



Sacramento River National Wildlife

A Model for Multiple Benefits of Well-functioning Riparian Ecosystems

Joe Silveira, Tim Arendt, John Carlon, Adrian Frediani, Tom Gardali,
Meghan Gilbert, Greg Golet, Tom Griggs, Jessica Hammond,
Colleen Hatfield, Karen Holl, Ryan Luster, John Merz, Kelly Moroney, Luis
Ojeda, Chris Parrez, Michael Rogner, Michael Singer, Garrett Spann, John
Stella, Helen Swagerty, Dave Wood, Dawit Zeleke

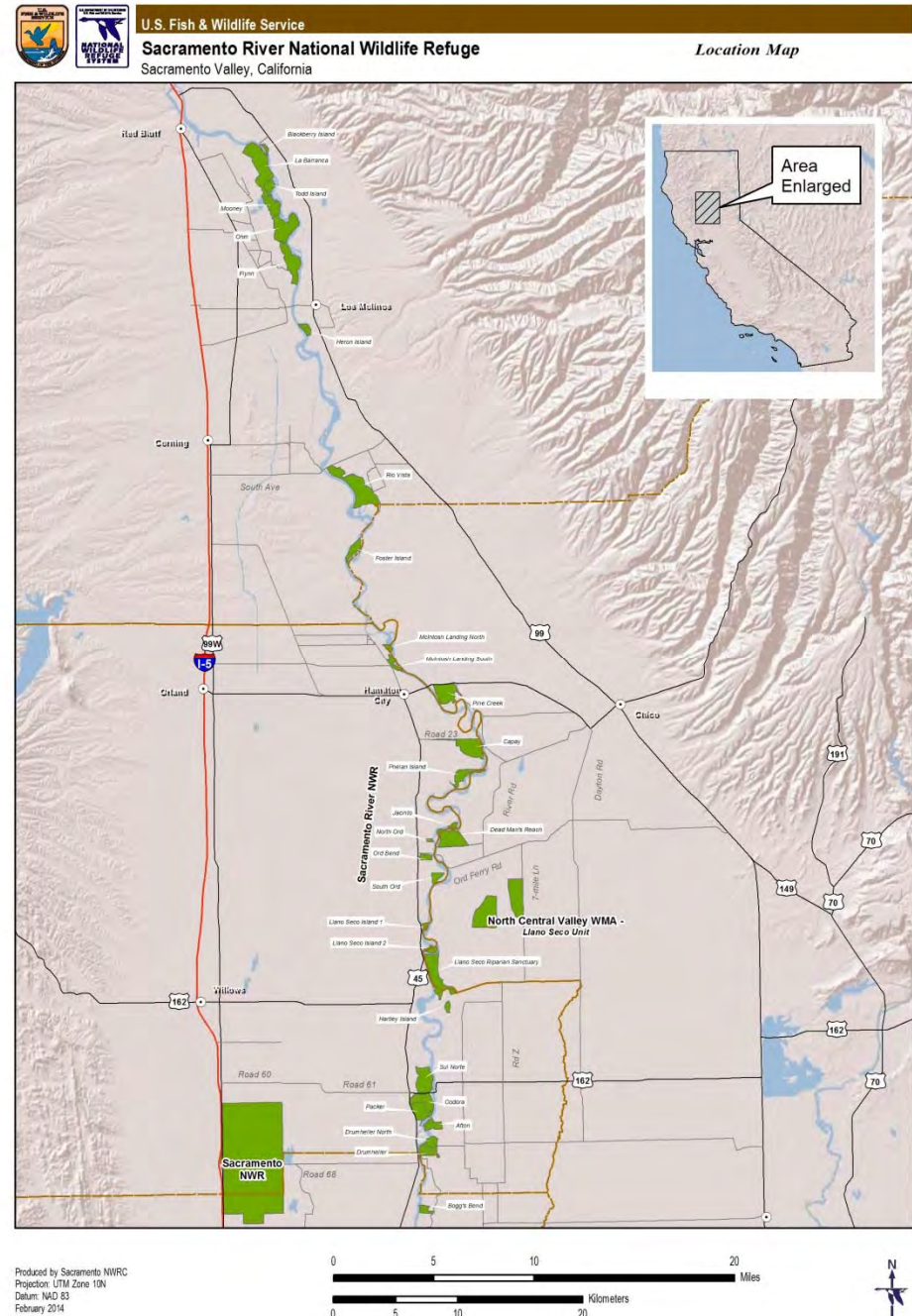
UC Davis Riparian Summit
October 18, 2017

Sacramento River National Wildlife Refuge

Est. 1989

- Currently 31 Units
- 10,355 acres
- 81-mile reach within the 100-year floodplain
- Restored (**5,360 ac**) & Natural Lands (4,535 ac)

*Willow scrub & herb land,
CTW, MR & VO forests,
VO woodland,
VO & elderberry savannas,
grasses & wildflowers*

