

5 Economic Consideration

The Regional Water Boards are legally required to consider economics in the development of water quality objectives¹. The triggers for Regional Water Board consideration of economics or costs in basin planning include:

- Establishing water quality objectives that ensure the reasonable protection of beneficial uses.
- Compliance with the California Environmental Quality Act (CEQA)² when Boards amend their basin plans. CEQA, and the regulations implementing CEQA, require that the Boards analyze the reasonably foreseeable methods of compliance with proposed performance standards and treatment requirements.³ This analysis must include economic factors.

Chapter 5 is the analysis of potential environmental impacts, as required under CEQA, associated with adopting an amendment to the Water Quality Control Plan for the North Coast Region (Basin Plan) to update water quality objectives. Chapter 5 contains the reasonably foreseeable compliance measures necessary to achieve compliance with the proposed water quality objectives for dissolved oxygen (DO) for surface waters, chemical constituents for surface waters and groundwater, and toxicity for groundwater. Compliance measures include treatment technologies and methods and management practices most likely to be implemented to achieve compliance with water quality objectives.

5.1 Scope of the Economic Considerations

What follows is an estimate of the costs associated with compliance measures. The costs are given as a range, dependent on the specific characteristics of the land or operation to which given management practices are applied. A list of potential funding sources is also given.

The Regional Water Boards are required to consider economics when developing water quality objectives; however, a Regional Water Board is not obligated to consider the balance of costs and benefits associated with implementation of a Basin Plan amendment. They are obligated to consider the costs of compliance and potential sources of funding and may adopt Basin Plan amendment even if the costs are considered to be significant⁴. For CEQA purposes, the economic and social impacts of the proposed project are considered to determine if they will cause or contribute to an adverse environmental impact, not whether the costs of the measures themselves are significant or will cause an economic hardship. In the case of prospectively incorporating Maximum Contaminant Levels (MCLs) adopted by the California Department of Public Health (now the State Water Board Division of

¹ See Wat. Code, § 13240-13247

² Pub. Resources Code § 21000 *et seq.*

³ Cal.Code Regs., tit., 23 § 3777 subdivision (b).

⁴ See *California Assn. of Sanitation Agencies v. State Water Resources Control Board* (2012) 208 Cal.App. 4th 1438, 1466.

Drinking Water), economic considerations were (or will have been) taken into account during the adoption or revision of those numbers. For example, engineering costs and the technical feasibility of implementation of the best available technologies (BAT) were evaluated. Therefore, MCLs are incorporated into the Basin Plan with an existing economic analysis sufficient for the purpose of complying with Water Code section 13241. This chapter estimates only the cost of compliance measures for the purpose of adopting a new groundwater toxicity objective and revising the existing objectives for DO and chemical constituents. The scope of this analysis covers the potential costs associated with implementation of compliance measures without considering whether compliance measures are currently part of the existing regulatory baseline.

5.1.1 Methodology

The majority of costs identified in this chapter were derived from the following sources of information including:

- U.S. Environmental Protection Agency (USEPA):
 - USEPA Technology Fact Sheets
<http://water.epa.gov/scitech/wastetech/mtbfact.cfm>
 - USEPA Technologies and Costs for Removal of Arsenic from Drinking Water
http://water.epa.gov/drink/info/arsenic/upload/2005_11_10_arsenic_treatments_and_costs.pdf
 - USEPA Wastewater Technology Fact Sheet Free Water Surface Wetlands & Constructed Wetland Treatment of Municipal Wastewaters
http://water.epa.gov/infrastructure/septic/upload/free_water_surface_wetlands.pdf
- State Water Resources Control Board (State Water Board) Underground Storage Tanks Cleanup Fund (UST Fund)
http://www.waterboards.ca.gov/water_issues/programs/ustcf/;
- California Department of Public Health Division of Drinking Water, now the State Water Board Division of Drinking Water (DDW)
http://www.waterboards.ca.gov/drinking_water/programs/index.shtml;
- Addressing Nitrate in California's Drinking Water Technical Report 5: Groundwater Remediation and Management for Nitrate <http://groundwaternitrate.ucdavis.edu/>;
- Federal Remediation Technologies Roundtable Screening Matrix and Reference Guide (FRTR) <http://www.frtr.gov/default.htm>;
- Natural Resource Conservation Service (NRCS) Field Office Technical Guide (FOTG)
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/>;
- California Department of Fish and Wildlife (CDFW) Salmonid Stream Habitat Restoration Manual <http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp>;
- CDFW Coho Salmon Recovery Strategy
<http://www.dfg.ca.gov/fish/Resources/Coho/CohoRecovery.asp>; and
- California Department of Transportation (Caltrans) 2013 contract proposal award information http://www.dot.ca.gov/hq/esc/oe/project_ads_addenda/.

The cost information provided in the USEPA guidance and FRTR are available to assist publicly owned treatment works (POTWs) and parties responsible for remediation in understanding the necessary components and costs involved with implementing particular technologies. Many of the cost breakdowns are based on a variety of example sites throughout the county over the last two decades. Therefore, it can be generally assumed that these costs have increased with inflation, although some compliance measures have become more affordable as improvements in technologies are made.

The cost information provided in the NRCS FOTG is a national dataset to assist local NRCS Districts in setting cost shares for implementing conservation practices. Cost estimates are provided at the county level and the data used for this analysis are specific to Northern California (including Del Norte, Humboldt, Trinity, Siskiyou, Mendocino and Sonoma Counties), as described in their Fiscal Year 2013 Payment Schedule. The FOTG represents the NRCS estimate of costs to implement such practices.

The costs included in the CDFG Manual are described as upslope erosion inventory and sediment control guidance. The numbers are based on estimates provided by Pacific Watershed Associates, a consulting firm specializing in erosion control work. Actual costs can vary considerably depending on operator skill and experience, equipment types, local site conditions, and regional location.

5.1.2 Existing Requirements

The costs of the compliance measures present a range of full scale implementation. However, the existing regulatory baseline already requires many of these measures to be in place and occasionally upgraded as advances in BAT are achieved and made more economically feasible to implement. For example, many waste water treatment plant operations undergo facility upgrades to achieve compliance with existing water quality objectives for chemical constituents and toxicity. Likewise, existing facilities such as hydropower dams in the region have undergone or are currently evaluating methods and measures by which compliance with the existing dissolved oxygen objectives may be met. Additionally, groundwater remediation actions currently being implemented in accordance with existing regulatory programs often require multiple layers of assessment, monitoring and corrective actions to reach compliance with existing objectives. Therefore, the full or total cost of a compliance measure may exceed the cost associated with the proposed revision of the water quality objectives. In fact, the cost associated with revisions of the water quality objectives in most cases will be a fraction of the total cost of compliance, if there is any additional cost at all.

Landowners and project proponents are bound by various existing regulatory requirements that involve water quality and natural resource protection. The economic impact of existing obligations (baseline) should not be attributed as costs of compliance with the proposed Basin Plan amendment. Limiting the scope of the economic analysis is difficult given the similarity of measures necessary to achieve a wide range of water quality

and wildlife protection goals. To remain as focused as possible, this economic analysis only contemplates the costs of measures identified as ‘reasonably foreseeable’ (see Chapter 5). However, if taken as a whole, they are likely an overestimate of the actual costs of compliance. This is because of the multiple and overlapping regulatory programs under which the same measures are reasonably foreseeable.

For example, some chemical or dissolved oxygen control costs are related to actions necessary to avoid violations of the existing discharge prohibitions in the Basin Plan or to avoid ‘taking’ of a species under the Endangered Species Act or to fully mitigate impacts of authorized ‘takes’. Other costs may be incurred as a result of compliance with the Clean Water Act (CWA), other related statutes and regulations, or local land use ordinances. Conversely, compliance with the proposed water quality objectives will help dischargers comply with the other regulatory requirements.

5.1.3 Geographic Scope

The implementation actions necessary for compliance with the proposed Basin Plan amendment are not uniformly required across the North Coast Region or even across properties with similar land uses. Instead, many of the implementation actions will be required of landowners/project proponents on an as-needed and project-specific basis. While the objectives themselves uniformly exist, the relevant beneficial uses being protected and site characteristics affecting the implementation of compliance measures vary across the region.

