# YEAR ONE
# CREATED WETLANDS MONITORING REPORT
# EAST CONTRA COSTA COUNTY
# HABITAT CONSERVANCY
# UPPER HESS CREEK RESTORATION PROJECT
# EAST CONTRA COSTA COUNTY, CALIFORNIA

**PROJECT APN #S: 094-130-014, 094-130-015, 075-080-011**

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# 1. INTRODUCTION

The Upper Hess Creek Habitat Restoration Project (Restoration Project) is located on an approximately 200-acre portion of the 496-acre Upper Hess Creek Watershed property located on the north side of Kirker Pass Road, west of the City of Pittsburg, and east of the City of Concord in Contra Costa County (Figures 1 and 2). The Restoration project was implemented by the East Contra Costa County Habitat Conservancy (ECCCHC) to meet goals and objectives for wetland and creek channel restoration as established in the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP: Jones & Stokes 2006). The Restoration Project initially included the development of a "Restoration Management Plan Outline" which described the HCP/NCCP's project-related goals as well as site specific restoration objectives and performance criteria (H. T. Harvey & Associates 2011).

Site specific goals for the Restoration Project included the restoration and creation of target habitats. To accomplish these goals, the Restoration Management Plan Outline (also referred to in other documents as the "Mitigation and Monitoring Plan" or "MMP") design proposed habitat restoration and/or creation work at five individual project areas shown in Figure 3 as listed below:

1. Creation of a "California tiger salamander (CTS) (*Ambystoma californiense*) Pond";
2. Restoration of the Upper Stock Pond;
3. Restoration of the Upper Hess Creek at a previous ranch road crossing (the "Channel Restoration Area" shown on Figure 3);
4. Restoration of the Main Stock Pond;
5. Restoration/re-construction of the Alluvial Valley Wetlands;

In addition to the habitat creation and restoration work at the five project areas, the proposed work involved clay harvest from a designated borrow area, placement of excess fill ("cut") at a specified placement area, and grading of a new ranch road (removing it from the creek crossing). The design also proposed improving existing sensitive habitats (1 through 5 above would be deemed sensitive habitats) by the control of non-native, invasive plant species and removal of ranch debris.

While most of the Restoration Management Plan restoration projects were completed, there were exceptions. For example, removal of the Upper Stock Pond and restoration of the stream channel (approximately 258 linear feet of channel) was never initiated due to two unexpected factors: (1) prolonged ponding, and (2) presence of federally listed California red-legged frogs (*Rana draytonii*) at the pond. Prolonged ponding did not allow for a work period when the pond was dry. Also, a decision was made not to impact a functioning California red-legged frog breeding pond. The exclusion of the the Upper Stock Pond restoration project resulted in a reduction in linear footage of proposed channel restoration and an acreage reduction for restored "other waters" of the United States (HT Harvey 2012). Another wetland creation element that was not constructed per the Restoration Management Plan Outline was that the CTS pond was graded smaller than originally specified. The contractor graded a 0.06-acre pond while the project specifications called for a 0.12-acre pond.

Below in Table 1 we provide the proposed creation/restoration acreages and the actual created acreages as provided in HT Harvey & Associates' 2012 "As-built" report.

**Table 1. Comparison of Proposed (P) and Installed (I) Target Habitats at Upper Hess**

| RESTORATION SITE NAME | ALKALI WETLANDS (AC) | | OTHER WATERS (AC) | | BREEDING POND WETTED (AC) | | CHANNEL RESTORATION (LINEAR FEET) | |
|---|---|---|---|---|---|---|---|---|
| | P | I | P | I | P | I | P | I |
| CTS Breeding Pond | | | 0.005 | 0.005 | 0.12 | 0.06 | 114 | 109 |
| Upper Stock Pond | | | 0.001 | 0.000 | | | 258 | 0 |
| Channel Restoration Area | 0.05 | 0.05 | | | | | 117 | 117 |
| Main Stock Pond | 0.10 | 0.08 | 0.002 | 0.002 | | | | |
| Alluvial Valley | 2.32 | 2.16 | | | | | | |
| **Total** | **2.47** | **2.29** | **0.009** | **0.007** | **0.12** | **0.06** | **489** | **226** |

## 2. BIOLOGICAL GOALS AND OBJECTIVES OF RESTORATION

The restoration project was designed to support the HCP/NCCP's biological goals and objectives (HT Harvey & Associates 2011). Table 2, below, is copied from Table 7 in HT Harvey & Associates' Restoration Management Plan Outline (op. cit.).

**Table 2. Site-specific Restoration Objectives and Performance Criteria**

| UHCW Site-specific Restoration Objectives | Performance Criteria |
|---|---|
| SO-1. Increase the abundance and distribution of native emergent vegetation in the project area. | Year 1: 5% relative cover of wetland veg.<br>Year 2: 10% relative cover of wetland veg.<br>Year 3: 20% relative cover of wetland veg.<br>Year 4: 35% relative cover of wetland veg.<br>Year 5: 50% relative cover of wetland veg. |
| SO-2. Reduce erosion along Upper Hess Creek. | Qualitative assessment including photo-documentation before and annually for 5 years after restoration activity determines that erosion along the Upper Hess Creek onsite has been reduced. |
| SO-3. Increase wetland and pond capacity and water duration in the project area. | Wetland and pond acreage onsite has increased and is in the range of the targeted 2.47 ac. of restored wetlands and 0.12-ac of restored pond within 5 years following restoration construction. |
| SO-4. Hydrologically reconnect the Upper Hess Creek from lower stock pond to channel at property boundary. | Qualitative assessment and hydrologic monitoring based on photo-documentation and seasonal shallow groundwater monitoring annually for 5 years after restoration activity shows that Upper Hess Creek is hydrologically connected between the lower stock pond and the restored channel at the property line. |

| UHCW Site-specific Restoration Objectives | Performance Criteria |
|---|---|
| SO-5. Reduce non-native plant species in restored wetlands. | Total absolute cover of non-native invasive plant species no more than 10% relative cover.* |
| SO-6. Restore approximately 2.32 ac. of alkali wetlands in the project area. | Approximately 2.32 ac. of alkali wetlands have been restored and confirmed via a wetland delineation at the end of 5 years. |
| SO-7. Create an approximately 0.12-ac. California tiger salamander breeding pond. | An approximately 0.12-ac pond will have been restored and confirmed via wetland delineation at the end of 5 years. |
| SO-8. Restore approximately 2.32 ac. of alkali wetlands. | Same as SO-6 |
| SO-9. Create an approximately 0.12-ac California tiger salamander breeding pond in the upper tributary. | Same as for SO-7. |
| SO-10. Restore 489 linear feet of stream channel and hydrologically connect Upper Hess Creek from the main stock pond to channel at property boundary. | Same as for SO-4. |
| SO-11. Create 0.12-ac. California tiger salamander pond, enhance existing main pond, restore 489 linear feet of channel, restore approximately 2.32 ac of alkali wetlands. | Same as for SO-6, SO-7, and SO-8. |

*Non-native invasive plant species include those species with high impact rankings by the California Invasive Plant Council (Cal-IPC) and any other species determined to threaten successful restoration of the native plant communities onsite (California Invasive Plant Council 2006).

## 3. MONITORING METHODS

M&A monitored hydrology and vegetation at the restoration sites in order to assess whether the goals and objectives as detailed in Table 2, above, were being met by the restoration project. To monitor the annual progress of restored features, permanent photo locations were established at each restoration site. The first annual photographs of the site restoration features are presented in Attachment A.

### 3.1 Hydrologic Monitoring

Monitoring to assess site hydrologic conditions commenced in January 2012 as it was the first month post-restoration construction. M&A then monitored the restoration site monthly through

August 2012 in accordance with the Restoration Management Plan Outline. M&A made an additional, unscheduled visit to the site in September 2012 to install a second staff gauge in the Main Stock Pond which had dried down considerably and deeper portions of the pond were accessible for the first time. During the September 2012 site visit, hydrology of all the site features was also recorded. In future years, monitoring will be conducted monthly between December and August to coincide with the Restoration Plan methodology.

M&A used rainfall data from a nearby weather station and hydrologic data recorded during site visits to assess the hydrologic functions of the reconstructed wetland features during the 2011-2012 wet season. Precipitation in the project vicinity was estimated from rainfall data recorded at an Antioch weather station: NCDC #0232, Antioch Pumping Plant 3, Contra Costa Water District. This station is located approximately 9 miles east of the project site (Latitude: 37 degrees, 59' N; Longitude: 121 degrees, 44' W). In addition, direct observations of the wetland features were made during each site visit using the following hydration categories:

Dry – Standing water is not present on the surface within the created pond and water is not present within subsurface soils (4-6 inches deep).

Saturated – Standing water is not present on the surface within the created pond. Water is present in surface and subsurface soils.

Inundated – Standing water is present on the surface within the created pond.

In January 2012, a staff gauge was installed in the CTS pond. Another staff gauge was installed in the Main Stock Pond. Pond depths were recorded from these staff gauges. The staff gauge installed in the Main Stock Pond was not installed in the deepest portion of the pond due to greater than 5 feet of water in the pond at the time of staff gauge installation. Hence, the installed staff gauge does not measure water depth in the deepest portion of the pond but does allow M&A to record pond water levels and document the dry down rate. As mentioned in the paragraphs above, M&A had the opportunity to install a second staff gauge in the Main Stock Pond in September 2012. While this second staff gauge was installed in a deeper portion of the pond, it was not installed in the deepest portion of the pond because the deepest portion was still inaccessible. However, this second staff gauge will assist M&A in documenting the water dry down. During the course of the 2012 monitoring year, cattle knocked over/bent the t-post attached to the staff gauge in the CTS pond rendering the gauge not functional. M&A removed this staff gauge in June of 2012.

