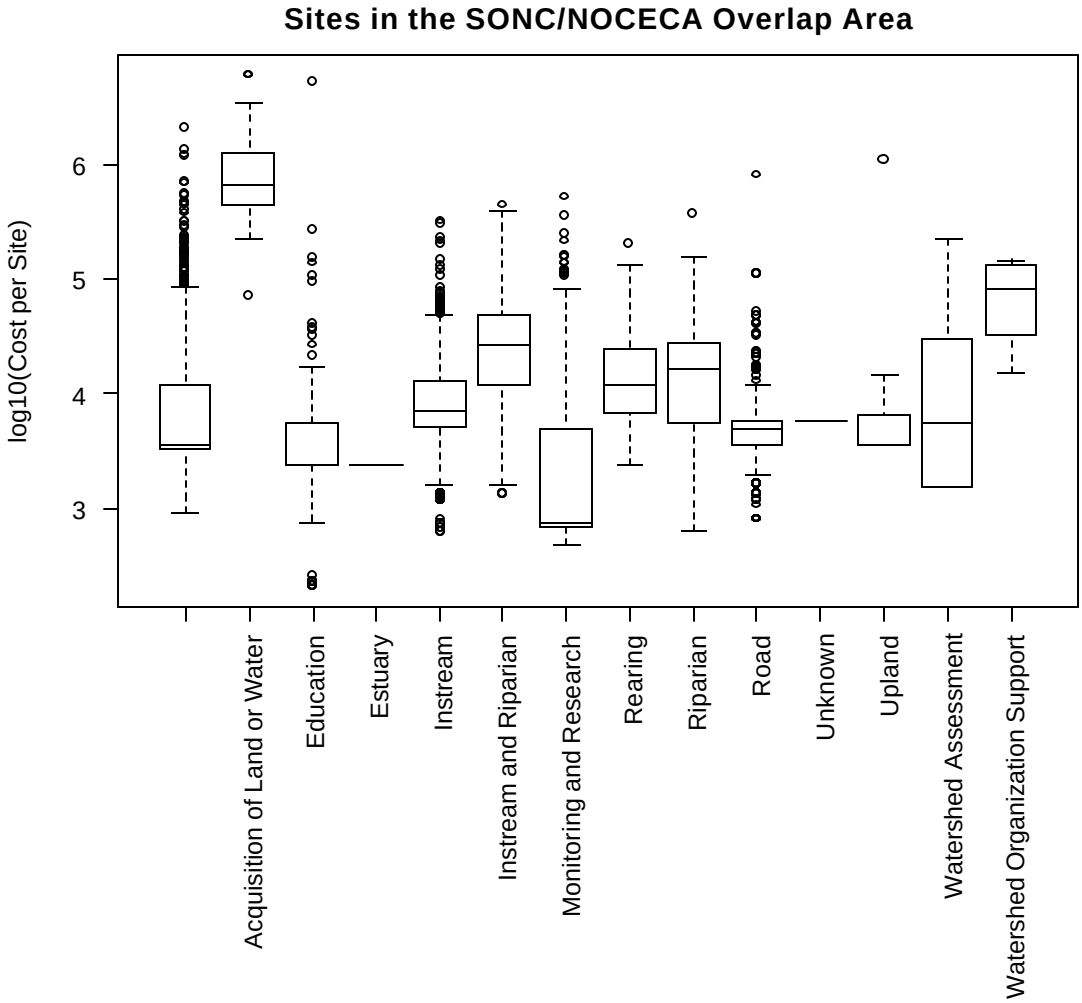


Figure 14. Parallel boxplot of log transformed site cost for each habitat category for sites in the SONC/NOCECA overlap area.

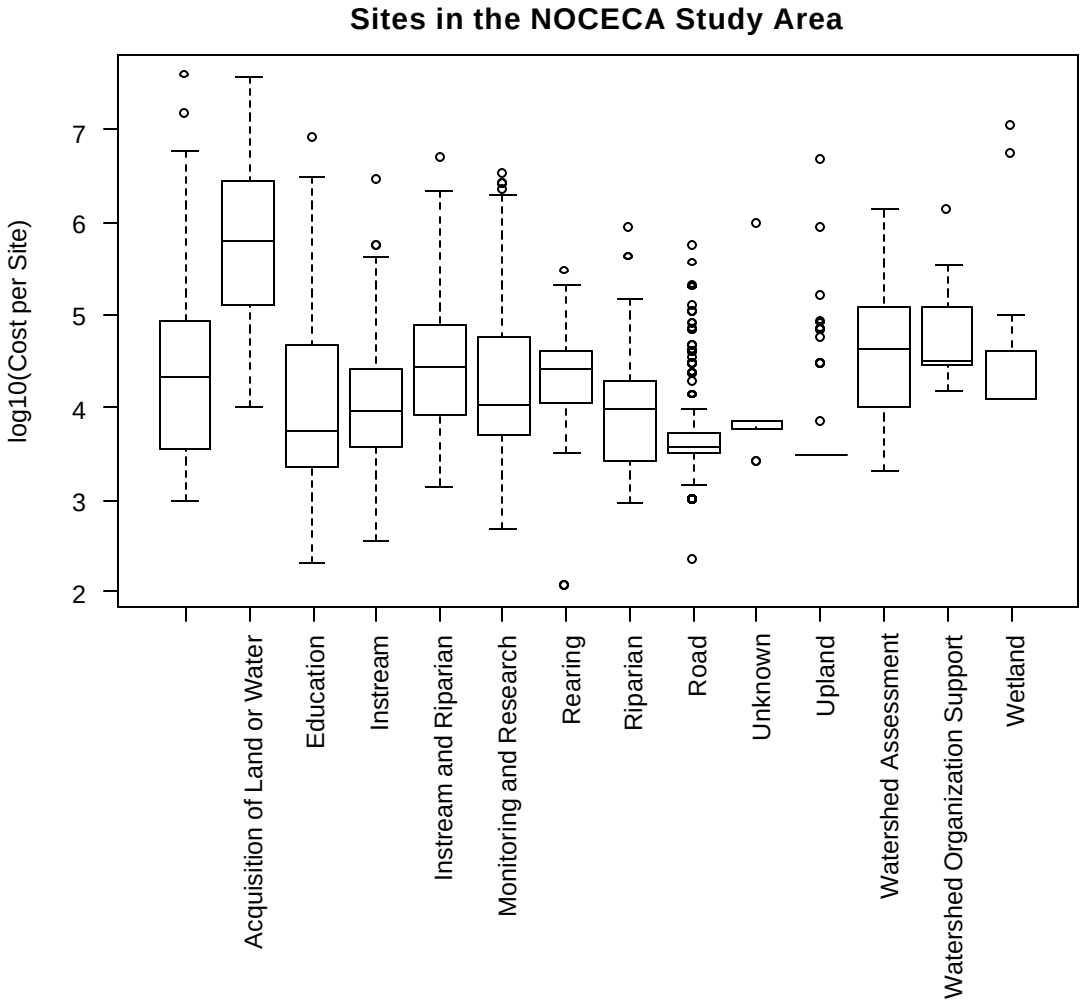


Figure 15. Parallel boxplot of log transformed site cost for each habitat category for sites in the NOCECA study area.

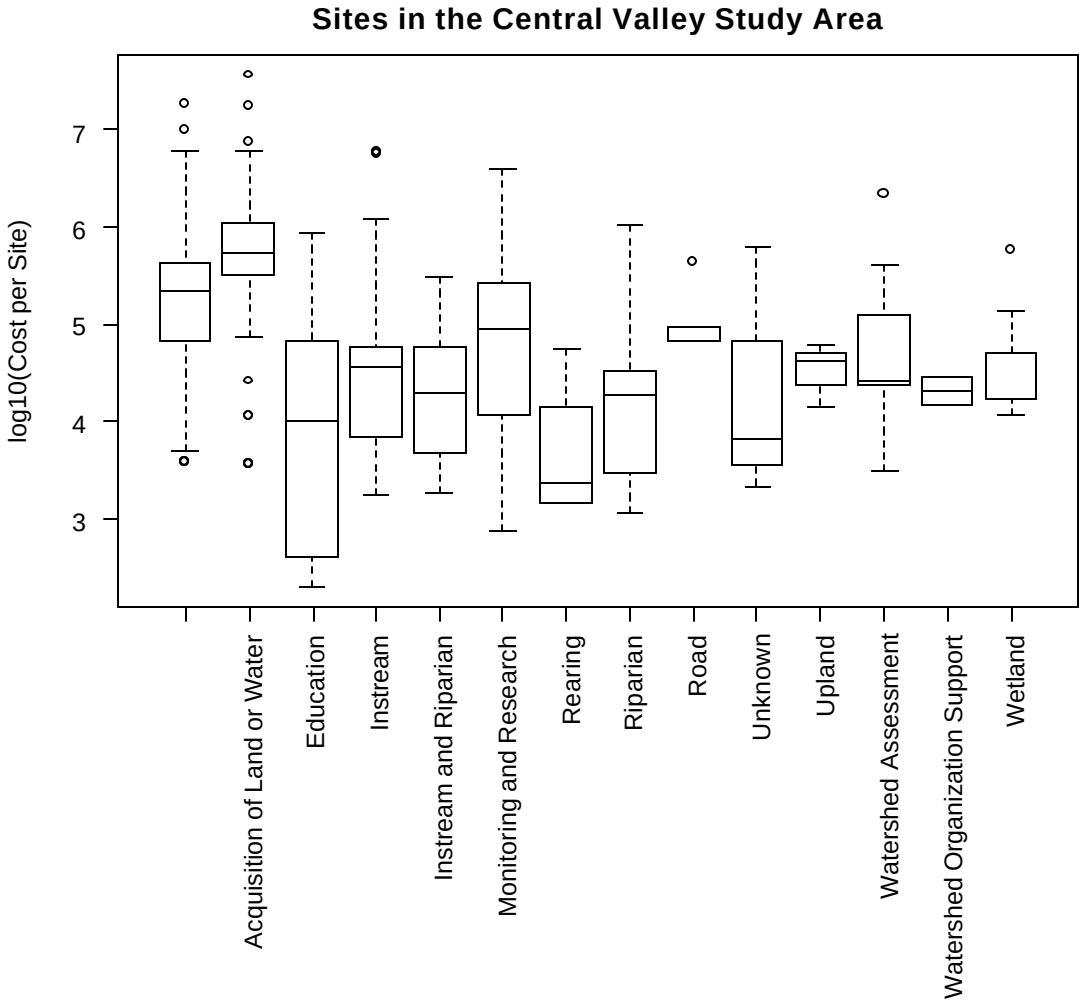


Figure 16. Parallel boxplot of log transformed site cost for each habitat category for sites in the Central Valley study area.

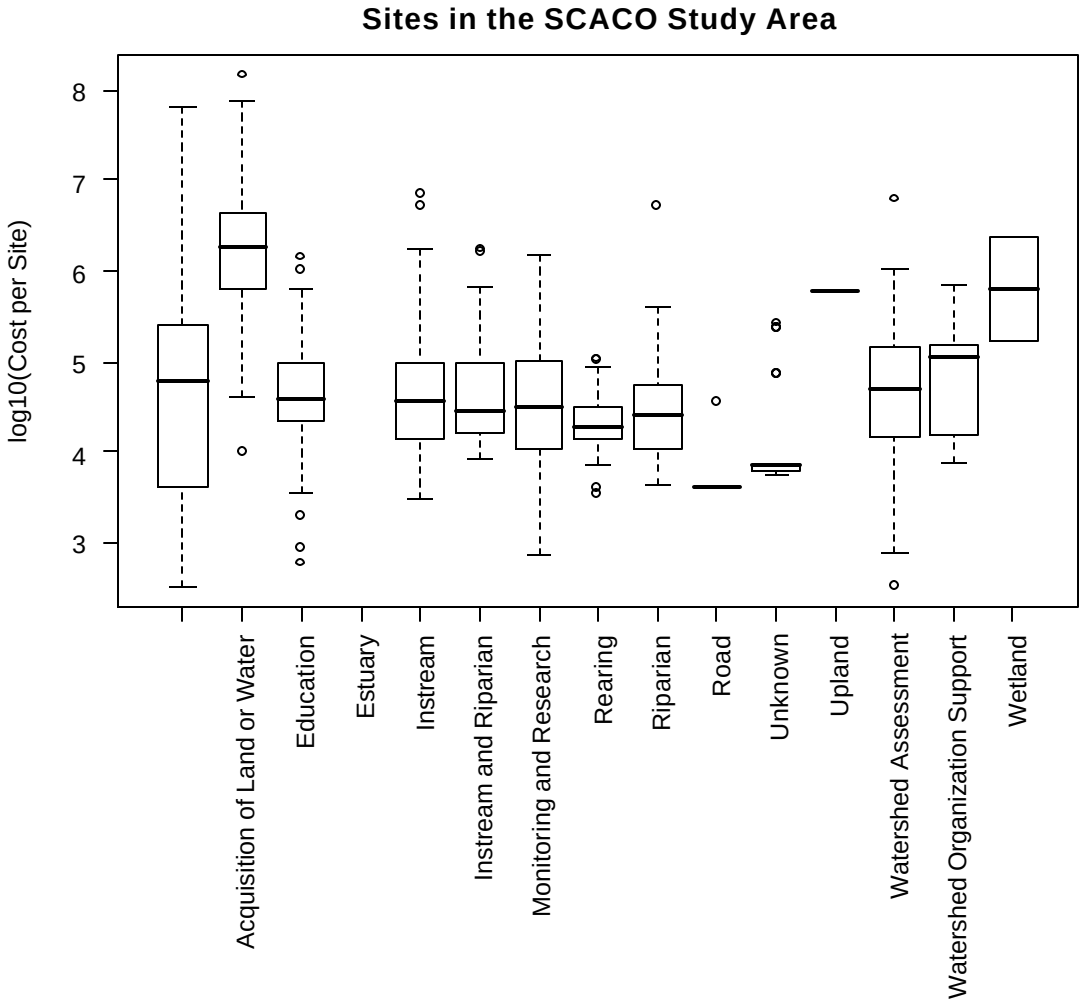


Figure 17. Parallel boxplot of log transformed site cost for each habitat category for sites in the SCACO study area.

Tier 2: Selected Habitat Restoration Categories

We are primarily interested in restoration habitat categories (mainly on-the-ground restoration) that are likely to affect salmonid recovery. The relevant habitat categories in the database are instream, riparian, roadwork, upland, and land acquisition, plus the combined 'instream and riparian' category we added to the database. Wetland and estuary restoration work are also relevant, but there are few projects in these categories, so they have been excluded. There are 2,432 projects and 8,354 sites in the database that are in one or more of the selected categories. For simplicity, from here on, we call this subset of projects 'restoration projects' or 'restoration sites'. To avoid double counting, projects and sites that occur in more than one category are assigned a new category called 'multiple'.

We are most interested in recent restoration projects because they are the most likely to use current techniques and have up-to-date cost information. The information in the database for more recent projects is also likely to be more complete and accurate because reporting requirements are more detailed and rigorous than they used to be. For this section, we therefore limit the data to projects from 1998 and forward. 1,523 of the 2,432 projects and 6,793 of the 8,354 sites with restoration habitat categories meet this criterion. Of those, 1367 projects and 6481 sites have geographic information. In this section we include the projects and sites without geographic information for all summaries that do not involve geography.

Temporal Distribution

The distributions of restoration projects and sites by year are shown in Figures 18 and 19 respectively. For this subset of projects, the temporal distribution of projects and sites is similar to that for the overall dataset. The number of projects peaked between 2001 and 2003 and has been decreasing annually since then. The number of sites peaked in 2003 and has been decreasing gradually since then. Interestingly, the number of roadwork sites decreased from 2003 to 2004 and then increased above 2003 levels in 2005.

The distribution of cost (amount spent or proposed) by year is shown in Figure 20. The amount spent on restoration peaked in 2003 and has declined rapidly in 2004 and 2005. For all years except 2005, the majority of the restoration money was spent on land acquisition projects, but in 2005 the majority of the restoration money was spent on instream and roadwork projects.

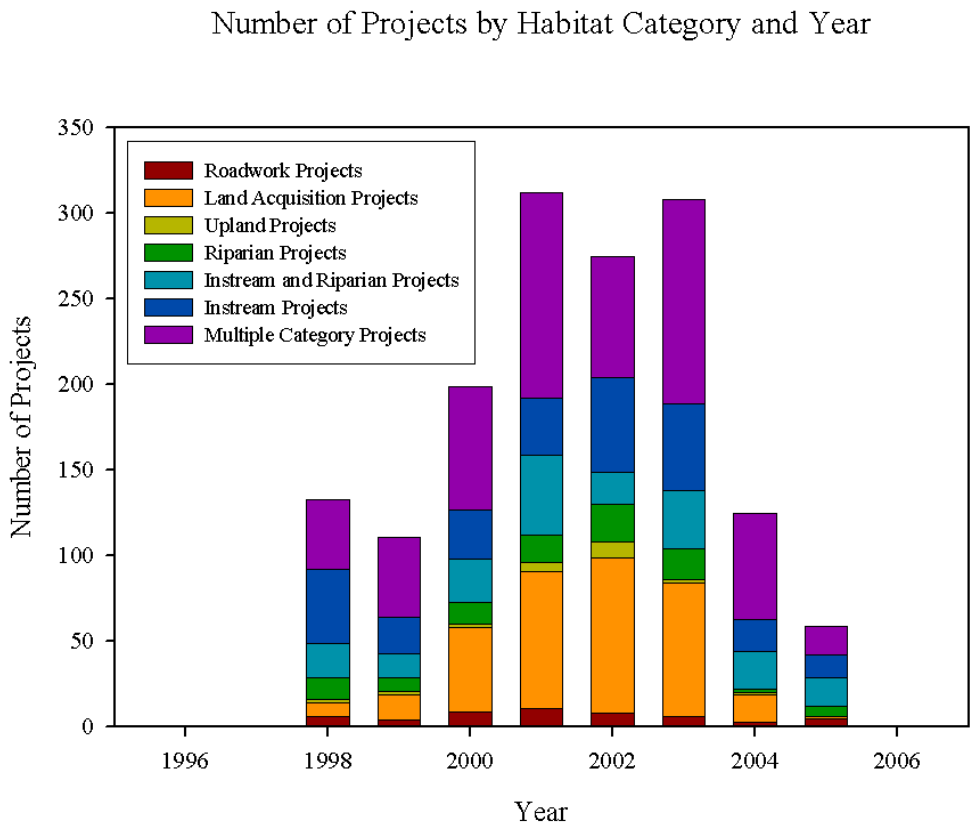


Figure 18. Number of projects by year, stratified by habitat category, for restoration projects beginning in 1998 and forward.

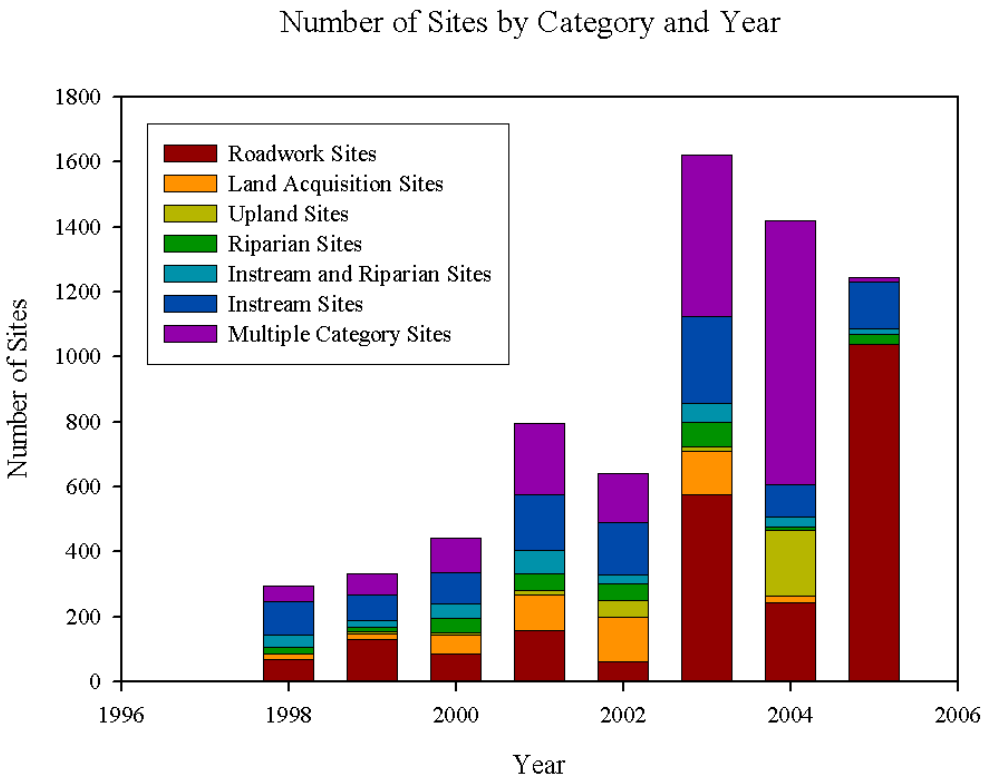


Figure 19. Number of sites by year, stratified by habitat category, for restoration projects beginning in 1998 and forward.

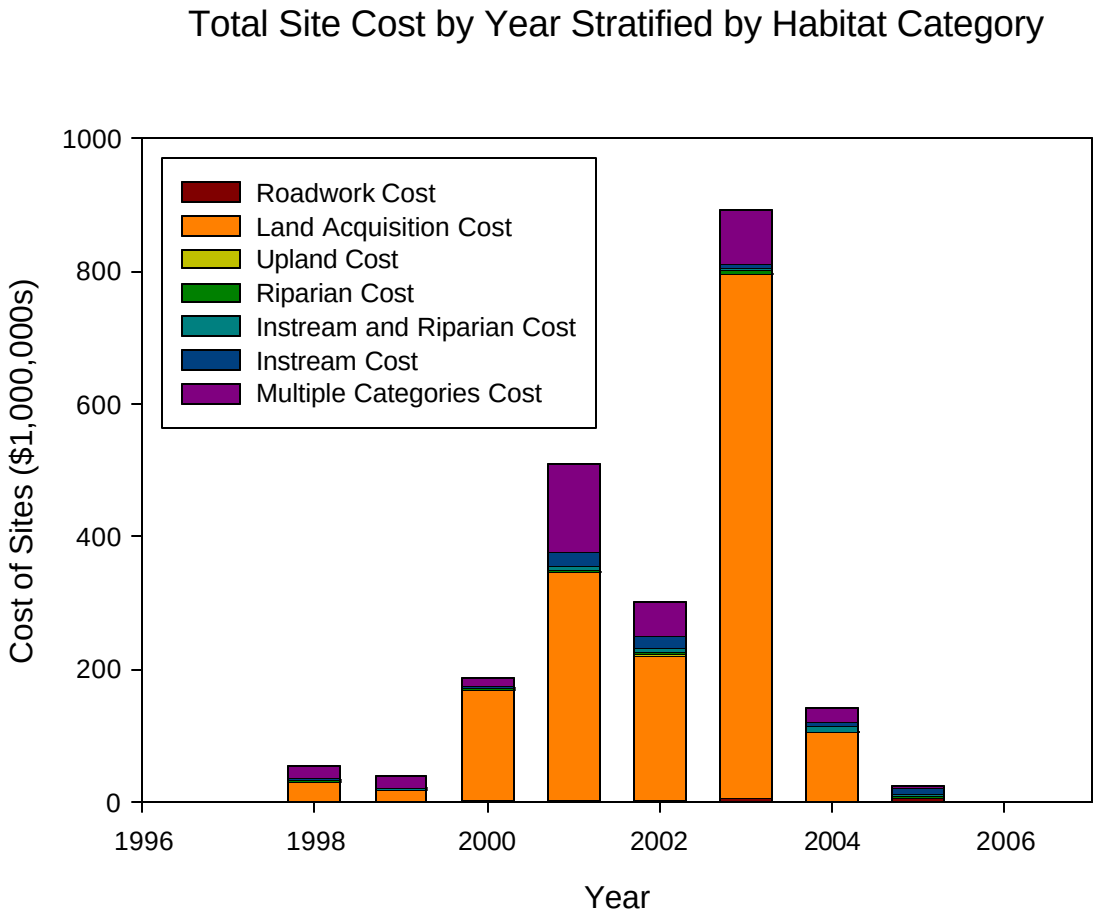


Figure 20. Total site costs (millions of dollars) by year, stratified by habitat category, for restoration projects beginning in 1998 and forward.

Measurements

One of the most important determinants of project cost is the amount of work that was done. This information is stored in the database as measurements of project and site size. Size measurements are stored separately for projects and their corresponding sites. There can be multiple measurements of size at both the site and the project level.

There are several problems with the size measurements in the CHRPD. First, the size measurements for projects don't necessarily correspond to the size measurements for the corresponding sites, indicating that some of the size measurements are not accurate. Second, the size measurements may not be a comprehensive representation of what was done for the site or project; there may have been more or less work done than indicated by the measurement data. This is because some measurements may not have been entered into the database, and some of the measurements in the database may represent work that was not completed. Third, in some cases there are many possible measurement units for the same treatment, and these units are not standardized. It is, therefore, impossible to tell whether some units are comparable (treatments, units, and number of

sites per habitat category are given in Appendix 3). We converted measurements to common units where possible. We converted yards, feet, and meters to miles; square feet, square yards, square meters, and square miles to acres; acre-feet and gallons to cubic yards; and pounds to tons.

Finally, many sites and projects don't have any measurement data. Of the 6793 sites of interest, 4643 (68%) have one or more measurements in the database; 32% have no measurement data. The number of sites by number of measurements per site is given in Table 17. Of the 1523 projects of interest, 1379 (90.5%) have one or more measurements in the database; 9.5% have no measurement data. The number of projects by number of measurements per project is given in Table 18.

For purposes of this document, we select the most common units for each habitat category to summarize the data. The number of sites associated with different measurement units is given by habitat category in Table 19, and the number of projects associated with different measurement units is given by habitat category in Table 20. The numbers of sites and projects per unit of measurement overall are given in Tables 21 and 22 respectively.

Table 17. Numbers of sites by number of measurements per site, for restoration projects beginning in 1998 and forward.

Number of Measurements	Number of Sites	Percent of Sites
0	2150	32%
1	2603	38%
2	1511	22%
3	339	5%
4	105	2%
5	45	1%
6	19	0%
7	7	0%
8	6	0%
9	7	0%
10	1	0%

Table 18. Numbers of projects by number of measurements per project, for restoration projects beginning in 1998 and forward.

Number of Measurements	Number of Projects	Percent of Projects
0	144	9%
1	687	45%
2	357	23%
3	186	12%
4	61	4%
5	52	3%

Number of Measurements	Number of Projects	Percent of Projects
6	26	2%
7	8	1%
8	2	0%

Table 19. Number of sites by habitat category and number of measurement units per site, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Habitat Category	Units	Number of Sites
Instream		904
Instream	structure	368
Instream	mile	240
Instream	culvert	117
Instream	barrier	98
Instream	pool	97
Instream	crossing	90
Instream	Unit	68
Instream	cubic yard	66
Instream	Log	65
Instream	Ton	41
Instream	screen	34
Instream	bridge	30
Instream	each	18
Instream	Dam	9
Instream	acre	9
Instream	Site	8
Instream	baffle	4
Instream	Tree	2
Instream	boulder	1
Instream	weir	1
Instream	section	1
Riparian		273
Riparian	Tree	85
Riparian	mile	73
Riparian	acre	64
Riparian	Unit	16
Riparian	seedling	4
Riparian	year	4
Riparian	structure	1
Upland		265
Upland	acre	31
Upland	mile	24
Upland	Site	7

Habitat Category	Units	Number of Sites
Upland	bale	6
Upland	cubic yard	6
Upland	structure	2
Upland	seedling	1
Upland	Unit	1
Instream and Riparian		761
Instream and Riparian	mile	221
Instream and Riparian	structure	106
Instream and Riparian	tree	60
Instream and Riparian	unit	33
Instream and Riparian	pool	32
Instream and Riparian	culvert	26
Instream and Riparian	barrier	25
Instream and Riparian	cubic yard	22
Instream and Riparian	acre	21
Instream and Riparian	log	14
Instream and Riparian	seedling	12
Instream and Riparian	ton	11
Instream and Riparian	crossing	11
Instream and Riparian	site	10
Instream and Riparian	each	6
Instream and Riparian	dam	5
Instream and Riparian	deflector	2
Instream and Riparian	year	2
Instream and Riparian	cluster	1
Instream and Riparian	bridge	1
Instream and Riparian	screen	1
Road		1281
Road	crossing	511
Road	site	382
Road	culvert	341
Road	mile	220
Road	cubic yard	84
Road	structure	29
Road	unit	9
Road	each	1
Acquisition of Land or Water	acre	343
Acquisition of Land or Water		143
Acquisition of Land or Water	mile	6
Multiple		2013
Multiple	crossing	1546
Multiple	mile	404

Habitat Category	Units	Number of Sites
Multiple	acre	311
Multiple	cubic yard	261
Multiple	culvert	259
Multiple	site	231
Multiple	structure	63
Multiple	unit	54
Multiple	tree	53
Multiple	barrier	34
Multiple	student	17
Multiple	ton	16
Multiple	year	14
Multiple	each	13
Multiple	pool	12
Multiple	bridge	10
Multiple	seedling	9
Multiple	day	5
Multiple	dam	5
Multiple	log	4
Multiple	persons	3
Multiple	screen	3
Multiple	meeting	1
Multiple	fish	1
Multiple	baffle	1
Multiple	boulder	1

Table 20. Number of projects by habitat category and number of measurement units per project, for restoration projects beginning in 1998 and forward (with duplicates).

Habitat Category	Units	Number of Projects
Instream	mile	152
Instream	structure	131
Instream	barrier	48
Instream	culvert	27
Instream	crossing	25
Instream	screen	22
Instream		17
Instream	cubic yard	13
Instream	dam	8
Instream	bridge	5
Instream	unit	4
Instream	pool	3
Instream	acre	2

Habitat Category	Units	Number of Projects
Instream	tree	2
Instream	ton	2
Instream	cfs	2
Instream	baffle	1
Instream	each	1
Instream	seedling	1
Riparian	mile	61
Riparian	acre	39
Riparian	tree	32
Riparian		20
Riparian	seedling	1
Riparian	crossing	1
Riparian	structure	1
Riparian	student	1
Upland	acre	12
Upland		8
Upland	cubic yard	2
Upland	mile	2
Upland	bale	1
Upland	crossing	1
Upland	structure	1
Upland	tree	1
Instream and Riparian	mile	223
Instream and Riparian	structure	94
Instream and Riparian	tree	69
Instream and Riparian	acre	40
Instream and Riparian	cubic yard	22
Instream and Riparian		15
Instream and Riparian	crossing	13
Instream and Riparian	barrier	12
Instream and Riparian	culvert	9
Instream and Riparian	seedling	3
Instream and Riparian	dam	3
Instream and Riparian	ton	2
Instream and Riparian	bridge	2
Instream and Riparian	meeting	1
Instream and Riparian	screen	1
Instream and Riparian	student	1
Instream and Riparian	unit	1
Instream and Riparian	persons	1
Road	mile	34
Road	crossing	19
Road	cubic yard	19

Habitat Category	Units	Number of Projects
Road		11
Road	Culvert	8
Road	Acre	3
Road	Tree	2
Road	Unit	1
Acquisition of Land or Water	Acre	326
Acquisition of Land or Water		13
Acquisition of Land or Water	Mile	9
Acquisition of Land or Water	Meeting	1
Acquisition of Land or Water	Persons	1
Acquisition of Land or Water	Student	1
Multiple	Mile	345
Multiple	Acre	284
Multiple	Crossing	109
Multiple	cubic yard	91
Multiple	Structure	68
Multiple	Tree	68
Multiple	Culvert	64
Multiple		60
Multiple	Persons	30
Multiple	Student	25
Multiple	Barrier	19
Multiple	Meeting	17
Multiple	Unit	14
Multiple	Classroom	5
Multiple	Screen	5
Multiple	Seedling	5
Multiple	Each	4
Multiple	Cfs	4
Multiple	Dam	3
Multiple	Ton	3
Multiple	cubic yards/year	1
Multiple	Log	1

Table 21. Overall number of sites associated with each type of measurement unit, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Measurement Units	Number of Sites
	5640
Crossing	2158
Mile	1188
Acre	779

Measurement Units	Number of Sites
Culvert	743
Site	638
structure	569
cubic yard	439
Tree	200
Unit	181
barrier	157
pool	141
Log	83
Ton	68
bridge	41
each	38
screen	38
seedling	26
year	20
Dam	19
student	17
Bale	6
Day	5
baffle	5
persons	3
deflector	2
boulder	2
Weir	1
Fish	1
section	1
meeting	1
cluster	1

Table 22. Overall number of projects associated with each type of measurement unit, for restoration projects beginning in 1998 and forward (with duplicates).

Measurement Units	Number of Projects
Mile	826
Acre	706
structure	295
Tree	174
crossing	168
cubic yard	147
	144
culvert	108
barrier	79
persons	32

Measurement Units	Number of Projects
student	28
screen	28
Unit	20
meeting	19
Dam	14
seedling	10
bridge	7
Ton	7
Cfs	6
classroom	5
each	5
Pool	3
cubic yards/year	1
Log	1
Bale	1
baffle	1

Projects and Sites by Study Area

Here we summarize data for restoration projects and sites by TRT study area to facilitate analysis by technical recovery teams. In the next section we summarize the data by watershed.

Numbers and Density

Figure 21 shows the density and number of sites per study area. The density and number of sites is highest in the SONC/NOCECA overlap area and lowest in the Central Valley and SCACO study areas. Figure 22 and Table 23 show the number of sites per habitat category and study area. The majority of sites in the northwestern part of the state are roadwork, multiple category, and instream restoration sites, whereas in the Central Valley and SCACO study areas the majority of sites are land acquisition and multiple category restoration sites. The number of projects per habitat category and study area is shown in Figure 23 and Table 24. In the northwestern part of the state, projects are dominated by instream, instream and riparian, and multiple category projects. There are far fewer roadwork projects than roadwork sites because roadwork projects are typically comprised of many sites (Table 25).

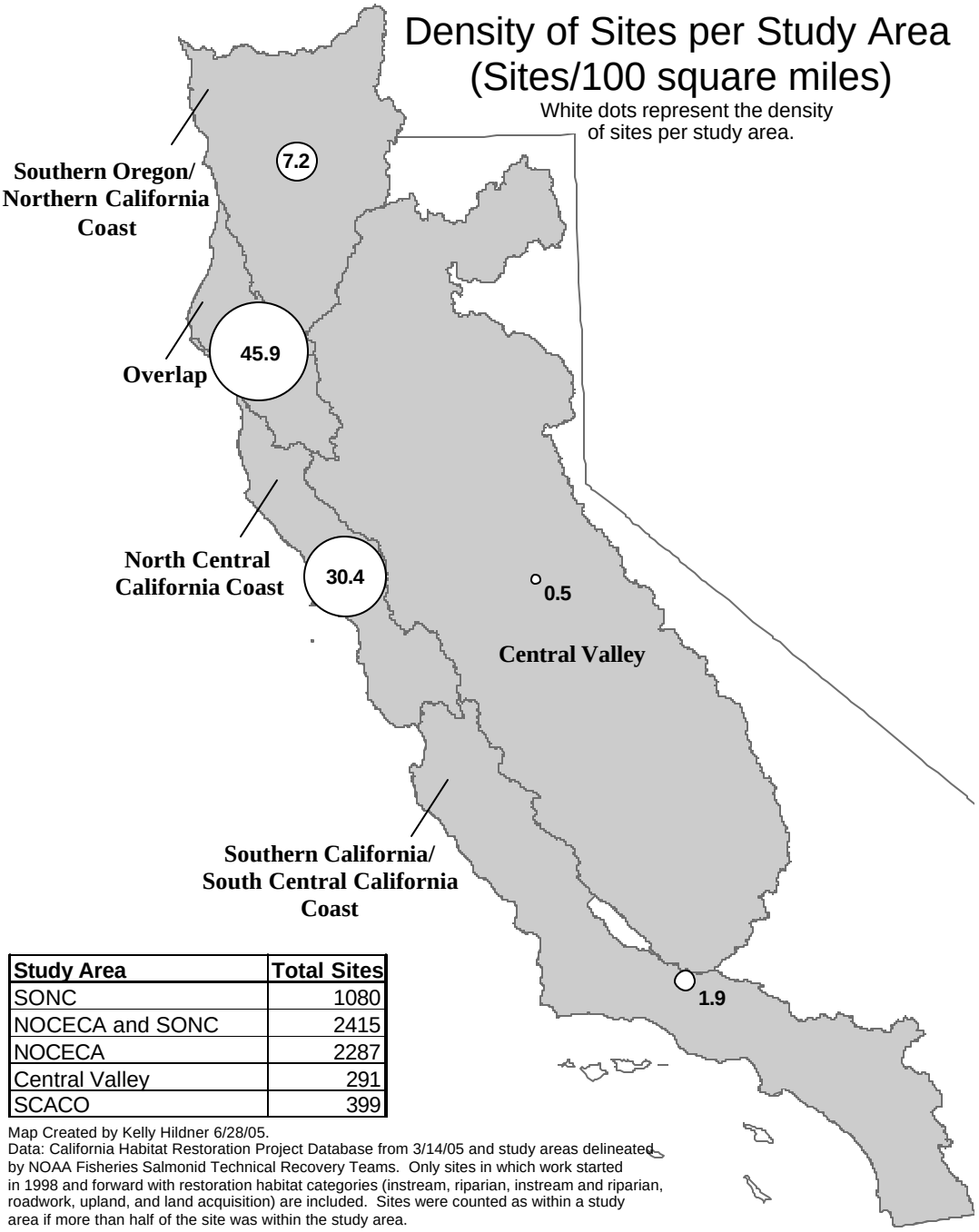


Figure 21. Density and number of sites per study area (Tier 2 data).

