Santa Rita Creek at Ferrasci Park
Habitat Restoration Assessment

Summary Report

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CCWG
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EXECUTIVE SUMMARY

The Central Coast Wetlands Group conducted assessments of the condition of Santa Rita Creek at Ferrasci Park from 2014-2015 as part of the Greater Monterey County IRWMP Round 1 Implementation Project 6 restoration project. The California Rapid Assessment Method for Wetlands (CRAM) was used to conduct assessments of existing vegetation and habitat within the restoration site. Photo Monitoring at Santa Rita Creek at Ferrasci Park was conducted in conjunction with the CRAM assessments.

CRAM Index scores increased from 39 to 58 on the downstream parcel (AA-1) where a majority of the restoration work was completed and from 44 to 49 on the upstream parcel (AA-2) where no ground engineering was conducted. The CRAM index score increased by 19 points in AA-1 and 5 points in AA-2 during the project period.

1. Purpose

The objective of this study was to characterize the condition of the riverine system over the course of a restoration project at Santa Rita Creek at Ferrasci Park using the California Rapid Assessment Method (CRAM). The Central Coast Wetlands Group (CCWG) performed CRAM assessments at two sites that comprise the restoration project area. Multiple assessments were conducted at each site before and after restoration. The results of these assessments provide information on the success of restoration activities.

2. Project Description

Site Location

The project location is Santa Rita Creek, as it passes through Ferrasci Little League Park in the Bolsa Knolls unincorporated area, immediately north of the City of Salinas, CA. The project is located on private land adjacent to a popular baseball field in a residential neighborhood. This reach of Santa Rita Creek, also known as Little Bear Creek, is downstream of active farm land and a series of culverts in an urban subdivision. Santa Rita Creek passes through agricultural lands into the City of Salinas and then discharges into the Salinas Reclamation Canal, Tembladero Slough, Moss Landing Harbor, Elkhorn Slough, and ultimately the Monterey Bay National Marine Sanctuary. Santa Rita Creek has seven 303d listings, mostly for agriculture related pollutants such as nutrients, pesticides and bacteria.

Restoration Work

Design goals of the restoration project include creating a more naturally sinuous channel with a more natural cross-section featuring low-flow channel and habitat-bench & flood plain, including revegetation with locally-native riparian vegetation extending from the low-flow channel edge to the bank tops. This project included restoring native vegetation along 1,025 linear feet (LF) of the creek and improving channel morphology to 475 LF of creek in the lower downstream section of the project area. The 475 LF of creek bank that was modified is alongside and upstream of the Ferrasci Park little league field owned by Boys Stadiums of Salinas. Specific restoration work included:

Ground engineering (downstream Parcel): The ground changes included widening the stream to decrease erosional forces and to allow the stream to slow and drop out some of the sediment coming from upstream agriculture. The channel widening varies through the site, but the 'typical' x-section calls for a 16'-wide 'bankfull' channel with an additional floodplain that varies from 0-20 feet depending on the location.

Invasive removal (Upstream and Downstream Parcel): Efforts to remove invasive plants occurred on both the upstream and downstream parcel of the project, though more effort was spent on the downstream parcel where the ground engineering occurred. Weed removal continued throughout the project period to prevent re-infestation and allow new plants to flourish. Mulch was spread on the downstream parcel to help with weed management.

Native Planting (Upstream and Downstream Parcel): Native plantings were installed on the newly created flood plain and stream banks to reduce erosion and increase uptake of pollutants. The plant

palette included rushes and sedges, native grasses, small shrubs (such as California sage and lizard tail), and trees (such coast live oak and elderberry).

The restoration project design was developed in consultation with Monterey County Public Works Department, which has historically managed the channel by periodically (every 1-3 years) removing deposited sediments in the channel bottom. The design accommodates the Public Works Department's access requirements for continued maintenance in such a manner that it will not hinder their work nor be impacted by it. Planting within the project area is designed around a minimized access corridor for the County's sediment removal activities.

