JIMMYCOMELATEY CREEK-LOWER SEQUIM BAY ESTUARY RESTORATION PROJECT

ADDENDUM TO THE PHASE I MONITORING PLAN:

DEAN CREEK CHANNEL REALIGNMENT

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EXECUTIVE SUMMARY

This monitoring plan describes all tasks required to monitor the success or failure of the Dean Creek restoration elements of the Jimmycomelately Creek-Lower Sequim Bay Estuary Restoration Project (the project). **This plan is an addendum to the existing Jimmycomelately Creek Realignment Monitoring Plan (Shreffler 2001).**

Early on in the restoration planning effort, the project partners decided not to include Dean Creek in the restoration project. At the time, the project was considered large enough and complicated enough already, without including Dean Creek. However, as the estuary design group (EDG) pursued conceptual planning for restoration of the estuary, it became clear that Dean Creek realignment was significant to the overall functioning of the ecosystem. Once EDG made the decision to restore the log yard to the 1870 edge of the salt marsh, it was deemed essential that Dean Creek restoration become part of the project.

Dean Creek is a tributary to Sequim Bay and shares many of the same impairments as Jimmycomelately Creek (JCL), but on a smaller scale. Like JCL, Dean Creek was moved into a straightened artificial channel in the past, and culverts and roads (Highway 101, Old Blyn Highway, and Log Deck Road) have constricted both flood flows and tidal action. Non-native vegetation (e.g., Himalayan blackberry, scotch broom, Japanese knotweed) have colonized the creek banks and other associated fill, causing further constriction of the narrow, artificial creek channel. These constrictions have contributed to a cycle of sediment build up at the mouth, as well as downstream of culverts. The resultant flooding at road crossings necessitates dredging of blockages within the Dean Creek channel. Dean Creek is presently the most frequently dredged creek in all of Clallam County (Pat McElroy, Clallam County Roads Department, personal communication 2002).

Proposed Restoration Actions and Related Construction Activities for Dean Creek

The proposed restoration actions for realigning Dean Creek through the restored log yard area are to:

- Realign the lower reach of Dean Creek into a more sinuous channel;
- Place and bury large woody debris (LWD) at key locations in the realigned channel and in the creek banks;
- Place streambed spawning gravel in the realigned channel (as necessary);

- Hydroseed native forbs in disturbed areas;
- Plant and water native trees, shrubs, and groundcover in riparian corridor and buffer areas. Replant as necessary. Control invasive species.

Construction-related activities:

- Install temporary sediment and erosion control structures;
- Excavate a temporary stream bypass to divert flow if the creek is not dry during the construction window;
- Remove approximately 17,000 cubic yards of fill and dispose in an approved upland location (likely offsite).

The section numbers that follow (e.g., 3.1.1 Hydrology) correspond to the same section numbers in the Jimmycomelately Creek Realignment Monitoring Plan (Shreffler 2001). Both "essential" monitoring and "recommended" monitoring are identified in this addendum. EDG believes that the tasks listed as essential have higher priority than those listed as recommended. However, priorities for monitoring will be influenced by funding availability, staff availability, and EDG determinations of which monitoring parameters are most likely to allow us to assess success or failure. As with any monitoring plan, this addendum will be subject to future revision.

3.1.1 HYDROLOGY

BASELINE MONITORING

Methods and Data Analysis

1) Essential: Map the historic and current locations of the Dean Creek channel using aerial photos and ground surveys.

2) Essential: Install a staff gage in the existing Dean Creek channel above Highway 101.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Map: Prior to excavation of new Dean Creek channel
2) Staff Gage: Prior to excavation of new Dean Creek channel

Personnel: 1) Map: Historic map completed by WDFW in November, 2000. Current channel will be mapped by JKT prior to construction: 1 biologist 4 hrs
2) Staff Gage: 1 biologist 4 hrs for installation

Cost: 1) Map: $216 for biologist
2) Staff Gage: no cost for gage; $216 for biologist

Lead: 1) Map: WDFW and JKT
2) Staff Gage: Clallam County

IMPLEMENTATION MONITORING

Methods & Data Analysis

Essential: Prepare as-built drawings according to standard construction engineering practices (i.e., surveyed elevations) for the Dean Creek channel realignment.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Year 0; as-built drawings should be completed immediately after construction of the realigned Dean Creek channel.

