Trinity River Restoration Program

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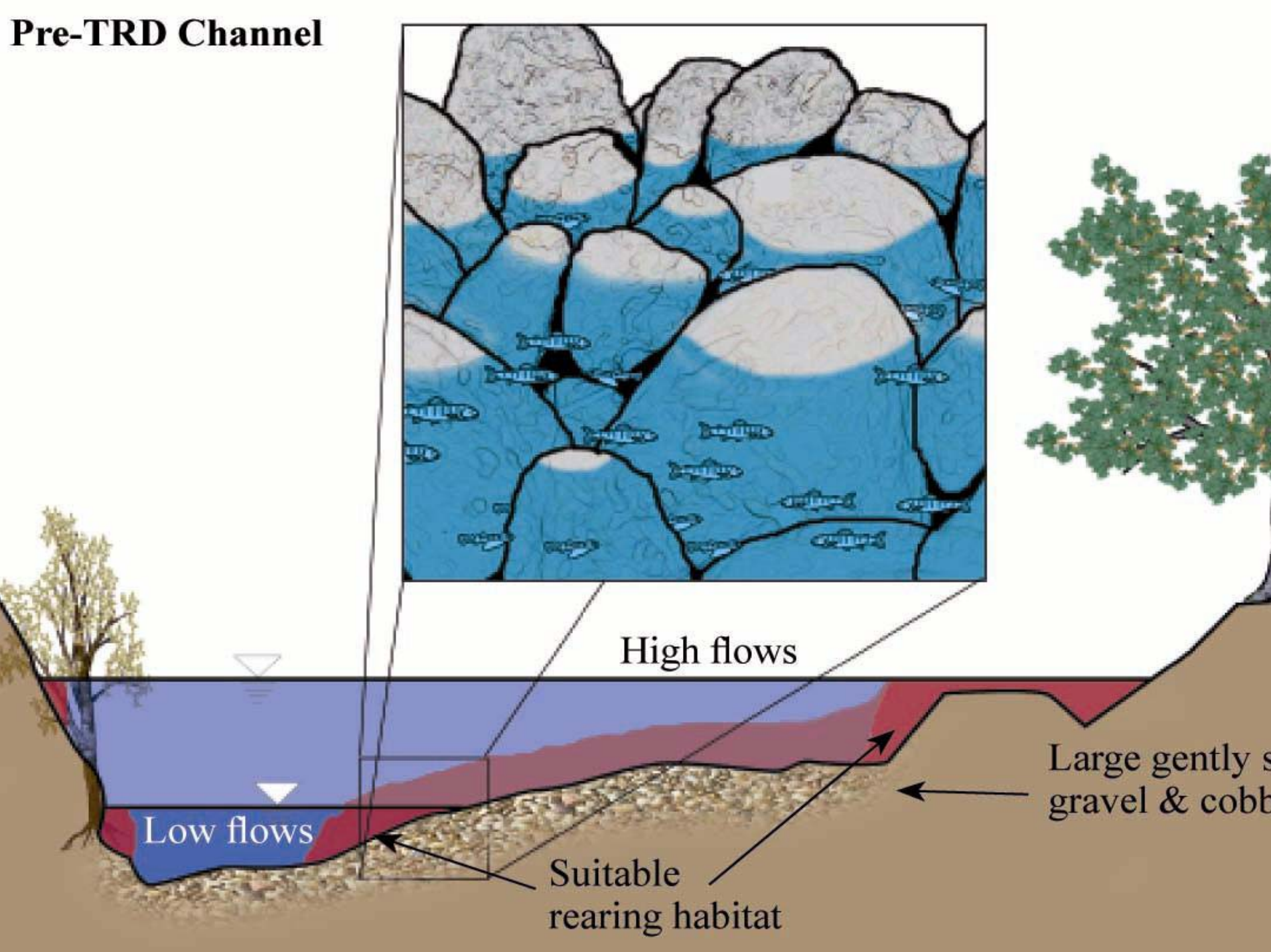
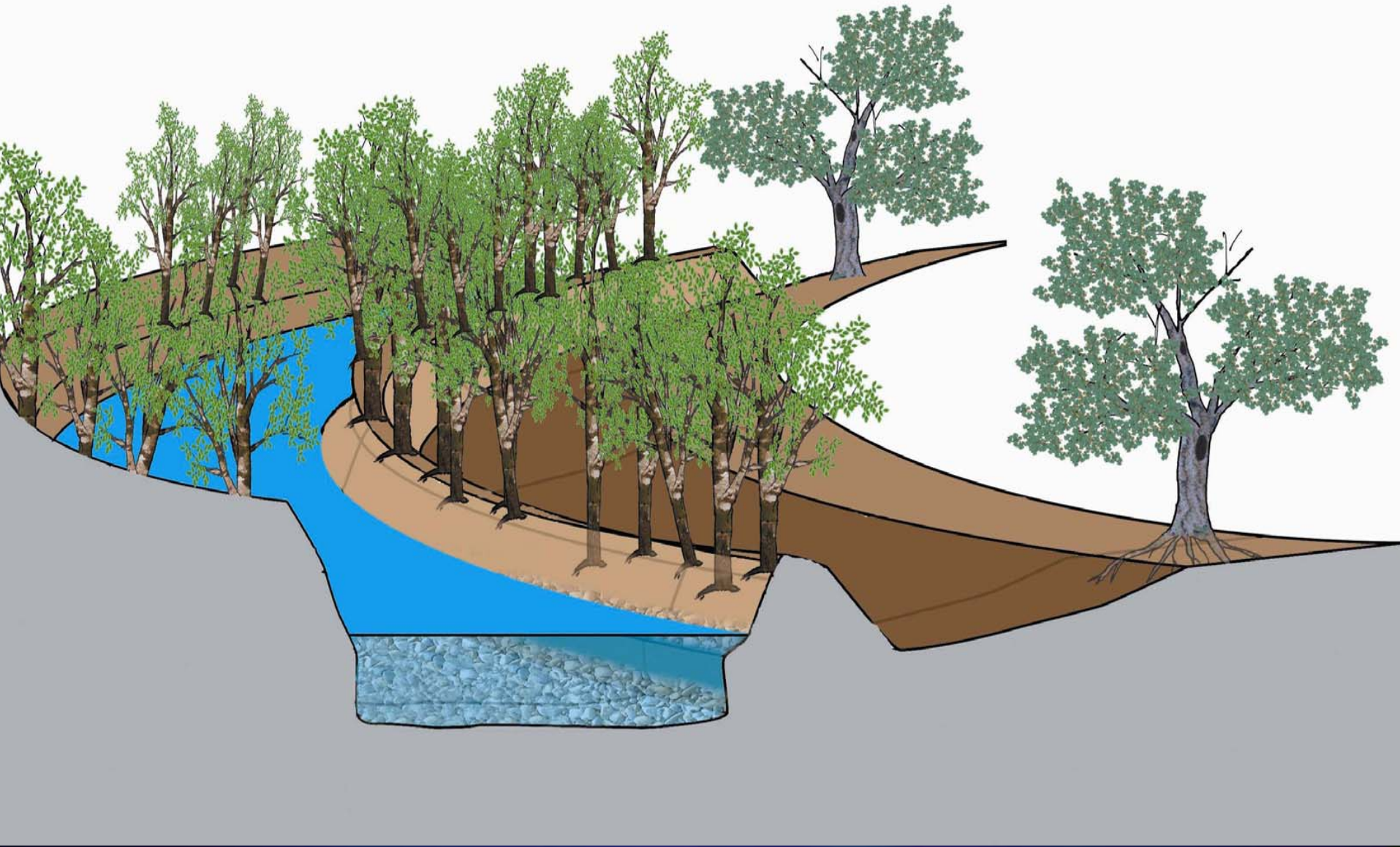
Foundation Impacts

