

## Case Study: Flood Risk Reduction, passive restoration and future hydrologic variability in two Central Coast Rivers

Presentation for the Climate Smart Riparian Restoration Workshop  
for  
Restoration Practitioners on California's Central Coast  
Elkhorn Slough Coastal Training Program

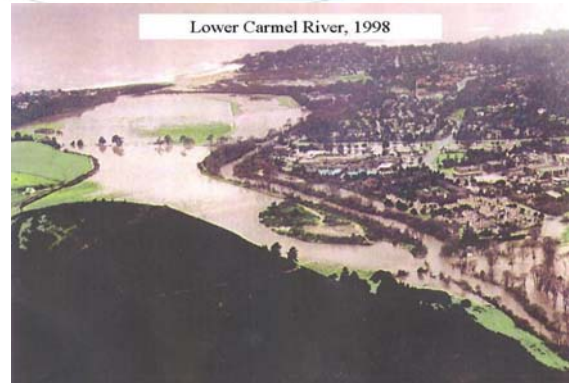
## Flood Risk Reduction & Riparian Habitat Enhancement

- ◆ **Its all about water...**
- ◆ Design flood flows – inundation frequency and extent
- ◆ Balancing design flow (out of bank) with riparian recovery versus channel impacts, erosion, and avulsion
- ◆ Groundwater availability - eventual recharge
- ◆ Passive versus active restoration – deposition - microtopography
- ◆ Climate change – more drought, larger storms, shorter wet season
- ◆ Sea level rise – adaptation planning – coastal areas especially

## A Tale of Two Rivers...

- ◆ Carmel River
- ◆ Located north of Big Sur Coast; 255 square miles; mainstem 36 miles
- ◆ Steelhead stream
- ◆ Dams attenuate flood flows and natural hydrograph and reduce bedload supply to stream channel
- ◆ Riparian habitat heavily impacted by groundwater depletion due to private wells along stream corridor – mass loss of riparian areas in late 1970s along the middle Carmel River below San Clemente Dam
- ◆ Perched floodplain; significant channel bed incision; remaining riparian and bank armoring transformed a braided and more active lower Carmel River to a relatively fixed single-thread channel

## Carmel River 20-year flow



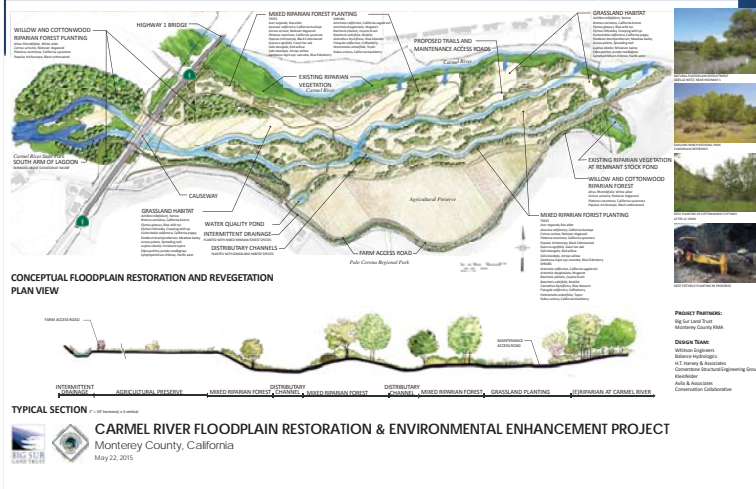
## A Tale of Two Rivers...

- ◆ Salinas River – 4,160 square mile basin; mainstem 17 miles
- ◆ Located east of Santa Lucia Range and west of Gabilan & Diablo Ranges
- ◆ Dams, sediment supply, groundwater overdraft, floodplain conversion/channelization, channel aggradation, gravel mining, invasive species (Arundo) all combine to effect surface and groundwater availability, channel geometry, and riparian habitat
- ◆ Significant loss of freshwater wetlands especially in middle river
- ◆ Reduction of riparian habitat width in the greater floodplain/valley
- ◆ Increase in density or width of riparian vegetation in the river channel in recent decades

## Transitioning to floodplain function and riparian restoration 2007 started design work



## 2015 Design for Construction in 2017/2018



## Salinas River

- Efforts began in 2013
- Lack of information due to majority private property
- Reconnaissance level assessment in 2 dry years (2014 and 2015)
- Arundo major issue for riparian and 2-5-year floodplain
- Incremental change – get water on floodplain, reduce and control Arundo, passive revegetation (what species), avoiding riparian vegetation, mitigation plantings as a start



## Flood Risk Reduction – Using the Floodplain – Co-Riparian Benefits

- Multi-benefit focus
- Hydrology is the driver/flood risk reduction – not protection
- Secondary channel design – re-establishing historic meander channels to increase floodplain storage, address velocity increases in constrained reaches, promote channel stability – 125 channels over 90 miles
- Design flow is 2-year to 7-year flows
- Riparian enhancement is long term goal; program defines annual work areas – not whole channel for vegetation removal; provides avoidance guidance and requires mitigation that addresses Arundo first and replanting of least common riparian species based on field confirmation



Thanks!

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- ◆ Many amazing groups have worked on these projects I presented today – this is their work... Big Sur Land Trust, Balance Hydrologics, Whitson Engineers, Nikki Nedeff, Scott Hennessy, HT Harvey & Associates, County of Monterey, California State Parks, Monterey Peninsula Water Management District, Monterey Regional Parks District, Resource Conservation District of Monterey County, Monterey County Water Resource Agency, Salinas River Channel Coalition, The Nature Conservancy, Alnus Ecological, Flow West Inc., Grower Shipper Association of Central Coast, Monterey County Farm Bureau, California Coastal Conservancy