Personnel: 1 engineer, Engineering Services Associates, Inc. (ESAI)

Cost: $800

Lead: JKT/ESAI

PERFORMANCE MONITORING

1) Essential: Monitor upstream and downstream staff gages on a bi-weekly basis.

Performance Criteria

1) The realigned channel below HWY 101 shall not be a losing reach, as demonstrated by the relative water height difference between the staff gage above HWY 101 and the staff gage below HWY 101.

Timeline, Personnel, Cost Estimate, and Lead

Timeline:	Install in Year 3, monitor bi-weekly Year 3-10.
Personnel:	Planning biologist 4 hours for installation + 16 hours to develop rating curve + technician 64 hrs/year for staff gage readings
Cost:	$1,200 for installation and rating curve + $2,048/yr for staff gage readings
Lead:	Clallam County

Contingency Measures

Failure to meet the performance criteria should trigger EDG discussions regarding the need to alter the hydrologic regime. Adequate river discharge and tidal connections between the Dean Creek channel and the estuary are essential for the long-term functioning of the ecosystem in support of fish, shellfish, birds, and other aquatic species. Inadequate river flows or tidal connections could reduce fish access and use of the realigned channel and reduce export of organic matter from the site, which, in turn, would deleteriously affect the associated food web support for the estuary. Contingency measures could include: altering the channel morphology below Highway 101 to facilitate increased discharge and tidal connections, or restoring the channel above Highway 101 where the flow presently goes subsurface at certain times of the year.

Excessive stream flows could lead to problems with erosion, redd scouring, and flooding. Contingency measures could include implementing stricter stormwater management BMP’s, implementing and/or better enforcing land use regulations to limit the amount of impervious surfaces in the watershed, and/or altering the channel morphology to minimize erosion.

3.1.2 SEDIMENT TRANSPORT & DEPOSITION

BASELINE MONITORING

Methods & Data Analysis

1) Recommended: Determine size fractions of sediment present within given reaches of the existing Dean Creek channel, using the pebble count method (Wolman 1954).

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Year 0
Personnel: 1 tribal biologist 8 hrs
Cost: $432
Lead: JKT

IMPLEMENTATION MONITORING

None

PERFORMANCE MONITORING

Methods & Data Analysis

1) Recommended: Perform pebble counts at six cross sections within the new Dean Creek channel.

Performance Criteria

1) Pebble counts will provide an indication of whether unexpected sediment aggradation is occurring at undesirable locations within the new Dean Creek channel.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Years 1, 5, 10
Personnel: 1 biologist 8 hrs/year
Cost: $432/year
Lead: JKT

Contingency Measures

Adequate sediment transport and deposition is critical for long-term functioning of the ecosystem in support of invertebrates, fish, shellfish, and birds. Excessive aggradation could trigger contingency measures such as: better enforcement of land use regulations to control sediment inputs from the upper watershed; implementation of new regulations; bank stabilization preferably through "soft" approaches (e.g., vegetation, fiber mats) as opposed to hardening approaches (e.g., rip rap, logs, root wads); alteration of the channel morphology; and installation of grade controls.

3.2.1 CHANNEL MORPHOLOGY & TOPOGRAPHY

BASELINE MONITORING

Methods and Data Analysis

1) Essential: Use aerial photos and topographic surveys to document current conditions and elevations in the existing Dean Creek channel.

2) Essential: Establish and survey 2 permanent channel cross-section monuments in the existing Dean Creek channel.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Year 0

Personnel: 1) Aerial photos: 1 biologist 4 hrs for aerial photo analysis + 2 surveyors 8 hrs each for topographic survey
2) Channel cross sections: 1 biologist + 1 technician (8 hours each)

Cost: 1) Aerial photos: $216 + $960 topographic survey
2) Channel cross sections: $688

Lead: JKT

IMPLEMENTATION MONITORING

1) Essential: Prepare as-built drawings (included in Hydrology Process Task, see Section 3.1.1).