### 3.2 Vegetation Monitoring

The HT Harvey Restoration Plan's vegetation monitoring methods called for quadrat sampling using a 1-meter square quadrat. Through experimentation with various vegetation sampling methods, M&A has found that point intercept sampling as presented in Bonham (1989) is an effective, comparable method *for measuring herbaceous cover*. Most importantly, point intercept sampling is quicker than quadrat sampling. Thus, M&A proposed to the ECCCHC staff point intercept sampling methods for measuring herbaceous cover in the restoration areas in lieu of quadrat sampling. Staff agreed to allow the switch from quadrat to point intercept sampling methods if it is consistently used each and every year of the monitoring program (A. Fateman, ECCCHC, pers. comm. with S. Lynch of M&A on January 4, 2012). Having received the ECCCHC's concurrence, M&A conducted fixed line transect sampling of the Alluvial Valley Wetland using a point intercept method derived from Bonham (1989).

To implement the Bonham (1989) point intercept method, a permanent transect was established at each representative location within the Alluvial Valley Wetland. Both ends of the transects were recorded using a Trimble global positioning system (GPS) with submeter accuracy so that annual transect declinations can be relocated at the same approximate locations each year of monitoring. To measure cover of herbaceous species, a 100-foot tape measure was placed along the established transect declinations, and then point counts were made along each transect at 6-inch intervals over the total distance of 100 feet (200 total points per transect). The transect length will remain the same each monitoring year. The frequency (that is, abundance and distribution) of plants observed along each transect is then determined from the point counts as are total and relative cover of each plant species encountered along the transect. These data are also used to determine if the plant community supports a dominance of hydrophytic (wetland) plant species and/or native species. The sampling data can be compared from year to year to record plant dominance changes from baseline conditions and will be helpful for predicting future trends and/or conditions after a five-year monitoring period has elapsed.

Figure 4 of this report shows the transect locations in the Alluvial Valley Wetland. The frequency of each plant species observed along a transect run through the Alluvial Valley is calculated as follows:

$$\text{\% plant `X' in section Y} = \frac{\text{number of plant `X' counted along transect}}{\text{200 total observations along the transect}} * 100$$

Habitat affinities (i.e. obligate, facultative wetland, or facultative species) of all plants encountered during transect vegetation sampling was determined following the classification of Lichvar and Kartesz (2009). Habitat affinities include the following categories:

Obligate wetland plants (OBL) – Plants occur over 99% of the time in wetlands.

Facultative wetland plants (FACW) - Plants occur 67 to 99% of the time in wetlands.

Facultative plants (FAC) - Plants occur 67 to 33% of the time in wetlands.

Facultative upland plants (FACU) - Plants occur 33% to 1% of the time in wetlands.

Upland plants (UPL) - Plants occur less than 1% of the time in wetlands.

Non-indicator plants (NI) – No classification given in Reed (1988) due to lack of information.

Wetland indicator species are those plant species that can tolerate prolonged inundation or soil saturation during the growing season and are classified as OBL, FACW and FAC, as described above.

Fixed line transect sampling using a point intercept method was also completed along the Channel Restoration Area to calculate relative percent cover of hydrophytic plant species and determine percent cover of native plant species. One, 100-foot tape was placed in the Channel Restoration Area to collect 200 points of data.

### 3.3 Wildlife Monitoring

Wildlife observed within the Alluvial Valley Wetlands, the CTS pond, the Channel Restoration Area, and at the Main Stock Pond were recorded during each site visit.

## 4. MONITORING RESULTS FOR SITE SPECIFIC RESTORATION OBJECTIVES

The monitoring results are presented below under each site-specific restoration objective sub-header so that the focus of the monitoring visits would be reiterated. Tables 3 and 4 of this report show the plant species observed along the transects in the 2011/12 wet season and provide their total and relative percent cover, respectively. Table 5 is a complete list of all plants observed within the restoration site's wetland features during all monitoring visits.

### 4.1 SO-1. Increase Abundance and Distribution of Native Emergent Vegetation in Project Area [Restoration Areas as Presented in Table 1]

The annual performance restoration goal for Year 1 was that each restoration area (Table 1) be colonized by 5% relative percent cover of native wetland vegetation (Table 2). M&A discusses our monitoring results by restoration area below.

#### 4.1.1 ALLUVIAL VALLEY WETLANDS

According to sampling data as presented in Table 4, annual performance criterion SO-1 was not met in Year 1 at the Alluvial Valley Wetlands. The vegetation transects conducted in the Alluvial Valley Wetlands showed that while there were three native hydrophytic plant species present in this wetland along transects, the mean relative percent cover of these species along all transects was 3.0% (Table 4), which is less than the goal of 5 % relative cover. Native hydrophytic species encountered in the Alluvial Valley Wetlands included meadow barley (*Hordeum brachyantherum*) (FACW) ($\bar{x} = 2.64\%$), toad rush (*Juncus bufonius*)(FACW) ($\bar{x} = 0.4\%$), and umbrella sedge (*Cyperus eragrostis*) (FACW) ($\bar{x} = < 1.0\%$). In contrast to native wetland species cover, mean cover of non-native hydrophytic species was 98.06%, which far exceeds the 5% relative cover goal in SO-1. For example, Italian rye grass (*Festuca perennis*) (FAC) was the dominant plant species in the Alluvial Valley Wetlands in spring of 2012 with mean relative cover of 87.78%.

While the intent of the wetland restoration and wetland vegetation seeding was for the Alluvial Valley Wetlands to support more diverse and native wetland plant cover, the dominance of non-native hydrophytic vegetation may be attributable to drought-like conditions during the winter of 2011-2012 (see Figure 5 for 2011-2012 rainfall amounts), which favors colonization of Italian rye grass, a non-native, facultative (FAC) hydrophytic species. As designed and targeted, with normal to above-normal rainfall conditions, prolonged saturation and/or inundation would be more likely to favor a higher dominance of FACW and OBL hydrophytic plant species.

#### 4.1.2 Main Stock Pond

The Main Stock Pond remained inundated throughout the year and was observed holding greater than 48 inches of water in the deepest locations well into September 2012 (Figure 6; this figure shows staff gauge depths from the southern-most portion of the pond, not the deepest portion). Seacoast bulrush (*Bolboschoenus robustus*) (OBL) (native) grows along the upper channel leading into the Main Stock Pond and this species also occurs along the pond's edges. Owing to vegetation colonization suppression from long-term inundation in the Main Stock Pond, it is likely that only the edges of the pond will colonize with vegetation although it is conceivable that seacoast bulrush could become more dominant in future years. The Main Stock Pond's wetland fringe supported a dominance of OBL and FACW vegetation. Boccone's sand-spurrey (FACW) (non-native), rabbit's foot grass (*Polypogon monspilensis*) (non-native) (FACW), and meadow barley (FACW) (native) were all dominant along the pond margin throughout the monitoring season. As the pond dried down over the course of the monitoring season, exposed areas to an extent also colonized with hydrophytic species.

#### 4.1.3 Channel Restoration Area

The Channel Restoration Area (Figure 3) supported a dense vegetative cover of hydrophytic vegetation comprised of OBL and FACW plants throughout the spring and summer months. Even in early September 2012, the wetland had 1 to 2 inches of standing water and supported a dominant cover of rabbit's foot grass, meadow barley, and salt grass (FAC) (*Distichlis spicata*). This wetland also supported narrow-leaved cattail (OBL) (*Typha angustifolia*) and water cress (*Nasturtium officinale*) (OBL) with mean cover of 5% relative cover.

#### 4.1.4 CTS Pond

The CTS pond (Figure 3) was inundated for several months during the growing season (March, April, and May); hence, vegetation did not establish (0 percent cover) within the inundation area within this pond. Inundation related "vegetation scouring" is typical for seasonally wet, long-term inundated pools/ponds.

### 4.2 SO-2. Reduce Erosion Along Upper Hess Creek.

This specific restoration objective was met in Year 1 (Table 2, above). Erosion along Upper Hess Creek (that is, the restored ranch road crossing/Channel Restoration Area; Figure 3) did not appear to be a problem during the 2011-2012 monitoring year. No erosional scars or nick points were observed within the restored area. This restored former road crossing within this creek was 100% vegetated over the monitoring year with hydrophytic (wetland) plant species as described in Section 4.1.3 above. Water was flowing or standing in this area most of the year; M&A did not observe any obvious or pronounced erosional areas.

### 4.3 SO-3. Increase Wetland and Pond Capacity and Water Duration in the Project Area

The objective of increasing wetland and pond capacity and water duration in the project area was met in Year 1. Construction of the Alluvial Valley Wetlands, the CTS pond, and restoration of the Main Stock Pond and the Upper Hess Creek channel (i.e., the Channel Restoration Area), have increased the wetland acreage, pond capacity and water duration in the project area. One of the goals of the Main Stock Pond restoration (HT Harvey 2011) was "a net gain of approximately 0.10-acre of wetland habitat around the pond." (HT Harvey 2011). However, according to the As-built report, reconstruction work at the Main Stock Pond resulted in an increase in alkali wetland acreage of 0.08-acre and 0.002-acre other waters acreage at this pond (Table 1 above). Monitoring data show that this reconstruction work may have been successful; however, the final acreage of area created will not be determined until Year 5.