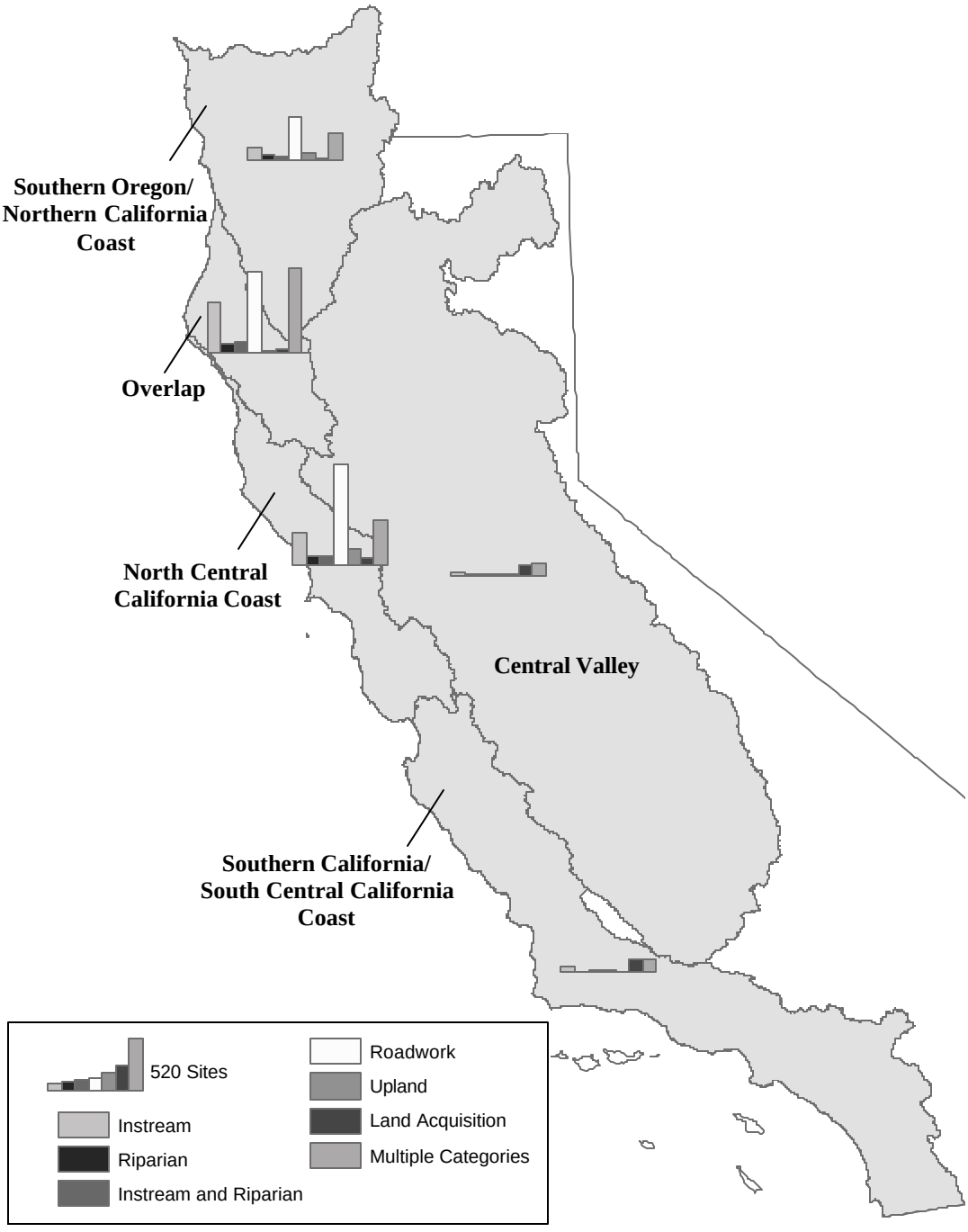


Figure 22. Number of sites per study area for selected habitat categories, for restoration projects beginning in 1998 and forward. See Table 23.

Table 23. Number of sites by habitat category and study area, for sites associated with restoration projects beginning in 1998 and forward.

Habitat Category	Study Area					
	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO
Instream	55	145	503	330	31	59
Riparian	26	62	78	104	13	14
Upland	9	86	21	181	2	1
Instream and Riparian	13	39	111	104	14	24
Road	32	441	820	1034	5	30
Acquisition of Land or Water	118	26	29	75	102	142
Multiple	68	281	853	459	124	129

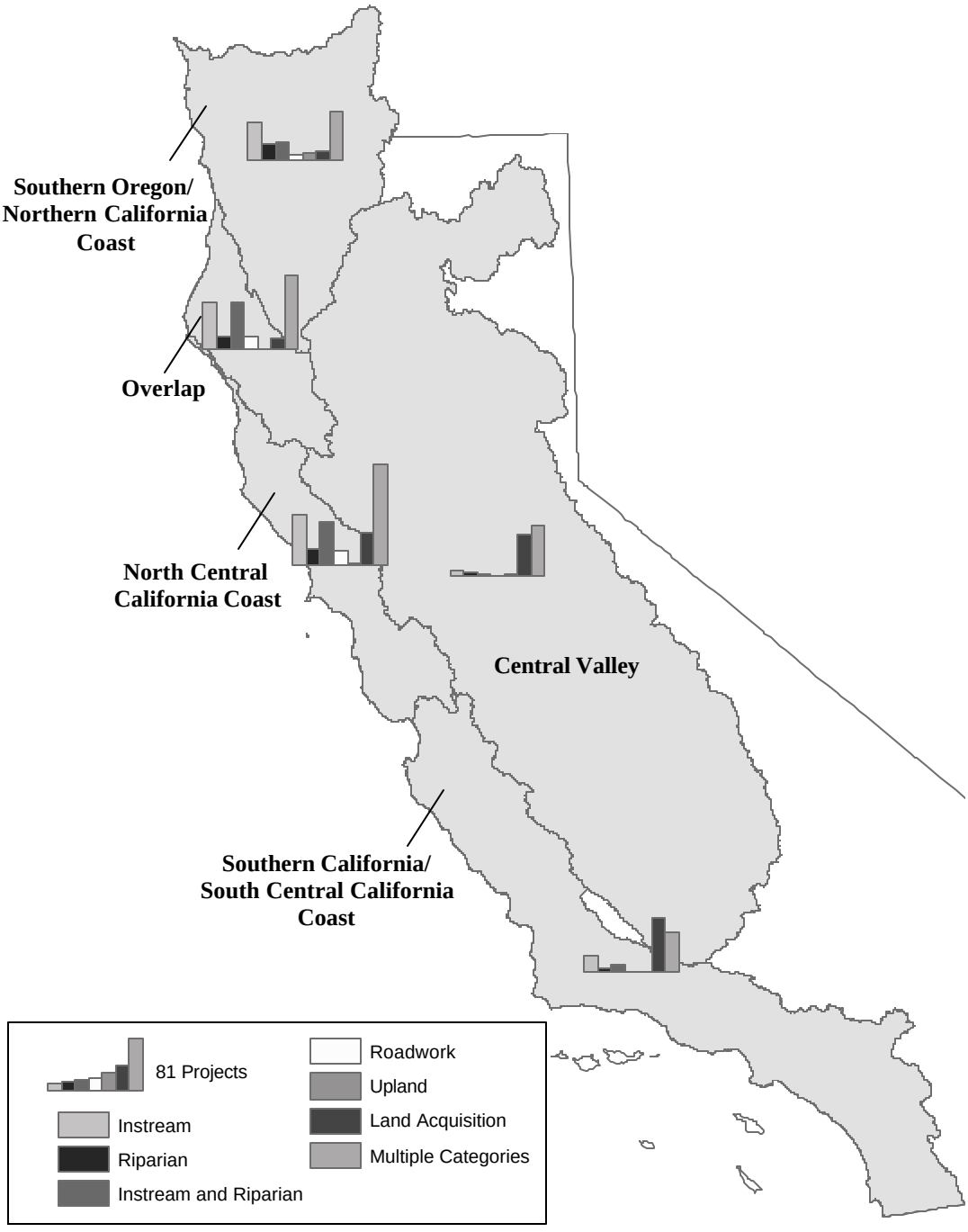


Figure 23. Number of projects per study area for selected habitat categories, for restoration projects beginning in 1998 and forward. See Table 24.

Table 24. Number of projects by habitat category and study area, for restoration projects beginning in 1998 and forward.

Habitat Category	Study Area					
	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO
Instream	8	63	74	82	8	29
Riparian	13	27	19	27	5	7
Upland	2	13	0	5	2	1
Instream and Riparian	9	29	75	69	3	13
Road	0	10	18	24	0	
Acquisition of Land or Water	98	16	17	53	66	88
Multiple	48	78	117	162	80	65

Table 25. Average number of sites per project by habitat category, for sites associated with restoration projects beginning in 1998 and forward.

Habitat Category	Average Number of Sites per Project
Instream	2.1
Riparian	1.7
Upland	10.8
Instream and Riparian	2.3
Road	15.8
Acquisition of Land or Water	1.4
Multiple	7.6

Cost

Figure 24 and Table 26 show the total cost of sites by habitat category and study area. Land acquisition sites are clearly the most costly, especially in the SCACO study area. Table 27 shows the cost of projects by habitat category and study area. The pattern of cost for projects is similar to that for sites, so no figure is provided.

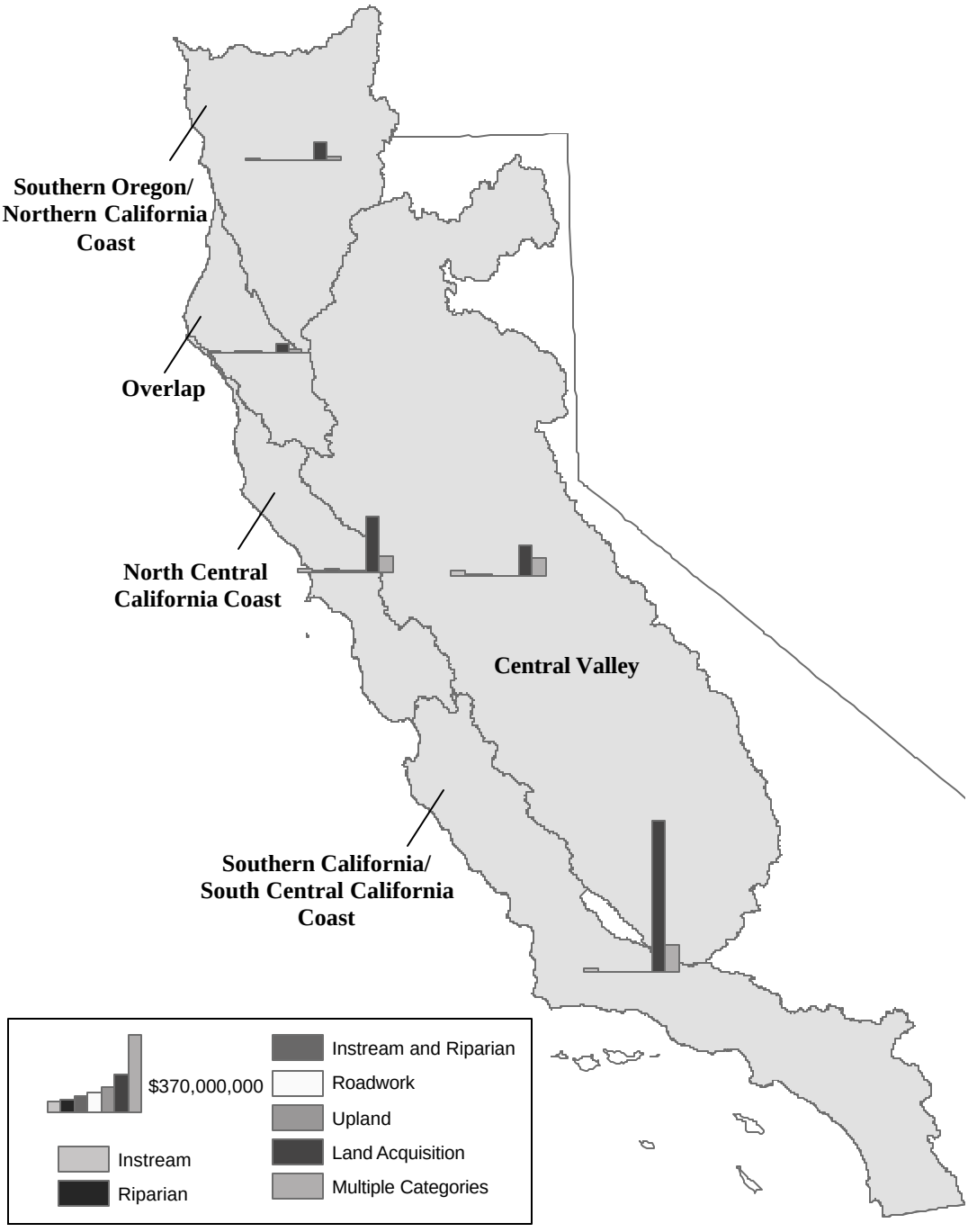


Figure 24. Total cost of sites per study area for selected habitat categories, for sites associated with restoration projects beginning in 1998 and forward. See Table 26.

Table 26. Total cost ($1,000s) of sites by habitat category and study area, for sites associated with restoration projects beginning in 1998 and forward.

Habitat Category	Study Area					
	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO
Instream		$9,139	$5,790	$12,041	$21,592	$19,912
Riparian		$1,596	$1,705	$3,467	$2,354	$5,863
Upland		$2,810	$103	$1,382	$103	$584
Instream and Riparian		$3,557	$5,515	$15,290	$1,317	$5,600
Road		$7,558	$6,527	$7,563	$724	$159
Acquisition of Land or Water	$2,014	$95,665	$39,492	$271,282	$149,643	$744,215
Multiple		$16,760	$13,096	$75,843	$81,668	$133,016

Table 27. Total cost ($1,000s) of projects by habitat category and study area, for restoration projects beginning in 1998 and forward.

Habitat Category	Study Area					
	None	SONC	NOCECA and SONC	NOCECA	Central Valley	SCACO
Instream	$128	$8,804	$3,314	$8,539	$20,586	$19,596
Riparian	$38	$1,493	$790	$1,373	$2,320	$5,631
Upland		$2,778		$1,081	$103	$584
Instream and Riparian	$109	$3,591	$6,409	$15,969	$362	$5,710
Road		$3,272	$2,643	$4,958		
Acquisition of Land or Water	$30,654	$95,665	$41,913	$264,506	$143,238	$737,695
Multiple	$17,734	$21,710	$19,971	$100,131	$88,098	$144,027

Measurements by Study Area

As discussed above, sites are summarized by measurement units for the most common measurement units overall (Table 21) and within each habitat category (Table 19). Here we group sites based on common measurement units; it is important to note that different treatments and measurement categories may be lumped together because they share the same unit of measure. Blank cells indicate no data. Double counting of sites is not avoided in the following tables.

All Habitat Categories

Table 28. Numbers of sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Total Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
None	321	4	9	32	37	167	128,122
SONC	1,080	349	695	254	2,717	72	39,915
NOCECA and SONC	2,415	1,211	1,562	535	209	57	5,974
NOCECA	2,287	522	629	254	487	166	94,034
Central Valley	291	2	22	57	71	144	184,145
SCACO	399	70	70	56	45	173	106,330

Table 29. Numbers of projects per study area with common measurement units and the corresponding total measurement per study area, for restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Total Projects	#Projects w/ #Miles	#Miles	#Projects w/ #Acres	#Acres	#Projects w/ #Structures	#Structures
None	178	36	80	149	132,262	9	152
SONC	236	153	3,130	64	38,600	56	510
NOCECA and SONC	320	314	625	57	32,156	119	1,436
NOCECA	422	229	1,111	135	1,061,180	90	1,039
Central Valley	164	30	119	152	318,590	2	27
SCACO	203	64	195	149	520,704	19	176

Instream Sites

Table 30. Numbers of instream sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Number of Sites	#Sites w/ #Structures	Structures	#Sites w/ #Miles	Miles
None	55	52	59	11	0.3
SONC	145	46	329	10	4
NOCECA and SONC	503	140	393	181	6
NOCECA	330	109	357	31	2
Central Valley	31	2	3	0	0

Study Area	Number of Sites	#Sites w/ #Structures	Structures	#Sites w/ #Miles	Miles
SCACO	59	19	46	7	0.3

Riparian Sites

Table 31. Numbers of riparian sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Number of Sites	#Sites w/ #Trees	Trees	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
None	26	2	3,900	3	2	10	248
SONC	62	9	44,165	20	24	10	81
NOCECA and SONC	78	26	141,484	24	17	16	50
NOCECA	104	33	7,449	21	12	16	36
Central Valley	13	11	84,917	1	0.2	4	679
SCACO	14	4	8,677	4	3	8	193

Upland Sites

Table 32. Numbers of upland sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Number of Sites	#Sites w/ #Acres	Acres	#Sites w/ #Miles	Miles
None	9				
SONC	86	28	200	23	25
NOCECA and SONC	21				
NOCECA	181	1	400	1	0.7
Central Valley	2	2	24		
SCACO	1				

Instream and Riparian Sites

Table 33. Numbers of instream and riparian sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Number of Sites	#Sites w/ #Miles	Miles	#Sites w/ #Structures	Structures
None	13	5	0.5	7	31
SONC	39	20	5	13	78
NOCECA and SONC	111	113	17	49	313
NOCECA	104	57	24	31	194
Central Valley	14	9	2	0	0
SCACO	24	17	2	6	39

Roadwork Sites

Table 34. Numbers of roadwork sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Sites	Sites	#Sites w/ #Culverts	Culverts	#Sites w/ #Miles	Miles
None	32			22	22	10	10	0	0
SONC	441	93	236	21	39	56	67	89	118
NOCECA and SONC	820	203	253	47	257	85	112	59	41
NOCECA	1,034	215	232	262	265	190	214	71	82
Central Valley	5			2	13	0	0	1	1
SCACO	30			28	28	0	0	0	0

Land Acquisition Sites

Table 35. Numbers of land acquisition sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward.

Study Area	Number of Sites	#Sites w/ #Acres	Acres
None	118	96	111,354
SONC	26	16	26,701

Study Area	Number of Sites	#Sites w/ #Acres	Acres
NOCECA and SONC	29	17	5,528
NOCECA	75	55	63,678
Central Valley	102	66	54,117
SCACO	142	93	82,270

Multiple Category Sites

Table 36. Numbers of multiple category sites per study area with common measurement units and the corresponding total measurement per study area, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Study Area	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
None	68	2	7	13	34	60	16,521
SONC	281	238	440	92	2,541	13	12,894
NOCECA and SONC	853	954	1252	157	127	11	394
NOCECA	459	283	373	68	368	88	29,890
Central Valley	124	2	22	46	68	68	5
SCACO	129	67	67	28	39	71	23,839

Projects and Sites by Watershed

Here we summarize data for projects and sites for TRT delineated watersheds.

Numbers, Density and Cost

The density of sites per watershed is shown in Figure 25. Table 37 shows the number of projects and sites and corresponding total spent for each watershed. Only watersheds that have at least one project or site are included in this table. Note that many projects and sites fall outside of TRT designated watersheds and are grouped together under 'None' in the table.

The geographic distribution of the amount spent on restoration work per watershed and the amount spent per square mile of watershed are shown for sites in Figures 26 and 27 respectively. It is clear from Figure 27 that the highest density of spending is along the coast.

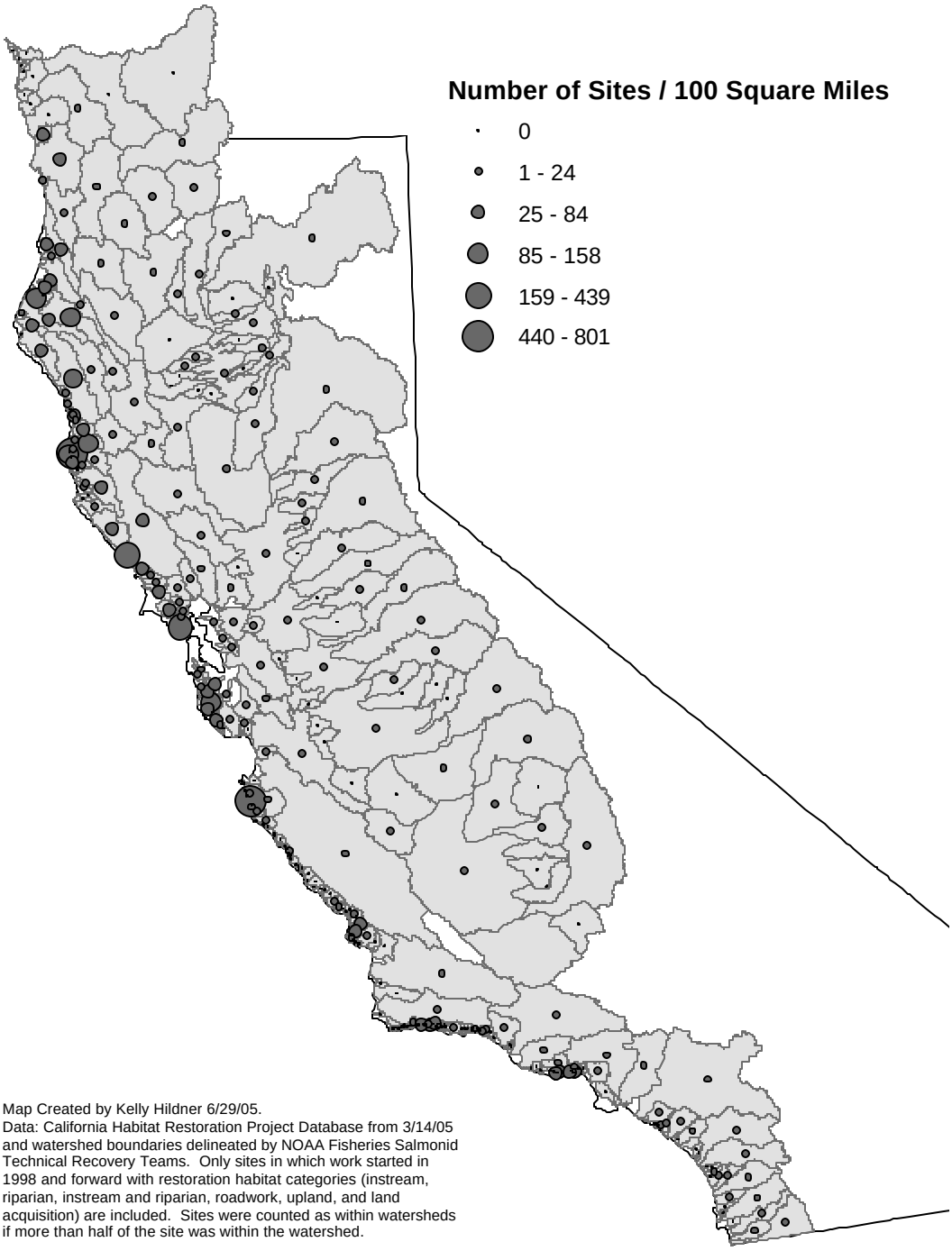


Figure 25. Density of sites per watershed, for sites associated with restoration projects beginning in 1998 and forward.

Table 37. Number of projects and sites and corresponding total spent for each watershed, for restoration projects beginning in 1998 and forward.

TRT Watershed	Number of Projects	Total Spent (Projects)	Number of Sites	Total Spent (Sites)
None	318	$748,665,562	530	$709,516,290
Agua Hedionda Creek	1	$2,165,039	1	$2,165,039
Alameda Creek	3	$2,462,196	3	$2,462,196
Albion River	4	$667,362	9	$667,362
Aliso Creek			2	$3,781,429
American River	6	$6,533,318	8	$12,492,591
Americano Creek	3	$961,361	3	$961,361
Arroyo Hondo	2	$8,592,395	2	$8,592,395
Arroyo Leon	1	$670,320	3	$670,320
Ballona Creek	5	$142,691,731	12	$142,691,731
Battle Creek	4	$3,068,222	8	$3,068,222
Bear Creek N_CV	1	$1,236,381	1	$1,236,381
Bear Creek S_CV	1	$3,049,859	1	$3,049,859
Bear River	18	$1,418,323	58	$1,426,502
Big Chico and Mud Creeks	5	$6,485,388	20	$6,465,109
Big River	6	$35,930,240	9	$35,930,240
Big Sur River	1	$755,717	1	$755,717
Bixby Creek			1	$10,800,273
Butte Creek	6	$11,250,391	12	$11,924,630
Cache Creek	9	$3,149,464	9	$3,149,464
Calaveras River	2	$55,983	3	$55,983
Calleguas Creek	4	$16,115,238	4	$16,115,238
Cañada de la Gaviota	1	$119,237	1	$119,237
Cañada del Capitan	2	$1,010,681	2	$1,010,681
Cañada del Refugio	1	$1,047,208	1	$1,047,208
Cañada del Venadito			1	$608,854
Carbon Canyon	1	$1,192,208	1	$1,192,208
Carmel River	11	$29,394,582	15	$29,394,582
Carpinteria Creek	2	$328,016	2	$328,016
Carpinteria Salt Marsh Complex	1	$1,762,000	1	$1,762,000
Caspar Creek	2	$2,241,976	56	$2,916,723

TRT Watershed	Number of Projects	Total Spent (Projects)	Number of Sites	Total Spent (Sites)
Chorro Creek	11	$9,133,158	24	$9,133,158
Clear Creek	2	$675,163	7	$479,348
Coon Creek	1	$51,026	1	$51,026
Corte Madera Creek	1	$6,000	2	$4,000
Cosumnes River	7	$17,387,918	11	$18,464,648
Cottaneva Creek	1	$43,334	1	$43,334
Coyote Creek	4	$6,804,704	4	$6,804,704
Deer Creek N_CV	1	$2,323,000	3	$2,507,645
DeHaven Creek	1	$19,908	3	$19,908
Doyle Creek	1	$2,024,241	2	$1,349,494
Dry Creek	2	$134,273	2	$134,273
East South Valley Fresno Slough	1	$375,070	1	$375,070
Elk Creek	1	$160,466	5	$160,466
Elkhorn Slough	6	$20,641,962	9	$20,362,699
Escondido Creek	2	$3,844,069	2	$3,844,069
Feather River	6	$8,102,057	15	$8,106,979
Freshwater Creek	12	$935,183	24	$1,063,993
Garcia River	8	$26,094,206	13	$23,411,547
Garrapata Creek	1	$375,864	86	$363,195
Gazos Creek	4	$458,814	6	$469,288
Goleta Slough Complex			2	$98,616
Greenwood Creek	1	$56,903	1	$56,903
Guadalupe River	3	$4,024,367	5	$13,088,146
Gualala River	10	$1,431,245	169	$1,723,183
Guthrie Creek	2	$2,866,208	2	$2,866,208
Hare Creek			1	$24,507
Howard Creek	1	$5,432	1	$5,432
Ilinois River	2	$58,454	8	$58,454
Jacoby Creek	11	$5,923,995	17	$5,940,962
Kern River	4	$5,925,457	7	$5,945,994
Kings River			1	$102,204
Laguna Canyon	1	$2,795,238	1	$2,795,238
Lagunitas Creek	17	$1,765,571	59	$1,765,571
Little River - N	2	$370,880	9	$370,880
Little River - S	2	$106,833	2	$106,833

TRT Watershed	Number of Projects	Total Spent (Projects)	Number of Sites	Total Spent (Sites)
Little Sur River	1	$11,399	1	$11,399
Los Angeles River	4	$29,178,070	8	$29,178,070
Los Gatos Creek	1	$32,712	1	$32,712
Los Osos Creek	3	$172,107	8	$172,107
Los Peñasquitos Creek	2	$7,813,821	2	$7,813,821
Lower Eel River	33	$5,818,322	207	$5,810,517
Lower Kaweah and Tule Rivers	1	$646,168	1	$646,168
Lower Klamath River	25	$4,042,556	120	$4,078,371
Lower Middle Eel River	10	$1,172,554	13	$1,172,554
Lower Sacramento River Colusa Basin	8	$2,872,248	11	$3,511,443
Lower San Joaquin River	4	$13,483,534	4	$13,483,534
Lower Trinity River	3	$144,528	20	$134,595
Mad River	18	$3,117,970	36	$2,785,693
Malibu Creek	4	$152,334,975	9	$152,334,975
Maple Creek	1	$157,704	29	$157,704
Marsh Creek	6	$20,071,484	6	$20,071,484
Mattole River	49	$7,073,283	205	$7,226,902
McCloud River			1	$86,628
Merced River			1	$33,864
Mid Klamath River	17	$1,418,129	99	$1,245,238
Middle Fork Eel River	8	$7,597,563	14	$4,293,017
Middle Sacramento River	10	$5,903,785	15	$8,654,767
Middle San Joaquin River	11	$6,583,918	13	$6,583,918
Mill Creek			1	$92,322
Miller Creek			1	$4,995
Mokelumne River	5	$4,507,507	7	$3,972,903
Napa River	24	$13,876,780	49	$13,759,561
Navarro River	29	$4,596,232	247	$4,524,494
North Fork Eel River	2	$110,319	37	$98,662
North Suisun Bay	2	$5,027,093	3	$5,257,064
Novato Creek	8	$29,768,216	9	$29,768,216
Noyo River	7	$2,972,161	179	$3,052

TRT Watershed	Number of Projects	Total Spent (Projects)	Number of Sites	Total Spent (Sites)
Otay River	3	$28,488,905	7	$33,114,255
Pajaro River	3	$13,235,844	3	$13,235,844
Pescadero Creek	8	$2,007,225	88	$1,835,185
Petaluma River	7	$34,761,244	13	$29,112,957.
Pit River	2	$1,650,639	2	$1,650,639
Pudding Creek	1	$2,871,472	2	$2,951,738
Putah Creek	4	$848,486	13	$848,486
Ramirez Canyon	1	$402,495	1	$402,495
Red Bank Creek			1	$143,212
Redwood Creek	8	$2,519,582	160	$2,473,982
Redwood Creek - Muir Woods	2	$244,472	40	$272,250
Reeds Creek			1	$143,212
Romero Creek	1	$44,216	1	$44,216
Russian Gulch - S			56	$177,489
Russian River	125	$26,538,533	930	$26,085,027
Sacramento Delta	11	$14,372,992	26	$20,005,350
Salinas River	9	$23,068,513	10	$23,347,777
Salmon Creek - N	6	$1,564,377	28	$1,564,377
Salmon Creek - S	12	$5,337,268	13	$5,337,268
Salmon River	11	$7,644,946	97	$7,683,767
San Diego Creek	1	$2,843,936	1	$2,843,936
San Diego River	3	$7,395,039	4	$8,257,539
San Dieguito River	2	$5,961,903	2	$5,961,903
San Francisquito Creek	4	$422,550	20	$463,422
San Gabriel River	3	$31,082,289	4	$23,445,211
San Gregorio Creek	4	$23,634,065	29	$23,799,585
San Joaquin Delta	6	$60,258,207	15	$62,059,598
San Jose Creek	2	$49,179	2	$49,179
San Juan Creek			1	$1,890,714
San Leandro Creek	2	$309,005	4	$510,279
San Lorenzo Creek	1	$274,241	2	$720,208
San Lorenzo River	12	$14,293,907	22	$6,173,055
San Luis Obispo Creek	11	$4,925,505	20	$4,925,505
San Luis Rey River	2	$5,163,444	3	$5,178,206
San Marcos Creek	2	$283,269	2	$283,269

TRT Watershed	Number of Projects	Total Spent (Projects)	Number of Sites	Total Spent (Sites)
San Mateo Creek	2	$5,000,000	5	$7,798,667
San Pablo Creek	1	$711,515	2	$733,515
San Vicente Creek	1	$67,756	2	$67,756
Santa Ana River	12	$54,798,505	23	$48,218,835
Santa Clara River	10	$11,720,255	14	$9,327,263
Santa Margarita River	2	$14,085,000	7	$9,689,985
Santa Maria River	1	$456,337	1	$456,337
Santa Rosa Creek	6	$14,551,025	8	$11,618,960
Santa Ynez River	8	$8,192,347	17	$8,192,347
Scott Creek	4	$218,061	9	$218,061
Scott River	38	$5,264,536	140	$5,710,161
Shasta River	39	$2,749,881	53	$3,120,353
Smith River	49	$100,500,454	337	$100,464,131
Solstice Canyon	2	$732,152	2	$732,152
Sonoma Creek	6	$8,066,718	16	$7,361,820
Soquel Creek	2	$703,247	2	$703,247
South Fork Eel River	94	$8,544,605	1091	$8,636,018
South Fork Trinity River	11	$1,108,921	65	$1,108,921
South Suisun Bay	8	$6,727,359	9	$7,173,327
Stanislaus River	2	$759,048	19	$722,942
Stemple Creek	1	$317,191	3	$349,792
Stevens Creek	1	$335,267	1	$335,267
Stony Creek			4	$2,643,636
Sweetwater River	1	$1,703,000	1	$1,703,000
Ten Mile River	2	$142,146	32	$142,146
Tijuana River	4	$14,422,255	4	$12,205,486
Topanga Canyon	2	$1,232,678	2	$1,232,678
Toro Creek	3	$92,940	3	$92,940
Tulare Lake Basin	2	$44,296	6	$44,296
Tule River	1	$336,445	1	$336,445
Tuna Canyon	1	$14,742,656	1	$14,742,656
Tunitas Creek			1	$3,607
Tuolumne River	2	$1,420,658	3	$996,387
Upper Eel River	1	$156,118	2	$817,027
Upper Klamath River	12	$3,814,843	42	$3,814,843
Upper Middle Eel River	6	$602,337	15	$602,337

TRT Watershed	Number of Projects	Total Spent (Projects)	Number of Sites	Total Spent (Sites)
Upper Sacramento River	6	$8,280,461	8	$8,191,741
Upper San Joaquin River	2	$7,636,083	2	$7,636,083
Upper Trinity River	18	$6,798,334	42	$6,798,334
Usal Creek	1	$98,647	1	$98,647
Van Duzen River	22	$20,695,059	438	$20,716,872
Ventura River	8	$19,031,666	11	$18,814,499
Villa Creek - SLO	1	$17,965,000	1	$17,965,000
Wages Creek	1	$20,449	1	$20,449
Walker Creek	6	$4,269,308	26	$4,322,659
Wilson Creek	3	$63,369	5	$63,369
Winchuck River	2	$462,610	47	$477,565
Yuba River	1	$620,035	2	$620,035

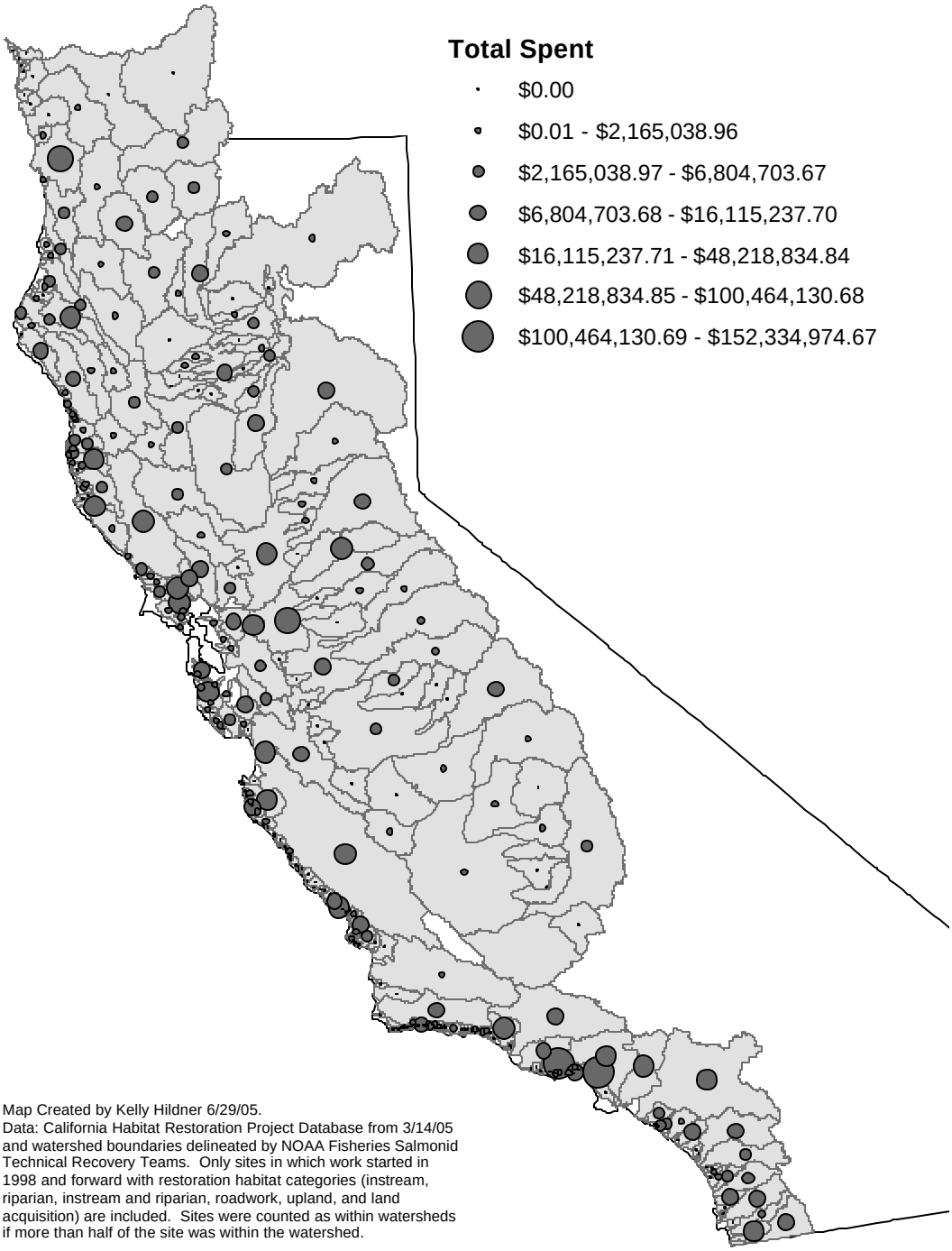


Figure 26. Total spent on restoration sites per watershed, for sites associated with restoration projects beginning in 1998 and forward. See Table 37.