5.2 Costs of Compliance Measures to Address Water Quality Objectives for Chemical Constituents and Toxicity in Surface Waters and Groundwaters

5.2.1 Potential Costs for Groundwater Remediation

The cost of remediating groundwater includes:

- Cost of characterizing the groundwater aquifer in terms of contaminants present, horizontal and vertical extent of contamination, and the hydrogeology underlying the site.
- Capital costs of remediation systems including design, permitting and construction.
- Operation and maintenance cost during the life of the project; which may be longer with more stringent water quality objectives.

General Monitoring and Assessment Compliance Measures⁵

- Monitoring Well Installation – 3 wells to 30 feet deep = \$12,604 / 6 wells to 50 feet deep = \$33,012
- On-site Storage Areas – \$528 / month

⁵ SWRCB USTCF Cost Guidelines

- Traffic Control Plans – \$462 - \$1,254 per event
- Health and Safety Plans – \$1,264
- Work Plans - \$1,742 to \$3,069

Table 5-1 Estimated Cost Ranges for Soil and Groundwater Remediation Compliance Measures			
Compliance Measures	Range of Practice Costs for Small Site 500-10,000 ft² / 500-10,000 cy/ <10,000s gallons per year	Range of Practice Costs for Large Site 10,000-2,000,000 ft² / 10,000-50,000 cy / >10,000s gallons per year	Cost Source
In-Situ Biological Remediation			
Bioventing	\$26 to \$27/ ft ² \$710 to \$742 /cy	\$2 to \$3 / ft ² \$60 to \$94 /cy	FRTR
Bioreactor Landfills	\$143 to \$167 per thousand gallons	\$21 to \$36 per ten thousand gallons	FRTR
Enhanced Biodegradation	Oxygen enhancement \$40 to \$80 per 1,000 gallons Nitrate enhanced treatment \$160 to \$230 per gallon		FRTR
Phytoremediation	\$480 to \$1,800 /cy \$1.52 to \$1.69 / ft ²	\$150 to \$485 /cy \$0.45 to \$0.64 / ft ²	FRTR
Natural Attenuation	\$40,000 to \$60,000 per site includes site assessment and year of monitoring	\$100,000 to \$750,000 includes site assessment and 5-10 yrs of monitoring	FRTR, USTCF
In-Situ Physical/Chemical Remediation			
Chemical Oxidation	\$71 to \$100 /cy \$0.02 / gallon \$156 to \$175 / 10,000 gallons	\$71 to \$100 /cy \$0.004 / gallon \$31 to \$39 / 10,000 gallons	FRTR, USEPA ²
Electrokinetic Separation	\$20 to \$225 /cy		FRTR, GWRTAC
Fracturing	\$1,000 to \$1,500 includes four to six fractures per day.		FRTR
Soil Flushing	\$32 to \$49 /cy	\$18 to \$27 /cy	FRTR
Soil Vapor Extraction	\$944 to \$1,100/ cy	\$300 to \$722/ cy	FRTR
Air Sparging	\$28 to \$64/cy	\$18 to \$20/cy	FRTR
Air Stripping	\$0.002 to \$0.0021/ gallon \$20 to \$34 / 10,000 gallons	\$0.004 to \$0.005/ gallon \$4 to \$5 / 10,000 gallons	FRTR
BioSlurping / Dual Phase Extraction	\$56/ gallon \$25 to \$55 /cy \$10,000 to \$12,000 per week	\$56/ gallon \$23 to \$52 /cy \$10,000 to \$125,000 per year	FRTR
Directional Wells	\$20 to \$100 / ft		FRTR, USTCF
Permeable Reactive Barriers / Treatment Walls	Trenching >=30 ft bsg \$2 to \$10 /ft ² Trenching >=80 ft bsg \$2 to \$55+ /ft ² Reactive media \$0.30-\$1.25 /lb \$963 to \$1,961 /cy of treatment wall \$0.13 to \$0.21 /cy of groundwater treated		ITRC, USTCF, FRTR
Thermal Treatment	\$32 to \$300 /cy		FRTR

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Ex-Situ Biological Remediation Compliance Measures			
Biopiles	\$30 to \$60 /cy		FRTR
Composting	\$489 to \$578 /cy	\$481 to \$555 /cy	FRTR
Land Farming	Pre-treatment capital costs \$25,000 to \$50,000 Treatment cost <=\$75 /cy		FRTR
Slurry Phase	\$100 to \$160 /cy		FRTR
Bioreactors	\$143 to \$167 per thousand gallons	\$21 to \$36 per ten thousand gallons	FRTR
Constructed Wetlands	\$0.45 to \$1.36 /1,000 gallons over 10 to 30 year timeframe Pre-treatment capital \$359,000 to \$1,015,009 /acre of wetland treatment system Operations and maintenance costs \$5,00 to \$8,323 /acre per year		FRTR, USEPA ³
Ex-Situ Physical/Chemical Remediation Compliance Measures			
Chemical Reduction	\$42 to \$500 /cy		FRTR, USEPA ²
De-halogenation/ De-chlorination / Reductive Treatment	\$200 to \$500 /ton \$1.20 to \$6.30 /1,000 gallons treated (pump & treat GAC) \$0.10 to \$10.00/1,000 gallons treated		FRTR, USEPA ¹ , USEPA ²
Separation / Soil washing	\$53 to \$142 /cy \$1.38 to \$4.56 /1,000 gallons treated		FRTR
Activated Carbon Treatment	\$0.80 to \$6.30 /1,000 gallons treated		FRTR, GWRMN
Advanced Oxidation	\$0.10 to \$10 /1,000 gallons treated		FRTR, AFCEE
Air Sparging	\$28 to \$64/cy	\$18 to \$20/cy	FRTR
Air Stripping	\$0.002 to \$0.0021/ gallon \$20 to \$34 / 10,000 gallons	\$0.004 to \$0.005/ gallon \$4 to \$5 / 10,000 gallons	FRTR
Excavation/ Dredging and Disposal	\$12 to \$500 /ton \$5 to \$300 /cy		FRTR, USEPA ³ , USTCF
Groundwater Pumping /Extraction, Treatment & Disposal	See costs for bioreactors, constructed wetlands, adsorption, air stripping, activated carbon treatment, oxidation, dual phase extraction, Air Stripping, De-halogenation/ De-chlorination / Reductive Treatment and ion exchange.		FRTR, USEPA ¹ , USEPA ² , USTCF
Ion Exchange / Electrodialysis	\$0.30 to \$1.23 /1,000 gallons treated	\$254k to \$2.1 million / 1.1 to 12.3 mgd	FRTR, GWRTAC, USEPA ² , GWRMN
Reverse Osmosis	\$5.75 to \$16.64 /10,000 gallons treated	\$776k to \$81 million / 1.0 to 200 mgd	WESC, GWRMN, USEPA ² ,

Table 5-1 Estimated Cost Ranges for Soil and Groundwater Remediation Compliance Measures			
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Precipitation/ Coagulation/ Flocculation/ Sedimentation (including lime softening)	\$17 to \$41 /<=10,000 gallons treated	\$91k to \$9.1 million / 0.7 to 135 mgd	FRTR, USEPA ¹ , USEPA ²
Ex-Situ Thermal Remediation Compliance Measures			
Incineration	\$796 to \$1,171 /cy	\$695 to \$1,063 /cy	FRTR
Pyrolysis	\$300 /ton		FRTR
Thermal Desorption	\$75 to \$232 / cy	\$40 to \$101 / cy	FRTR
Contamination Containment Compliance Measures			
Landfill Cap	\$175k to \$225K / acre		FRTR
Physical Barriers	\$5 to \$7 / ft ² Trenching >=30 ft bsg \$2 to \$10 /ft ² Trenching >=80 ft bsg \$2 to \$55+ /ft ² Reactive media \$0.30-\$1.25 /lb \$963 to \$1,961 /cy of treatment wall \$0.13 to \$0.21 /cy of groundwater treated		ITRC, USTCF, FRTR

ft- feet

ft² – feet squared

cy – cubic yard

bsg – below surface grade

lb – pound

mgd- million gallons per day

FRTR – Federal Remediation Technologies Roundtable

GWRTAC – Groundwater Remediation Technologies Analysis Center, Technology Overview Report TO-97-03

USTCF – State Water Resources Control Board Underground Storage Tank Cleanup Fund

USEPA 1 – US Environmental Protection Agency Technology Fact Sheets <http://water.epa.gov/scitech/wastetech/mtbfact.cfm>

USEPA 2 – US Environmental Protection Agency Technologies and Cost for Removal of Arsenic from Drinking Water

USEPA 3 – US Environmental Protection Agency Technology Fact Sheet Free Surface Water Wetland & Constructed Wetland Treatment of Municipal Wastewaters

GWRMN- Groundwater Remediation and Management for Nitrate Report – Addressing Nitrate in California’s Drinking Water Technical Report 5

AFCEE – AFCEE Technology Transfer Workshop; InSitu Chemical Oxidation, R. Brown, Ph.D

WESC – Williams Engineering Services Company, Inc. – A Review of Wastewater Treatment by Reverse Osmosis

ITRC - Interstate Technology & Regulatory Council – Permeable Reactive Barrier: Technology Update

5.2.2 Potential Costs for Wastewater Treatment

The cost of treating and discharging wastewater includes capital costs and operations and maintenance.