During the 2011-2012 monitoring year, the Main Stock Pond was filled to capacity (i.e., to the invert elevation of the spillway elevation), as was the CTS Pond, despite the low rainfall totals during the year. The at capacity inundation observed in these two ponds is attributed to two factors: (1) the Main Stock Pond's water is supplied by natural springs and seeps within the creek channel above the stock pond; (2) the constructed CTS pond is located at the bottom of a steep valley and has a relatively large watershed that funnels directly into this constructed pond.

The Alluvial Valley Wetlands, while exhibiting some areas with wetland vegetation and inundation, did not function as designed during the 2011-2012 rain year. This may be attributable to the low rainfall during the 2011/2012 wet season (Figure 5). In Year 1, approximately 0.26-acre of wetland functioned in the Alluvial Valley Wetlands. This is well short of the 2.16 acres of wetland expected at the Alluvial Valley from site restoration work (the As-built reports 2.16 acres of wetland was installed in the Alluvial Valley; Table 1).

It is hoped that with normal to above normal rainfall over the next four monitoring years that the combined wetland acreage goal of 2.47 acres of newly created wetland should develop within the Alluvial Valley Wetlands, the Main Stock Pond, and the Channel Restoration Area. Also it may be that remedial actions and modifications to the CTS Pond could increase its size, but owing to steep topography it will be difficult to increase the footprint of this pond to the goal acreage of 0.12-acre.

### 4.4 SO-4. Hydrologically Reconnect the Upper Hess Creek from Lower Stock Pond [also referred to as the "Main Stock Pond"] to Channel at Property Boundary.

This site specific restoration objective as written in the Restoration Management Plan calls for: "*Qualitative assessment and hydrologic monitoring based on photo-documentation and seasonal shallow groundwater monitoring annually for 5 years after restoration activity shows that Upper Hess Creek is hydrologically connected between the lower stock pond and the restored channel at the property line*." Figure 3 shows the creek channels, the Main Stock Pond and the lower creek channel (Lower Channel) at the property boundary.

It should be noted that the monitoring requirements presented in the Restoration Management Plan included ground water monitoring in previously installed monitoring wells. This method of monitoring ground water is no longer achievable since the ground water monitoring wells were removed at the end of the planning phase, prior to wetland restoration construction. Thus, M&A has been visually monitoring surface hydrology (extent of saturation and inundation) along the creek channels and within the constructed Alluvial Valley Wetlands. As part of this monitoring effort, M&A mapped the visible extent of saturation/inundation within the restored Alluvial Valley Wetlands using a hand-held Trimble global positioning system (GPS) with sub-meter accuracy. By projecting the GIS shape file over an aerial photograph the extent of saturation/inundation within the restoration site can be visualized and the acreage of functioning wetland can be calculated.

Although rainfall was lower than normal during the 2011/2012 monitoring year (Figure 5), there was enough water from direct precipitation and as contributed by onsite perennial seeps to confirm that there is a hydrologic connection between the Main Stock Pond and the Lower Channel. Above ground flow, or an obvious scour line from recent flows, was observed between the Main Stock Pond and the Lower Channel at the property boundary in the months of January and February 2012. Flowing water was observed in Upper Hess Creek, above the Main Stock Pond, in focused areas within the Alluvial Valley Wetlands, and in the Lower Channel at different times during the monitoring year. The Upper Creek Channel (above the Main Stock Pond) was observed to be flowing during the January to June monitoring visits, likely due to the presence of perennial seeps along this channel. However, by the August 2012 monitoring visit this channel was only saturated and barely trickling water into the Main Stock Pond. The creek channels below the Main Stock Pond were observed either flowing or with saturated soils for several months during the monitoring season. The Lower Channel held water in separate constructed pools during the months of February, March, and April.

Thus, as there was an observed hydrologic connection between the Upper Hess Creek channel and the Lower Channel, monitoring objective SO-4 was met in Year 1 despite below normal rainfall amounts during the 2011-2012 wet season.

### 4.5 SO-5. Reduce Non-native Plant Species in Restored Wetlands.

Restoration objective SO-5 calls for: "Total absolute cover of non-native invasive plant species no more than 10% relative cover." Invasive species are those with "high impact" ratings in Cal-IPC's Table 1 (Cal-IPC 2006 and electronic updates to this table). According to Cal-IPC's Inventory, non-native plants that are given a "high" impact ranking are those species that *have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically*. Examples of high impact, non-native invasive plant species found in the San Francisco Bay Area include perennial pepper weed (*Lepidium latifolium*) and giant reed (*Arundo donax*).

None of the restored wetlands supported 10% relative cover of high impact invasive plant species. While one high impact invasive plant was observed within the restoration area, perennial pepper grass, this plant was found in very small numbers. For example, the Main Stock Pond had two small clumps (approximately 20 plants) of mature pepper grass plants along the northeastern wetland edge. The restored creek channel (former road crossing) had 10 seedling plants (M&A hand pulled these plants). It was not observed elsewhere within the restoration site.

While Italian rye grass (FAC) is a dominant plant in the Alluvial Valley Wetlands, and is also common in the uplands, this plant does not have a high rating on Cal-IPC's list. Rather Italian rye grass has a rating of "moderate" on this list. Italian rye grass has been widely planted by ranchers in an attempt to improve forage opportunities for livestock. It is now ubiquitous in East Bay grasslands and its control is near impossible due to the abundant seed source throughout the East Bay open spaces. Future years of normal to high rainfall likely would suppress the total cover of this plant species in favor of those species with "wetter" hydrophytic statuses (for example, FACW and OBL) in restored wetlands.

Only one high impact invasive plant species found on Cal-IPC's Table 1, pepper grass, was observed in the restored wetlands. Its total absolute cover was very low and not measurable within defined transects. As non-native invasive plant species represented less than 10% of the relative cover within the Restoration Project wetlands, restoration objective SO-5 was met in Year 1.

## 4.6 SO-6. Restore Approximately 2.32 ac. of Alkali Wetlands in the Project Area.

This specific restoration objective as shown in Table 2 (above) and taken from the Restoration Management Plan Outline (HT Harvey 2011) is less than straight forward. Table 1 (above) of the "As-built" report shows proposed construction/restoration of 2.47 acres of "alkali wetlands" in the project area. SO-6 calls for the restoration of "approximately 2.32 acres of Alkali Wetlands in the project area." Note that 2.32 acres is the acreage goal for alkali wetland creation in the "Alluvial Valley Wetlands." We believe this is a typo in SO-6 and instead of "Project Area" it should be in the Alluvial Valley. M&A therefore is assuming that the specific objective of SO-6 is to create 2.32 acres of alkali wetland within the Alluvial Valley.

While M&A believes the objective of SO-6 was to create approximately 2.32 acres of alkali wetlands within the Alluvial Valley, Table 1 of the As-built report shows that the installed acreage of Alluvial Valley Wetlands was 2.16 acres. Accordingly, M&A believe that the SO-6 objective should be to restore 2.16 acres of Alluvial Valley Wetlands. Regardless, to determine if the objectives set forth in SO-6 are met in Year 5, the final functioning acreage of Alluvial Valley Wetland will be GPSed/calculated. Below we provide a discussion on the Alluvial Valley Wetlands and their functionality during the 2011-2012 monitoring year.

Within the Alluvial Valley Wetlands, approximately 0.26-acre of the proposed 2.16 acres of constructed/restored alkali wetlands exhibited hydrology in the 2011/2012 wet season. Specific alkaline wetland indicators observed within this valley in the 2011/2012 wet season included presence of salt tolerant plants such as salt grass (*Distichlis spicata*) and swamp pricklegrass (*Crypsis schoenoides*), and there was a salt crust within the functioning wetland areas visible on the ground during late-season monitoring visits.

Since the 2011/2012 wet season was relatively dry, it is expected that in wetter years that more area within the Alkali Valley Wetland restoration area will support wetland hydrology. It likely is too early in the monitoring program to tell if the goal of restoring 2.16 acres of alkali wetlands in this valley can be achieved by this component of the Restoration Project. Monitoring of the Alkali Valley Wetland restoration area in the 2012/2013 wet season has commenced (as of this writing). Thus far there has been an expansion of functioning wetland area since the 2011/2012 wet season, likely due to an increase in rainfall in the 2012/2013 wet season.

## 4.7 SO-7. Create an Approximately 0.12-Acre California Tiger Salamander Breeding Pond.

Restoration Goal SO-7 is to construct a 0.12-acre pond that would provide breeding habitat for California tiger salamander (CTS) (*Ambystoma californiense*), a state and federal listed threatened species. The "As-built" report prepared by HT Harvey and Associates (2012) states: *data from the post-constructed condition of the CTS Pond indicate a ponding area of 0.06 ac (design provided for 0.12 ac). In addition, elevation data taken at that time [a January 2012 site* *visit] showed that the berm/dam face did not provide any free-board, and that the spill point was located too close to the berm/dam face and not centered in the spillway.* Hence, it appears that this pond was not constructed as originally proposed. Remedial measures are under consideration by the ECCCHC that include possibly raising the height of the berm to increase the pond depth and area of inundation. M&A believes that owing to the steep adjacent slopes that the berm would have to be raised considerably higher to net any significant increase in pond area. Prior to implementing measures to increase the berm height, an analysis should be completed that projects the net increase in pond area based upon added heights to the berm. The additional height of the berm required to net new pond area should be weighed against berm maintenance requirements, and the character of a taller berm in the setting of this pond.

