Spawning and Rearing Habitat Restoration Program

CVPIA 3406 b(13)

John Hannon, Program Manager, Reclamation

Dan Cox, Co-Lead, Service

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 Streams
Upper Sacramento River
American River
Stanislaus River
LEGEND
CVP-Related Facilities
River
Canal / Tunnel
Lake / Reservoir / Dam
City
*B13 actions are limited to these CVP streams
Keswick Dam
Red Bluff Diversion Dam
Nimbus Dam
Goodwin Dam
Shasta Lake
Trinity R.
Clair Eagle Lake
Lewiston Lake
Clear Creek Tunnel
Whiskeytown Lake
Redding
Clear Cr.
Cow Cr.
Bear Cr.
ACID Diversion Dam
Battle Cr.
Paynes Cr.
Antelope Cr.
Cottonwood Cr.
Red Bluff Diversion Dam
Corning Canal
Elder Cr.
Mill Cr.
Deer Cr.
Thomes Cr.
Big Chico Cr.
Black Butte Lake
Stony Cr.
Stony Gorge Res.
East Park Res.
Tehama-Colusa Canal
Colusa Canal
Sacramento River
Butte Cr.
Feather R.
Yuba R.
Camp Far West Res.
Bear R.
American R.
Folsom Lake
Lake Natoma
Folsom S. Canal
Cache Cr.
Lake Berryessa
Sacramento
Putah Cr.
Putah S. Canal
Cosumnes R.
Mokelumne R.
Lake Lodi
New Hogan Res.
New Melones Res.
Calaveras R.
Stanislaus R.
New Don Pedro Res.
Tuolumne R.
Merced R.
Lake McClure
Eastside Bypass
Eastman Lake
Chowchilla R.
Hensley Lake
Millerton Lake
Fresno R.
Madera Canal
Kings R.
Pine Flat Res.
Fresno
Mendota Pool
San Joaquin River
Delta-Mendota Canal
Pachecho Conduit
San Luis Reservoir
Contra Costa Canal
Tracy Pumping Plant
San Francisco
Pacific Ocean
Locator Map