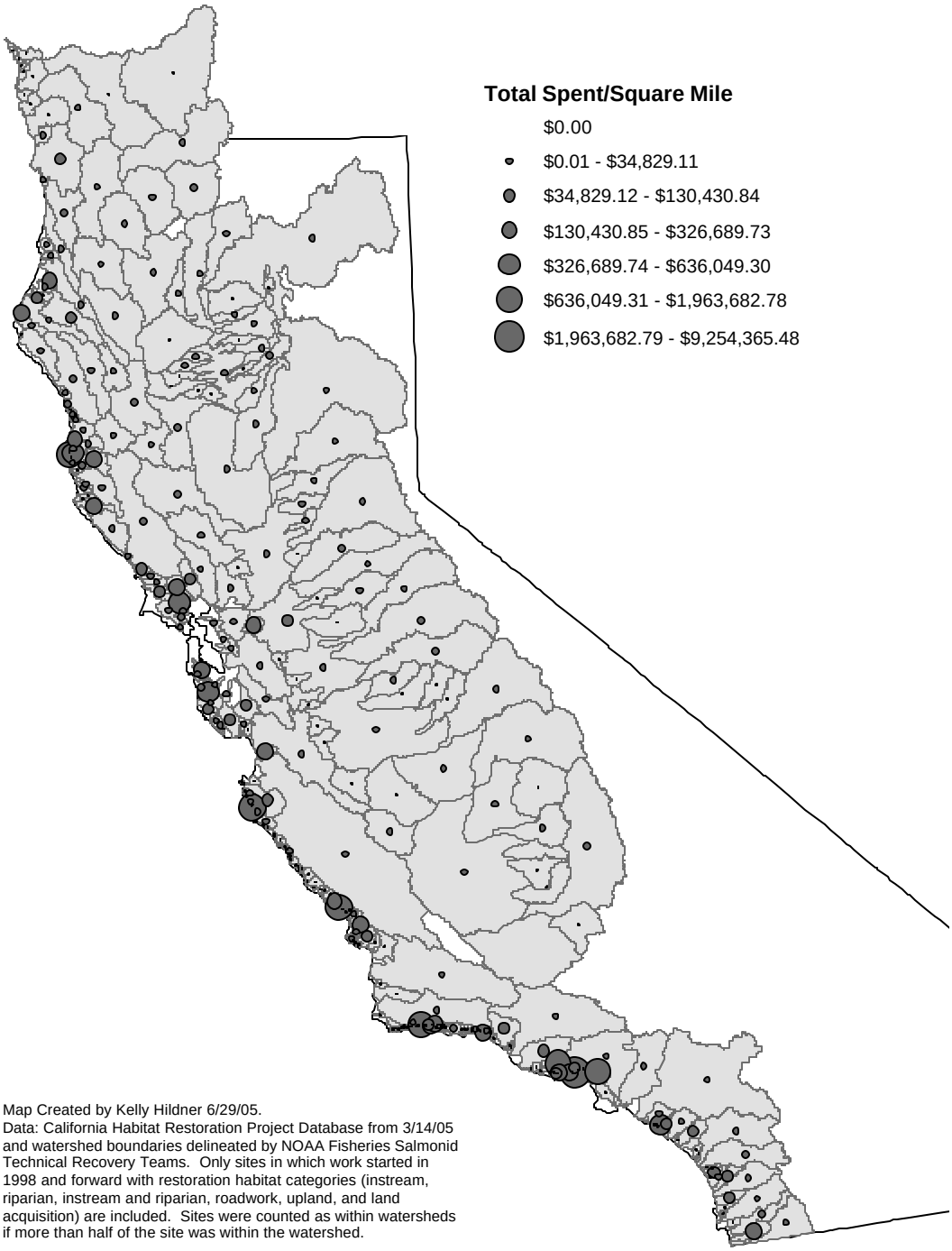


Figure 27. Total spent per square mile on restoration sites per watershed, for sites associated with restoration projects beginning in 1998 and forward.

Measurements by Watershed

Below (Tables 38-45) we summarize sites by measurement units for the most common measurement units overall (Table 21) and within each habitat category (Table 19). As with the measurements by study area, we group sites together based on common measurement units; it is important to note that there may be different treatments and measurement categories lumped together because they share the same unit of measure. Blank cells indicate no data. Only watersheds with at least one site with at least one of the measurement units of interest are included in the tables.

All Habitat Categories

Table 38. Number of sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
	530	10	15	67	2,486	287	190,844
Agua Hedionda Creek	1					1	99
Alameda Creek	3					2	715
Albion River	9	2	2	6	6		
Aliso Creek	2						
American River	8					5	594
Americano Creek	3			3	1	2	366
Arroyo Hondo	2					1	800
Arroyo Leon	3			2	0.1		
Ballona Creek	12					2	192
Battle Creek	8					6	4,834
Bear Creek N_CV	1			1	6	1	2,242
Bear Creek S_CV	1					1	3,074
Bear River	58	23	23	19	6	1	494
Big Chico and Mud Creeks	20					6	4,132
Big River	9	1	1	1	0.01	1	7,344
Big Sur River	1					1	17
Bixby Creek	1					1	846
Butte Creek	12					11	1,199
Cache Creek	9			1	16	8	65,606

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Calaveras River	3						
Calleguas Creek	4			2	4	3	620
Cañada de la Gaviota	1						
Cañada del Capitan	2	1	1	1	0.2		
Cañada del Refugio	1					1	660
Cañada del Venadito	1					1	745
Carbon Canyon	1						
Carmel River	15			1	0.1	6	1,821
Carpinteria Creek	2						
Carpinteria Salt Marsh Complex	1					1	12
Caspar Creek	56	37	37	1	4	1	71
Chorro Creek	24			14	3	6	4,306
Clear Creek	7					1	20
Coon Creek	1					2	74
Corte Madera Creek	2					2	5
Cosumnes River	11					11	13,343
Cottaneva Creek	1						
Coyote Creek	4					4	2,046
Deer Creek N_CV	3	1	13	1	1	1	9,479
DeHaven Creek	3						
Doyle Creek	2						
Dry Creek	2			1	0.04		
East South Valley Fresno Slough	1					1	362
Elk Creek	5	1	1				
Elkhorn Slough	9					6	976
Escondido Creek	2					3	7
Feather River	15			3	10	3	1,196
Freshwater Creek	24			6	1	3	8
Garcia River	13			5	8	3	25,550
Garrapata Creek	86	65	65				
Gazos Creek	6			1	1	1	400
Goleta Slough Complex	2						
Greenwood Creek	1			1	25		
Guadalupe River	5					5	1,079

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Gualala River	169	1	1	2	2		
Guthrie Creek	2					2	405
Hare Creek	1			1	0.002		
Howard Creek	1						
Ilinois River	8						
Jacoby Creek	17	1	1	6	2	5	630
Kern River	7					3	1,121
Kings River	1						
Laguna Canyon	1					1	11
Lagunitas Creek	59	16	18	32	10	1	0
Little River - N	9	9	40	9	5		
Little River - S	2	1	2	2	0.1		
Little Sur River	1						
Los Angeles River	8					5	1,738
Los Gatos Creek	1					3	150
Los Osos Creek	8			4	0.1		
Los Peñasquitos Creek	2					4	508
Lower Eel River	207	36	37	77	15	6	3,651
Lower Kaweah and Tule Rivers	1						
Lower Klamath River	120	15	58	17	11	6	11,361
Lower Middle Eel River	13			12	8		
Lower Sacramento River Colusa Basin	11					8	882
Lower San Joaquin River	4					6	1,602
Lower Trinity River	20			8	11		
Mad River	36	1	1	2	0.04	3	94
Malibu Creek	9					2	3,064
Maple Creek	29						
Marsh Creek	6					4	4,407
Mattole River	205	54	200	70	21	8	733
McCloud River	1						
Merced River	1						
Mid Klamath River	99	16	64	61	71	29	119
Middle Fork Eel River	14			6	4		
Middle Sacramento	15			1	0.04	11	2,082

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
River							
Middle San Joaquin River	13					11	4,292
Mill Creek	1	1	9	1	1		
Miller Creek	1						
Mokelumne River	7			1	0.2	1	2,866
Napa River	49	5	5	17	11	5	786
Navarro River	247	90	90	18	23		
North Fork Eel River	37			1	0.3		
North Suisun Bay	3			4	0.8	2	3,317
Novato Creek	9					7	5,865
Noyo River	179	164	181	3	1	2	35
Otay River	7					6	4,575
Pajaro River	3					3	597
Pescadero Creek	88	1	1	1	4	1	80
Petaluma River	13			3	5	13	3,722
Pit River	2			1	9	2	3,780
Pudding Creek	2			1	5	1	38
Putah Creek	13			1	0.2	7	613
Ramirez Canyon	1					1	37
Red Bank Creek	1						
Redwood Creek	160	164	203	11	11		
Redwood Creek - Muir Woods	40	20	20	15	2		
Reeds Creek	1						
Romero Creek	1					2	4
Russian Gulch - S	56	1	1				
Russian River	930	125	212	88	356	18	312
Sacramento Delta	26			34	21	7	8,625
Salinas River	10			1	1	8	27,368
Salmon Creek - N	28	9	30	20	10		
Salmon Creek - S	13			4	1	4	2,520
Salmon River	97	5	149	10	51		
San Diego Creek	1			1	1	1	11
San Diego River	4					7	3,654
San Dieguito River	2					2	758
San Francisquito Creek	20						

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
San Gabriel River	4					7	637
San Gregorio Creek	29					2	3,948
San Joaquin Delta	15					8	39,498
San Jose Creek	2	1	1	5	0.7		
San Juan Creek	1						
San Leandro Creek	4					1	70
San Lorenzo Creek	2					2	123
San Lorenzo River	22			5	5	4	170
San Luis Obispo Creek	20			16	3	6	1,837
San Luis Rey River	3					4	56
San Marcos Creek	2					3	28
San Mateo Creek	5					1	165
San Pablo Creek	2					2	11
San Vicente Creek	2						
Santa Ana River	23					10	10,059
Santa Clara River	14	1	1	4	29	12	1,497
Santa Margarita River	7						
Santa Maria River	1					1	0.5
Santa Rosa Creek	8			2	0.1	5	288
Santa Ynez River	17			3	2	2	1,434
Scott Creek	9			3	0.06		
Scott River	140	7	7	48	47	10	52
Shasta River	53			24	28	5	1,442
Smith River	337	218	242	21	17	15	26,670
Solstice Canyon	2						
Sonoma Creek	16	1	1	3	0.2	1	165
Soquel Creek	2	1	1	1	0.04		
South Fork Eel River	1091	597	710	269	80	21	2
South Fork Trinity River	65	30	72	30	34		
South Suisun Bay	9			1	0.2	5	1,273
Stanislaus River	19						
Stemple Creek	3			1	0.2	1	325
Stevens Creek	1						
Stony Creek	4						
Sweetwater River	1					1	6

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Ten Mile River	32	52	52				
Tijuana River	4					4	8,009
Topanga Canyon	2			1	1	1	120
Toro Creek	3						
Tulare Lake Basin	6					1	79
Tule River	1					1	722
Tuna Canyon	1					1	416
Tunitas Creek	1						
Tuolumne River	3			1	0.06		
Upper Eel River	2						
Upper Klamath River	42	5	50	31	40		
Upper Middle Eel River	15						
Upper Sacramento River	8			4	3	1	345
Upper San Joaquin River	2					2	362
Upper Trinity River	42	1	1	2	7	7	270
Usal Creek	1			2	0.9		
Van Duzen River	438	313	313	13	3	1	48
Ventura River	11	2	2	1	0.2	8	3,157
Villa Creek - SLO	1					1	748
Wages Creek	1						
Walker Creek	26	1	1	14	10	2	1,896
Wilson Creek	5						
Winchuck River	47	52	52				
Yuba River	2						

Instream Sites

Table 39. Number of instream sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Watershed	Number of Sites	#Sites w/ #Structures	Structures	#Sites w/ #Miles	Miles
Bear River	58	8	25	5	0.3
Big River	9	3	3		
Butte Creek	12	2	3		

Watershed	Number of Sites	#Sites w/ #Structures	Structures	#Sites w/ #Miles	Miles
Carmel River	15	3	3		
Carpinteria Creek	2	1	7		
Chorro Creek	24			6	0.1
Freshwater Creek	24	3	36	1	0.004
Garcia River	13	1	10		
Gualala River	169	21	21		
Ilinois River	8	3	10		
Jacoby Creek	17			2	0.6
Lagunitas Creek	59	3	14		
Los Osos Creek	8	1	1		
Lower Eel River	207	24	80	12	0.4
Lower Klamath River	120	8	64		
Lower Middle Eel River	13	4	11	1	0.3
Lower Trinity River	20	2	2		
Mad River	36	1	1	1	0.02
Maple Creek	29	28	32		
Mattole River	205	11	31	41	1
Mid Klamath River	99	2	31		
Napa River	49	4	12	6	0.4
Navarro River	247	13	125	1	0.03
Noyo River	179	4	35		
Russian River	930	53	114	17	0.5
Salinas River	10	1	16		
Salmon Creek – S	13	1	6		
San Lorenzo River	22	6	17		
San Luis Obispo Creek	20	3	6		
Santa Clara River	14	2	3		
Santa Ynez River	17	8	10		
Scott Creek	9			3	0.06
Scott River	140	7	17	7	1
Shasta River	53	6	6		
Smith River	337	12	123	2	3
South Fork Eel River	1091	38	115	108	3
South Fork Trinity River	65			1	0.1
Stemple Creek	3			1	0.2
Upper Klamath River	42	4	56		

Watershed	Number of Sites	#Sites w/ #Structures	Structures	#Sites w/ #Miles	Miles
Upper Middle Eel River	15	9	13		
Van Duzen River	438	7	32	8	0.3
Ventura River	11			1	0.2
Walker Creek	26			2	0.6
Wilson Creek	5	2	20		

Riparian Sites

Table 40. Number of riparian sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Watershed	Number of Sites	#Sites w/ #Trees	Trees	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Bear River	58	1	2,700	1	0.9		
Cache Creek	9	1	2,000			1	153
Chorro Creek	24	2	8,000	2	1	1	6
Corte Madera Creek	2					2	5
Freshwater Creek	24	2	525			1	8
Lagunitas Creek	59	3	145				
Lower Eel River	207	4	1,400	14	8	5	11
Lower Klamath River	120	1	5,000	1	1	1	3
Mad River	36	5	5,140			1	20
Malibu Creek	9					1	105
Maple Creek	29	3	2,000				
Mattole River	205	3	114,224				
Mid Klamath River	99	2	10,000			3	54
Middle Fork Eel River	14			2	2		
Middle Sacramento River	15	5	81,127			2	462
Napa River	49			3	2		
Navarro River	247	2	425				
Petaluma River	13			2	4		
Putah Creek	13	5	1,790	1	0.2	1	64
Russian River	930	28	6,879	10	5	7	21

Watershed	Number of Sites	#Sites w/ #Trees	Trees	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Salmon Creek - S	13			1	0.1		
San Diego River	4					2	9
San Luis Obispo Creek	20	2	677	2	2		
San Luis Rey River	3					2	48
San Marcos Creek	2					2	25
Scott River	140					5	15
Shasta River	53	1	65	15	22		
Smith River	337	2	5,600			1	10
South Fork Eel River	1,091	2	1,800	4	3	7	0.5
Upper Klamath River	42	1	9,500	4	0.8		
Van Duzen River	438	3	13,020	1	2		
Walker Creek	26			3	0.9		
Winchuck River	47	2	14,000				

Upland Sites

Table 41. Number of upland sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Watershed	Number of Sites	#Sites w/ #Acres	Acres	#Sites w/ #Miles	Miles
Cache Creek	9	2	24		
Gazos Creek	6	1	400		
Lower Eel River	207			1	0.7
Mid Klamath River	99	26	65	17	7
Scott River	140			4	18
Shasta River	53			2	0.2
Upper Trinity River	42	2	135		

Instream and Riparian Sites

Table 42. Number of instream and riparian sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Watershed	Number of Sites	#Sites w/ #Miles	Miles	#Sites w/ #Structures	Structures	#Sites w/ #Trees	Trees
Bear River	58	11	2	9	65	3	5,756
Big River	9					1	40
Carmel River	15			1	20		
Freshwater Creek	24	4	1			5	2,680
Garcia River	13	3	0.3	2	5		
Gualala River	169	1	0.2				
Ilinois River	8			1	9		
Jacoby Creek	17	1	0.03				
Lagunitas Creek	59	5	0.2				
Los Osos Creek	8	4	0.09	1	3		
Lower Eel River	207	15	1	7	80	8	10,140
Lower Klamath River	120	4	0.5	3	36	5	4,840
Lower Middle Eel River	13	9	2	7	17	4	18,000
Mad River	36					4	624
Mattole River	205	6	0.2	5	16	2	4,300
Mid Klamath River	99			1	4	2	8,000
Middle Fork Eel River	14	2	1	1	3	1	3,000
Mokelumne River	7	1	0.2				
Napa River	49	6	9			2	2,019
Navarro River	247	1	0.02	1	1		
North Fork Eel River	37	1	0.3				
Russian River	930	25	4	26	162	10	31,196
Sacramento Delta	26	8	1				
Salmon Creek - S	13	3	1				
San Lorenzo River	22			1	1	1	10

Watershed	Number of Sites	#Sites w/ #Miles	Miles	#Sites w/ #Structures	Structures	#Sites w/ #Trees	Trees
San Luis Obispo Creek	20	9	0.2	1	1		
Santa Clara River	14	1	0.02				
Santa Ynez River	17	3	2	1	6		
Scott River	140	10	0.8	6	20		
Shasta River	53	6	4			2	3,850
Smith River	337			1	6	2	580
Solstice Canyon	2			1	3		
Sonoma Creek	16	3	0.2				
South Fork Eel River	1,091	58	9	13	78	3	2,600
South Fork Trinity River	65			1	3		
Toro Creek	3					1	100
Usal Creek	1	2	0.9	1	25	1	3,000
Van Duzen River	438	2	0.3	4	32	2	300
Ventura River	11			1	6		
Walker Creek	26	8	8				
Wilson Creek	5					1	5,000

Roadwork Sites

Table 43. Number of roadwork sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Sites	Sites	#Sites w/ #Culverts	Culverts	#Sites w/ #Miles	Miles
Albion River	9							2	2
Bear River	58			7	7			2	3
Big River	9					1	1		
Caspar Creek	56					20	20	1	4
Clear Creek	7			2	13				
DeHaven Creek	3					1	1		
Feather River	15							1	1
Garrapata	86			25	25				

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Sites	Sites	#Sites w/ #Culverts	Culverts	#Sites w/ #Miles	Miles
Creek									
Gualala River	169			30	30	34	34	1	2
Lagunitas Creek	59	1	1			7	7	20	9
Lower Eel River	207	30	31			13	13	15	3
Lower Middle Eel River	13					2	22	1	6
Mattole River	205	14	14			22	23	4	1
Mid Klamath River	99			2	20			25	23
Navarro River	247	10	10	11	11	30	39	8	18
Noyo River	179	81	98					1	1
Pescadero Creek	88					1	4	1	4
Redwood Creek	160	27	27						
Redwood Creek - Muir Woods	40	8	8	1	4	12	17	14	2
Russian Gulch - S	56	1	1	55	55				
Russian River	930	114	114	165	165	84	91	18	36
Salmon Creek - N	28							4	2
Salmon River	97	4	145					6	37
San Lorenzo River	22							5	5
Scott River	140	7	7			27	34	17	15
Smith River	337	80	80	13	13	25	25	9	7
South Fork Eel River	1,091	132	181	31	241	42	48	33	26
South Fork Trinity River	65	2	4			4	8	15	22
Upper Klamath River	42							16	13
Upper Trinity River	42							1	1
Van Duzen River	438			9	9	5	5		
Winchuck River	47			6	6				

Land Acquisition Sites

Table 44. Number of land acquisition sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward.

Watershed	Number of Sites	#Sites w/ #Acres	Acres
Agua Hedionda Creek	1	1	99
Alameda Creek	3	2	715
American River	8	4	540
Americano Creek	3	2	366
Ballona Creek	12	2	192
Battle Creek	8	4	4,801
Bear Creek S_CV	1	1	3,074
Bear River	58	1	494
Big River	9	1	7,344
Big Sur River	1	1	17
Bixby Creek	1	1	846
Cache Creek	9	2	279
Calleguas Creek	4	3	620
Cañada del Refugio	1	1	660
Cañada del Venadito	1	1	745
Caspar Creek	56	1	71
Chorro Creek	24	2	580
Clear Creek	7	1	20
Cosumnes River	11	7	5,676
Coyote Creek	4	4	2,046
Deer Creek N_CV	3	1	9,479
East South Valley Fresno Slough	1	1	362
Elkhorn Slough	9	3	391
Feather River	15	1	740
Garcia River	13	3	25,550
Guadalupe River	5	4	1,073
Guthrie Creek	2	2	405
Jacoby Creek	17	5	630
Kern River	7	3	1,121
Laguna Canyon	1	1	11
Los Angeles River	8	3	1,733
Los Peñasquitos Creek	2	1	400
Lower Eel River	207	1	3,640
Lower Sacramento River Colusa Basin	11	2	56
Mad River	36	1	74
Malibu Creek	9	1	2,959

Watershed	Number of Sites	#Sites w/ #Acres	Acres
Marsh Creek	6	4	4,407
Mattole River	205	3	341
Middle Sacramento River	15	2	683
Middle San Joaquin River	13	8	1,107
Mokelumne River	7	1	2,866
Napa River	49	5	786
North Suisun Bay	3	2	3,317
Novato Creek	9	7	5,865
Noyo River	179	1	16
Otay River	7	6	4,575
Pajaro River	3	3	597
Pescadero Creek	88	1	80
Pit River	2	1	2,080
Pudding Creek	2	1	38
Putah Creek	13	6	549
Ramirez Canyon	1	1	37
Sacramento Delta	26	2	7,083
Salinas River	10	6	26,416
Salmon Creek – S	13	3	2,508
San Diego River	4	2	1,359
San Dieguito River	2	2	758
San Gabriel River	4	1	91
San Gregorio Creek	29	2	3,948
San Joaquin Delta	15	3	2,604
San Lorenzo Creek	2	1	113
San Lorenzo River	22	1	167
San Luis Obispo Creek	20	5	1,837
San Mateo Creek	5	1	165
Santa Ana River	23	10	10,059
Santa Clara River	14	3	411
Santa Rosa Creek	8	5	288
Santa Ynez River	17	1	1,406
Shasta River	53	3	42
Smith River	337	13	26,659
Sonoma Creek	16	1	165
South Suisun Bay	9	5	1,273
Stemple Creek	3	1	325
Sweetwater River	1	1	6
Topanga Canyon	2	1	120
Tulare Lake Basin	6	1	79
Tule River	1	1	722
Upper Sacramento River	8	1	345
Upper San Joaquin River	2	1	360

Watershed	Number of Sites	#Sites w/ #Acres	Acres
Van Duzen River	438	1	48
Ventura River	11	1	30
Villa Creek - SLO	1	1	748
Walker Creek	26	2	1,896

Multiple Category Sites

Table 45. Number of multiple category sites per watershed with common measurement units and the corresponding total measurement per watershed, for sites associated with restoration projects beginning in 1998 and forward (with duplicates).

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Albion River	9			4	4		
American River	8					1	54
Americano Creek	3			3	1		
Arroyo Hondo	2					1	800
Arroyo Leon	3			2	0.06		
Battle Creek	8					2	33
Bear Creek N_CV	1			1	6	1	2,242
Bear River	58	23	23				
Big Chico and Mud Creeks	20					6	4,132
Big River	9	1	1	1	0.01		
Butte Creek	12					11	1,199
Cache Creek	9			1	16	3	65,150
Calleguas Creek	4			2	4		
Cañada del Capitan	2	1	1	1	0.2		
Carmel River	15			1	0.09	6	1,821
Carpinteria Salt Marsh Complex	1					1	12
Caspar Creek	56	37	37				
Chorro Creek	24			6	2	3	3,720
Coon Creek	1					2	74
Cosumnes River	11					4	7,667
Deer Creek N_CV	3	1	13	1	1		
Dry Creek	2			1	0.04		
Elk Creek	5	1	1				
Elkhorn Slough	9					3	585

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Escondido Creek	2					3	7
Feather River	15			2	9	2	456
Freshwater Creek	24			1	0.02	1	0.1
Garcia River	13			2	8		
Garrapata Creek	86	65	65				
Gazos Creek	6			1	0.9		
Greenwood Creek	1			1	25		
Guadalupe River	5					1	6
Jacoby Creek	17			3	2		
Lagunitas Creek	59	15	17	7	1		
Little River - N	9	9	40	9	5		
Little River - S	2	1	2	2	0.07		
Los Angeles River	8					2	5
Los Peñasquitos Creek	2					3	108
Lower Eel River	207	2	2	20	2		
Lower Klamath River	120	8	51	12	10	5	11,359
Lower Middle Eel River	13			1	0.1		
Lower Sacramento River Colusa Basin	11					6	826
Lower San Joaquin River	4					6	1,602
Lower Trinity River	20			8	11		
Mad River	36			1	0.02	1	0.1
Mattole River	205	37	183	19	19	5	392
Mid Klamath River	99	16	64	19	41		
Middle Fork Eel River	14			2	0.8		
Middle Sacramento River	15			1	0.04	7	937
Middle San Joaquin River	13					3	3,185
Mill Creek	1	1	9	1	1		
Napa River	49			2	0.3		
Navarro River	247	78	78	8	5		
North Suisun Bay	3			4	0.8		
Noyo River	179	78	78			1	19
Petaluma River	13			1	0.5	13	3,722
Pit River	2			1	9	1	1,700

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Pudding Creek	2			1	5		
Redwood Creek	160	136	175	11	11		
Redwood Creek - Muir Woods	40	12	12	1	0.03		
Romero Creek	1					2	4
Russian River	930	5	92	18	311	7	275
Sacramento Delta	26			26	19	5	1,542
Salinas River	10			1	1	2	953
Salmon Creek - N	28	9	30	16	8		
Salmon Creek - S	13					1	12
Salmon River	97	1	4	4	13		
San Diego Creek	1			1	1	1	11
San Diego River	4					3	2,286
San Gabriel River	4					6	546
San Joaquin Delta	15					4	27,694
San Jose Creek	2	1	1	5	0.7		
San Leandro Creek	4					1	70
San Lorenzo Creek	2					1	10
San Lorenzo River	22					3	3
San Luis Obispo Creek	20			5	0.8	1	0.1
San Luis Rey River	3					2	8
San Marcos Creek	2					1	2
San Pablo Creek	2					2	11
Santa Clara River	14			3	29	9	1,086
Santa Maria River	1					1	0.5
Santa Rosa Creek	8			2	0.1		
Scott River	140			10	13	1	0.4
Shasta River	53			1	2	2	1,400
Smith River	337	137	161	10	7		
Soquel Creek	2	1	1	1	0.04		
South Fork Eel River	1,091	430	491	66	40	2	0.2
South Fork Trinity River	65	20	59	14	12		
South Suisun Bay	9			1	0.2		
Ten Mile River	32	52	52				
Tijuana River	4					4	8,009
Topanga Canyon	2			1	1		

Watershed	Number of Sites	#Sites w/ #Crossings	Crossings	#Sites w/ #Miles	Miles	#Sites w/ #Acres	Acres
Tuna Canyon	1					1	416
Tuolumne River	3			1	0.06		
Upper Klamath River	42	4	49	11	27		
Upper Sacramento River	8			4	3		
Upper San Joaquin River	2					1	2
Upper Trinity River	42			1	6	5	135
Van Duzen River	438	307	307	2	0.6		
Ventura River	11					7	3,128
Walker Creek	26			1	0.7		
Winchuck River	47	52	52				

Cost Per Measurement Unit

So far we have presented cost data as the total spent per habitat category and study area or watershed. Also of interest is the cost per unit of work performed. Unfortunately, the complexity of data storage in the database makes it difficult, and in many cases impossible, to derive such values. As explained previously, cost data are stored in the database at the project level. Attributing these costs to measurement units is difficult, at best, because each project can have multiple measurement units in the database, and there is no indication of how to partition the costs among the measurements. In some cases the measurements are probably redundant and attributing the total cost to one of the units of measure would be reasonably accurate, but in other cases the units are not redundant, so attributing total cost to one unit of measure would be highly misleading. Determining which of these situations apply is somewhat subjective and is beyond the scope of this document. Here we simplify matters by only looking at unit costs for projects with only one unit of measure.

Even focusing on projects with one measurement category may provide misleading results, for several reasons. First, the measurements in the database may not be accurate or comprehensive. For example, if the project involved riparian planting and installation of instream structures, but the measurements only show the number of structures installed, determining the cost per structure by dividing the entire project cost by the number of structures would give an inflated estimate for cost per structure because the cost of the riparian planting would not be taken into account. Second, even if the measurement units are comprehensive, distributing the costs equally among the measurement units could be misleading. For example if there were several structures installed, dividing the total cost by the number of structures to arrive at cost per structure could be misleading if the structures differ dramatically in complexity. Third, limiting the sample to projects with only one measurement likely biases the sample toward smaller, less complex projects and/or those with little data on project size. These projects

may not be representative of restoration projects in general. In particular unit costs may not take into account the economies of scale of larger projects, which might have lower unit costs.

Keeping in mind the above limitations, Table 46 shows the type of unit, total cost, total number of units, average cost per unit, standard deviation of cost per unit, and median cost per unit for projects in each habitat category and measure category. Only projects with only one measurement category are used. The cost per unit is calculated for each project by dividing the total project cost by the number of units; the values for all projects for a particular category are averaged. Appendices 4 and 5 are equivalent tables that also break out the data by study area and watershed respectively.

Table 46. Total cost, average cost per unit, standard deviation of cost per unit, and median cost per unit – by habitat category and measurement category - for projects with one unit of measure and a beginning date of 1998 and forward.

Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
Instream	Amount of upland area treated (acres)	acre	4	1	$6,293	$1,573		$1,573
Instream	Barriers removed/modified (number)	barrier	32	19	$10,604,329	$554,164	1,288,900	$25,338
Instream	Barriers removed/modified (number)	dam	3	3	$346,357	$115,452	156,595	$32,500
Instream	Fish screens installed/maintained (number)	screen	87	14	$15,050,525	$481,233	1,578,391	$33,035
Instream	Instream structures installed/modified (number)	baffle	2	1	$9,395	$4,698		$4,698
Instream	Instream structures installed/modified (number)	structure	445	38	$704,016	$3,357	5,379	$1,837
Instream	Instream structures installed/modified (number)	unit	253	2	$771,272	$86,826	119,424	$86,826
Instream	Length of instream habitat treated - except for bank stabilization (miles)	mile	1	4	$355,460	$322,126	154,374	$257,929
Instream	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.03	1	$5,457	$181,883		$181,883
Instream	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.6	3	$144,132	$283,951	171,084	$309,480
Instream	Sediment volume prevented from entering stream (cubic yards)	cubic yard	3,300	1	$7,713	$2		$2
Instream	Stream crossings assessed (number)	crossing	4	1	$1,450,013	$362,503		$362,503

Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
Instream	Stream crossings treated (number)	bridge	6	3	$499,828	$56,982	50,254	$51,798
Instream	Stream crossings treated (number)	crossing	5	5	$624,637	$124,927	211,267	$22,684
Instream	Stream crossings treated (number)	culvert	7	7	$325,778	$46,540	74,642	$13,859
Instream	Stream crossings treated (number)	each	1	1	$84,100	$84,100		$84,100
Instream	Stream crossings treated (number)	structure	1	1	$5,631	$5,631		$5,631
Instream	Stream length treated (miles, count one side of stream only)	mile	2	3	$284,115	$138,379	80,132	$108,491
Riparian	Amount of riparian area treated (acres)	acre	331	5	$1,586,454	$5,188	4,907	$4,547
Riparian	Amount of riparian area treated for invasive species (acres)	acre	54	2	$5,055,286	$61,821	86,728	$61,821
Riparian	Amount of upland area treated (acres)	acre	5	2	$8,600	$43,910	60,467	$43,910
Riparian	Amount of wetland area treated for invasive species (acres)	acre	0.05	1	$2,300	$46,000		$46,000
Riparian	Area planted (acres)	acre	5	1	$157,550	$31,510		$31,510
Riparian	Area treated (acres)	acre	5	1	$89,834	$19,963		$19,963
Riparian	Fence length installed/repaired (miles)	mile	11	9	$338,657	$35,683	31,299	$27,191
Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	3	6	$104,226	$91,517	170,022	$25,409
Riparian	Length of streambank stabilized (miles, count both sides of	mile	0.1	1	$10,759	$94,683		$94,682

Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
	stream where applicable)							
Riparian	Stream length treated (miles, count one side of stream only)	mile	20	1	$464,803	$23,240		$23,240
Riparian	Trees planted (number)	tree	62,529	10	$207,508	$68	183	$9
Upland	Amount of riparian area treated (acres)	acre	117	4	$306,953	$7,918	10,885	$2,924
Upland	Amount of upland area treated (acres)	acre	565	2	$365,475	$732	132	$732
Upland	Area treated (acres)	acre	412	2	$200,055	$1,968	2,227	$1,968
Upland	Instream structures installed/modified (number)	structure	3	1	$4,048	$1,349		$1,349
Upland	Sediment volume prevented from entering stream (cubic yards)	cubic yard	20,771	1	$54,462	$2		$3
Upland	Stream length treated (miles, count one side of stream only)	mile	3	1	$1,803,492	$601,164		$601,164
Instream and Riparian	Amount of riparian area treated for invasive species (acres)	acre	14	1	$4,594	$335		$335
Instream and Riparian	Barriers removed/modified (number)	barrier	7	5	$2,066,730	$243,289	334,756	$119,237
Instream and Riparian	Barriers removed/modified (number)	dam	2	1	$160,676	$80,338		$80,338
Instream and Riparian	Instream structures installed/modified (number)	structure	48	6	$271,455	$7,227	4,758	$7,838
Instream and Riparian	Length of instream habitat treated - except for bank stabilization (miles)	mile	0.1	1	$47,904	$421,556		$421,556.43
Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	1	6	$101,265	$158,021	186,400	$88,661
Instream and	Length of streambank stabilized	mile	2	8	$379,796	$389,054	421,368	$272,833

Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
Riparian	(miles, count both sides of stream where applicable)							
Instream and Riparian	Stream crossings treated (number)	culvert	1	1	$315,962	$315,962		$315,962
Instream and Riparian	Stream length treated (miles, count one side of stream only)	mile	1	3	$2,232,320	$7,314,011	12,539,227	$92,981
Instream and Riparian	Trees planted (number)	tree	6,930	3	$641,991	$334	520	$64
Road	Barriers removed/modified (number)	unit	7	1	$761,955	$108,851		$108,851
Road	Instream structures installed/modified (number)	culvert	1	1	$1,058	$1,058		$1,058
Road	Road length treated (miles)	mile	136	10	$2,757,744	$15,324	16,679	$8,635
Road	Sediment volume prevented from entering stream (cubic yards)	cubic yard	5,078	1	$78,270	$15		$15
Road	Stream crossings treated (number)	crossing	7	2	$23,849	$6,102	5,336	$6,102
Road	Stream crossings treated (number)	culvert	24	3	$123,974	$8,079	6,944	$4,605
Road	Stream length treated (miles, count one side of stream only)	mile	2	1	$4,855	$2,653		$2,653
Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	403,775	315	$1,557,415,685	$39,033	152,936	$5,500
Multiple	Amount of riparian area treated (acres)	acre	794	8	$5,505,325	$84,051	221,969	$4,407.90
Multiple	Amount of riparian area treated for invasive species (acres)	acre	7,015	4	$606,325	$28,957	26,364	$26,352.64
Multiple	Amount of upland area treated (acres)	acre	93	7	$1,949,017	$80,066	79,638	$65,619
Multiple	Amount of wetland area treated	acre	7,059	6	$3,044,544	$18,595	28,650	$192

Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
	(acres)							
Multiple	Area assessed (acres)	acre	4,019	2	$661,536	$2,272	3,009	$2,272
Multiple	Area planted (acres)	acre	146	5	$1,846,329	$31,173	52,911	$10,959
Multiple	Area protected with acquisition, easement or lease (acres)	acre	19,688	19	$92,261,100	$642,790.	2,470,883	$13,407
Multiple	Area treated (acres)	acre	202,140	16	$22,738,654	$35,446	94,034	$1,315
Multiple	Barriers removed/modified (number)	barrier	3	3	$8,284,216	$2,761,405	3,071,762	$2,133,222
Multiple	Barriers removed/modified (number)	dam	2	2	$205,972	$102,986	133,499	$102,986
Multiple	Fence length installed/repaired (miles)	mile	3	2	$96,664	$33,822	20,742	$33,822
Multiple	Fish screens installed/maintained (number)	screen	51	2	$110,508	$5,998	5,639	$5,998
Multiple	Instream structures installed/modified (number)	structure	14	4	$103,977	$15,437	21,331	$6,526
Multiple	Instream structures installed/modified (number)	unit	2	2	$233,958	$116,979	149,312	$116,979
Multiple	Length of instream habitat treated - except for bank stabilization (miles)	mile	0.05	1	$1,272,813	$22,401,512		$22,401,512
Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	258	8	$4,429,193	$184,782	185,725	$132,413
Multiple	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	5	5	$2,864,207	$332,937	251,562	$275,087
Multiple	Participants in workshop/training events (number)	persons	98	3	$450,068	$7,513	8,594	$4,485
Multiple	Road length treated (miles)	mile	38	12	$1,873,653	$154,508	378,894	$30,242

Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
Multiple	Schools and other institutions reached (number)	classroom	85	1	$19,686	$232		$232
Multiple	Schools and other institutions reached (number)	unit	1	1	$6,141	$6,141		$6,141
Multiple	Sediment volume prevented from entering stream (cubic yards)	cubic yard	42,472	1	$71,593	$2		$2
Multiple	Stream crossings treated (number)	crossing	44	8	$3,030,784	$162,506	297,980	$7,729
Multiple	Stream crossings treated (number)	culvert	88	15	$1,967,118	$77,743	90,846	$24,234
Multiple	Stream length treated (miles, count one side of stream only)	mile	0.8	2	$179,405	$246,136	47,193	$246,136
Multiple	Students educated (number)	student	12,929	12	$1,953,173	$457	538	$250
Multiple	Students educated (number)	unit	6,500	1	$365,000	$56		$56
Multiple	Trees planted (number)	seedling	1,700	1	$25,995	$15		$15
Multiple	Trees planted (number)	tree	2,744	4	$461,738	$163	71	$168
Multiple	Workshop/training events (number)	each	1	1	$20,041	$20,041		$20,041
Multiple	Workshop/training events (number)	meeting	4	1	$9,133	$2,283		$2,283
Multiple	Workshop/training events (number)	unit	2	1	$56,513	$28,256		$28,256

Tier 3: Restoration Tasks – CHRPD Reclassified

Cost summaries by habitat type (Table 46) are useful for understanding how restoration activity is distributed among habitats that are important for salmonid survival and recovery. However, in terms of analyzing the structure of costs, it is important to consider costs as they relate to specific types of restoration (i.e., treatments). In this section we identify ambiguities and problems with CHRPD project data associated with the categorization of treatments and demonstrate the limited types of treatment-related cost summaries that can be produced, given these constraints. We also create a set of restoration tasks (e.g., culvert replacement, instream structure installation, fencing) that are less ambiguous than the classification of treatment in the CHRPD and provide cost summaries that relate costs to tasks. As with the Tier 2 analysis, all data summarizations contained in this section pertain to projects that began in 1998 and forward.