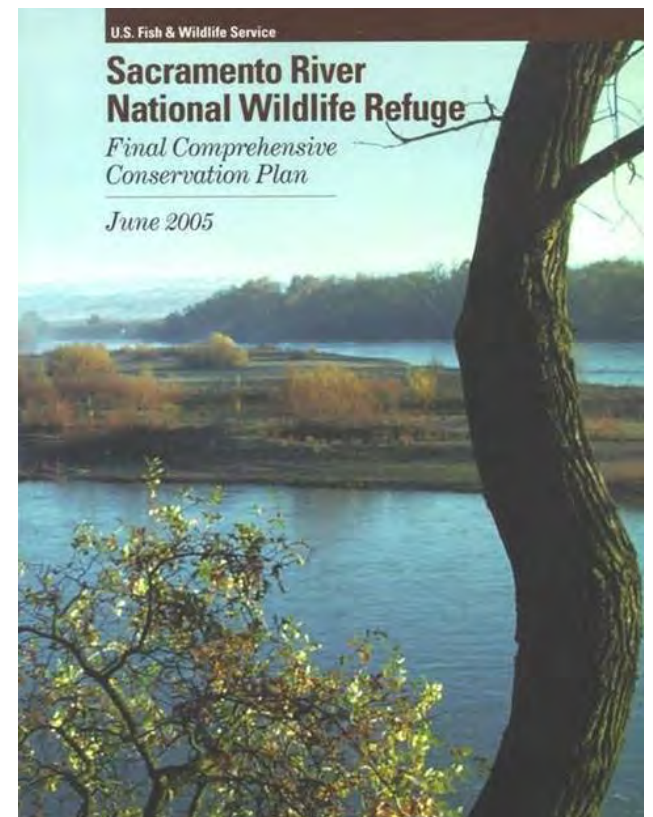




Purpose of the Refuge (*Authorities*)



- Conserve endangered and threatened species (In 1989, winter-run Chinook salmon, Valley elderberry long-horned beetle, Least Bell's Vireo, American Bald Eagle) and their habitats (*Endangered Species Act 1973*)
- Provide riparian/floodplain wetland habitat for migratory bird conservation (*Emergency Wetland Resources Act 1986*)
- Manage for fish, wildlife and native plant resources (*Fish & Wildlife Act 1956*)

