

ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES –

This attachment includes Monitoring, Assessment, and Performance measures for projects in the following order:

Lower Carmel River Restoration and Floodplain Enhancement
Carmel River Lagoon and Beach Studies
Seaside Groundwater Basin ASR
Sanitary Sewer System Repair
Implementation of Solid Waste Removal Technology
Carmel River Watershed Volunteer Program
Microbial Source Tracking in the Cities of Monterey and Pacific Grove

**ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES –
LOWER CARMEL RIVER FLOODPLAIN RESTORATION AND ENHANCEMENT PROJECT**

The Project is expected to achieve the following objectives as described in the Work Plan and Economic Analysis - Flood Damage Reduction:

1. Reduce flood flows in urban areas
2. Increase riparian and wetland habitat
3. Recharge groundwater and base flows to the Carmel River
4. Provide habitat connection across the floodplain
5. Protect agricultural land from flooding
6. Improve water quality
7. Create Public trails and recreation

Existing conditions for flood elevations, habitat conditions, and agricultural operations have been documented and monitored through the following studies and analyses:

- Philip Williams and Associates and California Coastal Conservancy, Carmel River Reach 2: (Eastwood/Big Sur Land trust Property): Conceptual Enhancement Plan, 2000. Prepared for Big Sur Land Trust and California Coastal Conservancy.
- Big Sur Land Trust, Carmel River Parkway Vision Plan, 2005.
- Balance Hydrologics, Inc., Design Alternatives Analysis for Floodplain Restoration at the Odello Property, 2007. Prepared for Big Sur Land Trust.
- Balance Hydrologics Inc., Supplemental Analysis for Floodplain Restoration at the Odello Property, 2008. Prepared for Big Sur Land Trust.
- Whitson Engineers, Project Study Report to request Conceptual Approval, 2010. Prepared for Big Sur Land Trust, County of Monterey and Cal Trans.
- Balance Hydrologics, Inc., Groundwater Investigation and Initial Results of Monitoring at the Odello East Property, Carmel River Valley, June 2, 2010.
- Nikki Nedeff, Wetland Delineation for Odello East Property, 2010. Prepared for the Big Sur Land Trust.

These reports provide a baseline for conditions associated with pre-project conditions at the Project site and associated quantitative outcomes with regards to flood protection, habitat restoration, groundwater recharge and water quality. These four project objectives are most appropriately used for quantified performance measures as “pre-project” conditions are documented to compare against “post-project” conditions.

The following assessment and performance criteria will be used for these Project Objectives:

Flood Protection: Number of residential and commercial properties damaged in an above 25-year event with damages from 1995 and 1998 floods to use as comparable damage quantification.

Habitat Restoration (riparian and wetland habitats): Amount of acreage converted to native wetland and riparian species will be compared against existing land conditions (now primarily agricultural fields). Additional success will be measured by ratio of survival versus failure of plantings as well as assessment of recruitment of natives through invasive species control.

Groundwater Recharge: Implement a monitoring network of groundwater monitoring wells to identify appropriate design for restoration and storage features on floodplain. Utilize remnant monitoring wells to assess potential infiltration and recharge post-project. Note at this time this monitoring is not funded.

Water Quality: Through funding provided by the EPA, the Project site will be monitored for water quality parameters related to sediment and nutrients (see Table 6 for actual parameters). A water quality monitoring plan has been developed for the project and will be implemented by a qualified laboratory beginning in 2011. This work will document pre-project water quality conditions on the Project site. Sampling will also occur post-project according to the same monitoring plan.

The remaining Project objectives are more qualitative in nature and performance reporting will be whether the project was actual built and how it is being used or changes related to morphology or actual use of an area.

Connection Across the Floodplain: Results for this objective are expected in wildlife use and possible re-habitation of wetland areas in the Project area especially by California red-legged frogs. This performance assessment approach will be done for the causeway for use by wildlife through installing a wildlife camera at the causeway if approval is secured from Cal Trans for such monitoring. Use of wetland areas by new populations of species such as the California red-lagged frog will be done by onsite wildlife monitoring and surveys. An additional measure of success for the connectivity will be scour of the lagoon restoration area completed in 2004. This can be measured through monitoring conducted by California State Parks and Monterey Peninsula Water Management District for the lagoon restoration project.

Protect Agricultural Land from Flooding: This objective can be reported based on flood events.

Public Trails and Recreation: This objective can be reported once construction of trail is complete and public use is estimated or quantified.

Monitoring and assessment of Project success will largely be completed by the Big Sur Land Trust with partner agencies including Monterey County Water Resources Agency, Monterey Peninsula Water Management District, Monterey Peninsula Regional Park District, California State Parks, and Cal Trans.

Objectives	Desired Outcome	Output Indicators	Outcome Indicators	Tools & Measurement Methods	Targets	Target Units & Timeframe
Reduce flood flows in urban areas	Reduce public and private property damages from flood flows greater than a 20-year event	Complete flood protection capital improvements : (1) flood conveyance causeway; (2) levee removal and regrading	Flood damage costs and FEMA repetitive loss reports	Review of annual flood repetitive loss reports at Monterey County Water Resources Agency; review of gauging for flood flow events	Average 0.5 foot reduction in flood elevations for 100-year event	flood elevations and gauge data initiated after 2013
Increase riparian and wetland habitat	Restore 90 acres of riparian and wetland habitats	100% design plans indicating restoration features and locations for plantings and habitat features such as recharge wetlands	% of native riparian and wetland species present on site	Vegetation mapping	65% success for restoration planting	number of plants surviving initiated after 2013
Provide habitat connection across the floodplain	Provide 500 feet of additional clearance under Highway One to connect the east side of floodplain with the west side of floodplain	500 foot causeway is constructed at Highway One	Movement of species such as California red-legged frog to East Odello	Annual red-legged frog surveys	Occupation of 1 wetland area in Odello East by California red-legged frog	1 population initiated after 2015
Protect Agricultural Land from Flooding	Remove 36-acres of Agricultural land from the 100-year floodplain	Agricultural land on south edge of Odello east is raised out of 100-year floodplain with fill from levees	Crop damages are reduced to \$0	Post flood event assessments and observations	\$0 in damages to crop values	Initiated 2011
Recharge groundwater and base flows to the Carmel River	Restoration actions result in areas for establishing storage areas for recharge of groundwater	Floodplain restoration design includes areas for storage and recharge to the aquifer	Recharge estimated utilizing existing monitoring wells in the floodplain	Monitoring wells and pit percolation tests correlating with restoration design for storage and recharge wetlands	Groundwater elevations at NGVD29 minimum at 4.5 feet and maximum at 20 feet	Measured groundwater elevations initiated after 2015

Improve water quality	Restored floodplain provides area for sediment and nutrients to deposit in flood events thus preventing deposition in lagoon habitat	Riparian and wetland habitats are created in 90-acres of floodplain	Sediment and nutrient levels are monitored and reported for floodplain area	EPA approved water quality monitoring program to be conducted beginning 2011/2012 through and post project construction	Measurement of pre-project and post-project for the following parameters: nitrate and nitrite, total phosphate, turbidity, total suspended sediments	Measured water quality parameters initiated 2011
Public Trails and Recreation	Provide a new 1.2 mile trail along the south edge of the floodplain and trail connections to Palo Corona Regional Park	Public trail is constructed	Public use of trail	NA	15 users monthly	2015

**ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES
CARMEL RIVER LAGOON AND BEACH STUDIES**

- A. Monitoring: will be conducted by volunteers applying the CRAM method and using the Sonde Profiler (remotely operated)
- B. Assessment: see Project Performance Measures Table
- C. Performance Measures: see Project Performance Measures Table

Project Performance Measures Table

Project Goals:	<ol style="list-style-type: none"> 1. Improve rearing habitat for threatened species, especially steelhead 2. Reduce or minimize emergency mechanical breaching of barrier beach; allow natural breaching of barrier beach 3. Provide flood protection to residences along north side of Lagoon
Desired outcomes	<p>Increased depth and volume in CR Lagoon Improved water quality in CR Lagoon Natural breaching of the CR barrier beach Flood protection for residences and other buildings adjacent to the lagoon Improved rearing habitat for threatened species of Central Coast Steelhead and CA Red-Legged Frogs</p>
Output indicators	<p>Water depth measurements Lagoon surface area measurements Water quality measurements: temperature, dissolved oxygen, salinity; using CRAM method Reduction in frequency and costs of flood damage Increased numbers of threatened species rearing in the CR Lagoon</p>
Measurement tools and methods	<p>Sonde Profiler in South Arm of Lagoon Water Quality Kits for CRAM Methodology* in central and northern portions of Lagoon Depth yardsticks in south, central, and north portions of lagoon Google Earth Map Lagoon Quadrants and height of barrier beach and Lagoon Fish counts by MPWMD and CRSA</p>
Targets	<ul style="list-style-type: none"> -Lagoon water volume to increase periodically by 259 af -Water quality indicators to improve by 10% during dry or low-flow season in south arm of CR Lagoon using CRAM method -Reduction of reported flood damage following installation of the ecosystem protective barrier -No artificial breaches by Public Works except in declared emergencies subsequent to installation of EPB
*The California Rapid Assessment Method (CRAM) is a standardized, cost-effective tool for assessing the health of wetlands and riparian habitats	

ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES –SEASIDE GROUNDWATER BASIN AQUIFER STORAGE AND RECOVERY

Project goals

The goals of this project are: (1) to reduce the amount of illegal diversions by Cal-Am and (2) leave more groundwater in storage in the Carmel River Alluvial Aquifer during the summer months to support aquatic habitat.

The ASR project as outlined in this grant application would provide an average increase in firm yield for Cal-Am municipal users on the Monterey Peninsula of 2,000 acre-feet per year. Water produced from the project will be used to offset water diverted from the Carmel River System in excess of Cal-Am’s legal water rights as set forth in CDO 2009-0060. By diverting water from the Carmel River under the water rights associated with the ASR project (20808A), Cal-Am will reduce the amount of illegal diversions. By recovering the stored water in the summer months, more water will be left in the River to support aquatic habitat during the low-flow regime.

Desired outcomes

The desired outcome of this project is to shift the production of 2,000 acre-feet per year on average from the Carmel River away from violation of Cease and Desist Order 2009-0060. The rules governing when water is available for diversion under the water rights associated with the ASR project will provide more water to aquatic habitat.

Output Indicators

MPWMD, in cooperation with Cal-Am, tracks all sources of water to the Cal-Am distribution system and assigns each source to the appropriate water right. In compliance with MPWMD Ordinance Nos. 19 and 41, MPWMD and Cal-Am meet with CDFG and NOAA Fisheries quarterly to plan the next three months of water production to best comply with all water rights and to minimize the effects of overproduction on the Carmel River. The agreed upon water budget from these meetings are adopted by the MPWMD Board and are available to DWR. In compliance with ASR water rights, during the ‘recovery’ portion of the water year, ASR production is used in-lieu of Carmel River production. This mechanism of moving production away from the Carmel River is what will achieve the goals of the project and will be documented in the Quarterly Water Budgets adopted by the MPWMD Board. All values of water are reported in acre-feet and an example of a Quarterly Water Budget is provided with this application packet.

In addition to reducing illegal pumping from the Carmel River, the ASR project will leave more water in the Carmel River to support aquatic habitat. Because of the priority of production of ASR over Carmel River during the River’s low-flow regime, more water will be left in storage to support stream flow and aquatic habitat. MPWMD monitors stream flow and groundwater levels in the Carmel Valley. Stream flow is monitored in 15 minute intervals and reported in daily flow averages (all values are in cubic feet per second). Groundwater levels are monitored monthly in the Carmel Valley and are used to calculate the amount of water in storage in the aquifer (all values are in acre-feet). Stream flow and groundwater in storage will increase when ASR recovery is utilized in-lieu of Carmel River diversions. During the summer ‘dry-back’ of the River, MPWMD records a river schema documenting when each section of the River dries. Monthly, the MPWMD board receives a Water Resources report summarizing the amount of water in storage for each component of the Monterey Peninsula Water Resources System. An example of this report is included in this grant application and all past and future reports are available to DWR. MPWMD is proposing to modify this report to monitor the effectiveness of ASR on stream flow, groundwater storage, and aquatic habitat. The tables that would be utilized for this are presented as the Project Performance Measuring Tables attached to this section.

Outcome Indicators

If the output indicators demonstrate that ASR water is reducing the illegal diversions from the Carmel River and providing improved aquatic habitat, this will demonstrate the project goals are met. MPWMD will track production by source and compliance with water rights to demonstrate the reduction in illegal diversions from the Carmel River and will track stream flow, groundwater storage, and map river schema to demonstrate the improvement of aquatic habitat.

Reduce illegal diversions – The data will show a reduction in illegal diversion by recording an increase of water diverted under the ASR water right and a reduction of water diverted under the regulation of CDO 2009-0060.

Improve aquatic habitat – The data will show a reduction of river diversions during the ‘recovery’ period as defined in the ASR water rights. This reduction in diversions will result in more groundwater remaining in storage, increased stream flow, and a reduction in River ‘dry back.’ Because the River is a system that is driven by climate variability, data collected during the operation of the Project will need to be compared to a similar water year to best assess the effects of the Project on the River.

MPWMD will document output indicators with the attached proposed Project Performance Monitoring Tables. MPWMD will conduct trend analysis to assess the outcome indicators as to the ability of the Project to meet its goals.

Measurement Tools and Methods

Production from the Carmel River is measured by flow meter at each well head and reported to MPWMD as a daily volume by Cal-Am. Monthly production summaries are prepared for the MPWMD Board.

ASR injection and production volumes are measured by flow meter at each well head and are reported to Cal-Am by MPWMD daily.

Production by source is as outlined by the Quarterly Water Budget.

Stream flow is measured by MPWMD and USGS. Both entities use the USGS methodology outlined in Techniques of water-resources investigations of the United States Geological Survey – Discharge Measurements at Gaging Stations. MPWMD and the USGS maintain 19 and 2 flow gages, respectively, and data are available on the web.

Groundwater levels are measured on a monthly time step using an electric wire sounder graduated to 0.01 feet. Groundwater elevation vs. storage curves are used to calculate storage in each section of the aquifer. Groundwater levels and associated storage numbers are included in the Project Performance Monitoring Tables.

River schema is recorded in river mile from Carmel Lagoon. Monthly surveys of River ‘dry back’ are performed by MPWMD and are included in the Project Performance Monitoring Tables.