The 0.06-acre pond that resulted from the construction effort inundated during the 2011-2012 wet season and held water for several months. This pond started to fill in January 2012 (i.e., it held 1-inch of water on the very bottom), was dry in February, and was ¾-full in March and April of 2012. It started to dry down in May, and was dry by July 2012. Despite the unusually dry winter and spring of 2011/2012, M&A documented this pond holding water and functioning as intended over a four month period.

This pond did not support breeding CTS during 2012. The rains likely came too late in the 2011-2012 wet season to fill the pond for migrating/moving/breeding CTS. CTS typically arrive at their breeding ponds between November and February to mate and lay eggs (Jennings and Hayes 1994). The construction of this pond was not finished until the end of 2011. At the time of the January 10, 2012 monitoring visit it was dry. During the January 30, 2012 monitoring visit it only held 1-inch of water in the very bottom. This pond remained dry through the month of February 2012, not providing an aquatic habitat for CTS to lay eggs. It wasn't until March 2012, when the area received approximately 1.59 inches of rain[1] that the pond inundated, holding approximately 15 inches of water. The pond's depth increased to a maximum depth of approximately 36 inches in April 2012 and then gradually receded and was dry in July 2012.

SO-8 has the same goals as SO-6 and is not reiterated here.
SO-9 has the same goals as SO-7 and is not reiterated here.

### 4.8 SO-10. Restore 489 Linear Feet of Stream Channel and Hydrologically Connect Upper Hess Creek from the Main Stock Pond to Channel at Property Boundary.

Because the Upper Stock Pond was not drained and restored, Restoration Goal SO-10 which called for restoration of 489 linear feet of stream channel was not met by the restoration project (as discussed in Section 1 of this report). Rather only 226 linear feet of stream channel was restored during completion of restoration work (Table 1). Since Restoration Goal SO-10 only resulted in 226 linear feet of channel restoration, M&A believes that this Specific Objective (SO) 10 should be restated indicating that the goal is 226 linear feet of stream channel restoration.

M&A visually assessed the stream channel below the CTS Pond (109 linear feet restored), Upper Hess Creek Channel (117 feet restored), the Main Stock Pond, and the Lower Channel (Figure 3) during each and every monitoring visit. The Upper Hess Creek drains into the Main Stock Pond

[1] Antioch Weather Station: NCDC #0232, Antioch Pumping Plant 3, Contra Costa Water District.

which in times of high flows/high rainfall overflows into the lower creek channel to the Alluvial Valley Wetlands and down to the Lower Channel at the property's eastern boundary. The 226 linear feet of stream channel that was restored was monitored by M&A during the 2011/2012 monitoring year. During monitoring visits Upper Hess Creek was either flowing or exhibited saturated soil conditions. Vegetation growing along this channel consisted of FACW and OBL hydrophytic vegetation.

Approximately 226 feet of restored stream channel functioned during the 2011-2012 monitoring year. Additionally, the Main Stock Pond was also hydrologically connected with the Lower Channel at the property boundary as intended.

SO-11 has the same goals as SO-6, SO-7, and SO-8, thus, is not reiterated here.

## 5. WILDLIFE OBSERVATIONS

A variety of wildlife was observed during monitoring visits. The restored and constructed wetlands increase the habitat diversity of the area, provide an essential water source for wildlife over the restoration area, and attract and maintain wildlife species in an otherwise dry landscape. Table 6 is a list of all wildlife observed during the monthly monitoring visits January through August 2012.

The main stock pond remains inundated nearly year round and holds greater than 36 inches of water in the deepest locations well into September. This pond supports breeding, egg laying and larval development of Sierran tree frogs (*Pseudacris sierra*), western toads (*Bufo boreas*), and California red-legged frogs (*Rana draytonii*). Rafts of western toad larvae, numbering in the hundreds of thousands, were observed floating/swimming at the pond's surface in the spring of 2012. Adult toads were also observed in the vegetation at the drainage's confluence with the pond. Sierran tree frog larvae were observed swimming at the pond's edge, though they were not as numerous as the western toad larvae.

California red-legged frog adults and subadults were observed in the Main Stock Pond on almost every monitoring visit. On May 24, 2012, 25 adults and subadult California red-legged frogs were observed resting in the rabbit's foot grass along the pond's western bank (where the creek channel enters the pond). These frogs were sunning when originally observed, but quickly jumped (escaped) into the pond when approached. Although M&A never dip-netted the stock pond, breeding of California red-legged frog was confirmed when one dead California red-legged frog larvae (approximately 2 inches total length) was observed floating in the pond during a September 2012 site visit. The cause of death was not apparent. M&A left the larvae in the pond.

M&A recorded all wildlife observed during each monitoring visit, not just those species associated with the wetland features. The Main Stock Pond's berm was frequented by killdeer (*Charadrius vociferus*). An addled killdeer egg was found on the berm, but had been abandoned. It is unknown if a remainder clutch hatched and dispersed, but evidence suggested that the egg was solitary and not part of a clutch that hatched (no other shell fragments were observed). The pond's dense emergent vegetation also provided cover for a few foraging birds such as song sparrow (*Melospiza melodia*) and red-winged blackbird (*Agelaius phoeniceus*), both of which were observed during multiple site visits.

The surrounding grasslands and the drying Alluvial Valley Wetlands provide habitat for a number of snakes that were observed as daily temperatures increased in the spring months. Both gopher snakes (*Pituophis catenifer*) and western rattlesnakes (*Crotalus viridis*) were observed in the dry portions of the wetlands during a June 2012 site visit. Western fence lizards (*Sceloporus occidentalis*) were observed on all the log features installed near restored wetlands as part of the restoration project. Grassland rodents such as California meadow vole (*Microtus californicus*) were common along the upper pond edges and provide food for a number of predators observed onsite including the coyote (*Canis latrans*), red-tailed hawk (*Buteo jamaicensis*) and northern harrier (*Circus cyaneus*).

## 6. REMEDIAL ACTIVITIES COMPLETED IN 2012

An October 16, 2012 memorandum from Balance Hydrologics, Inc. (Balance) to the ECCCHC details remedial activities completed on the Lower Channel cascade structure to improve the function of this structure (Attachment B). The remedial work involved raising the upper-most boulder structure by adding an additional course of large boulders, and several courses of rock slope protection on top of that. The total height increase was approximately 3 feet above the previous top course. In addition, the sides, face, and toe of the structure were armored with the rock slope protection, and backfilled with Class 2 aggregate base and native soils. The structure was tied into the berm along the left bank and the slope along the right bank. The area behind the structure was backfilled. An originally planned second drop structure was not constructed as part of the remediation project since the elevations achieved by the main structure (upper-most boulder structure by adding an additional course of large boulders, and several courses of rock slope protection on top of that) and limitation of material available on site. All disturbed areas were planted with native seed and covered with hay from existing hay bales and old wattles.

## 7. RECOMMENDATIONS

M&A observed three areas that could use attention in 2013:

1. The dirt road leading down to the main stock pond did not seed well in 2012 due to a paucity of rain events. As a result of low germination rates for distributed erosion control seeding, rill erosion occurred along the road. The ECCHC tried to slow and otherwise prevent this erosion by installing hay waddles across the road. This helped somewhat but did not prevent road based sediments from entering the Main Stock Pond. Since this road is no longer used (it was constructed to allow construction equipment access to the restoration sites) M&A recommends that this condition be watched during the winter and spring of 2013 and if natural vegetation establishment does not occur that the area be reseeded in the fall of 2013 and jute matting placed along the road.

2. M&A observed two patches of perennial pepper grass within the restoration area during the 2011-2012 monitoring year. These two patches should be selectively sprayed with an herbicide to control the spread of these invasive plants. M&A will continue to monitor the restoration area for other invasive plants that need controlling.

3. Remedial measures that include raising the berm of the CTS Pond to increase pond acreage should be analyzed and weighed. M&A believes that owing to the steep adjacent slopes that the berm would have to be raised considerably higher to net any significant increase in pond area. Prior to implementing measures to increase the berm height, an analysis should be completed that projects the net increase in pond area based upon added heights to the berm. The additional height of the berm required to net new pond area should be weighed against berm maintenance requirements, and the character of a taller berm in the setting of this pond.

Reporting recommendations for future years:

1. Table 1 of the "As-built" report (HT Harvey 2012) calls for the installation of 2.47 acres of "alkali wetlands." We believe that this goal should be changed to 2.47 acres of "seasonal wetlands" since there are more naturally occurring seasonal wetlands onsite and this goal is easier to achieve than creating large areas of alkali wetlands.

## 8. DISCUSSION AND CONCLUSION

The following site-specific restoration objectives (SO) were met during Year 1:

SO-1
SO-2
SO-3
SO-4
SO-5

The following SOs were not met and for the following reasons:

SO-6 was not met during Year 1 because only 0.26-acre of the net goal of 2.32 acres of Alluvial Valley Wetlands met its hydrologic functions. It is hoped that with normal to above normal rainfall in 2013 that this goal will be met.

