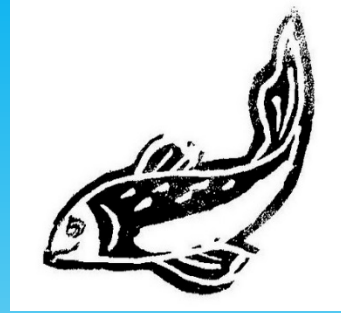


Sanctuary Forest



Sanctuary Forest is a land and water trust whose mission is to conserve the Mattole River watershed and surrounding areas for wildlife habitat and aesthetic, spiritual and intrinsic values, in cooperation with our diverse community.

Addressing Land Use Impacts to Restore Dry Season Flows and Foster Hydrologic Resiliency in the Mattole Headwaters

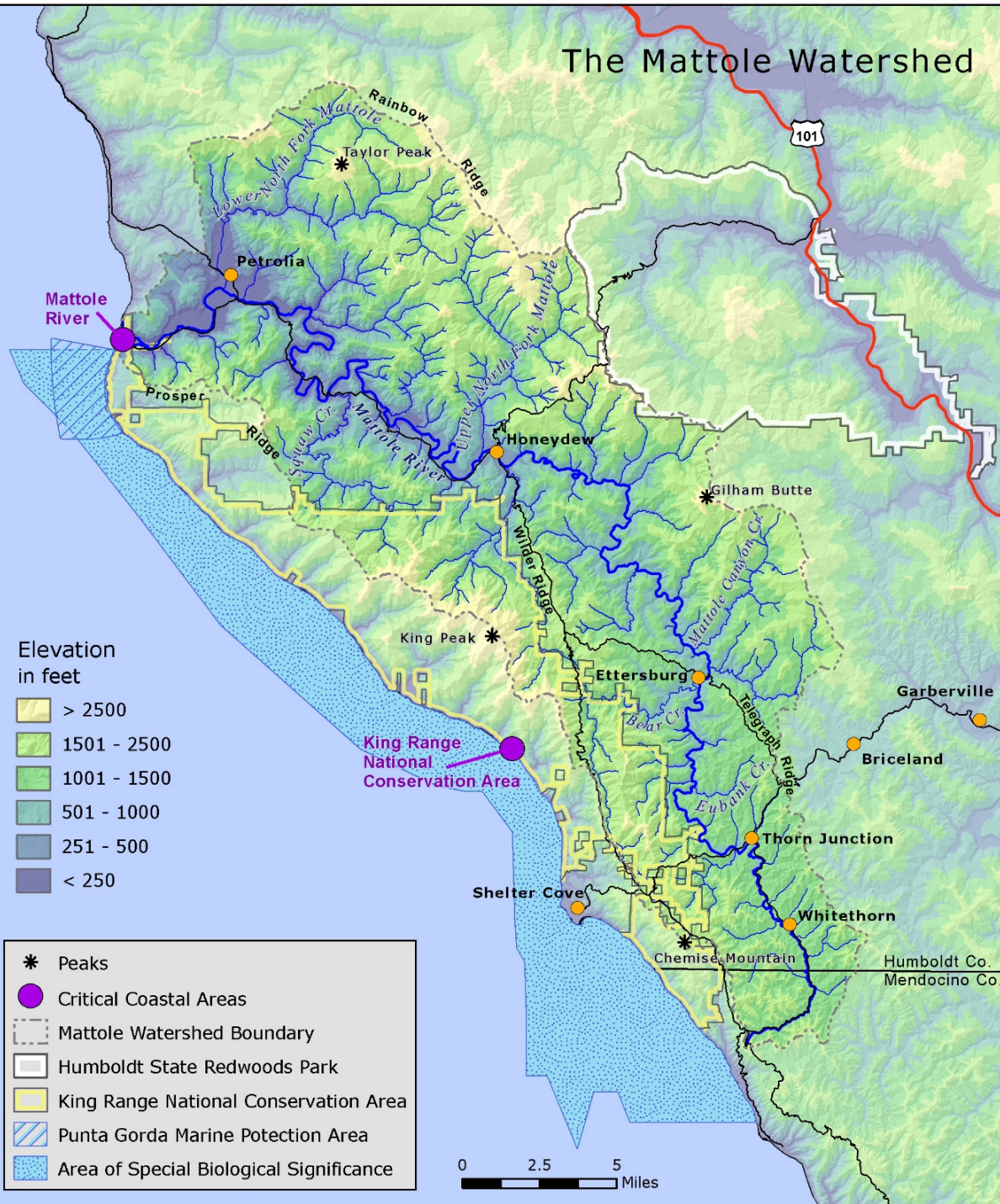
Tasha McKee, Sanctuary Forest; Sam Flanagan, BLM and Joel Monschke, Stillwater Sciences

In collaboration with Michael Pollock, NOAA Fisheries; Conor Shea, USFWS, Campbell Thompson, Mattole Salmon Group, John Neill Construction, funders, donors, community volunteers and working group/technical advisory committees 2010 – present.



