Spawning and Rearing Habitat Restoration Program

CVPIA 3406 b(13)

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Overview of Spawning and Rearing Habitat Restoration Program b(13)

- Restore and replenish spawning gravel and rearing habitat lost from the construction and operation of CVP dams

- Gravel augmentation is an ongoing activity

- Other CVPIA programs and agencies place gravel on both CVP and non-CVP streams

*B13 actions are limited to three CVP streams
(American, Sacramento, and Stanislaus Rivers)*
*B13 actions are limited to these CVP streams
Restore habitat in depleted areas to create sufficient spawning, incubation, rearing and out-migration habitat for salmonids to complete their life-cycle

Annual placement targets:
- 10,000 tons in the Sacramento River
- 3,000 tons in the Stanislaus River
- 7,000 tons in the American River
Measures of Success

The program uses two criteria to determine success:

- **Percent of Use**
  - compare the number of redds in new gravel versus number of redds in the old gravel (indicating the suitability of placed gravel)

- **Redds per square meter in areas of gravel placement**
California Fish and Game, National Marine Fisheries Service, other CVPIA programs to help determine location of placements, and gravel specifications

- Permitting

- Monitoring to evaluate effectiveness of gravel placement
Factors That Determine Gravel Placement

**Primary**
- The need for spawning habitat
- Location of placement
- Accessibility
  - (truck, helicopter, or sluice to deliver the gravel)
- Community readiness and desire
- Gravel availability

**Secondary**
- Cost
- Input from partners

Pebble counts
## Gravel Placed Since 1997

<table>
<thead>
<tr>
<th>River</th>
<th>Total gravel placed since 1997 (tons)</th>
<th>Gravel placed in 2007</th>
<th>Gravel placed in 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacramento</td>
<td>168,300</td>
<td>6,000</td>
<td>8,300</td>
</tr>
<tr>
<td>Stanislaus</td>
<td>14,100</td>
<td>4,100</td>
<td>0</td>
</tr>
<tr>
<td>American</td>
<td>13,000</td>
<td>0</td>
<td>7,000</td>
</tr>
</tbody>
</table>

Total gravel placed is over 195,000 tons since 1997
2008 Accomplishments

- **American River** - permitting and placement of 7,000 tons of spawning gravel at Sailor Bar  *(target 7,000 tons)*

- **Sacramento River** - approximately 8,300 tons of gravel were purchased and placed at Salt Creek  *(target 10,000 tons)*

- **Stanislaus River** - evaluation of previous gravel placements and evaluation for future restoration opportunities  *(target 3,000 tons)*
American River - gravel was added in 2008, post project monitoring will assess the effectiveness of the new gravel

Sacramento River - Half of spawning winter-run Chinook use b(13) gravel (target is 25%)

Stanislaus River - 10% of fish spawn on b(13) gravel (target is 10%) and gravel sites get high juvenile use
Sacramento River
Gravel Placement Sites

- Keswick Dam
- Keswick Dam site
- Salt Creek site
- Redding
- 8 in-river sites (1978-1990)
- Tobiasson site
- Shea site
Sacramento River
2008 Salt Creek Gravel Placement

The gravel will be distributed naturally as high flow events occur in the river.
American River Spawning Gravel Augmentation

- Mississippi Bar
- Nimbus Dam
- Sunrise Blvd
- River Bend Park
- Gravel Addition Area
- Gravel Source

Legend:
- Side Channel
- Miles
American River
2008 Upper Sailor Bar Placement-

Pre-Placement

Post-Placement ~7,000 tons
Monitoring and Evaluation

**Biological**
- Snorkel surveys of salmon use of gravels
- Aerial photography documenting spawning
- Redd mapping
- Invertebrate sampling
- Egg survival

**Physical**
- Gravel permeability studies
- Gravel transport
- River profile data
Sacramento River b13 Monitoring

- Geomorphic
  - Cross sections
  - Substrate samples
  - Habitat typing
  - Sediment transport

- Fisheries
  - Superimpose redd locations onto habitat types
  - Gravel quality parameters and egg survival
1. Substrate characterization pre/post placement (CSUS)
2. Chinook spawning distribution (aerial photos)
3. Steelhead spawning distribution (with CCAO)
4. Fish use – pre/post placement
5. Substrate Size Criteria – based on fish size
6. Gravel mobility – quartz and tracer rocks
7. Effects of gravel placement on benthic macroinvertebrates
Salmon redds in a year of low abundance (2007 - 10,000 in river)
Salmon redds in a year of high abundance (2003 – 160,000 in river)
Stanislaus River (B)(13) Monitoring

- Topographic survey of placement areas pre and post gravel placement
  - Determine site specific gravel movement rates
- Topographic survey of entire river in conjunction with Central California Area Office
  - Determine future placement locations and bed changes
- Mapping Chinook redds on placed gravel
  - Determine site specific gravel utilization
- Snorkel Surveys (no longer occurring)
  - Determined juvenile fish usage of placement vs non-placement sites and emergence timing.
Future Projects

- **American River**
  - Sailor Bar Side channel renovation
  - Lower Sailor Bar gravel placement
  - Process on site gravel for cost effective source

- **Sacramento River**
  - Continue to place gravel along the river banks
  - Use sediment transport model to help decision making
  - Evaluate opportunity for in river placement
  - Evaluate new sites for placement along the river banks

- **Stanislaus River**
  - Work with communities to identify sites for restoration
  - Focus on creation of juvenile rearing habitat
65,000 tons in the Sacramento River
  - Old number being updated with current gravel budget

26,000 tons in the Stanislaus River
  - Kondolf et al. 2001 reconnaissance level assessment

74,360 tons in the American River
  - Fairman 2007 gravel budget for Lower American River