2) Essential: Install permanent channel cross sections in the new Dean Creek channel to ensure that final elevations match design elevations.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Year 0

Personnel: 1) As-built drawings: included in Hydrology Process Task, see Section 3.1.12
2) Channel cross sections: 1 biologist + 1 technician (16 hours each)

Cost: 1) As-built drawings: included in Hydrology Process Task, see Section 3.1.1

2) Channel cross sections: $1,376

Lead: JKT

PERFORMANCE MONITORING

Methods and Data Analysis

1) Essential: Use aerial photos and ground surveys to compare changes in Dean Creek channel morphology & topography pre- and post-restoration over time.

2) Essential: Resurvey the channel cross sections in the new Dean Creek channel; compare channel depth, width, and overall profile between the former channel and the new channel, and track changes in the morphology & topography of the new channel.

3) Essential: Photo-document (from permanent photo points) changes in the new Dean Creek channel morphology and topography, at minimum, three times/year at high flow, post-high flow, and low flow.

Performance Criteria

No performance criteria have been identified. Because of the high degree of uncertainty associated with predicting changes in channel morphology and topography, EDG has, instead, identified the following triggers that would necessitate further evaluation and potential contingency measures:

- Greater than 3 feet of downcutting at the riffle crests any time in the first 10 years;
- Straightening of the channel meander geometry;
- Decreases in channel meander amplitude.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Aerial photos: Once/year in years 1-10

2) Channel cross sections: Once/year in years 1, 4, 7, and 10

3) Photo-documentation: 4 times/year in years 1-10

Personnel: 1) Aerial photos: 1 biologist 12 hrs/year
2) Channel cross sections: 1 biologist + 1 technician (16 hours each)
3) Photo-documentation: 1 technician 8 hrs/year

Cost: 1) Aerial photos: $648/year for biologist to do photo interpretation; aerial photo cost is already included in JCL Creek Realignment Monitoring Plan
2) Channel cross sections: $1,376
3) Photo-documentation: $256

Lead: 1) Aerial photos: JKT
2) Channel cross sections: JKT
3) Photo-documentation: JKT

Contingency Measures

Same as Section 3.1.2 above.

3.2.2 WATER QUALITY

BASELINE MONITORING

Methods and Data Analysis

1) Essential: Add Dean Creek to ongoing JKT water quality sampling in JCL**,** which includes monthly monitoring of air and water temperature, dissolved oxygen, conductivity, pH, and bi-monthly monitoring of fecal coliform. Also add monthly turbidity monitoring for both JCL and Dean Creek.

2) Essential: Monitor air temperature daily at one station and water temperature daily at three stations in the existing Dean Creek channel, using TIDBIT sensors.

3) Recommended: Take surface sediment samples for metals, organics, and total petroleum hydrocarbons (TPHs) from three stations each in the existing Dean Creek.

4) Recommended: Sample suspended sediment (total suspended solids [TSS]) in Dean Creek during high flooding events and sieve to determine grains sizes at three stations: 1 near Highway 101, 1 mid-channel, and 1 near the mouth.

5) Recommended: Sample macroinvertebrates in existing Dean Creek channel using a Surber sampler and 500-micron mesh sieves. Identify macroinvertebrate taxa to genus. Compare results to B-IBI index developed by Streamkeepers of Clallam County.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Water Quality: Monthly, Year 0
2) TIDBIT Sensors: Daily (June-September), Year 0
3) Sediment Quality: Once, Year 0
4) TSS: Year 0 (opportunistically, during flooding events)
5) Macroinverts: Twice (spring and early fall), Year 0

Personnel: 1) Water Quality: 1 technician 48 hrs (~4 hrs/month)
2) TIDBIT Sensors: 1 technician 16 hrs + 1 biologist 8 hrs for data analysis
3) Sediment Quality: 1 technician 16 hrs + 1 biologist 8 hrs for data analysis

4) TSS: 1 technician 8 hrs for "opportunistic" data collection + 1 biologist 8 hrs for data analysis

5) Macroinverts: 1 technician 16 hrs

Cost: 1) Water Quality: $1,536

2) TIDBIT Sensors: $300 for sensors + $512 for technician labor + $432 for biologist

3) Sediment Quality: $512 for technician + $432 for biologist + $300 for sample processing (assumes 3 samples at ~$100/sample)

4) TSS: $256 for technician + $432 for biologist + $900 for sample processing (assumes 9 samples at ~$100/sample)

5) Macroinverts: $512 for technician + $200 for sample processing

Lead: 1) Water Quality: JKT

2) TIDBIT Sensors: JKT

3) Sediment Quality: JKT

4) TSS: JKT

5) Macroinverts: JKT/Streamkeepers

IMPLEMENTATION MONITORING

No implementation monitoring was identified.