Table 5-2 Estimated Cost Range for Wastewater Treatment Compliance Measures			
Compliance Measures	Capital Costs	Annual O&M Costs	Cost Source
Wastewater Disinfection Compliance Measures			
Chlorine	1-2.5 mgd = \$1.1 to \$1.3 million 10-20 mgd = \$3.1 to \$4 million 100-175 mgd = \$14.3 to \$1.3 million	1-2.5 mgd = \$49K to \$76K 10-20 mgd = \$158K to \$380K 100-175 mgd = \$660K to \$1.3 million	USEPA ¹
Ozone	Oxygen gas /compressor \$245K Contact vessel (500 gpm) \$4,000 - \$5,000 <u>Destruct unit:</u> Small (around 30 cfm) \$800 Large (around 120) \$1,000-1,200 Non-component costs \$35,000 Engineering \$12,000-15,000 Contingencies 30%	Labor \$12,000 Power 90 kW Other (filter replacements, compressor oil, spare dielectric, etc.) \$6,500	USEPA ¹
Ultraviolet	Lamps 1-5 mgd = \$400-\$1,375 5-10 mgd = \$345-\$595 19-100 mgd = \$275-\$590 Systems \$245k	\$19,200	USEPA ¹
Decentralized Systems Technology			
Septic System	\$2,500 to \$4,500		USEPA ¹ , EN
Aerobic Treatment	500 - 1,500 gpd = \$2,500 to \$9,000	\$350	USEPA ¹
Control Panels	\$1,500 - \$3,000 /unit		USEPA ¹
Sand/Gravel Filters	Range \$4,000 - \$15,000 1,500-gallon single compartment septic/pump tank @ \$0.57/gallon = \$850 ISF complete equipment package (includes dual simplex panel, pump pkg., tank risers, lids, liner, lateral kit, orifice shields, etc.) = \$3,200 Non-component costs = \$750	Labor @ \$65/hr. (2 hrs./yr.)= \$130 Power @10 cents/kWh Sludge disposal=\$25	USEPA ¹ , EN

Table 5-2													
Estimated Cost Range for Wastewater Treatment Compliance Measures													
Compliance Measures	Capital Costs	Annual O&M Costs	Cost Source										
	Engineering (soil evaluation, siting, design, and construction)= \$2,000 Contingencies (permit fees)= \$1,000 Land may vary												
Low Pressure Pipe System	\$1,500 - \$5,000		USEPA ¹ , EN										
Pressure Systems	\$4,000 - \$6,500		USEPA ¹ , EN										
Mound Systems	\$9,000 to \$20,000		USEPA ¹ , EN										
Wastewater Treatment Compliance Measures													
Aerated/ Partial Mix Lagoons	Excavation =\$12 to \$500 /ton \$5 to \$300 /cy Compaction = \$3 to \$5/cy Synthetic lining = \$0.5 to \$1/ft ²		USEPA ¹										
Advanced Ecologically Engineered Systems	40K gpd = \$985K to \$1.2 million 80K gpd = \$1.5 to \$1.9 million 1 million gpd = \$8.5 to \$10.5 million		USEPA ¹										
Ballasted Flocculation	\$91 /million gallons treated		USEPA ¹										
Chemical Precipitation	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"><u>Chemical Treatment Cost/gal</u></td> <td style="width: 50%;"><u>Cost/lb</u></td> </tr> <tr> <td>Ferrous sulfate</td> <td>\$0.17</td> </tr> <tr> <td>Dithiocarbamate</td> <td>\$0.95</td> </tr> <tr> <td>Borohydride</td> <td>\$2.86</td> </tr> <tr> <td>Aluminum</td> <td>\$0.50</td> </tr> </table>	<u>Chemical Treatment Cost/gal</u>	<u>Cost/lb</u>	Ferrous sulfate	\$0.17	Dithiocarbamate	\$0.95	Borohydride	\$2.86	Aluminum	\$0.50	\$1.03 \$0.82 \$0.76 \$0.04	FRTR, USEPA ¹ , USEPA ²
<u>Chemical Treatment Cost/gal</u>	<u>Cost/lb</u>												
Ferrous sulfate	\$0.17												
Dithiocarbamate	\$0.95												
Borohydride	\$2.86												
Aluminum	\$0.50												
Granular Activated Carbon Absorption	\$0.80 to \$6.30 /1,000 gallons treated	Carbon \$0.50 to \$1.20 /lb	USEPA ¹										
Dechlorination	\$6,500 to \$383,000	\$9,900 to \$17,500 \$0.10 to \$10.00/1,000 gallons treated	USEPA ¹ ,										
Denitrifying Filters	\$241,000 to \$26,520,000 \$1.0/lb of total nitrogen removed \$0.58/gpd capacity	\$7,050 to \$841,000 \$0.51/lb nitrogen removed	USEPA ¹ , GWRMN										
Ion Exchange / Electrolysis	\$240 to \$400 /square meter of membrane	\$0.30 to \$1.23 /1,000 gallons treated \$254k to \$2.1 million / 1.1 to 12.3 mgd	FRTR, GWRTAC, USEPA ² , GWRMN										

Compliance Measures	Capital Costs	Annual O&M Costs	Cost Source
Chemical reduction	Aluminum sulfate, liquid, in tanks, iron-free \$269/ton Aluminum sulfate, liquid, in tanks, NOT iron-free \$152/ton Aluminum sulfate, dry, 100 lb bags, iron-free \$250/ton Aluminum sulfate, dry, 100 lb bags, NOT iron-free \$245 - \$280/ton Ferric chloride, technical grade, in tanks \$255 - \$300/ton Ferrous sulfate, monohydrate, granulated, bulk \$223 - \$240/ton Lime, chemical, hydrated, bulk \$70/ton	Ferrous sulfate \$1.03/ gallon treated Dithiocarbamate \$0.82/ gallon treated Borohydride \$0.76/ gallon treated Aluminum \$0.04/ gallon treated \$91k to \$9.1 million / 0.7 to 135 mgd treated	FRTR, USEPA ¹ , USEPA ² , GWRTAC,
Wetland Treatment Systems	\$155,000 to \$260,00 /100,000 gpd \$359,000 to \$1,015,009 /acre of wetland treatment system Operations and maintenance costs	\$5,00 to \$8,323 /acre per year \$0.45 to \$1.36 /1,000 gallons over 10 to 30 year timeframe	FRTR, USEPA ³
Membrane Bioreactors	\$7.00-\$20.00 / gpd capacity	\$1.00-\$2.00 /gallons treated	USEPA ¹ , GWRMN
Oxidation Ditches	\$2.50-\$4.00 / gpd	\$2.00-\$12.00 / gpd treated	USEPA ¹
Package Plants	\$4.00-\$6.00 /gallons treated	\$800-\$2,000 /millions gallons treated	USEPA ¹
Reverse Osmosis	\$776k to \$81 million / 1.0 to 200 mgd		USEPA ¹

gpm – gallons per minute / mgd – million gallons per day / gpd – gallons per day/ cy – cubic yard / ft² – square foot / lb – pound / ft- feet
 FRTR – Federal Remediation Technologies Roundtable
 GWRTAC – Groundwater Remediation Technologies Analysis Center, Technology Overview Report TO-97-03
 USTCF – State Water Resources Control Board Underground Storage Tank Cleanup Fund
 USEPA 1 – US Environmental Protection Agency Technology Fact Sheets <http://water.epa.gov/scitech/wastetech/mtbfact.cfm>
 USEPA 2 – US Environmental Protection Agency Technologies and Cost for Removal of Arsenic from Drinking Water
 USEPA 3 – US Environmental Protection Agency Technology Fact Sheet Free Surface Water Wetland & Constructed Wetland Treatment of Municipal Wastewaters
 GWRMN- Groundwater Remediation and Management for Nitrate Report – Addressing Nitrate in California’s Drinking Water AFCEE – AFCEE Technology Transfer Workshop; InSitu Chemical Oxidation, R. Brown, Ph.D
 WESC – Williams Engineering Services Company, Inc. – A Review of Wastewater Treatment by Reverse Osmosis
 ITRC - Interstate Technology & Regulatory Council – Permeable Reactive Barrier: Technology Update
 EN- Eco-Nomic Septic System design Page <http://www.eco-nomic.com/indexsdd.htm#Industrial or Non-Residential Wastewater>