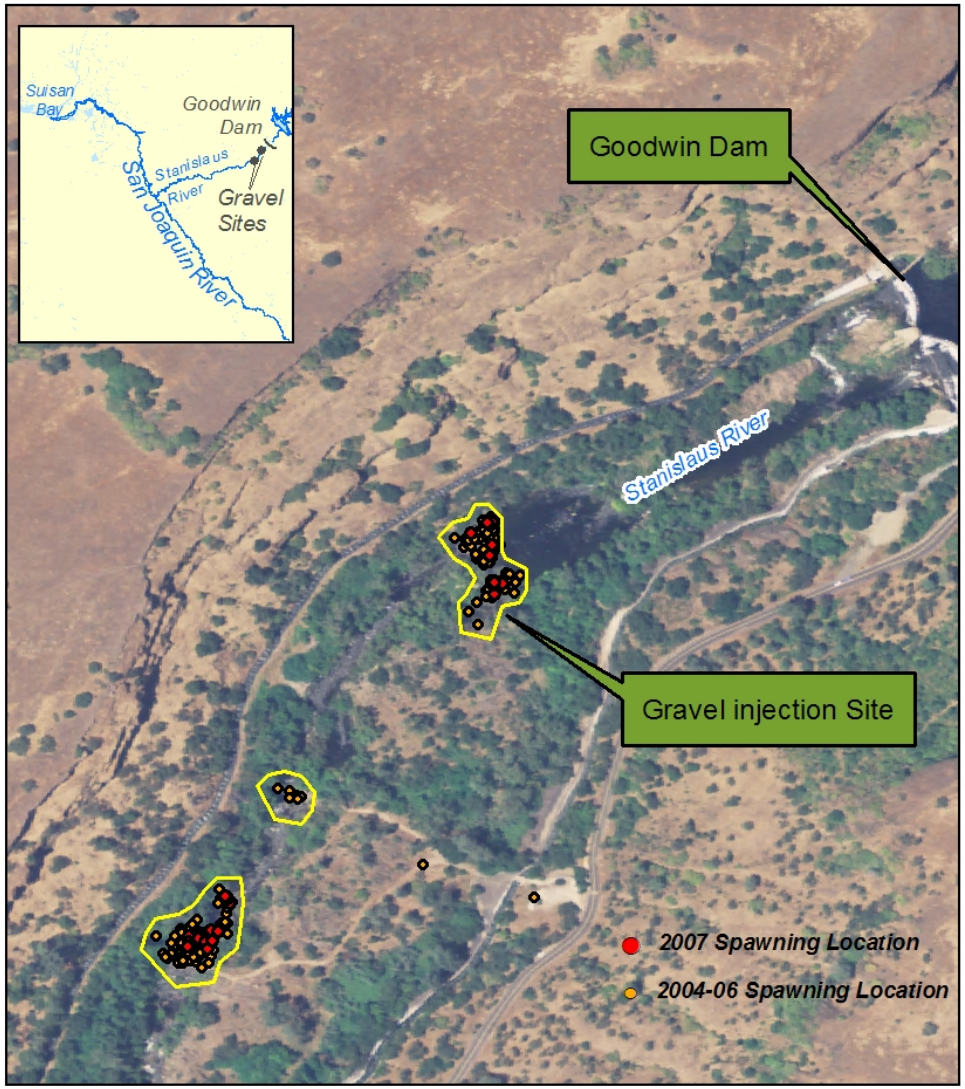
Program Goals

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

Coordination

- 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

Gravel Placed Since 1997

River	Total gravel placed since 1997 (tons)	Gravel placed in 2007	Gravel placed in 2008