- Blocked access to 109 miles of primary habitat for anadromous salmonids
- Forced downstream portion of river to function as headwater habitats
- Changes in fluvial geomorphic processes initiated detrimental changes to remaining habitat downstream of the dam (historic flow variability of 100 cfs to 100,000 cfs reduced to 150-450 cfs years around with most “high” flows <6,000cfs)


Pre-TRD Channel
High flows
Low flows
Large gently s
gravel & cobb
Suitable
rearing habitat

Existing Channel w/Riparian Berm



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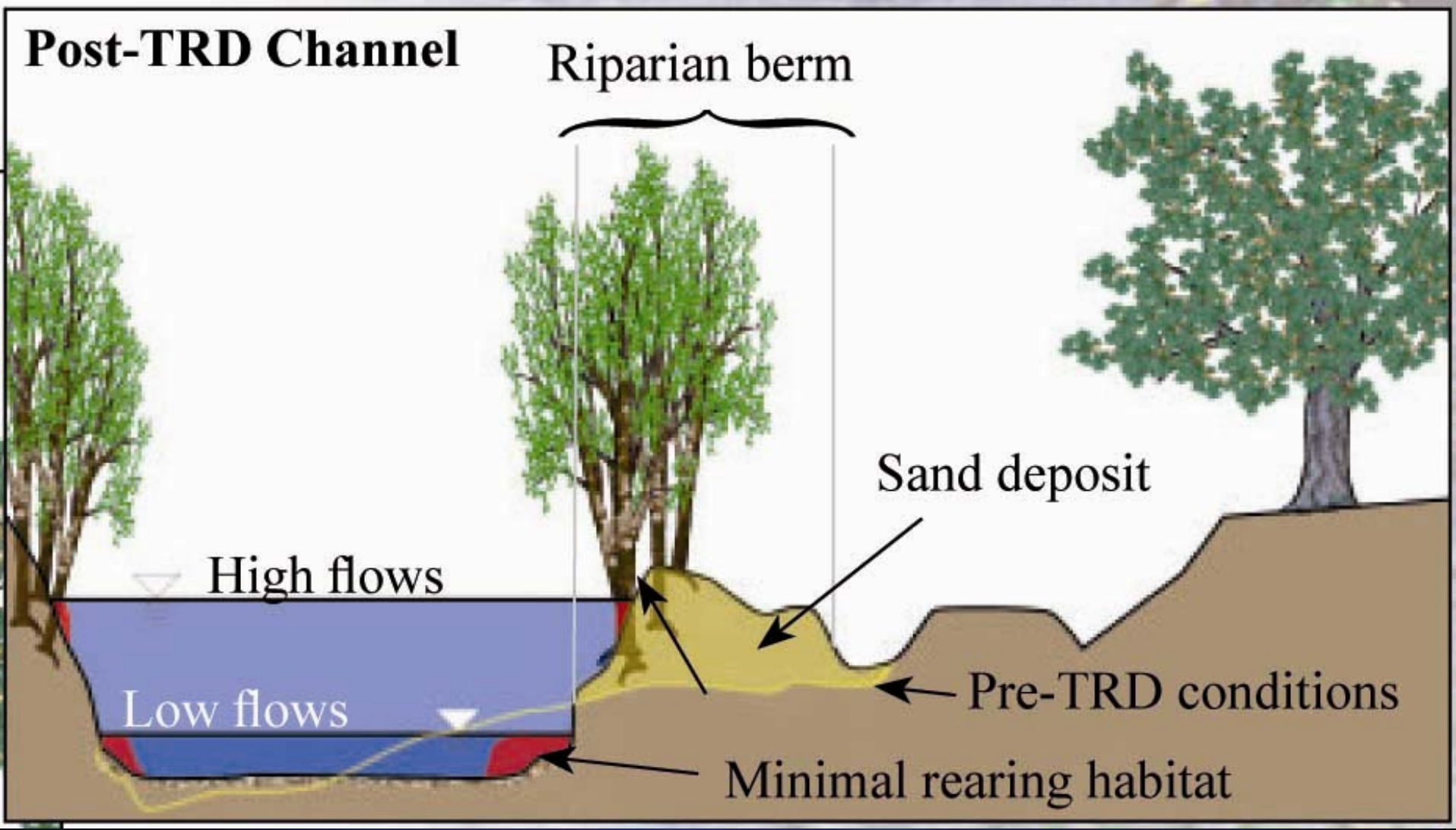
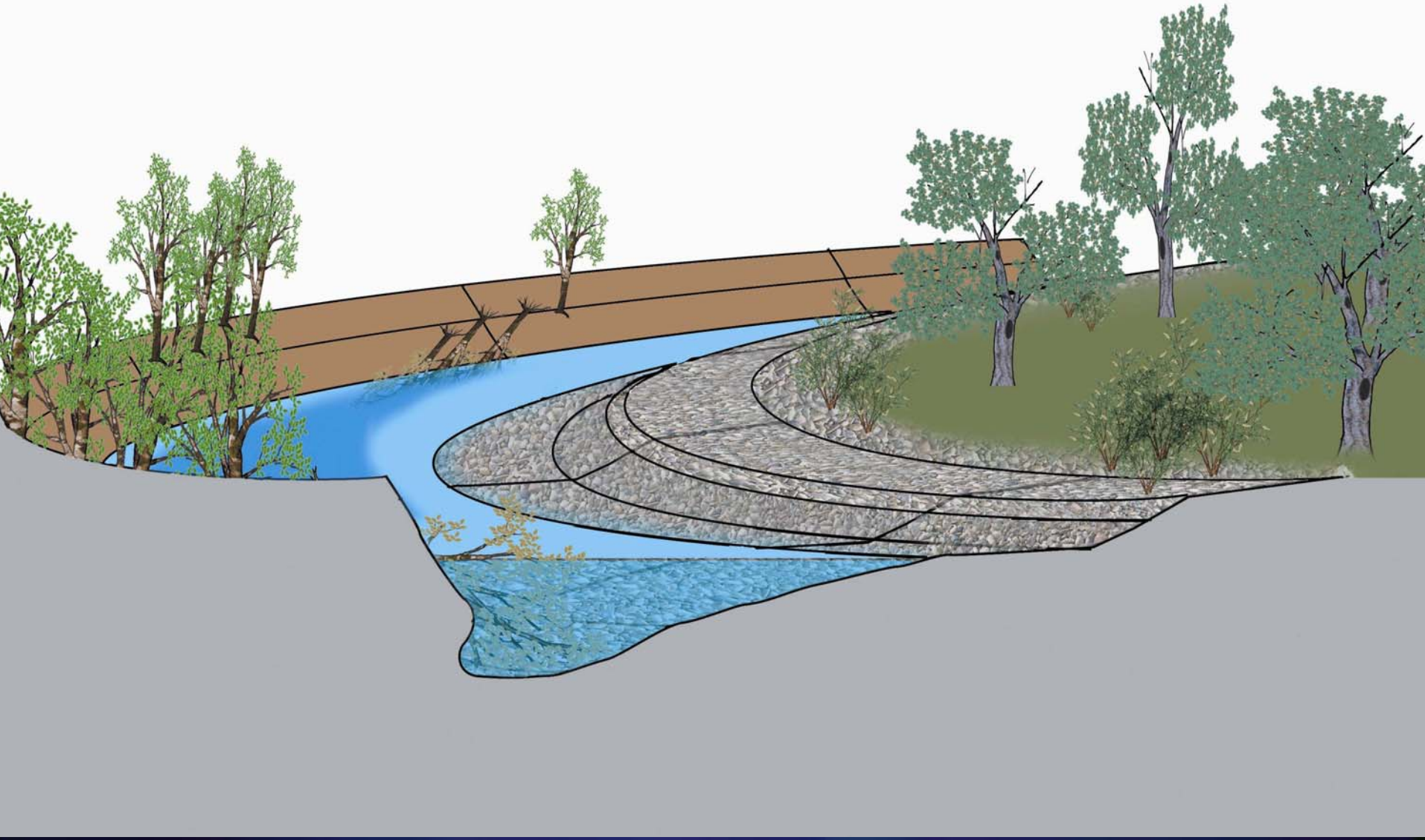