5.3 Costs of Compliance Measures to Address the Water Quality Objective for Dissolved Oxygen in Surface Waters

The following activities influence the presence of DO in an aquatic system: agricultural practices, forestry practices, fossil fuel extraction and refinement practices, other mining practices, construction practices, residential and commercial practices, recreational practices, and industrial practices. These activities have the potential to act as sources of: animal wastes, mining wastes, septic system leachate, landfill leachate, fertilizers, sewage treatment plant effluent, industrial effluent, industrial emissions, vehicle emissions, storm water discharge, fire ash and smoke, and other historic or existing sources. In addition, these activities have the potential to alter environmental conditions in such a way as to alter the natural cycle of DO availability. For example, the installation of impoundments, alteration of land cover, alteration of the stream channel, increase in temperature, or increase in sediment delivery can impact or alter the natural pattern and range of DO in an aquatic system. See Chapter 2 of this Staff Report, for more details on land uses that affect DO and the existing regulatory programs in place.

Timber

Timber harvest activities can substantially impact water temperature. Timber harvest on non-federal lands is currently regulated by the Regional Water Board through a combination of general WDRs and conditional waivers of WDRs. The costs associated with WDRs are not outlined here as they are a current requirement. Roads that are part of a timber harvest plan or Non-Industrial Timber Management Plan (NTMP) are required by the WDRs and waivers for timber harvest on nonfederal lands to implement an erosion control plan. Additional costs to timber operators associated with the proposed WQO Update Amendment could come from the additional retention of trees above the existing requirements in certain areas. Therefore, the additional retention of trees could potentially be foregone revenue. However, due to the broad range of potential factors including site potential, topography, existing requirements, and amount of timber available the specific costs are too complex to estimate. Typical categories of compliance for timber operations include maintaining and preserving site potential shade, controlling erosion and sediment, preserving existing cold water resources, and aquatic ecosystem restoration.

Roads

The road networks in the North Coast Region contribute to elevated sediment loads and temperatures in tributary watersheds through the discharge of excess sediment. In some cases, an inventory of roads will determine that decommissioning or upgrading of roads is required.

Regardless of the method of regulation or the responsible party, the requirements for controlling sources of sediment from roads are similar and implementation will potentially focus on the following process:

1. Inventory: Identify sources of excess sediment discharge or threatened discharge and quantify the discharge or threatened discharge from the source(s).
2. Prioritize: Prioritize efforts to control discharge of excess sediment based on, but not limited to, severity of threat to water quality and beneficial uses, the feasibility of source control, and source site accessibility.
3. Implement: Develop and implement feasible sediment control practices to prevent, minimize, and control the discharge. Road decommissioning may be required as part of a responsible parties' load allocation if maintaining the road is cost prohibitive, the road is not needed or is a source of uncontrollable excess sediment discharge.
4. Monitor and Adapt: Use monitoring results to direct adaptive management in order to refine excess sediment control practices and implementation schedules until discharges are reduced to a level that meets any applicable TMDL load allocations and water quality standards.

Typical categories of compliance for roads include maintaining and preserving site potential shade, controlling erosion and sediment delivery, preserving existing cold water resources, and aquatic ecosystem restoration.

Irrigated Agriculture

Irrigated agriculture occurs throughout the North Coast Region and is predominantly concentrated in: 1) the Tule Lake region in Siskiyou and Modoc Counties; 2) the Scott Valley, Shasta Valley, and upper Klamath River Valley in Siskiyou County; 3) Round Valley, Potter Valley, Eden Valley, Anderson Valley and the upper Russian River Valley in Mendocino County; and 4) Alexander Valley, Dry Creek Valley, Russian River Valley Below Dry Creek and the Laguna de Santa Rosa in Sonoma County. Principal irrigated crops are barley, irrigated pasture, alfalfa hay and other hay, oats, potatoes, wheat and grapes. For most of the management practices, a range of costs is given, depending on numerous project-specific factors to be determined by landowners/dischargers. Typical categories of compliance for irrigated agriculture include maintaining and preserving site potential shade, controlling erosion and sediment delivery, addressing tailwater and surface water impoundments, preserving existing cold water resources, aquatic ecosystem restoration, and actions to restore or maintain stream flows to support all beneficial uses. Costs to the irrigated agricultural community to comply with the proposed Basin Plan Amendment were primarily derived from NRCS Fiscal Year 2013 Payment Schedule.

Grazing

Grazing activities occur throughout the North Coast Region both on private and public lands. As with the estimated costs to the irrigated agricultural community to comply with the proposed Basin Plan Amendment, the estimates to the grazing community are derived from NRCS Fiscal Year 2013 Payment Schedule. Typical categories of compliance for grazing include maintaining and preserving site potential shade, controlling erosion and

sediment delivery, preserving existing cold water resources, aquatic ecosystem restoration, and actions to restore or maintain stream flows to support all beneficial uses.

Dam Removal

The cost of removing dams varies with the height and width of the dam, but project-specific factors, such as structure type, stored sediments, water rights, easements, and the need for monitoring can greatly impact the total cost of treatment. Friends of the Earth, a Non-Governmental Organization, performed case studies of more than 30 dam removal projects in the United States and found that some small dams can be removed for under \$10,000. The removal of a larger dam (e.g., 15-20 feet in height) can cost as much as \$1 million. In neither case do these cost estimates include the important considerations of the cost of permits, easements, design, or monitoring. The median cost of dam removal in this study was about \$100,000. However, this finding cannot be interpreted to suggest that this will always be true in California or elsewhere in the future. Previous dam removals were not the result of a random selection; it is likely that relatively inexpensive removal projects have been undertaken first and that average removal costs will rise over time. (Sunding, D./A. P. Zwane, 2004)

Reasonably Foreseeable Compliance Measure	Practice Name	Range of Practice Costs	NRCS Practice Code or Source
Use Exclusion	Forage exclusion	\$0.64-1.32/ft	#472
Riparian Restoration	Riparian forest buffer/herbaceous cover	\$165.04-22,916.06/acre	#390, #391
Protect and manage existing wetland and/or riparian areas for their natural filtering functions	Riparian herbaceous cover/forest buffer, wetland restoration	\$165.04-22,916.06/acre	#390, #391, #657
Animal Trails and Walkways	Animal trails and walkways	Not available	#575
Stream Crossing	Ford, culvert, bridge	\$363-1,488 per/Lft	#578
Riparian Restoration	--	\$44.03/ft ² -\$2,706/Lft	A.Riley, 2008
Riparian Restoration	--		A.Riley, 2008
Retain in-channel trees following timber operations Increased riparian canopy retention in Class II and III Watercourses	Not applicable	Dependent on site specific determinations	Staff judgment