Treatment Summary

Problems Using CHRPD for Cost Analysis

The CHRPD has several features that make it less than ideal for cost analysis. Many of these features are artifacts of using preexisting data to create and populate the database.

One such feature is the large number of treatments used to classify the data. There are 105 treatments in this release of the database and many sites and projects in the database have been assigned more than one treatment (Table 6). For some of these projects, multiple treatments are needed to accurately describe the work that was done. However, because treatments are often not well defined by the entities who provide data to the CHRPD, it is not possible to tell whether the assigned treatments reflect distinctive types of restoration work or are redundant and/or overlapping definitions of the same thing.

Measurement data in the database have similar problems to those of treatments. A discussion of problems with the measurement data can be found in the Measurements section of Tier 2.

Another feature of the database that makes it inadequate for cost analysis is that the cost data provided to the CHRPD are usually at the project level and are not broken out by treatment or by site.

Together, these problems make it impossible to determine the cost by treatment or by measurement unit for many of the projects in the database. As a consequence, one can accurately and reliably analyze costs only for projects that have one treatment and one unit of measurement. In addition, costs can be related to site-specific variables only for projects that either have one site or that have all sites clustered together spatially.

Of the 1523 restoration projects that began in 1998 or later, only 481 (32%) have only one treatment. 385 (25%) of these also have only one measurement unit at the project level. The number of projects by treatment for projects with only one treatment is given in Table 47, and the number of projects by treatment for projects with only one treatment and only one measurement unit is given in Table 48. The number of projects by treatment and measurement unit for restoration projects with only one treatment and one measurement unit is given in Table 49. Total and average cost estimates by treatment and measurement unit for these projects are provided in Tables 50 and 51 respectively.

Table 47. Number of projects by treatment, for projects with only one treatment and beginning in 1998 and forward.

Treatment	Number of Projects	Percent of Projects
Land purchased, leased, or easement acquired	337	70%
Fencing/livestock exclusion	14	3%
Invasive plant control	12	2%
Fish screen installed	11	2%
Road modified to reduce impacts to streams	11	2%
Road decommissioned/obliterated	10	2.%
Other treatment (enter further information in comments)	7	1%
Repair/maintenance of existing restoration project structure (non-dam)	7	1%
Conifers planted	6	1%
Culvert/bridge upgraded (unknown method)	6	1%
Irrigated new plantings	5	1%
Irrigation water recycled (tailwater recaptured)	4	1%
Culvert replaced with bridge	3	1%
Planting (unknown type)	3	1%
Log jam removed	3	1%
Road ditch and drainage culvert maintenance (removing debris)	3	1%
Culvert retrofitted with baffles or weirs	3	1%
Upland erosion control	3	1%
Culvert replaced with open-bottom arch culvert	3	1%
Fish barrier removed (type unknown)	3	1%
Irrigation system improved	3	1%
Upland vegetation management changed	2	0%
Water management (storage and release timing)	2	0%
Boulders placed in stream	2	0%
Large wood placement (not anchored, or not known if anchored)	2	0%
Spawning gravel placed in stream	2	0%
Brush bundles placed in stream	1	0%
Bridge installed	1	0%

Treatment	Number of Projects	Percent of Projects
Water right purchased or leased	1	0%
Fish ladder improved	1	0%
Fish ladder installed	1	0%
Large wood anchored in place (log, rootwad)	1	0%
Improve ford (low water crossing)	1	0%
Stream bank stabilized: stream bank resloped	1	0%
Stream bank stabilized: bioengineering (living building materials)	1	0%
Stream bank stabilized (unknown method)	1	0%
Wildlife management, trapping, transport (except beaver introduction)	1	0%
Livestock off-channel watering facility developed	1	0%
Road drainage culvert installed/replaced/improved	1	0%
Hardwoods planted	1	0%

Table 48. Number of projects by treatment, for projects with only one treatment and one measurement unit (at the project level) and a beginning date of 1998 and forward.

Treatment	Number of Projects	Percent
Land purchased, leased, or easement acquired	315	82%
Fish screen installed	11	3%
Fencing/livestock exclusion	6	2%
Road modified to reduce impacts to streams	6	2%
Invasive plant control	6	2%
Culvert/bridge upgraded (unknown method)	5	1%
Repair/maintenance of existing restoration project structure (non-dam)	5	1%
Other treatment (enter further information in comments)	4	1%
Fish barrier removed (type unknown)	3	1%
Conifers planted	2	1%
Irrigation system improved	2	1%
Road ditch and drainage culvert maintenance (removing debris)	2	1%
Log jam removed	2	1%
Fish ladder installed	1	0%
Bridge installed	1	0%
Upland vegetation management changed	1	0%
Culvert replaced with bridge	1	0%
Culvert retrofitted with baffles or weirs	1	0%
Upland erosion control	1	0%
Stream bank stabilized: bioengineering (living building materials)	1	0%
Irrigation water recycled (tailwater recaptured)	1	0%
Fish ladder improved	1	0%

Treatment	Number of Projects	Percent
Road decommissioned/obliterated	1	0%
Irrigated new plantings	1	0%
Boulders placed in stream	1	0%
Planting (unknown type)	1	0%
Water management (storage and release timing)	1	0%
Large wood placement (not anchored, or not known if anchored)	1	0%
Road drainage culvert installed/replaced/improved	1	0%

Table 49. Number of projects by treatment and measurement unit, for projects with only one treatment and one measurement unit and a beginning date of 1998 and forward

Treatment	Units	Number of Projects	Percent of Projects
Land purchased, leased, or easement acquired	acre	315	82%
Fish screen installed	screen	11	3%
Road modified to reduce impacts to streams	mile	6	2%
Fencing/livestock exclusion	mile	6	2%
Repair/maintenance of existing restoration project structure (non-dam)	structure	5	1%
Invasive plant control	acre	5	1%
Fish barrier removed (type unknown)	barrier	3	1%
Log jam removed	barrier	2	1%
Other treatment (enter further information in comments)	unit	2	1%
Culvert/bridge upgraded (unknown method)	crossing	2	1%
Conifers planted	tree	2	1%
Irrigation water recycled (tailwater recaptured)	acre	1	0%
Culvert/bridge upgraded (unknown method)	culvert	1	0%
Invasive plant control	mile	1	0%
Culvert/bridge upgraded (unknown method)	bridge	1	0%
Culvert retrofitted with baffles or weirs	baffle	1	0%
Fish ladder improved	barrier	1	0%
Culvert replaced with bridge	crossing	1	0%
Fish ladder installed	barrier	1	0%
Bridge installed	each	1	0%
Culvert/bridge upgraded (unknown method)	structure	1	0%
Planting (unknown type)	mile	1	0%
Upland vegetation management changed	acre	1	0%
Upland erosion control	acre	1	0%
Stream bank stabilized: bioengineering (living building materials)	mile	1	0%
Road drainage culvert installed/replaced/improved	unit	1	0%
Road ditch and drainage culvert maintenance	mile	1	0%

Treatment	Units	Number of Projects	Percent of Projects
(removing debris)			
Irrigation system improved	acre	1	0%
Road decommissioned/obliterated	crossing	1	0%
Irrigated new plantings	acre	1	0%
Other treatment (enter further information in comments)	structure	1	0%
Other treatment (enter further information in comments)	acre	1	0%
Large wood placement (not anchored, or not known if anchored)	structure	1	0%
Water management (storage and release timing)	structure	1	0%
Irrigation system improved	mile	1	0%
Boulders placed in stream	structure	1	0%
Road ditch and drainage culvert maintenance (removing debris)	culvert	1	0%

Table 50. Number of projects and total, minimum, and maximum cost, for projects with only one treatment and one measurement unit and a beginning date of 1998 and forward.

Treatment	Units	Number of Project	Number of Projects w/ Cost	Total Cost	Minimum Cost	Maximum Cost
Land purchased, leased, or easement acquired	acre	315	314	$1,557,415,686	$1,779	$150,000,000
Fish screen installed	screen	11	11	$13,864,120	$18,225	$11,918,545
Road modified to reduce impacts to streams	mile	6	6	$1,681,076	$2,065	$1,250,067
Fencing/livestock exclusion	mile	6	6	$213,838	$13,086	$66,200
Repair/maintenance of existing restoration project structure (non-dam)	structure	5	5	$54,465	$2,314	$35,430
Invasive plant control	acre	5	5	$5,297,269	$2,300	$5,049,000
Fish barrier removed (type unknown)	barrier	3	3	$5,142,460	$27,297	$5,082,251
Log jam removed	barrier	2	2	$41,846	$3,900	$37,946
Other treatment (enter further information in comments)	unit	2	2	$771,272	$171,272	$600,000
Culvert/bridge upgraded (unknown method)	crossing	2	2	$1,950,013	$500,000	$1,450,013
Conifers planted	tree	2	2	$93,337	$37,212	$56,125
Irrigation water recycled (tailwater recaptured)	acre	1	1	$344,834	$344,834	$344,834
Culvert/bridge upgraded	culvert	1	1	$13,859	$13,859	$13,859

Treatment	Units	Number of Project	Number of Projects w/ Cost	Total Cost	Minimum Cost	Maximum Cost
(unknown method)						
Invasive plant control	mile	1	1	$464,803	$464,803	$464,803
Culvert/bridge upgraded (unknown method)	bridge	1	1	$438,509	$438,509	$438,509
Culvert retrofitted with baffles or weirs	baffle	1	1	$9,395	$9,395	$9,395
Fish ladder improved	barrier	1	1	$49,537	$49,537	$49,537
Culvert replaced with bridge	crossing	1	1	$22,684	$22,684	$22,684
Fish ladder installed	barrier	1	1	$530,129	$530,129	$530,129
Bridge installed	each	1	1	$84,100	$84,100	$84,100
Culvert/bridge upgraded (unknown method)	structure	1	1	$5,631	$5,631	$5,631
Planting (unknown type)	mile	1	1	$2,352	$2,352	$2,352
Upland vegetation management changed	acre	1	1	$20,641	$20,641	$20,641
Upland erosion control	acre	1	1	$157,541	$157,541	$157,541
Stream bank stabilized: bioengineering (living building materials)	mile	1	1	$5,457	$5,457	$5,457
Road drainage culvert installed/replaced/improved	unit	1	1	$761,955	$761,955	$761,955
Road ditch and drainage culvert maintenance (removing debris)	mile	1	1	$4,855	$4,855	$4,855
Irrigation system improved	acre	1	1	$6,293	$6,293	$6,293
Road decommissioned/obliterated	crossing	1	1	$9,875	$9,875	$9,875
Irrigated new plantings	acre	1	1	$19,000	$19,000	$19,000
Other treatment (enter further information in comments)	structure	1	1	$25,794	$25,794	$25,794
Other treatment (enter further information in comments)	acre	1	1	$60,438	$60,438	$60,438
Large wood placement (not anchored, or not known if anchored)	structure	1	1	$35,069	$35,069	$35,069
Water management (storage and release timing)	structure	1	1	$4,048	$4,048	$4,048
Irrigation system improved	mile	1	1	$1,803,492	$1,803,492	$1,803,492
Boulders placed in stream	structure	1	1	$11,335	$11,335	$11,335
Road ditch and drainage culvert maintenance (removing debris)	culvert	1	1	$1,058	$1,058	$1,058

Table 51. Number of projects and average, minimum, and maximum cost per unit, for projects with only one treatment and one measurement unit and a beginning date of 1998 and forward.

Treatment	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Land purchased, leased, or easement acquired	403,776	acre	315	314	$39,157	$52	$1,675,063
Fish screen installed	49	screen	11	11	$603,721	$1,393	$5,959,273
Road modified to reduce impacts to streams	71	mile	6	6	$10,490	$1,990	$32,053
Fencing/livestock exclusion	7	mile	6	6	$37,423	$12,826	$116,513
Repair/maintenance of existing restoration project structure (non-dam)	84	structure	5	5	$651	$355	$1,205
Invasive plant control	64	acre	5	5	$54,031	$1,154	$123,146
Fish barrier removed (type unknown)	7	barrier	3	3	$1,705,377	$6,582	$5,082,251
Log jam removed	7	barrier	2	2	$5,112	$3,900	$6,324
Other treatment (enter further information in comments)	253	unit	2	2	$86,826	$2,381	$171,272
Culvert/bridge upgraded (unknown method)	5	crossing	2	2	$431,252	$362,503	$500,000
Conifers planted	31,700	tree	2	2	$4	$2	$6
Irrigation water recycled (tailwater recaptured)	540	acre	1	1	$639	$639	$639
Culvert/bridge upgraded (unknown method)	1	culvert	1	1	$13,859	$13,859	$13,859
Invasive plant control	20	mile	1	1	$23,240	$23,240	$23,240
Culvert/bridge upgraded (unknown method)	4	bridge	1	1	$109,627	$109,627	$109,627
Culvert retrofitted with baffles or weirs	2	baffle	1	1	$4,698	$4,698	$4,698
Fish ladder improved	1	barrier	1	1	$49,537	$49,537	$49,537
Culvert replaced with bridge	1	crossing	1	1	$22,684	$22,684	$22,684
Fish ladder installed	1	barrier	1	1	$530,129	$530,129	$530,129
Bridge installed	1	each	1	1	$84,100	$84,100	$84,100
Culvert/bridge upgraded (unknown method)	1	structure	1	1	$5,631	$5,631	$5,631
Planting (unknown type)	0.6	mile	1	1	$3,675	$3,675	$3,675
Upland vegetation management changed	25	acre	1	1	$826	$826	$826

Treatment	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Upland erosion control	400	acre	1	1	$394	$394	$394
Stream bank stabilized: bioengineering (living building materials)	0.03	mile	1	1	$181,883	$181,883	$181,883
Road drainage culvert installed/replaced/improved	7	unit	1	1	$108,851	$108,851	$108,851
Road ditch and drainage culvert maintenance (removing debris)	2	mile	1	1	$2,653	$2,653	$2,653
Irrigation system improved	4	acre	1	1	$1,573	$1,573	$1,573
Road decommissioned/obliterated	1	crossing	1	1	$9,875	$9,875	$9,875
Irrigated new plantings	26	acre	1	1	$731	$731	$731
Other treatment (enter further information in comments)	1	structure	1	1	$25,794	$25,794	$25,794
Other treatment (enter further information in comments)	3	acre	1	1	$24,175	$24,175	$24,175
Large wood placement (not anchored, or not known if anchored)	12	structure	1	1	$2,922	$2,922	$2,922
Water management (storage and release timing)	3	structure	1	1	$1,349	$1,349	$1,349
Irrigation system improved	3	mile	1	1	$601,164	$601,164	$601,164
Boulders placed in stream	1	structure	1	1	$11,335	$11,335	$11,335
Road ditch and drainage culvert maintenance (removing debris)	1	culvert	1	1	$1,058	$1,058	$1,058

Task Summary

To work with the current database, we created a set of restoration tasks that are more detailed and task oriented than the habitat categories and less detailed than the treatments already existing in the CHRPD. These restoration tasks are stored in the CHRPD in the CostModelTaskLU lookup table and cross-referenced to treatments (and assigned to sites) through the MitDetailsLU table (see schematic in Appendix 1).

Mapping Treatments to Tasks

Restoration tasks are shown in Table 52, and the mapping of treatments to tasks is summarized in Table 53. Note that some of the tasks we created are quite broad (e.g. Instream Structures) whereas others are more narrowly defined (Fencing Projects). Of the 1523 restoration projects beginning in 1998 and forward, 1405 (92%; 49% of all projects beginning in 1998 or later) can be mapped to one or more restoration tasks. The number of projects by the number of tasks per project is given in Table 54, and the number of projects by task is given in Table 55.

Of the 1405 restoration projects since 1998 that can be assigned tasks, 793 (56%) have only one task, and 506 (36%) have only one task and only one measurement type. Table 56 shows the number of projects per task for projects with only one task. Note that the most common tasks for projects with only one task (Table 56) differ from the most common tasks for all projects (Table 55). The most common task overall is riparian planting, while the most common task for projects with only one task is land acquisition.

The number of projects per task for projects with only one task and only one measurement are shown in Table 57. Table 58 shows the number of projects by task and by unit for these same projects.

Table 52. Restoration tasks used to reclassify CHRPD data.

TaskID	Task
1	Fencing Projects
2	Riparian Planting
3	Culvert Replacement
4	Existing Culvert Improvement
5	Instream Structures
6	Bank Stabilization
7	Road Decommissioning
8	Road Surface Upgrade/Maintenance
9	Land Acquisition
10	Water Conservation Measures
11	Fish Screens
12	Fish Ladders
13	Barrier Removal

Table 53. Mapping of CHRPD treatments to restoration tasks.

TaskID	Task	Treatment	DetailsID
	None	Agricultural or grazing practices modified	306
	None	Beavers introduced	104
	None	Bridge installed	39
	None	Carcasses or other nutrients added to stream/bank	55
	None	Culvert or other stream crossing removed and not replaced	40
	None	Dike breached	401
	None	Education, training, workshops	30003
	None	Educational video, display, interpretive facilities	30005
	None	Estuarine area created	601
	None	Existing wetland improved	404
	None	Fence maintenance	58
	None	Fish trapped for survey or rearing	18
	None	Freshwater flow in estuary increased	604
	None	Grass planted	115
	None	Harvest/land management practices changed	205
	None	Improve ford (low water crossing)	33
	None	Invasive plant control	65
	None	Irrigated new plantings	30023
	None	Livestock access/crossing created or improved	59
	None	Livestock off-channel watering facility developed	107
	None	Livestock rotation	103
	None	Loosened/cleaned spawning gravels (gravel ripping)	29
	None	Main stream channel modified/created	32
	None	Mine site restored	209
	None	Monitoring of watersheds and fisheries	30013
	None	Off-channel habitat created (alcove, side channel, pond)	10
	None	Off-channel habitat reconnected or access improved (alcove, side channel, etc.)	24
	None	Other treatment (enter further information in comments)	97
	None	Pool created (unknown method)	5
	None	Pool excavated or blasted	54
	None	Previously filled or drained estuary restored	603
	None	Previously filled or drained wetland restored	403

TaskID	Task	Treatment	DetailsID
	None	Repair/maintenance of existing restoration project structure (non-dam)	503
	None	Restoration project effectiveness monitoring	10001
	None	Salmon enhancement: Collect/raise/transport/plant fish	30007
	None	Salmon enhancement: facillities	30022
	None	Salmon enhancement: Fish marking and technology	30015
	None	Sediment removed from stream	119
	None	Sediment-trap dam installed	118
	None	Spawning gravel placed in stream	16
	None	Survey, study, research	30000
	None	Unknown	99
	None	Upland erosion control	302
	None	Upland vegetation management changed	303
	None	Water right purchased or leased	502
	None	Watershed assessment and planning	30008
	None	Watershed organization support	10002
	None	Wetland created	402
	None	Wetland vegetation planted	407
	None	Wildlife management, trapping, transport (except beaver introduction)	30011
1	Fencing Projects	Fencing/livestock exclusion	106
2	Riparian Planting	Conifers planted	101
2	Riparian Planting	Hardwood stand converted to conifers	102
2	Riparian Planting	Hardwoods planted	105
2	Riparian Planting	Planting (unknown type)	42
2	Riparian Planting	Shrubs or herbaceous vegetation planted	121
2	Riparian Planting	Trees planted (unknown type)	41
2	Riparian Planting	Willows planted (simple planting, not bioengineering)	117
3	Culvert Replacement	Culvert replaced with box culvert	62
3	Culvert Replacement	Culvert replaced with bridge	34
3	Culvert Replacement	Culvert replaced with closed-bottom box culvert	64
3	Culvert Replacement	Culvert replaced with closed-bottom culvert (round or pipe-arch)	36
3	Culvert Replacement	Culvert replaced with open-bottom arch culvert	35
3	Culvert Replacement	Culvert replaced with open-bottom box culvert	63
3	Culvert Replacement	Culvert/bridge upgraded (unknown method)	30021
4	Existing Culvert Improvement	Culvert retrofitted with baffles or weirs	37
4	Existing Culvert Improvement	Weir installed below culvert outlet	38

TaskID	Task	Treatment	DetailsID
5	Instream Structures	Boulders placed in stream	8
5	Instream Structures	Brush bundles placed in stream	9
5	Instream Structures	Concrete weir installed (not below culvert)	31
5	Instream Structures	Flow deflector installed (type unspecified)	12
5	Instream Structures	Flow deflector installed: log	52
5	Instream Structures	Flow deflector installed: rock and log	30019
5	Instream Structures	Flow deflector installed: rock/boulder	53
5	Instream Structures	Large wood anchored in place (log, rootwad)	1
5	Instream Structures	Large wood placement (not anchored, or not known if anchored)	47
5	Instream Structures	Log weir installed (not below culvert)	4
5	Instream Structures	Pool created using scour structure	30020
5	Instream Structures	Rock weir installed (not below culvert)	11
5	Instream Structures	Rootwads placed in stream	2
5	Instream Structures	Weir installed (unknown type, not below culvert)	48
6	Bank Stabilization	Stream bank stabilized (unknown method)	7
6	Bank Stabilization	Stream bank stabilized: bioengineering (living building materials)	51
6	Bank Stabilization	Stream bank stabilized: log revetment installed	49
6	Bank Stabilization	Stream bank stabilized: riprap (rock revetment) installed	116
6	Bank Stabilization	Stream bank stabilized: rock and log revetment installed	50
6	Bank Stabilization	Stream bank stabilized: rock gabion installed	17
6	Bank Stabilization	Stream bank stabilized: stream bank resloped	120
7	Road Decommissioning	Road decommissioned/obliterated	206
8	Road Surface Upgrade/Maintenance	Road ditch and drainage culvert maintenance (removing debris)	202
8	Road Surface Upgrade/Maintenance	Road drainage culvert installed/replaced/improved	203
8	Road Surface Upgrade/Maintenance	Road modified to reduce impacts to streams	201
9	Land Acquisition	Land purchased, leased, or easement acquired	501
10	Water Conservation Measures	Irrigation system improved	304
10	Water Conservation Measures	Irrigation water recycled (tailwater recaptured)	61
10	Water Conservation Measures	Water management (storage and release timing)	28
11	Fish Screens	Fish screen installed	15
12	Fish Ladders	Fish ladder improved	23
12	Fish Ladders	Fish ladder installed	14
13	Barrier Removal	Dam removed	57
13	Barrier Removal	Dam repaired	112
13	Barrier Removal	Fish barrier removed (type unknown)	21

TaskID	Task	Treatment	DetailsID
13	Barrier Removal	Log jam removed	56
13	Barrier Removal	Pushup dam permanently removed	20
13	Barrier Removal	Tidegate altered/removed	602

Table 54. Number of projects by number of tasks per project, for restoration projects beginning in 1998 and forward.

Number of Tasks	Number of Projects	Percent of Projects
0	118	8%
1	793	52%
2	318	21%
3	190	12%
4	79	5%
5	20	1%
6	4	0%
7	1	0%

Table 55. Number of projects by restoration task, for restoration projects beginning in 1998 and forward (projects with multiple tasks are duplicated).

Task	Number of Projects
Riparian Planting	457
Bank Stabilization	392
Land Acquisition	387
Instream Structures	366
Road Surface Upgrade/Maintenance	201
Barrier Removal	162
Culvert Replacement	122
Fencing Projects	119
Road Decommissioning	111
Water Conservation Measures	43
Fish Ladders	35
Fish Screens	32
Existing Culvert Improvement	19

Table 56. Number of projects by restoration task, for projects with only one task and a beginning date of 1998 and forward.

Task	Number of Projects	Percent of Projects
Land Acquisition	375	47%
Riparian Planting	127	16%

Task	Number of Projects	Percent of Projects
Instream Structures	70	9%
Road Surface Upgrade/Maintenance	56	7%
Road Decommissioning	42	5%
Fencing Projects	23	3%
Water Conservation Measures	20	3%
Barrier Removal	20	3%
Fish Screens	17	2%
Bank Stabilization	17	2%
Culvert Replacement	16	2%
Fish Ladders	7	1%
Existing Culvert Improvement	3	0%

Table 57. Number of projects by task, for projects with only one task and one measurement unit and a beginning date of 1998 and forward.

Task	Number of Projects	Percent of Projects
Land Acquisition	334	66%
Riparian Planting	47	9%
Instream Structures	32	6%
Road Surface Upgrade/Maintenance	22	4%
Fish Screens	14	3%
Barrier Removal	12	2%
Fencing Projects	10	2%
Water Conservation Measures	9	2%
Culvert Replacement	8	2%
Road Decommissioning	6	1%
Fish Ladders	6	1%
Bank Stabilization	5	1%
Existing Culvert Improvement	1	0%

Table 58. Number of projects by task and measurement unit, for projects with only one task and one measurement unit and a beginning date of 1998 and forward.

Task	Units	Number of Projects	Percent of Projects
Land Acquisition	Acre	334	66%
Instream Structures	structure	24	5%
Riparian Planting	Acre	19	4%
Fish Screens	Screen	14	3%
Road Surface Upgrade/Maintenance	Mile	12	2%
Riparian Planting	Tree	11	2%
Fencing Projects	mile	10	2%
Riparian Planting	mile	10	2%

Task	Units	Number of Projects	Percent of Projects
Water Conservation Measures	acre	6	1%
Barrier Removal	barrier	6	1%
Fish Ladders	barrier	5	1%
Riparian Planting	student	5	1%
Instream Structures	mile	5	1%
Road Surface Upgrade/Maintenance	culvert	5	1%
Bank Stabilization	mile	3	1%
Culvert Replacement	crossing	3	1%
Culvert Replacement	culvert	3	1%
Barrier Removal	dam	2	0%
Road Decommissioning	mile	2	0%
Instream Structures	cubic yard	2	0%
Road Surface Upgrade/Maintenance	unit	2	0%
Barrier Removal	structure	2	0%
Barrier Removal	culvert	1	0%
Barrier Removal	acre	1	0%
Culvert Replacement	bridge	1	0%
Culvert Replacement	structure	1	0%
Existing Culvert Improvement	baffle	1	0%
Bank Stabilization	meeting	1	0%
Fish Ladders	structure	1	0%
Instream Structures	bridge	1	0%
Water Conservation Measures	persons	1	0%
Water Conservation Measures	mile	1	0%
Water Conservation Measures	structure	1	0%
Riparian Planting	classroom	1	0%
Riparian Planting	seedling	1	0%
Road Decommissioning	acre	1	0%
Road Decommissioning	crossing	1	0%
Road Decommissioning	cubic yard	1	0%
Road Decommissioning	persons	1	0%
Road Surface Upgrade/Maintenance	acre	1	0%
Road Surface Upgrade/Maintenance	crossing	1	0%
Road Surface Upgrade/Maintenance	cubic yard	1	0%
Bank Stabilization	acre	1	0%

Cost by Task

As already mentioned, cost per task and unit can only be determined from data in the CHRPD for projects that have only one task and only one measurement type. Table 59 gives the total, minimum and maximum cost by task and unit for these projects. Table 60 shows the average, minimum and maximum cost per unit for each task and unit for

restoration projects with only one task and one measurement unit. Tables 61 and 62 provide the same information as Table 60, broken out by study area and watershed respectively.

Table 59. Total, minimum, and maximum cost by task and measurement unit, for projects with only one task and one measurement unit and a beginning date of 1998 and forward.

Task	Units	Number of Projects	Number of Projects w/ Cost	Total Cost	Minimum Cost	Maximum Cost
Land Acquisition	Acre	334	333	$1,649,163,997	$1,779	$150,000,000
Instream Structures	structure	24	24	$510,238	$3,429	$70,530
Riparian Planting	Acre	19	19	$5,303,603	$6,286	$1,050,298
Fish Screens	Screen	14	14	$15,050,525	$16,876	$11,918,545
Road Surface Upgrade/Maintenance	Mile	12	12	$2,311,884	$2,065	$1,250,067
Riparian Planting	Tree	11	11	$570,060	$2,541	$298,450
Fencing Projects	Mile	10	10	$410,288	$13,086	$71,631
Riparian Planting	Mile	10	10	$858,022	$2,352	$701,351
Water Conservation Measures	Acre	6	6	$7,419,215	$6,293	$5,369,024
Barrier Removal	Barrier	6	6	$5,209,643	$3,900	$5,082,251
Fish Ladders	Barrier	5	5	$8,863,883	$49,537	$6,098,701
Riparian Planting	Student	5	5	$688,572	$27,980	$197,369
Instream Structures	Mile	5	5	$360,801	$5,341	$133,967
Road Surface Upgrade/Maintenance	Culvert	5	5	$132,858	$1,058	$71,145
Bank Stabilization	Mile	3	3	$1,050,223	$5,457	$1,019,936
Culvert Replacement	crossing	3	3	$1,972,670	$22,684	$1,450,013
Culvert Replacement	Culvert	3	3	$40,017	$1,924	$24,234
Barrier Removal	Dam	2	2	$215,169	$17,784	$197,384
Road Decommissioning	Mile	2	2	$1,264,254	$89,402	$1,174,851
Instream Structures	cubic yard	2	2	$62,175	$7,713	$54,462
Road Surface Upgrade/Maintenance	Unit	2	2	$773,354	$11,399	$761,955
Barrier Removal	structure	2	2	$7,776	$1,595	$6,181
Barrier Removal	Culvert	1	1	$213,220	$213,220	$213,220
Barrier Removal	Acre	1	1	$1,762,000	$1,762,000	$1,762,000
Culvert Replacement	Bridge	1	1	$438,509	$438,509	$438,509
Culvert Replacement	structure	1	1	$5,631	$5,631	$5,631
Existing Culvert Improvement	Baffle	1	1	$9,395	$9,395	$9,395
Bank Stabilization	Meeting	1	1	$9,133	$9,133	$9,133

Task	Units	Number of Projects	Number of Projects w/ Cost	Total Cost	Minimum Cost	Maximum Cost
Fish Ladders	structure	1	1	$47,227	$47,227	$47,227
Instream Structures	Bridge	1	1	$51,798	$51,798	$51,798
Water Conservation Measures	Persons	1	1	$89,695	$89,695	$89,695
Water Conservation Measures	Mile	1	1	$1,803,492	$1,803,492	$1,803,492
Water Conservation Measures	structure	1	1	$4,048	$4,048	$4,048
Riparian Planting	classroom	1	1	$19,686	$19,686	$19,686
Riparian Planting	seedling	1	1	$25,995	$25,995	$25,995
Road Decommissioning	Acre	1	1	$879,341	$879,341	$879,341
Road Decommissioning	crossing	1	1	$9,875	$9,875	$9,875
Road Decommissioning	cubic yard	1	1	$71,593	$71,593	$71,593
Road Decommissioning	Persons	1	1	$309,793	$309,793	$309,793
Road Surface Upgrade/Maintenance	Acre	1	1	$105,784	$105,784	$105,784
Road Surface Upgrade/Maintenance	crossing	1	1	$13,974	$13,974	$13,974
Road Surface Upgrade/Maintenance	cubic yard	1	1	$78,270	$78,270	$78,270
Bank Stabilization	Acre	1	1	$4,594	$4,594	$4,594

Table 60. Number of projects and average, minimum, and maximum cost per measurement unit, for projects with only one task and one measurement unit and a beginning date of 1998 and forward.

Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Land Acquisition	423,402	acre	334	333	$73,589	$52	$10,813,166
Instream Structures	236	structure	24	24	$2,495	$214	$11,335
Riparian Planting	3,238	acre	19	19	$10,096	$168	$63,115
Fish Screens	87	screen	14	14	$481,232	$1,393	$5,959,274
Road Surfac e Upgrade/Maintenance	91	mile	12	12	$17,999	$1,944	$51,960
Riparian Planting	63,071	tree	11	11	$110	$1	$587
Fencing Projects	13	mile	10	10	$36,964	$12,826	$116,514
Riparian Planting	10	mile	10	10	$96,049	$3,675	$436,640
Water Conservation	19,674	acre	6	6	$39,602	$27	$234,432

Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Measures							
Barrier Removal	15	barrier	6	6	$858,615	$3,900	$5,082,251
Fish Ladders	5	barrier	5	5	$1,772,777	$49,537	$6,098,701
Riparian Planting	2,099	student	5	5	$638	$108	$1,579
Instream Structures	1	mile	5	5	$364,521	$220,528	$552,118
Road Surface Upgrade/Maintenance	26	culvert	5	5	$6,624	$1,058	$16,074
Bank Stabilization	2	mile	3	3	$285,245	$163,883	$509,968
Culvert Replacement	6	crossing	3	3	$295,062	$22,684	$500,000
Culvert Replacement	3	culvert	3	3	$13,339	$1,924	$24,234
Barrier Removal	2	dam	2	2	$107,584	$17,784	$197,384
Road Decommissioning	16	mile	2	2	$121,605	$8,240	$234,970
Instream Structures	24,071	cubic yard	2	2	$2	$2	$3
Road Surface Upgrade/Maintenance	8	unit	2	2	$60,125	$11,399	$108,851
Barrier Removal	28	structure	2	2	$251	$159	$343
Barrier Removal	1	culvert	1	1	$213,220	$213,220	$213,220
Barrier Removal	33	acre	1	1	$53,394	$53,394	$53,394
Culvert Replacement	4	bridge	1	1	$109,627	$109,627	$109,627
Culvert Replacement	1	structure	1	1	$5,631	$5,631	$5,631
Existing Culvert Improvement	2	baffle	1	1	$4,698	$4,698	$4,698
Bank Stabilization	4	meeting	1	1	$2,283	$2,283	$2,283
Fish Ladders	1	structure	1	1	$47,227	$47,227	$47,227
Instream Structures	1	bridge	1	1	$51,798	$51,798	$51,798
Water Conservation Measures	20	persons	1	1	$4,485	$4,485	$4,485
Water Conservation Measures	3	mile	1	1	$601,164	$601,164	$601,164
Water Conservation Measures	3	structure	1	1	$1,349	$1,349	$1,349
Riparian Planting	85	classroom	1	1	$232	$232	$232
Riparian Planting	1,700	seedling	1	1	$15	$15	$15
Road Decommissioning	5,664	acre	1	1	$155	$155	$155
Road Decommissioning	1	crossing	1	1	$9,875	$9,875	$9,875
Road Decommissioning	42,472	cubic yard	1	1	$2	$2	$2
Road Decommissioning	18	persons	1	1	$17,211	$17,211	$17,211
Road Surface	11	acre	1	1	$9,617	$9,617	$9,617

Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Upgrade/Maintenance							
Road Surface Upgrade/Maintenance	6	crossing	1	1	$2,329	$2,329	$2,329
Road Surface Upgrade/Maintenance	5,078	cubic yard	1	1	$15	$15	$15
Bank Stabilization	13	acre	1	1	$335	$335	$335

Table 61. Number of projects by study area and average, minimum, and maximum cost per measurement unit, for projects with only one task and one measurement unit and a beginning date of 1998 and forward.

