Water Supply Reliability

Fishery Restoration

Science & Engineering

Stakeholder Participation

Power Generation

POTTER VALLEY PROJECT TECHNICAL STUDIES

Lake Pillsbury Vegetation Management Discussion

John Bair – Senior Riparian Ecologist

Amy Livingston – Riparian Botanist

Scott McBain – Fluvial Geomorphologist

CALIFORNIA TROUT 50 FOR 50 YEARS. FOREVER.

Stillwater Sciences

McBain Associates APPLIED RIVER SCIENCES

McMILLEN JACOBS ASSOCIATES

Meeting Objectives

- Provide an overview of potential Lake Pillsbury Revegetation options assessed by the Feasibility Study
- Provide an overview of anticipated changes to riparian vegetation upstream and downstream of Scott Dam after decommissioning
- Facilitate a technical discussion of these revegetation options to inform anticipated work conducted as part of FERC studies (study AQ12)

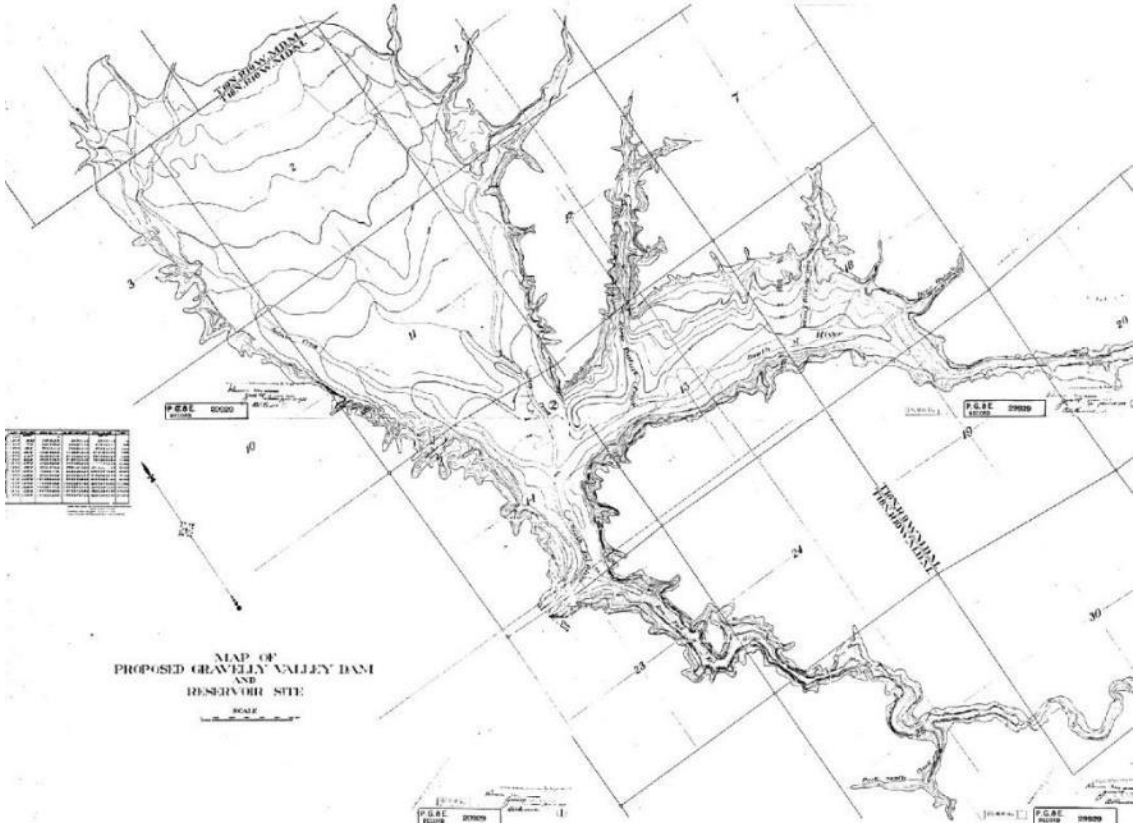
Components of Presentation

- Part 1: Overview of Potential Scott Dam Removal and Lake Pillsbury Sediment Management considerations
- Part 2: Revegetation Components
  - Comparison to Similar Projects and Costs
  - Hypothesized Outcomes Post Dam Removal
  - Revised Unit Costs
  - Future Studies/Next Steps

