STREAM HEALTH OF THE COYOTE CREEK AND GUADALUPE RIVER WATERSHEDS USING WRAMP

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CALIFORNIA'S WETLAND AND RIPARIAN AREA MONITORING PLAN (WRAMP)

WRAMP is a framework and toolset for collecting and managing information to assess the condition of aquatic resources. This assessment of stream condition in the Coyote Creek and Guadalupe River watersheds used the following WRAMP tools:

California Aquatic Resources Inventory: CARI is a digital dataset of surface waters throughout the state, a standardized mapping methodology, and a classification system with crosswalks to other systems used by USFWS, CalFire, USGS, Habitat Joint Ventures, and other agencies. www.sfei.org/it/gis/cari

California Rapid Assessment Method: CRAM is a cost-effective and scientifically defensible, standardized method for monitoring the overall ecological condition or health of wetlands and streams throughout California. www.cramwetlands.org

Online data access, visualization, and summarizing tools: EcoAtlas is an information visualization and delivery system for environmental regulatory and management programs. The Project Tracker enables users to map and track natural resource management actions, including restoration and mitigation projects. The Landscape Profile Tool uses web services and spatial queries to aggregate environmental information for any user-defined area throughout the state. www.ecoatlas.org

WRAMP PARTICIPATING AGENCIES AND WORK GROUPS

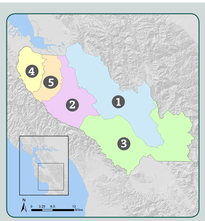
http://www.mywaterquality.ca.gov/monitoring_council/wetland_workgroup/wramp/

THE SANTA CLARA VALLEY WATER DISTRICT (SCVWD) IS IMPLEMENTING WRAMP

The voter-approved Safe Clean Water and Natural Flood Protection Program of the SCVWD includes priorities to restore wildlife habitat and provide open space. Under these priorities, the Ecological Data Collection and Analysis project is using WRAMP as an integral part of its comprehensive, watershed approach to planning and protecting natural resources and assets. The SCVWD is applying WRAMP in five watersheds in Santa Clara County using the following tools:

- CARI to characterize the abundance, and diversity of aquatic resources;
- Probabilistic surveys using CRAM to evaluate the overall ecological condition of streams, and
- Intensive assessment and focused studies to support specific management actions such as fish passage improvements and stream, upland, and wetland and riparian habitat revitalization.

http://www.valleywater.org/SCW-D.aspx



SCVWD has completed ambient assessments in the ❶Coyote Creek and ❷Guadalupe River watershed (2010 and 2012 respectively) and is currently assessing the ❸Pajaro River and ❹Lower San Francisco Bay peninsula watersheds in 2015 and 2016. The ❺West Valley watershed assessment is planned for 2017.

The watershed assessments characterize the abundance and diversity of aquatic resources, and overall ecological condition of streams within each watershed.

BENEFITS OF THE WATERSHED APPROACH

The SCVWD Ecological Data Collection and Analysis project began watershed based stream assessments in 2010 to establish ecological service indices (ESIs) that are science based, standardized and repeatable. The assessments are conducted on an ongoing basis with repeat assessments over time to determine if ecological levels of service are maintained or improved.

The SCVWD expects that their watershed approach to ecological monitoring and assessment will increase the effectiveness of its management actions by improving their coordination and positive cumulative effects.

The WRAMP framework is consistent with the federal and state's watershed approach to mitigation planning, and has been shown to:

- Provide a systematic, scientific framework for actions to improve stream conditions;
- Support effective design options for capital projects;
- Maximize the return on investments in ecosystem health;
- Improve access to data and information; and
- Improve public reporting of program performance.

References

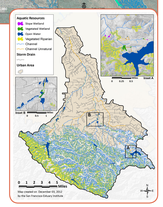
Stevens, D.L., Jr., and A.R. Olsen. 2004. Spatially balanced sampling of natural resources. Journal of the American Statistical Association 99(465): 262-278.

EOA, Inc. and San Francisco Estuary Institute. 2011. Ecological Monitoring & Assessment Framework. Stream Ecosystem Condition Profile: Coyote Creek Watershed Including the Upper Penitencia Creek Subwatershed. Final Technical Report #2. Prepared for: Santa Clara Valley Water District.

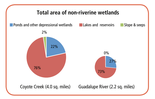
San Francisco Estuary Institute & Aquatic Science Center. 2013. Statistical Design, Analysis and Graphics for the Guadalupe River Assessment. Technical Memoranda Two, Four & Five. Report prepared for the Santa Clara Valley Water District Agreement Number A35607. SFEI Contribution No. 687. Richmond, California.