2018/02/14

The Mattole Watershed



Causes of Mattole Low flows -

- Longer dry season
- Land use practices that increase runoff : *logging, roads, removal of wood from streams, draining wetlands, hardscape, etc.*
- Land use practices that increase evapotranspiration: *fire suppression, plantation forestry, etc.*
- Human use

Addressing Land Use Impacts to Restore Dry Season Flows

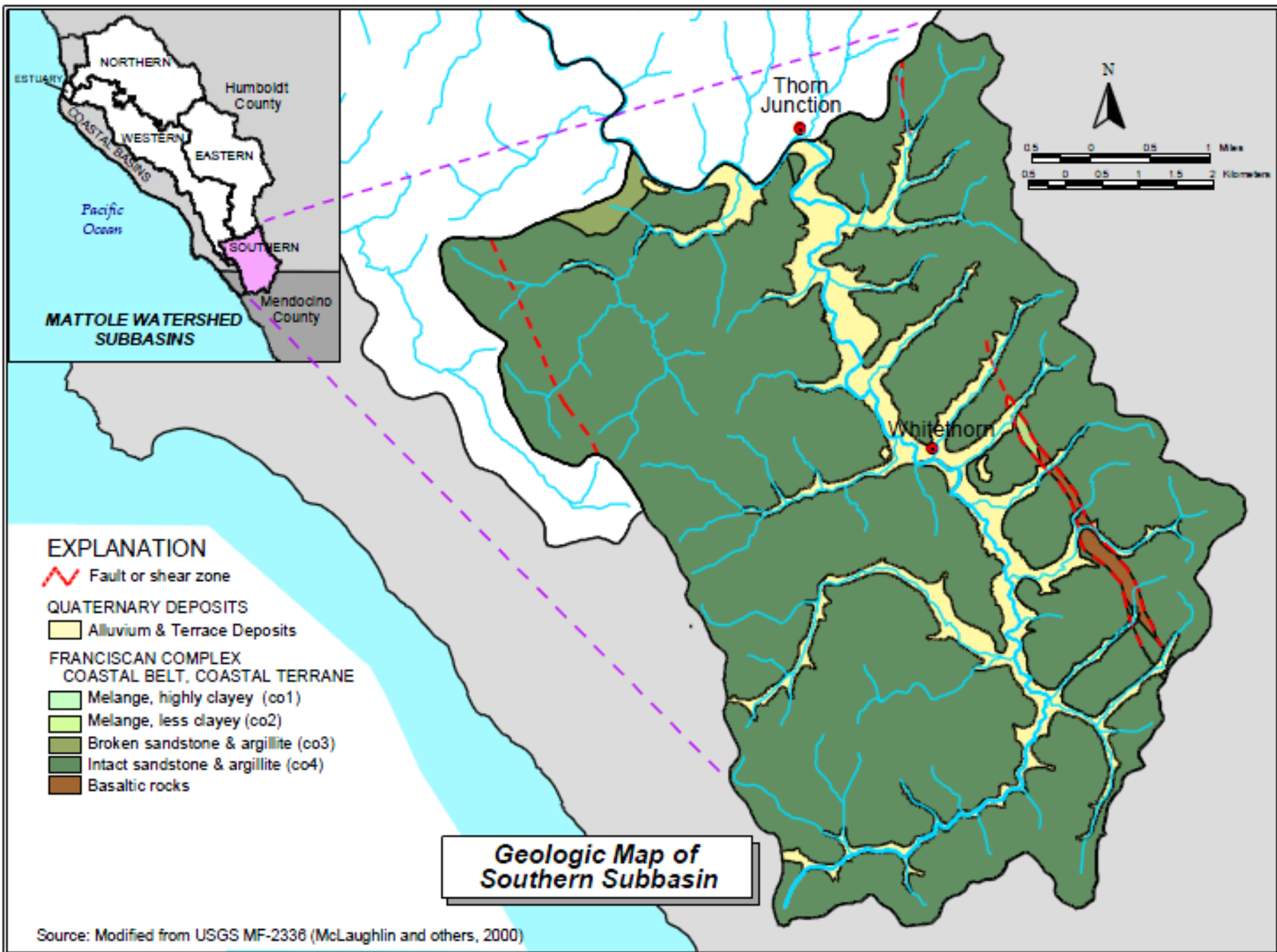
Multi-pronged approach:

- forest thinning - evapotranspiration & forest health,
- infiltration from roads & hardscapes
- gully repair
- upland infiltration / wetland enhancement
- restoring entrenched streams
- instream ponds (upstream of anadromy)