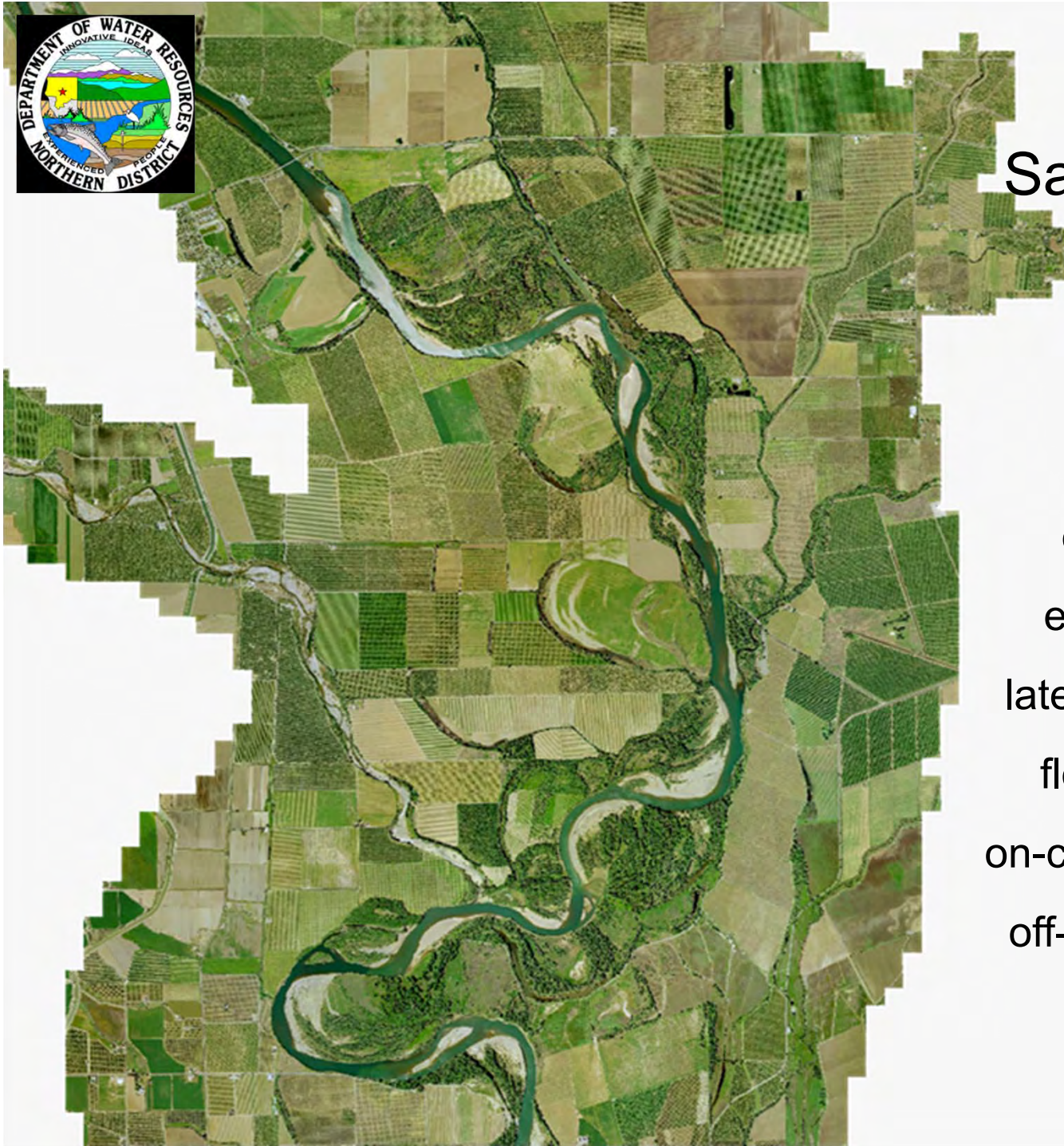




Sacramento River

Reach 2 & 3

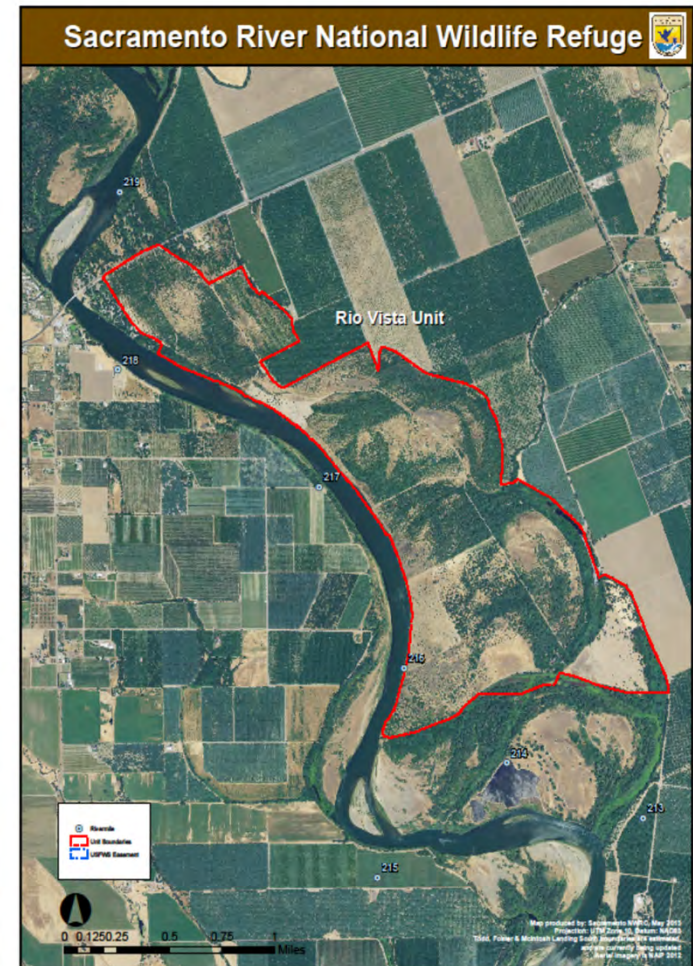
Sinuosity;
over-bank flooding,
erosion & deposition;
lateral channel migration,
floodplain re-working;
on-channel meander loops,
off-channel oxbow lakes,
floodplain sloughs



Recent alluvium has not yet developed pedogenic “acquired” soil horizons— they are “inherited” through the various dynamic energies at the time of deposition, and on top of this, channel migration / floodplain reworking further mixes and creates new (inherited) horizons— resulting in unpredictable, azonal stratigraphic soil texture (horizons) across the recent (100-year) floodplain



Columbia & Gianella Soils with & without gravel lenses

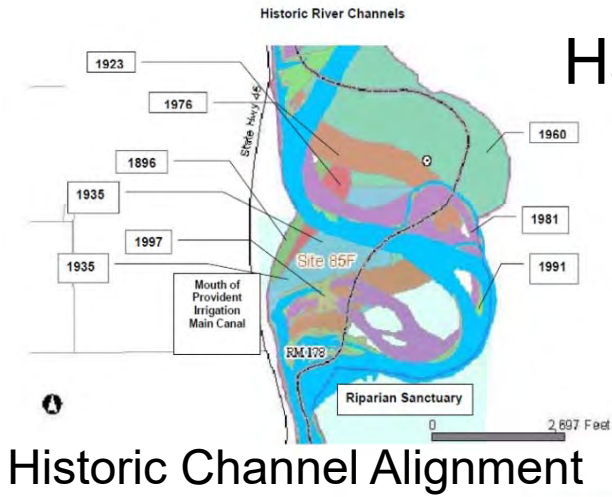


Openings in restoration
Indicated buried gravel bars,
also seen in the 1936 air photo