Study Area	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
	Bank Stabilization	4	meeting	1	1	$2,283	$2,283	$2,283
	Barrier Removal	1	barrier	1	1	$3,900	$3,900	$3,900
	Fish Screens	37	screen	2	2	$19,340	$2,813	$35,868
	Land Acquisition	115,108	acre	96	96	$11,262	$52	$128,087
	Riparian Planting	2,462	acre	6	6	$7,320	$168	$31,510
	Riparian Planting	3	mile	1	1	$233,785	$233,784	$233,784
	Riparian Planting	1,934	tree	3	3	$69	$8	$188
SONC	Bank Stabilization	0.2	mile	1	1	$163,883	$163,883	$163,883
SONC	Barrier Removal	1	culvert	1	1	$213,220	$213,220	$213,220
SONC	Barrier Removal	2	dam	2	2	$107,584	$17,784	$197,384
SONC	Barrier Removal	28	structure	2	2	$251	$159	$343
SONC	Culvert Replacement	4	bridge	1	1	$109,627	$109,627	$109,627
SONC	Culvert Replacement	5	crossing	2	2	$431,252	$362,503	$500,000
SONC	Culvert Replacement	1	culvert	1	1	$1,924	$1,924	$1,924
SONC	Fencing Projects	8	mile	6	6	$48,133	$24,193	$116,513
SONC	Fish Ladders	1	barrier	1	1	$530,129	$530,129	$530,129
SONC	Fish Screens	40	screen	8	8	$27,411	$1,393	$57,634
SONC	Instream Structures	33	structure	3	3	$1,276	$214	$2,145
SONC	Land Acquisition	29,045	acre	16	16	$12,108	$157	$37,318
SONC	Riparian Planting	10	acre	1	1	$1,758	$1,758	$1,758
SONC	Riparian Planting	4	mile	2	2	$30,830	$8,800	$52,859
SONC	Riparian Planting	75	student	1	1	$373	$373	$373

Study Area	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
SONC	Road Decommissioning	5,664	acre	1	1	$155	$155	$155
SONC	Road Decommissioning	42,472	cubic yard	1	1	$2	$2	$2
SONC	Road Decommissioning	16	mile	2	2	$121,605	$8,240	$234,970
SONC	Road Decommissioning	18	persons	1	1	$17,211	$17,211	$17,211
SONC	Road Surface Upgrade/Maintenance	42	mile	3	3	$12,257	$2,065	$32,053
SONC	Water Conservation Measures	544	acre	3	3	$78,881	$639	$234,432
SONC	Water Conservation Measures	3	mile	1	1	$601,164	$601,164	$601,164
SONC	Water Conservation Measures	20	persons	1	1	$4,485	$4,485	$4,485
SONC	Water Conservation Measures	3	structure	1	1	$1,349	$1,349	$1,349
NOCECA and SONC	Bank Stabilization	0.03	mile	1	1	$181,883	$181,883	$181,883
NOCECA and SONC	Barrier Removal	6	barrier	1	1	$6,324	$6,324	$6,324
NOCECA and SONC	Culvert Replacement	1	culvert	1	1	$13,859	$13,859	$13,859
NOCECA and SONC	Fencing Projects	4	mile	3	3	$17,882	$12,826	$25,801
NOCECA and SONC	Fish Screens	1	screen	1	1	$83,806	$83,806	$83,806
NOCECA and SONC	Instream Structures	72	structure	5	5	$2,994	$2,385	$3,527

Study Area	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
NOCECA and SONC	Land Acquisition	29,141	acre	16	16	$10,047	$316	$53,727
NOCECA and SONC	Riparian Planting	1,700	seedling	1	1	$15	$15	$15
NOCECA and SONC	Riparian Planting	59,314	tree	4	4	$5	$1	$11
NOCECA and SONC	Road Decommissioning	1	crossing	1	1	$9,875	$9,875	$9,875
NOCECA and SONC	Road Surface Upgrade/Maintenance	6	crossing	1	1	$2,329	$2,329	$2,329
NOCECA and SONC	Road Surface Upgrade/Maintenance	6	culvert	4	4	$7,391	$1,058	$16,074
NOCECA and SONC	Road Surface Upgrade/Maintenance	1	mile	2	2	$12,708	$3,311	$22,105
NOCECA and SONC	Road Surface Upgrade/Maintenance	7	unit	1	1	$108,851	$108,851	$108,851
NOCECA	Bank Stabilization	14	acre	1	1	$335	$335	$335
NOCECA	Barrier Removal	6	barrier	2	2	$16,940	$6,582	$27,297
NOCECA	Existing Culvert Improvement	2	baffle	1	1	$4,698	$4,698	$4,698
NOCECA	Instream Structures	1	bridge	1	1	$51,798	$51,798	$51,798
NOCECA	Instream Structures	24,071	cubic yard	2	2	$2	$2	$3
NOCECA	Instream Structures	0.01	mile	1	1	$534,100	$534,100	$534,100
NOCECA	Instream Structures	130	structure	15	15	$1,985	$680	$4,068
NOCECA	Land Acquisition	62,432	acre	51	51	$295,639	$138	$10,813,166
NOCECA	Riparian Planting	128	acre	4	4	$8,117	$1,843	$13,467
NOCECA	Riparian Planting	3	mile	7	7	$95,006	$3,675	$436,640
NOCECA	Riparian Planting	1,824	student	3	3	$652	$108	$1,579

Study Area	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
NOCECA	Riparian Planting	1,823	tree	4	4	$247	$6	$587
NOCECA	Road Surface Upgrade/Maintenance	11	acre	1	1	$9,617	$9,617	$9,617
NOCECA	Road Surface Upgrade/Maintenance	5,078	cubic yard	1	1	$15	$15	$15
NOCECA	Road Surface Upgrade/Maintenance	20	culvert	1	1	$3,557	$3,557	$3,557
NOCECA	Road Surface Upgrade/Maintenance	48	mile	7	7	$21,972	$1,944	$51,960
NOCECA	Water Conservation Measures	7,000	acre	1	1	$767	$767	$767
Central Valley	Fish Ladders	1	barrier	1	1	$2,133,222	$2,133,222	$2,133,222
Central Valley	Fish Screens	9	screen	3	3	$2,131,824	$168,760	$5,959,273
Central Valley	Land Acquisition	95,495	acre	67	67	$5,860	$195	$32,590
Central Valley	Riparian Planting	610	acre	4	4	$4,785	$2,000	$7,785
Central Valley	Riparian Planting	85	classroom	1	1	$232	$232	$232
Central Valley	Riparian Planting	200	student	1	1	$866	$866	$866
Central Valley	Water Conservation Measures	12,130	acre	2	2	$101	$27	$174
SCACO	Bank Stabilization	2	mile	1	1	$509,968	$509,968	$509,968
SCACO	Barrier Removal	33	acre	1	1	$53,394	$53,394	$53,394
SCACO	Barrier Removal	2	barrier	2	2	$2,553,794	$25,338	$5,082,251
SCACO	Culvert Replacement	1	crossing	1	1	$22,684	$22,684	$22,684
SCACO	Culvert Replacement	1	culvert	1	1	$24,234	$24,234	$24,234
SCACO	Culvert Replacement	1	structure	1	1	$5,631	$5,631	$5,631
SCACO	Fencing Projects	0.9	mile	1	1	$27,191	$27,191	$27,191
SCACO	Fish Ladders	3	barrier	3	3	$2,066,844	$49,537	$6,098,701
SCACO	Fish Ladders	1	structure	1	1	$47,227	$47,227	$47,227

Study Area	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
SCACO	Instream Structures	1	mile	4	4	$322,126	$220,528	$552,118
SCACO	Instream Structures	1	structure	1	1	$11,335	$11,335	$11,335
SCACO	Land Acquisition	92,181	acre	88	87	$87,349	$387	$1,675,063
SCACO	Riparian Planting	28	acre	4	4	$23,633	$495	$63,114
SCACO	Road Surface Upgrade/Maintenance	1	unit	1	1	$11,399	$11,399	$11,399

Table 62. Number of projects by watershed and average, minimum, and maximum cost per measurement unit, for projects with only one task and one measurement unit and a beginning date of 1998 and forward.

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
None	Bank Stabilization	14	acre	1	1	$335	$335	$335
None	Bank Stabilization	4	meeting	1	1	$2,283	$2,283	$2,283
None	Barrier Removal	1	barrier	1	1	$3,900	$3,900	$3,900
None	Fish Screens	39	screen	3	3	$1,999,318	$2,813	$5,959,273
None	Instream Structures	1	bridge	1	1	$51,798	$51,798	$51,798
None	Land Acquisition	155,137	acre	136	136	$62,487	$52	$1,675,063
None	Riparian Planting	2,468	acre	7	7	$7,840	$168	$31,510
None	Riparian Planting	85	classroom	1	1	$232	$232	$232
None	Riparian Planting	3	mile	2	2	$335,212	$233,784	$436,640
None	Riparian Planting	1,095	student	2	2	$240	$108	$373
None	Riparian Planting	1,934	tree	3	3	$69	$8	$188
None	Road Surface Upgrade/Maintenance	11	acre	1	1	$9,617	$9,617	$9,617
None	Road Surface	21	mile	1	1	$18,748	$18,748	$18,748

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
	Upgrade/Maintenance							
None	Water Conservation Measures	7,000	acre	1	1	$767	$767	$767
Agua Hedionda Creek	Land Acquisition	99	acre	1	1	$21,869	$21,869	$21,869
Alameda Creek	Land Acquisition	715	acre	2	2	$3,364	$3,011	$3,716
American River	Land Acquisition	1,055	acre	5	5	$7,916	$4,417	$16,618
Americano Creek	Land Acquisition	366	acre	2	2	$4,797	$1,670	$7,925
Arroyo Hondo	Land Acquisition	800	acre	1	1	$9,461	$9,461	$9,461
Ballona Creek	Land Acquisition	483	acre	1	1	$289,855	$289,855	$289,855
Battle Creek	Land Acquisition	4,511	acre	2	2	$589	$559	$619
Bear Creek S_CV	Land Acquisition	3,074	acre	1	1	$992	$992	$992
Bear River	Land Acquisition	494	acre	1	1	$1,409	$1,409	$1,409
Bear River	Road Surface Upgrade/Maintenance	0.8	mile	1	1	$3,311	$3,311	$3,311
Big Chico and Mud Creeks	Land Acquisition	7,998	acre	2	2	$785	$496	$1,073
Big River	Land Acquisition	7,344	acre	1	1	$4,830	$4,830	$4,830
Big Sur River	Land Acquisition	17	acre	1	1	$43,937	$43,937	$43,937
Butte Creek	Fish Ladders	1	barrier	1	1	$2,133,222	$2,133,222	$2,133,222
Butte Creek	Riparian Planting	96	acre	1	1	$4,807	$4,807	$4,807
Cache Creek	Land Acquisition	279	acre	2	2	$15,847	$2,126	$29,569
Calleguas Creek	Bank Stabilization	2	mile	1	1	$509,968	$509,968	$509,968
Calleguas Creek	Land Acquisition	620	acre	3	2	$57,672	$41,040	$74,304
Cañada del Refugio	Land Acquisition	660	acre	1	1	$1,587	$1,587	$1,587
Carmel River	Fish Ladders	2	barrier	2	2	$50,915	$49,537	$52,293
Carpinteria Creek	Culvert Replacement	1	culvert	1	1	$24,234	$24,234	$24,234

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Carpinteria Salt Marsh Complex	Barrier Removal	33	acre	1	1	$53,394	$53,394	$53,394
Caspar Creek	Land Acquisition	71	acre	1	1	$29,763	$29,763	$29,763
Chorro Creek	Instream Structures	1	mile	3	3	$245,462	$220,528	$261,981
Chorro Creek	Land Acquisition	2,440	acre	2	2	$5,672	$1,180	$10,165
Clear Creek	Land Acquisition	20	acre	1	1	$4,386	$4,386	$4,386
Cosumnes River	Land Acquisition	6,201	acre	6	6	$5,915	$2,033	$21,155
Coyote Creek	Land Acquisition	1,984	acre	3	3	$11,127	$2,094	$27,461
Deer Creek N_CV	Land Acquisition	9,479	acre	1	1	$245	$245	$245
Doyle Creek	Land Acquisition	75	acre	1	1	$26,990	$26,990	$26,990
East South Valley Fresno Slough	Land Acquisition	362	acre	1	1	$1,036	$1,036	$1,036
Elkhorn Slough	Land Acquisition	1,001	acre	4	4	$3,035	$1,661	$5,109
Feather River	Land Acquisition	21,877	acre	3	3	$550	$195	$1,243
Freshwater Creek	Instream Structures	12	structure	1	1	$3,413	$3,413	$3,413
Garcia River	Land Acquisition	25,550	acre	2	2	$2,682	$731	$4,633
Garcia River	Road Surface Upgrade/Maintenance	8	mile	2	2	$37,194	$26,999	$47,389
Gazos Creek	Instream Structures	20,771	cubic yard	1	1	$3	$3	$3
Guadalupe River	Land Acquisition	268	acre	2	2	$12,057	$8,259	$15,855
Guadalupe River	Riparian Planting	6	acre	1	1	$13,170	$13,170	$13,170
Gualala River	Instream Structures	25	structure	2	2	$3,215	$2,509	$3,920
Guthrie Creek	Land Acquisition	405	acre	2	2	$7,146	$6,527	$7,765
Howard Creek	Instream Structures	5	structure	1	1	$1,086	$1,086	$1,086
Jacoby Creek	Land Acquisition	410	acre	5	5	$16,734	$4,829	$53,727
Kern River	Land Acquisition	3,665	acre	3	3	$1,626	$1,188	$2,040
Laguna Canyon	Land Acquisition	11	acre	1	1	$263,702	$263,702	$263,702

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Lagunitas Creek	Riparian Planting	15	tree	1	1	$587	$587	$587
Little Sur River	Road Surface Upgrade/Maintenance	1	unit	1	1	$11,399	$11,399	$11,399
Los Angeles River	Land Acquisition	2,162	acre	3	3	$379,021	$4,147	$1,087,816
Los Peñasquitos Creek	Land Acquisition	400	acre	1	1	$19,412	$19,412	$19,412
Lower Eel River	Land Acquisition	3,640	acre	1	1	$928	$928	$928
Lower Kaweah and Tule Rivers	Riparian Planting	83	acre	1	1	$7,785	$7,785	$7,785
Lower Klamath River	Barrier Removal	18	structure	1	1	$343	$343	$343
Lower Klamath River	Instream Structures	6	structure	1	1	$1,468	$1,468	$1,468
Lower Klamath River	Road Decommissioning	5,664	acre	1	1	$155	$155	$155
Lower Klamath River	Road Decommissioning	42,472	cubic yard	1	1	$2	$2	$2
Lower Klamath River	Road Decommissioning	18	persons	1	1	$17,211	$17,211	$17,211
Lower Sacramento River Colusa Basin	Fish Screens	7	screen	2	2	$218,100	$168,760	$267,440
Lower Sacramento River Colusa Basin	Land Acquisition	56	acre	2	2	$5,850	$4,950	$6,750
Lower Trinity River	Instream Structures	11	structure	1	1	$2,145	$2,145	$2,145
Lower Trinity River	Road Decommissioning	11	mile	1	1	$8,240	$8,240	$8,240
Mad River	Fish Screens	1	screen	1	1	$83,806	$83,806	$83,806
Mad River	Land Acquisition	74	acre	1	1	$8,833	$8,833	$8,833
Mad River	Riparian Planting	1,700	seedling	1	1	$15	$15	$15
Mad River	Riparian Planting	3,390	tree	1	1	$11	$11	$11

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Mad River	Road Surface Upgrade/Maintenance	7	unit	1	1	$108,851	$108,851	$108,851
Malibu Creek	Land Acquisition	3,030	acre	2	2	$36,210	$21,723	$50,697
Marsh Creek	Land Acquisition	4,407	acre	4	4	$4,906	$2,159	$10,395
Mattole River	Bank Stabilization	0.03	mile	1	1	$181,883	$181,883	$181,883
Mattole River	Instream Structures	40	structure	3	3	$2,676	$2,385	$2,922
Mattole River	Land Acquisition	531	acre	2	2	$3,257	$2,100	$4,415
Mattole River	Riparian Planting	24,224	tree	1	1	$1	$1	$1
Mattole River	Road Surface Upgrade/Maintenance	0.6	mile	1	1	$22,105	$22,105	$22,105
Mid Klamath River	Riparian Planting	3	mile	1	1	$8,800	$8,800	$8,800
Middle Fork Eel River	Fencing Projects	1	mile	1	1	$12,826	$12,826	$12,826
Middle Fork Eel River	Land Acquisition	23,000	acre	1	1	$316	$316	$316
Middle Sacramento River	Land Acquisition	8	acre	1	1	$2,922	$2,922	$2,922
Middle Sacramento River	Riparian Planting	231	acre	1	1	$4,547	$4,547	$4,547
Middle San Joaquin River	Land Acquisition	1,223	acre	9	9	$12,816	$962	$18,596
Middle San Joaquin River	Water Conservation Measures	2,930	acre	1	1	$27	$27	$27
Mokelumne River	Land Acquisition	2,866	acre	1	1	$1,047	$1,047	$1,047
Napa River	Land Acquisition	1,356	acre	4	4	$11,590	$877	$37,146
Napa River	Riparian Planting	2	mile	2	2	$16,414	$5,111	$27,717
Navarro River	Instream Structures	3,300	cubic yard	1	1	$2	$2	$2
Navarro River	Instream Structures	17	structure	2	2	$2,684	$1,300	$4,068

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Navarro River	Riparian Planting	425	tree	1	1	$6	$6	$6
Navarro River	Road Surface Upgrade/Maintenance	5	mile	1	1	$51,960	$51,960	$51,960
North Suisun Bay	Land Acquisition	3,317	acre	2	2	$1,565	$580	$2,551
Novato Creek	Land Acquisition	2,652	acre	4	4	$5,384	$2,161	$10,407
Noyo River	Land Acquisition	35	acre	2	2	$50,553	$4,400	$96,706
Otay River	Land Acquisition	1,655	acre	3	3	$22,231	$15,988	$27,440
Pajaro River	Land Acquisition	597	acre	3	3	$16,175	$2,993	$23,156
Pescadero Creek	Barrier Removal	1	barrier	1	1	$27,297	$27,297	$27,297
Pescadero Creek	Land Acquisition	80	acre	1	1	$9,167	$9,167	$9,167
Petaluma River	Existing Culvert Improvement	2	baffle	1	1	$4,698	$4,698	$4,698
Pit River	Land Acquisition	2,080	acre	1	1	$636	$636	$636
Pudding Creek	Land Acquisition	38	acre	1	1	$75,565	$75,565	$75,565
Putah Creek	Land Acquisition	549	acre	2	2	$920	$726	$1,114
Ramirez Canyon	Land Acquisition	37	acre	1	1	$10,878	$10,878	$10,878
Redwood Creek	Road Decommissioning	1	crossing	1	1	$9,875	$9,875	$9,875
Russian River	Instream Structures	75	structure	9	9	$1,648	$680	$2,702
Russian River	Riparian Planting	52	acre	2	2	$8,728	$3,988	$13,467
Russian River	Riparian Planting	1	mile	3	3	$33,631	$3,675	$74,117
Russian River	Riparian Planting	125	student	1	1	$1,579	$1,579	$1,579
Russian River	Riparian Planting	1,233	tree	1	1	$242	$242	$242
Russian River	Road Surface Upgrade/Maintenance	5,078	cubic yard	1	1	$15	$15	$15
Russian River	Road Surface Upgrade/Maintenance	20	culvert	1	1	$3,557	$3,557	$3,557
Russian River	Road Surface Upgrade/Maintenance	9	mile	2	2	$3,359	$1,944	$4,774

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Sacramento Delta	Land Acquisition	7,083	acre	2	2	$1,260	$422	$2,098
Sacramento Delta	Riparian Planting	200	acre	1	1	$2,000	$2,000	$2,000
Sacramento Delta	Riparian Planting	200	student	1	1	$866	$866	$866
Salinas River	Land Acquisition	26,213	acre	5	5	$6,456	$387	$25,153
Salmon Creek - S	Instream Structures	0.01	mile	1	1	$534,100	$534,100	$534,100
Salmon Creek - S	Land Acquisition	2,508	acre	3	3	$26,120	$138	$75,471
Salmon Creek - S	Riparian Planting	0.1	mile	1	1	$94,683	$94,683	$94,683
Salmon River	Road Decommissioning	5	mile	1	1	$234,970	$234,970	$234,970
Salmon River	Road Surface Upgrade/Maintenance	39	mile	1	1	$32,053	$32,053	$32,053
San Diego River	Land Acquisition	1,214	acre	1	1	$3,637	$3,637	$3,637
San Diego River	Riparian Planting	5	acre	1	1	$19,963	$19,963	$19,963
San Dieguito River	Land Acquisition	758	acre	2	2	$7,952	$7,155	$8,748
San Francisquito Creek	Barrier Removal	5	barrier	1	1	$6,582	$6,582	$6,582
San Francisquito Creek	Riparian Planting	150	tree	1	1	$149	$149	$149
San Gabriel River	Land Acquisition	91	acre	1	1	$65,021	$65,021	$65,021
San Gregorio Creek	Land Acquisition	3,681	acre	1	1	$5,934	$5,934	$5,934
San Joaquin Delta	Land Acquisition	11,015	acre	3	3	$11,950	$1,290	$32,590
San Joaquin Delta	Water Conservation Measures	9,200	acre	1	1	$174	$174	$174
San Leandro Creek	Riparian Planting	70	acre	1	1	$1,843	$1,843	$1,843
San Leandro Creek	Riparian Planting	679	student	1	1	$265	$265	$265
San Lorenzo River	Instream Structures	8	structure	1	1	$2,044	$2,044	$2,044
San Lorenzo River	Land Acquisition	168	acre	2	2	$5,415,954	$18,743	$10,813,166
San Lorenzo River	Road Surface	5	mile	1	1	$1,990	$1,990	$1,990

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
	Upgrade/Maintenance							
San Luis Obispo Creek	Fencing Projects	0.9	mile	1	1	$27,191	$27,191	$27,191
San Luis Obispo Creek	Land Acquisition	1,603	acre	3	3	$5,507	$565	$9,076
San Marcos Creek	Riparian Planting	13	acre	1	1	$495	$495	$495
San Mateo Creek	Land Acquisition	335	acre	2	2	$14,929	$14,706	$15,152
Santa Ana River	Land Acquisition	14,380	acre	11	11	$7,556	$2,814	$16,249
Santa Clara River	Culvert Replacement	1	crossing	1	1	$22,684	$22,684	$22,684
Santa Clara River	Fish Ladders	1	structure	1	1	$47,227	$47,227	$47,227
Santa Clara River	Instream Structures	1	structure	1	1	$11,335	$11,335	$11,335
Santa Clara River	Land Acquisition	220	acre	1	1	$22,634	$22,634	$22,634
Santa Margarita River	Land Acquisition	4,418.00	acre	2	2	$4,115.55	$2,569.33	$5,662
Santa Maria River	Land Acquisition	0.5	acre	1	1	$871,845	$871,845	$871,845
Santa Rosa Creek	Barrier Removal	1	barrier	1	1	$25,338	$25,338	$25,338
Santa Rosa Creek	Land Acquisition	638	acre	4	4	$71,037	$10,608	$235,264
Santa Ynez River	Culvert Replacement	1	structure	1	1	$5,631	$5,631	$5,631
Santa Ynez River	Land Acquisition	1,406.	acre	1	1	$3,980	$3,980	$3,980
Scott River	Bank Stabilization	0.2	mile	1	1	$163,883	$163,883	$163,883
Scott River	Fish Ladders	1	barrier	1	1	$530,129	$530,129	$530,129
Scott River	Fish Screens	11	screen	4	4	$24,557	$19,470	$30,203
Scott River	Land Acquisition	2,360	acre	1	1	$157	$157	$157
Scott River	Riparian Planting	10	acre	1	1	$1,758	$1,758	$1,758
Scott River	Water Conservation Measures	3	mile	1	1	$601,164	$601,164	$601,164
Scott River	Water Conservation Measures	3	structure	1	1	$1,349	$1,349	$1,349

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Shasta River	Fencing Projects	8	mile	6	6	$48,133	$24,193	$116,513
Shasta River	Fish Screens	28	screen	3	3	$34,278	$1,393	$57,634
Shasta River	Land Acquisition	42	acre	3	3	$3,106	$2,541	$3,727
Shasta River	Riparian Planting	0.7	mile	1	1	$52,859	$52,859	$52,859
Shasta River	Water Conservation Measures	540	acre	2	2	$117,535	$639	$234,432
Shasta River	Water Conservation Measures	20	persons	1	1	$4,485	$4,485	$4,485
Smith River	Barrier Removal	1	culvert	1	1	$213,220	$213,220	$213,220
Smith River	Barrier Removal	10	structure	1	1	$159	$159	$159
Smith River	Culvert Replacement	1	culvert	1	1	$1,924	$1,924	$1,924
Smith River	Instream Structures	16	structure	1	1	$214.31	$214.31	$214.31
Smith River	Land Acquisition	26,643	acre	12	12	$15,354.42	$3,210.39	$37,318.33
Sonoma Creek	Land Acquisition	165	acre	1	1	$34,515.15	$34,515.15	$34,515.15
South Fork Eel River	Barrier Removal	6	barrier	1	1	$6,324	$6,324	$6,324
South Fork Eel River	Fencing Projects	3	mile	2	2	$20,411	$15,020	$25,801
South Fork Eel River	Instream Structures	20	structure	1	1	$3,527	$3,527	$3,527
South Fork Eel River	Riparian Planting	23,000	tree	1	1	$2	$2	$2
South Fork Eel River	Road Surface Upgrade/Maintenance	6	crossing	1	1	$2,329	$2,329	$2,329
South Fork Eel River	Road Surface Upgrade/Maintenance	4	culvert	2	2	$8,566	$1,058	$16,074
South Fork Trinity River	Water Conservation Measures	4	acre	1	1	$1,573	$1,573	$1,573

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
South Suisun Bay	Land Acquisition	1,189	acre	4	4	$3,781	$1,592	$5,605
Stemple Creek	Land Acquisition	325	acre	1	1	$976	$976	$976
Sweetwater River	Land Acquisition	6	acre	1	1	$290,614	$290,614	$290,614
Topanga Canyon	Land Acquisition	120	acre	1	1	$8,772	$8,772	$8,772
Toro Creek	Instream Structures	0.07	mile	1	1	$552,118	$552,118	$552,118
Tulare Lake Basin	Land Acquisition	117	acre	2	2	$405	$329	$481
Tule River	Land Acquisition	722	acre	1	1	$466	$466	$466
Tuna Canyon	Land Acquisition	416	acre	1	1	$35,425	$35,425	$35,425
Upper Klamath River	Fish Screens	1	screen	1	1	$18,225	$18,225	$18,225
Upper Sacramento River	Land Acquisition	354	acre	2	2	$14,841	$3,707	$25,976
Upper San Joaquin River	Land Acquisition	360	acre	1	1	$21,155	$21,155	$21,155
Upper Trinity River	Barrier Removal	2	dam	2	2	$107,584	$17,784	$197,384
Upper Trinity River	Culvert Replacement	4	bridge	1	1	$109,627	$109,627.21	$109,627.21
Upper Trinity River	Culvert Replacement	5	crossing	2	2	$431,252	$362,503.17	$500,000.00
Upper Trinity River	Road Surface Upgrade/Maintenance	3	mile	2	2	$2,359	$2,064.91	$2,653.01
Van Duzen River	Culvert Replacement	1	culvert	1	1	$13,859	$13,859.00	$13,859.00
Van Duzen River	Land Acquisition	691	acre	1	1	$26,483	$26,483	$26,483
Van Duzen River	Riparian Planting	8,700	tree	1	1	$6	$6	$6
Van Duzen River	Road Surface Upgrade/Maintenance	2	culvert	2	2	$6,216	$4,605	$7,827
Ventura River	Barrier Removal	1	barrier	1	1	$5,082,251	$5,082,251	$5,082,251
Ventura River	Fish Ladders	1	barrier	1	1	$6,098,701	$6,098,701	$6,098,701
Ventura River	Land Acquisition	30	acre	1	1	$14,478	$14,478	$14,478
Ventura River	Riparian Planting	5	acre	1	1	$63,114	$63,114	$63,114

Watershed	Task	Total Measure	Units	Number of Projects	Number of Projects w/ Cost	Average Cost per Unit	Minimum Cost per Unit	Maximum Cost per Unit
Villa Creek - SLO	Land Acquisition	748	acre	1	1	$24,017	$24,017	$24,017
Walker Creek	Land Acquisition	1,896	acre	2	2	$1,313	$1,069	$1,558
Yuba River	Land Acquisition	223	acre	1	1	$2,780	$2,780	$2,780

Findings and Recommendations

Habitat restoration involves the use of best management practices to address habitat-related factors that limit salmon survival and recovery. On-the-ground restoration involves use of inputs (e.g., labor, materials, equipment) to produce outcomes that are variously described in terms of treatments (e.g., road upgrade, fencing, revegetation), area covered (e.g., stream miles, road miles, acres), and work completed (e.g., instream structures installed, fish passage barriers removed, trees planted). Restoration proposals typically include a description of outcomes, as well as a breakdown of input costs. Funding entities rely on these proposals, as well as their own internal cost accounting procedures, to ensure that individual projects are completed according to specification and within budget. While this process is useful for monitoring individual contracts, it does not yield the types of standardized project data needed to provide an informative program-wide description of restoration costs as they relate to particular treatments, sites and outcomes. Accomplishing the latter requires consideration of the cumulative effects of restoration projects and thus some standardization of information among projects.

The CHRPD contains restoration project data collected by multiple funding entities. Each project in the database is assigned to a project type and involves work conducted at single or multiple sites. While not all sites in the CHRPD can be assigned to a location, those that have been assigned are recorded in digital shapefiles as points, lines or polygons. Each site is also characterized by treatment and habitat - with restoration at some sites involving multiple treatments and habitats. For each treatment, outcomes are described in terms of the size of the area treated and the amount of the treatment. Treatment outcomes are reported separately for projects and sites in the CHRPD, with many projects and sites characterized by multiple treatment units.

The following steps were taken to make the CHRPD data more tractable and to focus on CHRPD projects most relevant to salmon recovery:

- Each site in the CHRPD is assigned to one or more of 14 habitat categories. We were primarily interested in habitat categories involving on-the-ground restoration related to salmonid recovery and for which a reasonable number of projects were included in the CHRPD. Through a process of exclusion and aggregation, we reduced the number of habitat categories from fourteen to six: instream, riparian, upland, instream and riparian, road, land acquisition. Each site that fit into one or more of these six categories was assigneda habitat category; sites fitting multiple categories were assigned a seventh category denoted “multiple”

- Sites are assigned to one or more of the 105 treatments in the CHRPD. Through a process of exclusion and aggregation, we reduced the 105 treatments to 13 tasks: fencing, riparian planting, culvert replacement, existing culvert improvement, instream structures, bank stabilization, road decommissioning, road surface upgrade/maintenance, land acquisition, water conservation measures, fish screens,

fish ladders, barrier removal. Each task is a logical component of one or more of the seven habitat categories. Some tasks are more broadly defined than others, due in part to the ambiguity in the definitions of treatments.

- Quantities of restoration work performed are measured in the CHRPD in units pertaining to the size of the area treated (e.g., miles, acres) and the extent of treatment (e.g., number of structures installed, number of cubic yards of dirt removed). Separate measurement units are included in the CHRPD for projects and sites, with multiple units provided for some projects and sites. Measurement units for a project and its associated sites did not always correspond - suggesting errors or omissions in the data. It was also unclear whether the measurement units included for each project/site were a comprehensive representation of the work completed. For purposes of our analysis, we standardized units as much as possible and identified and focused on the most common measurement units associated with each habitat category.

- Restoration costs are reported in the CHRPD at the project but not the site level. For site level cost analyses, we estimated site cost by arbitrarily allocating project costs equally among the sites associated with each project.

- Approximately half of the projects in the CHRPD have multiple measurement units (after standardizing units as much as possible) and there are no indications of how project costs should be partitioned among the measurements of the amount of work that was done. In order to estimate cost per unit of work for the various restoration categories, we limited the analysis to projects with only one measurement type in the database and divided the total project cost by the units of measurement. Resulting cost per unit values are likely to be biased toward values for simpler projects if unit costs differ depending on the complexity of the project.

- Not all restoration sites in the CHRPD are assigned to a location. However, those that have location data are recorded in digital shapefiles as points, lines or polygons. We devised rules to assign sites and projects to study areas and watersheds. Specifically, each site was assigned to the study area and watershed that included more than 50% of its area (for sites defined as polygons) or length (for sites defined as lines). Each project was assigned to the study area and watershed accounting for more than 50% of its sites.

Given the re-categorization methods described above, some caveats are in order:

- Due to ambiguities and lack of standardization in existing restoration project data, we resorted to often arbitrary methods to estimate restoration costs by habitat category, treatment, unit of work, study area and watershed. All cost summaries contained in this report are thus “ballpark” estimates and should be interpreted accordingly.

- Sites and projects in this report are assigned to geographic areas (watersheds and study areas) based on the area that they fall most within. When sites or projects straddle multiple areas, the costs are not apportioned among the areas, but rather all costs are assigned to the watershed or study area that the majority of the site or project occurs within. Thus the maps and tables contained in this report reflect some loss of geographic precision in the data.

Restoration project data contained in the CHRPD reflect the typically non-standard manner in which data are collected on project types, habitats, treatments, and treatment measurement units. Because costs are monitored at the project level and because treatments used and habitats restored are reported at the site level, it is not possible to directly relate costs to sites, treatments and habitats. While the inherent complexity and variability of restoration makes standardized reporting of all of its aspects infeasible, routine standardization of some aspects of restoration projects can go a long way toward characterizing the cumulative costs and benefits of restoration. The following recommendations are intended to facilitate such standardization:

- We recommend that funding entities categorize their restoration projects on a site-specific basis according to a well-defined, comprehensive and standardized set of treatments/tasks. The eight task categories used in this report included: road upgrade/maintenance, road decommissioning, bank stabilization, instream structure installation, culvert replacement, culvert improvement, fencing installation, and riparian planting. Other categorizations could be used as well, depending on the types of projects funded by a particular habitat restoration program.

- Current non-standardization of treatments and associated measurement units makes it difficult to estimate the aggregate amount of restoration associated with a particular treatment or to determine how costs relate to particular measurement units. We recommend that funding entities devise a well-defined, comprehensive and standardized set of treatments and treatment measurement units for each task, and that work completed by contractors under each task be described in terms of those units.

- In order to adequately characterize the locations and types of work accomplished with restoration monies, we recommend that project costs be broken out by task and site. To deal with potential ambiguities in this regard, explicit protocols may be required to assign costs to tasks and to deal with fixed costs that may be applicable to multiple tasks.

- Standardized project data are probably most efficiently obtained as part of the routine information requirements of restoration proposals and contract reports. Trade-offs will likely need to be made in terms of establishing requirements that are adequate to their purpose but not unduly burdensome on contractors.

- The CHRPD is an important repository of habitat restoration project data on California. Whatever the shortcomings of the project data contained in the CHRPD, it is the existence of that database that made it possible for us to systematically evaluate the types of restoration data currently collected and to consider the types of enhancements needed to better estimate the cumulative outcomes of habitat restoration and relate costs to outcomes. Future improvements in restoration project data will need to be accomplished in the context of repositories like the CHRPD.

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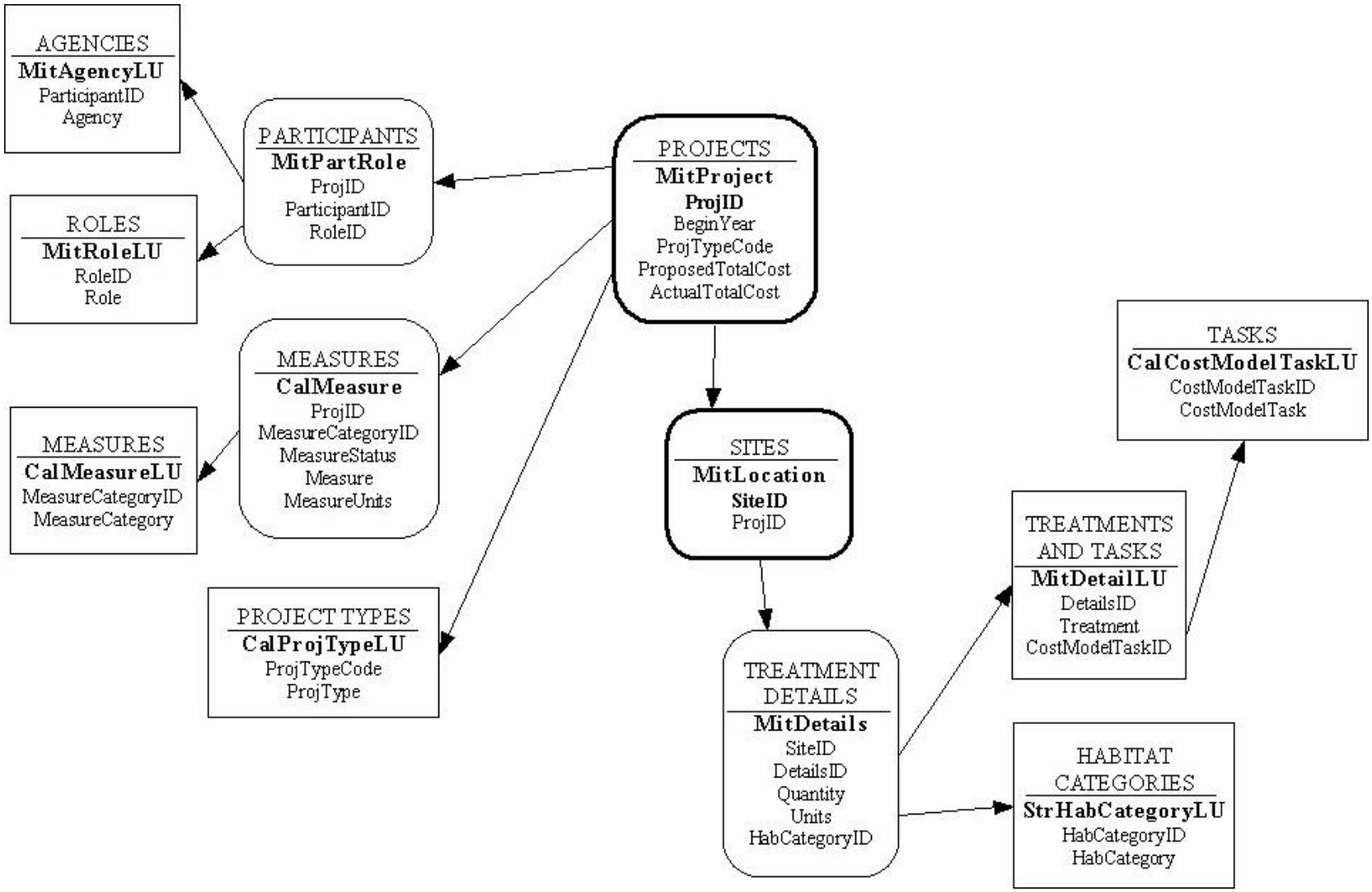
Appendix 1: CHRPD Schematic

The schematic below provides a simplified representation of selected tables and fields in the CHRPD. Each box represents a table and contains a descriptor of the type of information at the top. CHRPD table names are in bold, with selected fields listed beneath.