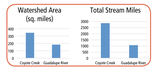
CASE STUDY: SCVWD's Coyote Creek and Guadalupe River Assessments

1 DETERMINE ABUNDANCE AND DIVERSITY OF AQUATIC RESOURCES



Knowing the amounts and types of aquatic resources within the watershed lets managers track changes in their condition over time.



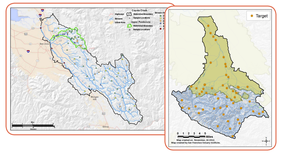


- The Coyote Creek watershed is about twice as large as the Guadalupe River watershed.
- Coyote Creek has >60% more stream miles.
- Coyote Creek has about twice as many acres of wetlands, but roughly similar proportions of wetland types.

2 ASSESS OVERALL STREAM HEALTH

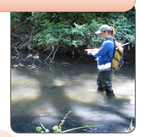
2.1 Develop the sample draw using the CARI streams dataset.

A probability sample is used to characterize the overall health of all streams within the watersheds with known levels of confidence.



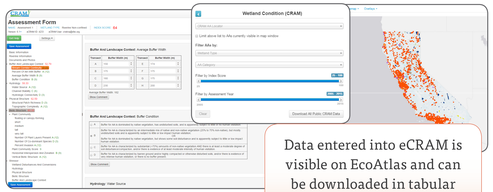
2.2 Conduct field assessments using CRAM.

Field observations are carried out by trained CRAM practitioners.



CRAM ATTRIBUTES		METRICS AND SUBMETRICS
Buffer and Landscape Context		Continuity of the Steam Corridor
		Buffer:
		Percent of AA with Buffer
		Average Buffer Width
		Buffer Condition
Hydrology		Water Source
		Channel Stability
		Hydrologic Connectivity
Structure	Physical	Structural Patch Richness
		Topographic Complexity
	Biotic	Plant Community Composition:
		Number of Plant Layers Present
		Number of Co-dominant Species
		Percent Invasion
		Horizontal Interspersion
		Vertical Biotic Structure

2.3. Enter data into eCRAM (www.cramwetlands).

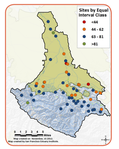


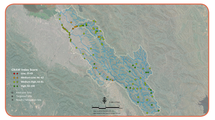
Data entered into eCRAM is visible on EcoAtlas and can be downloaded in tabular format for further analyses.

3 RESULTS

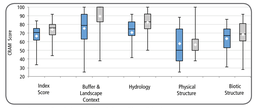
3.1 Summarize CRAM Scores.

CRAM results can be used to ID areas with low or high condition within and between watersheds





Map showing the range of possible scores (25-100) divided into 4 equal parts.



Coyote Creek (gray), Guadalupe River (blue)

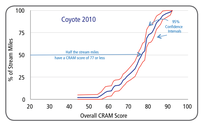
Box plots show summary statistics about the range of scores within each watershed including the inter-quartile range, median, and mean (white diamond).

3.2 Cumulative Distribution Function Plots (CDFs) of CRAM Index Scores for Streams.

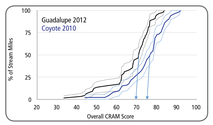
CDFs, based on the probability sample draw characterize the condition of all streams within the whole watershed.

As management actions within the watersheds improve and revitalize streams over time, one would expect conditions to improve, shifting the CDF curves to the right.

Comparing CDFs from Coyote Creek and Guadalupe River watersheds indicates that Guadalupe River streams have lower CRAM Scores as evidenced by the whole curve being shifted left by about 5 CRAM points.



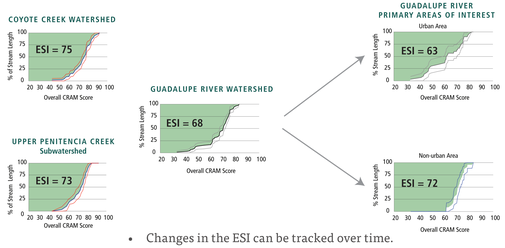
The Coyote Creek watershed stream survey indicates that 50% of the streams have a CRAM Score of 77 or lower (with a 95% confidence interval between 74-78).



50% of the streams in the Guadalupe River watershed have a CRAM Score of 71 or lower (with a 95% confidence interval between 68-72).

3.3 Ecological Service Indices (ESIs).

The ESI is calculated as the sum of individual CRAM scores times the proportion of the stream length represented by each score.



The ESI is a landscape-level statistic that can be used to describe the overall ecological condition (or health) of streams within a watershed that have been assessed using a probability based sample design and CRAM.

- Changes in the ESI can be tracked over time.
- The SCVWD could develop watershed goals based on reaching specific target ESI levels for whole watersheds, subwatersheds and/or other areas of interest.