Sacramento	**168,300**	**6,000**	**8,300**
Stanislaus	**14,100**	**4,100**	**0**
American	**13,000**	**0**	**7,000**

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)

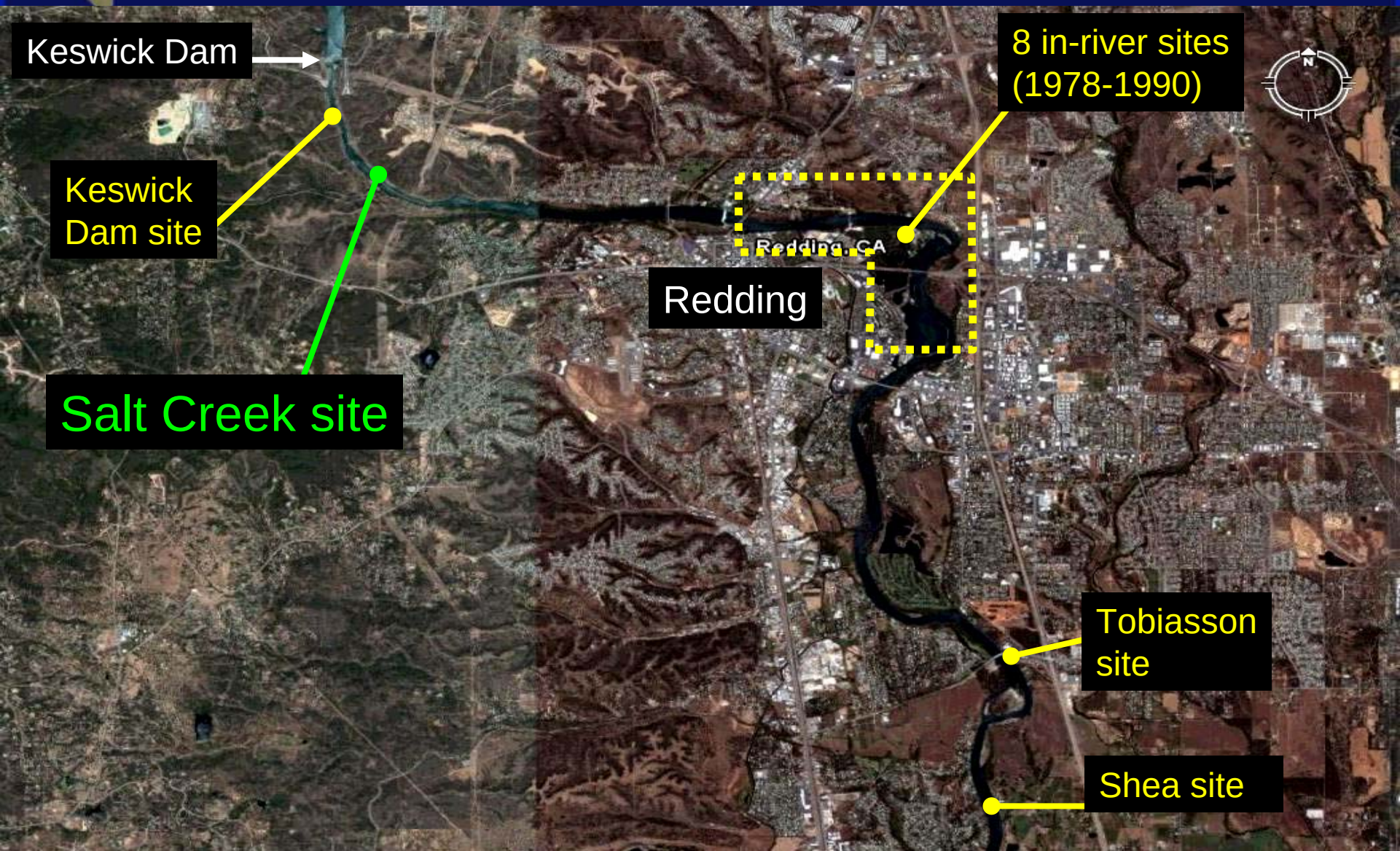
- **Sacramento River-** approximately 8,300 tons of gravel were purchased and placed at Salt Creek
  *(target 10,000 tons)