SO-7 was not met during Year 1 because the contractor only constructed 0.06-acre of wetland (CTS pond) instead of 0.12-acre. However, this 0.06-acre pond functioned as intended. It may be that remedial actions and modifications to the CTS pond could increase its size but owing to steep topography it will be difficult to increase the footprint of this pond to the goal acreage of 0.12-acre.

SO-10 was not met during Year 1 because the goal of restoring 489 linear feet of stream channel was not completed since removal of the Upper Stock Pond and restoration of the stream channel did not take place. However, the 226 linear feet of stream channel that was restored functioned as intended.

## 9. REFERENCES

Baldwin D.H, Goldman D.H., Keil D.J., Patterson R, Rosatti T.J., Wilken D.H. (ed.). 2012. The Jepson Manual Vascular Plants of California: Second Edition. University of California Press, Berkeley. 1568 pps.

Bonham, C.D. 1989. Measurements for terrestrial vegetation. John Wiley & Sons. New York. 338 pps.

California Invasive Plant Council (Cal-IPC). 2006. Table 1: Invasive non-native plants that threaten wildlands in California. February 2006. http://www.cal-ipc.org/ip/inventory.

California Invasive Plant Council (Cal-IPC). Electronic update to Table 1 viewed in 2012. http://www.cal-ipc.org/ip/inventory.

H.T. Harvey & Associates. 2011. Upper Hess Creek restoration project restoration management plan outline. Drafted July 22, 2011. 41 pages plus appendices.

H.T. Harvey & Associates. 2012. Upper Hess Creek habitat restoration project biological as-built report. Project No. 2927-05. February 23, 2012.

Jennings, M.R., M.P. Hayes, and Research Section, Animal Management Division, Metro Washington Park Zoo. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report Submitted to the California Department of Fish & Game, Inland Fisheries Division. Rancho Cordova, CA. 255 pp. November 1.

Jones & Stokes, 2006. East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan. October. (J&S 01478.01). San Jose, California.

Lichvar R.W. and J. T. Kartesz. 2009. North American Digital Flora: National Wetland Plant List, version 2.4.0 (https://wetland_plants.usace.army.mil). U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH, and BONAP, Chapel Hill, NC.

U.S. Army Corps of Engineers. 1987. Corps of Engineers wetlands delineation manual. Waterways experiment station. Technical Report, Y-87-1. Vicksburg, Mississippi. 100 pp.


Miles 0 2.5 5 10 15 20 25

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Figure 1. Upper Hess Creek
Habitat Restoration Project Site Regional Map
Contra Costa County, California

County: Contra Costa
Map Preparation Date: January 8, 2013

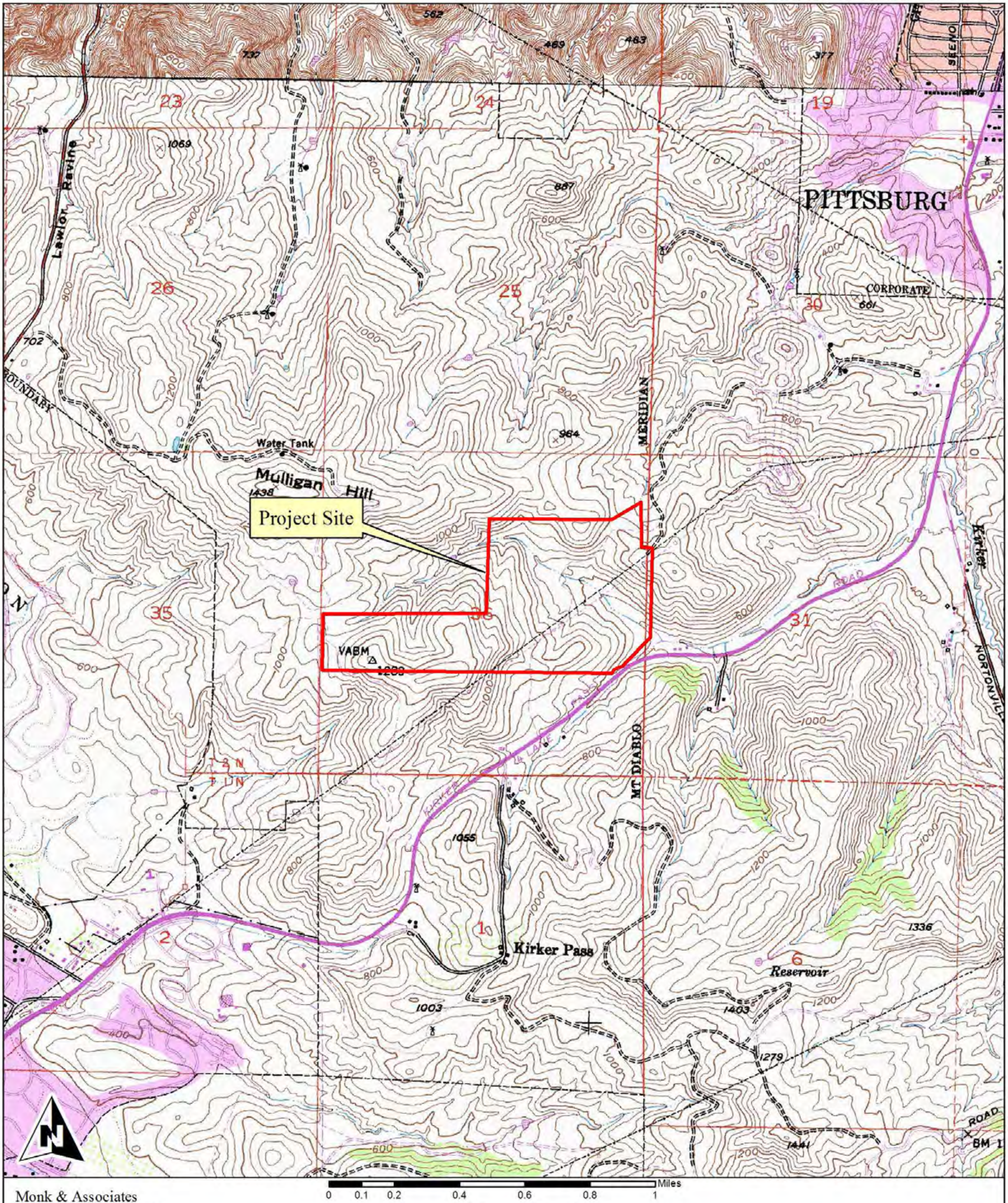


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Figure 2. Upper Hess Creek
Habitat Restoration Project Site Location Map
Contra Costa County, California

7.5-Minute Clayton quadrangle
Topography Source: http://gis.ca.gov
Map Preparation Date: January 7, 2013

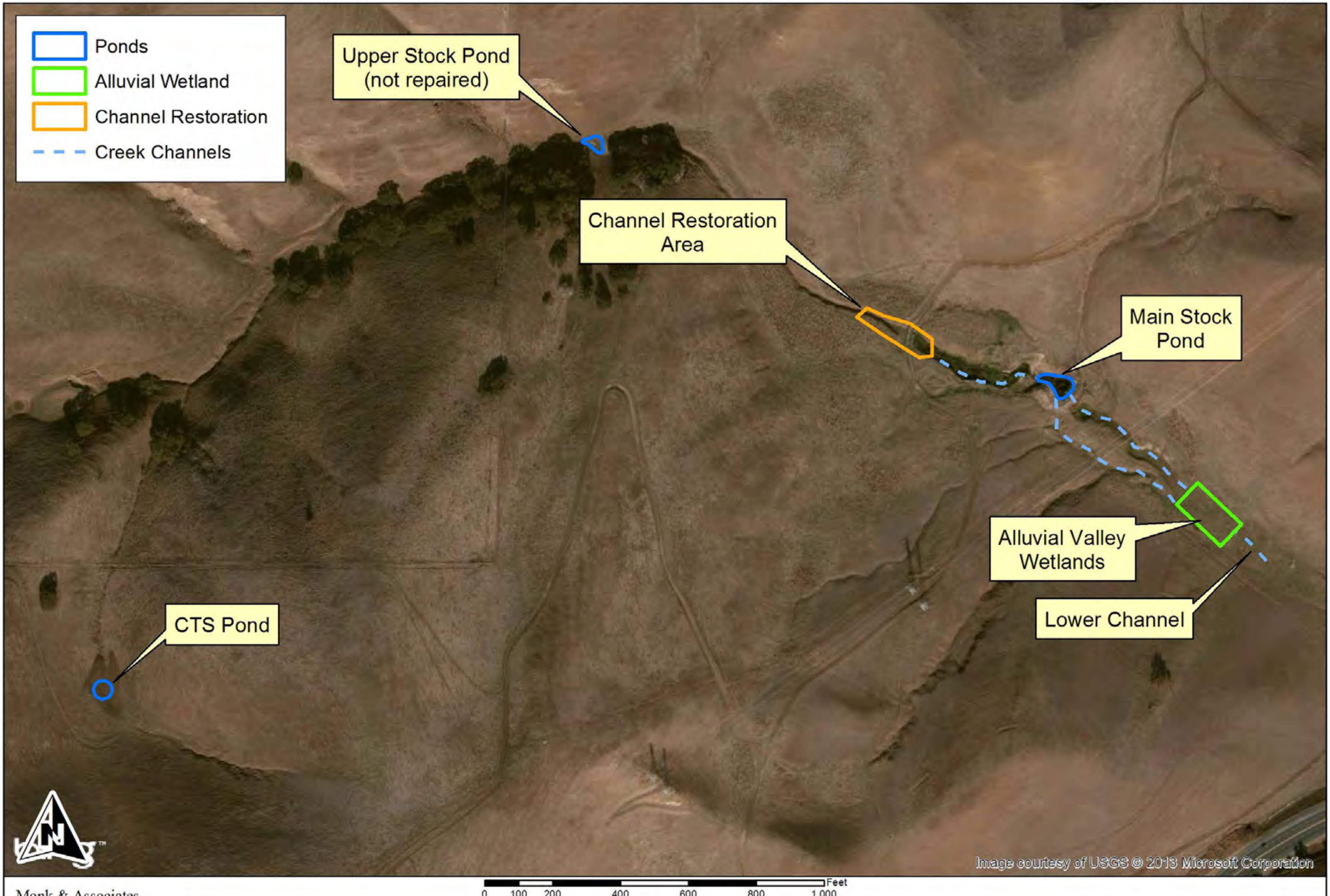


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Figure 3. Site Features
Upper Hess Creek Restoration Site
Contra Costa County, California