PERFORMANCE MONITORING

Methods and Data Analysis

1) Essential: Monitor water quality (same parameters as baseline monitoring) along the new Dean Creek channel quarterly for ten years post-construction. Compare pre-project and post-project data over time.

2) Essential: Monitor air and water temperature daily at three stations in the new Dean Creek channel. Compare pre-project and post-project data over time.

3) Recommended: Take surface sediment samples for metals, organics, and total petroleum hydrocarbons (TPHs) from three stations in the new Dean Creek channel. Compare pre-project and post-project data over time.

4) Recommended: Sample suspended sediment (total suspended solids [TSS]) in the new Dean Creek channel during high flooding events and sieve to determine grains sizes at three stations: 1 near Highway 101, 1 mid-channel, and 1 near the mouth.

5) Recommended: Sample macroinvertebrates in new Dean Creek channel using a Surber sampler and 500-micron mesh sieves. Identify macroinvertebrate taxa to genus. Compare results to B-IBI index developed by Streamkeepers of Clallam County.

Performance Criteria

1) Water quality parameters (water temperature, dissolved oxygen, conductivity, pH, turbidity, nitrate, and fecal coliform) within the new Dean Creek channel shall not exceed state water quality standards.

2) Sediment quality parameters (metals, organics, TPH, TSS) within the new Dean Creek channel shall not exceed state water quality standards.

Timeline, Personnel, Cost Estimate, and Lead

Timeline:
1) Water Quality: Quarterly each year, Years 1-10.
2) TIDBIT Sensors: Daily (June-September), Years 1, 3, 5, 10
3) Sediment Quality: Once annually, Years 1, 3, 5, 10
4) TSS: Years 1, 3, 5, 10 (opportunistically, during flooding events)
5) Macroinverts: Twice annually (spring and early fall), Years 1, 3, 5, 10

Personnel:
1) Water Quality: 1 technician 48 hrs/year
2) TIDBIT Sensors: 1 technician 16 hrs/year
3) Sediment Quality: 1 technician 16 hrs/year + 1 biologist 8 hrs/year for data analysis
4) TSS: 1 technician 8 hrs/year for “opportunistic” data collection + 1 biologist 8 hrs/year for data analysis
5) Macroinverts: 1 technician 16 hrs/year

Cost:
1) Water Quality: 1,536/year
2) TIDBIT Sensors: $512/year for technician labor

3) Sediment Quality: $512/year for technician + $400/year for biologist + $300/year for sample processing (assumes 3 samples at ~$100/sample)
4) TSS: $256/year for technician + $400/year for biologist + $900/year for sample processing (assumes 9 samples at ~$100/sample)
5) Macroinverts: $512/year for technician + $200/year for sample processing

Lead: 1) Water Quality: JKT
2) TIDBIT Sensors: JKT
3) Sediment Quality: JKT
4) TSS: JKT
5) Macroinverts: JKT/Streamkeepers

Contingency Measures

Same as Section 3.2.2 of JCL monitoring plan (Shreffler 2001).

3.2.3 LARGE WOODY DEBRIS

BASELINE MONITORING

Methods and Data Analysis

1) Essential: Perform a habitat survey (pools/riffles/wood) prior to channel realignment.

2) Essential: Create a planview drawing of logjams in relation to the channel form.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Habitat survey: Year 0, pre-channel realignment
2) Planview drawings: Year 0, pre-LWD installation

Personnel: 1) Habitat survey: 1 biologist for 8 hrs
2) Planview drawings: 1 biologist for 8 hrs

Cost: 1) Habitat survey: $432
2) Planview drawings: $432

Lead: JKT

IMPLEMENTATION MONITORING

Methods and Data Analysis

At least one biologist will be present on-site during construction to ensure the placement and alignment of LWD at pre-determined locations by the heavy equipment operators.