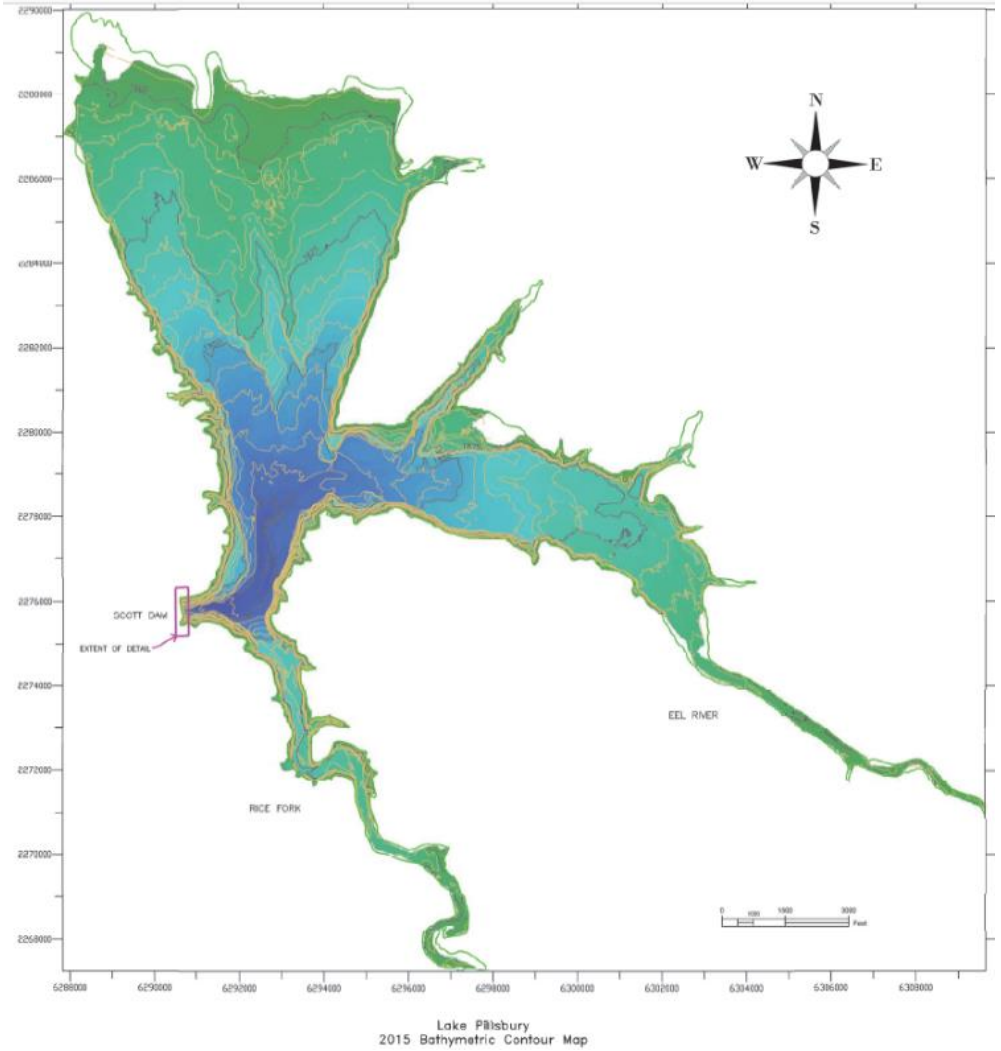
Part 1: Overview of Lake Pillsbury Sediment Management Considerations

How much sediment is stored in Lake Pillsbury?