Map Preparation Date: January 23, 2012
Aerial Photograph Source: Bing Maps

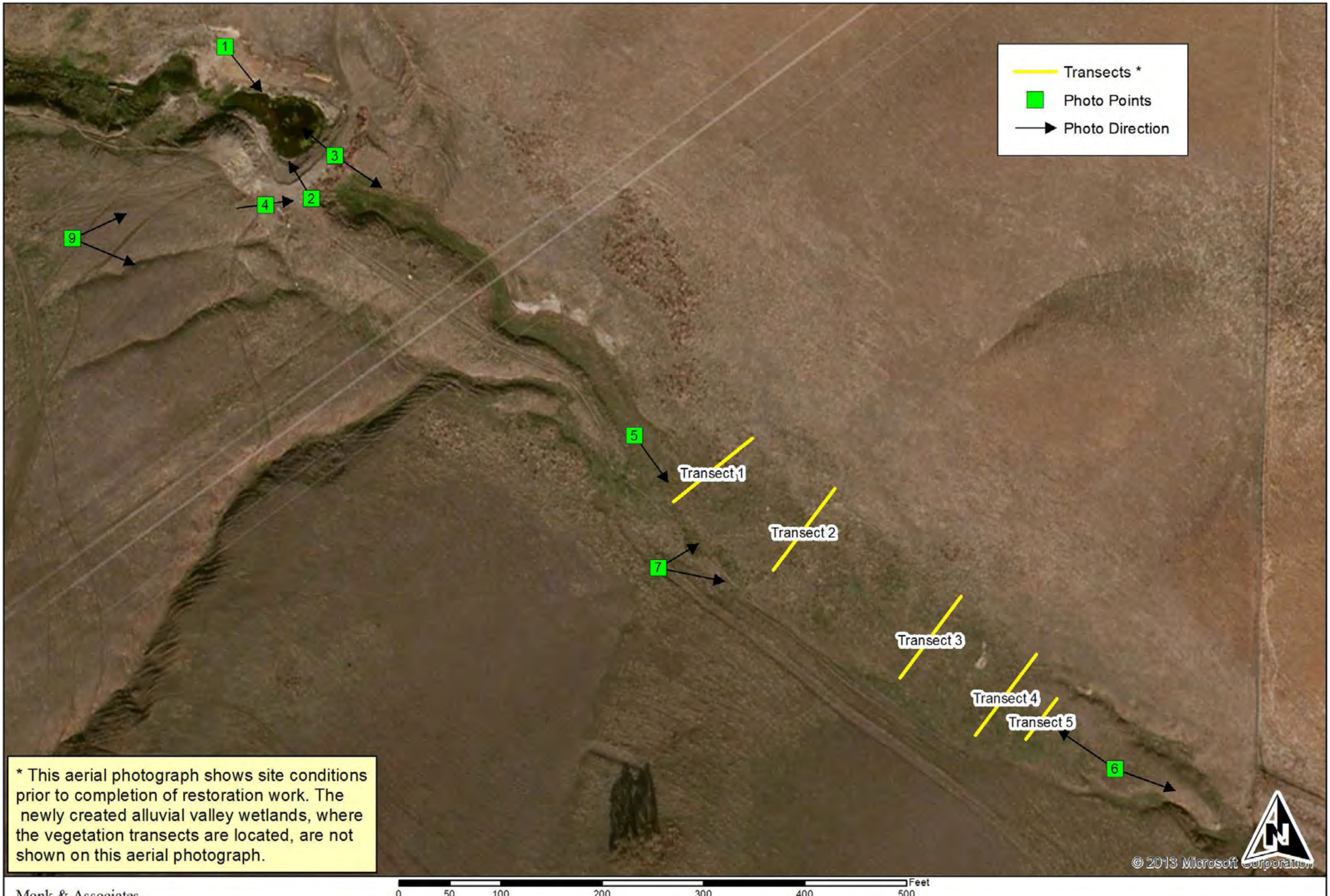


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Figure 4. Upper Hess Creek Habitat Restoration Project Area Showing Vegetation Transect Locations in the Alluvial Valley Wetlands Contra Costa County, California

Map Preparation Date: January 8, 2013
Aerial Photograph Source: Bing Maps

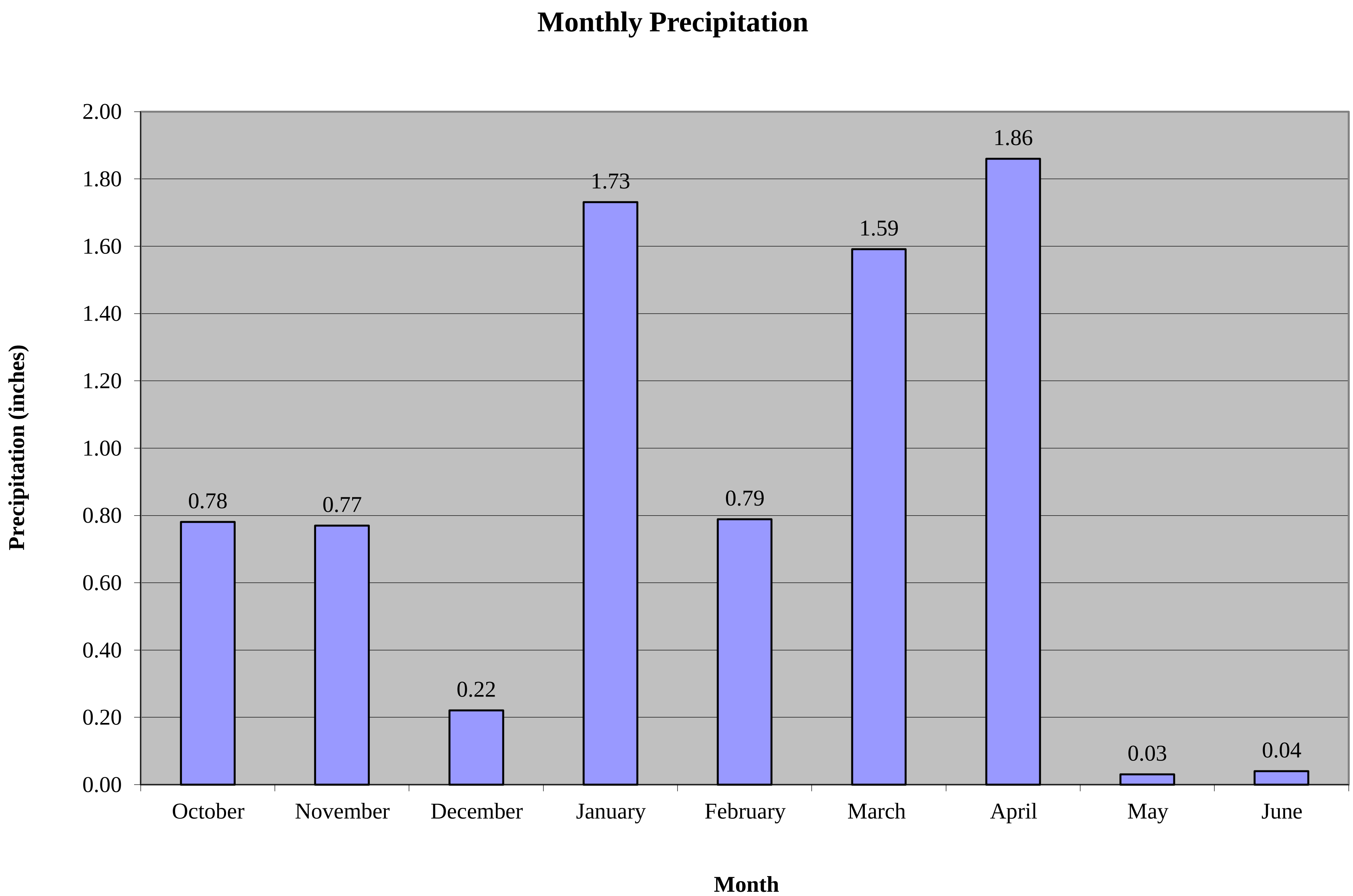
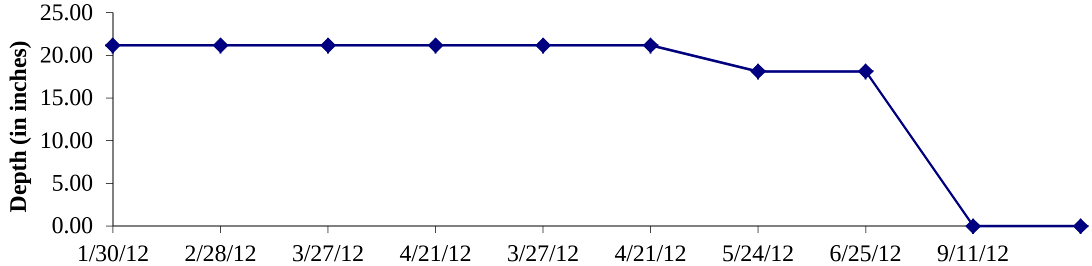



**Figure 5**. Monthly Rainfall (Inches) From October 2011 Through June 2012 Near the Upper Hess Restoration Site.

# Figure 6. Monthly Maximum Water Depths (Inches) in the Stock Pond




Water depths recorded in the main stock pond are based on staff gauge readings made from a gauge installed in the southern portion of the pond - not the deepest portion of the pond which is at least 5 feet deep or more. The deepest portion of the pond held water throughout 2012.