Pilot Projects

experimental with uncertain outcomes

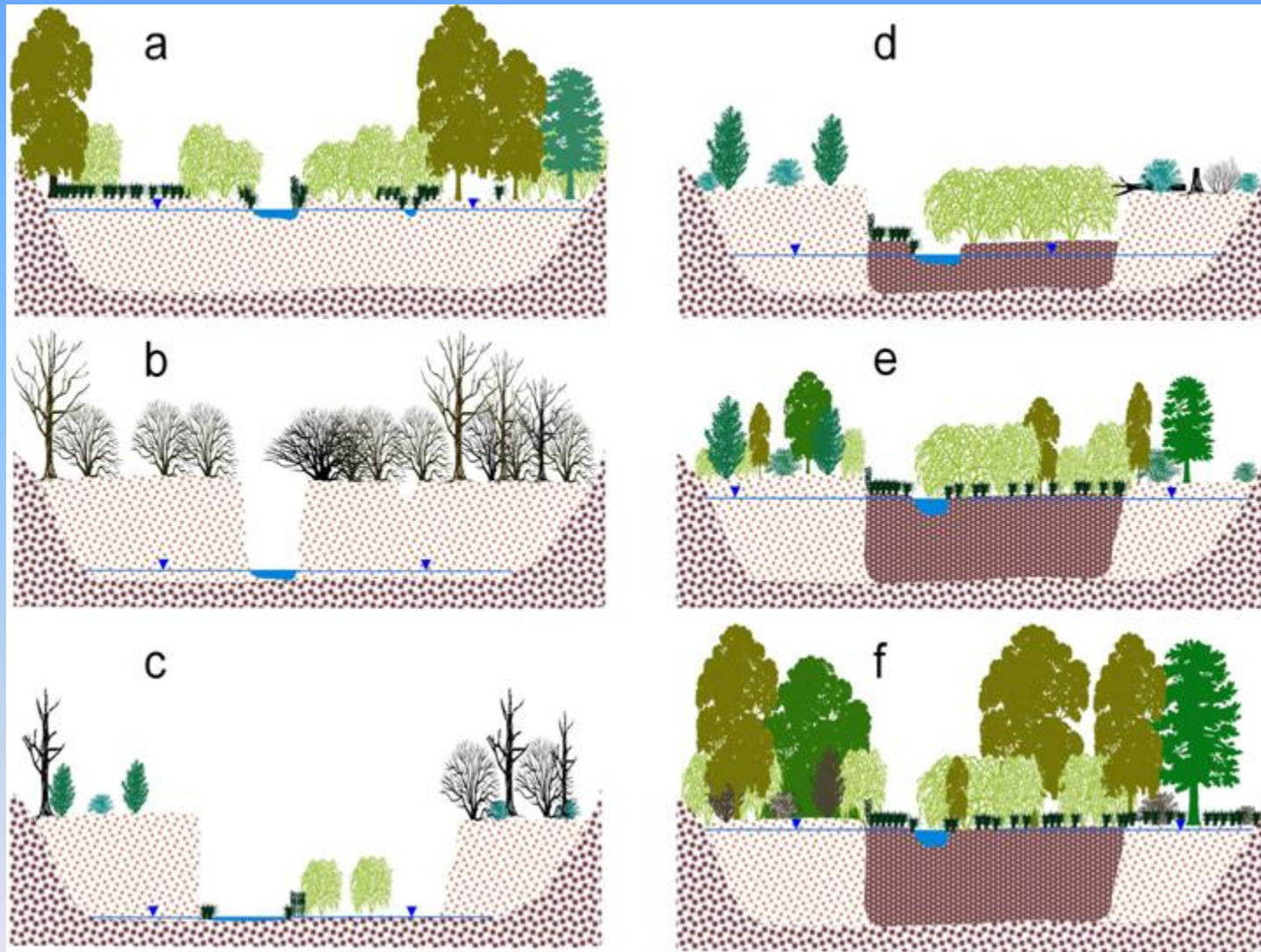
- Develop hypotheses, desired outcomes, and potential risks analyses
- Perform site evaluation and pre- project monitoring with estimated outcomes
- Design projects large enough to produce measurable outcomes and small enough to minimize risks and cost
- Implement project
- Perform post project monitoring and evaluation
- Use project outcomes to further the science of streamflow enhancement and salmonid habitat recovery in the Mattole and beyond



Valley & Stream Settings – confined versus unconfined valley; colluvial hillslopes, entrenched bedrock and alluvial streams



Stream Incision and Loss of Groundwater



Incision to bedrock

Poor Summer Rearing Habitat

Insufficient pools, groundwater and streamflow to withstand summer months

- Simplified channel with shallow pools
- Lack of deformable bed for pool scour
- Minimal bank and streambed storage & associated low flows

Poor Winter Rearing Habitat

- Disconnected floodplains & lack of high velocity flow refuge



Baker Creek Instream Objectives

- Inundate historic and paleo channel topography (off channel habitat)
- Increase Groundwater Storage in terrace alluvium (low flows)
- Improve in-channel habitat complexity

