Item 11:
Update on Upper Elk River Sediment Total Maximum Daily Load

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Eureka, CA

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Basin Planning
North Coast Regional Water Quality Control Board
Presentation Overview

- Project Team
- Status of Upper Elk River Sediment TMDL
- External Scientific Peer review process
- Technical elements of the TMDL
- TMDL Implementation strategy
- Update on *Elk River Recovery Assessment* funding request
- Next Steps
External Scientific Peer Review of Upper Elk River TMDL Staff Report

• Cal/EPA coordinates Peer Review Program through the University of California
• Four reviewers with expertise in fisheries, water quality, hydrology and geomorphology, and slope stability
• Technical TMDL submitted in March 4, 2013; comments received April 26, 2013
• Reviewers evaluated if the assertions, findings, and conclusions were based upon sound scientific knowledge, methods, and practices
Elk River
Waterbody
Delineations
Fine Sediment Impairments

• Deposition of settleable material impacts beneficial uses and causes flooding
  – Altered channel and floodplain morphology
  – Diminished streamflow conveyance capacity
  – Diminished pool size
  – Reduced substrate grain size
  – Cross-sectional areas continue to decrease

• Elevated turbidity and suspended sediment concentrations impact COLD, SPWN, MIGR, RARE, MUN
TMDL = Loading Capacity
      = Natural Background
         + Waste Load Allocation
         + Load Allocation
         + Margin of Safety
Sediment Loading Capacity

• Multiple lines of inquiry:
  – Reviewed loading capacities established in other North Coast sediment TMDLs
  – Modeled loads below which localized channel scour is initiated
  – Calculated loads necessary to attain numeric turbidity objective

• Expressed as percentage of natural loading
Sediment Loading Capacity Based on Turbidity Objective

\[ \frac{SSL_{Objective}}{SSL_{Background}} \times 100 = \% \text{ Natural } SSL \text{ to attain turbidity objective} \]

Where:
- \( SSL_{Background} \) = SSL associated with background turbidity
- \( SSL_{Objective} \) = SSL associated with 1.2 x background turbidity

Assumptions
1. Conditions in Upper Little South Fork reference subbasin are representative of natural occurring background turbidity and the associated suspended sediment loads (SSL)
2. A change in SSL results in a commensurate change in total load
3. The mean of 2004-2007 water years provide good representation of a range of climatic conditions
Sediment Loading Capacity

Results

\[
\frac{SSL_{Objective}}{SSL_{Background}} \times 100 = \% \text{ Natural SSL to attain turbidity objective}
\]

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>123%</td>
</tr>
<tr>
<td>2005</td>
<td>126%</td>
</tr>
<tr>
<td>2006</td>
<td>115%</td>
</tr>
<tr>
<td>2007</td>
<td>132%</td>
</tr>
<tr>
<td>Mean</td>
<td>124%</td>
</tr>
</tbody>
</table>

Loading Capacity = 120% of Natural loading, with a Margin of Safety
\[ TMDL = \text{Loading Capacity} \]

\[ = \sum (\text{Natural Background} + \text{Waste Load Allocation} + \text{Load Allocation} + \text{MOS}) \]

\[ = (0 \text{ WLA}) + \text{Load Allocations} + \text{MOS} \]

\[ = 1.2 \times \text{Natural Background} \]

\[ = 1.2 \times (68 \text{ yd}^3/\text{mi}^2/\text{yr}) \]

\[ = 82 \text{ yd}^3/\text{mi}^2/\text{yr} \]
Load

Allocation = Loading Capacity – Natural Background

= 82 yd$^3$/mi$^2$/yr - 68 yd$^3$/mi$^2$/yr

= 14 yd$^3$/mi$^2$/yr

= Upslope Loading - Instream Loading
The bar chart illustrates the sediment loading (yd³/mi²/yr) for various time periods from 1955-1966 to 2004-2011. The chart categorizes loading into different types:

- Natural Loading
- Bank Erosion
- Streamside Landslides
- Open Slope Shallow Landslides
- Road-related Landslides
- Management-related discharge sites
- Skid Trails
- Post-Treatment Discharge Sites
- Road Surface Erosion
- Harvest Surface Erosion
- Low Order Channel Incision
- Total Loading