1) Essential: Record as-built locations of each log using a hand-held GPS unit, and later map the locations of each LWD structure.

2) Essential: Photograph each significant LWD placement from a fixed location that is geo-referenced.

3) Essential: Record the as-built depths of each pool associated with a LWD placement.

4) Recommended: Measure the diameter of the large end of each key member (0.1m<0.3m, 0.3m<0.6m, 0.6m<0.8m, >0.8m) and the length of each key member (1.5m<5.0m, 5.0m<15m, >15m). Mark each key member with a metal plate or tag, which will be able to resist flooding and other kinds of abrasion over a 10-year period. Use a unique identifier code for each tag and record the number for future reference

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Year 0, during-construction

Personnel:
1) As-built locations/map: 1 biologist for 40 hrs
2) Photo-document: 1 technician for 8 hrs
3) As-built pool depths: 1 biologist (time included in #1 above)
4) LWD measurements: 1 technician for 40 hrs

Cost:
1) As-built locations/map: $2,160
2) Photo-document: $256
3) As-built pool depths: cost included in #1 above
4) LWD measurements: $1,280

Lead: JKT

PERFORMANCE MONITORING

Methods and Data Analysis

1) Essential: Perform a habitat survey (pools/riffles/wood) following channel realignment. Document that logjams create and maintain pool habitat. Track pool depth and dimensions using habitat surveys and channel cross-sections (see Channel Morphology and Topography).

2) Essential: Track movement of logs using fixed photo points and GPS positions (Note: Logjams will be constructed [without cabling] to resist coming apart in a flood or in winter storms at extreme high tides. However, some movement of LWD is an expected and natural process).

3) Essential: Track changes in the number of pieces of wood per logjam (Note: Logjams will trap other floating debris).

Performance Criteria

1) In Year 10, 80% or more of the LWD placements should be in the same general location as originally placed.

2) LWD placements that move to locations where they pose a threat to infrastructure, properties, or the channel morphology would trigger the need for discussion of potential contingency measures.

3) LWD placements shall maintain pool depth and channel form as intended.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Habitat survey: Annually, Years 1-10
2) Photo-Documentation & GPS: Annually, Years 1-10
3) Pieces/jam: Years 1, 5, 10

Personnel: 1) Habitat survey: 1 biologist 8 hrs/year
2) Photo-Documentation & GPS: 1 technician 8 hrs/year
3) Pieces/jam: 1 technician and 1 biologist for 8 hrs each/year

Cost: 1) Habitat survey: $432
2) Photo-Documentation & GPS: $256/year
3) Pieces/jam: $688/year

Lead: JKT

Contingency Measures

Same as Section 3.2.3 of JCL monitoring plan (Shreffler 2001).

3.2.4 SOILS

EDG identified no soils monitoring for Dean Creek.

3.2.5 FLOOD CONVEYANCE

PERFORMANCE MONITORING

Methods and Data Analysis

1) Essential: Perform visual inspections of the realigned Dean Creek project area for signs of flood damage, following major rainfalls or rain-on-snow events. Document any observed flood damage with photographs, including channel avulsion into terrace side channels.

Performance criteria

1) No evidence of flooding that threatens property or infrastructure will be observed after a one-year period of initial site stabilization.

Timeline, Personnel, Cost Estimate, and Lead

Timeline:	Years 1-3
Personnel:	1 technician for 8 hrs/year
Cost:	$256/yr for technician
Lead:	JKT

Contingency Measures

Same as Section 3.2.5 of JCL monitoring plan (Shreffler 2001).

3.3.1 RIPARIAN VEGETATION ESTABLISHMENT

BASELINE MONITORING

Methods and Data Analysis

1) Essential: Identify major vegetation types on an aerial photograph. Field verify vegetation communities by species composition.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Baseline in year 0

Personnel: 1 biologist 16 hrs for aerial photo analysis + 1 biologist/botanist and 1 technician 8 hrs each for field verifications

Cost: $2,064

Lead: JKT

IMPLEMENTATION MONITORING

Methods and Data Analysis

1) Essential: Photo-document the entire revegetation process from permanently established photo points.