1922 Topography (USGS)

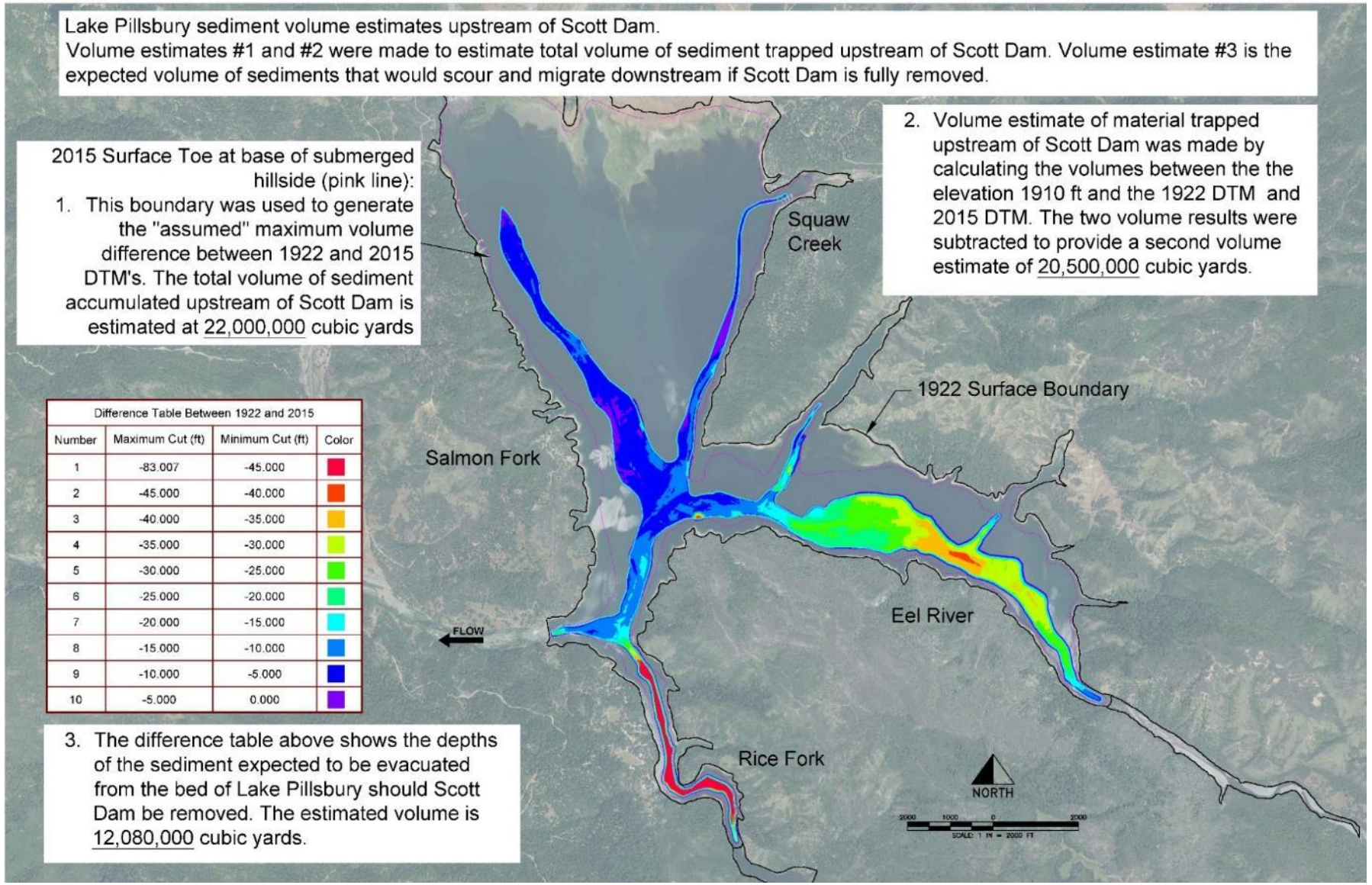


2015-16 Bathymetry (PG&E)