The percent of natural loading is also shown, with values ranging from 0% to 1,800%. The graph highlights the significant increase in sediment loading during the 1988-1997 period, peaking at 1,134% of natural loading. The loading capacity is represented by a line graph that shows a downward trend from 1955-1966 to 2004-2011.
Instream Loading = (Volume management-related deposits) ÷ (upstream area) ÷ (10 year time frame for restoration)

<table>
<thead>
<tr>
<th>Reach description (downstream to upstream)</th>
<th>Estimated Volume Stored within Reach (yd$^3$)</th>
<th>Upstream drainage area (mi$^2$)</th>
<th>Volume per Unit Area (yd$^3$/mi$^2$)</th>
<th>Instream Loading (yd$^3$/mi$^2$/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Mainstem: Shaw Gulch to confluence</td>
<td>260,000</td>
<td>45</td>
<td>5,777</td>
<td>578</td>
</tr>
<tr>
<td>Lower North Fork: confluence to Browns Gulch</td>
<td>280,000</td>
<td>22</td>
<td>12,727</td>
<td>1,273</td>
</tr>
<tr>
<td>Lower South Fork: confluence to Toms Gulch</td>
<td>100,000</td>
<td>19</td>
<td>5,263</td>
<td>526</td>
</tr>
<tr>
<td>Total Middle Reach</td>
<td>640,000</td>
<td>45</td>
<td>14,222</td>
<td>1,422</td>
</tr>
<tr>
<td>Management-Related Sediment Source Category</td>
<td>Allocation (yd³/mi²/yr)</td>
<td>2004-2011 Loading (yd³/mi²/yr)</td>
<td>Percent Reduction from 2011 Loading</td>
<td>Schedule to Achieve Allocations</td>
</tr>
<tr>
<td>---------------------------------------------</td>
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</tr>
<tr>
<td>Total Management-Related Upslope Sediment Loading</td>
<td>14</td>
<td>417</td>
<td>97%</td>
<td>20 years</td>
</tr>
<tr>
<td>Total Management-Related Instream Storage Loading</td>
<td>0</td>
<td>1,422</td>
<td>100%</td>
<td>10 years</td>
</tr>
<tr>
<td>Management-Related Sediment Source Category</td>
<td>Schedule to Achieve Allocations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Sediment Discharge Sites</td>
<td>5 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Treatment Sediment Discharge Sites</td>
<td>5 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road surface erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Harvest Surface Erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Slope Shallow Landslides</td>
<td>7 years</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Road-Related Landslides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Order Channel Incision</td>
<td>20 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank Erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Streamside Landslides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skid Trails</td>
<td>20 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Management-Related Upslope Sediment Loading</strong></td>
<td>20 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Management-Related Instream Storage Loading</strong></td>
<td>10 years</td>
<td></td>
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</tr>
</tbody>
</table>
**Targets:** Translate Allocations and Objectives to Inform Implementation and Compliance

- **Hillslope Targets**
  - Address factors influencing sediment source categories
  - Provide basis for conditions in future permits
  - Progress informed by monitoring program