Groundwater Storage by River Section

Lower Carmel Valley River

	8150			6340			5985			3133			4510			2987			3530			3046			2409			Lower CV					
	DS of Hwy 1			I - II			II - III			III - IV			IV - V			V - VI			VI - VII			VII - VIII			VIII - IX			Acre Feet		Total	Usable	Current	Percent of
	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	Storage	Depletion	Capacity	Capacity	Usable	Usable Capacity	
Dec-09	-2.8	7,959.4	190.6	-5.09	6057.5	282.5	-5.94	5666.1	318.9	-3.65	2992.6	140.4	-3.865	4197.5	312.5	-5.62	2717.4	269.6	-3.67	3320.6	209.4	-1.25	3006.02	40.0	-3.71	2306.4	102.6	38,224	1,866	40,090	21,927	20,061	91%
Jan-10	-1.9	8,023.2	126.8	-3.75	6132.9	207.1	-1.86	5885.9	99.1	-1.17	3089.3	43.7	-1.75	4357.6	152.4	-3.97	2794.4	192.6	-2.56	3382.0	148.0	-0.98	3015.11	30.9	-1.53	2363.6	45.4	39,044	1,046	40,090	21,927	20,881	95%
Feb-10	-1.4	8,065.1	84.9	-2.85	6183.1	156.9	-3.305	5808.8	176.2	-1.2	3088.1	44.9	-1.015	4419.6	90.4	-5.42	2726.4	260.6	-1.94	3416.4	113.6	-0.61	3027.77	18.2	-1.65	2360.5	48.5	39,096	994	40,090	21,927	20,933	95%
Mar-10	-2.5	7,980.2	169.8	-2.74	6188.9	151.1	-4.425	5748.5	236.5	-2.82	3025.5	107.5	-1.735	4358.9	151.1	-2.81	2849.8	137.2	-1.82	3423.2	106.8	-1.45	2998.99	47.0	-1.60	2361.8	47.2	38,936	1,154	40,090	21,927	20,773	95%
Apr-10	-2.7	7,968.7	181.3	-2.65	6193.9	146.1	-4.38	5751.0	234.0	-2.475	3039.1	93.9	-1.4	4386.8	123.2	-2.02	2887.9	99.1	-1.79	3425.2	104.8	-1.11	3010.65	35.3	-1.39	2367.3	41.7	39,030	1,060	40,090	21,927	20,867	95%
May-10	-4.6	7,835.1	314.9	-3.80	6130.1	209.9	-5.285	5701.9	283.1	-2.86	3024.0	109.0	-3.105	4251.8	258.2	-2.26	2876.3	110.7	-2.49	3385.6	144.4	-1.34	3002.76	43.2	-2.94	2326.7	82.3	38,534	1,556	40,090	21,927	20,371	93%
Jun-10	-3.9	7,883.5	266.5	-4.42	6095.1	244.9	-5.925	5666.9	318.1	-3.705	2990.4	142.6	-3.945	4192.0	318.0	-2.82	2849.5	137.5	-2.98	3358.7	171.3	-2.00	2980.07	65.9	-2.58	2336.3	72.7	38,353	1,737	40,090	21,927	20,190	92%
Jul-10	-1.6	8,049.9	100.1	-5.13	6055.3	284.7	-6.41	5640.3	344.7	-4.03	2977.4	155.6	-4.645	4145.7	364.3	-3.24	2829.2	157.8	-3.43	3334.0	196.0	-2.41	2965.95	80.1	-2.75	2331.9	77.1	38,329	1,761	40,090	21,927	20,166	92%
Aug-10	-3.2	7,932.0	218.0	-5.80	6017.8	322.2	-7.24	5594.4	390.6	-4.46	2960.0	173.0	-5.125	4115.8	394.2	-3.95	2795.6	191.4	-3.90	3308.4	221.6	-2.86	2950.58	95.4	-2.96	2326.2	82.8	38,001	2,089	40,090	21,927	19,838	90%
Sep-10	-2.9	7,952.9	197.1	-6.30	5989.3	350.7	-8.3	5535.4	449.6	-4.86	2943.7	189.3	-5.3	4105.3	404.7	-4.57	2766.1	220.9	-4.12	3296.3	233.7	-3.01	2945.40	100.6	-3.15	2321.3	87.7	37,856	2,234	40,090	21,927	19,693	90%
Oct-10	-2.7	7,968.7	181.3	-6.32	5988.4	351.6	-6.815	5617.9	367.1	-4.215	2969.9	163.1	-4.59	4149.2	360.8	-4.16	2785.7	201.3	-4.11	3297.1	232.9	-2.48	2963.70	82.3	-2.28	2344.0	65.0	38,085	2,005	40,090	21,927	19,922	91%
Nov-10	-1.0	8,088.2	61.8	-5.76	6019.8	320.2	-6.64	5627.6	357.4	-4.155	2972.3	160.7	-4.35	4164.8	345.2	-3.63	2810.6	176.4	-4.11	3296.8	233.2	-2.33	2968.70	77.3	-2.04	2350.4	58.6	38,299	1,791	40,090	21,927	20,136	92%
Dec-10																																	