Baker Creek Project: Phase I Post-Project

Pre-Project



Drought resilient habitat upstream of weirs

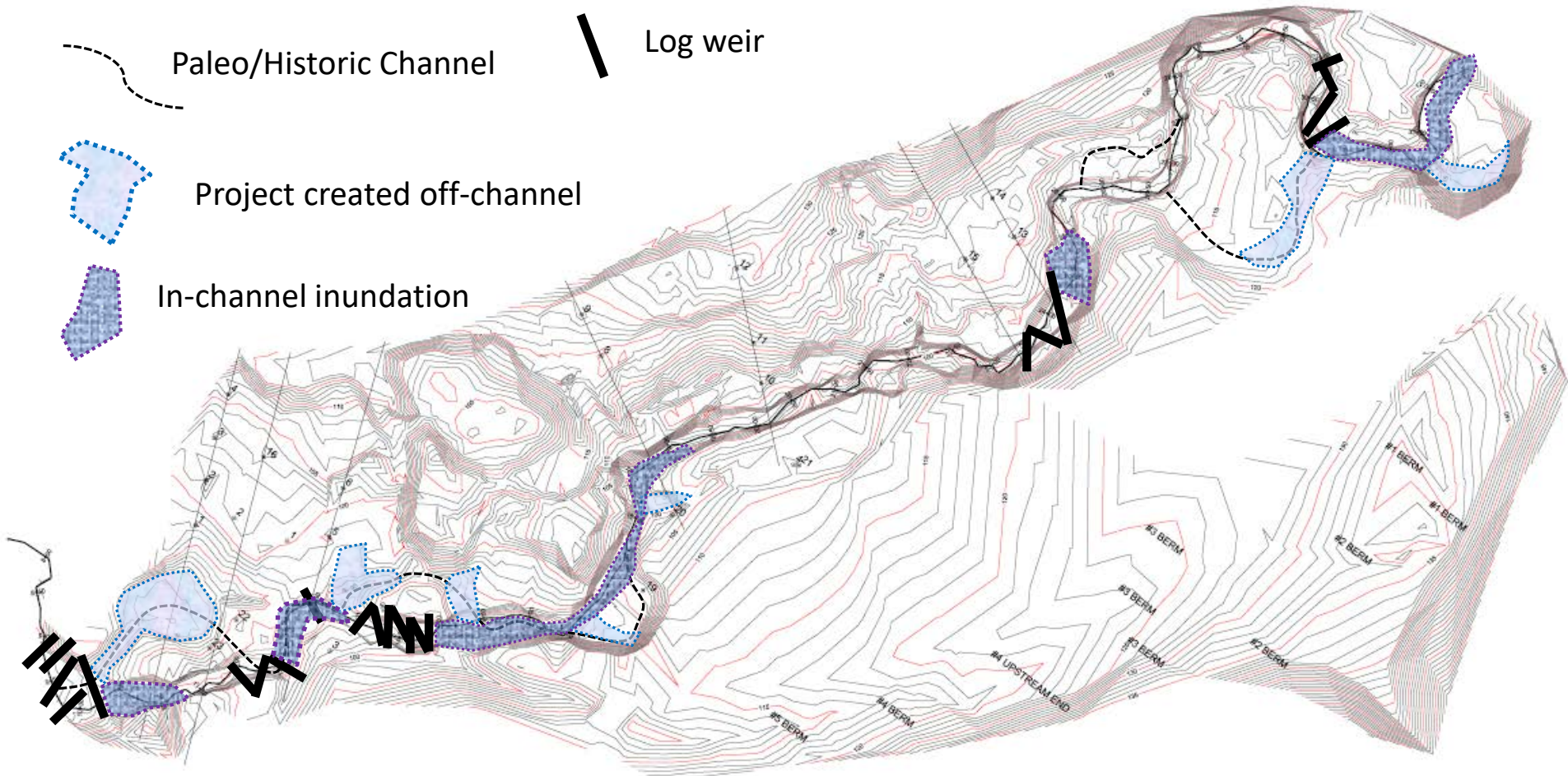




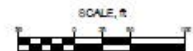
Diagonal weirs with backwater jam



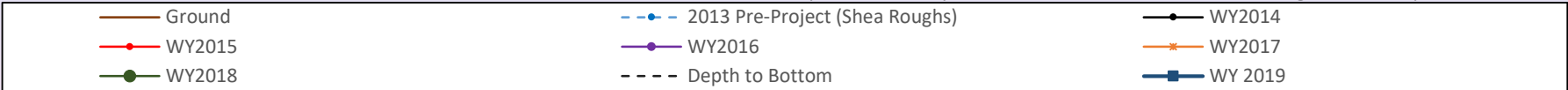
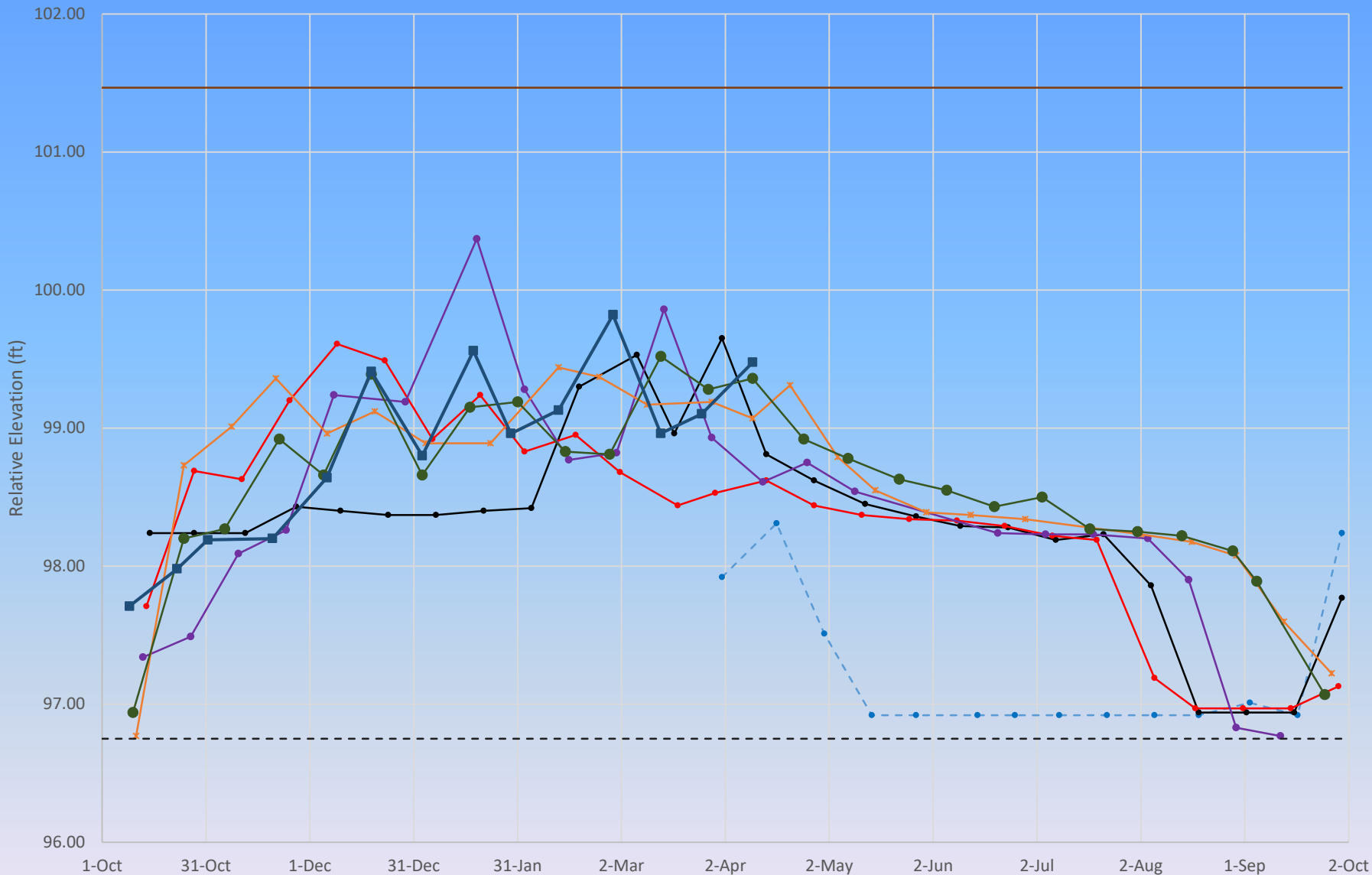
Leveraging Historic and Paleo Channel Features