Appendix 2: Number of Projects and Sites per Watershed

Watershed	Number of Projects	Number of Sites
Agua Hedionda Creek	3	6
Alameda Creek	11	19
Albion River	10	18
Aliso Creek		2
American River	17	25
Americano Creek	4	4
Aptos Creek	3	6
Arroyo Burro	2	3
Arroyo Grande Creek	5	13
Arroyo Hondo	3	4
Arroyo Leon	2	7
Arroyo Sequit		1
Ballona Creek	15	29
Battle Creek	6	12
Bear Creek N_CV	1	1
Bear Creek S_CV	1	1
Bear River	23	64
Big Chico and Mud Creeks	9	34
Big River	28	50
Big Salmon Creek	1	2
Big Sur River	1	1
Bixby Creek		1
Brush Creek	1	5
Buena Vista Creek	1	7
Butte Creek	15	27
Cache Creek	12	26
Calaveras River	6	8
Calleguas Creek	12	20
Cañada de la Gaviota	1	1
Cañada de Segunda Deshecha		1
Cañada del Capitan	2	2
Cañada del Refugio	1	1
Cañada del Venadito		1
Canyon de las Encincas		3
Carbon Canyon	1	4
Carmel River	19	34
Carpinteria Creek	8	9
Carpinteria Salt Marsh Complex	5	10
Caspar Creek	3	61
Chollas Creek	2	4

Watershed	Number of Projects	Number of Sites
Chorro Creek	20	37
Clear Creek	4	14
Coon Creek	3	5
Corte Madera Creek	4	5
Cosumnes River	9	13
Cottaneva Creek	1	1
Cottonwood Creek	3	3
Coyote Creek	8	10
Deer Creek N_CV	2	9
Deer Creek S_CV	1	1
DeHaven Creek	1	4
Del Rey Creek	1	4
Doyle Creek	3	5
Dry Creek	2	2
East South Valley Fresno Slough	1	1
Elk Creek	2	13
Elk River - CA	13	22
Elkhorn Slough	18	31
Escondido Creek	7	9
Feather River	21	48
Freshwater Creek	42	143
Fresno River	1	1
Garcia River	24	57
Garrapata Creek	3	88
Gazos Creek	11	20
Goleta Slough Complex	1	6
Greenwood Creek	1	1
Guadalupe River	6	8
Gualala River	44	224
Guthrie Creek	2	4
Hall Canyon		1
Hardy Creek	1	5
Hare Creek		5
Howard Creek	1	3
Ilinois River	4	10
Jacoby Creek	23	51
Jalama Creek		1
Juan Creek	1	2
Kaweah River	1	1
Kern River	9	39
Kings River	3	5
Laguna Canyon	1	2

Watershed	Number of Projects	Number of Sites
Laguna Creek		2
Lagunitas Creek	29	96
Las Pulgas Canyon		1
Little Cow Creek		2
Little River - N	7	17
Little River - S	7	9
Little Sur River	1	1
Los Angeles River	15	28
Los Gatos Creek	1	1
Los Osos Creek	4	11
Los Peñasquitos Creek	4	5
Lower Eel River	56	284
Lower Kaweah and Tule Rivers	1	1
Lower Klamath River	53	186
Lower Middle Eel River	22	45
Lower Sacramento River Colusa Basin	16	26
Lower San Joaquin River	9	11
Lower Trinity River	32	107
Mad River	50	141
Malibu Creek	13	26
Maple Creek	2	30
Marsh Creek	8	9
Mattole River	127	489
McCloud River	2	3
McNutt Gulch		4
Merced River	10	13
Mid Klamath River	57	278
Middle Fork Eel River	21	31
Middle Sacramento River	13	20
Middle San Joaquin River	15	20
Mill Creek		4
Miller Creek	1	3
Mission Creek	1	2
Mokelumne River	6	13
Morrison Creek	1	1
Napa River	51	97
Navarro River	66	320
North Fork Eel River	6	44
North Suisun Bay	9	26
Novato Creek	13	19
Noyo River	18	197
Otay River	4	12

Watershed	Number of Projects	Number of Sites
Pajaro River	18	30
Panoche Creek	1	1
Pescadero Creek	12	105
Petaluma River	19	37
Pit River	7	7
Poso Creek		1
Pudding Creek	3	8
Putah Creek	6	16
Ramirez Canyon	1	1
Red Bank Creek		1
Redwood Creek	38	205
Redwood Creek - Muir Woods	6	49
Reeds Creek		1
Rincon Creek	2	3
Romero Creek	1	1
Rose Canyon	2	2
Russian Gulch - N	1	1
Russian Gulch - S		56
Russian River	206	1137
Sacramento Delta	19	42
Salinas River	19	39
Salmon Creek - N	13	42
Salmon Creek - S	22	31
Salmon River	57	327
Salt Creek	1	3
San Diego Creek	6	13
San Diego River	7	9
San Dieguito River	4	14
San Francisquito Creek	8	45
San Gabriel River	8	10
San Gregorio Creek	7	32
San Joaquin Delta	16	39
San Jose Creek	3	3
San Juan Creek		2
San Leandro Creek	2	11
San Lorenzo Creek	1	3
San Lorenzo River	46	86
San Luis Obispo Creek	14	24
San Luis Rey River	3	6
San Marcos Creek	4	7
San Mateo Creek	3	8
San Pablo Creek	2	5

Watershed	Number of Projects	Number of Sites
San Vicente Creek	1	2
Santa Ana River	19	37
Santa Clara River	28	60
Santa Margarita River	4	12
Santa Maria River	9	16
Santa Rosa Creek	8	13
Santa Ynez River	12	31
Scott Creek	25	55
Scott River	102	408
Shasta River	86	158
Smith River	138	487
Solstice Canyon	3	6
Sonoma Creek	20	65
Soquel Creek	10	28
South Fork Eel River	201	1322
South Fork Trinity River	59	138
South Suisun Bay	13	17
Stanislaus River	5	24
Stemple Creek	2	4
Stevens Creek	1	1
Stillwater Creek	2	2
Stony Creek		4
Sweetwater River	3	3
Ten Mile River	20	66
Tijuana River	14	19
Topanga Canyon	9	10
Toro Creek	3	4
Tulare Lake Basin	2	6
Tule River	2	2
Tuna Canyon	1	1
Tunitas Creek		1
Tuolumne River	12	16
Upper Eel River	7	14
Upper Klamath River	37	204
Upper Middle Eel River	34	65
Upper Sacramento River	16	23
Upper San Joaquin River	19	27
Upper Trinity River	28	86
Usal Creek	1	1
Van Duzen River	59	489
Ventura River	28	42
Villa Creek - SLO	2	2
Waddell Creek		3

Watershed	Number of Projects	Number of Sites
Wages Creek	5	7
Walker Creek	14	35
White River	1	2
Wilson Creek	6	8
Winchuck River	11	56
Yuba River	10	13

Appendix 3: Treatments, Measurement Units, and Number of Sites per Habitat Category – Tier 2, All Sites, With Duplicates

(qryRestMeasHabCatTreatUnitsSites)

Habitat Category	Treatment	Units	Number of Sites
Instream	Boulders placed in stream		106
Instream	Boulders placed in stream	structure	39
Instream	Boulders placed in stream	cubic yard	23
Instream	Boulders placed in stream	ton	20
Instream	Boulders placed in stream	foot	6
Instream	Boulders placed in stream	unit	4
Instream	Boulders placed in stream	square foot	3
Instream	Boulders placed in stream	each	2
Instream	Boulders placed in stream	boulder	1
Instream	Boulders placed in stream	site	1
Instream	Bridge installed	bridge	7
Instream	Bridge installed	crossing	5
Instream	Bridge installed	culvert	1
Instream	Bridge installed	each	1
Instream	Brush bundles placed in stream	foot	19
Instream	Brush bundles placed in stream		4
Instream	Brush bundles placed in stream	structure	1
Instream	Brush bundles placed in stream	unit	1
Instream	Concrete weir installed (not below culvert)	structure	2
Instream	Concrete weir installed (not below culvert)	each	1
Instream	Concrete weir installed (not below culvert)	unit	1
Instream	Culvert or other stream crossing removed and not replaced	crossing	45
Instream	Culvert or other stream crossing removed and not replaced	culvert	28
Instream	Culvert or other stream crossing removed and not replaced	bridge	8
Instream	Culvert or other stream crossing removed and not replaced		2
Instream	Culvert or other stream crossing removed and not replaced	section	1
Instream	Culvert replaced with bridge	culvert	13
Instream	Culvert replaced with bridge	crossing	5
Instream	Culvert replaced with bridge		1
Instream	Culvert replaced with bridge	bridge	1
Instream	Culvert replaced with closed-bottom box culvert	culvert	1
Instream	Culvert replaced with closed-bottom culvert (round or pipe-arch)	culvert	5
Instream	Culvert replaced with closed-bottom culvert (round or pipe-	crossing	1

Habitat Category	Treatment	Units	Number of Sites
	arch)		
Instream	Culvert replaced with closed-bottom culvert (round or pipe-arch)	site	1
Instream	Culvert replaced with open-bottom arch culvert	culvert	13
Instream	Culvert replaced with open-bottom arch culvert	crossing	3
Instream	Culvert replaced with open-bottom box culvert	unit	2
Instream	Culvert replaced with open-bottom box culvert	culvert	1
Instream	Culvert retrofitted with baffles or weirs	culvert	9
Instream	Culvert retrofitted with baffles or weirs	baffle	1
Instream	Culvert/bridge upgraded (unknown method)	culvert	29
Instream	Culvert/bridge upgraded (unknown method)	bridge	12
Instream	Culvert/bridge upgraded (unknown method)		2
Instream	Culvert/bridge upgraded (unknown method)	crossing	1
Instream	Dam removed	dam	5
Instream	Dam removed	barrier	1
Instream	Dam repaired		1
Instream	Dam repaired	dam	1
Instream	Fish barrier removed (type unknown)	barrier	86
Instream	Fish barrier removed (type unknown)	unit	4
Instream	Fish barrier removed (type unknown)	dam	3
Instream	Fish barrier removed (type unknown)	culvert	2
Instream	Fish barrier removed (type unknown)	structure	2
Instream	Fish barrier removed (type unknown)	crossing	1
Instream	Fish ladder improved	structure	4
Instream	Fish ladder improved		3
Instream	Fish ladder installed	structure	11
Instream	Fish ladder installed	unit	4
Instream	Fish ladder installed		2
Instream	Fish screen installed	screen	32
Instream	Fish screen installed		3
Instream	Fish screen installed	structure	1
Instream	Fish screen installed	unit	1
Instream	Flow deflector installed (type unspecified)	structure	9
Instream	Flow deflector installed (type unspecified)		7
Instream	Flow deflector installed (type unspecified)	unit	1
Instream	Flow deflector installed: log	structure	13
Instream	Flow deflector installed: log		2
Instream	Flow deflector installed: log	foot	1
Instream	Flow deflector installed: log	log	1
Instream	Flow deflector installed: rock and log	structure	12
Instream	Flow deflector installed: rock and log		3

Habitat Category	Treatment	Units	Number of Sites
Instream	Flow deflector installed: rock and log	unit	1
Instream	Flow deflector installed: rock/boulder		23
Instream	Flow deflector installed: rock/boulder	structure	22
Instream	Flow deflector installed: rock/boulder	foot	10
Instream	Flow deflector installed: rock/boulder	unit	3
Instream	Flow deflector installed: rock/boulder	square foot	1
Instream	Improve ford (low water crossing)	culvert	11
Instream	Improve ford (low water crossing)		1
Instream	Irrigation system improved		6
Instream	Irrigation system improved	foot	2
Instream	Irrigation system improved	unit	1
Instream	Large wood anchored in place (log, rootwad)	structure	38
Instream	Large wood anchored in place (log, rootwad)	log	6
Instream	Large wood placement (not anchored, or not known if anchored)		134
Instream	Large wood placement (not anchored, or not known if anchored)	structure	82
Instream	Large wood placement (not anchored, or not known if anchored)	log	51
Instream	Large wood placement (not anchored, or not known if anchored)	unit	9
Instream	Large wood placement (not anchored, or not known if anchored)	each	2
Instream	Large wood placement (not anchored, or not known if anchored)	barrier	1
Instream	Livestock access/crossing created or improved	crossing	3
Instream	Livestock access/crossing created or improved		1
Instream	Log jam removed		26
Instream	Log jam removed	structure	25
Instream	Log jam removed	barrier	8
Instream	Log jam removed	log	6
Instream	Log jam removed	unit	6
Instream	Log jam removed	foot	2
Instream	Log jam removed	site	1
Instream	Log weir installed (not below culvert)		9
Instream	Log weir installed (not below culvert)	structure	3
Instream	Loosened/cleaned spawning gravels (gravel ripping)		1
Instream	Main stream channel modified/created		15
Instream	Main stream channel modified/created	foot	6
Instream	Off-channel habitat created (alcove, side channel, pond)	structure	3
Instream	Off-channel habitat created (alcove, side channel, pond)	pool	1
Instream	Off-channel habitat reconnected or access improved		3

Habitat Category	Treatment	Units	Number of Sites
	(alcove, side channel, etc.)		
Instream	Other treatment (enter further information in comments)		17
Instream	Other treatment (enter further information in comments)	structure	4
Instream	Other treatment (enter further information in comments)	bridge	2
Instream	Other treatment (enter further information in comments)	foot	2
Instream	Other treatment (enter further information in comments)	unit	2
Instream	Other treatment (enter further information in comments)	cubic yard	1
Instream	Other treatment (enter further information in comments)	screen	1
Instream	Pool created (unknown method)	pool	21
Instream	Pool created (unknown method)		12
Instream	Pool created using scour structure	pool	75
Instream	Pool created using scour structure		62
Instream	Pool created using scour structure	unit	1
Instream	Pool excavated or blasted		1
Instream	Pushup dam permanently removed	barrier	2
Instream	Pushup dam permanently removed		1
Instream	Pushup dam permanently removed	structure	1
Instream	Repair/maintenance of existing restoration project structure (non-dam)	structure	20
Instream	Repair/maintenance of existing restoration project structure (non-dam)		10
Instream	Repair/maintenance of existing restoration project structure (non-dam)	log	1
Instream	Repair/maintenance of existing restoration project structure (non-dam)	screen	1
Instream	Road decommissioned/obliterated		31
Instream	Road decommissioned/obliterated	crossing	1
Instream	Road drainage culvert installed/replaced/improved	crossing	13
Instream	Road modified to reduce impacts to streams	crossing	9
Instream	Road modified to reduce impacts to streams		1
Instream	Rock weir installed (not below culvert)	structure	50
Instream	Rock weir installed (not below culvert)	unit	12
Instream	Rock weir installed (not below culvert)		9
Instream	Rock weir installed (not below culvert)	each	7
Instream	Rock weir installed (not below culvert)	site	1
Instream	Rock weir installed (not below culvert)	weir	1
Instream	Rootwads placed in stream		85
Instream	Rootwads placed in stream	structure	13
Instream	Rootwads placed in stream	unit	10
Instream	Rootwads placed in stream	each	3
Instream	Sediment removed from stream		27
Instream	Sediment removed from stream	cubic yard	22

Habitat Category	Treatment	Units	Number of Sites
Instream	Sediment removed from stream	site	1
Instream	Sediment-trap dam installed		4
Instream	Sediment-trap dam installed	each	1
Instream	Sediment-trap dam installed	structure	1
Instream	Sediment-trap dam installed	unit	1
Instream	Spawning gravel placed in stream	ton	20
Instream	Spawning gravel placed in stream		3
Instream	Stream bank stabilized (unknown method)		68
Instream	Stream bank stabilized (unknown method)	foot	52
Instream	Stream bank stabilized (unknown method)	cubic yard	5
Instream	Stream bank stabilized (unknown method)	mile	2
Instream	Stream bank stabilized (unknown method)	site	2
Instream	Stream bank stabilized (unknown method)	crossing	1
Instream	Stream bank stabilized: bioengineering (living building materials)	foot	95
Instream	Stream bank stabilized: bioengineering (living building materials)		85
Instream	Stream bank stabilized: bioengineering (living building materials)	baffle	3
Instream	Stream bank stabilized: bioengineering (living building materials)	square foot	3
Instream	Stream bank stabilized: bioengineering (living building materials)	structure	3
Instream	Stream bank stabilized: bioengineering (living building materials)	unit	3
Instream	Stream bank stabilized: bioengineering (living building materials)	mile	2
Instream	Stream bank stabilized: bioengineering (living building materials)	each	1
Instream	Stream bank stabilized: bioengineering (living building materials)	tree	1
Instream	Stream bank stabilized: log revetment installed		11
Instream	Stream bank stabilized: riprap (rock revetment) installed		65
Instream	Stream bank stabilized: riprap (rock revetment) installed	foot	18
Instream	Stream bank stabilized: riprap (rock revetment) installed	cubic yard	12
Instream	Stream bank stabilized: riprap (rock revetment) installed	structure	4
Instream	Stream bank stabilized: riprap (rock revetment) installed	mile	1
Instream	Stream bank stabilized: riprap (rock revetment) installed	ton	1
Instream	Stream bank stabilized: riprap (rock revetment) installed	tree	1
Instream	Stream bank stabilized: riprap (rock revetment) installed	yard	1
Instream	Stream bank stabilized: rock and log revetment installed		6
Instream	Stream bank stabilized: rock and log revetment installed	foot	2
Instream	Stream bank stabilized: rock and log revetment installed	structure	1

Habitat Category	Treatment	Units	Number of Sites
Instream	Stream bank stabilized: rock gabion installed	unit	1
Instream	Stream bank stabilized: stream bank resloped		49
Instream	Stream bank stabilized: stream bank resloped	foot	18
Instream	Stream bank stabilized: stream bank resloped	crossing	2
Instream	Stream bank stabilized: stream bank resloped	acre	1
Instream	Stream bank stabilized: stream bank resloped	site	1
Instream	Stream bank stabilized: stream bank resloped	yard	1
Instream	Upland erosion control	cubic yard	3
Instream	Water management (storage and release timing)		1
Instream	Water management (storage and release timing)	acre	1
Instream	Water management (storage and release timing)	structure	1
Instream	Weir installed (unknown type, not below culvert)		1
Instream	Weir installed below culvert outlet	culvert	4
Instream	Weir installed below culvert outlet	structure	3
Riparian	Agricultural or grazing practices modified	mile	1
Riparian	Conifers planted		45
Riparian	Conifers planted	tree	26
Riparian	Conifers planted	acre	3
Riparian	Fence maintenance		6
Riparian	Fence maintenance	year	4
Riparian	Fencing/livestock exclusion	foot	53
Riparian	Fencing/livestock exclusion		24
Riparian	Fencing/livestock exclusion	mile	3
Riparian	Fencing/livestock exclusion	structure	1
Riparian	Grass planted		8
Riparian	Grass planted	unit	3
Riparian	Grass planted	acre	1
Riparian	Hardwood stand converted to conifers		4
Riparian	Hardwood stand converted to conifers	seedling	1
Riparian	Hardwood stand converted to conifers	tree	1
Riparian	Hardwoods planted		56
Riparian	Hardwoods planted	tree	44
Riparian	Hardwoods planted	acre	8
Riparian	Hardwoods planted	square foot	6
Riparian	Hardwoods planted	foot	1
Riparian	Hardwoods planted	seedling	1
Riparian	Invasive plant control		29
Riparian	Invasive plant control	acre	21
Riparian	Invasive plant control	mile	3
Riparian	Invasive plant control	square foot	1
Riparian	Irrigated new plantings		23

Habitat Category	Treatment	Units	Number of Sites
Riparian	Irrigated new plantings	acre	4
Riparian	Livestock off-channel watering facility developed		7
Riparian	Livestock off-channel watering facility developed	foot	2
Riparian	Other treatment (enter further information in comments)		3
Riparian	Other treatment (enter further information in comments)	acre	1
Riparian	Planting (unknown type)		11
Riparian	Planting (unknown type)	unit	6
Riparian	Planting (unknown type)	tree	3
Riparian	Planting (unknown type)	acre	2
Riparian	Planting (unknown type)	foot	2
Riparian	Planting (unknown type)	mile	1
Riparian	Planting (unknown type)	seedling	1
Riparian	Planting (unknown type)	square foot	1
Riparian	Planting (unknown type)	yard	1
Riparian	Repair/maintenance of existing restoration project structure (non-dam)	acre	2
Riparian	Repair/maintenance of existing restoration project structure (non-dam)		1
Riparian	Repair/maintenance of existing restoration project structure (non-dam)	mile	1
Riparian	Shrubs or herbaceous vegetation planted		9
Riparian	Shrubs or herbaceous vegetation planted	unit	6
Riparian	Shrubs or herbaceous vegetation planted	tree	4
Riparian	Shrubs or herbaceous vegetation planted	acre	3
Riparian	Shrubs or herbaceous vegetation planted	foot	2
Riparian	Stream bank stabilized: bioengineering (living building materials)		1
Riparian	Trees planted (unknown type)	acre	6
Riparian	Trees planted (unknown type)		5
Riparian	Trees planted (unknown type)	tree	2
Riparian	Wildlife management, trapping, transport (except beaver introduction)		6
Riparian	Willows planted (simple planting, not bioengineering)		35
Riparian	Willows planted (simple planting, not bioengineering)	tree	5
Riparian	Willows planted (simple planting, not bioengineering)	acre	4
Riparian	Willows planted (simple planting, not bioengineering)	foot	2
Riparian	Willows planted (simple planting, not bioengineering)	mile	1
Riparian	Willows planted (simple planting, not bioengineering)	seedling	1
Riparian	Willows planted (simple planting, not bioengineering)	square foot	1
Riparian	Willows planted (simple planting, not bioengineering)	unit	1
Upland	Conifers planted	seedling	1
Upland	Flow deflector installed (type unspecified)		1

Habitat Category	Treatment	Units	Number of Sites
Upland	Grass planted		8
Upland	Grass planted	acre	1
Upland	Irrigation system improved	mile	4
Upland	Irrigation system improved	foot	1
Upland	Irrigation water recycled (tailwater recaptured)		4
Upland	Irrigation water recycled (tailwater recaptured)	foot	1
Upland	Irrigation water recycled (tailwater recaptured)	unit	1
Upland	Livestock off-channel watering facility developed		4
Upland	Livestock off-channel watering facility developed	foot	1
Upland	Livestock off-channel watering facility developed	structure	1
Upland	Other treatment (enter further information in comments)		2
Upland	Trees planted (unknown type)	acre	1
Upland	Upland erosion control		227
Upland	Upland erosion control	mile	17
Upland	Upland erosion control	bale	6
Upland	Upland erosion control	site	4
Upland	Upland erosion control	acre	2
Upland	Upland erosion control	cubic yard	1
Upland	Upland erosion control	structure	1
Upland	Upland vegetation management changed	acre	27
Upland	Upland vegetation management changed		18
Upland	Water management (storage and release timing)	acre foot	3
Upland	Water management (storage and release timing)	site	3
Upland	Water management (storage and release timing)	gallon	2
Upland	Water management (storage and release timing)		1
Instream and Riparian	Agricultural or grazing practices modified		1
Instream and Riparian	Boulders placed in stream		54
Instream and Riparian	Boulders placed in stream	structure	12
Instream and Riparian	Boulders placed in stream	ton	8
Instream and Riparian	Boulders placed in stream	cubic yard	6
Instream and Riparian	Boulders placed in stream	foot	2
Instream and Riparian	Boulders placed in stream	yard	2
Instream and Riparian	Boulders placed in stream	cluster	1
Instream and Riparian	Boulders placed in stream	site	1

Habitat Category	Treatment	Units	Number of Sites
Instream and Riparian	Boulders placed in stream	unit	1
Instream and Riparian	Bridge installed	crossing	4
Instream and Riparian	Brush bundles placed in stream		10
Instream and Riparian	Conifers planted		54
Instream and Riparian	Conifers planted	tree	20
Instream and Riparian	Conifers planted	seedling	4
Instream and Riparian	Conifers planted	acre	1
Instream and Riparian	Culvert or other stream crossing removed and not replaced	culvert	5
Instream and Riparian	Culvert or other stream crossing removed and not replaced	bridge	1
Instream and Riparian	Culvert replaced with bridge	culvert	6
Instream and Riparian	Culvert replaced with bridge	crossing	4
Instream and Riparian	Culvert replaced with bridge	barrier	1
Instream and Riparian	Culvert replaced with open-bottom arch culvert	culvert	6
Instream and Riparian	Culvert/bridge upgraded (unknown method)	culvert	7
Instream and Riparian	Culvert/bridge upgraded (unknown method)		1
Instream and Riparian	Dam removed	dam	4
Instream and Riparian	Dam repaired	dam	1
Instream and Riparian	Fence maintenance		1
Instream and Riparian	Fence maintenance	year	1
Instream and Riparian	Fencing/livestock exclusion		22
Instream and Riparian	Fencing/livestock exclusion	foot	20
Instream and Riparian	Fish barrier removed (type unknown)	barrier	19
Instream and Riparian	Fish barrier removed (type unknown)	culvert	2
Instream and	Fish barrier removed (type unknown)		1

Habitat Category	Treatment	Units	Number of Sites
Riparian			
Instream and Riparian	Fish ladder installed	unit	2
Instream and Riparian	Fish ladder installed		1
Instream and Riparian	Fish ladder installed	structure	1
Instream and Riparian	Fish screen installed	screen	1
Instream and Riparian	Flow deflector installed (type unspecified)		10
Instream and Riparian	Flow deflector installed (type unspecified)	structure	5
Instream and Riparian	Flow deflector installed (type unspecified)	site	1
Instream and Riparian	Flow deflector installed: log	structure	5
Instream and Riparian	Flow deflector installed: log		2
Instream and Riparian	Flow deflector installed: rock and log	structure	8
Instream and Riparian	Flow deflector installed: rock and log	unit	3
Instream and Riparian	Flow deflector installed: rock and log		1
Instream and Riparian	Flow deflector installed: rock and log	deflector	1
Instream and Riparian	Flow deflector installed: rock/boulder	structure	12
Instream and Riparian	Flow deflector installed: rock/boulder		8
Instream and Riparian	Flow deflector installed: rock/boulder	each	2
Instream and Riparian	Flow deflector installed: rock/boulder	unit	2
Instream and Riparian	Flow deflector installed: rock/boulder	deflector	1
Instream and Riparian	Flow deflector installed: rock/boulder	foot	1
Instream and Riparian	Grass planted		23
Instream and Riparian	Grass planted	cubic yard	2
Instream and Riparian	Grass planted	foot	1
Instream and Riparian	Grass planted	square foot	1

Habitat Category	Treatment	Units	Number of Sites
Instream and Riparian	Grass planted	square yards	1
Instream and Riparian	Hardwood stand converted to conifers		1
Instream and Riparian	Hardwoods planted		102
Instream and Riparian	Hardwoods planted	tree	24
Instream and Riparian	Hardwoods planted	foot	5
Instream and Riparian	Hardwoods planted	acre	4
Instream and Riparian	Hardwoods planted	seedling	3
Instream and Riparian	Hardwoods planted	square foot	2
Instream and Riparian	Invasive plant control		12
Instream and Riparian	Invasive plant control	acre	3
Instream and Riparian	Invasive plant control	tree	2
Instream and Riparian	Invasive plant control	foot	1
Instream and Riparian	Invasive plant control	mile	1
Instream and Riparian	Invasive plant control	seedling	1
Instream and Riparian	Invasive plant control	year	1
Instream and Riparian	Irrigated new plantings		13
Instream and Riparian	Irrigation system improved		1
Instream and Riparian	Large wood anchored in place (log, rootwad)	structure	8
Instream and Riparian	Large wood anchored in place (log, rootwad)		1
Instream and Riparian	Large wood anchored in place (log, rootwad)	log	1
Instream and Riparian	Large wood placement (not anchored, or not known if anchored)	structure	29
Instream and Riparian	Large wood placement (not anchored, or not known if anchored)		20
Instream and Riparian	Large wood placement (not anchored, or not known if anchored)	log	11
Instream and	Large wood placement (not anchored, or not known if	each	1

Habitat Category	Treatment	Units	Number of Sites
Riparian	anchored)		
Instream and Riparian	Large wood placement (not anchored, or not known if anchored)	site	1
Instream and Riparian	Large wood placement (not anchored, or not known if anchored)	unit	1
Instream and Riparian	Log jam removed		6
Instream and Riparian	Log jam removed	barrier	4
Instream and Riparian	Log jam removed	structure	1
Instream and Riparian	Log jam removed	unit	1
Instream and Riparian	Log weir installed (not below culvert)		12
Instream and Riparian	Log weir installed (not below culvert)	structure	2
Instream and Riparian	Log weir installed (not below culvert)	log	1
Instream and Riparian	Log weir installed (not below culvert)	unit	1
Instream and Riparian	Main stream channel modified/created	foot	6
Instream and Riparian	Main stream channel modified/created		5
Instream and Riparian	Main stream channel modified/created	yard	2
Instream and Riparian	Off-channel habitat created (alcove, side channel, pond)		1
Instream and Riparian	Off-channel habitat reconnected or access improved (alcove, side channel, etc.)		1
Instream and Riparian	Other treatment (enter further information in comments)	foot	4
Instream and Riparian	Other treatment (enter further information in comments)		3
Instream and Riparian	Other treatment (enter further information in comments)	structure	1
Instream and Riparian	Other treatment (enter further information in comments)	unit	1
Instream and Riparian	Planting (unknown type)		31
Instream and Riparian	Planting (unknown type)	foot	5
Instream and Riparian	Planting (unknown type)	tree	4
Instream and Riparian	Planting (unknown type)	yard	2

Habitat Category	Treatment	Units	Number of Sites
Instream and Riparian	Planting (unknown type)	acre	1
Instream and Riparian	Planting (unknown type)	square foot	1
Instream and Riparian	Pool created (unknown method)		7
Instream and Riparian	Pool created (unknown method)	pool	7
Instream and Riparian	Pool created using scour structure	pool	25
Instream and Riparian	Pool created using scour structure		16
Instream and Riparian	Pool created using scour structure	log	1
Instream and Riparian	Pool excavated or blasted		1
Instream and Riparian	Repair/maintenance of existing restoration project structure (non-dam)		6
Instream and Riparian	Repair/maintenance of existing restoration project structure (non-dam)	structure	4
Instream and Riparian	Repair/maintenance of existing restoration project structure (non-dam)	acre	1
Instream and Riparian	Rock weir installed (not below culvert)	structure	12
Instream and Riparian	Rock weir installed (not below culvert)		10
Instream and Riparian	Rock weir installed (not below culvert)	unit	5
Instream and Riparian	Rock weir installed (not below culvert)	each	2
Instream and Riparian	Rock weir installed (not below culvert)	barrier	1
Instream and Riparian	Rock weir installed (not below culvert)	crossing	1
Instream and Riparian	Rock weir installed (not below culvert)	site	1
Instream and Riparian	Rootwads placed in stream		18
Instream and Riparian	Rootwads placed in stream	unit	7
Instream and Riparian	Rootwads placed in stream	structure	5
Instream and Riparian	Sediment removed from stream		9
Instream and Riparian	Sediment removed from stream	cubic yard	6
Instream and	Sediment removed from stream	foot	2

Habitat Category	Treatment	Units	Number of Sites
Riparian			
Instream and Riparian	Sediment-trap dam installed		5
Instream and Riparian	Sediment-trap dam installed	unit	2
Instream and Riparian	Shrubs or herbaceous vegetation planted		19
Instream and Riparian	Shrubs or herbaceous vegetation planted	foot	2
Instream and Riparian	Shrubs or herbaceous vegetation planted	unit	2
Instream and Riparian	Spawning gravel placed in stream		2
Instream and Riparian	Spawning gravel placed in stream	ton	1
Instream and Riparian	Stream bank stabilized (unknown method)		70
Instream and Riparian	Stream bank stabilized (unknown method)	foot	47
Instream and Riparian	Stream bank stabilized (unknown method)	crossing	1
Instream and Riparian	Stream bank stabilized (unknown method)	meter	1
Instream and Riparian	Stream bank stabilized (unknown method)	mile	1
Instream and Riparian	Stream bank stabilized (unknown method)	site	1
Instream and Riparian	Stream bank stabilized (unknown method)	square foot	1
Instream and Riparian	Stream bank stabilized (unknown method)	yard	1
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)	foot	57
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)		41
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)	unit	4
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)	each	1
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)	seedling	1
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)	site	1
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)	structure	1
Instream and Riparian	Stream bank stabilized: bioengineering (living building materials)	tree	1

Habitat Category	Treatment	Units	Number of Sites
Instream and Riparian	Stream bank stabilized: log revetment installed		1
Instream and Riparian	Stream bank stabilized: log revetment installed	foot	1
Instream and Riparian	Stream bank stabilized: riprap (rock revetment) installed		41
Instream and Riparian	Stream bank stabilized: riprap (rock revetment) installed	foot	9
Instream and Riparian	Stream bank stabilized: riprap (rock revetment) installed	cubic yard	7
Instream and Riparian	Stream bank stabilized: riprap (rock revetment) installed	ton	2
Instream and Riparian	Stream bank stabilized: riprap (rock revetment) installed	site	1
Instream and Riparian	Stream bank stabilized: riprap (rock revetment) installed	square foot	1
Instream and Riparian	Stream bank stabilized: rock and log revetment installed		1
Instream and Riparian	Stream bank stabilized: rock and log revetment installed	foot	1
Instream and Riparian	Stream bank stabilized: rock and log revetment installed	site	1
Instream and Riparian	Stream bank stabilized: rock and log revetment installed	unit	1
Instream and Riparian	Stream bank stabilized: stream bank resloped		44
Instream and Riparian	Stream bank stabilized: stream bank resloped	foot	33
Instream and Riparian	Stream bank stabilized: stream bank resloped	yard	3
Instream and Riparian	Stream bank stabilized: stream bank resloped	crossing	1
Instream and Riparian	Stream bank stabilized: stream bank resloped	cubic yard	1
Instream and Riparian	Stream bank stabilized: stream bank resloped	meter	1
Instream and Riparian	Stream bank stabilized: stream bank resloped	site	1
Instream and Riparian	Trees planted (unknown type)		11
Instream and Riparian	Trees planted (unknown type)	tree	5
Instream and Riparian	Trees planted (unknown type)	foot	1
Instream and Riparian	Water management (storage and release timing)		4
Instream and	Willows planted (simple planting, not bioengineering)		57

Habitat Category	Treatment	Units	Number of Sites
Riparian			
Instream and Riparian	Willows planted (simple planting, not bioengineering)	foot	9
Instream and Riparian	Willows planted (simple planting, not bioengineering)	tree	4
Instream and Riparian	Willows planted (simple planting, not bioengineering)	acre	3
Instream and Riparian	Willows planted (simple planting, not bioengineering)	seedling	3
Instream and Riparian	Willows planted (simple planting, not bioengineering)	site	1
Instream and Riparian	Willows planted (simple planting, not bioengineering)	square foot	1
Road	Culvert or other stream crossing removed and not replaced	crossing	194
Road	Culvert or other stream crossing removed and not replaced	culvert	10
Road	Culvert or other stream crossing removed and not replaced		2
Road	Culvert replaced with closed-bottom culvert (round or pipe-arch)	culvert	3
Road	Culvert replaced with closed-bottom culvert (round or pipe-arch)	crossing	1
Road	Grass planted		4
Road	Improve ford (low water crossing)		9
Road	Improve ford (low water crossing)	crossing	5
Road	Other treatment (enter further information in comments)	site	5
Road	Other treatment (enter further information in comments)		1
Road	Planting (unknown type)		4
Road	Road decommissioned/obliterated		479
Road	Road decommissioned/obliterated	site	106
Road	Road decommissioned/obliterated	mile	71
Road	Road decommissioned/obliterated	crossing	29
Road	Road decommissioned/obliterated	culvert	27
Road	Road decommissioned/obliterated	foot	23
Road	Road ditch and drainage culvert maintenance (removing debris)		18
Road	Road ditch and drainage culvert maintenance (removing debris)	culvert	15
Road	Road ditch and drainage culvert maintenance (removing debris)	foot	13
Road	Road ditch and drainage culvert maintenance (removing debris)	site	5
Road	Road ditch and drainage culvert maintenance (removing debris)	each	1

Habitat Category	Treatment	Units	Number of Sites
Road	Road ditch and drainage culvert maintenance (removing debris)	structure	1
Road	Road drainage culvert installed/replaced/improved	culvert	275
Road	Road drainage culvert installed/replaced/improved	crossing	123
Road	Road drainage culvert installed/replaced/improved		39
Road	Road drainage culvert installed/replaced/improved	unit	9
Road	Road drainage culvert installed/replaced/improved	mile	6
Road	Road drainage culvert installed/replaced/improved	foot	1
Road	Road drainage culvert installed/replaced/improved	site	1
Road	Road drainage culvert installed/replaced/improved	structure	1
Road	Road modified to reduce impacts to streams		714
Road	Road modified to reduce impacts to streams	site	265
Road	Road modified to reduce impacts to streams	crossing	159
Road	Road modified to reduce impacts to streams	mile	61
Road	Road modified to reduce impacts to streams	foot	44
Road	Road modified to reduce impacts to streams	structure	27
Road	Road modified to reduce impacts to streams	cubic yard	19
Road	Road modified to reduce impacts to streams	culvert	11
Road	Road modified to reduce impacts to streams	yard	1
Road	Unknown		1
Road	Upland erosion control	cubic yard	65
Road	Upland erosion control		10
Acquisition of Land or Water	Land purchased, leased, or easement acquired	acre	340
Acquisition of Land or Water	Land purchased, leased, or easement acquired		141
Acquisition of Land or Water	Land purchased, leased, or easement acquired	foot	6
Acquisition of Land or Water	Land purchased, leased, or easement acquired	square foot	3
Acquisition of Land or Water	Water right purchased or leased		2
Multiple	Agricultural or grazing practices modified		1
Multiple	Boulders placed in stream	cubic yard	64
Multiple	Boulders placed in stream		19
Multiple	Boulders placed in stream	ton	9
Multiple	Boulders placed in stream	structure	3
Multiple	Boulders placed in stream	foot	2
Multiple	Boulders placed in stream	boulder	1
Multiple	Boulders placed in stream	pound	1
Multiple	Bridge installed	crossing	5
Multiple	Bridge installed	bridge	4

