Outline

1. Purpose and Description of vegetation model

2. Summarize system-wide vegetation results and management implications, from Programmatic EIS studies

3. Recent model improvements and current studies for assessing management actions
1. Purpose of San Joaquin River Vegetation Studies and Modeling

- Regenerate native cottonwood-willow communities to benefit fisheries
- Restrain the spread of invasive riparian vegetation

Predict Hydraulic Capacity
1. SRH-1DV

Base Model SRH-1D
- 1D Hydraulics
- 1D Sediment transport

Link Vegetation

SRH-1DV

Physical Processes
Hydraulic and sediment transport computations, and estimates groundwater elevation based on river water surface elevation, and specified soil permeability

Ecological Processes
Germination, growth and mortality of native vegetation
Germination, growth and mortality of invasive vegetation
1. SRH-1DV  Since 1999, the Sedimentation and River Hydraulics Group at Reclamation’s Technical Service Center has used 1D models to study linkages between management actions, flow regime, sediment transport, riparian vegetation and species habitat in river environments.

**Platte River** - SedVeg-Gen3 for bird habitat, forage fish habitat, native vegetation and river morphology studies (fully braided river)

**Sacramento River** - SRH-1DV for native vegetation studies

**San Joaquin River** - SRH-1DV for native vegetation, invasive vegetation and hydraulic capacity studies.

Dr. Blair Greimann is the author of SRH-1DV vegetation code with Dr. Victor Huang also supporting code development.
1. SRH-1DV modeling begins with input of existing conditions from GIS 2002 vegetation mapping and 2008 mapping of invasive vegetation
Selected as: species of interest, representative of a community, or geomorphically significant.

-Natives:
- Fremont cottonwood
- Gooding’s black willow
- Narrow-leaf willow

-Invasives:
- Red sesbania
- Giant reed (Arundo)

-For computations:
- dry land grass
- no-grow areas
1. **SRH-1DV** - Dynamic, deterministic, 1D model

Represents ground surface with cross sections and flow in one direction—downstream.

San Joaquin River studies uses **300 cross sections** with approximately **80 points per cross section**.

Every point can potentially support all **six plant types** or a no-grow designation.

In addition to flow and sediment transport computations, **SRH-1DV** can track: age, root growth, stem growth, canopy growth, growth seasons, germination periods, seed viability, distance to groundwater, capillary fringe, and mortality (removal) due to scour, desiccation, inundation, competition, shading, and senescence.

For:
- each plant type,
- at every point,
- at every cross section,
- on every flow day,
- in modeled reach for the period of study.
1. SRH-1DV Vegetation Model

- Mature cottonwood grove
- Young cottonwood or Goodings black willow
- Narrow-leaf willow
- Herbaceous
- Arundo or red sesbania
Productivity: Average Native Vegetation Width for Baseline and Alternative A flow regimes.
2. Simulated Daily Flows at Friant Dam

Friant Release

Baseline
Alternative A
2. Simulated daily flows at Mendota
2. Reach 1A – Channel Complexity
Reach 1B- Heavily vegetated with invasive red sesbania on right bank
Reach 2A
2. Reach 2B

Verification of water surface, channel geometry and root depth. Confirmed relation between Mendota Pool water surface, groundwater elevation, root depth, and persistent vegetation in Reach 2B.
2. Hydrographs and Flow Routing

Profile of Reach 2B

- original thalweg
- simulated Program thalweg
- Program w.s.e
- reach divisions
2. Reach 3- simple, vegetated channel
Reach 4- Are peak flows insufficient to wet overbank areas? Overbank areas too high for new vegetation establishment? Incision migrating up from Reach 5?
Reach 4B1-
Groundwater supported vegetation
Reach 5 Incision but wide flood plain
2. Reach 5- overestimating increases?
2. Native Vegetation Mortality and Implications to Management

![Graph showing various data points related to vegetation mortality and management implications.](image-url)
2. Sensitivity Studies

Examples: root growth rates, groundwater conductivity, historical flows
2. Programmatic EIS Reports

- Appendix N- Summary of Geomorphology, Sediment Transport and Vegetation
- Appendix N, Attachment 6- SRH-1DV vegetation modeling
3. Current Studies - Model Development and Verification

Expand model capabilities
• link vegetation growth or removal to channel resistance (hydraulic capacity)
• add large-scale vegetation density capabilities
• add function relating Fremont cottonwood and Gooding’s black willow seed release to temperature (Stillwater Science, 2006)

Model verification
• Elevation establishment and mortality (dessication, inundation) using vegetation monitoring cross sections, SAIC reports (2002, 2003)
• Verification with 2010 spring flow event (scour, burial)
• Spread of invasives using 2000 mapping, 2008 invasive mapping, 2010 spring flows field review
3. Current Studies- Detailed Investigation of Reach 4B1

• Aid Design of Reach 4B1 and evaluate proposed flow management and channel shape, and productive areas of the Reach
• Automated predictions of channel resistance for assessment of change to future hydraulic capacity- aids management strategies