3. Assessment Methods

California Rapid Assessment Method

The California Rapid Assessment Method for Wetlands (CRAM) was used to assess the habitat condition of Santa Rita Creek at Ferrasci Park throughout the project period. CRAM is a rapid habitat condition assessment. CRAM is a standardized tool for wetland monitoring, developed with support from EPA. It is based on the concept that the structure and complexity of a wetland is indicative of its capacity to provide a range of functions and services. It is designed for assessing ambient conditions within watersheds, regions, and throughout the State. It can also be used to assess the performance of restoration projects. CRAM requires a team of 2-3 trained practitioners less than 3 hours to assess a representative wetland area. CRAM evaluates wetland condition at specific sites within defined boundaries in what is termed the Assessment Area, or AA. There are specific guidelines for defining the AA for each CRAM module for different wetland types. For riverine wetlands the recommended size is 100 meters long. For this study the AAs were tailored around where restoration was planned and the site was broken up into two adjacent AAs: a downstream assessment area (AA-1) and an upstream assessment area (AA-2).

Each assessment area was evaluated according to the four universal attributes of CRAM (Table 1) using the current CRAM Riverine field book (v 6.1)

1. **Buffer and Landscape Context** - measured by assessing the quantity and condition of adjacent aquatic areas as well as extent and quality of the buffering environment adjacent to the AA.
2. **Hydrology** - assesses the sources of water, the stream channel stability, and the hydrologic connectivity of rising flood waters in the stream.
3. **Physical Structure** - measured by counting the number of patch types found within the AA and the topographic complexity of the marsh plain.
4. **Biotic Structure** - assesses the site based on several factors including the number of plant vertical layers, the number of different species that are commonly found in the marsh, the percent of the common species that are invasive, and the horizontal and vertical heterogeneity of the plant communities.

These four attributes are consistent for all wetland modules of CRAM. Each of the four attribute categories is comprised of a number of metrics and submetrics that are evaluated in the field and scored on a scale of (D)3 to (A)12. The metrics that are measured may vary between wetland types. Each of the four attribute categories are then converted to a scale of 25 through 100, and the average of these four scores is the final CRAM index score, also ranging on a scale from 25 (lowest possible) to a maximum of 100.

The scale of condition categories presented in Table 1 is appropriate for the purposes of evenly distributing CRAM results into quartiles.

TABLE 1. CRAM CONDITION CATEGORIES AND ASSOCIATED INDEX SCORING RANGES.

Condition Category	Total CRAM Index Score Range
Excellent	82-100
Good	63-81
Fair	44-62
Poor	25-43

CCWG conducted six CRAM assessments at the project site between in September 2014 and December 2015 (figure 1). At AA-1, four CRAM assessments were conducted: one pre-construction, one post construction, one post re-vegetation, and one at the end of the project period. At AA-2, two assessments were conducted: one pre-restoration, and one at the end of the project period/post-re vegetation. No ground engineering occurred at along the upstream parcel so no CRAM assessment was conducted at that time. Re-vegetation at AA-2 was delayed until rains began in 2015 which was towards the end of the project period, so only one CRAM assessment was conducted post-re-vegetation.

The restoration work conducted on the downstream part of the creek expanded the riparian area by creating a larger floodplain. This expanded area was what was assessed during assessments conducted after ground-engineering was complete. Although the width of the AA increased along certain parts of the creek reach, the length remained the same.

FIGURE 1. CRAM ASSESSMENT AREA (AA) BOUNDARIES AT THE SANTA RITA CREEK AT FERRASCI PARK RESTORATION PROJECT (CONDUCTED 2013-2015).

Results from CRAM wetland condition assessments will be uploaded to eCRAM, the Statewide CRAM database. This means that all the scientifically quantifiable outcomes of the project will be available online to any interested groups.

PHOTO MONITORING

Simple photographic monitoring is a practical and cost-effective method of monitoring a restoration project. It visually documents changes in a site as restoration progresses. Photo monitoring at Santa Rita Creek at Ferrasci Park was conducted in conjunction with CRAM assessments. A photo monitoring map of the restoration area was generated by walking the perimeter with a geographic positioning system (GPS) unit and selecting sites from which the restoration work could be visually covered. Ten locations were chosen to use for photo point monitoring (figure 2).