Habitat Category	Treatment	Units	Number of Sites
Multiple	Bridge installed		2
Multiple	Bridge installed	culvert	1
Multiple	Brush bundles placed in stream		4
Multiple	Brush bundles placed in stream	structure	2
Multiple	Brush bundles placed in stream	foot	1
Multiple	Brush bundles placed in stream	unit	1
Multiple	Concrete weir installed (not below culvert)		1
Multiple	Concrete weir installed (not below culvert)	unit	1
Multiple	Conifers planted		39
Multiple	Conifers planted	tree	16
Multiple	Conifers planted	seedling	2
Multiple	Conifers planted	acre	1
Multiple	Culvert or other stream crossing removed and not replaced	crossing	503
Multiple	Culvert or other stream crossing removed and not replaced		87
Multiple	Culvert or other stream crossing removed and not replaced	culvert	50
Multiple	Culvert or other stream crossing removed and not replaced	bridge	2
Multiple	Culvert or other stream crossing removed and not replaced	mile	1
Multiple	Culvert or other stream crossing removed and not replaced	site	1
Multiple	Culvert replaced with bridge	crossing	4
Multiple	Culvert replaced with bridge	culvert	4
Multiple	Culvert replaced with bridge	bridge	1
Multiple	Culvert replaced with closed-bottom culvert (round or pipe-arch)	culvert	7
Multiple	Culvert replaced with open-bottom arch culvert	culvert	5
Multiple	Culvert retrofitted with baffles or weirs	baffle	1
Multiple	Culvert retrofitted with baffles or weirs	culvert	1
Multiple	Culvert/bridge upgraded (unknown method)	crossing	155
Multiple	Culvert/bridge upgraded (unknown method)	culvert	18
Multiple	Culvert/bridge upgraded (unknown method)		9
Multiple	Culvert/bridge upgraded (unknown method)	bridge	2
Multiple	Culvert/bridge upgraded (unknown method)	cubic yard	2
Multiple	Culvert/bridge upgraded (unknown method)	mile	1
Multiple	Dam removed	dam	4
Multiple	Dam repaired		2
Multiple	Dike breached		6
Multiple	Dike breached	foot	1
Multiple	Dike breached	mile	1

Habitat Category	Treatment	Units	Number of Sites
Multiple	Education, training, workshops		201
Multiple	Education, training, workshops	student	16
Multiple	Education, training, workshops	acre	3
Multiple	Education, training, workshops	persons	3
Multiple	Education, training, workshops	foot	2
Multiple	Education, training, workshops	each	1
Multiple	Education, training, workshops	meeting	1
Multiple	Educational video, display, interpretive facilities		18
Multiple	Educational video, display, interpretive facilities	acre	3
Multiple	Educational video, display, interpretive facilities	mile	3
Multiple	Educational video, display, interpretive facilities	each	2
Multiple	Educational video, display, interpretive facilities	unit	1
Multiple	Existing wetland improved	acre	22
Multiple	Existing wetland improved		11
Multiple	Existing wetland improved	structure	1
Multiple	Fence maintenance		5
Multiple	Fencing/livestock exclusion		26
Multiple	Fencing/livestock exclusion	foot	20
Multiple	Fencing/livestock exclusion	mile	3
Multiple	Fencing/livestock exclusion	acre	1
Multiple	Fish barrier removed (type unknown)	barrier	32
Multiple	Fish barrier removed (type unknown)	culvert	3
Multiple	Fish barrier removed (type unknown)	crossing	1
Multiple	Fish ladder improved	structure	4
Multiple	Fish ladder improved		1
Multiple	Fish ladder installed	unit	5
Multiple	Fish ladder installed	structure	4
Multiple	Fish ladder installed		1
Multiple	Fish screen installed		3
Multiple	Fish screen installed	screen	3
Multiple	Fish screen installed	structure	1
Multiple	Fish trapped for survey or rearing		1
Multiple	Fish trapped for survey or rearing	structure	1
Multiple	Flow deflector installed: rock and log	structure	4
Multiple	Flow deflector installed: rock and log		1
Multiple	Flow deflector installed: rock/boulder	structure	5
Multiple	Flow deflector installed: rock/boulder	unit	1
Multiple	Freshwater flow in estuary increased		3
Multiple	Grass planted		50
Multiple	Grass planted	acre	20

Habitat Category	Treatment	Units	Number of Sites
Multiple	Grass planted	pound	4
Multiple	Grass planted	unit	3
Multiple	Grass planted	seedling	1
Multiple	Grass planted	square foot	1
Multiple	Hardwoods planted		65
Multiple	Hardwoods planted	acre	24
Multiple	Hardwoods planted	tree	13
Multiple	Hardwoods planted	mile	2
Multiple	Hardwoods planted	seedling	2
Multiple	Hardwoods planted	foot	1
Multiple	Hardwoods planted	square foot	1
Multiple	Hardwoods planted	unit	1
Multiple	Harvest/land management practices changed		2
Multiple	Improve ford (low water crossing)	crossing	5
Multiple	Improve ford (low water crossing)		2
Multiple	Improve ford (low water crossing)	site	2
Multiple	Invasive plant control		101
Multiple	Invasive plant control	acre	37
Multiple	Invasive plant control	foot	9
Multiple	Invasive plant control	square foot	8
Multiple	Invasive plant control	mile	4
Multiple	Invasive plant control	site	1
Multiple	Irrigated new plantings		17
Multiple	Irrigated new plantings	acre	1
Multiple	Irrigation system improved		7
Multiple	Irrigation water recycled (tailwater recaptured)		1
Multiple	Irrigation water recycled (tailwater recaptured)	site	1
Multiple	Land purchased, leased, or easement acquired	acre	45
Multiple	Land purchased, leased, or easement acquired		17
Multiple	Land purchased, leased, or easement acquired	square foot	1
Multiple	Large wood anchored in place (log, rootwad)	structure	1
Multiple	Large wood placement (not anchored, or not known if anchored)	structure	9
Multiple	Large wood placement (not anchored, or not known if anchored)		7
Multiple	Large wood placement (not anchored, or not known if anchored)	log	3
Multiple	Large wood placement (not anchored, or not known if anchored)	each	2
Multiple	Large wood placement (not anchored, or not known if anchored)	unit	2
Multiple	Livestock off-channel watering facility developed	unit	7

Habitat Category	Treatment	Units	Number of Sites
Multiple	Livestock off-channel watering facility developed		5
Multiple	Livestock off-channel watering facility developed	site	5
Multiple	Livestock off-channel watering facility developed	each	2
Multiple	Livestock off-channel watering facility developed	gallon	1
Multiple	Livestock off-channel watering facility developed	structure	1
Multiple	Log jam removed	unit	4
Multiple	Log jam removed		1
Multiple	Log jam removed	barrier	1
Multiple	Log jam removed	mile	1
Multiple	Log weir installed (not below culvert)		5
Multiple	Log weir installed (not below culvert)	structure	3
Multiple	Log weir installed (not below culvert)	each	1
Multiple	Log weir installed (not below culvert)	log	1
Multiple	Loosened/cleaned spawning gravels (gravel ripping)		1
Multiple	Main stream channel modified/created		8
Multiple	Main stream channel modified/created	foot	8
Multiple	Main stream channel modified/created	mile	3
Multiple	Mine site restored		1
Multiple	Mine site restored	site	1
Multiple	Monitoring of watersheds and fisheries		23
Multiple	Monitoring of watersheds and fisheries	foot	6
Multiple	Monitoring of watersheds and fisheries	year	4
Multiple	Monitoring of watersheds and fisheries	acre	1
Multiple	Monitoring of watersheds and fisheries	student	1
Multiple	Off-channel habitat created (alcove, side channel, pond)		2
Multiple	Other treatment (enter further information in comments)		28
Multiple	Other treatment (enter further information in comments)	acre	10
Multiple	Other treatment (enter further information in comments)	mile	2
Multiple	Other treatment (enter further information in comments)	unit	2
Multiple	Other treatment (enter further information in comments)	foot	1
Multiple	Other treatment (enter further information in comments)	site	1
Multiple	Other treatment (enter further information in comments)	structure	1
Multiple	Other treatment (enter further information in comments)	tree	1
Multiple	Planting (unknown type)		128
Multiple	Planting (unknown type)	acre	14
Multiple	Planting (unknown type)	tree	6
Multiple	Planting (unknown type)	foot	5
Multiple	Planting (unknown type)	mile	4
Multiple	Planting (unknown type)	site	2
Multiple	Planting (unknown type)	square foot	1
Multiple	Planting (unknown type)	yard	1

Habitat Category	Treatment	Units	Number of Sites
Multiple	Pool created (unknown method)	pool	2
Multiple	Pool created (unknown method)	unit	1
Multiple	Pool created using scour structure	pool	9
Multiple	Pool created using scour structure		7
Multiple	Pool created using scour structure	site	1
Multiple	Pool excavated or blasted		1
Multiple	Pool excavated or blasted	pool	1
Multiple	Previously filled or drained estuary restored	acre	2
Multiple	Previously filled or drained estuary restored		1
Multiple	Previously filled or drained wetland restored		15
Multiple	Previously filled or drained wetland restored	acre	7
Multiple	Repair/maintenance of existing restoration project structure (non-dam)		10
Multiple	Repair/maintenance of existing restoration project structure (non-dam)	year	6
Multiple	Repair/maintenance of existing restoration project structure (non-dam)	acre	4
Multiple	Repair/maintenance of existing restoration project structure (non-dam)	structure	1
Multiple	Repair/maintenance of existing restoration project structure (non-dam)	unit	1
Multiple	Restoration project effectiveness monitoring		24
Multiple	Restoration project effectiveness monitoring	acre	13
Multiple	Restoration project effectiveness monitoring	year	4
Multiple	Restoration project effectiveness monitoring	day	1
Multiple	Restoration project effectiveness monitoring	mile	1
Multiple	Restoration project effectiveness monitoring	square foot	1
Multiple	Restoration project effectiveness monitoring	square mile	1
Multiple	Road decommissioned/obliterated	crossing	501
Multiple	Road decommissioned/obliterated		125
Multiple	Road decommissioned/obliterated	mile	101
Multiple	Road decommissioned/obliterated	foot	50
Multiple	Road decommissioned/obliterated	site	49
Multiple	Road decommissioned/obliterated	culvert	4
Multiple	Road decommissioned/obliterated	bridge	1
Multiple	Road decommissioned/obliterated	yard	1
Multiple	Road ditch and drainage culvert maintenance (removing debris)	culvert	21
Multiple	Road ditch and drainage culvert maintenance (removing debris)		16
Multiple	Road ditch and drainage culvert maintenance (removing debris)	foot	3
Multiple	Road ditch and drainage culvert maintenance (removing	cubic yard	1

Habitat Category	Treatment	Units	Number of Sites
	debris)		
Multiple	Road ditch and drainage culvert maintenance (removing debris)	mile	1
Multiple	Road drainage culvert installed/replaced/improved	culvert	119
Multiple	Road drainage culvert installed/replaced/improved		25
Multiple	Road drainage culvert installed/replaced/improved	site	8
Multiple	Road drainage culvert installed/replaced/improved	crossing	5
Multiple	Road drainage culvert installed/replaced/improved	unit	4
Multiple	Road drainage culvert installed/replaced/improved	each	2
Multiple	Road drainage culvert installed/replaced/improved	foot	2
Multiple	Road drainage culvert installed/replaced/improved	structure	1
Multiple	Road modified to reduce impacts to streams	crossing	236
Multiple	Road modified to reduce impacts to streams		132
Multiple	Road modified to reduce impacts to streams	site	84
Multiple	Road modified to reduce impacts to streams	mile	39
Multiple	Road modified to reduce impacts to streams	foot	30
Multiple	Road modified to reduce impacts to streams	culvert	23
Multiple	Road modified to reduce impacts to streams	acre	3
Multiple	Road modified to reduce impacts to streams	cubic yard	2
Multiple	Road modified to reduce impacts to streams	structure	1
Multiple	Rock weir installed (not below culvert)	structure	14
Multiple	Rock weir installed (not below culvert)	unit	6
Multiple	Rock weir installed (not below culvert)		5
Multiple	Rock weir installed (not below culvert)	each	2
Multiple	Rootwads placed in stream		6
Multiple	Rootwads placed in stream	unit	4
Multiple	Rootwads placed in stream	each	1
Multiple	Rootwads placed in stream	structure	1
Multiple	Rootwads placed in stream	tree	1
Multiple	Salmon enhancement: Collect/raise/transport/plant fish		4
Multiple	Salmon enhancement: Collect/raise/transport/plant fish	fish	1
Multiple	Sediment removed from stream	cubic yard	55
Multiple	Sediment removed from stream		26
Multiple	Sediment removed from stream	site	13
Multiple	Sediment removed from stream	crossing	8
Multiple	Sediment removed from stream	acre	1
Multiple	Sediment-trap dam installed		7
Multiple	Shrubs or herbaceous vegetation planted		25
Multiple	Shrubs or herbaceous vegetation planted	acre	8
Multiple	Shrubs or herbaceous vegetation planted	tree	4
Multiple	Shrubs or herbaceous vegetation planted	seedling	2

Habitat Category	Treatment	Units	Number of Sites
Multiple	Shrubs or herbaceous vegetation planted	unit	2
Multiple	Spawning gravel placed in stream	foot	1
Multiple	Spawning gravel placed in stream	ton	1
Multiple	Stream bank stabilized (unknown method)		57
Multiple	Stream bank stabilized (unknown method)	foot	21
Multiple	Stream bank stabilized (unknown method)	site	5
Multiple	Stream bank stabilized (unknown method)	crossing	2
Multiple	Stream bank stabilized (unknown method)	structure	2
Multiple	Stream bank stabilized (unknown method)	cubic yard	1
Multiple	Stream bank stabilized (unknown method)	mile	1
Multiple	Stream bank stabilized (unknown method)	square foot	1
Multiple	Stream bank stabilized: bioengineering (living building materials)	foot	20
Multiple	Stream bank stabilized: bioengineering (living building materials)		16
Multiple	Stream bank stabilized: bioengineering (living building materials)	site	2
Multiple	Stream bank stabilized: bioengineering (living building materials)	mile	1
Multiple	Stream bank stabilized: bioengineering (living building materials)	square foot	1
Multiple	Stream bank stabilized: log revetment installed		2
Multiple	Stream bank stabilized: log revetment installed	foot	1
Multiple	Stream bank stabilized: riprap (rock revetment) installed		39
Multiple	Stream bank stabilized: riprap (rock revetment) installed	cubic yard	33
Multiple	Stream bank stabilized: riprap (rock revetment) installed	foot	7
Multiple	Stream bank stabilized: riprap (rock revetment) installed	culvert	2
Multiple	Stream bank stabilized: riprap (rock revetment) installed	square foot	1
Multiple	Stream bank stabilized: riprap (rock revetment) installed	ton	1
Multiple	Stream bank stabilized: rock and log revetment installed	foot	3
Multiple	Stream bank stabilized: stream bank resloped	crossing	93
Multiple	Stream bank stabilized: stream bank resloped		66
Multiple	Stream bank stabilized: stream bank resloped	foot	12
Multiple	Stream bank stabilized: stream bank resloped	mile	2
Multiple	Stream bank stabilized: stream bank resloped	cubic yard	1
Multiple	Stream bank stabilized: stream bank resloped	square foot	1
Multiple	Survey, study, research		106
Multiple	Survey, study, research	acre	12
Multiple	Survey, study, research	mile	4
Multiple	Survey, study, research	barrier	1
Multiple	Survey, study, research	foot	1
Multiple	Tidegate altered/removed	structure	2
Multiple	Tidegate altered/removed	unit	1

Habitat Category	Treatment	Units	Number of Sites
Multiple	Trees planted (unknown type)	tree	7
Multiple	Trees planted (unknown type)		4
Multiple	Trees planted (unknown type)	seedling	1
Multiple	Unknown		8
Multiple	Unknown	acre	3
Multiple	Unknown	foot	1
Multiple	Upland erosion control		173
Multiple	Upland erosion control	cubic yard	100
Multiple	Upland erosion control	site	55
Multiple	Upland erosion control	crossing	28
Multiple	Upland erosion control	mile	5
Multiple	Upland erosion control	acre	4
Multiple	Upland erosion control	foot	4
Multiple	Upland erosion control	square foot	2
Multiple	Upland erosion control	dam	1
Multiple	Upland erosion control	square mile	1
Multiple	Upland erosion control	structure	1
Multiple	Upland erosion control	unit	1
Multiple	Upland vegetation management changed	acre	7
Multiple	Upland vegetation management changed	mile	1
Multiple	Water management (storage and release timing)		12
Multiple	Water management (storage and release timing)	unit	4
Multiple	Water management (storage and release timing)	acre	1
Multiple	Water management (storage and release timing)	gallon	1
Multiple	Water right purchased or leased		2
Multiple	Water right purchased or leased	acre	1
Multiple	Watershed assessment and planning		99
Multiple	Watershed assessment and planning	acre	24
Multiple	Watershed assessment and planning	foot	8
Multiple	Watershed organization support		41
Multiple	Watershed organization support	acre	4
Multiple	Weir installed below culvert outlet		4
Multiple	Weir installed below culvert outlet	culvert	1
Multiple	Wetland created		5
Multiple	Wetland created	day	4
Multiple	Wetland created	acre	3
Multiple	Wetland created	square foot	1
Multiple	Wetland vegetation planted		10
Multiple	Wetland vegetation planted	acre	4
Multiple	Wetland vegetation planted	tree	1
Multiple	Wildlife management, trapping, transport (except beaver		2

Habitat Category	Treatment	Units	Number of Sites
	introduction)		
Multiple	Willows planted (simple planting, not bioengineering)		26
Multiple	Willows planted (simple planting, not bioengineering)	acre	6
Multiple	Willows planted (simple planting, not bioengineering)	tree	4
Multiple	Willows planted (simple planting, not bioengineering)	unit	2
Multiple	Willows planted (simple planting, not bioengineering)	foot	1
Multiple	Willows planted (simple planting, not bioengineering)	seedling	1

Appendix 4: Total Cost, Average Cost per Unit, Standard Deviation of Cost per Unit, and Median Cost per Unit – by Study Area, Habitat Category and Measure Category – for Projects with One Measurement Unit (Tier 2 data).

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
None	Instream	Barriers removed/modified (number)	barrier	1	1	$3,900	$3,900		$3,900
None	Instream	Fish screens installed/maintained (number)	screen	37	2	$1,128,771	$19,340	23,373	$19,340
None	Instream	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.3	1	$28,846	$101,537		$101,537
None	Instream	Stream crossings treated (number)	culvert	1	1	$41,086	$41,086		$41,086
None	Riparian	Amount of riparian area treated (acres)	acre	90	3	$519,456	$6,546	6,269	$5,719
None	Riparian	Area planted (acres)	acre	5	1	$157,550	$31,510		$31,510
None	Riparian	Stream length treated (miles, count one side of stream only)	mile	20	1	$464,803	$23,240		$23,240
None	Riparian	Trees planted (number)	tree	1,573	2	$13,251	$10	3	$10
None	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	113,316	94	$356,577,327	$11,251	22,015	$2,752
None	Multiple	Amount of riparian area	acre	418	2	$1,421,050	$3,634	530	$3,634

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
		treated (acres)							
None	Multiple	Amount of wetland area treated (acres)	acre	4,086	3	$620,533	$154	71	$168
None	Multiple	Area planted (acres)	acre	125	2	$572,695	$3,155	3,364	$3,155
None	Multiple	Area protected with acquisition, easement or lease (acres)	acre	1,792	2	$18,822,111	$11,804	2,266	$11,804
None	Multiple	Area treated (acres)	acre	13	1	$53,781	$4,137		$4,137
None	Multiple	Fence length installed/repaired (miles)	mile	1	1	$25,033	$19,155		$19,155
None	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	3	1	$701,351	$233,784		$233,784
None	Multiple	Schools and other institutions reached (number)	unit	1	1	$6,141	$6,141		$6,141
None	Multiple	Stream crossings treated (number)	culvert	1	1	$9,990	$9,990		$9,990
None	Multiple	Trees planted (number)	tree	361	1	$67,728	$188		$188
None	Multiple	Workshop/training events (number)	meeting	4	1	$9,133	$2,283		$2,283
SONC	Instream	Amount of upland area treated (acres)	acre	4	1	$6,293	$1,573		$1,573
SONC	Instream	Barriers removed/modified (number)	barrier	2	2	$544,316	$272,158	364,827	$272,158
SONC	Instream	Barriers removed/modified (number)	dam	2	2	$50,284	$25,142	10,405	$25,142
SONC	Instream	Fish screens installed/maintained	screen	40	8	$442,043	$27,411	17,077	$24,277

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
		(number)							
SONC	Instream	Instream structures installed/modified (number)	structure	156	11	$120,335	$2,931	7,605	$379
SONC	Instream	Stream crossings assessed (number)	crossing	4	1	$1,450,013	$362,503		$362,503
SONC	Instream	Stream crossings treated (number)	bridge	4	1	$438,509	$109,627		$109,627
SONC	Instream	Stream crossings treated (number)	crossing	1	1	$500,000	$500,000		$500,000
SONC	Instream	Stream crossings treated (number)	culvert	2	2	$215,144	$107,572	149,409	$107,572
SONC	Riparian	Amount of riparian area treated (acres)	acre	10	1	$16,700	$1,758		$1,758
SONC	Riparian	Fence length installed/repaired (miles)	mile	7	5	$247,032	$48,062	38,573	$33,862
SONC	Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.7	1	$39,044	$52,859		$52,859
SONC	Upland	Amount of riparian area treated (acres)	acre	115	3	$246,516	$2,499	1,237	$1,930
SONC	Upland	Amount of upland area treated (acres)	acre	565	2	$365,475	$732	132	$732
SONC	Upland	Instream structures installed/modified (number)	structure	3	1	$4,048	$1,349		$1,349
SONC	Upland	Stream length treated (miles, count one side of stream only)	mile	3	1	$1,803,492	$601,164		$601,164
SONC	Instream and Riparian	Barriers removed/modified (number)	dam	2	1	$160,676	$80,338		$80,338

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
SONC	Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.07	1	$9,597	$126,679		$126,679
SONC	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.3	2	$33,323	$140,855	50,923	$140,855
SONC	Instream and Riparian	Stream crossings treated (number)	culvert	1	1	$315,962	$315,962		$315,962
SONC	Road	Road length treated (miles)	mile	40	2	$1,252,132	$17,059	21,205	$17,059
SONC	Road	Stream length treated (miles, count one side of stream only)	mile	2	1	$4,855	$2,653		$2,653
SONC	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	29,045	16	$95,664,951	$12,108	11,892	$7,393
SONC	Multiple	Amount of upland area treated (acres)	acre	0.08	1	$18,755	$234,432		$234,432
SONC	Multiple	Area treated (acres)	acre	5,664	1	$879,341	$155		$155
SONC	Multiple	Barriers removed/modified (number)	dam	2	2	$205,972	$102,986	133,499	$102,986
SONC	Multiple	Fence length installed/repaired (miles)	mile	1	1	$71,631	$48,489		$48,489
SONC	Multiple	Fish screens installed/maintained (number)	screen	50	1	$100,523	$2,010		$2,010
SONC	Multiple	Instream structures installed/modified (number)	structure	6	1	$8,806	$1,468		$1,468
SONC	Multiple	Length of streambank	mile	0.2	1	$24,831	$163,883		$163,882

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
		stabilized (miles, count both sides of stream where applicable)							
SONC	Multiple	Participants in workshop/training events (number)	persons	38	2	$399,488	$10,848	8,999	$10,848
SONC	Multiple	Road length treated (miles)	mile	19	3	$1,288,893	$84,003	130,742	$8,800
SONC	Multiple	Sediment volume prevented from entering stream (cubic yards)	cubic yard	42,472	1	$71,593	$2		$2
SONC	Multiple	Stream crossings treated (number)	crossing	3	1	$2,299,373	$766,458		$766,458
SONC	Multiple	Stream crossings treated (number)	culvert	1	1	$106,357	$106,356		$106,356
SONC	Multiple	Students educated (number)	student	75	1	$27,980	$373		$373
NOCECA and SONC	Instream	Barriers removed/modified (number)	barrier	6	1	$37,946	$6,324		$6,324
NOCECA and SONC	Instream	Fish screens installed/maintained (number)	screen	1	1	$83,806	$83,806		$83,806
NOCECA and SONC	Instream	Instream structures installed/modified (number)	structure	148	9	$264,837	$3,895	5,462	$2,721
NOCECA and SONC	Instream	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.03	1	$5,457	$181,883		$181,883
NOCECA and SONC	Instream	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.07	1	$23,445	$309,480		$309,480

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
NOCECA and SONC	Instream	Stream crossings treated (number)	bridge	1	1	$9,521	$9,521		$9,521
NOCECA and SONC	Instream	Stream crossings treated (number)	crossing	3	3	$101,953	$33,984	35,988	$18,070
NOCECA and SONC	Instream	Stream crossings treated (number)	culvert	3	3	$39,207	$13,069	1,086	$13,517
NOCECA and SONC	Instream	Stream length treated (miles, count one side of stream only)	mile	0.6	1	$43,292	$77,486		$77,486
NOCECA and SONC	Riparian	Fence length installed/repaired (miles)	mile	4	3	$68,451	$17,882	6,945	$15,020
NOCECA and SONC	Riparian	Trees planted (number)	tree	59,839	5	$169,964	$9	10	$6
NOCECA and SONC	Instream and Riparian	Barriers removed/modified (number)	barrier	3	2	$101,482	$41,631	33,108	$41,631
NOCECA and SONC	Instream and Riparian	Instream structures installed/modified (number)	structure	36	3	$175,878	$5,562	3,974	$7,341
NOCECA and SONC	Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	1	1	$59,531	$59,531		$59,531
NOCECA and SONC	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	1	4	$331,967	$277,351	140,380	$300,306
NOCECA and SONC	Instream and Riparian	Trees planted (number)	tree	5,900	1	$23,416	$4		$4
NOCECA and SONC	Road	Barriers removed/modified (number)	unit	7	1	$761,955	$108,851		$108,851
NOCECA	Road	Instream structures	culvert	1	1	$1,058	$1,058		$1,058

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
and SONC		installed/modified (number)							
NOCECA and SONC	Road	Road length treated (miles)	mile	0.8	1	$2,549	$3,311		$3,311
NOCECA and SONC	Road	Stream crossings treated (number)	crossing	7	2	$23,849	$6,102	5,336	$6,102
NOCECA and SONC	Road	Stream crossings treated (number)	culvert	4	2	$52,828	$10,340	8,110	$10,340
NOCECA and SONC	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	28,929	15	$40,001,909	$10,576	13,380	$6,527
NOCECA and SONC	Multiple	Area protected with acquisition, easement or lease (acres)	acre	212	1	$445,183	$2,100		$2,100
NOCECA and SONC	Multiple	Instream structures installed/modified (number)	structure	1	1	$6,074	$6,074		$6,074
NOCECA and SONC	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.4	1	$22,165	$50,884		$50,884
NOCECA and SONC	Multiple	Road length treated (miles)	mile	3	3	$62,918	$461,070	762,545	$22,105
NOCECA and SONC	Multiple	Stream crossings treated (number)	crossing	37	5	$218,028	$6,487	3,073	$5,608
NOCECA and SONC	Multiple	Stream crossings treated (number)	culvert	29	5	$216,459	$27,283	50,604	$4,412
NOCECA and SONC	Multiple	Students educated (number)	student	600	1	$92,930	$155		$155
NOCECA and SONC	Multiple	Trees planted (number)	seedling	1,700	1	$25,995	$15		$15
NOCECA	Instream	Barriers removed/modified	barrier	14	9	$3,661,187	$403,481	932,197	$14,979

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
		(number)							
NOCECA	Instream	Barriers removed/modified (number)	dam	1	1	$296,073	$296,073		$296,073
NOCECA	Instream	Instream structures installed/modified (number)	baffle	2	1	$9,395	$4,698		$4,698
NOCECA	Instream	Instream structures installed/modified (number)	structure	138	16	$276,995	$2,104	1,118	$2,128
NOCECA	Instream	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.2	1	$91,841	$440,836		$440,836
NOCECA	Instream	Sediment volume prevented from entering stream (cubic yards)	cubic yard	3,300	1	$7,713	$2		$2
NOCECA	Instream	Stream crossings treated (number)	bridge	1	1	$51,798	$51,798		$51,798
NOCECA	Instream	Stream crossings treated (number)	culvert	1	1	$30,342	$30,342		$30,342
NOCECA	Instream	Stream crossings treated (number)	each	1	1	$84,100	$84,100		$84,100
NOCECA	Instream	Stream length treated (miles, count one side of stream only)	mile	1	2	$240,823	$168,825	85,325	$168,825
NOCECA	Riparian	Amount of upland area treated (acres)	acre	5	2	$8,600	$43,910	60,467	$43,910
NOCECA	Riparian	Amount of wetland area treated for invasive species (acres)	acre	0.05	1	$2,300	$46,000		$46,000
NOCECA	Riparian	Length of riparian stream bank treated (miles, count	mile	3	5	$65,182	$99,249	188,908	$23,100

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
		both sides of stream if applicable)							
NOCECA	Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.1	1	$10,759	$94,683		$94,683
NOCECA	Riparian	Trees planted (number)	tree	440	2	$11,341	$296	411	$296
NOCECA	Upland	Area treated (acres)	acre	400	1	$157,541	$394		$394
NOCECA	Upland	Sediment volume prevented from entering stream (cubic yards)	cubic yard	20,771	1	$54,462	$3		$3
NOCECA	Instream and Riparian	Amount of riparian area treated for invasive species (acres)	acre	14	1	$4,594	$335		$335
NOCECA	Instream and Riparian	Barriers removed/modified (number)	barrier	3	2	$1,846,012	$506,973	459,751	$506,973
NOCECA	Instream and Riparian	Instream structures installed/modified (number)	structure	12	3	$95,577	$8,892	5,699	$8,983
NOCECA	Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.4	4	$32,137	$190,480	230,092	$88,661
NOCECA	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.03	2	$14,505	$860,661	750,468	$860,661
NOCECA	Instream and Riparian	Stream length treated (miles, count one side of stream only)	mile	1	3	$2,232,320	$7,314,011	12,539,227	$92,981
NOCECA	Instream and	Trees planted (number)	tree	1,030	2	$618,575	$499	615	$499

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
	Riparian								
NOCECA	Road	Road length treated (miles)	mile	95	7	$1,503,063	$16,545	17,763	$12,495
NOCECA	Road	Sediment volume prevented from entering stream (cubic yards)	cubic yard	5,078	1	$78,270	$15		$15
NOCECA	Road	Stream crossings treated (number)	culvert	20	1	$71,145	$3,557		$3,557
NOCECA	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	62,330	46	$251,970,045	$85,479	220,754	$8,092
NOCECA	Multiple	Amount of riparian area treated (acres)	acre	205	4	$3,355,991	$164,194	312,786	$9,727
NOCECA	Multiple	Amount of upland area treated (acres)	acre	91	5	$1,799,025	$52,082	50,250	$43,010
NOCECA	Multiple	Amount of wetland area treated (acres)	acre	10	1	$582,619	$57,685		$57,685
NOCECA	Multiple	Area assessed (acres)	acre	19	1	$83,595	$4,400		$4,400
NOCECA	Multiple	Area planted (acres)	acre	6	1	$79,020	$13,170		$13,170
NOCECA	Multiple	Area protected with acquisition, easement or lease (acres)	acre	83	4	$13,787,659	$2,785,295	5,352,427	$150,512
NOCECA	Multiple	Area treated (acres)	acre	7,735	5	$6,994,775	$1,814	1,224	$1,724
NOCECA	Multiple	Instream structures installed/modified (number)	unit	1	1	$222,559	$222,559		$222,559
NOCECA	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	237	2	$1,243,054	$11,050	9,584	$11,050
NOCECA	Multiple	Length of streambank	mile	0.2	2	$30,173	$165,690	154,710	$165,690

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
		stabilized (miles, count both sides of stream where applicable)							
NOCECA	Multiple	Participants in workshop/training events (number)	persons	60	1	$50,580	$843		$843
NOCECA	Multiple	Road length treated (miles)	mile	17	6	$521,842	$36,479	17,843	$34,027
NOCECA	Multiple	Stream crossings treated (number)	crossing	4	2	$513,382	$250,578	345,725	$250,578
NOCECA	Multiple	Stream crossings treated (number)	culvert	56	7	$1,610,079	$127,022	105,905	$128,349
NOCECA	Multiple	Stream length treated (miles, count one side of stream only)	mile	0.8	2	$179,405	$246,136	47,193	$246,136
NOCECA	Multiple	Students educated (number)	student	12,054	9	$1,659,040	$455	604	$234
NOCECA	Multiple	Students educated (number)	unit	6,500	1	$365,000	$56		$56
NOCECA	Multiple	Trees planted (number)	tree	1,383	2	$320,771	$195	66	$195
NOCECA	Multiple	Workshop/training events (number)	each	1	1	$20,041	$20,041		$20,041
NOCECA	Multiple	Workshop/training events (number)	unit	2	1	$56,513	$28,256		$28,256
Central Valley	Instream	Fish screens installed/maintained (number)	screen	9	3	$13,395,905	$2,131,824	3,315,035	$267,440
Central Valley	Riparian	Amount of riparian area treated (acres)	acre	231	1	$1,050,298	$4,547		$4,547
Central Valley	Upland	Amount of riparian area treated (acres)	acre	3	1	$60,438	$24,175		$24,175
Central Valley	Upland	Area treated (acres)	acre	12	1	$42,515	$3,543		$3,543

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
Central Valley	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	81,538	64	$142,544,331	$6,033	7,680	$2,814
Central Valley	Multiple	Amount of riparian area treated (acres)	acre	171	2	$728,284	$4,182	883	$4,182
Central Valley	Multiple	Amount of riparian area treated for invasive species (acres)	acre	7,000	1	$59,224	$8		$8
Central Valley	Multiple	Amount of wetland area treated (acres)	acre	2,930	1	$79,391	$27		$27
Central Valley	Multiple	Area planted (acres)	acre	9	1	$1,128,859	$125,429		$125,429
Central Valley	Multiple	Area protected with acquisition, easement or lease (acres)	acre	14,037	4	$25,320,836	$3,491	2,822	$2,718
Central Valley	Multiple	Area treated (acres)	acre	140,683	6	$3,818,299	$1,756	3,048	$373
Central Valley	Multiple	Barriers removed/modified (number)	barrier	1	1	$2,133,222	$2,133,222		$2,133,222
Central Valley	Multiple	Length of instream habitat treated - except for bank stabilization (miles)	mile	0.1	1	$1,272,813	$22,401,512		$22,401,512
Central Valley	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	14	2	$1,262,687	$240,762	220,528	$240,762
Central Valley	Multiple	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	5	2	$2,809,204	$584,710	133,782	$584,710

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
Central Valley	Multiple	Schools and other institutions reached (number)	classroom	85	1	$19,686	$232		$232
Central Valley	Multiple	Students educated (number)	student	200	1	$173,223	$866		$866
SCACO	Instream	Barriers removed/modified (number)	barrier	9	6	$6,356,980	$1,057,208	2,016,585	$67,967
SCACO	Instream	Instream structures installed/modified (number)	structure	3	2	$41,849	$13,296	2,773	$13,296
SCACO	Instream	Instream structures installed/modified (number)	unit	253	2	$771,272	$86,826	119,424	$86,826
SCACO	Instream	Length of instream habitat treated - except for bank stabilization (miles)	mile	1	4	$355,460	$322,126	154,374	$257,929
SCACO	Instream	Stream crossings treated (number)	crossing	1	1	$22,684	$22,684		$22,684
SCACO	Instream	Stream crossings treated (number)	structure	1	1	$5,631	$5,631		$5,631
SCACO	Riparian	Amount of riparian area treated for invasive species (acres)	acre	54	2	$5,055,286	$61,821	86,728	$61,821
SCACO	Riparian	Area treated (acres)	acre	5	1	$89,833.87	$19,963.08		$19,963.08
SCACO	Riparian	Fence length installed/repaired (miles)	mile	0.9	1	$23,174.00	$27,190.83		$27,190.83
SCACO	Riparian	Trees planted (number)	tree	677	1	$12,952	$19.13		$19.13
SCACO	Instream and Riparian	Barriers removed/modified (number)	barrier	1	1	$119,237	$119,236.64		$119,236.64
SCACO	Instream and Riparian	Length of instream habitat treated - except for bank stabilization (miles)	mile	0.1	1	$47,904	$421,556.43		$421,556.43

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
SCACO	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	88,617	80	$670,657,121	$82,089.92	$243,506.74	$11,169.12
SCACO	Multiple	Amount of riparian area treated for invasive species (acres)	acre	15	3	$547,101	$38,606.29	$21,998.39	$32,138.25
SCACO	Multiple	Amount of upland area treated (acres)	acre	2	1	$131,238.00	$65,619.00		$65,619.00
SCACO	Multiple	Amount of wetland area treated (acres)	acre	33	1	$1,762,000.00	$53,393.93		$53,393.93
SCACO	Multiple	Area assessed (acres)	acre	4,000	1	$577,941.00	$144.48		$144.48
SCACO	Multiple	Area planted (acres)	acre	6	1	$65,754.95	$10,959.15		$10,959.15
SCACO	Multiple	Area protected with acquisition, easement or lease (acres)	acre	3,564	8	$33,885,311.13	$129,020	301,120	$18,556
SCACO	Multiple	Area treated (acres)	acre	48,045	3	$10,992,457.71	$181,081	164,717	$221,209
SCACO	Multiple	Barriers removed/modified (number)	barrier	2	2	$6,150,994.66	$3,075,497	4,275,456	$3,075,497
SCACO	Multiple	Fish screens installed/maintained (number)	screen	1	1	$9,985.45	$9,985		$9,985
SCACO	Multiple	Instream structures installed/modified (number)	structure	7	2	$89,096.15	$27,103	28,460	$27,103
SCACO	Multiple	Instream structures installed/modified (number)	unit	1.00	1	$11,399	$11,399		$11,399
SCACO	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	3.00	2	$1,199,936	$344,984	233,322	$344,984

Study Area	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost per Unit
SCACO	Multiple	Stream crossings treated (number)	culvert	1.00	1	$24,234	$24,234		$24,234
SCACO	Multiple	Trees planted (number)	tree	1,000.00	1	$73,239	$73		$73

Appendix 5: Total Cost, Average Cost per Unit, and Standard Deviation of Cost per Unit – by Watershed, Habitat Category and Measure Category - for Projects with One Measurement Unit (Tier 2 Data).