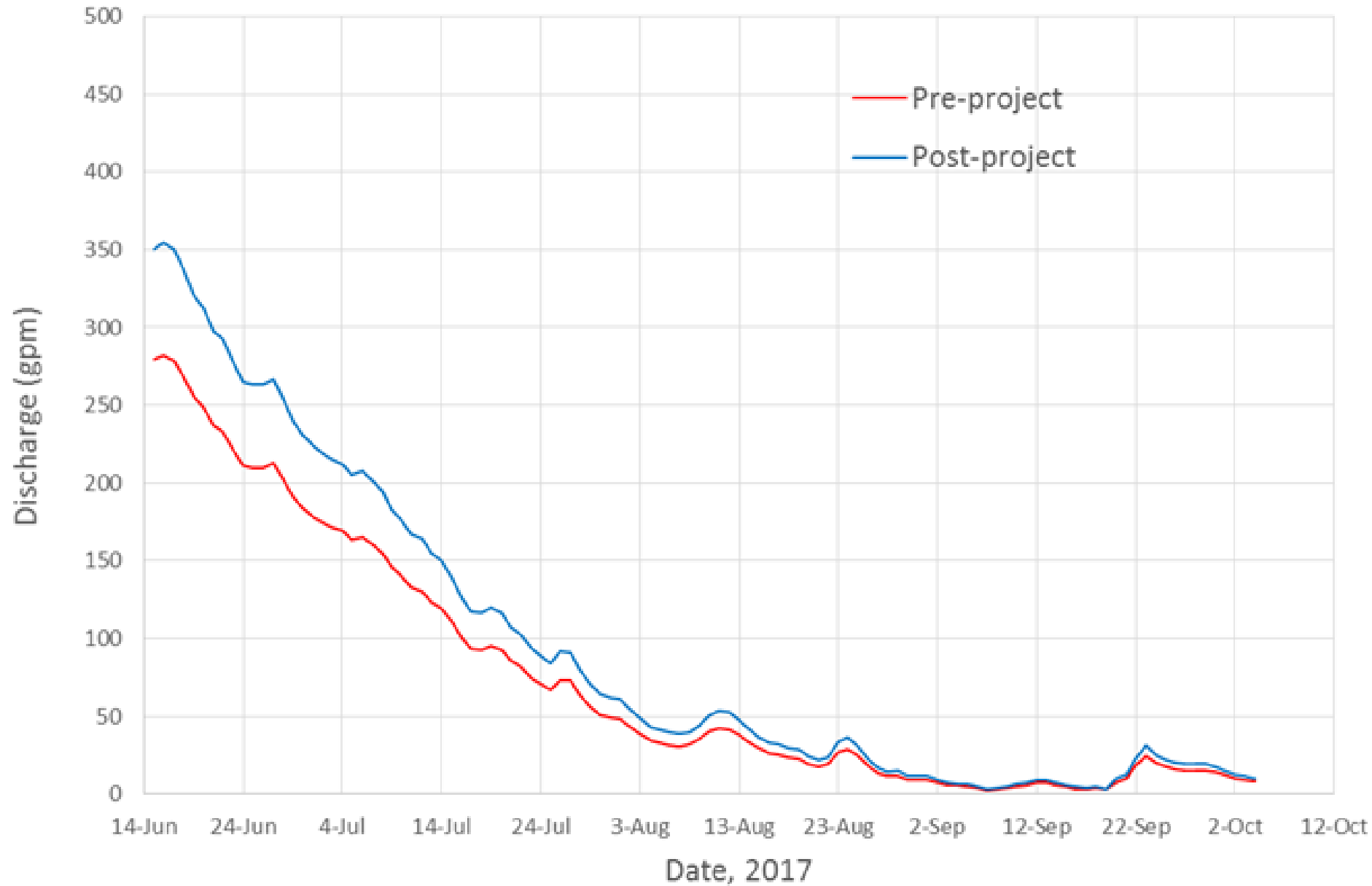
Baker Creek
Topography, Wells, Pits
Feb, 2015