Point Name	Picture Direction
LPM-1	Upstream
LPM-2	Downstream & upstream
LPM-3	Upstream
LPM-4	Downstream & upstream
LPM-5	Downstream & upstream
LPM-6	From both sides
UPM-1	Upstream
UPM-2	Downstream & upstream
UPM-3	Upstream
UPM-4	Downstream

FIGURE 2. PHOTO MONITORING LOCATIONS

4. Assessment Results and Discussion

Downstream Site (AA-1):

On September 2, 2014, immediately prior to ground engineering, an assessment was conducted at AA-1 and the site received an overall index score of 39. After ground engineering was completed, the site was assessed on October 7, 2014 and received an overall index score of 45. All attributes except for *Biotic Structure* increased in score. A majority of the re-vegetation efforts were completed by May of 2015. On June 4, 2015 a post-revegetation assessment was conducted and received an overall CRAM score of 50. A fourth assessment was conducted on December 16, 2015 (at the end of project period) and received an overall CRAM index score of 58. Over the project period, the largest increases in scores were over the *Hydrology* and *Physical Structure* attributes. The site improved over the project period from initially falling in the "poor" category (index score=39) to falling in the "fair" category (index score=58). We expected that as the native vegetation becomes more established over the site, the *Biotic Structure* attribute will continue to increase in score.

TABLE 2. AA-1 CRAM METRIC, ATTRIBUTE AND INDEX SCORES BY EACH PHASE OF RESTORATION. FOR METRIC SCORING, A=12, B=9, C =6 AND D=3.

CRAM Attribute	Attribute and Metric Scores by Restoration Phase	Pre-construction 9/2/2014	Post-construction 10/7/2014	Post re-vegetation 6/4/2015	End of project 12/16/2015
Buffer and Landscape Context	Aquatic Area Abundance	3	3	3	3
	% of AA with Buffer	9	9	9	9
	Average Buffer Width	3	3	3	3
	Buffer Condition	3	3	6	6
	Attribute Score	**29**	**29**	**35.77**	**35.77**
Hydrology	Water Source	6	6	6	6
	Channel Stability	6	6	6	9
	Hydrologic Connectivity	6	12	12	12
	Attribute Score	**50**	**66.67**	**66.67**	**75**
Physical Structure	Structural Patch Richness	6	6	6	9
	Topographic Complexity	3	6	6	9
	Attribute Score	**37.5**	**50**	**50**	**75**
Biotic Structure	PC: No. of plant layers	6	6	6	6
	PC: No. of co-dominants	9	6	9	9
	PC: Percent Invasion	9	6	9	6
	Interspersion	3	3	6	6
	Vertical Biotic Structure	3	3	3	3
	Attribute Score	**38.89**	**33.33**	**47.22**	**44.44**
	Index Score	**39**	**45**	**50**	**58**