Sacramento River Winter 2017



Habitat Restoration Planting Design Planning



Historic Channel Alignment

The Nature Conservancy

Planning for Success

RIVER PARTNERS

TWO-DIMENSIONAL HYDRAULIC MODELING OF RIPARIAN HABITAT RESTORATION FROM COLUSA TO PRINCETON

SACRAMENTO RIVER, RM 142.5 TO RM 164.5
GLENN AND COLUSA COUNTIES, CA

March 28, 2008



Soil Texture
Depth to Gravel & Water



2-D Hydraulic Modeling
Baseline & Restoration

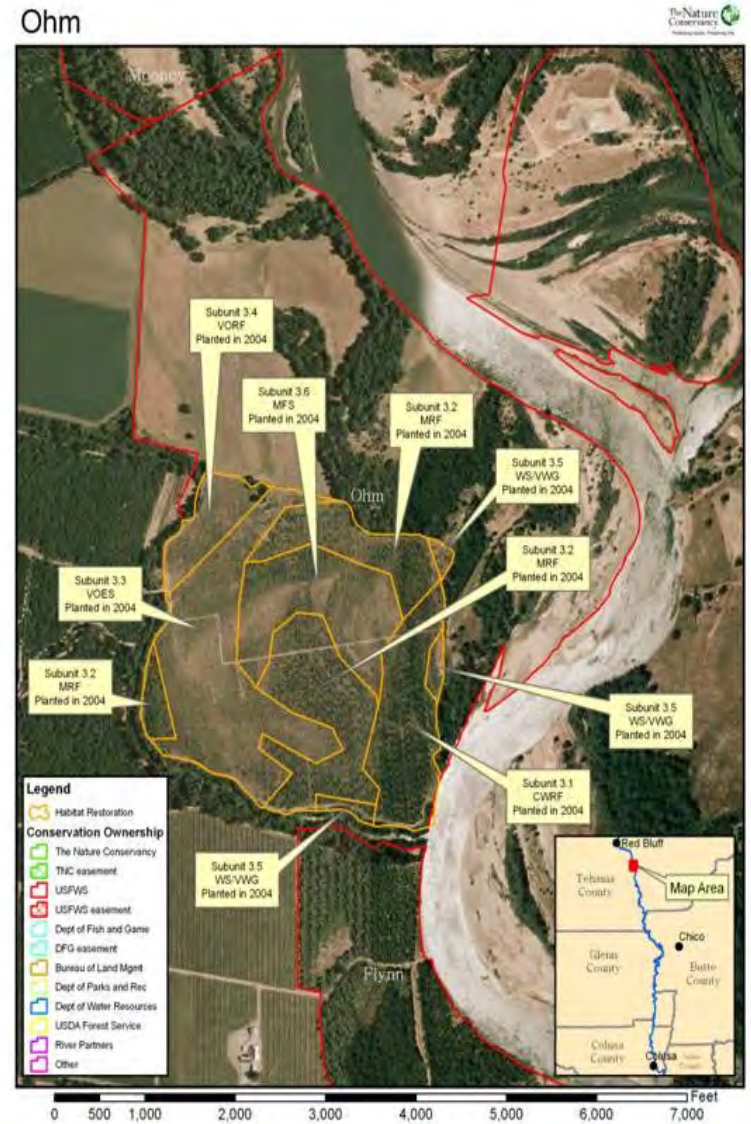
Prepared For:

The Nature Conservancy
Protecting nature. Preserving life.

500 Main Street
Chico, CA 95928



AYRES ASSOCIATES



Planting Design– Vegetation
Plant Spp. Comp, Freq & Density



Sacramento River National Wildlife Refuge Riparian Vegetation Restoration



Site Preparation

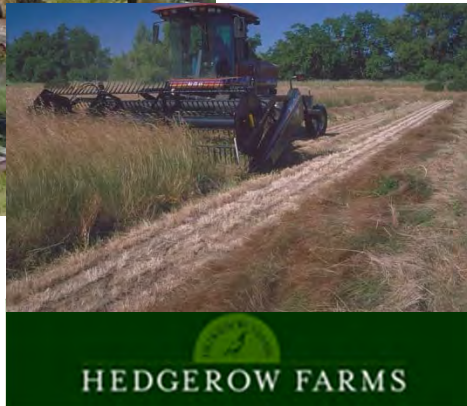
Seed & Cuttings of Local Ecotypes



Planting



Nursery Propagation

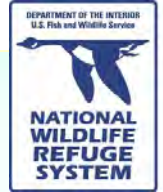


Maintenance





Sacramento River National Wildlife Refuge



Elderberry Savanna – Ord Bend Unit



Sambucus mexicana

Valley Elderberry Longhorn Beetle (VELB)
Desmocerus californicus dimorphus



— 1 cm

1990 – 2012: 114,420 elderberry shrubs planted

RIPARIAN & FLOODPLAIN RESTORATION BENEFITS TO A DIVERSITY OF TAXA

INSECTS

- Valley elderberry LB
- Ground-dwelling Beetles
- Bees

BIRDS

- Landbirds

SMALL MAMMALS

- Rodents
- Bats



Sacramento River NWR
Monitoring & Research
1992-2017
~ 90 Projects



The Health of Blue Elderberry (*Sambucus mexicana*)
and Colonization by the Valley Elderberry Longhorn
Beetle (*Democerus californicus dimorphus*) in
Restored Riparian Habitat
Meghan Gilbart — CSU Chico
2009



Photo by Jon Katz



It Was Built... Did They Come:
Habitat Characteristics of
Yellow-billed Cuckoo in
Restored Riparian Forests
Along the Sacramento River, California
Jessica E. Hammond — CSU Chico
2011