2) Essential: Verify species planting (#s, locations) and germination of hydroseed mix.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: During construction in year 0

Personnel: 1) Photodocument: 1 biologist 4 hrs to establish photo-points + 1 technician 4 hrs to take photos

2) Verify plantings: 1 technician 4 hrs

Cost: 1) Photodocument: $344

2) Verify plantings: $128

Lead: JKT

PERFORMANCE MONITORING

Methods and Data Analysis

1) Essential: Percent cover: Identify and map major vegetation types on an aerial photograph for each year of monitoring. Groundtruth vegetation communities twice/year in mid-spring and late summer in Years 1, 3, 5, 7, and 9, and once/year in late spring or early summer in Years 2, 4, 6, 8, and 10. Categorize vegetation communities by dominant species composition. Establish permanent transects to identify species composition and percent canopy cover at the bank (densiometer reading).

2) Essential: Plant survival: Visually inspect shrub and tree planting for survival and growth vigor once/year in Years 1, 3, 5, 7 and 10. Note native and non-native pioneer species.

3) Essential: Photo-documentation: photograph the revegetated areas from fixed camera points.

Performance Criteria

1) Percent Cover of riparian native plantings and native pioneers (trees and shrubs) should be at least 50% in year 5, 60% in year 8, and 90% at the end of 10 years.

2) Plant survival: If mortality of the native plantings is greater than 30% in any given year, then evaluate planting scheme (species composition and location) and make necessary adjustment for replanting area(s) of mortality.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Percent Cover: Twice/year in Years 1, 3, 5, 7, and 9 and once /year in Years 2, 4, 6, 8, and 10; Year 1 monitoring should take place within 4-6 months of planting to determine whether replanting is necessary
2) Plant survival: Mid-summer once/year in Years 1, 2, 3, 5, and 10
3) Photo-documentation: Twice/year (in driest and wettest periods of the year) in years 1, 2, 3, 5, and 10

Personnel: for all 3 tasks = 1 technician 12 hrs/year + 1 biologist 8 hrs/year for species verifications

Cost: for all 3 tasks = 600/year for 1 technician and 1 biologist + $200 supplies

Lead: JKT

Contingency Measures

Same as Section 3.3.1 (Shreffler 2001).

3.3.2 WETLAND VEGETATION ESTABLISHMENT

BASELINE MONITORING

1) Essential: Same as for riparian vegetation establishment.

IMPLEMENTATION MONITORING

None

PERFORMANCE MONITORING

Methods and Data Analysis

1) Essential: Percent Cover: Identify the percent cover of wetland vegetation (freshwater and brackish reaches) on aerial photographs, or use GPS or traditional survey techniques to map the perimeter of wetland vegetation patches.

2) Essential: Species composition: Establish permanent transects and survey these transects during mid-summer to determine species composition within ten (or more, depending on length of transect) 0.25m x 0.25m quadrats randomly distributed along each transect line. Record all plant species observed within each quadrat, and visually estimate percent cover of each species within each quadrat.

3) Essential: Photo-documentation: Establish fixed camera points, and photograph the wetland areas that have naturally recolonized.

Performance Criteria

1) Within 10 years, the areal extent (percent cover) of wetland vegetation should be stable or increasing within portions of the project site with elevations suitable to wetland vegetation establishment. In Year 2 – 25% cover, Year 5 – 60% cover, and Year 10 – 95% cover with native species (trees, shrubs and/or groundcover/emergents).

2) Species composition of native wetland plant species should be comparable (greater than 80%) to that of appropriate reference sites after 10 years.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Percent Cover: Mid-summer once/year in Years 1, 2, 3, 5, and 10
2) Species composition: Mid-summer once/year in Years 1, 2, 3, 5, and 10

3) Photo-document: Mid-summer once/year in Years 1, 2, 3, 5, and 10

Personnel: for all 3 tasks = 1 technician 12 hrs/year + 1 biologist 8 hrs/year for species verifications

Cost: for all 3 tasks = $600/year for 1 technician and 1 biologist + $200 supplies

Lead: JKT

Contingency Measures

Same as for riparian vegetation establishment.