## Table 3

### Total Percent Vegetative Cover Observed Along Transects within the Alluvial Valley Wetlands

| | Transect 1 | Transect 2 | Transect 3 | Transect 4 | Transect 5 |
|---|---|---|---|---|---|
| **Vegetation Cover** | 30.0 | 95.5 | 100.0 | 92.0 | 100.0 |
| **Bare Ground/ Open Water** | 70.0 | 4.5 | 0.0 | 8.0 | 0.0 |

## Table 4

### Relative Percent Vegetative Cover Observed Along Transects within the Alluvial Valley Wetlands

| Species | Wetland Status | Transect 1 | Transect 2 | Transect 3 | Transect 4 | Transect 5 | Mean |
|---|---|---|---|---|---|---|---|
| *Schoenoplectus sp.* (N) | OBL | x | | | | | 0.0 |
| *Typha sp.* (N) | OBL | x | x | | | | 0.0 |
| *Crypsis schoenoides* | OBL | x | x | | x | | 0.0 |
| **Total Relative Cover of OBL Species** | | **0.0** | **0.0** | | | **0.0** | **0.0** |
| *Juncus bufonius* (N) | FACW | x | 1.0 | | 1.0 | | 0.4 |
| *Polypogon monspeliensis* | FACW | 1.7 | 3.7 | 1.0 | 1.0 | | 1.48 |
| *Cyperus eragrostis* (N) | FACW | | x | | | | 0.0 |
| *Polygonum aviculare* | FACW | | x | x | 1.0 | | 0.2 |
| *Hordeum brachyantherum* (N) (S) | FACW | 5.0 | 4.2 | 3.0 | 1.0 | | 2.64 |
| *Spergularia bocconi* | FACW | | x | | | | 0.0 |
| **Total Relative Cover of FACW Species** | | **6.7** | **8.9** | **4.0** | **4.0** | **0.0** | **4.72** |
| *Festuca perennis* | FAC | 83.3 | 79.6 | 91.0 | 89.0 | 96.0 | 87.78 |
| *Phalaris paradoxa* | FAC | | | 2.0 | | | 0.4 |
| *Hordeum marinum gussoneanum* | FAC | 8.3 | 11.5 | 1.0 | 2.0 | 3.0 | 5.16 |
| **Total Relative Cover of FAC Species** | | **91.6** | **91.1** | **94.0** | **91.0** | **99.0** | **93.34** |
| *Bromus hordeaceus* | FACU | | | x | | x | 0.0 |
| *Hordeum murinum leporinum* | FACU | | | 3.0 | | x | 0.6 |
| *Medicago polymorpha* | FACU | x | | 1.0 | 2.0 | x | 0.6 |
| *Helminthotheca echioides* | FACU | | | | | | 0.0 |
| *Lactuca serriola* | FACU | x | x | x | | | 0.0 |
| *Cynodon dactylon* | FACU | | | | | | 0.0 |
| **Total Relative Cover of FACU Species** | | **0.0** | **0.0** | **4.0** | **2.0** | **0.0** | **1.2** |
| *Avena barbata* | UPL | | | x | 1.0 | x | 0.2 |
| *Sonchus oleraceus* | UPL | x | x | 1.0 | 1.0 | | 0.4 |
| *Festuca microstachys* (N) (S) | UPL | | | | x | 1.0 | 0.2 |
| *Silybum marianum* | UPL | x | | | x | | 0.0 |
| *Triticum aestivum* (S) | UPL | 1.7 | | 1.0 | 2.0 | x | 0.9 |
| *Centaurea solstitialis* | UPL | x | | | 1.0 | | 0.2 |
| *Brassica nigra* | UPL | x | | | 1.0 | x | 0.2 |
| **Total Relative Cover of UPL Species** | | **1.7** | **0.0** | **2.0** | **5.0** | **1.0** | **1.94** |
| **Total Relative Cover of Hydrophytic Species (OBL, FACW, FAC)** | | **98.3** | **100.0** | **98.0** | **95.0** | **99.0** | **98.06** |
| **Total Relative Cover of Native Hydrophytic Species** | | **5.0** | **5.2** | **3.0** | **2.0** | **0.0** | **3.0** |

**(N) = Native Species (S) = Seeded**
**x = Species observed, but not occurring within transect line.**

# Table 5

## Plants Observed at the Upper Hess Restoration Site January - August 2012

### Angiosperms - Dicots

#### Asteraceae

| | |
|---|---|
| **Asteraceae** | |
| **Anthemis cotula* | Mayweed |
| **Centaurea solstitialis* | Yellow starthistle |
| *Centromadia fitchii* | Fitch's spikeweed |
| **Helminthotheca echioides* | Bristly ox-tongue |
| **Lactuca serriola* | Prickly lettuce |
| **Silybum marianum* | Milk thistle |
| **Sonchus oleraceus* | Common sow-thistle |
| **Boraginaceae** | |
| *Heliotropium curassavicum var. oculatum* | Heliotrope |
| **Brassicaceae** | |
| **Brassica nigra* | Black mustard |
| **Lepidium latifolium* | Broadleaf pepperweed |
| **Nasturtium officinale* | Water cress |
| **Sisymbrium altissimum* | Tumble mustard |
| **Caryophyllaceae** | |
| **Spergularia bocconi* | Boccone's sand-spurrey |
| **Fabaceae** | |
| **Medicago polymorpha* | California burclover |
| **Polygonaceae** | |
| **Polygonum aviculare* | Common knotweed |
| **Ranunculaceae** | |
| *Ranunculus hebecarpus* | Downy buttercup |
| **Salicaceae** | |
| *Salix sp.* | Willow |

### Angiosperms -Monocots

| | |
|---|---|
| **Cyperaceae** | |
| *Bolboschoenus robustus* | seacoast bulrush |
| *Cyperus eragrostis* | Tall flatsedge |
| *Schoenoplectus americanus* | Olney's bulrush |
| **Juncaceae** | |
| *Juncus bufonius* | Toad rush |
| *Juncus sp.* | Rush |
| **Poaceae** | |
| **Avena barbata* | Slender wild oat |
| **Crypsis schoenoides* | Swamp pricklegrass |
| **Cynodon dactylon* | Bermudagrass |
| *Distichlis spicata* | Saltgrass |
| *Festuca microstachys* | Small fescue |

* Indicates a non-native species

## Table 5

## Plants Observed at the Upper Hess Restoration Site January - August 2012

| | |
|---|---|
| **Poaceae (continued)** | |
| **Festuca perennis* | Italian ryegrass |
| *Hordeum brachyantherum* | Meadow barley |
| **Hordeum marinum subsp. gussoneanum* | Mediterranean barley |
| **Hordeum murinum subsp. murinum* | Foxtail barley |
| **Phalaris paradoxa* | Paradox canary-grass |
| **Polypogon monspeliensis* | Annual beard grass |
| **Triticum aestivum* | Wheat |
| **Themidaceae** | |
| *Triteleia laxa* | Ithuriel's spear |
| **Typhaceae** | |
| *Typha angustifolia* | Narrow-leaved cattail |