Upper Carmel Valley River

	1131			1725			1075			1777			390			2029			Upper CV				CV Combined										
	IX - X			X - XI			XI - XII			XII - XIII			XIII - XIV			US of XIV			Acre Feet	Total	Usable	Current	Percent of	Acre Feet	Total	Usable	Current	Percent of					
	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	(feet)	(feet)	(acre feet)	Storage	Depletion	Capacity	Capacity	Usable	Usable Capacity	Storage	Depletion	Capacity	Capacity	Usable	Usable Capacity				
Dec-09	-1.85	1083.77	47.2271	-0.84	1690.07	34.9316	-1.38	1048.31	26.690443	-0.1	1775.021	1.979342	-2.05	351.3575	38.6425	-2.3	1839.135	189.865	7787.664	339.336	8128	6531	6191.664	94.8%	46011.18	2205.818	48218	28458	26252.182	92.2%			
Jan-10	-0.04	1128.99	2.01212	0	1725	0	-0.7	1061.555	13.444753	0	1777	0	-1.1	369.265	20.735	-0.8	1962.96	66.04	8024.768	102.2319	8128	6531	6428.768	98.4%	47068.78	1148.219	48218	28458	27309.781	96.0%			
Feb-10	-1.03	1104.12	26.88408	0	1725	0	-3.1	1014.066	60.933581	-0.1	1775.021	1.979342	-0.5	380.575	9.425	-0.6	1979.47	49.53	7978.248	148.752	8128	6531	6382.248	97.7%	47074.06	1142.938	48218	28458	27315.062	96.0%			
Mar-10	-0.78	1110.36	20.63552	-0.63	1698.42	26.58417	-0.995	1055.831	19.169313	-0.6	1756.174	20.82623	-1.475	362.1963	27.80375	-1.8	1880.41	148.59	7863.391	263.609	8128	6531	6267.391	96.0%	46799.25	1417.748	48218	28458	27040.252	95.0%			
Apr-10	-0.305	1122.3	8.703282	-0.59	1700.01	24.99151	-0.325	1068.783	6.2174084	0	1777	0	-0.46	381.329	8.671	-1	1946.45	82.55	7995.867	131.1332	8128	6531	6399.867	98.0%	47026.3	1190.703	48218	28458	27267.297	95.8%			
May-10	-1.365	1095.78	35.2231	-0.9	1687.69	37.31224	-1.2	1051.833	23.167118	-0.1	1775.021	1.979342	-1.35	364.5525	25.4475	-0.2	2012.49	16.51	7987.361	139.6393	8128	6531	6391.361	97.9%	46521.61	1695.385	48218	28458	26762.615	94.0%			
Jun-10	-1.845	1083.9	47.10376	-0.64	1698.02	26.98221	-2.065	1034.793	40.206588	-1.1	1737.41	39.58985	-2.38	345.137	44.863	-0.8	1962.96	66.04	7862.215	264.7854	8128	6531	6266.215	95.9%	46214.8	2002.202	48218	28458	26455.798	93.0%			
Jul-10	-1.71	1087.23	43.77038	-0.94	1686.1	38.89827	-2.04	1035.29	39.710373	-2.29	1693.089	83.91062	-2.315	346.3623	43.63775	-1.4	1913.43	115.57	7761.503	365.4974	8128	6531	6165.503	94.4%	46090.94	2126.064	48218	28458	26331.936	92.5%			
Aug-10	-2.485	1068.18	62.82082	-1.18	1676.6	48.39644	-2.165	1032.806	42.193609	-1.005	1740.969	36.03118	-2.48	343.252	46.748	-2.4	1830.88	198.12	7692.69	434.3101	8128	6531	6096.69	93.4%	45693.61	2523.385	48218	28458	25934.615	91.1%			
Sep-10	-2.44	1069.28	61.72033	-1.195	1676.01	48.98905	-2.38	1028.523	46.477273	-0.955	1742.843	34.15699	-2.445	343.9118	46.08825	-1.9	1872.155	156.845	7732.723	394.2769	8128	6531	6136.723	94.0%	45588.51	2628.486	48218	28458	25829.514	90.8%			
Oct-10	-2.405	1070.14	60.86391	-1.21	1675.42	49.58154	-2.43	1027.524	47.47571	-1.3	1729.928	47.07192	-2.48	343.252	46.748	-1.8	1880.41	148.59	7726.669	400.3311	8128	6531	6130.669	93.9%	45811.4	2405.601	48218	28458	26052.399	91.5%			
Nov-10	-2.3	1072.71	58.29212	-1.01	1683.33	41.67175	-2.07	1034.694	40.305857	-1.205	1733.48	43.5196	-2.47	343.4405	46.5595	-1.7	1888.665	140.335	7756.316	370.6838	8128	6531	6160.316	94.3%	46055.6	2161.405	48218	28458	26296.595	92.4%			
Dec-10																																	

Groundwater Elevations in Carmel Valley

Aquifer Zone	Lower Carmel Valley																Upper Carmel Valley														
	DS of Hwy 1		I - II		II - III		III - IV		IV - V		V - VI		VI - VII		VII - VIII		VIII - IX		IX - X		X - XI		XI - XII		XII - XIII		XIII - XVI		US of XVI		
	16S/1W-13L? (CAWD dewtr)	16S/1W-13Lc (nr CAWD-W)	16S/1E-18Mc (Rio Rd-N)	16S/1E-18L1 (Clark/Wells)	16S/1E-18Ka (RC West)	16S/1E-17Lb (RC East)	16S/1E-17Lc (Mallorca)	16S/1E-17Jd (Rubin)	16S/1E-17R2 (Valley Grns)	16S/1E-16Xx (Well E)	16S/1E-22Da (Wlms. North)	16S/1E-22Fc (Wlms. South)	16S/1E-23E4 (Schulte)	16S/1E-23Fb (CV High#1)	16S/1E-23Xx (Heyermann)	16S/1E-24N5 (Center St.)	16S/1E-25Ba (CVR#5)	16S/1E-25Bc (CVR#8)	16S/2E-30Da (CVR#1)	16S/2E-19Nx (Coyote us)	16S/2E-29Ka (Hern.RPD)	16S/2E-29Rb (Kurtz 2)	16S/2E-33Qx (Brmda-new)	16S/2E-33L2 (WaterWest4)	17S/2E-3Dd (Water West 1)	17S/2E-3La (Little Lgue 1)	17S/2E-10B1 (Helechos)	17S/2E-10A1 (Robles 1)	17S/2E-14A1 (Russell 2)	17S/2E-14A2 (Russell 4)	
Historical Full Date	2/24/2003	3/27/1995	4/26/1995	4/2/1993	4/26/1995	4/26/1995	4/26/1995	4/26/1995	4/2/1999	4/2/1999	4/27/1995	4/26/1995	5/30/1995	2/25/2009	4/26/1995	4/27/1995	4/27/1995	4/27/1995	4/26/1995	4/26/1995	4/26/1995	2/27/2009	garzas 4/27/1995	panetta 4/27/1995	4/26/1995	4/26/1995	4/26/1995	4/27/1995	4/27/1995	4/27/1995	
Historic Full Depth	5.8	5.6	6.3	15.6	11.7	15.3	11.7	9.6	21.3	13.8	33.1	23.7	26.5	26.5	29.1	31.7	32.2	29.2	25.5	18.7	16.1	25.5	13.3	10.6	13.9	6.0	8.1	10.5	11.0	10.2	
Dec-09	9.61	7.4	10.59	21.52	16.3	22.58	16.23	12.33	24.9	17.91	41.91	26.15	30.99	29.35	30.24	33.09	31.68	32.91	27.22	20.68	16.25	27.03	14.65	12	14	5.75	9.7	13	11	12.5	
Jan-10	8.35	6.89	9.02	20.4	14.1	16.62	12.92	10.68	22.5	16.08	40.34	24.43	29.7	28.41	28.26	32.68	40.34	29.5	30.73	25.02	18.74	14.45	25.23	12.92	11.3	12	4	7.76	11.6	11.8	9.5
Feb-10	7.35	6.73	8.26	19.36	13.56	20.05	13.84	9.82	21.33	15.78	38.55	23.23	29.2	27.68	28.37	32.31	29.65	30.85	24.79	19.73	13.5	25.23	12.24	13.7	14	3.46	7.29	11	11.6	9.8	
Mar-10	9.25	7.18	8.64	18.77	14.07	21.78	15.22	11.68	22.37	16.18	37.2	25.25	29.15	27.49	30.65	33.09	31.86	30.8	26.21	19.55	15.45	26.13	13.88	12	14.5	4.94	8.75	12.8	13.8	11	
Apr-10	9.2	7.55	8.5	18.73	14.12	21.64	14.93	11.28	21.8	16.08	35.95	24.92	29.09	27.48	29.38	33.68	31.68	30.59	25.75	19.06	15.13	26.09	13.54	11	13	5.65	8.52	11	12	10	
May-10	10.29	10.18	9.72	19.8	15.42	22.15	15.7	11.28	24.15	17.14	35.8	25.55	29.72	28.26	30.25	33.27	30.59	32.14	26.78	20.15	15.88	26.4	14.29	12	14	5.52	9.3	12	11	10.4	
Jun-10	10.51	8.61	10.25	20.52	16.13	22.72	16.25	12.42	25.33	17.64	36.13	26.33	30.18	28.77	31.28	33.56	33.82	32.73	27.25	20.64	16.33	26.55	14.62	13.4	15	5.9	9.76	13.6	12	10.8	
Jul-10	7.72	6.78	10.82	21.37	16.7	23.12	16.62	12.7	26.18	18.19	36.7	26.61	30.61	29.24	31.28	34.38	34	32.89	26.6	21.02	16.63	26.85	14.97	13	18	6.48	10.23	13	12	12	
Aug-10	9.69	8.08	11.43	22.09	17.31	24.17	17.22	12.96	26.81	18.52	37.33	27.39	31.08	29.71	32	34.55	34.24	33.08	27.87	21.3	16.8	27.16	15.22	13	15	6.91	10.56	13	14	12	
Sep-10	9.01	8.18	11.9	22.63	17.93	25.67	17.98	13	27.02	18.66	37.94	28.03	31.39	29.85	32	34.85	34.42	33.27	27.8	21.28	16.74	27.25	15.15	13.5	15	6.81	10.49	13	13	12	
Oct-10	8.79	7.96	11.86	22.7	17.3	23.33	16.87	12.82	25.76	18.5	38.34	26.8	31.36	29.85	32	33.79	33.55	32.41	27.78	21.23	16.77	27.25	15.15	13.6	15.6	6.9	10.56	13	12.8	12	
Nov-10	7.01	6.43	11.27	22.18	16.78	23.5	16.87	12.7	25.46	18.32	38.11	25.98	31.45	29.77	32	33.5	33.3	32.17	27.68	21.12	16.62	27	15.03	13	15.6	6.71	10.44	13.1	12.6	12	
Dec-10																															
Jan-11																															
Feb-11																															
Mar-11																															
Apr-11																															
May-11																															
Jun-11																															
Jul-11																															
Aug-11																															
Sep-11																															
Oct-11																															
Nov-11																															
Dec-11																															