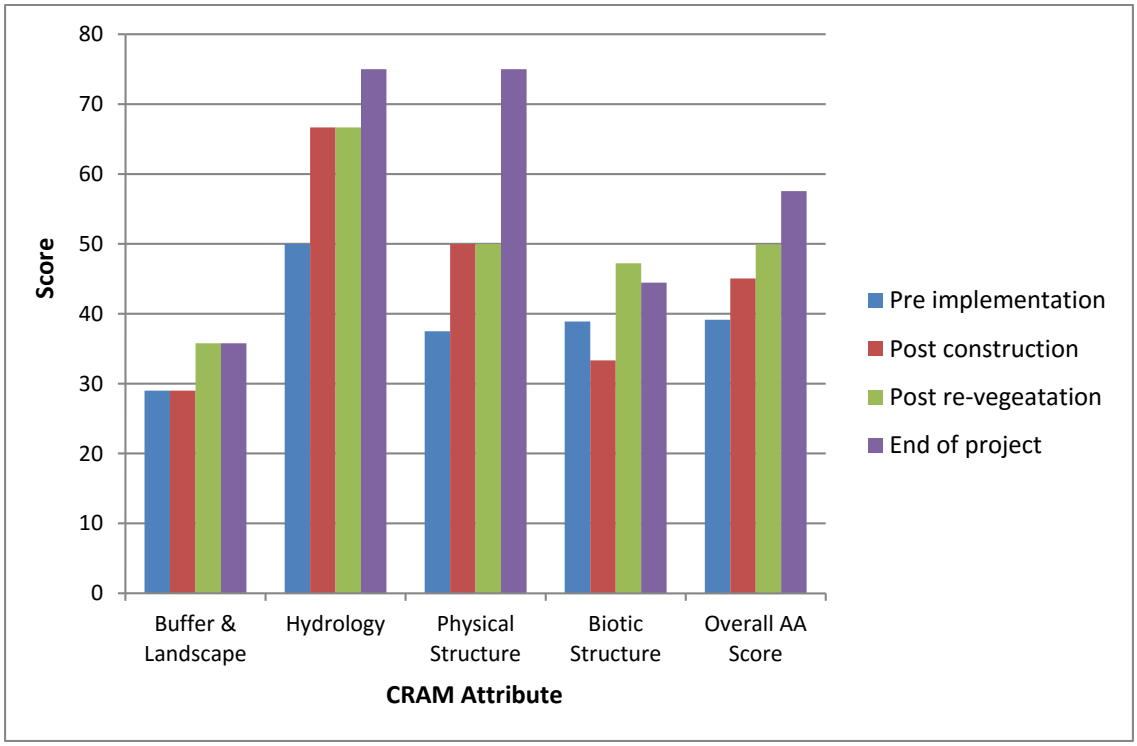

FIGURE 3. AA-1 CRAM SCORES BY ATTRIBUTE OVER RESTORATION PROJECT PERIOD.

The *Landscape and Buffer* attribute score increased from 29 to 36. Work conducted during the restoration did not affect the percent of buffer surrounding the AA or the stream corridor continuity metric The restoration did increase buffer condition as the edge of the restoration project extended outside of the AA into the buffer area. Where there was once bare ground or higher amounts of invasive vegetation, there are now more native plants.

The *Hydrology* attribute score increased from 50 to 75 throughout implementation. The largest increase occurred in the hydrologic connectivity metric right after ground engineering was complete as this created a less steep bank and a large floodplain. Channel stability also increased slightly once plants became more established along stream banks. Water source was not affected by the project.

The *Physical Structure* attribute saw the largest increase in score from 37.5 to 75. The ground engineering added in some physical structure patches such as cobbles and boulders and with the help of the constructed flood plain, over time, the topographic complexity and structural patch richness naturally increased.

Biotic Structure also increased throughout the project period. The biotic score dropped immediately after ground engineering as the ground was disturbed and native plants were yet to be established. The score increased significantly in the June 2015 assessment and then it dropped down slightly at the end of the project assessment in conducted in December. This decrease in score is due to the percent of invasive metric and is most likely because the last assessment was conducted during the rainy season where more invasive grasses would be present and some of the native species that were planted are still not large enough to be counted as a co-dominant species.

UPSTREAM SITE (AA-2):

On September 2, 2014, prior to any restoration work, an assessment was conducted at AA-2 and the site received an overall index score of 44. Since no ground engineering was conducted at AA-2, no assessment was conducted in October. Native vegetation was planted at the site in November and December of 2015. An assessment was conducted on Dec 16, 2015 after native species were planted at the end of the project period. The site received an overall Index score of 49. Over the project period, Only the *Hydrology* and *Biotic Structure* attributes increasing in score. We did not expect to see a change in score for the *Buffer and Landscape* attribute as none of the restoration work occurring would impact those metrics. Although the overall *Physical Attribute* score stayed the same (50) the *structural patch richness* metric increased from a C to a B, but *the topographic complexity* metric decreased from a C to a D, meaning that the bench that was apparent during the initial assessment, did not characterize the site during the December assessment. It is expected that as the native vegetation becomes more established at the site, the *Biotic Structure* attribute will continue to increase in score.

TABLE 3. AA-2 CRAM METRIC, ATTRIBUTE AND INDEX SCORES BY EACH PHASE OF RESTORATION. FOR METRIC SCORING, A=12, B=9, C =6 AND D=3.

CRAM Attribute	CRAM Metrics and Submetrics	Pre-construction 9/2/2014	Post-construction 10/7/2014	End of project/post re-vegetation 12/16/2015
Buffer and Landscape Context	Aquatic Area Abundance	3	N/A	3
	% of AA with Buffer	3	N/A	3
	Average Buffer Width	3	N/A	3
	Buffer Condition	3	N/A	3
	Attribute Score	**25**	**N/A**	**25**
Hydrology	Water Source	6	N/A	6
	Channel Stability	6	N/A	9
	Hydrologic Connectivity	6	N/A	9
	Attribute Score	**50**	**N/A**	**66.67**
Physical Structure	Structural Patch Richness	6	N/A	9
	Topographic Complexity	3	N/A	3
	Attribute Score	**50**	**N/A**	**50**
Biotic Structure	PC: No. of plant layers	12	N/A	9
	PC: No. of co-dominants	9	N/A	9
	PC: Percent Invasion	6	N/A	6
	Interspersion	6	N/A	6
	Vertical Biotic Structure	3	N/A	6
	Attribute Score	**50**	**N/A**	**55.56**
	Index Score	**44**	**N/A**	**49**