Baker Well #19



Baker Creek Pre- and Post-project Discharge, 2017



McKee Creek Bedrock and Inset Floodplain Streamflow Enhancement

Pre- Project August 3, 2014



Post – Project August 8, 2019

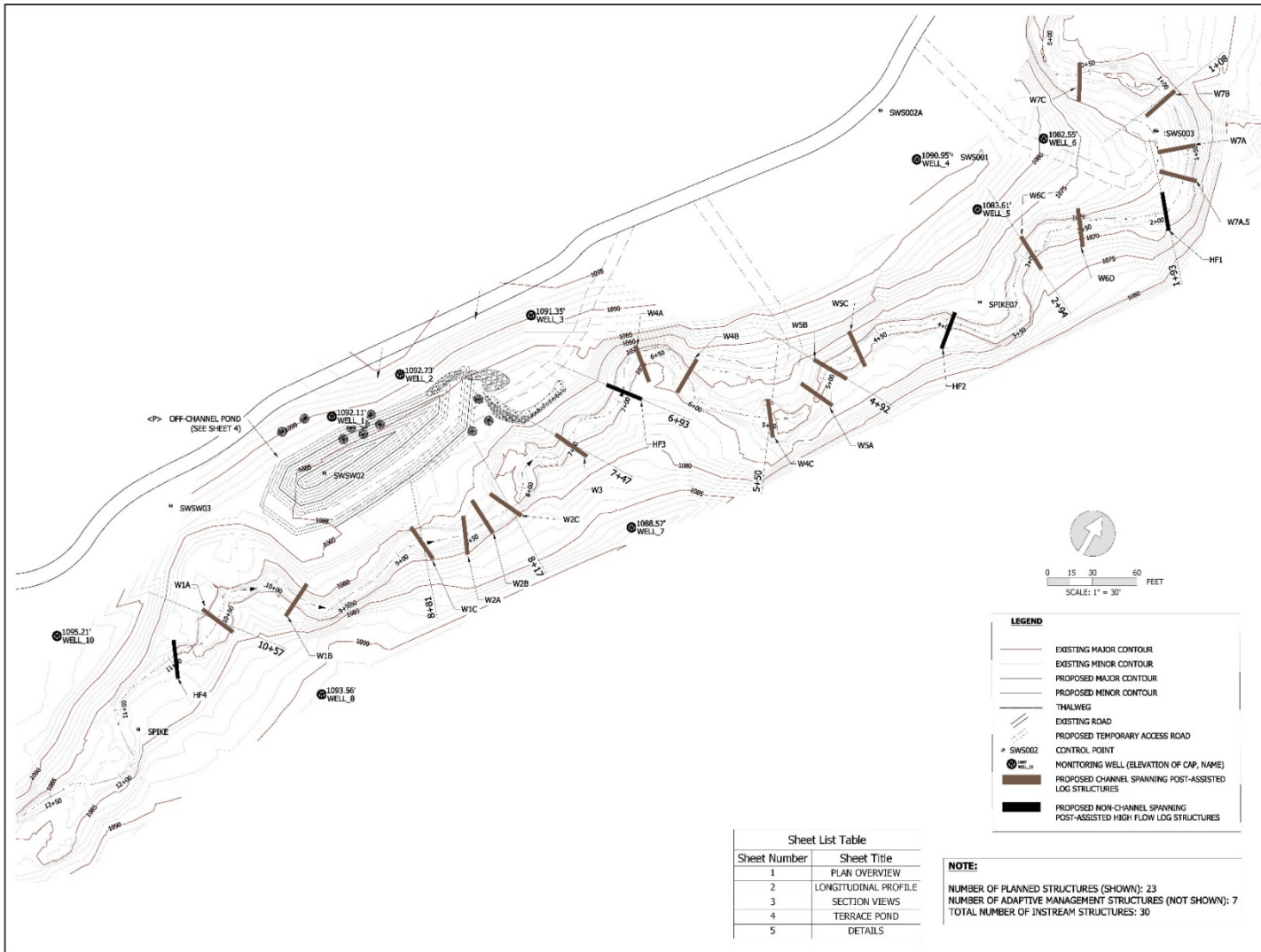


McKee Creek Bedrock and Inset Floodplain Streamflow Enhancement

Post- Project evaluation – Campbell Thompson, Joseph Cook, landowner, Conor Shea and Galen Doherty



Lost River Alluvial Valley BDA Project



LOST RIVER
GROUNDWATER
RECHARGE

MENDOCINO COUNTY, CA

Stillwater Sciences
2025 TELEGRAPH AVENUE, SUITE 400
BERKELEY, CA 94705 P: (415) 948-8008

PROJECT NUMBER: 588.04
SCALE: AS NOTED
DATE: 12/20/2018

DESIGN: JM
DRAWN: RT
CHECKED: JM
APPROVED: ----



PLAN OVERVIEW

SHEET 1 OF 5

Sheet List Table

Sheet Number	Sheet Title
1	PLAN OVERVIEW
2	LONGITUDINAL PROFILE
3	SECTION VIEWS
4	TERRACE POND
5	DETAILS

NOTE:
NUMBER OF PLANNED STRUCTURES (SHOWN): 23
NUMBER OF ADAPTIVE MANAGEMENT STRUCTURES (NOT SHOWN): 7
TOTAL NUMBER OF INSTREAM STRUCTURES: 30