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
	Instream	Barriers removed/modified (number)	barrier	1	1	$3,900	$3,900		$3,900
	Instream	Fish screens installed/maintained (number)	screen	39	3	$13,047,316	$1,999,318	3,429,461	$35,868
	Instream	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.3	1	$28,846	$101,537		$101,537
	Instream	Stream crossings treated (number)	bridge	1	1	$51,798	$51,798		$51,798
	Instream	Stream crossings treated (number)	culvert	1	1	$41,086	$41,086		$41,086
	Instream	Stream crossings treated (number)	each	1	1	$84,100	$84,100		$84,100
	Riparian	Amount of riparian area treated (acres)	acre	90	3	$519,456	$6,546	6,269	$5,719
	Riparian	Amount of upland area treated (acres)	acre	0.03	1	$2,600	$86,667		$86,667
	Riparian	Amount of wetland area treated for invasive species (acres)	acre	0.05	1	$2,300	$46,000		$46,000
	Riparian	Area planted (acres)	acre	5	1	$157,550	$31,510		$31,510

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
	Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.05	1	$24,809	$436,640		$436,640
	Riparian	Stream length treated (miles, count one side of stream only)	mile	20	1	$464,803	$23,240		$23,240
	Riparian	Trees planted (number)	tree	1,573	2	$13,251	$10	3	$10
	Instream and Riparian	Amount of riparian area treated for invasive species (acres)	acre	14	1	$4,594	$335		$335
	Instream and Riparian	Barriers removed/modified (number)	barrier	1	1	$181,879	$181,879		$181,879
	Instream and Riparian	Instream structures installed/modified (number)	structure	16	1	$16,140	$1,009		$1,009
	Road	Road length treated (miles)	mile	21	1	$393,709	$18,748		$18,748
	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	153,295	131	$591,616,105	$61,817	210,861	$4,333
	Multiple	Amount of riparian area treated (acres)	acre	421	3	$3,321,050	$213,534	363,557	$4,009
	Multiple	Amount of riparian area treated for invasive species (acres)	acre	7	1	$143,969	$20,567		$20,567
	Multiple	Amount of upland area treated (acres)	acre	26	4	$1,335,886	$69,533	47,454	$71,737

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
	Multiple	Amount of wetland area treated (acres)	acre	4,096	4	$1,203,153	$14,537	28,766	$192
	Multiple	Area planted (acres)	acre	131	3	$638,450	$5,756	5,095	$5,533
	Multiple	Area protected with acquisition, easement or lease (acres)	acre	1,841	5	$22,957,482	$80,022	79,965	$75,477
	Multiple	Area treated (acres)	acre	7,678	5	$6,919,551	$2,272	1,607.41	$1,724
	Multiple	Fence length installed/repaired (miles)	mile	1	1	$25,033	$19,155		$19,155
	Multiple	Instream structures installed/modified (number)	unit	1	1	$222,559	$222,559		$222,559
	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	3	1	$701,351	$233,784		$233,784
	Multiple	Road length treated (miles)	mile	1	1	$47,361	$34,570		$34,570
	Multiple	Schools and other institutions reached (number)	classroom	85	1	$19,686	$232		$232
	Multiple	Schools and other institutions reached (number)	unit	1	1	$6,141	$6,141		$6,141
	Multiple	Stream crossings treated (number)	culvert	2	2	$306,622	$153,311	202,687	$153,311
	Multiple	Students educated (number)	student	10,145	6	$1,034,584	$368	537	$171
	Multiple	Students educated	unit	6,500	1	$365,000	$56		$56

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		(number)							
	Multiple	Trees planted (number)	tree	361	1	$67,728	$188		$188
	Multiple	Workshop/training events (number)	meeting	4	1	$9,133	$2,283		$2,283
Agua Hedionda Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	99	1	$2,165,039	$21,869		$21,869
Alameda Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	715	2	$2,378,449	$3,364	499	$3,364
Albion River	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.02	1	$6,600	$330,000		$330,000
Albion River	Multiple	Road length treated (miles)	mile	6	1	$72,587	$12,098		$12,098
American River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,055	5	$6,310,999	$7,916	4,944	$6,148
Americano Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	366	2	$861,361	$4,797	4,423	$4,797
Americano Creek	Multiple	Stream length treated (miles, count one side of stream only)	mile	0.5	1	$100,000	$212,766		$212,766
Arroyo Hondo	Multiple	Area protected with acquisition, easement or lease (acres)	acre	800	1	$7,568,405	$9,461		$9,461
Ballona Creek	Instream	Instream structures	unit	253	2	$771,272	$86,826	119,424	$86,826

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		installed/modified (number)							
Ballona Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	483	1	$140,000,000	$289,855		$289,855
Battle Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	4,511	2	$2,612,061	$589	42	$589
Bear Creek S_CV	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	3,074	1	$3,049,859	$992		$992
Bear River	Instream	Instream structures installed/modified (number)	structure	48	1	$10,159	$212		$212
Bear River	Instream	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.07	1	$23,445	$309,480		$309,480
Bear River	Road	Road length treated (miles)	mile	0.8	1	$2,549	$3,311		$3,311
Bear River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	494	1	$696,268	$1,409		$1,409
Big Chico and Mud Creeks	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	3,868	1	$1,920,000	$496		$496
Big Chico and Mud Creeks	Multiple	Area protected with acquisition, easement or lease (acres)	acre	4,130	1	$4,432,601	$1,073		$1,073
Big River	Acquisition	Area protected with	acre	7,344	1	$35,472,161	$4,830		$4,830

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
	of Land or Water	acquisition, easement or lease (acres)							
Big Sur River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	17	1	$755,717	$43,937		$43,937
Butte Creek	Multiple	Amount of riparian area treated (acres)	acre	96	1	$461,466	$4,807		$4,807
Butte Creek	Multiple	Area protected with acquisition, easement or lease (acres)	acre	80	1	$596,384	$7,455		$7,455
Butte Creek	Multiple	Barriers removed/modified (number)	barrier	1	1	$2,133,222	$2,133,222		$2,133,222
Ca±ada de la Gaviota	Instream and Riparian	Barriers removed/modified (number)	barrier	1	1	$119,237	$119,237		$119,237
Ca±ada del Refugio	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	660	1	$1,047,208	$1,587		$1,587
Cache Creek	Upland	Area treated (acres)	acre	12	1	$42,515	$3,543		$3,543
Cache Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	279	2	$1,471,209	$15,847	19,406	$15,847
Cache Creek	Multiple	Amount of riparian area treated (acres)	acre	75	1	$266,818	$3,558		$3,558
Cache Creek	Multiple	Area treated (acres)	acre	130,000	2	$484,591	$4	1	$4
Calleguas Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	620	3	$15,095,302	$38,448	37,220	$41,040

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Calleguas Creek	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	2	1	$1,019,936	$509,968		$509,968
Carmel River	Instream	Barriers removed/modified (number)	barrier	5	2	$67,846	$27,057	31,792	$27,057
Carmel River	Multiple	Barriers removed/modified (number)	barrier	1	1	$52,293	$52,293		$52,293
Carmel River	Multiple	Fish screens installed/maintained (number)	screen	1	1	$9,985	$9,985		$9,985
Carpinteria Creek	Multiple	Stream crossings treated (number)	culvert	1	1	$24,234	$24,234		$24,234
Carpinteria Salt Marsh Complex	Multiple	Amount of wetland area treated (acres)	acre	33	1	$1,762,000	$53,394		$53,394
Caspar Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	71	1	$2,113,200	$29,763		$29,763
Chorro Creek	Instream	Length of instream habitat treated - except for bank stabilization (miles)	mile	1	3	$318,861	$245,462	21,970	$253,877
Chorro Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	580	1	$5,895,411	$10,165		$10,165
Chorro Creek	Multiple	Area protected with acquisition, easement or lease (acres)	acre	1,860	1	$2,195,000	$1,180		$1,180

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Chorro Creek	Multiple	Area treated (acres)	acre	48,000	1	$332,316	$7		$7
Chorro Creek	Multiple	Trees planted (number)	tree	1,000	1	$73,239	$73		$73
Clear Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	20	1	$87,720	$4,386		$4,386
Corte Madera Creek	Riparian	Amount of upland area treated (acres)	acre	5	1	$6,000	$1,154		$1,154
Cosumnes River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	5,574	5	$15,154,713	$6,405	8,256	$2,922
Cosumnes River	Multiple	Amount of riparian area treated for invasive species (acres)	acre	7,000	1	$59,224	$8		$8
Cosumnes River	Multiple	Area protected with acquisition, easement or lease (acres)	acre	627	1	$2,173,981	$3,467		$3,467
Coyote Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,984	3	$6,652,236	$11,127	14,172	$3,827
Deer Creek N_CV	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	9,479	1	$2,323,000	$245		$245
Doyle Creek	Multiple	Area protected with acquisition, easement or lease (acres)	acre	75	1	$2,024,241	$26,990		$26,990
East South Valley Fresno Slough	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	362	1	$375,070	$1,036		$1,036
Elkhorn	Acquisition	Area protected with	acre	806	3	$2,479,451	$3,493	1,542	$3,333

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Slough	of Land or Water	acquisition, easement or lease (acres)							
Elkhorn Slough	Multiple	Area protected with acquisition, easement or lease (acres)	acre	195	1	$323,879	$1,661		$1,661
Escondido Creek	Multiple	Amount of riparian area treated for invasive species (acres)	acre	2	1	$77,132	$32,138		$32,138
Feather River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	21,877	3	$5,175,455	$550	601	$211
Freshwater Creek	Instream	Instream structures installed/modified (number)	structure	12	1	$40,950	$3,413		$3,413
Freshwater Creek	Riparian	Trees planted (number)	tree	525	1	$12,985	$25		$25
Freshwater Creek	Multiple	Instream structures installed/modified (number)	structure	1	1	$6,074	$6,074		$6,074
Freshwater Creek	Multiple	Stream crossings treated (number)	culvert	1	1	$117,742	$117,742		$117,742
Garcia River	Instream	Barriers removed/modified (number)	barrier	1	1	$14,979	$14,979		$14,979
Garcia River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	25,550	2	$25,574,377	$2,682	2,760	$2,682
Garcia River	Multiple	Road length treated (miles)	mile	8	2	$334,283	$37,194	14,418	$37,194

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Gazos Creek	Upland	Area treated (acres)	acre	400	1	$157,541	$394		$394
Gazos Creek	Upland	Sediment volume prevented from entering stream (cubic yards)	cubic yard	20,771	1	$54,462	$3		$3
Guadalupe River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	268	2	$3,945,346	$12,057	5,372	$12,057
Guadalupe River	Multiple	Area planted (acres)	acre	6	1	$79,020	$13,170		$13,170
Gualala River	Instream	Instream structures installed/modified (number)	structure	25	2	$76,837	$3,215	998	$3,215
Gualala River	Instream and Riparian	Instream structures installed/modified (number)	structure	4	1	$12,590	$3,147		$3,147
Gualala River	Road	Road length treated (miles)	mile	45	1	$562,278	$12,495		$12,495
Gualala River	Multiple	Stream crossings treated (number)	culvert	34	1	$158,089	$4,650		$4,650
Guthrie Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	405	2	$2,866,208	$7,146	875	$7,146
Howard Creek	Instream	Instream structures installed/modifi ed (number)	structure	5	1	$5,432	$1,086		$1,086
Jacoby Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	410	5	$3,585,964	$16,734	20,795	$9,067
Kern River	Acquisition	Area protected with	acre	3,665	3	$5,844,487	$1,626	426	$1,650

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
	of Land or Water	acquisition, easement or lease (acres)							
Laguna Canyon	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	11	1	$2,795,238	$263,702		$263,702
Lagunitas Creek	Instream	Barriers removed/modified (number)	dam	1	1	$296,073	$296,073		$296,073
Lagunitas Creek	Riparian	Trees planted (number)	tree	15	1	$8,799	$587		$587
Lagunitas Creek	Instream and Riparian	Instream structures installed/modified (number)	structure	6	1	$53,897	$8,983		$8,983
Lagunitas Creek	Multiple	Amount of upland area treated (acres)	acre	7	1	$301,072	$43,010		$43,010
Lagunitas Creek	Multiple	Road length treated (miles)	mile	0.5	1	$30,777	$64,333		$64,333
Lagunitas Creek	Multiple	Stream crossings treated (number)	crossing	3	1	$18,340	$6,113		$6,113
Little Sur River	Multiple	Instream structures installed/modified (number)	unit	1	1	$11,399	$11,399		$11,399
Los Angeles River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	2,162	3	$27,484,070	$379,021	614,176	$45,101
Los Osos Creek	Instream	Instream structures installed/modified (number)	structure	2	1	$30,513	$15,257		$15,257
Los Osos Creek	Multiple	Instream structures installed/modified	structure	6	1	$41,869	$6,978		$6,978

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		(number)							
Los Pe±asquitos Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	400	1	$7,764,953	$19,412		$19,412
Lower Eel River	Instream	Instream structures installed/modified (number)	structure	8	2	$26,894	$9,678	11,910	$9,678
Lower Eel River	Instream	Stream crossings treated (number)	bridge	1	1	$9,521	$9,521		$9,521
Lower Eel River	Instream	Stream crossings treated (number)	crossing	2	2	$83,883	$41,942	47,014	$41,942
Lower Eel River	Instream	Stream crossings treated (number)	culvert	1	1	$13,517	$13,517		$13,517
Lower Eel River	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.08	1	$34,267	$384,945		$384,945
Lower Eel River	Instream and Riparian	Trees planted (number)	tree	5,900	1	$23,416	$4		$4
Lower Eel River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	3,640	1	$3,378,634	$928		$928
Lower Eel River	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.4	1	$22,165	$50,884		$50,884
Lower Kaweah and Tule Rivers	Multiple	Area treated (acres)	acre	83	1	$646,168	$7,785		$7,785

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Lower Klamath River	Instream	Barriers removed/modified (number)	barrier	1	1	$14,187	$14,187		$14,187
Lower Klamath River	Instream	Instream structures installed/modified (number)	structure	33	2	$11,506	$349	8	$349
Lower Klamath River	Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.07	1	$9,597	$126,679		$126,679
Lower Klamath River	Multiple	Area treated (acres)	acre	5,664	1	$879,341	$155		$155
Lower Klamath River	Multiple	Instream structures installed/modified (number)	structure	6	1	$8,806	$1,468		$1,468
Lower Klamath River	Multiple	Participants in workshop/training events (number)	persons	18	1	$309,793	$17,211		$17,211
Lower Klamath River	Multiple	Sediment volume prevented from entering stream (cubic yards)	cubic yard	42,472	1	$71,593	$2		$2
Lower Sacramento River Colusa Basin	Instream	Fish screens installed/maintained (number)	screen	7	2	$1,477,360	$218,100	69,777	$218,100
Lower Sacramento River Colusa Basin	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	56	2	$342,000	$5,850	1,273	$5,850
Lower Trinity	Instream	Instream structures	structure	11	1	$23,597	$2,145		$2,145

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
River		installed/modified (number)							
Lower Trinity River	Multiple	Road length treated (miles)	mile	11	1	$89,402	$8,240		$8,240
Mad River	Instream	Fish screens installed/maintained (number)	screen	1	1	$83,806	$83,806		$83,806
Mad River	Riparian	Trees planted (number)	tree	3,390	1	$35,735	$11		$10.54
Mad River	Road	Barriers removed/modified (number)	unit	7	1	$761,955	$108,851		$108,851
Mad River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	74	1	$652,764	$8,833		$8,833
Mad River	Multiple	Trees planted (number)	seedling	1,700	1	$25,995	$15		$15
Malibu Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	3,030	2	$151,553,216	$36,210	20,487	$36,210
Marsh Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	4,407	4	$19,897,750	$4,906	3,863	$3,534
Mattole River	Instream	Instream structures installed/modified (number)	structure	40	3	$105,886	$2,676	271	$2,721
Mattole River	Instream	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.03	1	$5,457	$181,883		$181,883
Mattole River	Riparian	Trees planted (number)	tree	24,224	1	$27,908	$1		$1

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Mattole River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	319	1	$1,408,271	$4,415		$4,415
Mattole River	Multiple	Area protected with acquisition, easement or lease (acres)	acre	212	1	$445,183	$2,100		$2,100
Mattole River	Multiple	Road length treated (miles)	mile	0.6	2	$23,868	$681,843	933,010	$681,843
Mattole River	Multiple	Stream crossings treated (number)	crossing	8	1	$77,579	$9,697		$9,697
Mid Klamath River	Upland	Amount of riparian area treated (acres)	acre	40	1	$77,433	$1,930		$1,930
Mid Klamath River	Upland	Amount of upland area treated (acres)	acre	25	1	$20,641	$826		$826
Mid Klamath River	Multiple	Road length treated (miles)	mile	3	1	$24,639	$8,800		$8,800
Middle Fork Eel River	Riparian	Fence length installed/repaired (miles)	mile	1	1	$16,664	$12,826		$12,826
Middle Fork Eel River	Instream and Riparian	Instream structures installed/modified (number)	structure	13	1	$108,349	$8,335		$8,335
Middle Fork Eel River	Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	1	1	$59,531	$59,531		$59,531
Middle Fork Eel River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	23,000	1	$7,270,000	$316		$316
Middle Sacramento	Riparian	Amount of riparian area treated (acres)	acre	231	1	$1,050,298	$4,547		$4,547

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
River									
Middle Sacramento River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	8	1	$23,378	$2,922		$2,922
Middle Sacramento River	Multiple	Area planted (acres)	acre	9	1	$1,128,859	$125,429		$125,429
Middle San Joaquin River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,223	9	$6,381,134	$12,816	5,491	$14,388
Middle San Joaquin River	Multiple	Amount of wetland area treated (acres)	acre	2,930	1	$79,391	$27		$27
Mokelumne River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	2,866	1	$3,000,000	$1,047		$1,047
Mokelumne River	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.2	1	$75,132	$396,699		$396,699
Napa River	Instream	Barriers removed/modified (number)	barrier	1	1	$374,500	$374,500		$374,500
Napa River	Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	2	2	$27,455	$16,414	15,985	$16,414
Napa River	Instream and Riparian	Barriers removed/modified (number)	barrier	2	1	$1,664,132	$832,066		$832,066
Napa River	Instream	Stream length treated	mile	0.9	1	$47,732	$56,005		$56,005

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
	and Riparian	(miles, count one side of stream only)							
Napa River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,356	4	$9,875,518	$11,590	17,289	$4,169
Napa River	Multiple	Students educated (number)	student	766	1	$227,000	$296		$296
Navarro River	Instream	Instream structures installed/modified (number)	structure	17	2	$33,172	$2,684	1,957	$2,684
Navarro River	Instream	Sediment volume prevented from entering stream (cubic yards)	cubic yard	3,300	1	$7,713	$2		$2
Navarro River	Riparian	Trees planted (number)	tree	425	1	$2,541	$6		$6
Navarro River	Road	Road length treated (miles)	mile	5	1	$270,190	$51,960		$51,960
Navarro River	Multiple	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.09	1	$25,268	$275,087		$275,087
Navarro River	Multiple	Road length treated (miles)	mile	1	1	$36,833	$33,485		$33,485
Navarro River	Multiple	Stream crossings treated (number)	culvert	13	1	$180,379	$13,875		$13,875
Navarro River	Multiple	Workshop/training events (number)	each	1	1	$20,041	$20,041		$20,041
North Fork Eel River	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream	mile	0.3	1	$28,717	$108,305		$108,305

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		where applicable)							
North Suisun Bay	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	3,317	2	$5,027,093	$1,565	1,394	$1,565
Novato Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	2,652	4	$19,259,423	$5,384	3,777	$4,484
Noyo River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	16	1	$1,498,936	$96,706		$96,706
Noyo River	Multiple	Area assessed (acres)	acre	19	1	$83,595	$4,400		$4,400
Otay River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,655	3	$28,488,905	$22,231	5,796	$23,267
Pajaro River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	597	3	$13,235,844	$16,175	11,423	$22,376
Pescadero Creek	Instream	Barriers removed/modified (number)	barrier	1	1	$27,297	$27,297		$27,297
Pescadero Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	80	1	$733,369	$9,167		$9,167
Pescadero Creek	Multiple	Stream length treated (miles, count one side of stream only)	mile	0.3	1	$79,405	$279,507		$279,507
Pescadero Creek	Multiple	Students educated (number)	student	414.	1	$48,066	$116		$116
Petaluma	Instream	Instream structures	baffle	2	1	$9,395	$4,698		$4,698

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
River		installed/modified (number)							
Petaluma River	Instream	Stream crossings treated (number)	culvert	1	1	$30,342	$30,342		$30,342
Petaluma River	Multiple	Amount of riparian area treated (acres)	acre	150	1	$897,873	$5,986		$5,986
Pit River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	2,080	1	$1,322,000	$636		$636
Pudding Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	38	1	$2,871,472	$75,565		$75,565
Putah Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	549	2	$529,989	$920	274	$920
Ramirez Canyon	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	37	1	$402,495	$10,878		$10,878
Redwood Creek	Road	Stream crossings treated (number)	crossing	1	1	$9,875	$9,875		$9,875
Russian River	Instream	Barriers removed/modified (number)	barrier	5	4	$2,876,233	$718,176	1,425,988	$6,008
Russian River	Instream	Instream structures installed/modified (number)	structure	83	10	$145,205	$1,874	1,013	$1,922
Russian River	Instream	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.2	1	$91,841	$440,836		$440,836

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Russian River	Instream	Stream length treated (miles, count one side of stream only)	mile	1	2	$240,823	$168,825	85,325	$168,825
Russian River	Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	1	2	$12,918	$13,388	13,736	$13,388
Russian River	Instream and Riparian	Instream structures installed/modified (number)	structure	2	1	$29,090	$14,545		$14,545
Russian River	Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.3	2	$24,271	$88,661	20,567	$88,661
Russian River	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.01	1	$7,905	$1,391,322		$1,391,322
Russian River	Instream and Riparian	Stream length treated (miles, count one side of stream only)	mile	0.2	2	$2,184,588	$10,943,015	15,344,265	$10,943,015
Russian River	Instream and Riparian	Trees planted (number)	tree	1,030	2	$618,575	$499	615	$499
Russian River	Road	Road length treated (miles)	mile	19	3	$267,117	$10,208	11,947	$4,774
Russian River	Road	Sediment volume prevented from entering stream (cubic yards)	cubic yard	5,078	1	$78,270	$15		$15
Russian River	Road	Stream crossings treated	culvert	20	1	$71,145	$3,557		$3,557

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		(number)							
Russian River	Multiple	Amount of riparian area treated (acres)	acre	52	2	$558,119	$8,728	$6,703	$8,728
Russian River	Multiple	Amount of upland area treated (acres)	acre	60	1	$293,305	$4,888		$4,888
Russian River	Multiple	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	237	2	$1,243,054	$11,050	9,584	$11,050
Russian River	Multiple	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.08	1	$4,904	$56,294		$56,294
Russian River	Multiple	Stream crossings treated (number)	crossing	1	1	$495,042	$495,042		$495,042
Russian River	Multiple	Stream crossings treated (number)	culvert	8	4	$974,979	$143,499	56,758	$156,199
Russian River	Multiple	Students educated (number)	student	125	1	$197,369	$1,579		$1,579
Russian River	Multiple	Trees planted (number)	tree	1,233	1	$298,450	$242		$242
Russian River	Multiple	Workshop/training events (number)	unit	2	1	$56,513	$28,256		$28,256
Sacramento Delta	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	7,083	2	$3,153,580	$1,260	1,185.	$1,260
Sacramento Delta	Multiple	Area treated (acres)	acre	1,400	2	$1,086,623	$1,286	1,010	$1,286
Sacramento Delta	Multiple	Length of riparian stream bank treated (miles, count	mile	14	1	$1,187,555	$84,825		$84,825

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		both sides of stream if applicable)							
Sacramento Delta	Multiple	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	5	2	$2,809,204	$584,710	133,782	$584,710
Sacramento Delta	Multiple	Students educated (number)	student	200	1	$173,223	$866		$866
Salinas River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	26,213	5	$14,785,558	$6,456	10,686	$573
Salmon Creek - S	Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.1	1	$10,759	$94,683		$94,683
Salmon Creek - S	Instream and Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.06	2	$7,866	$292,299	341,959	$292,299
Salmon Creek - S	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	2,508	3	$4,833,261	$26,120	42,759	$2,752
Salmon River	Upland	Amount of riparian area treated (acres)	acre	75	2	$169,082	$2,784	1,604	$2,784
Salmon River	Instream and Riparian	Barriers removed/modified (number)	dam	2	1	$160,676	$80,338		$80,338
Salmon River	Road	Road length treated (miles)	mile	39	1	$1,250,067	$32,053		$32,053
Salmon River	Multiple	Road length treated	mile	5	1	$1,174,851	$234,970		$234,970

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		(miles)							
San Diego River	Riparian	Area treated (acres)	acre	5	1	$89,834	$19,963		$19,963
San Diego River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,214	1	$4,415,500	$3,637		$3,637
San Dieguito River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	758	2	$5,961,903	$7,952	1,127	$7,952
San Francisquito Creek	Instream	Barriers removed/modified (number)	barrier	5	1	$32,912	$6,582		$6,582
San Francisquito Creek	Multiple	Trees planted (number)	tree	150	1	$22,321	$149		$149
San Gabriel River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	91	1	$5,916,875	$65,021		$65,021
San Gabriel River	Multiple	Area treated (acres)	acre	7	1	$2,254,182	$322,026		$322,026
San Gregorio Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	3,681	1	$21,844,000	$5,934		$5,934
San Joaquin Delta	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,815	2	$38,837,200	$16,940	22,132	$16,940
San Joaquin Delta	Multiple	Area protected with acquisition, easement or lease (acres)	acre	9,200	1	$18,117,869	$1,969		$1,969

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
San Joaquin Delta	Multiple	Area treated (acres)	acre	9,200	1	$1,600,918	$174		$174
San Leandro Creek	Multiple	Area treated (acres)	acre	70	1	$129,005	$1,843		$1,843
San Leandro Creek	Multiple	Students educated (number)	student	679	1	$180,000	$265		$265
San Lorenzo River	Instream	Instream structures installed/modified (number)	structure	8	1	$16,349	$2,044		$2,044
San Lorenzo River	Road	Road length treated (miles)	mile	5	1	$9,770	$1,990		$1,990
San Lorenzo River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	167	1	$3,130,000	$18,743		$18,743
San Lorenzo River	Multiple	Area protected with acquisition, easement or lease (acres)	acre	1	1	$10,813,166	$10,813,166		$10,813,166
San Lorenzo River	Multiple	Participants in workshop/training events (number)	persons	60	1	$50,580	$843		$843
San Luis Obispo Creek	Riparian	Fence length installed/repaired (miles)	mile	0.9	1	$23,174	$27,191		$27,191
San Luis Obispo Creek	Riparian	Trees planted (number)	tree	677	1	$12,952	$19		$19
San Luis Obispo Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,603	3	$1,867,629	$5,507	4,419	$6,880
San Luis Rey River	Riparian	Amount of riparian area treated for invasive species (acres)	acre	41	1	$5,049,000	$123,146		$123,146

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
San Marcos Creek	Riparian	Amount of riparian area treated for invasive species (acres)	acre	13	1	$6,286	$495		$495
San Mateo Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	335	2	$5,000,000	$14,929	315	$14,929
Santa Ana River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	14,380	11	$52,075,922	$7,556	4,334	$7,906
Santa Clara River	Instream	Barriers removed/modified (number)	barrier	1	1	$1,095,149	$1,095,149		$1,095,149
Santa Clara River	Instream	Instream structures installed/modified (number)	structure	1	1	$11,335	$11,335		$11,335
Santa Clara River	Instream	Stream crossings treated (number)	crossing	1	1	$22,684	$22,684		$22,684
Santa Clara River	Multiple	Area protected with acquisition, easement or lease (acres)	acre	220	1	$4,979,581	$22,634		$22,634
Santa Clara River	Multiple	Instream structures installed/modified (number)	structure	1	1	$47,227	$47,227		$47,227
Santa Margarita River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	4,418	2	$14,085,000	$4,116	2,187	$4,116
Santa Maria River	Multiple	Area protected with acquisition, easement or lease (acres)	acre	0.5	1	$456,337	$871,845		$871,845
Santa Rosa	Instream	Barriers	barrier	1	1	$25,338	$25,338		$25,338

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Creek		removed/modified (number)							
Santa Rosa Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	638	4	$14,354,127	$71,037	109,780	$19,137
Santa Ynez River	Instream	Barriers removed/modified (number)	barrier	1	1	$86,396	$86,396		$86,396
Santa Ynez River	Instream	Stream crossings treated (number)	structure	1	1	$5,631	$5,631		$5,631
Santa Ynez River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,406	1	$5,596,575	$3,980		$3,980
Scott River	Instream	Barriers removed/modified (number)	barrier	1	1	$530,129	$530,129		$530,129
Scott River	Instream	Fish screens installed/maintained (number)	screen	11	4	$286,156	$24,557	4,661	$24,277
Scott River	Riparian	Amount of riparian area treated (acres)	acre	10	1	$16,700	$1,758		$1,758
Scott River	Upland	Instream structures installed/modified (number)	structure	3	1	$4,048	$1,349		$1,349
Scott River	Upland	Stream length treated (miles, count one side of stream only)	mile	3	1	$1,803,492	$601,164		$601,164
Scott River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	2,360	1	$369,988	$157		$157

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Scott River	Multiple	Fish screens installed/maintained (number)	screen	50	1	$100,523	$2,010		$2,010
Scott River	Multiple	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.2	1	$24,831	$163,883		$163,883
Scott River	Multiple	Stream crossings treated (number)	culvert	1	1	$106,356	$106,356		$106,356
Shasta River	Instream	Fish screens installed/maintained (number)	screen	28	3	$137,662	$34,278	29,306	$43,806
Shasta River	Riparian	Fence length installed/repaired (miles)	mile	7	5	$247,032	$48,062	38,573	$33,862
Shasta River	Riparian	Length of riparian stream bank treated (miles, count both sides of stream if applicable)	mile	0.7	1	$39,044	$52,859		$52,859
Shasta River	Upland	Amount of upland area treated (acres)	acre	540	1	$344,834	$639		$639
Shasta River	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.3	1	$29,786	$104,847		$104,847
Shasta River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	42	3	$132,139	$3,106	595	$3,049
Shasta River	Multiple	Amount of upland area treated (acres)	acre	0.08	1	$18,755	$234,432		$234,432
Shasta River	Multiple	Fence length	mile	1	1	$71,631	$48,489		$48,489

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		installed/repaired (miles)							
Shasta River	Multiple	Participants in workshop/training events (number)	persons	20	1	$89,695	$4,485		$4,485
Smith River	Instream	Instream structures installed/modified (number)	structure	58	6	$42,576	$4,576	10,396	$354
Smith River	Instream	Stream crossings treated (number)	culvert	2	2	$215,144	$107,572	149,409	$107,572
Smith River	Instream and Riparian	Stream crossings treated (number)	culvert	1	1	$315,962	$315,962		$315,962
Smith River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	26,643	12	$95,162,824	$15,354	12,091	$8,918
Sonoma Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	165	1	$5,695,000	$34,515		$34,515
South Fork Eel River	Instream	Barriers removed/modified (number)	barrier	6	1	$37,946	$6,324		$6,324
South Fork Eel River	Instream	Instream structures installed/modified (number)	structure	40	2	$80,948	$2,024	2,125	$2,024
South Fork Eel River	Instream	Stream crossings treated (number)	crossing	1	1	$18,070	$18,070		$18,070
South Fork Eel River	Instream	Stream length treated (miles, count one side of stream only)	mile	0.6	1	$43,292	$77,486		$77,486
South Fork Eel	Riparian	Fence length	mile	2	2	$51,787	$20,411	7,623	$20,411

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
River		installed/repaired (miles)							
South Fork Eel River	Riparian	Trees planted (number)	tree	23,000	1	$37,212	$2		$2
South Fork Eel River	Instream and Riparian	Barriers removed/modified (number)	barrier	3	2	$101,482	$41,631	33,108	$41,631
South Fork Eel River	Instream and Riparian	Instream structures installed/modified (number)	structure	7	1	$51,389	$7,341		$7,341
South Fork Eel River	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.9	2	$268,984	$308,076	130,686	$308,076
South Fork Eel River	Road	Instream structures installed/modified (number)	culvert	1	1	$1,058	$1,058		$1,058
South Fork Eel River	Road	Stream crossings treated (number)	crossing	6	1	$13,974	$2,329		$2,329
South Fork Eel River	Road	Stream crossings treated (number)	culvert	3	1	$48,223	$16,074		$16,074
South Fork Eel River	Multiple	Road length treated (miles)	mile	2	1	$39,050	$19,525		$19,525
South Fork Eel River	Multiple	Stream crossings treated (number)	crossing	29	4	$140,449	$5,684	2,881	$5,547
South Fork Eel River	Multiple	Stream crossings treated (number)	culvert	24	2	$77,654	$3,216	333	$3,216
South Fork Eel River	Multiple	Students educated (number)	student	600	1	$92,930	$155		$155
South Fork	Instream	Amount of upland area	acre	4	1	$6,293	$1,573		$1,573

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Trinity River		treated (acres)							
South Fork Trinity River	Instream	Barriers removed/modified (number)	dam	1	1	$32,500	$32,500		$32,500
South Fork Trinity River	Instream and Riparian	Length of streambank stabilized (miles, count both sides of stream where applicable)	mile	0.02	1	$3,537	$176,863		$176,863
South Suisun Bay	Upland	Amount of riparian area treated (acres)	acre	3	1	$60,438	$24,175		$24,175
South Suisun Bay	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,189	4	$5,342,932	$3,781	1,795	$3,964
Stemple Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	325	1	$317,191	$976		$976
Stevens Creek	Instream	Barriers removed/modified (number)	barrier	1	1	$335,267	$335,267		$335,267
Sweetwater River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	6	1	$1,703,000	$290,614		$290,614
Tijuana River	Multiple	Area assessed (acres)	acre	4,000	1	$577,941	$144		$144
Tijuana River	Multiple	Area treated (acres)	acre	38	1	$8,405,960	$221,209		$221,209
Topanga Canyon	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	120	1	$1,052,678	$8,772		$8,772
Topanga Canyon	Multiple	Length of riparian stream bank treated (miles, count	mile	1	1	$180,000	$180,000		$180,000

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
		both sides of stream if applicable)							
Toro Creek	Instream	Length of instream habitat treated - except for bank stabilization (miles)	mile	0.06	1	$36,599	$552,118		$552,118
Toro Creek	Instream and Riparian	Length of instream habitat treated - except for bank stabilization (miles)	mile	0.1	1	$47,904	$421,556		$421,556
Tulare Lake Basin	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	117	2	$44,296	$405	$107.73	$405
Tule River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	722	1	$336,445	$466		$466
Tuna Canyon	Multiple	Area protected with acquisition, easement or lease (acres)	acre	416	1	$14,742,656	$35,425		$35,425
Tuolumne River	Multiple	Length of instream habitat treated - except for bank stabilization (miles)	mile	0.05	1	$1,272,813	$22,401,512		$22,401,512
Upper Klamath River	Instream	Fish screens installed/maintained (number)	screen	1	1	$18,225	$18,225		$18,225
Upper Klamath River	Instream	Instream structures installed/modified (number)	structure	54	2	$42,657	$971	330	$971
Upper Sacramento River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	354	2	$1,512,657	$14,841	15,747	$14,841
Upper San	Acquisition	Area protected with	acre	360	1	$7,615,855	$21,155		$21,155

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
Joaquin River	of Land or Water	acquisition, easement or lease (acres)							
Upper Trinity River	Instream	Barriers removed/modified (number)	dam	1	1	$17,784	$17,784		$17,784
Upper Trinity River	Instream	Stream crossings assessed (number)	crossing	4	1	$1,450,013	$362,503		$362,503
Upper Trinity River	Instream	Stream crossings treated (number)	bridge	4	1	$438,509	$109,627		$109,627
Upper Trinity River	Instream	Stream crossings treated (number)	crossing	1	1	$500,000	$500,000		$500,000
Upper Trinity River	Road	Road length treated (miles)	mile	1	1	$2,065	$2,065		$2,065
Upper Trinity River	Road	Stream length treated (miles, count one side of stream only)	mile	2	1	$4,855	$2,653		$2,653
Upper Trinity River	Multiple	Barriers removed/modified (number)	dam	2	2	$205,972	$102,986	$133,499	$102,986
Upper Trinity River	Multiple	Stream crossings treated (number)	crossing	3	1	$2,299,373	$766,458		$766,458
Van Duzen River	Instream	Stream crossings treated (number)	culvert	2	2	$25,690	$12,845	$1,434	$12,845
Van Duzen River	Riparian	Trees planted (number)	tree	8,700	1	$56,125	$6		$6
Van Duzen River	Road	Stream crossings treated (number)	culvert	1	1	$4,605	$4,605		$4,605
Van Duzen River	Acquisition of Land or	Area protected with acquisition, easement or	acre	691	1	$18,300,000	$26,483		$26,483.35

Watershed	Habitat Category	Measure Category	Units	Total Units	Number of Projects	Total Cost	Average Cost per Unit	Standard Deviation of Cost per Unit	Median Cost Per Unit
	Water	lease (acres)							
Van Duzen River	Multiple	Stream crossings treated (number)	culvert	4	2	$21,064	$6,120	2,415	$6,120
Ventura River	Instream	Barriers removed/modified (number)	barrier	1	1	$5,082,251	$5,082,251		$5,082,251
Ventura River	Multiple	Amount of riparian area treated for invasive species (acres)	acre	5	1	$326,000	$63,114		$63,114
Ventura River	Multiple	Area protected with acquisition, easement or lease (acres)	acre	30	1	$434,334	$14,478		$14,478
Ventura River	Multiple	Barriers removed/modified (number)	barrier	1	1	$6,098,701	$6,098,701		$6,098,701
Villa Creek - SLO	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	748	1	$17,965,000	$24,017		$24,017
Walker Creek	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	1,896	2	$2,667,687	$1,313	346	$1,313
Yuba River	Acquisition of Land or Water	Area protected with acquisition, easement or lease (acres)	acre	223	1	$620,035	$2,780		$2,780

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