Photo by Mike Brinkley



Sacramento River NWR – Public Use

81,000 visits (2017)



- Wildlife Observation
- Wildlife Photography
- Environmental Education
- Interpretation
- Hunting
- Fishing

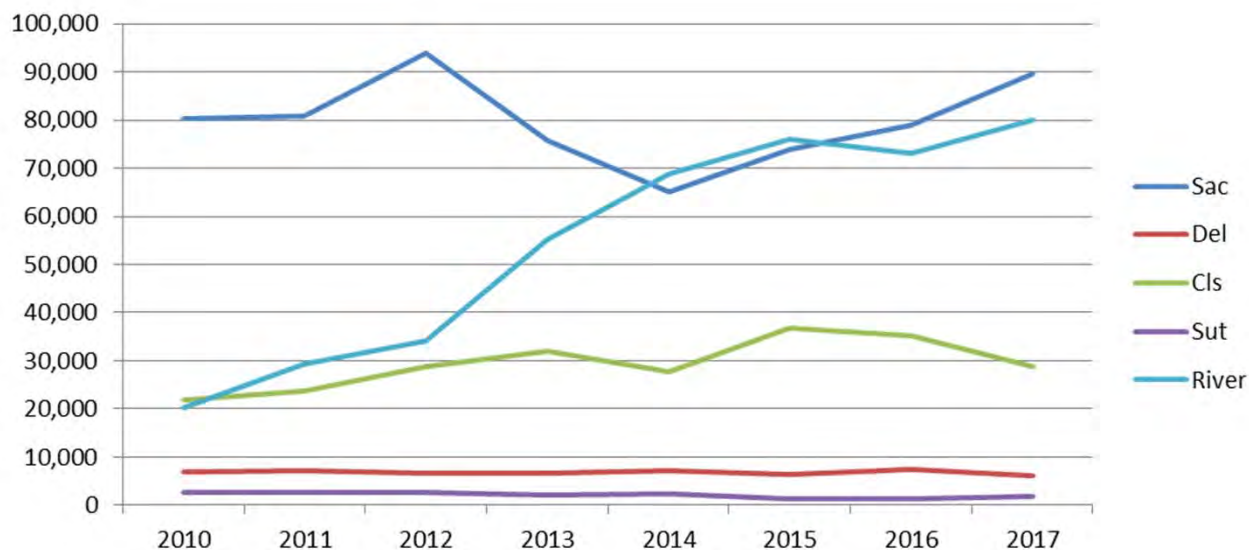




Sacramento National Wildlife Refuge Public Use



Wildlife Observation – Photography – Hunting – Fishing – Environmental Interpretation - Education



Sacramento National Wildlife Refuge Complex Auto Counter Numbers

| | Total | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Average |
| Sac | 80,402 | 80,734 | 93,813 | 75,693 | 65,157 | 73,759 | 78,869 | 89,746 | 79,772 |
| Del | 7,013 | 7,178 | 6,716 | 6,534 | 7,147 | 6,450 | 7,350 | 6,208 | 6,825 |
| Cls | 21,773 | 23,730 | 28,825 | 32,047 | 27,757 | 36,724 | 35,211 | 28,720 | 29,348 |
| Sut | 2,719 | 2,622 | 2,677 | 2,145 | 2,233 | 1,198 | 1,258 | 1,767 | 2,077 |
| River | 20,207 | 29,320 | 34,143 | 55,064 | 68,824 | 76,034 | 73,107 | 80,086 | 54,598 |
| Complex | 132,114 | 143,584 | 166,174 | 171,483 | 171,118 | 194,165 | 195,795 | 208,544 | 172,872 |

WEEDS





Sacramento River NWR Annual Habitat Management Plan



Habitat Management — Annual Vegetation Management (IPM) 2016

| Treatment | Refuge Units | Unit Cells | Acres |
|--------------|--------------|------------|--------------|
| Burn | 18 | 22 | 220 |
| Mow/ chip | 12 | 16 | 110 |
| Disc/ grade | 10 | 10 | 48 |
| Rototill | 2 | 2 | 12 |
| Spray | 24 | 60 | 540 |
| Graze | 13 | 32 | 3,130 |
| Total | | | 4,060 |