Beaver Dam Analogs – Where feasible, can replace function of wood in North Coast Streams



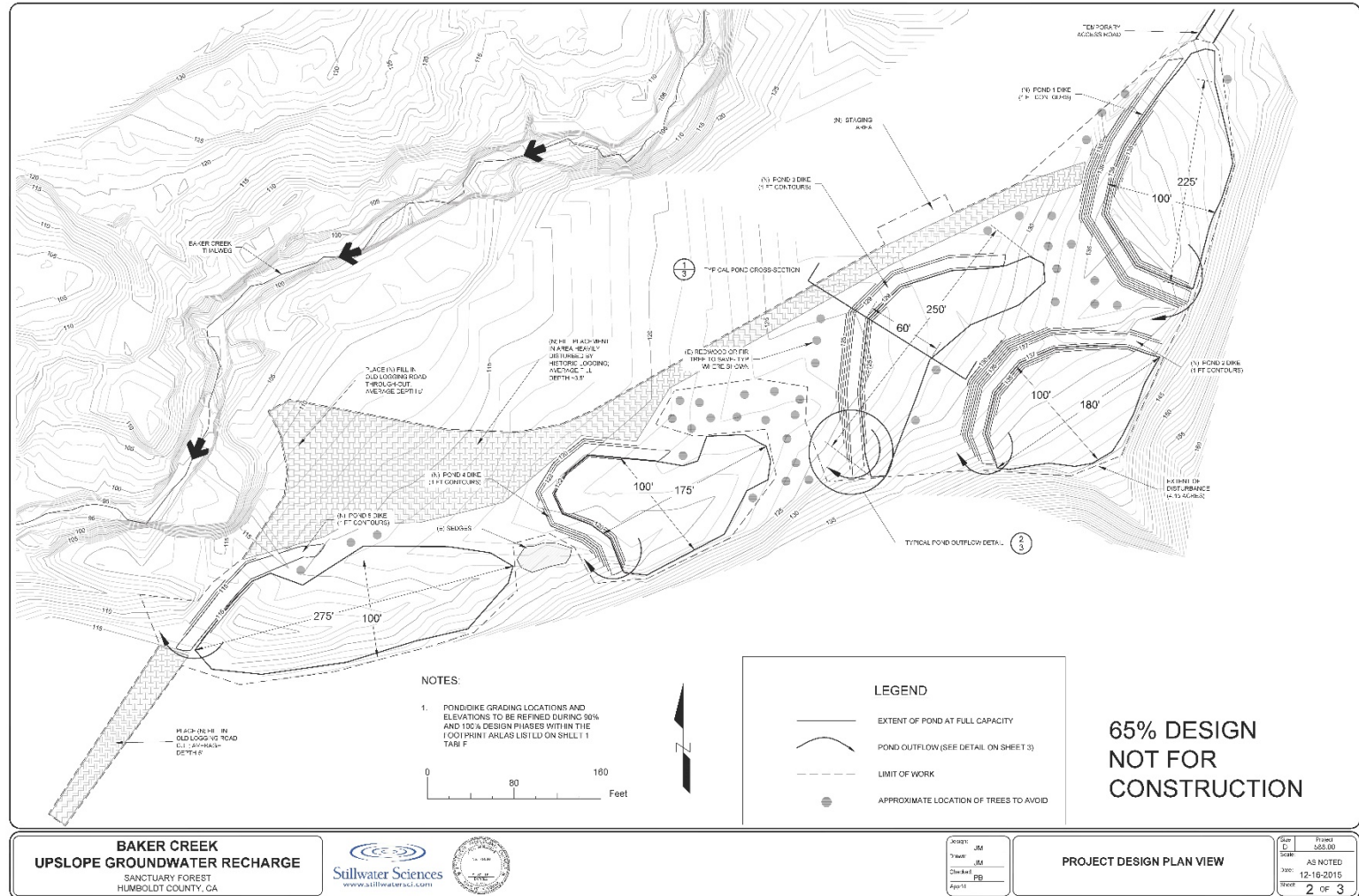
Beaver dam analog with post line and willow weave (photo from Dr. Michael Pollock)



Small wood jam in the North Fork of Lost River (photo from Sanctuary Forest)