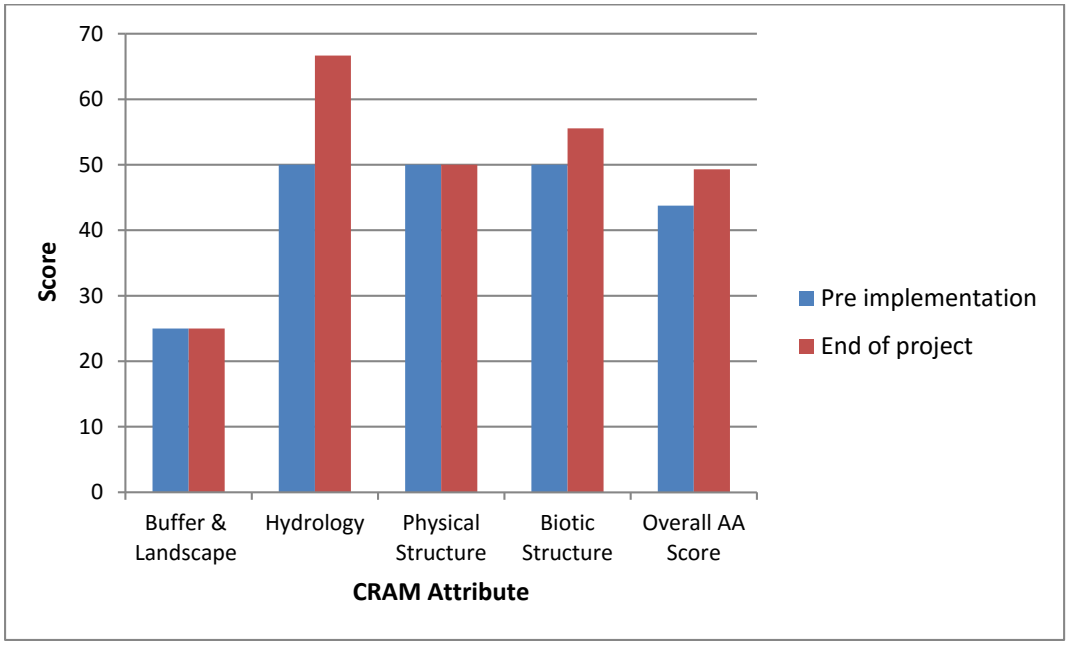

FIGURE 4. AA-2 CRAM SCORES BY ATTRIBUTE OVER RESTORATION PROJECT PERIOD

STRESSORS:

Several stressors were identified at both sites during the assessments. While not factored into the CRAM scores, stressors can provide more detailed insight about what may be adversely affecting the ecological condition of the river, stream or creek. Stressors that were consistently observed on the site include:

- Non-point sources from agricultural areas
- Flow obstructions within 50 meters (culverts and paved stream crossings)
- Excessive sediment or organic debris from watershed
- Nutrients and Pesticides
- Urban residential areas
- Transportation Corridor
- Sports fields
- Trash

5. CONCLUSIONS

Riverine CRAM surveys at the Santa Rita Creek Restoration site show that the restoration efforts conducted during 2014 and 2015, which included ground engineering, removal of invasive plants, and planting of native plants, helped improve the condition of habitat at both AA-1 and AA-2.

6. PHOTO MONITORING

The following are photos from a selection of photo monitoring locations.

DOWNSTREAM PARCEL (AA-1):

LPM-1, LOOKING UPSTREAM

LPM-3, LOOKING DOWNSTREAM

LPM-3, LOOKING UPSTREAM

LPM-4, LOOKING DOWNSTREAM

FLOOD PLAIN AT END OF PROJECT

UPSTREAM PARCEL (AA-2):

UPM-1, LOOKING UPSTREAM

LPM-2, LOOKING UPSTREAM

LPM-4, LOOKING DOWNSTREAM