Table 5-4			
Estimated Costs of Reasonably Foreseeable Compliance Measures Associated with Erosion and Sediment Control			
Reasonably Foreseeable Compliance Measure	Practice Name	Range of Practice Costs	NRCS Practice Code or Source
Reduce erosion - Maintain crop residue or vegetative cover	Cover Crop	\$113.75-206.64/acre	#340
Erosion control	Dry Seed	\$0.40/ft ²	Caltrans 2013
Erosion control	Compost Cover	\$0.20-0.80/ft ²	Caltrans 2013
Erosion control	Compost Blanket	\$250/cubic yard	Caltrans 2013
Erosion control	Rolled Erosion Control Blanket	\$2.00/ft ²	Caltrans 2013
Erosion control	Straw	\$0.05/ft ²	Caltrans 2013
Erosion control	Hydroseed	\$0.05/ft ²	Caltrans 2013
Reduce erosion and sequester sediment - Stream buffer areas/Field borders	Field Borders: Riparian tree & shrub establishment; Non-native or native seedbed preparation	\$211-1,617/acre	#386
Reduce erosion and sequester sediment - Riparian restoration	Tree & Shrub Establishment	\$1.20-3.20/unit	#612
Reduce soil erosion - Improve soil properties	Deep tillage/1 Scenario	\$20.10/acre	#324
	Res. & Tillage Mgt, Mulch Till	\$28.10/acre	#345
Reduce slope length, steepness, or unsheltered distance	Precision land forming	\$175/acre	#462
	Contour Farming	\$10.10/acre	#330
	Contour Buffer Strips	\$282.30-917.40/acres	#332
Reduce soil erosion - Practices to reduce detachment	Conservation Cover	\$237.40-2,279.90/acre	#327
	Conservation Crop Rotation	\$6.10-30.90 /acre	#328
	Residue and Till Management	\$36-71.12/acre	#329
	Cover crop	\$113.75-206.64/acre	#340
	Critical area planting	\$398.21-14,046.80/acre	#342
	Seasonal residue management	\$3.76/acre	#344
	Diversion	\$3.17-5.69/ft	#362
	Windbreak/shelterbelt establishment	\$0.45-0.90/ft	#380

Table 5-4			
Estimated Costs of Reasonably Foreseeable Compliance Measures Associated with Erosion and Sediment Control			
Reasonably Foreseeable Compliance Measure	Practice Name	Range of Practice Costs	NRCS Practice Code or Source
Practices to reduce detachment (cont.)	Windbreak/shelterbelt renovation	\$0.56-4.77/ft	#650
	Mulching	\$297.73-756.15/acre	#484
	Hydromulch	\$0.05/yard ²	Caltrans 2013
	Irrigation water management	\$28.09-202.12/acre	#449
	Cross wind ridges/stripcropping/trap strips	Not available	#589
	Surface roughening		
	Waste utilization	\$175.21-949.51/acre	#612
	Wildlife upland habitat management	Not available \$17.50-392.05/acre	#633 #645
Practices to reduce transport within the field	Contour farming	\$304.10/acre	#330
	Field windbreak	Not available	#392
	Grassed waterway	\$1502.42/acre	#412
	Contour stripcropping	\$1.60-3.83/acre	#585
	Herbaceous wind barriers	Not available	#442A
	Field stripcropping	Not available	#586
	Terrace	\$2.09-3.40/Lft	#600
Practices to trap sediment below the field or critical area	Contour buffer strips	\$282.29-917.41/acre	#332
	Sediment basins	Not available	#350
	Field border	\$210.57-1617.25/acre	#386
	Filter strip	\$210.57-448.10/acre	#393
Water and sediment control basin		\$4.86/cubic yard	#638
Mulch exposed areas	Mulching	\$297.73-756.15/acre	#484
Grazing Management Plan		To be determined	
Pasture and hay planting	Seedbed preparation, seeding, non-native	\$191.43-501.24/acre	#512

Table 5-4			
Estimated Costs of Reasonably Foreseeable Compliance Measures Associated with Erosion and Sediment Control			
Reasonably Foreseeable Compliance Measure	Practice Name	Range of Practice Costs	NRCS Practice Code or Source
Rangeland planting	Drill or broadcast, native or non-native	Not available	#550
Animal trails and walkways	Animal trails and walkways	Not available	#575
Stream crossing	Ford, culvert, bridge	\$90-1,488 per/Lft	#578/ Caltrans 2013
Forage harvest management	Forage harvest management	\$12.74-61.61/acre	#511
Vegetation control with grazing	Prescribed grazing	\$3.89-5.80/acre	#528
Wetland wildlife habitat management	Low, medium or high intensity	\$17.50-248.94/acre	#644
Installation of grade stabilization structures	Grade stabilization structure	Not available	#410
Streambank and shoreline protection	Low-high complexity	\$17.58-80.26/ft	#580
Stream channel stabilization	Stream channel stabilization	Not available	#584
Road Surface stabilization	Asphalt paving	\$238,000/mile	Siskiyou County Public Works
	Asphalt paving	\$115.00-300.00/ton	Caltrans 2013
	Chip sealing	\$57,000/mile	Siskiyou County Public Works
	Rocking	\$4,250-10,000/1000 ft	Weaver, et. al. (2006)
	Class II Aggregate Base	\$75.00/cubic yard	Caltrans 2013
	Import Rock Material	\$100.00/cubic yard	Caltrans 2013
	Dust abatement	\$90/hr	Harris Blade Rental,
Road Fill slope/cutbank compliance measures	Removal/stabilization of unstable fill.	\$2-5/cubic yard	Weaver, et. al. (2006)
	Soil stabilization (mulch/vegetate) of fill and cut slopes.	\$19-22/1,000 ft.	Weaver, et. al. (2006)
Control sediment	Disconnect road drainage from watercourses (drain to hillslopes).	\$170/1,000 ft	Weaver, et. al. (2006)

Table 5-4 Estimated Costs of Reasonably Foreseeable Compliance Measures Associated with Erosion and Sediment Control			
Reasonably Foreseeable Compliance Measure	Practice Name	Range of Practice Costs	NRCS Practice Code or Source
	Install rolling dip	\$85-170/ each	Weaver, et. al. (2006)
	Install ditch relief culvert	\$645-825/ each	Weaver, et. al. (2006)
	Install stream crossing	\$3,270/each	Weaver, et. al. (2006)
	Fiber roll	\$5.00-20.00/Lft	Caltrans 2013
	Silt fence	\$8.00-20.00/Lft	Caltrans 2013
	Gavel check dam	\$8.00-20.00/Lft	Caltrans 2013
Stabilize/treat crossing approach	Rock road surface	\$4,250-10,000/1,000 ft	Weaver, et. al. (2006)
	Install additional road drainage: waterbars, rolling dips, cross drains	\$85-3,270/each	Weaver, et. al. (2006)
Stabilize/treat crossings and associated fills	Remove undersized/failing culverts	\$3-10/cubic yard	Weaver, et. al. (2006)
	Remove unstable fill	\$2-5/cubic yard	Weaver, et. al. (2006)
	Rock armor, rip rap fill slopes	\$150-725.00/Cubic yard	Caltrans 2013
	Rock slope protection fabric	\$5.00-100.00/yard ²	Caltrans
	Drain road away from unprotected fills	\$10,000-75,000/mile	Weaver, et. al. (2006)
Develop a Road System Plan	Erosion Control Plan, non-timber land use	\$3528-7,740/100 acres	R. Fitzgerald Memo dated August 6, 2005
	Erosion Control Plan, timber land use	\$2,370-7,740/100 acre	
	Water Pollution Control Plan	\$650-10,000/per	Caltrans 2013
Road decommissioning	Recontour road to provide for a stable, hydrologically “invisible” site (e.g. remove perched fill, outslope old road prism, remove crossings)	\$2,000-\$50,000/mile depending on steepness and location of road	Weaver, et. al. (2004)
	Minimize road system (density) to correspond with maintenance resources	\$2,000-50,000/mile to recontour unnecessary roads	Weaver, et. al. (2004)
	Decommission roads adjacent to watercourse and relocate to midslope or ridgetop if possible	\$3,000-23,000 per mile	CDFW Coho Recovery Plan

Reasonably Foreseeable Compliance Measure	NRCS Practice Name	NRCS Practice Cost	NRCS Practice Code
Irrigation scheduling	Irrigation water management	\$28.09-202.12/acre	#449
Efficient application of irrigation water	Microirrigation	\$503.85-1835.93/acre	#441
Efficient transport of irrigation water	Installation of piping to replace open ditches	\$2.47-5.13/ft	#516
Use of runoff or tailwater	Irrigation system/tailwater recovery	Not available	#447
Management of drainage water	Runoff management system	Not available	#570
Vegetated filter strips	Filter strip	\$210.57-448.10/acre	#393
Surface field ditch	Field ditch	Not available	#607
Water table control, controlled drainage	Subsurface drain	\$3.86-6.44/ft	#606
Installation of pipeline for off-channel water	Pipeline, rough terrain, steel or plastic	\$2.47-5.13/ft	#516
Constructing off-stream pond	Pond up to 50 AcFt	\$12,969.38-32,068.24/no.	#378
Installing trough or tank for off-channel water	Watering facility	\$1,958.69-5,020.64/no.	#614
Constructing well	Water well	\$15,413.45-41,537.97/no.	#642
Improving springs	Spring development	\$2,629.19-4,335.61/no.	#574
Barrier removal (dam)	NA	\$10,00 -500,000/per	CDFW Coho Recovery Plan
Barrier removal (non-structural sites)	NA	\$2,400-34,000/per	CDFW Coho Recovery Plan
Barrier removal (stream crossings)	NA	\$15,000-500,000/per	CDFW Coho Recovery Plan
Riparian revegetation	NA	\$5,000-135,000/acre	CDFW Coho Recovery Plan
Streambank restoration	NA	\$125.00/ft ²	CDFW Coho Recovery Plan
Fencing	NA	\$3.00-12.00/Lft	CDFW Coho Recovery Plan

5.4 Sources of Funding

Potential sources of funding include monies from private and public sources. Public financing includes, but is not limited to: grant funds, as described below; single-purpose appropriations from federal, state, and/or local legislative bodies; and bond indebtedness and loans from government institutions.