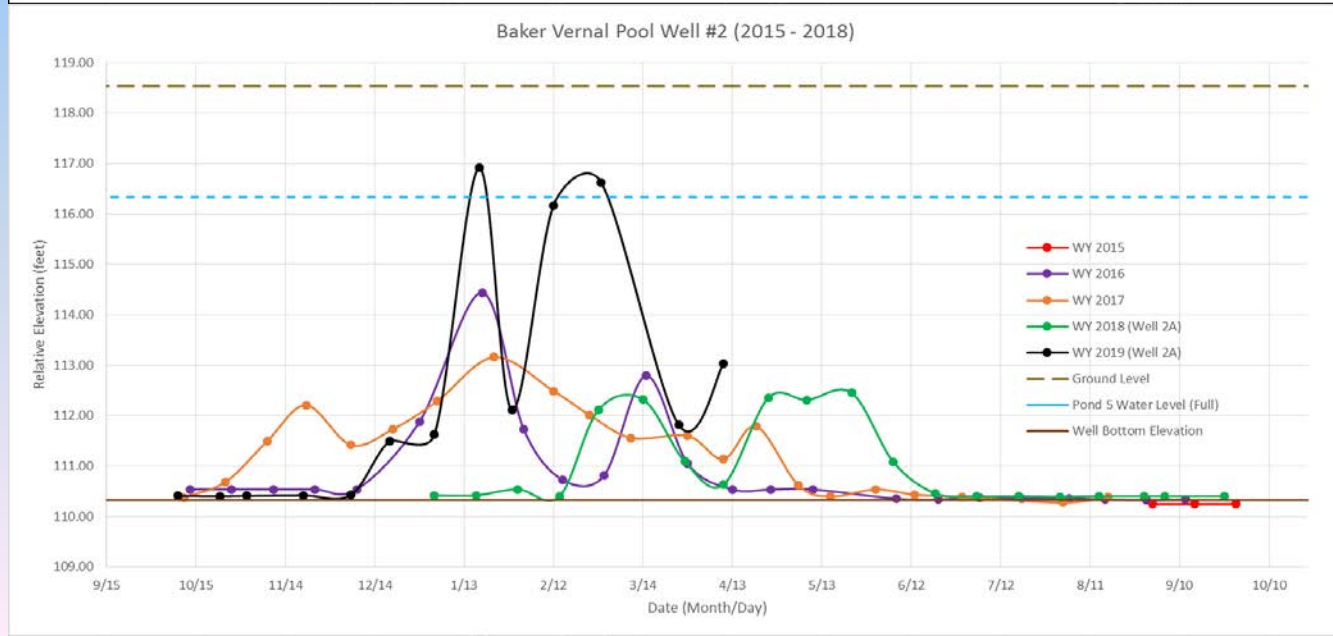
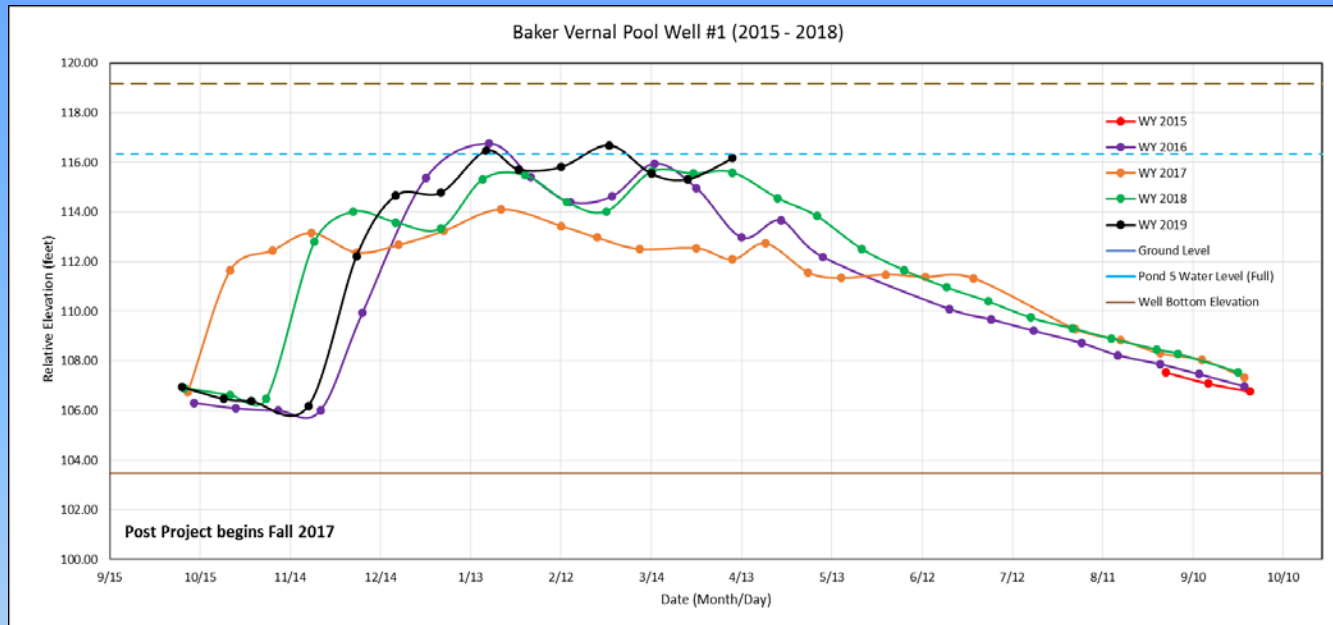
Baker Upslope - Five recharge ponds

Objectives: increase infiltration, groundwater storage & summer flows; enhance and expand wetland vegetation





Highly variable subsurface and associated groundwater declining limb (monitor wells with and without blue clay)



Mattole Flow Funders Thank You

- California Department of Fish and Wildlife
- California State Water Resources Control Board
- California Wildlife Conservation Board
- National Fish and Wildlife Foundation
- National Oceanic and Atmospheric Administration
- Bella Vista Foundation
- California State Coastal Conservancy
- Bureau of Land Management
- US Fish and Wildlife
- Humboldt Area Foundation
- Department of Water Resources
- Kenny Brothers Foundation
- Fish America Foundation
- Firedoll Foundation
- McLean Foundation
- Patagonia Foundation
- Weeden Foundation
- Cereus Fund

- Anadromous Fund
- Pacific Coast Joint Venture
- Grace Us Foundation
- Resources Legacy Fund
- Sanctuary Forest Donors
- Participating Landowners