3.3.3 INVASIVE VEGETATION REMOVAL

Baseline Monitoring

Methods and Data Analysis

1) Essential: Map existing locations of invasive species of concern on aerial photographs.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Year 0

Personnel: same as riparian and wetland vegetation

Cost: cost is included in mapping of riparian and wetland vegetation

Lead: JKT

Implementation Monitoring

1) Essential: Excavate all invasive plant species; removal all above-and below-ground biomass.

Performance Monitoring

Methods and Data Analysis

1) Essential: Following construction, re-map locations of invasive species of concern on aerial photographs.

Performance Criterion

1) The project area should contain less than 5% cover by area of invasive plant species after 10 years.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Years 1, 2, 3, 5, and 10 (at same time as riparian and wetland vegetation monitoring)

Personnel: same as Riparian (Section 3.3.1) and Wetland (Section 3.3.2) monitoring

Cost: included in Riparian (Section 3.3.1) and Wetland (Section 3.3.2) monitoring

Lead: JKT

Contingency Measures

More than 5% cover by area of invasive plant species during any monitoring year would trigger the need for contingency measures. Contingency measures could include some combination of mechanical treatments (e.g. hand clearing, burning, weed whacking, mowing) or chemical treatments (e.g. herbicides).

3.3.4 SALMONID USE

BASELINE MONITORING

Methods and Data Analysis

1) Essential: Deploy minnow traps to assess species composition and abundance of juvenile salmonids in the existing Dean Creek channel (monthly March to June).

2) Essential: Conduct weekly spawner surveys for coho (October-December) in the existing Dean Creek channel. Metric = number of redds per mile.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: Baseline in year 0

Personnel: 1) Juvenile salmonids: 1 technician + 1 biologist for 8 hrs/sampling period (monthly Mar-Jun=4 sampling periods)
2) Coho spawner surveys: JKT technician

Cost: 1) Juvenile salmonids: $2,752 for 2-person sampling team
2) Coho spawner surveys: ~$2,500/year

Lead: 1) Juvenile salmonids: JKT
2) Coho spawner surveys: JKT

IMPLEMENTATION MONITORING

None identified.

PERFORMANCE MONITORING

Methods and Data Analysis

1) Essential: Deploy minnow traps to assess species composition and abundance (monthly March to June) of juvenile salmonids in the new Dean Creek channel; compare data collected from the new Dean Creek channel to baseline data collected in the existing Dean Creek channel.

2) Essential: Conduct weekly spawner surveys for coho (October-December) in the new Dean Creek channel; compare data (redds/mile) collected from the new Dean Creek channel to baseline data collected in the existing Dean Creek channel.

Performance Criteria

1) At the end of 10 years, juvenile salmonid abundance within the restored Dean Creek channel and estuary should be higher than the pre-project abundance within the former Dean Creek channel.

2) At the end of 10 years, coho spawner abundances in the restored Dean Creek channel should be higher than the pre-project abundances within the former Dean Creek channel.

Timeline, Personnel, Cost Estimate, and Lead

Timeline: 1) Juvenile salmonids: Years 1, 2, 4, 7, and 10
2) Coho spawner surveys: Annually, Years 1-10

Personnel: 1) Juvenile salmonids: 1 technician + 1 biologist 8 hrs/sampling period (monthly March-June=4 sampling periods)
2) Coho spawner surveys: JKT technician

Cost: 1) Juvenile salmonids: $2,752/year for sampling team
2) Coho spawner surveys: $2,500/year

Lead: 1) Juvenile salmonids: JKT
2) Coho spawner surveys: JKT

Contingency Measures

Failure to meet the performance criteria would indicate that fundamental goals of the restoration project are not being met. While specific causes of failure are difficult to predict at this point, an examination of the project design, implementation, and site management would be required.

3.3.5 BIRD USE

EDG identified no monitoring that is specific to Dean Creek; the larger project area (including Dean Creek) is already being monitored as part of the JCL channel monitoring (Shreffler 2001) and the estuary monitoring (Shreffler 2003).