* Indicates a non-native species

# Table 6

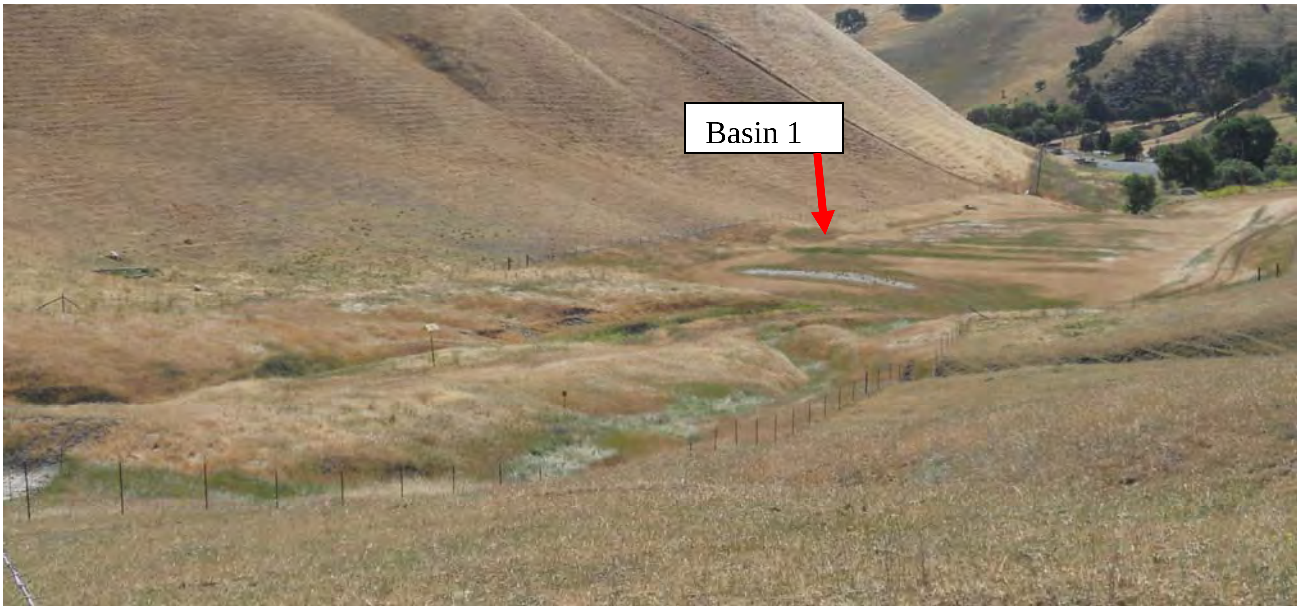
## Wildlife Observed at the Upper Hess Restoration Site January - August 2012

| | |
|---|---|
| **Amphibians** | |
| Western toad | *Bufo boreas* |
| Sierran treefrog | *Pseudacris sierra* |
| California red-legged frog | *Rana draytonii* |
| **Reptiles** | |
| Western fence lizard | *Sceloporus occidentalis* |
| Gopher snake | *Pituophis catenifer* |
| Western rattlesnake | *Crotalus viridis* |
| **Birds** | |
| Northern harrier | *Circus cyaneus* |
| Red-tailed hawk | *Buteo jamaicensis* |
| Killdeer | *Charadrius vociferus* |
| Lesser yellowlegs | *Tringa flavipes* |
| Mourning dove | *Zenaida macroura* |
| Loggerhead shrike | *Lanius ludovicianus* |
| Common raven | *Corvus corax* |
| Cliff swallow | *Petrochelidon pyrrhonota* |
| Savannah sparrow | *Passerculus sandwichensis* |
| Song sparrow | *Melospiza melodia* |
| Red-winged blackbird | *Agelaius phoeniceus* |
| Western meadowlark | *Sturnella neglecta* |
| Hooded oriole | *Icterus cucullatus* |
| **Mammals** | |
| Coyote | *Canis latrans* |

**Attachment A. Photographs of the Upper Hess Creek Restoration Area**
**2011-2012 Monitoring Season**

**Photograph #1.** Overview of the newly constructed Alluvial Valley Wetlands on January 11, 2012.

**Photograph #2.** Overview of Main Stock Pond and the Alluvial Valley Wetlands on January 11, 2012.



**Photograph #3.** May 24, 2012 photograph of the Alluvial Valley Wetlands.


**Photograph #4.** Showing inundation in Basin 1 of the Alluvial Valley Wetlands on April 21, 2012. Photo direction southwest.

**Photograph #5.** The newly constructed CTS Pond on January 11, 2012. Staff gauge installed this date.

**Photograph #6.** CTS Pond on March 23, 2012. Pond is approximately 15 inches deep. Staff gauge bent over from cattle rubbing up against it. Pond has not reached capacity and spilled.

**Photograph #7.** CTS Pond on April 21, 2012 approximately 36 inches deep.

**Photograph #8.** The Main Stock Pond on January 30, 2012. Looking northwest (upstream) towards the Upper Hess Creek Channel.

**Photograph #9.** Looking northwest at the Main Stock Pond on April 21, 2012. Note: No exposed rocks in the water (see photo below).

**Photograph #10.** Looking northwest at the Main Stock Pond on September 11, 2012. This photograph shows the exposed western bank, with water drawn down below the rocks, and a t-post (installation date unknown – prior to site restoration) that is typically under water near the deepest portion of the pond.


**Photograph #11.** Main Stock Pond looking southeast on September 11, 2012 showing pond draw down. The exposed t-post was an opportunity for M&A to install a second, 3 1/2-foot staff gauge in the pond. With the first rains of the 2012-2013 season, the newly installed staff gauge at this t-post was completely submerged.

**Photograph #12.** Articulated block spillway below stock pond on January 30, 2012.

**Photograph #13.** January 30, 2012. Lower portion of the Alluvial Valley Wetlands leading to the Lower Channel near the property's eastern boundary. This photo shows head-cutting coming up the Lower Channel.

**Photograph #14.** Lower Channel on January 30, 2012. This channel is immediately below the head-cutting shown in Photograph #13 above.

**Photograph #15.** The Lower Channel on March 23, 2012.

**Photograph #16.** March 23, 2012 photograph of the Channel Restoration Area above the Main Stock Pond. Photo looking northeast. This photo shows ponding water and wetland vegetation establishing. No signs of erosion.

# ATTACHMENT B

**Memo**

To: Abigail Fateman, East Contra Costa County Habitat Conservancy (ECCCHC)
From: Erik Moreno, E.I.T.
Review by: David Shaw, P.G.
Date: October 16, 2012

**Subject: Cascade-pool Structure Rehabilitation for the Upper Hess Wetland Outflow, Contra Costa County, California**

Introduction:

Balance Hydrologics, Inc. working with Thunder Mountain Enterprises, Inc. has completed the rehabilitation effort for the Upper Hess Creek Restoration Project. This memo has been created to describe the attempted rehabilitation approach, the implemented approach, and to describe the time that we were on site and the activities that we were involved with.

Planned Rehabilitation Approach:

Balance staff considered the time allotted to complete the rehabilitation, the project budget, and the assumed quantity of materials on-site to create a design to improve conditions surrounding the upstream-most boulder structure. The concept involved mining the project site for large boulders and using them to construct an additional course of rock above the existing top course to raise the structure by approximately 1-foot. Imported Rock Slope Protection (RSP) facing and Class 2 Aggregate Base (AB) would be used to chink the voids of the added boulders, and to provide further armoring to the existing face of the structure. The right bank would be built up to prevent the structure from being undermined by flows from the side. All remaining materials would then be used to create a second drop upstream of the boulder structure to achieve the final 1.3 feet to stabilize the existing head cut in the wetland.

Implemented Rehabilitation Approach:

The upper-most boulder structure was raised by adding an additional course of large boulders, and several courses of RSP facing on top of that. The total height increase was approximately 3 feet above the previous top course. In addition, the sides, face, and toe of the structure were armored with the RSP, and backfilled with AB and native soils. The structure was tied into the berm along the left bank and the slope along the right bank. The area behind the structure was backfilled. The originally planned second drop structure was not constructed, given the elevation that was achieved at the main structure and limitation of material available on site. All disturbed areas were planted with native seed and covered with hay from existing hay bales and old wattles.

Observation Summary – Day 1:

The first day of observed construction involved exploration activities to determine the extents of the existing boulders. The excavation around the existing structure showed that the boulder structure was not keyed into the left and right banks. Furthermore, there were no boulders that were found at the toe of the structure within the downstream pool. We were able to salvage several large boulders from the existing stock pile, but no material from the structure itself. And after backfilling and compacting the exploration pit at the toe of the structure, the Contracort ended the day by starting to excavate a shelf above the top row of boulders.

Observation Summary – Day 2:

The second day of observation began with the Contractor completing excavation and compaction of the shelf above the structure. A 4 to 6-inch layer of AB was placed on top of the compacted soil. The large boulders that were salvaged from on site were placed above the existing top row of boulders. Select material from the imported RSP and the AB were used to chink voids between the large boulders.

A shelf was then excavated on the right bank adjacent to the structure and the remaining large boulders were placed to widen the bottom and middle courses of boulders. RSP was placed to further widen the structure and the last remaining large boulder was placed at the top row.

Observation Summary – Day 3:

The third day of observation began with the Contractor placing several layers of RSP behind the top row of large boulders, and chinking all voids with AB. The right side of the structure was built up higher using RSP, and then the back of the structure was backfilled with native soils and compacted. Additional RSP was constructed on top to further raise the top of structure and tied into the berm on the left bank and the right bank. RSP was also placed along the entire face of the structure to provide a more gradual sloping drop down into the pool, and at the toe to provide some splash and scour protection. Upstream of the structure, select RSP was placed into the head cut.

Observation Summary – Day 4:

The Contractor completed placing the remaining RSP facing above the uppermost layer of RSP and backfilled using soils taken from on site.  The location that the soil was taken from was selected because it was on a rise and is not anticipated to be inundated during a storm event.  Because there was no longer any AB, the soil was used to fill in voids between the uppermost layer of RSP.  The soil was then placed and compacted to fill the low area between the wetland and the structure.  The pit used to generate soil for backfill was then scraped down to blend into the existing grade.

Some rock that was left over in the original salvage pile at the far end of the berm was moved and placed in the gaps between the rocks of the third drop structure.

After all work was complete, native seed mix was placed on all disturbed surfaces. The hay bales and deteriorated wattles were broken apart and spread out over all disturbed surfaces.

*Before:*

*After:*