- **Instream Targets to support beneficial uses and prevention of nuisance**
  - COLD, SPAWN, MIGR, MUN
  - Bankfull conveyance capacity
  - Progress informed by monitoring program
<table>
<thead>
<tr>
<th>Management-Related Sediment Source Category</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headward Incision in Low Order Channels</td>
<td>Zero increase in existing drainage network</td>
</tr>
<tr>
<td>Bank Erosion and Streamside Landslides</td>
<td>Decreasing trend in length of unstable channel</td>
</tr>
<tr>
<td></td>
<td>Harvest-related peak flow increases in Class II and III watercourse catchment areas do not exceed 10% in 10 years</td>
</tr>
<tr>
<td></td>
<td>All road segments are hydrologically disconnected from watercourses</td>
</tr>
<tr>
<td>Open Slope Shallow Landslides</td>
<td>Decrease in management-related open-slope landslide delivery in conformance with load allocation</td>
</tr>
<tr>
<td>Management-Related Sediment Source Category</td>
<td>Target</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Road Related Landslides</td>
<td>Improving trend in stability of roads in conformance with load allocation</td>
</tr>
<tr>
<td>Deep Seated Landslides</td>
<td>Zero increase in discharge from deep seated landslide due to management-related activities</td>
</tr>
<tr>
<td>Road Surface Erosion</td>
<td>Decrease road surface erosion to load allocation</td>
</tr>
<tr>
<td>Management Discharge Sites and Skid Trails</td>
<td>No new management discharge sites created</td>
</tr>
<tr>
<td></td>
<td>Treatment of all controllable management discharge sites</td>
</tr>
<tr>
<td>Watershed Indicator</td>
<td>Targets</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Riparian Areas</td>
<td>Improving trend in quality of riparian stands capable of providing: 1) delivery of wood and complexity to the channel for sediment metering, stabilization, and to provide habitat elements, 2) slope stability to minimize sediment delivery associated with landslide features, and 3) ground cover to ensure sediment control.</td>
</tr>
<tr>
<td>Timber Harvest Rate</td>
<td>The maximum timber harvest rate is ~1.5% of a Class I subbasin area and ~1.5% of ownership.</td>
</tr>
</tbody>
</table>
Program of Implementation

• Address upslope sources – revise WDRs
  - CAO program
  - Roads
  - Slope Stability
  - Riparian Protection and Enhancement
  - Harvest rate

• Remediate instream sources
  - Elk River Recovery Assessment and Implementation

• Adaptive Implementation
  - Informed by effectiveness monitoring and progress toward recovery
Adaptive Implementation for 20-Year Recovery Conceptual Model
Adaptive Implementation for 20-Year Recovery Conceptual Model

Plan and permit instream deposit recovery actions

Implement instream deposit recovery actions
Adaptive Implementation for 20-Year Recovery Conceptual Model

- Plan and permit instream deposit recovery actions
- Implement instream deposit recovery actions
- Open slope landslides; road-related landslides
- Management discharge sites and their treatments; road surface erosion; harvest surface erosion
- Bank erosion and streamside landslides
Adaptive Implementation for 20-Year Recovery Conceptual Model

- Bank erosion and streamside landslides
- Plan and permit instream deposit recovery actions
- Implement instream deposit recovery actions
- Open slope landslides; road-related landslides
- Management discharge sites and their treatments; road surface erosion; harvest surface erosion

Percent Attainment of Load Allocations

Annual Timber Harvest Rate
Peer reviewer comments

• Sound scientific basis for:
  – Water quality impairments
  – Reference subbasin in natural loading estimates
  – Management-related loading estimates
  – Loading Capacity
  – Load allocation strategy for hillslope and instream loading
  – Hillslope targets
  – LIDAR DEM and landslide hazard modeling and mapping strategy
  – Adaptive implementation

• Suggested greater detail on:
  – Instream conditions, provide individual cross section data
  – Implementation and monitoring plans

• Concerns/Recommendations:
  – Lower harvest rate may be needed to attain allocations
  – Channel conveyance target may not reflect unimpaired conditions
  – Habitat enhancement actions may be warranted for salmonids
Elk River Recovery Assessment

- Will identify feasible recovery actions for instream deposits from past management-related sediment discharges
- August 23, 2012 Regional Water Board Resolution supporting request to State Water Board for Cleanup and Abatement Account (CAA) funds
- Current funding request includes Recovery Assessment and implementation of pilot projects
- April 18, 2013 California Coastal Conservancy approved matching funds; HRC and RCAA matches committed
- May 7, 2013 State Board will consider CAA request
- Start work this summer
Next steps

• Continue Stakeholder Outreach
• Respond to Peer Reviews and post package on website
• Update technical TMDL for Public Review
• Present technical TMDL in a staff-led workshop in Eureka, including a 45-day public comment period
• Basin Planning and Timber staff to engage stakeholders on drafting permit revisions
• Present TMDL and implementation package to the Board for consideration