- **Stanislaus River-** evaluation of previous gravel placements and evaluation for future restoration opportunities
  *(target 3,000 tons)

2008 Accomplishments
Gravel Use

- 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



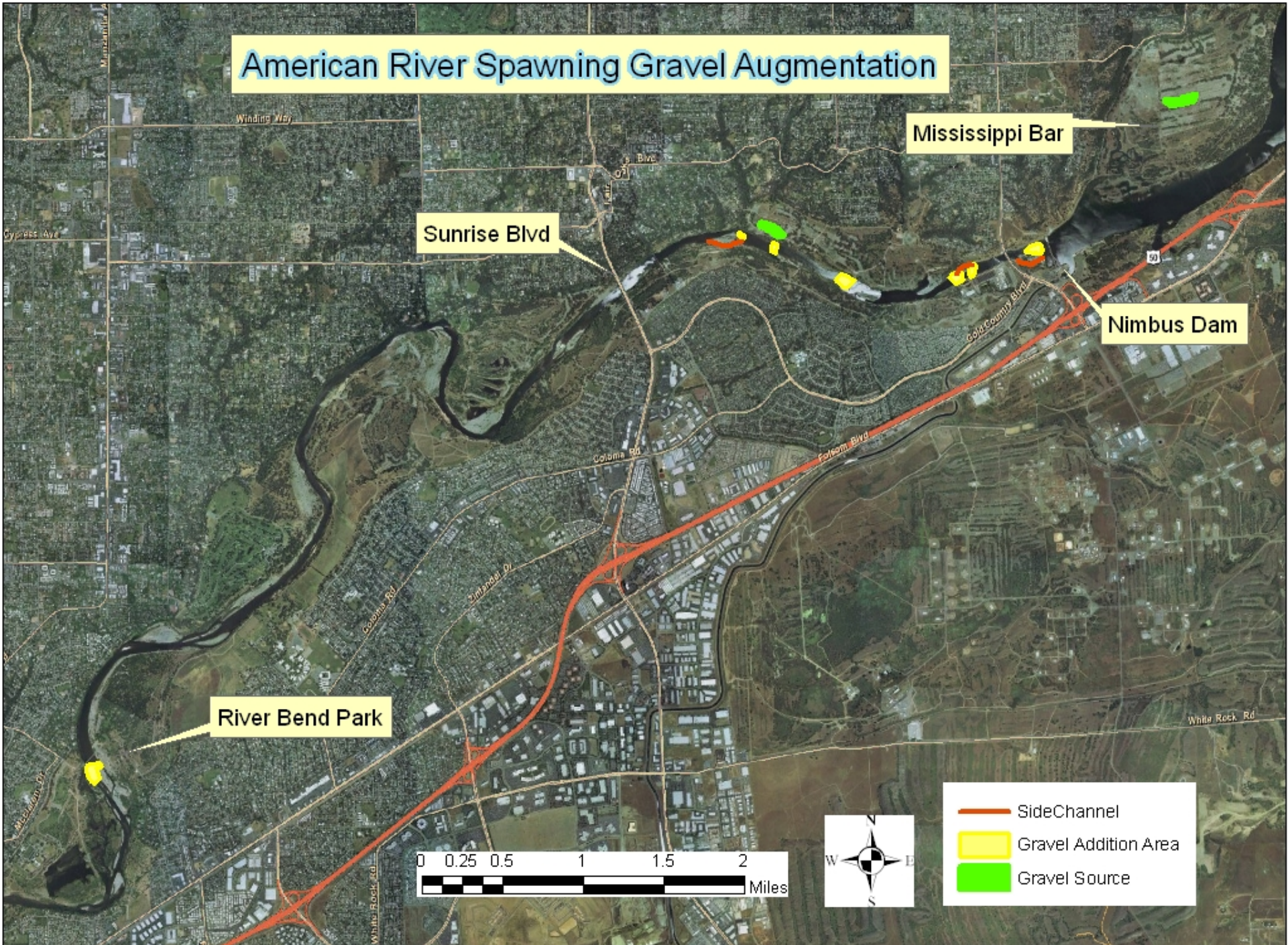
Sacramento River

2008 Salt Creek Gravel Placement

Truck Placing gravel on side of River channel

The gravel will be distributed naturally as high flow events occur in the river.

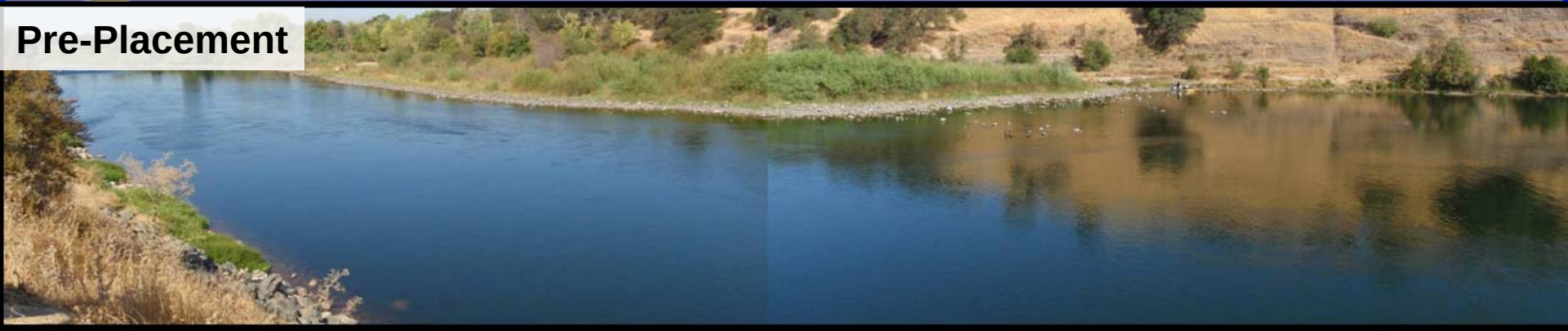
Project completed after adding 8,300 tons


American River Spawning Gravel Augmentation
Mississippi Bar
Sunrise Blvd
Nimbus Dam
River Bend Park
Folsom Blvd
Gold Country Blvd
Winding Way
Cypress Ave
Coloma Rd
Simpson Dr
White Rock Rd
0 0.25 0.5 1 1.5 2
Miles
N
W
E
S
SideChannel
Gravel Addition Area
Gravel Source