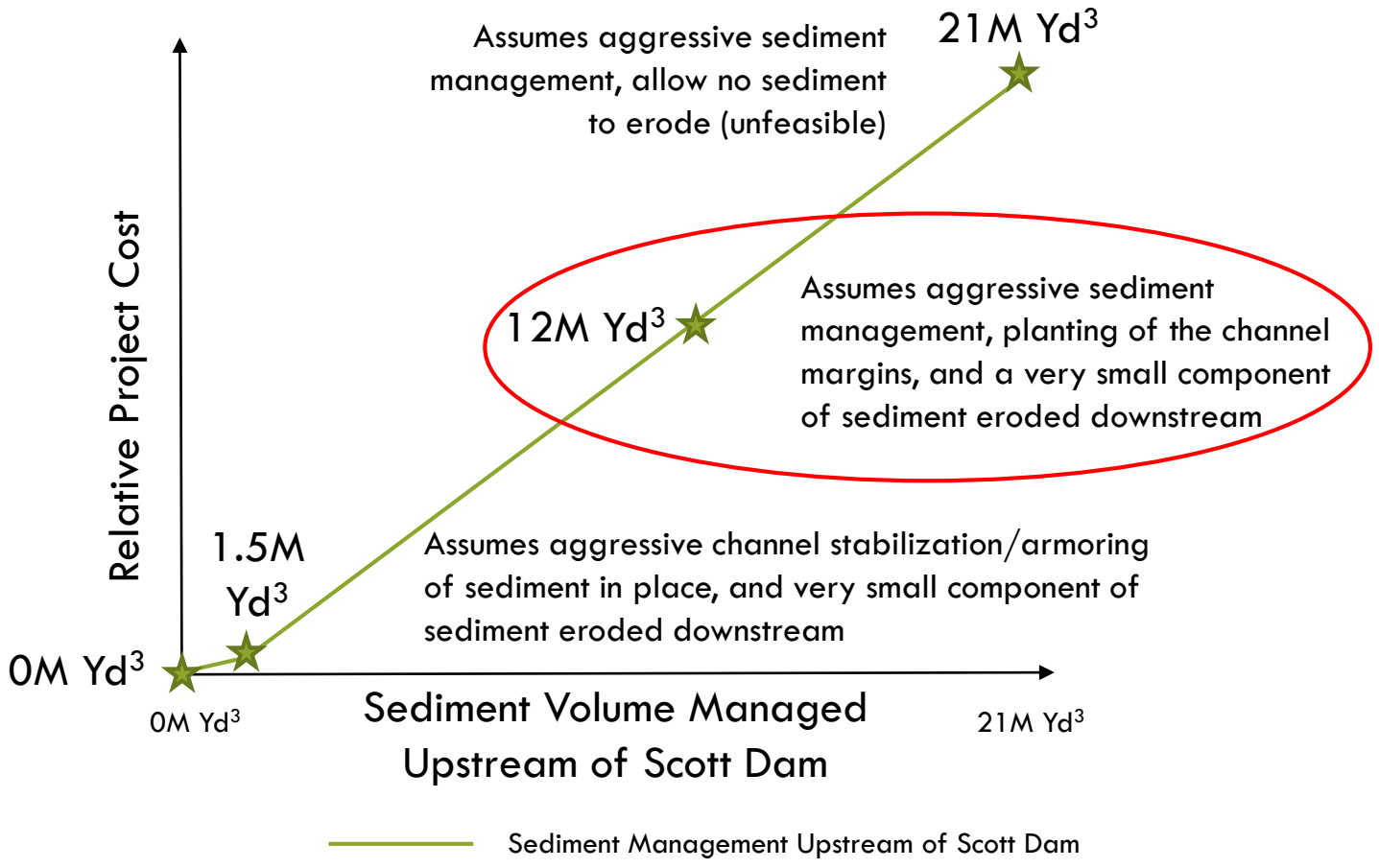
~21 million cubic yards

How much of this sediment could be easily eroded with Scott Dam removal?