California American Water Production and Associated Water Rights: Water Year 2011

(All Values in Acre-Feet)

Water Rights Limits					Water Supply Project Adjustments			
Carmel River Water Diverted by Cal-Am for Customer Service Under 95-10 Rights ¹	Seaside Groundwater Diverted by Cal-Am from Coastal Subareas for Customer Service Under Adjudicated Rights ⁴	Seaside Groundwater Diverted by Cal-Am from Laguna Seca Subarea for Customer Service Under Adjudicated Rights ⁴	Total Seaside Basin Adjudicated Diversions for Customer Service ⁴	Total Production Under 95-10 Rights and Seaside Basin Adjudicated Rights ^{1,4}	Carmel River Water Diverted by Cal-Am for ASR Injection Under 20808A Rights ³	Seaside Groundwater Recovered by Cal-Am for Customer Service Under ASR Rights ⁵	Desalinated Water from Sand City Plant ²	
Limit: 9,580 acre-feet	Limit: 3,202 acre-feet	Limit: 246 acre-feet	Limit: 3,448 acre-feet	Limit 13,028 acre-feet	Limit: 2,426 acre-feet	Target: 1,500 acre-feet	Target: 300 acre-feet	
Oct-10	629	0	39	39	668	0	420	25
Nov-10	477	0	27	27	504	0	392	12
Dec-10								
Jan-11								
Feb-11								
Mar-11								
Apr-11								
May-11								
Jun-11								
Jul-11								
Aug-11								
Sep-11								
Total	1,106	0	66	66	1,172	0	812	37

Notes:

1. "95-10 Rights" refer to water rights that were recognized by the State Water Resources Control Board (SWRCB) in Order No. WR 95-10 in July 1995 and assigned to California American Water. The rights total 3,376 acre-feet annually (AFA).
2. Under Orders 95-10 and 2009-0060, Cal-Am is allowed to produce no more than 10,429 AFA from the Carmel River in WY 2011. Under a separate agreement among Cal-Am, MPWMD, National Fisheries Service (NMFS), and California Department of Fish and Game (CDFG), this limit is reduced by the amount of water injected and recovered by Cal-Am for customer service during the 2011 recovery season, i.e., **812** AF through **Nov 2010**. In addition, under Order 2009-0060, this limit is further reduced by the amount of desalinated water produced by the Sand City Desalination Facility in WY 2011, i.e., **37** AF through **Nov 2010**.
3. "20808A Rights" refer to water rights that are held jointly by MPWMD and Cal-Am for the Phase 1 ASR project. "ASR" refers to Aquifer Storage and Recovery. "20808A" refers to Water Right Permit 20808A that was issued by the SWRCB in November 2007, for a maximum annual diversion of 2,426 AF.
4. "Adjudicated Rights" refer to groundwater rights determined by the Superior Court of Monterey County in March 2006 and amended in February 2007. These limits are subject to change by action of the Seaside Basin Watermaster and were updated by the Watermaster on December 2, 2009. Note that the adjudicated limit for the Coastal Subareas in WY 2011 includes 115 AF of carryover storage from WY 2010.
5. "Target" refers to the maximum amount of water that Cal-Am will try to recover each year for customer service as part of the Phase 1 ASR Project. The actual amount of water that is recovered will depend on the amount injected during a particular water year and previous water years.
6. Cal-Am's production from the Coastal Subareas of the Seaside Basin in October 2010 was reduced by 16 acre-feet to account for native groundwater that was produced and provided to the Seaside Municipal System as mutual aid.

Monterey Peninsula Water Management District

Carmel River Schematic: River Mile 1.0 to 6.0					
Status of River Flow and Steelhead Rescues: Sept. 13, 2010					
Gage or Creek	River Mile	River Reaches	Landmark		Explanation
			Rescue Reaches		
MPWMD Gage	1.0				
	1.1		Highway 1 Bridge		Dry Channel
	1.2				
	1.3				Transitional
	1.4		Crossroads Shopping Center		
	1.5				Wetted Channel
	1.6		River Meadows condos		
	1.7				Fish Rescue Pass 1
	1.8				
	1.9		West end Rancho Canada		Fish Rescue Pass 2
2.0					
2.1			Fish rescue Pass 3		
2.2					
2.3			Fish rescue Pass 4+		
2.4	R.C. Golf Cart Bridge #4				
2.5					
2.6	R.C. Golf Cart Bridge #3				
2.7	R.C. Golf Cart Bridge #2				
2.8	R.C. Golf Cart Bridge #1				
2.9					
3.0					
USGS Carmel Gage	3.1		Cal-Am Canada #2 Well		
	3.2		Via Mallorca Rd. Bridge		
	3.3		Hacienda Carmel		
	3.4				
	3.5		Old USGS gage		
3.6					
3.7			Cal-Am San Carlos #2 Well		
3.8					
Portreo Creek	3.9		Rancho San Carlos Rd. Br.		
	4.0				
	4.1				
	4.2				
	4.3				
	4.4		Quail Lodge condos		
	4.5				
	4.6		Doris Day pool		
	4.7				
	4.8		Valley Greens Dr. Bridge		
	4.9				
	5.0				
5.1					
5.2	CVGCC Bridge				
5.3	Valley Hills project				
5.4	Cal-Am Cypress #2 Well				
5.5					
5.6	Riverside RV Park				
5.7	Cal-Am Pearce Well				
5.8					
5.9					
6.0					