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

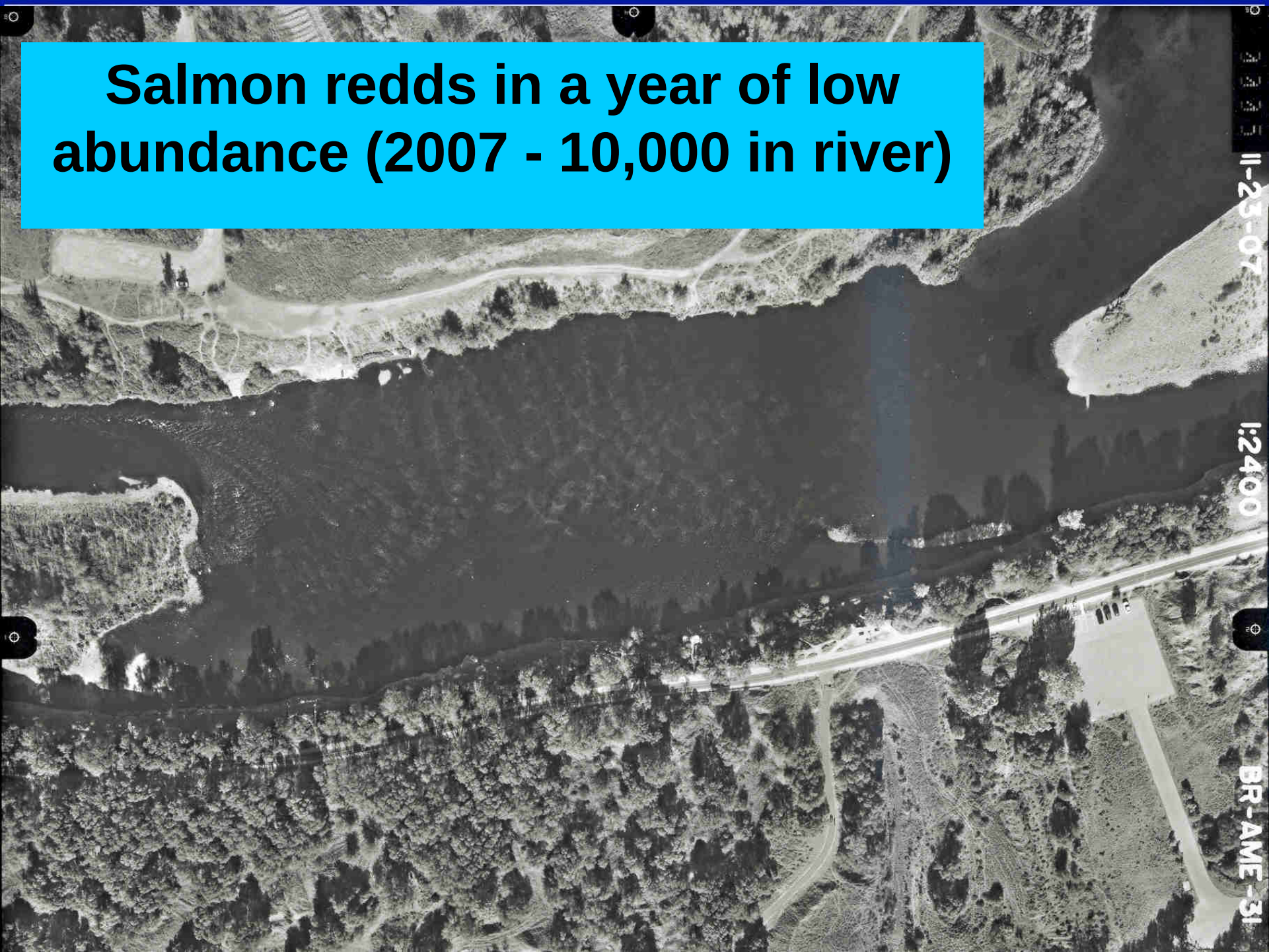
Sacramento River b13 Monitoring

- Geomorphic
  - Cross sections
  - Substrate samples
  - Habitat typing
  - Sediment transport
- Fisheries
  - Superimpose redd locations onto habitat types
  - Gravel quality parameters and egg survival

American River (B)(13) Monitoring

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


The End

Annual Gravel Deficits in CVP Streams

- 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