Prescribed Fire
Valley Oak Woodland Burn



Arundo donax Control
burn or cut/ spray

Prescribed Grazing
enhances native
grasses & wildflower





Forest Understory, Edge & Openings Native Grass Habitats



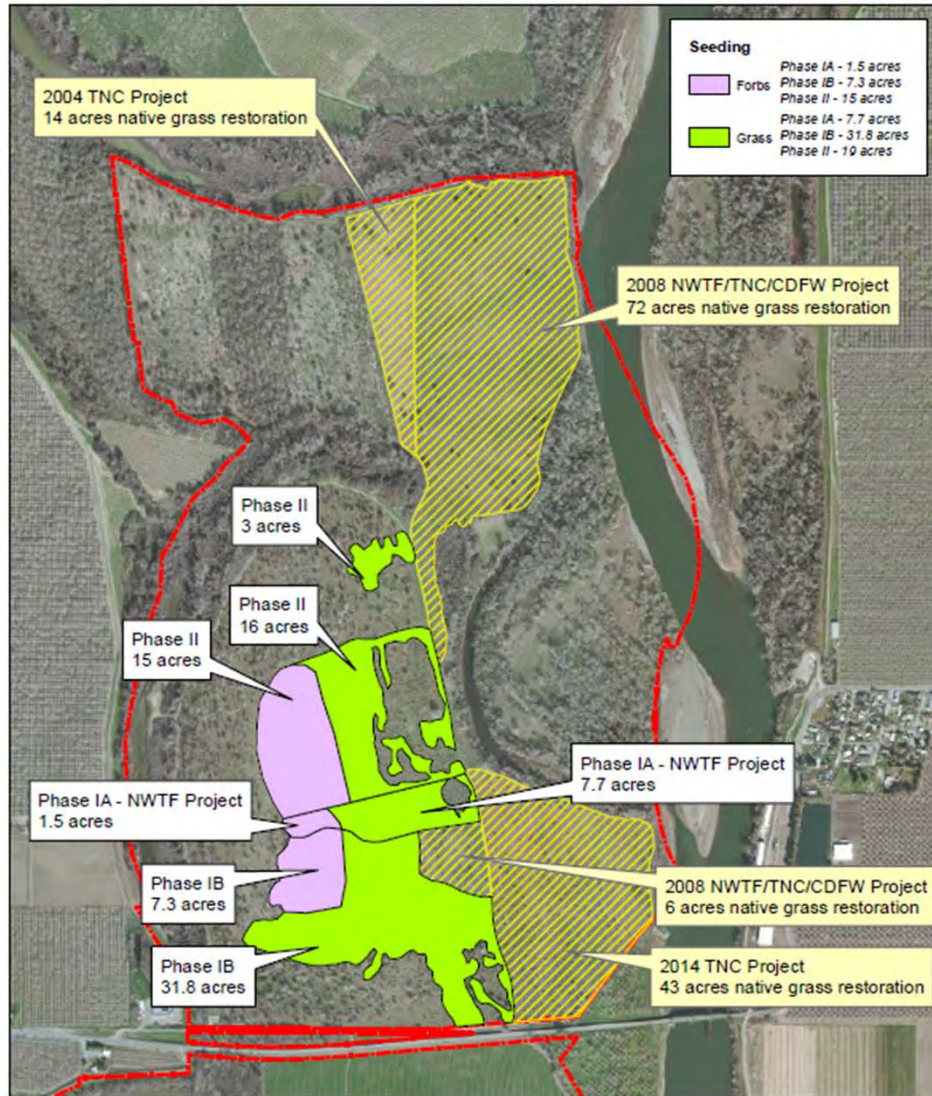
Large Openings
Natural & Designed for Flood Conveyance



Forest Understory



Forest Edge





Livestock Grazing Management

Cattle
eat grass...



- Native Plant Vigor
 - Vertical Habitat Structure
 - Thatch Reduction
- ↗ wildflowers ↘ fuels

Sheep
eat wildflowers...



- Broadleaf Weed Control
- Firebreaks

Goats
will eat bark...

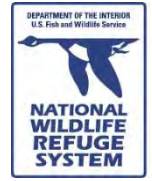


- Firebreaks
- Broadleaf Weed Control



Grazing Prescriptions

Sacramento River National Wildlife Refuge



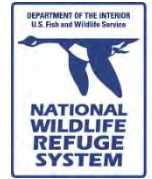
Timing Is Everything

- Native grass phenology – CRG tillering (late Feb – early March; PNG flowering (mid-March – mid-May)
- Grass thatch reduction for Spring wildflowers (September)
- Weed phenolgy (grazing as primary treatment or to lower grass height for herbicide application)
- Ground nesting birds (mid-March – mid-July)
- Deer Season (C4: mid-Sept – 1 Oct; D3: late Sept – late Oct; G1: late Oct – early Nov); Spring Wild Turkey (late March – early May)
- Winter & Spring Flooding (late December – late March)



Grazing Monitoring/ Research

Sacramento River National Wildlife Refuge



Monitoring & Research

- Point Blue – Pine Creek Grassland Birds (2007, 2008, 2009, 2010, 2011)
- Point Blue, UC Santa Cruz, North State Resources – Baseline Grazing Study (2012-2013: La Barranca, Capay, Sul Norte)
- Adrian Frediani (Humboldt State University, TNC) – Wildflower Response to Grazing (Capay Unit: 2012-2013)
- Point Blue – Rangeland Monitoring Network/ Rangeland Watershed Initiative (Pine Creek, La Barranca, Capay: 2015, 2016, 2017...)