5.4.1 Summary of Pertinent State Funding Programs

There are several potential sources of public financing through grant and loan funding programs administered, at least in part, by the Regional Water Board and the State Water Board. The Division of Financial Assistance (DFA) administers the implementation of the State Water Board financial assistance programs that include loan and grant funding for construction of municipal sewage and water recycling facilities, remediation for underground storage tank releases, watershed protection projects, and nonpoint source pollution control projects.

The resources available through these programs vary over time depending upon federal and state budgets and ballot propositions approved by voters. State funding programs pertinent to the proposed WQO Update Amendment are summarized and described below. Additional information can be found on the State Water Resources Control Board webpage. (http://www.waterboards.ca.gov/water_issues/programs/grants_loans/).

Clean Water State Revolving Fund

The Federal Water Pollution Control Act (Clean Water Act or CWA), as amended in 1987, provides for establishment of a Clean Water State Revolving Fund (CWSRF) program. The program is funded by federal grants, State funds, and Revenue Bonds. The purpose of the CWSRF program is to implement the CWA and various State laws by providing financial assistance for the construction of facilities or implementation of measures necessary to address water quality problems and to prevent pollution of the waters of the State, including federal waters.

The CWSRF Loan Program provides low-interest loan funding for construction of publicly-owned wastewater treatment facilities, local sewers, sewer interceptors, water recycling facilities, as well as, expanded use projects such as implementation of nonpoint source (NPS) projects or programs, development and implementation of estuary Comprehensive Conservation and Management Plans, and storm water treatment. Additional information can be found on the State Water Resources Control Board webpage http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/

Safe Drinking Water State Revolving Fund

The Safe Drinking Water Act, as amended in 1996, established the Drinking Water State Revolving Fund (DWSRF) to make funds available to drinking water systems to finance infrastructure improvements. A noted priority of the program is to provide funds to small and disadvantaged communities and to programs that encourage pollution prevention as a

tool for ensuring safe drinking water. The fund provides low interest loans, grants, and other assistance to public water systems for the purpose of infrastructure improvements to correct system deficiencies and improve water quality. Detailed information on the program can be found in the annual Intended Use Plan.

<http://www.cdph.ca.gov/services/funding/Pages/SRF.aspx>

Proposition 50

[Proposition 50](#), the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Water Code Section 79500, et seq.) was passed by California voters in the November 2002 general election. DDW is responsible for portions of the Act that deal with water security, safe drinking water, and treatment technology. DDW currently has funding available for projects designed to remove contaminants from drinking water supplies and/or install UV or ozone disinfection.

Proposition 84

[Proposition 84](#), the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Act of 2006 (Public Resources Code Section 75001, et seq.), was passed by California voters in the November 2006 general election. DDW is responsible for portions of the Act that deal with safe drinking water supplies, including emergency and urgent funding, infrastructure improvements, and groundwater quality. Integrated Regional Water Management program from DWR has funding available under Proposition 84 for projects that address critical drinking water supply or water quality needs for Disadvantaged Communities. Funding is also available for Urban Water Suppliers implementing leak detection and repair and installation of water meters Best Management Practices.

Integrated Regional Water Management Grants

Integrated Regional Water Management (IRWM) is a collaborative effort to manage all aspects of water resources in a region. IRWM crosses jurisdictional, watershed, and political boundaries; involves multiple agencies, stakeholders, individuals, and groups; and attempts to address the issues and differing perspectives of all the entities involved through mutually beneficial solutions. The Department of Water Resources has a number of IRWM grant program funding opportunities. Current IRWM grant programs include: planning, implementation, and storm water flood management. DWR's IRWM Grant Programs are managed within DWR's Division of IRWM by the Financial Assistance Branch with assistance from the Regional Planning Branch and regional offices.

Proposition 84 Storm Water Grant Program

The Public Resources Code (PRC) requires that the Proposition 84 Storm Water Grant Program (SWGPs) funds be used to provide matching grants to local public agencies for the reduction and prevention of storm water contamination of rivers, lakes, and streams. The Legislature may enact legislation to further define this grant program.

AB 739 requires the development of project selection and evaluation guidelines for the Proposition 84 SWGP, and provides additional information regarding types of projects eligible for funding. AB 739 also requires creation of a Storm Water Advisory Task Force that will provide advice to the State Water Board on its Storm Water Management Program that may include program priorities, funding criteria, project selection, and interagency coordination of State programs that address storm water management.

State Water Resources Control Board Underground Storage Tank Cleanup Fund

The Underground Storage Tank (UST) Cleanup Fund (Fund) provides a means for petroleum UST owners and operators to meet the federal and state requirements of maintaining financial responsibility to pay for any damages arising from their tank operations. The Fund assists a large number of small businesses and individuals by providing reimbursement for expenses associated with the cleanup of leaking USTs. The Fund also provides money to the Regional Water Boards and local regulatory agencies to abate emergency situations or to clean up abandoned sites that pose a threat to human health, safety, and the environment, as a result of a UST petroleum release.

Clean Beach Initiative Grant Program

The CBI Grant Program provides funding for projects that restore and protect the water quality and the environment of coastal waters, estuaries, bays, and near shore waters. The CBI Grant Program was initiated in response to the poor water quality and significant exceedances of bacterial indicators revealed by Assembly Bill (AB) 411 (Stats. 1997, Ch. 765) monitoring at California's beaches. Scientific studies have shown that water with high bacteria levels can cause infections rashes, and gastrointestinal and respiratory illnesses.

The CBI Grant Program has provided about \$100 million from voter-approved bonds for approximately 100 projects since it was started under the 2001 Budget Act. Typical projects include the construction of disinfecting facilities, diversions that prevent polluted storm water from reaching the beach, and scientific research that will enable early notification of unhealthy swimming conditions.

Agricultural Drainage Program

The Agricultural Drainage Loan Program was created by the Water Conservation and Water Quality Bond Act of 1986 to address treatment, storage, conveyance, or disposal of agricultural drainage water that threatens waters of the State. Loan repayments are for a period of up to 20 years. Eligible applicants include any city, county, district, joint powers authority or other political subdivision of the State involved with water management. Projects must address treatment, storage, conveyance or disposal of agricultural drainage that threaten waters of the State.