Monterey Peninsula Water Management District

Carmel River Schematic: River Mile 6.0 to 11.0				
Gage or Creek	River Mile	River Reaches	Bridge or Well	Explanation
	6.0			
	6.1			Dry Channel
	6.2		Koontz	
	6.3			Transitional
	6.4			
	6.5		Cal-Am Schulte Well	Wetted Channel
	6.6			
	6.7		Schulte Rd. Bridge	Fish Rescue Pass 1
	6.8			
	6.9			Fish Rescue Pass 2
	7.0			
	7.1			Fish rescue Pass 3
	7.2		Cal-Am Manor #2 Well	
	7.3			Fish rescue Pass 4+
	7.4			
	7.5			
	7.6			
	7.7			
	7.8		Cal-Am Begonia #2 Well	
	7.9			
	8.0			
	8.1		Cal-Am Berwick #9 Well	
	8.2		Cal-Am Berwick #8 Well	
	8.3			
	8.4			
	8.5	Robinson Cyn. Bridge		
	8.6			
	8.7			
	8.8			
	8.9			
"Narrows"	9.1	Cal-Am Scarlett #8 Well		
	9.2			
	9.3			
	9.4			
	9.5			
	9.6			
	9.7			
	9.8			
	9.9			
	10.0			
	10.1	Randazzo Bridge		
	10.2			
	10.3			
	10.4			
	10.5			
	10.6			
	10.7			
MPWMD Gage	10.8	Don Juan Bridge		
	10.9			
	11.0			

DAILY DISCHARGE IN CUBIC FEET PER SECOND WATER YEAR OCT 2010 TO SEP 2011

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	5.6	12e									
2	0	5.9	12e									
3	0	6.1	12e									
4	0	4.9	14e									
5	0	4.3	15e									
6	0	3.9	14e									
7	0	4.6	17e									
8	0	6.1	17e									
9	0	5.8	18e									
10	0	7.4	18e									
11	0	6.1	18e									
12	0	5.6	18e									
13	0	5.7	18e									
14	0	6.5	18e									
15	0	6.3	18e									
16	0	7.4	19e									
17	.04	6.7	19e									
18	0	5.8e	19e									
19	.01	5.8e	35e									
20	.88	7.6e	350e									
21	.81	11 e	257									
22	1.8	12 e										
23	2.8	13 e										
24	4.6	14 e										
25	5.1	14 e										
26	4.7	14 e										
27	4.6	14 e										
28	4.9	14 e										
29	4.6	13 e										
30	5.4	12 e										
31	5.4	-----										
TOTAL	45.64	249.1	938									
MEAN	1.47	8.30	44.7									
MAX	5.4	14	350									
MIN	0	3.9	12									
AC-FT	91	494	1,860									
			*	*	*	*	*	*	*	*	*	*
CAL YEAR 2010	TOTAL*	49,726.99	MEAN	140	MAX	2,070	MIN	0	AC-FT	98,630		
WTR YEAR 2011	TOTAL*	1,232.74	MEAN	15.0	MAX	350	MIN	0	AC-FT	2,450		

Note: Most recent instantaneous value: 209 cfs 12/22/10 0800.

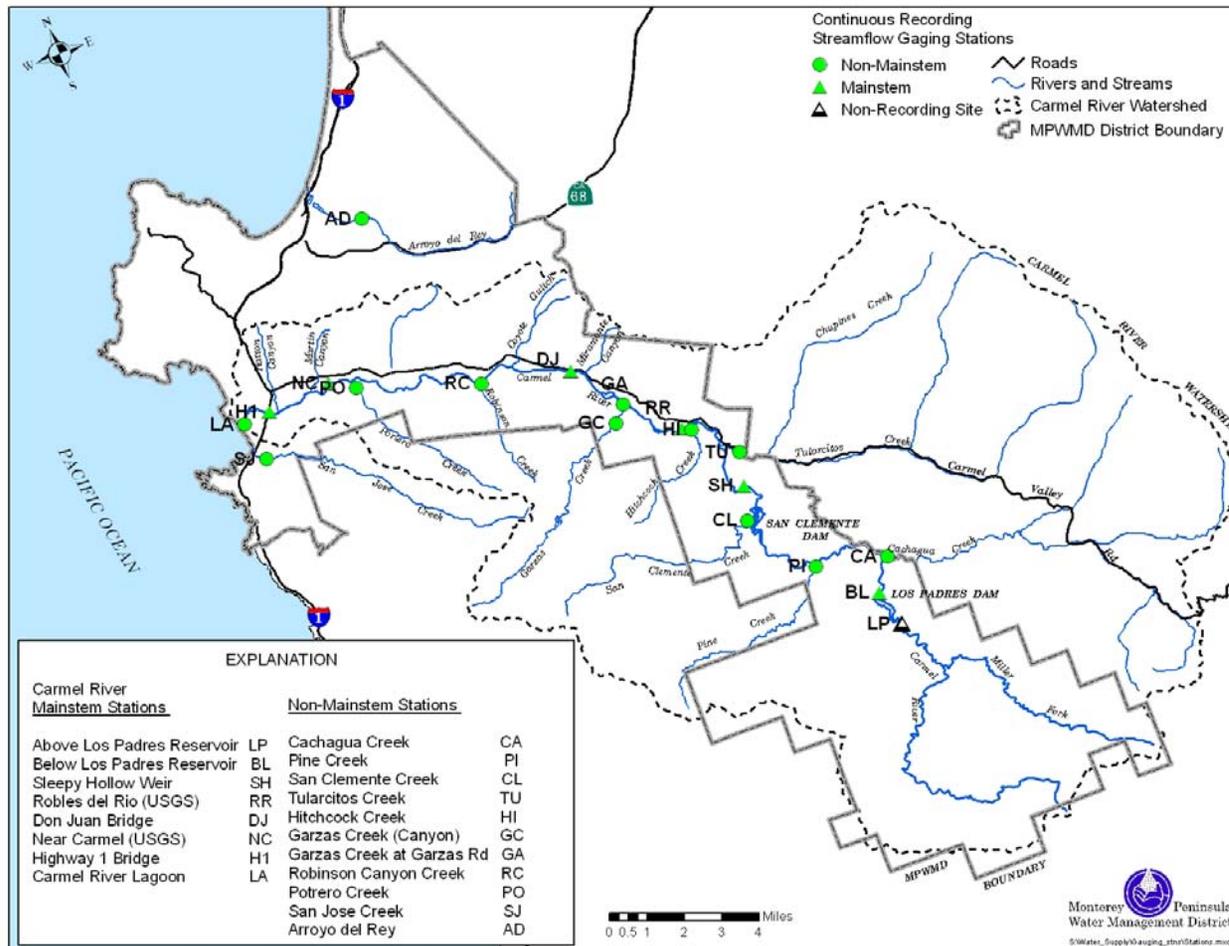
e - Estimated value based on field discharge measurements and comparison with CR near Carmel gage.

DAILY DISCHARGE IN CUBIC FEET PER SECOND WATER YEAR OCT 2010 TO SEP 2011

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	15	18									
2	14	14	18									
3	14	13	19									
4	15	12	21									
5	15	12	22									
6	15	13	26									
7	14	14	27									
8	12	15	26									
9	12	14	26									
10	11	14	26									
11	11	14	25									
12	12	13	25									
13	13	13	25									
14	12	12	25									
15	13	12	26									
16	14	12	26									
17	15	14	25									
18	15	14	28									
19	14	13	152									
20	14	15	436									
21	14	22	255									
22	14	22										
23	14	20										
24	15	21										
25	14	20										
26	14	19										
27	14	18										
28	13	20										
29	14	20			-----							
30	15	19			-----							
31	15	-----			-----		-----		-----			-----
TOTAL	424	469	1,277									
MEAN	13.7	15.6	60.8									
MAX	15	22	436									
MIN	11	12	18									
AC-FT	841	930	2,530									
CAL YEAR 2010	TOTAL*	50,362	MEAN	142	MAX	1,910	MIN	10	AC-FT	99,890		
WTR YEAR 2011	TOTAL*	2,170	MEAN	26.5	MAX	436	MIN	11	AC-FT	4,300		

Note: Most recent instantaneous value: 270 cfs 12/22/10 0800.