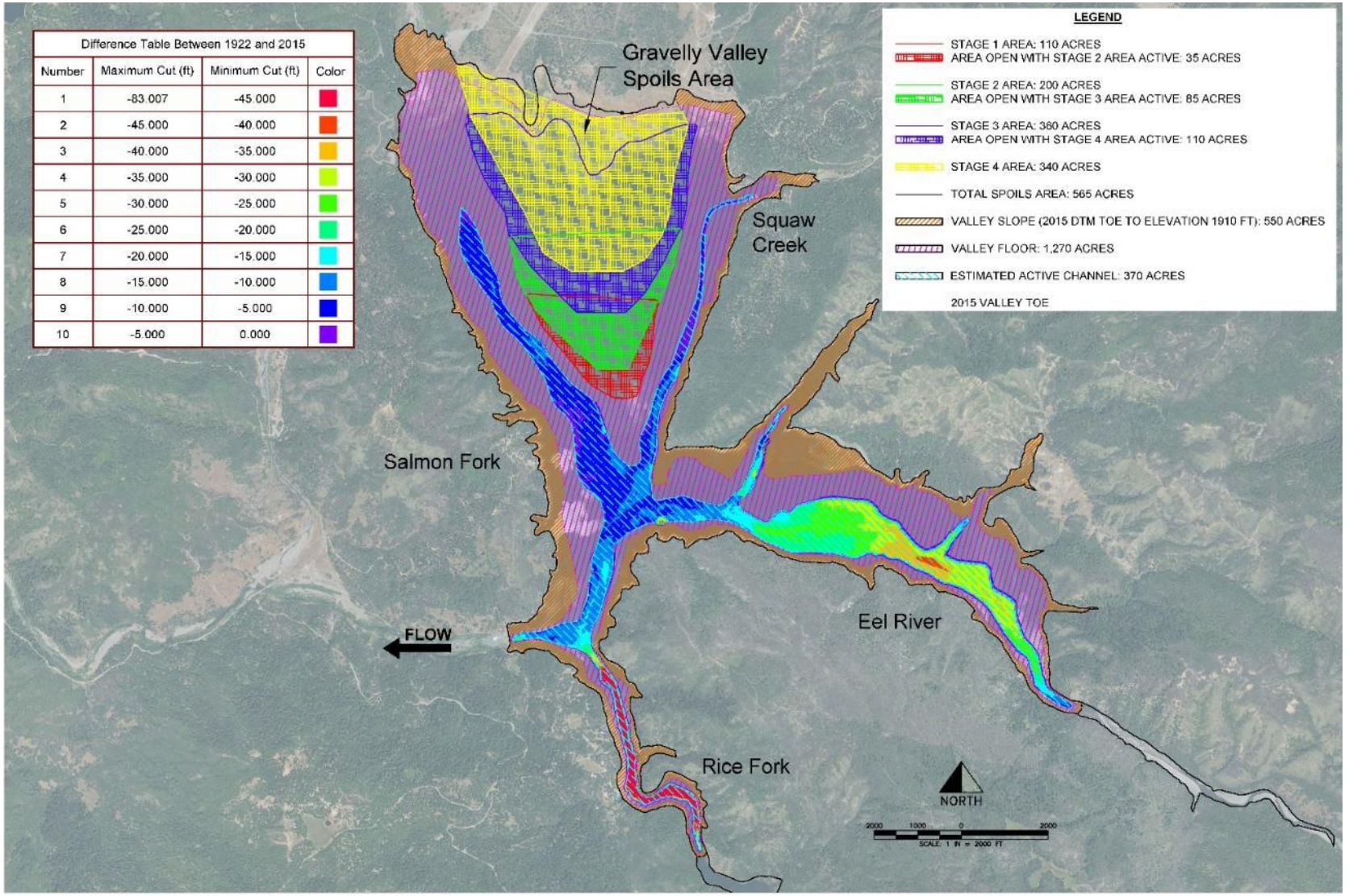
- Varying meander belt widths based on three examples
- Depth based on 1921/22 bathymetry and profile surveys
- **Best estimate is approximately 12,000,000 cu yds of "erodible sediment"**

How could we manage this sediment?



Assumes no sediment action upstream of Scott Dam and all sediment allowed to erode and route downstream.

Where could we stockpile this material?