5.4.2 Summary of Pertinent Federal Funding Programs

Several federal agencies, including but not limited to the U.S. Environmental Protection Agency, NOAA Fisheries, U.S. Fish and Wildlife Service, and USDA Natural Resources

Conservation Service also provide grants and other funding opportunities. Table 6-6 presented below provides a summary of the pertinent federal funding programs. The U.S. Environmental Protection Agency provides access through its webpage to a catalog of federal funding opportunities:

http://water.epa.gov/grants_funding/shedfund/databases.cfm

The U.S. Department of Agriculture – Natural Resource Conservation Service has a wide variety of agricultural/timber financial support programs. The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. In addition, one purpose of EQIP is to help producers meet Federal, State, Tribal and local environmental regulations. The financial assistance programs include:

- Agricultural Management Assistance
- Agricultural Water Enhancement Program
- Air Quality Initiative
- Cooperative Conservation Partnership Initiative
- Conservation Innovation Grants
- Conservation Stewardship Program
- Environmental Quality Incentives Program
- Emergency Watershed Protection Program
- Wildlife Habitat Incentive Program
- For additional agriculture specific grants:
<http://www.grants.gov/search-grants.html?fundingCategories%3DAG%7CAgriculture>
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/>

Table 5-6 Summary of Federal Funding Programs		
Funding Program	Programs Description	2014 Funding
Agency : National Fish and Wildlife Foundation (A non-profit organization created by Congress in 1984 to implement conservation grant funding through public/private partnerships under the leadership of the Secretary of the Interior)		
Environmental Solutions for Communities	In 2012, Wells Fargo and the National Fish and Wildlife Foundation launched the Environmental Solutions for Communities initiative, designed to support projects that link economic development and community well-being to the stewardship and health of the environment. This 5-year initiative is supported through a \$15 million contribution from Wells Fargo that will be used to leverage other public and private investments with an expected total impact of over \$37.5 million. Funding priorities for this program include: (1) supporting sustainable agricultural practices and private lands stewardship; (2) conserving critical land and water resources and	\$3 million (est.)

Table 5-6 Summary of Federal Funding Programs		
Funding Program	Programs Description	2014 Funding
	improving local water quality; (3) restoring and managing natural habitat, species and ecosystems that are important to community livelihoods; (4) facilitating investments in green infrastructure, renewable energy and energy efficiency; and (5) encouraging broad-based citizen participation in project implementation.	
Pulling Together Initiative	The National Fish and Wildlife Foundation's Pulling Together Initiative (PTI) provides a means for federal agencies to partner with state and local agencies, private landowners, and other interested parties to develop long-term weed management projects within the scope of an integrated pest management strategy. The goals of PTI are: (1) to prevent, manage, or eradicate invasive and noxious plants through a coordinated program of public/private partnerships; and (2) to increase public awareness of the adverse impacts of invasive and noxious plants. PTI provides support on a competitive basis for the formation of local weed management area (WMA) partnerships, allowing them to demonstrate successful collaborative efforts and develop permanent funding sources for the maintenance of WMAs from the involved parties. Successful projects will serve to increase public awareness and interest in future partnership projects.	TBD
Agency : National Oceanic and Atmospheric Administration		
Coastal Services Center Cooperative Agreements	The National Oceanic and Atmospheric Administration (NOAA) guides the conservation and management of coastal resources through a variety of mechanisms, including collaboration with the coastal resource management programs of the nation's states and territories. The mission of the NOAA Coastal Services Center (CSC) is to support the environmental, social, and economic well-being of the coast by linking people, information, and technology. The vision of the NOAA Coastal Services Center is to be the most useful government organization to those who manage and care for our nation's coasts.	\$3.21million
Agency : U.S. Department of Agriculture		
Conservation Reserve Program	The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners. Through CRP, you can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland.	\$1.965 billion
Farm and Ranch Lands Protection Program (FRPP)	The USDA Natural Resources Conservation Service's Farmland Protection Program (FPP) is a voluntary program that helps farmers and ranchers to keep their land in agriculture and prevents conversion of agricultural land to non-agricultural uses. The program provides matching funds to agencies and organizations with existing farmland protection programs that enable them to purchase conservation easements. These cooperating entities purchase easements from landowners in exchange for a lump sum payment. The Federal contribution cannot to exceed 50 percent of the appraised fair market value of the land's development rights. The easements are for perpetuity unless prohibited by state law. Eligible land is land on a farm or ranch that has prime, unique, statewide, or locally important soil, that contains historical or archaeological resources; or that	\$142.5 million (for technical and financial assistance) (est.)

Table 5-6 Summary of Federal Funding Programs		
Funding Program	Programs Description	2014 Funding
	supports the policy of a State or local farm and ranch land protection policy; is subject to a pending offer by an eligible entity; and includes cropland, rangeland, grassland, pasture land, forest land and other incidental land that is part of an agricultural operation.	
<u>Agricultural Management Assistance</u>	Agricultural Management Assistance (AMA) provides cost share assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations. Producers may construct or improve water management structures or irrigation structures; plant trees for windbreaks or to improve water quality; and mitigate risk through production diversification or resource conservation practices, including soil erosion control, integrated pest management, or transition to organic farming.	\$2.5 million
<u>USDA's Small Business Innovation Research</u>	To stimulate technological innovation in the private sector, strengthen the role of small businesses in meeting Federal research and development needs, increase private sector commercialization of innovations derived from USDA-supported research and development efforts, and foster and encourage participation, by women-owned and socially disadvantaged small business firms in technological innovation. The selected areas for research are Forests and Related Resources; Plant Production and Protection-Biology; Plant Production and Protection - Engineering; Animal Production and Protection; Air, Water and Soils; Food Science and Nutrition; Rural and Community Development; Aquaculture; Biofuels and Biobased Products; and Small and Mid-size Farms.	\$20.5 million (est.)
<u>Sustainable Agriculture Research and Education</u>	The Sustainable Agriculture Research and Education (SARE) program of the U.S. Department of Agriculture National Institute of Food and Agriculture (NIFA) works to advance farming systems that are productive, profitable, environmentally sound and good for communities through a regional grants program. SARE funds research and extension activities to reduce the use of chemical pesticides, fertilizers, and toxic materials in agricultural production; to improve management of on-farm resources to enhance productivity, profitability, and competitiveness; to promote crop, livestock, and enterprise diversification and to facilitate the research of agricultural production systems in areas that possess various soil, climatic, and physical characteristics; to study farms that are managed using farm practices that optimize on-farm resources and conservation practices; and to promote partnerships among farmers, nonprofit organizations, agribusiness, and public and private research and extension institutions. Click on program name and check the link in the Primary Internet box for more information about grant opportunities and program results.	\$22.7 million
<u>Wetlands Reserve Program</u>	Through this voluntary program, the USDA Natural Resources Conservation Service (NRCS) provides landowners with financial incentives to restore and protect wetlands in exchange for retiring marginal agricultural land. To participate in the program landowners	\$230.5 million (est.)

Table 5-6 Summary of Federal Funding Programs		
Funding Program	Programs Description	2014 Funding
	may sell a conservation easement or enter into a cost-share restoration agreement (landowners voluntarily limit future use of the land, but retain private ownership). Landowners and the NRCS jointly develop a plan for the restoration and maintenance of the wetland.	
Environmental Quality Incentives Program	The USDA Natural Resources Conservation Service's Environmental Quality Incentives Program (EQIP) was established to provide a voluntary conservation program for agricultural producers to address significant natural resource needs and objectives. Through a competitive process, EQIP offers financial assistance contracts with a maximum term of ten years, to help implement eligible conservation practices. Persons or legal entities, who are owners of land under agricultural production or who are engaged in livestock or agricultural production on eligible land, including private non-industrial forest land, or Indian Tribes may participate in EQIP. Conservation practices implemented through EQIP are subject to NRCS technical standards adapted for local conditions. NRCS or Technical Service Providers (TSPs) help applications develop a plan of operations which identifies practices needed to address natural resource concerns and support the EQIP contract. EQIP-related programs include Conservation Innovation Grants (CIG), Resource Conservation Partnership Program (RCPP), and the National Water Quality Initiative (NWQI).	\$981.7 million (Cost Share)
National Integrated Water Quality Program (NIWQP)	The National Integrated Water Quality Program (NIWQP) provides funding for research, education, and extension projects aimed at improving water quality in agricultural and rural watersheds. The NIWQP has identified eight "themes" that are being promoted in research, education and extension. The eight themes are (1) Animal manure and waste management (2) Drinking water and human health (3) Environmental restoration (4) Nutrient and pesticide management (5) Pollution assessment and prevention (6) Watershed management (7) Water conservation and agricultural water management (8) Water policy and economics. Awards are made in four program areas - National Projects, Regional Coordination Projects, Extension Education Projects, and Integrated Research, Education and Extension Projects. Please note that funding is only available to universities.	Not available
Agency : U.S. Department of Housing and Urban Development		
Community Development Block Grants/Entitlement Grants	The objective of this program is to develop viable urban communities, by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for persons of low and moderate income. Recipients may undertake a wide range of activities directed toward neighborhood revitalization, economic development and provision of improved community facilities and services.	\$1.95 billion (est.)
Agency : U.S. Environmental Protection Agency		
Source Reduction Assistance Grant Program	The Source Reduction Assistance Grant Program provides grants and cooperative agreements to fund pollution prevention (source reduction and resource conservation) activities. Specifically, the Agency is interested in funding projects that help reduce hazardous substances, pollutants, or contaminants entering waste streams or otherwise	\$1.0 million (est.)