**Figure II-3
Carmel River Basin Principal Streamflow Gaging Stations**



**ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES
CITY OF MONTEREY – SEWER LINE REHABILITATION GRANT PROPOSAL**

Project Goals: Rehabilitate or replace deteriorated sewer mains (rated C – F) within the ASBS drainage areas of Monterey and Pacific Grove.

Desired outcomes: Eliminate leaking pipes, displaced joints, root intrusion, and sewer overflows from blockages, due to the deteriorated sewer mains. Reduce the maintenance required on these lines from line jetting and root intrusion treatment.

Output indicators: The annual number of sewer overflows due to blockages.

Outcome indicators: Reduce the number of sewer overflows in the sewer mains in this area, due to blockages.

Measurement tools and methods: Each time a sewer overflow occurs; it is documented in a spill report and included in the annual report to the State Water Resource Control Board.

Targets: Reduce the amount of sewer overflows caused by sewer mains within the ASBS drainage area.

Task 4 – Monitoring

These scheduled sewer mains are within storm drainage basins that flow to the Pacific Groves ASBS. Rehabilitation of deteriorated pipes is one way of source control to keep the sewerage from entering the storm drainage system. We will record water quality to assess levels of non-point source pollutants such as nutrients, bacteria, and metals present in the storm water system downstream of the rehabilitated sewer mains.

- Snapshot day sampling event – May 1st
 - This community event provides a one-day “Snap shot” of the health of the rivers and streams that flow into the Monterey Bay National Marine Sanctuary. We accomplish this goal in partnership with the Sanctuary and hundreds of community volunteers who systematically sample the stream water on Event Day.
 - Volunteers are trained to monitor temperature, dissolved oxygen, pH, and conductivity in the field and collect water samples for laboratory analysis of nutrients and bacteria levels.
- Urban Watch Monitoring, 1 week per month June – October
 - This volunteer based program monitors storm drain outfalls for common urban pollutants like detergent, chlorine and ammonia-nitrogen. The program runs from June through the first significant rain - in which the program culminates with an event called “First Flush”. During First Flush volunteers collect samples at

the Urban Watch storm drain outfalls to be tested for bacteria, nutrients and metals.

- Urban Watch program participants work in teams to monitor water quality at 4-5 storm drains 1 week each month from June thru October. Urban Watch program volunteers run in-field chemical analysis on water collected from these stormdrains. Volunteer time commitment is attendance at formal training session, and approximately 4-8 hrs each month thru October.
- First Flush Dry run, Spring Run, Summer Run – September, 2 days in spring, 2 days in summer TBD.
 - The 'dry run' is a day time training event that carries three purposes: **1:** to familiarize volunteers with their First Flush site during daylight hours, as the actual event may occur at night; **2:** to provide field training; and **3:** to collect sample water (if any exists in the outfall) to determine pollutant concentrations in the runoff prior to the first rains.
 - Spring and Summer runs are meant to monitor samples throughout the seasons.
- First Flush Sampling Program – 1st rain event, usually September – October
 - First Flush is the annual volunteer monitoring event that samples storm drain run-off during the first significant rainfall of the wet season. During the first rain water mobilizes particles off street surfaces and curbs, and cleans drain pipes which have collected during the dry season. First Flush samples are analyzed professionally to assess levels of non-point source pollutants such as nutrients, bacteria and metals, which are washed into the Monterey Bay during the first rain of the year. Storm drain outfalls from the Urban Watch program will be monitored for First Flush during the first rain, day or night.

**ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES
CITY OF MONTEREY – SOLID WASTE REMOVAL TECHNOLOGY (FROM STORM WATER)**

Project Goals: Reduce the amount of solid waste and sediment emissions from two storm drain outfalls that drain into the Monterey Bay Sanctuary.

Desired outcomes: To improve the remediation efficiency by removing trash and sediment from urban runoff continuously throughout the year.

Output indicators: Track the amount of debris removed per year. Compare the results of historical outfall testing, over the last ten years for heavy metals.

Outcome indicators: The current outfalls discharge directly without any containment of debris. We will only be able to report what we will collect once the solid wastes separators are installed. We will be able to compare heavy metal sampling past levels.

Measurement tools and methods: The City will use its Vactor truck to routinely clean the separators. The debris collected will be transported to City dumpsters or to the regional land fill. The outfalls will continue to be tested by the Urban Watch program, as detailed below

Targets: Maintain records of debris removed. Reduce the accumulation of heavy metals in the sediment.

Task 4 – Monitoring

The City of Monterey is currently cleaning affected storm drains by vacuuming out accumulated trash and sediments prior to the winter rains. This proposal is aimed at improving our remediation efficiency by removing trash and sediment from urban runoff continuously throughout the year by installing Solid Waste Removal Technology (storm water) systems.

- The storm drain outfalls will be visually monitored for trash and deleterious materials. The monitoring will begin June 1, 2011 and continue till one year after the installation of the storm separators, approximately May 2013. Recorded information will include a history of the pounds of trash and debris removed. Grab samples will be collected and analyzed from the outfall twice, once during each of the wet seasons following installation. These samples will be augmented and compared to samples from the ongoing First Flush program performed by MBSCWMN.
- Snapshot day sampling event – May 1st
 - This community event provides a one-day “Snap shot” of the health of the rivers and streams that flow into the Monterey Bay National Marine Sanctuary. We accomplish this goal in partnership with the Sanctuary and hundreds of community volunteers who systematically sample and visually inspect the stream water from storm drains on Event Day.
- Urban Watch Monitoring, 1 week per month June – October

- This volunteer based program monitors storm drain outfalls for common urban pollutants like detergent, chlorine, ammonia-nitrogen, and debris. The program runs from June through the first significant rain - in which the program culminates with an event called "First Flush". During First Flush volunteers collect samples at the Urban Watch storm drain outfalls to be tested for bacteria, nutrients and metals.
- Urban Watch program participants work in teams to monitor water quality at 4-5 storm drains 1 week each month from June thru October. Urban Watch program volunteers run in-field chemical analysis on water collected from these storm drains. Volunteer time commitment is attendance at formal training session, and approximately 4-8 hrs each month thru October.
- First Flush Dry run, Spring Run, Summer Run – September, 2 days in spring, 2 days in summer TBD.
 - The 'dry run' is a day time training event that carries three purposes: **1:** to familiarize volunteers with their First Flush site during daylight hours, as the actual event may occur at night; **2:** to provide field training; and **3:** to collect sample water (if any exists in the outfall) to determine pollutant concentrations in the runoff prior to the first rains.
 - Spring and Summer runs are meant to monitor samples throughout the seasons.
- First Flush Sampling Program – 1st rain event, usually September – October
 - First Flush is the annual volunteer monitoring event that samples storm drain run-off during the first significant rainfall of the wet season. During the first rain water mobilizes particles off street surfaces and curbs, and cleans drain pipes which have collected during the dry season. First Flush samples are analyzed professionally to assess levels of non-point source pollutants such as nutrients, bacteria and metals, which are washed into the Monterey Bay during the first rain of the year. Storm drain outfalls from the Urban Watch program will be monitored for First Flush during the first rain, day or night.
 - Storm drain outfalls are monitored for conductivity, water temperature, pH, transparency, and field samples are collected for analysis of nitrate, orthophosphates, zinc, copper, lead, hardness, total coliform, *E. coli* ., total dissolved solids, and total suspended solids. Results are compared to the Central Coast Ambient Monitoring Program's (CCAMP) Action Levels.
- The monitoring data will be compiled and compared to historical data collected over the previous ten years.
- Submit a final report summarizing all of these activities.

ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES – CARMEL RIVER WATERSHED VOLUNTEER PROGRAM

Attachment Explanation: The activities, objectives and goals of the CRWVP are linked to three of the five Regional Priorities stated in the IRWM Plan approved in 2007: 3) mitigate effects of storm water runoff throughout the planning Region, 4) Address storm water discharges into Areas of Special Biological Significance, 5) promote the steelhead run. In addition to these connections to Regional Priorities, this project aligns closely with the criteria used by the Regional Water Management Group in establishing the Regional Priorities. This demonstrates that even as Regional Priorities potentially change over time, the CRWVP follows the fundamental principles regional leaders are using to shape cooperative efforts to address water supply, water quality and flood control issues. Performance measures listed in the following table represent mechanisms that will assess progress towards the four goals of this individual project, as well as addressing regional, state and federal needs (e.g., providing data for reporting to RWMG, DWR, federal partners' efforts to include in SQMP, CERES, GAMA).

There is not a performance measure for each objective, as doing so would not be cost-effective. Also, no long-term outcomes are included, as their measurement is not feasible within the life of the limited three-year proposal. CWC follows the ADDIE (Assessment and Analysis, Design, Development, Implementation, Evaluation) model as promoted by NOAA's Coastal Services Center.

Project Performance Measures Table

Goals	Desired Outcome	Output Indicators	Outcome Indicators	Tools & Measurement Methods	Targets	Target Units & Timeframe
1: Increase the amount and variety of monitoring data documenting the health of the Carmel River through scientifically-proven approaches to engage volunteers in watershed monitoring activities.	Short-term Outcome: 1 QA/QC Plan and 1 Monitoring Plan are approved by CCRWQCB/SWRCB by 12/31/2011.	Number of QA/QC Plans & Monitoring Plans approved.	Number of QA/QC Plans & Monitoring Plans which were funded by Prop 84 activities.	Count of approved Plans	2	total
	Mid-term Outcome: 34 monitoring events occur each year by May 31 (2012, 2013 & 2014)	Number of monitoring events each year.	Number of monitoring events compared to prior years (pre-Prop 84 grant period).	Count of monitoring events	34	per year
2: Habitat, water quality and flow monitoring results for the Carmel River are established as a publicly available resource for the community to learn about the health of the watershed.	Short-term Outcome: Within 90 days of each monitoring event, results will have undergone Quality Control review and compared to historical values and applicable water quality objectives (WQO).	Number of events with data sets undergoing QC and comparison to historical values & WQO.		Metadata fields included in CWC's internal database files tracking QC review & comparison to WQO.	100	% of events each year
	Mid-term Outcome: 100% of monitoring results match SWAMP or other applicable data formats for regional/state reporting (by May 31 of each year).	% of monitoring results conforming to State standards.	% of monitoring results conforming to State standards	Discussion with CCRWQCB staff to learn of consistency with regional/State data formatting requirements. Use of on-line data-checking tools for consistency. Manual QA/QC of monitoring data.	100	% each year
3: The public will understand more about the health of the Carmel River watershed, including impacts, threats and areas for improvement.	Short- & Mid-term Outcome: 60% of trained volunteers will demonstrate a 40% improvement in understanding of watershed ecology concepts, IRWMP goals, and DWR/SWRCB statewide priorities by May 31 of 2012, 2013 and 2014	% of trained volunteers describing their knowledge, skills and/or abilities (KSAs) have changed.	% of change attributed to CRWVP education & outreach activities	Volunteers' survey and testing, pre- and post-education events.	40	% for 60% of volunteers each year
	Short- & Mid-term Outcome: 80% of participants at outreach events will demonstrate a 20% improvement in KSAs related to IRWMP & Carmel River watershed issues by May 31 of each year.	% of improvement in applicable KSAs indicated by participants.	% of improvement in applicable KSAs indicated by participants and attributed to CRWVP events	Surveys and web forms completed by participants at education events.	20	% improvement by 80% of participants
	Mid-term Outcome: 14 education & outreach events are held each year for 3 years.	Number of events held	Number of events held	Count of events held each year	14	events/year
4: Monterey Peninsula residents will know about and engage in small-scale stewardship efforts to work towards improving the Carmel River watershed's overall health.	Short-term Outcome: By May 31, 2012, 10 Watershed Stewards will be recruited, selected and trained to lead Goal 4 Stewardship Activities.	Number of Stewards trained	Number of Stewards from CRWVP funds	Count of Stewards completing leadership training sessions	10	per year
	Mid-term Outcome: By May 31 of each year, 36 new small-scale best management practices (BMPs) will be installed by community members and posted on CWC's Data & Stewardship Portal (DSP).	Number of BMPs documented on DSP	Number of BMP's documented on DSP and attributed to CRWVP activities	Count of BMPs each year, as tracked in CWC's DSP database.	36	per year

**ATTACHMENT 6. MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES
MICROBIAL SOURCE TRACKING IN THE CITIES OF MONTEREY AND PACIFIC GROVE**

Project Goals: Analyze water samples from the storm drain system for the source of bacteria, providing critical data for the management of bacterial contamination that leads to beach advisory closures and postings in the Monterey Peninsula Region. The three water sheds chosen are representative of typical Municipal drainage basins with Parks, Residential, and Commercial uses. The report will include testing the entire drainage area to help in locating sources of discharge of contaminants, before it is at the end of pipe discharge.

Desired outcomes: The results of this study will provide the cities, County, Regional Water Quality Control Board, State Water Resources Control Board and the Sanctuary with additional information about anthropogenic sources of coliform. Tracking of the sources to distinguish among wildlife, domestic animals and human contributors. The testing will determine if an advisory or closure posting is caused by human or animal bacteria. Tracking of the sources may identify the best management practices for urban runoff management at these study locations.

Output indicators: The annual number of beach closures and postings in the Monterey Peninsula Region.

Outcome indicators: Reduce the annual number of beach advisory closures or postings in the Monterey Peninsula Region.

Measurement tools and methods: Using an analysis method such as ribosomal RNA typing to determine sources of coliform contamination. Once contamination is found continue testing, by reducing the drainage area tested, to determine its source.

Targets: Elimination of human sources by repairing failed sewer systems or illegal sewer discharges into the water sheds.

The progress reports, which will be submitted quarterly by the twentieth (20th) of the month following the end of the calendar quarter (March, June, September, and December) will include the following:

- The first year will show the progress of drainage basin areas that have been tested in dry and wet weather conditions. What the identified source was between wildlife, domestic animals and human contributors.
- The second year will entail the complete data analysis, completion of the report, and any outreach or technical follow-up.