Potential Lake Pillsbury Revegetation needs

- Dam site after decommissioning?
- Sediment Management spoils area?
- New riparian corridor?
- Upland areas?
- Elk considerations?
- Others?

Part 2: Overview of Lake Pillsbury Vegetation Management Considerations

Feasibility Study Workplan Objectives

- Update preliminary cost estimate from Tech Memo #2
- Develop a potential vision of post-Lake Pillsbury vegetation recovery
- Develop more detail in potential revegetation strategies
- Solicit agency input on potential vision and revegetation strategies
- Compile pertinent literature on reservoir bottomland revegetation
- Utilize Agency input to begin refining revegetation planning options

Elwha River Dam Removal Lakebed Recovery

- Overview of Elwha dam removal revegetation projects
  - Strategy to plant trees, shrubs, and seeds on ~441 acres
  - Planted NPS nursery grown materials at ~700 plants per acre
  - Installed with NPS, Tribal and volunteer support
  - Invasive management not included in initial costs
  - Included seeding

- Compare and contrast between Lake Pillsbury and the Elwha Project
  - Smaller watershed completely within NPS ownership
  - Project size about 30% of Lake Pillsbury (Two smaller areas to recover)
  - Project Stakeholders (NPS and local Tribes)
  - Revegetated in two phases over many years
  - More forgiving environment (rainfall, low fire frequency)

Klamath River Dam Removal Lakebed Recovery

- Overview Klamath dam removal revegetation projects; Definite Plan
  - Strategy to plant dominant sage scrub, conifer forest, riparian species and seed
  - Modest amount of private and government nursery grown container plants
  - Installed with Tribal labor sources
  - Relies on two or three iterations of seeding overtime
  - Invasive management part of estimated costs

- Compare and contrast between Lake Pillsbury and the Klamath Project
  - Second largest river in California
  - Many Project Stakeholders (Yurok, Private Utility, USFS, Private landowners, USBR)
  - Revegetated in short period in an arid environment
  - Multiple landowners within project area and within the entire drainage
  - Similar to Lake Pillsbury in size and socio-political climate