Funding Program	Programs Description	2014 Funding
	released into the environment (including fugitive emissions) prior to recycling, treatment, disposal or energy recovery activities.	
Clean Water State Revolving Fund	The EPA's Clean Water State Revolving Fund (CWSRF) program provides a permanent source of low-cost financing for a wide range of water quality infrastructure projects. These projects include traditional wastewater treatment and collection, nonpoint source pollution controls, and estuary management. Funds to capitalize the program are provided annually through federal grants and state matching funds (equal to 20 percent of federal grants). Monies are loaned to assistance recipients at below-market rates. In addition, states also have the ability to customize loan terms to benefit small and disadvantaged communities. Loan repayments are recycled back into the programs to fund additional projects. Since its inception, the CWSRF has provided over \$95.4 billion in assistance to eligible borrowers, including communities of all sizes, farmers, small businesses, and nonprofit organizations. More information on the CWSRF program can be obtained at http://www.epa.gov/owm/cwfinance/cwsrf/	\$1.1 billion (est.)
Nonpoint Source Implementation Grants (319 Program)	Through its 319 program, EPA provides formula grants to the states, territories and tribes to implement nonpoint source programs and projects and programs in accordance with section 319 of the Clean Water Act (CWA). Nonpoint source pollution projects can be used for a wide range of activities including agriculture, forestry, construction, and urban challenges. When set as priorities within a state's Nonpoint source management program, projects may also be used to protect source water areas and high quality waters. Examples of previously funded projects include installation of best management practices (BMPs) for animal waste; design and implementation of BMP systems for stream, lake, and estuary watersheds; and basin-wide landowner education programs. Most states provide opportunities for 3rd parties to apply for funds under a state request for proposal.	\$159.3 million
Urban Waters Small Grants	EPA's Urban Waters Program protects and restores America's urban waterways. EPA's funding priority is to achieve the goals and commitments established in the Agency's Urban Waters Strategic Framework (www2.epa.gov/urbanwaters/urban-waters-strategic-framework). This program has an emphasis on engaging communities with environmental justice concerns. The objective of the Urban Waters Small Grants is to fund projects that will foster a comprehensive understanding of local urban water issues, identify and address these issues at the local level, and educate and empower the community. In particular, the Urban Waters Small Grants seek to help restore and protect urban water quality and revitalize adjacent neighborhoods by engaging communities in activities that increase their connection to, understanding of, and stewardship of local urban waterways.	\$2.08 (est.)
Pollution Prevention Grant Program	The Pollution Prevention Grant Program provides grants and cooperative agreements to state agencies, instrumentalities of a state and federally recognized tribes to implement pollution prevention	\$4.1 million (est.)

Funding Program	Programs Description	2014 Funding
	projects that provide technical assistance to businesses. The program requires applicants to work towards reducing pollution, conserving energy and water, and saving dollars through P2 efforts; as identified in EPA's Strategic Plan under Goal 4: Ensuring Safety of Chemicals and Preventing Pollution, Objective 4.2: Promote Pollution Prevention.	
Science to Achieve Results	The Science to Achieve Results (STAR) program is designed to improve the quality of science used in EPA's decision-making process. STAR funds are provided for research in the following the following priority areas: (1) Air, Climate and Energy: Anthropogenic Influences on Organic Aerosol Formation and Regional Climate Implications; Measurements and Modeling for Quantifying Air Quality and Climatic Impacts of Residential Biomass or Coal Combustion for Cooking, Heating, and Lighting. (2) Chemical Safety and Sustainability: Center for Sustainable Molecular Design; Center for Material Life Cycle Safety; Human Exposure to Chemicals in Consumer Products and Indoor Environments; Development and Use of Adverse Outcome Pathways that Predict Adverse Developmental Neurotoxicity. (3) Safe and Sustainable Water Resources: Sustainable Chesapeake: A Community-Based Approach to Stormwater Management Using Green Infrastructure; Performance and Effectiveness of Green Infrastructure Stormwater Management Approaches in the Urban Context: A Philadelphia Case Study; High Priority Water Quality and Availability Research. (4) Safe and Healthy Communities: Research with Children's Health; Children's Environmental Health and Disease Prevention Research Centers (with NIEHS); Science for Sustainable and Healthy Tribes; Healthy and Sustainable Schools: Environmental Factors, Children's Health and Performance, and Sustainable Building Practices. In addition to the solicitations identified above, other solicitations may be announced in the coming year. Please check the NCER website for an updated listing of all solicitations.	\$61.1 million (est.)
Five-Star Restoration Program	The EPA supports the Five-Star Restoration Program by providing funds to the National Fish and Wildlife Foundation and its partners, the National Association of Counties, NOAA's Community-based Restoration Program and the Wildlife Habitat Council. These groups then make subgrants to support community-based wetland and riparian restoration projects. Competitive projects will have a strong on-the-ground habitat restoration component that provides long-term ecological, educational, and/or socioeconomic benefits to the people and their community. Preference will be given to projects that are part of a larger watershed or community stewardship effort and include a description of long-term management activities. Projects must involve contributions from multiple and diverse partners, including citizen volunteer organizations, corporations, private landowners, local conservation organizations, youth groups, charitable foundations, and other federal, state, and tribal agencies and local governments. Each project would ideally involve at least five partners who are expected to contribute funding, land, technical assistance, workforce support, or other in-kind services that are equivalent to the federal contribution.	TBD

Table 5-6 Summary of Federal Funding Programs		
Funding Program	Programs Description	2014 Funding
Regional Agricultural IPM Grants	The objective is to support Integrated Pest Management (IPM) implementation and approaches that reduce the risks associated with agricultural pesticide use in the United States. Regional Agricultural IPM Grants will support the implementation of IPM approaches to reduce pesticide risk in agricultural settings in the United States. Projects must address the national pesticide program stewardship priorities related to pest management needs and IPM program implementation stated in the announcement.	TBD
Agency : U.S. Fish and Wildlife Service		
Partners for Fish and Wildlife Program	The Partners for Fish and Wildlife Program provides technical and financial assistance to private landowners to restore fish and wildlife habitats on their lands via cooperative agreements. Since 1987, the program has partnered with more than 37,700 landowners to restore 765,400 acres of wetlands; over 1.9 million acres of grasslands and other upland habitats; and 6,560 miles of in-stream and streamside habitat. In addition, the program restores stream habitat for fish and other aquatic species by removing barriers to passage.	\$20 million
Cooperative Endangered Species Conservation Fund	The U.S. Fish and Wildlife Service's (USFWS) Cooperative Endangered Species Conservation Fund provides financial assistance to states and territories that have entered into cooperative agreements with the USFWS to assist in the development of programs for the conservation of endangered and threatened species. The assistance provided to the state or territorial wildlife agency can include animal, plant, and habitat surveys; research; planning; monitoring; habitat protection, restoration, management, and acquisition; and public education. The Fund is dispersed to the states and territories through four programs: Conservation Grants, Habitat Conservation Planning Assistance Grants, Habitat Conservation Plan Land Acquisition Grants, and Recovery Land Acquisition Grants. Although not directly eligible for these grants, third parties such as nonprofit organizations and local governments may work with their state or territorial wildlife agency to apply for these funds.	\$62 million (est.)
North American Wetlands Conservation Act Grants Program	The U.S. Fish and Wildlife Service's Division of Bird Habitat Conservation administers this matching grants program to carry out wetlands and associated uplands conservation projects in the United States, Canada, and Mexico. Grant requests must be matched by a partnership with nonfederal funds at a minimum 1:1 ratio. Conservation activities supported by the Act in the United States and Canada include habitat protection, restoration, and enhancement. Mexican partnerships may also develop training, educational, and management programs and conduct sustainable-use studies. Project proposals must meet certain biological criteria established under the Act. Visit the program web site for more information. (Click on the hyperlinked program name to see the listing for "Primary Internet".)	\$70 million (est.)

https://ofmpub.epa.gov/apex/watershedfunding/?p=109:1:0::NO:RP::#search_results