Charlie Ohm Ranch



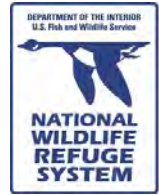
Breanna Owens Ranch

Terry Adams Livestock





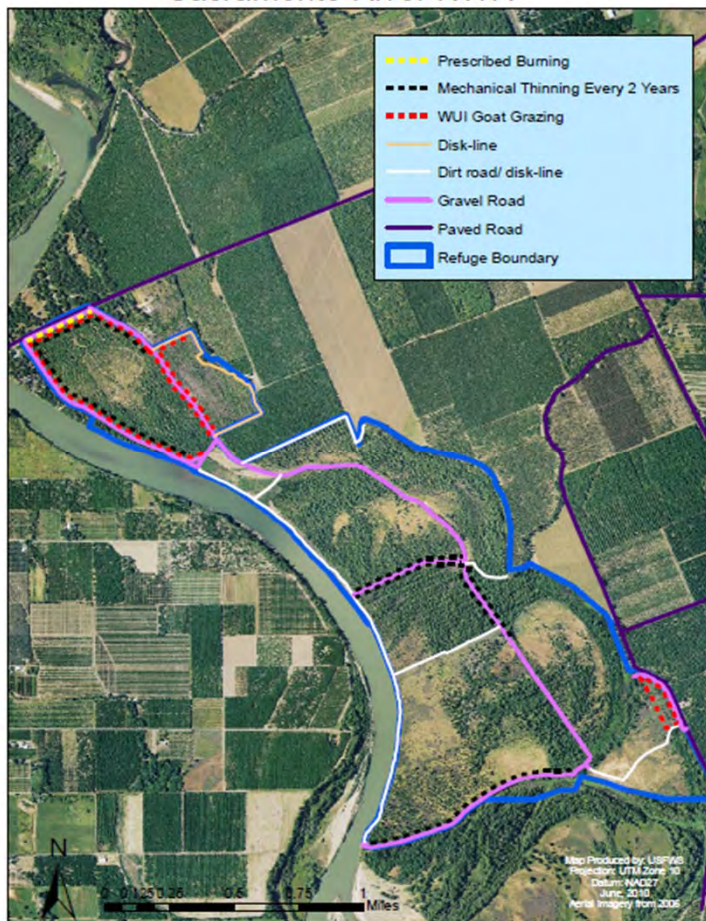
Sacramento River NWR Annual Habitat Management Plan



Facilities Maintenance — Gravel & Dirt Access Roads, Firebreaks, Hiking Trails, Gates, Fences, Culverts, Levees, Water Control Structures

Routine Maintenance Projects

FUELS MANAGEMENT: Rio Vista Unit
Sacramento River NWR



Deferred Maintenance Projects

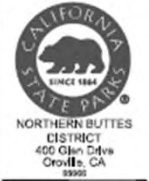




Sacramento River NWR Annual Habitat Management Plan



Facilities Maintenance — Visitor Services Public Use Parking Lot, Kiosk, Restroom, Picnic Benches, Signage



| | |
|-----------|---------|
| DESIGNED: | MT |
| DRAWING: | MT |
| CHECKED: | RR |
| DATE: | 11/1/13 |
| REVISIONS | |
| | |
| | |

BUTTE CITY PROJECT
RECREATION FACILITY AND HABITAT RESTORATION
PLAN

SHEET NO.
1 OF 3
SCALE: 1"=10'