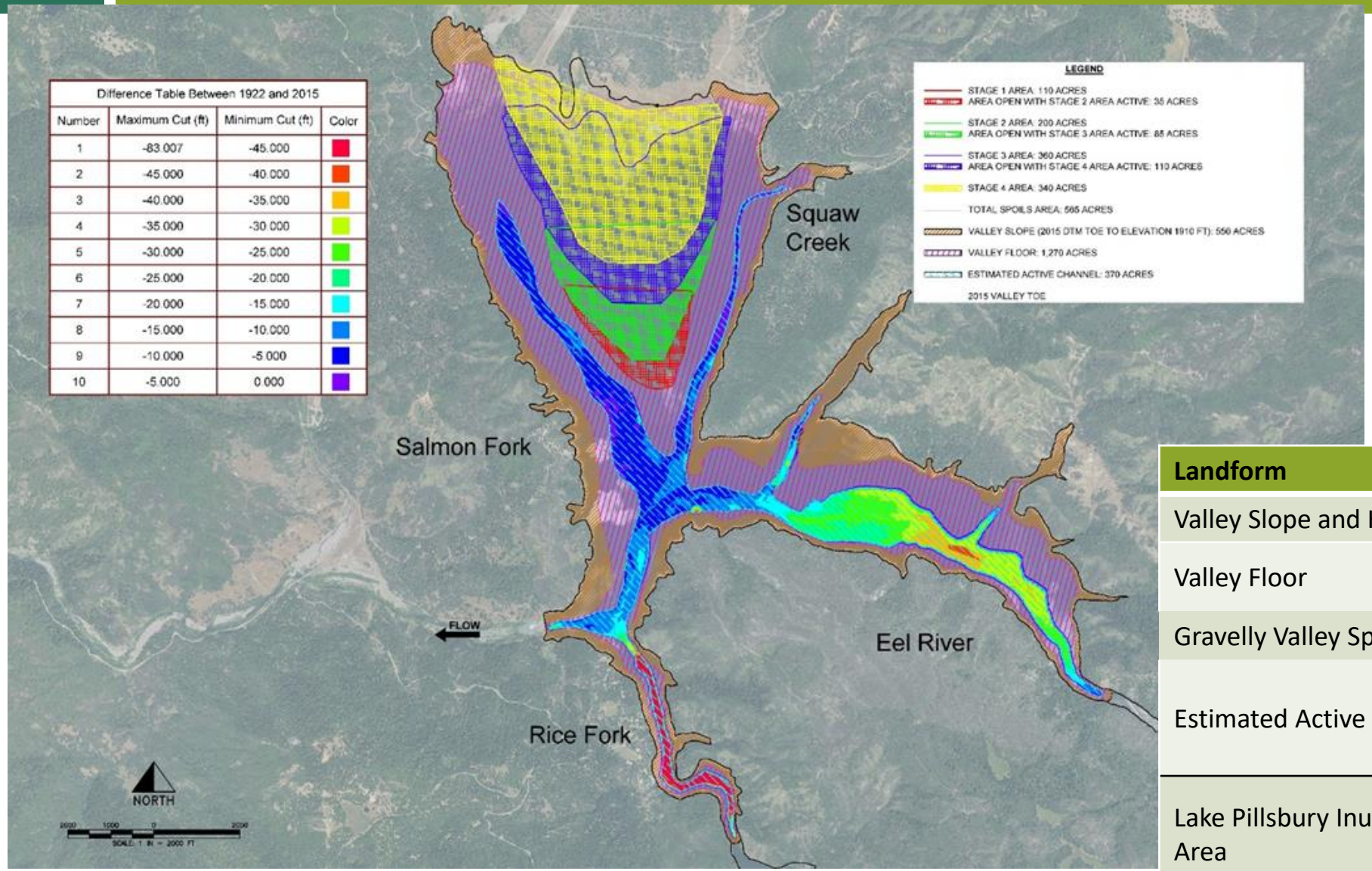
Feasibility Study Technical Memorandum #2: Initial Vegetation Recovery Concepts

The potential goal of revegetation is to recover the disturbance footprint within and around Lake Pillsbury with ecologically functioning vegetation that provides terrestrial and aquatic habitat and will meet agency desires for post-dam removal land condition.

Lake Pillsbury

- Revegetate with dominant species and seed co-dominant or commonly associated species.
- Recover woody vegetation on valley slopes and valley floor.
- Allow the active channel area to passively recover.
- Recover sediment management areas with grasslands and woody plants.
- Intensive Non-native Invasive Plant Species management.

Initial Recovery Strategy (for 12 million cu yds sediment management option)



Landform	Area	Recovery
Valley Slope and Hillsides	550 acres	Revegetate
Valley Floor	1,270 acres	Revegetate
Gravelly Valley Spoils Area	570 acres	Revegetate
Estimated Active Channel	370 Acres	Passive Recovery
Lake Pillsbury Inundation Area	2,760 acres	Combination of Passive and active

Feasibility Study Technical Memorandum #2

- Initial recovery approach was assumed to be “one size fits all”
- Initial cost estimate assumptions
  - one planting density everywhere
  - tree planting and seeding everywhere except for the active channel in the valley floor
  - one price for nursery grown materials
  - no labor overtime
  - no equipment
  - no per diem/lodging

- More tailored approach to be developed with agency input

Feasibility Study Technical Memorandum #2: Preliminary Unit Costs

- Developed unit costs for revegetation/recovery approaches
  - Evaluated two different prevailing wage labor costs assuming level of effort is like more intensive restoration project regionally
  - Compared seeding and mulching to hydroseeding costs
  - Included non-native invasive plant management
  - Included sediment management (erosion control then revegetation)
  - Compared preliminary cost estimates to Elwha and other unpublished unit costs

Source	Project	Revegetation Per Acre Unit Cost	Cost to Revegetate Project Area
From TM#2	Elwha Actual Unit Cost	$18,300	$43,737,000
From TM#2	Unpublished Local Unit Cost	$8,200	$19,598,000
From TM#2	Jan 2020 Preliminary Bottoms Up Cost estimate Group 3	$20,921	$50,000,000
From TM#2	Jan 2020 Preliminary Bottoms Up Cost estimate Group 7	$17,991	$43,000,000