South Ord Unit

Edible Fig Control

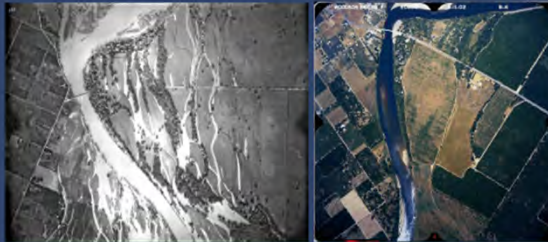




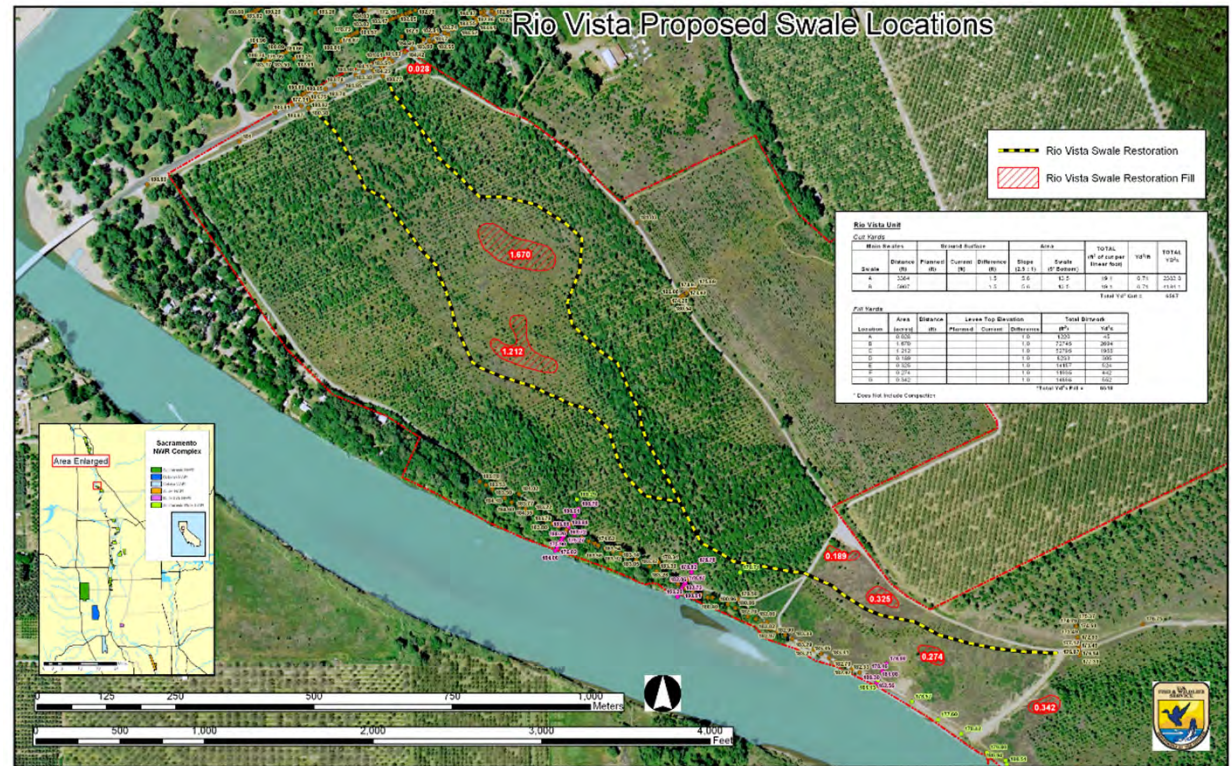
Rio Vista Unit Swale Restoration

January 19, 2004 | Final Report

*Sacramento River
National Wildlife Refuge
Rio Vista Unit*
Conceptual Restoration and
Local Flood Hazard Reduction Plan



Prepared for
**The Nature Conservancy
and
US Fish & Wildlife Service**

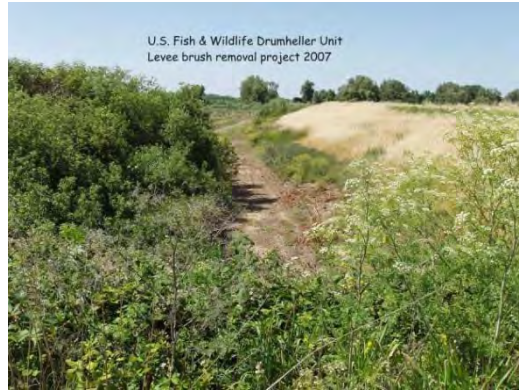




U.S. Fish & Wildlife Service Levee Maintenance Brush Removal Project Drumheller Unit 2007



BEFORE



DURING



AFTER





Flynn Unit Levee Removal Channel Meander



Refuge implements levee removal
Summer/Fall 2001



Levee removal completed
Fall 2001



Winter 2001- 02
Sacramento River floods



bank fills
&
channel migrates



October 2002
Fall-run Chinook Salmon Spawn
at levee removal site

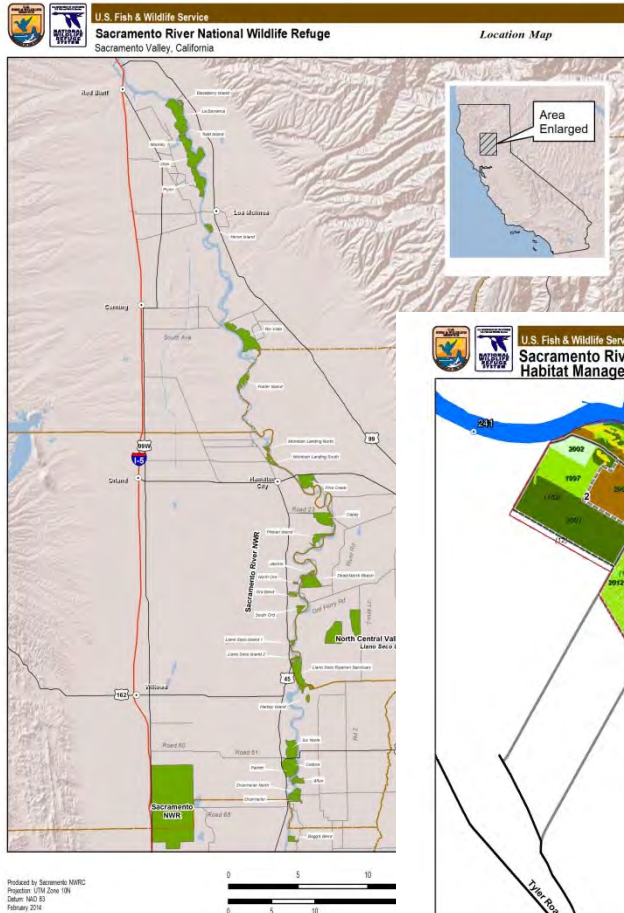
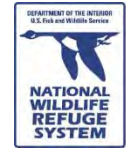


June 2002 BANS Survey
2,770 nest burrows
at levee removal site





Annual Habitat Management Planning



Sacramento River NWR
31 Refuge Units – 128 Cells
81 River Miles



Refuge Management Team

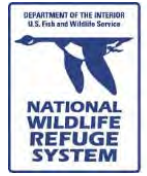
- Management
- Biology
- Maintenance/ Field Ops
- Public Use
- Fire
- Law Enforcement





Sacramento National Wildlife Refuge Complex

Partnerships for Habitat Restoration, Management & Conservation



Terry Adams Livestock

Charlie Ohm Ranch

Breanna Owens Ranch