Phase 2 Feasibility Study

- Information gaps and uncertainties
  - Specific lakebed recovery objectives/management priorities
  - How much passive vs active restoration
  - Planting needs- vegetation types, densities, locations
  - USFS and CDFW Input

Hypothesized evolution once dam is removed

- Lake Pillsbury
  - Sediment and dust management
  - Exposed lakebed will need active rehabilitation
  - Wildlife habitat rehabilitation

Hypothesized evolution once dam is removed

- Eel River within Reservoir
  - Rapid recovery (potentially from existing seed banks in exposed lakebed sediment)
  - Sparse riparian vegetation similar to what is upstream of lake now

Hypothesized evolution once dam is removed

- Eel River below Scott Dam
  - Riparian loss downstream of dam due to reduced flow volumes and streamflow during growing season
  - Riparian loss downstream of dam due to increased high flows and sediment supply during winter high flow season

Lakebed and Hillslope Recovery Concepts

- Valley slope and hillsides are mixed conifer forest
  - Reasonable to expect same pattern down to the valley floor
- Valley floor was most likely oak grassland
  - Observations during field visit
  - Likely similar to Round Valley
  - Oak stumps in lake inundation footprint

Elk Management

- Elk currently utilize lake during summer months for aquatic veg forage and temperature refuge and would not have those resources available with dam removal
- Elk herd effects on restoration efforts will need to be included
  - Loss of available forage during summer/fall months would put more pressure on lakebed revegetation
  - Elk eat reforested conifers at the south end of the lake and would eat planted trees
  - Could potentially lose all plantings in a season
- Elk will need to be actively managed
- Evaluate the trade offs of deferring revegetation or including annual losses in recovery

Phase 2 Feasibility Study Revised Unit Costs

- Revised unit costs for revegetation/recovery approaches
  - Updated labor to reflect tree planting at 786 plants per acre (~8 ft o.c.)
  - Updated labor rates to reflect August 2020 wages
  - Updated nonnative invasive management to reflect low invasive abundance field observations
  - Updated plant material costs to reflect reforestation tree costs regionally and not restoration nursery stock
- Assume Planting area = 2,390 acres

Source	Project	Revegetation Per Acre Unit Cost	Cost to Revegetate Project Area
From TM#2	Elwha Actual Unit Cost	$18,300	$43,700,000
From TM#2	Unpublished Local Unit Cost	$8,200	$19,600,000
Revised	December 2020 Revised Bottoms Up Average Cost estimate Group 3	$8,069	$19,300,000
Revised	December 2020 Revise Bottoms Up Cost estimate Group 7	$7,566	$18,000,000

FERC Study AQ 12 Assessments

- Compile information (other dam removals, flows, photographs, etc.)
- Solar radiation evaluation
- Lakebed sediment assessments
- Non-native Invasive Species management
- Riparian hardwood phenology evaluation
- Identify appropriate plant species
- Integrate with sediment management strategies
- Assess landscape opportunities
- AQ12 will not be a plan but will inform a plan (PM&E's)

Next Steps

- Define desired future conditions
  - Habitat types and functions
- Developing broad management objectives
  - Elk
  - Riparian and wetland vegetation
  - Landscape form and function
- Refine broad revegetation concepts
  - Identify the “Must Do” actions (e.g., dust abatement, non-native species management)
  - Identify the “Nice to Do” actions (e.g., elk habitat creation)
  - Vegetation patterns and plant species
  - Needs further agency input to better define and detail to the potential revegetation vision
  - Location and types of revegetation
- If time allows, refinement of AQ 12 tasks on riparian vegetation assessment subtask

Additional Feedback

- E-mail comments/suggestions to John, Scott, Dirk, and Darren

john@mcbainassociates.com
scott@mcbainassociates.com
dirk@stillwatersci.com
dmierau@caltrout.org