Proposed Cooper Bar Rehab Site
Vegetated Berms

Basic Premise

- A combination of mechanical alterations and vegetation removal in addition to managed high-flow releases in the spring will promote fluvial processes leading to a new channel form that is expected to provide significantly increased spawning and rearing habitat for anadromous salmonids

Anticipated Channel Evolution



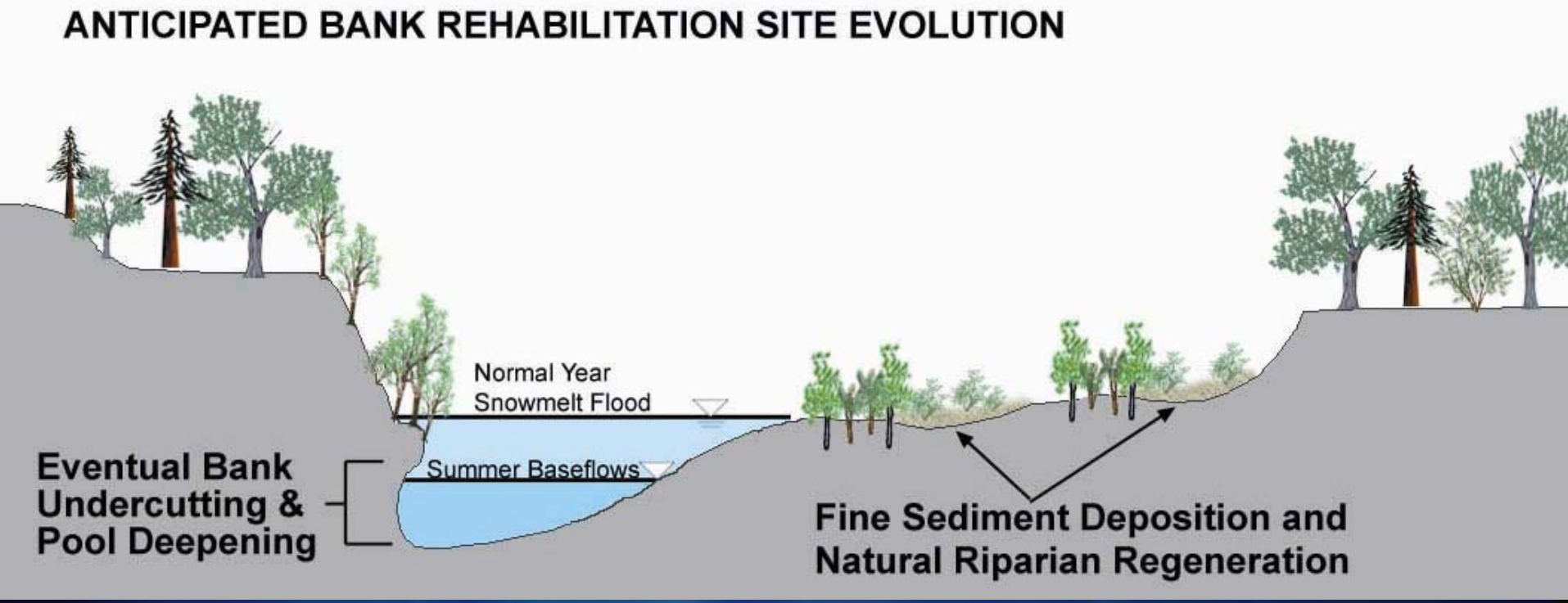
Sheridan Creek Rehab Site

Newly formed gravel bars

Steiner Flat – Rehabilitated Site

Newly formed gravel bar

Floodplain Develpoment

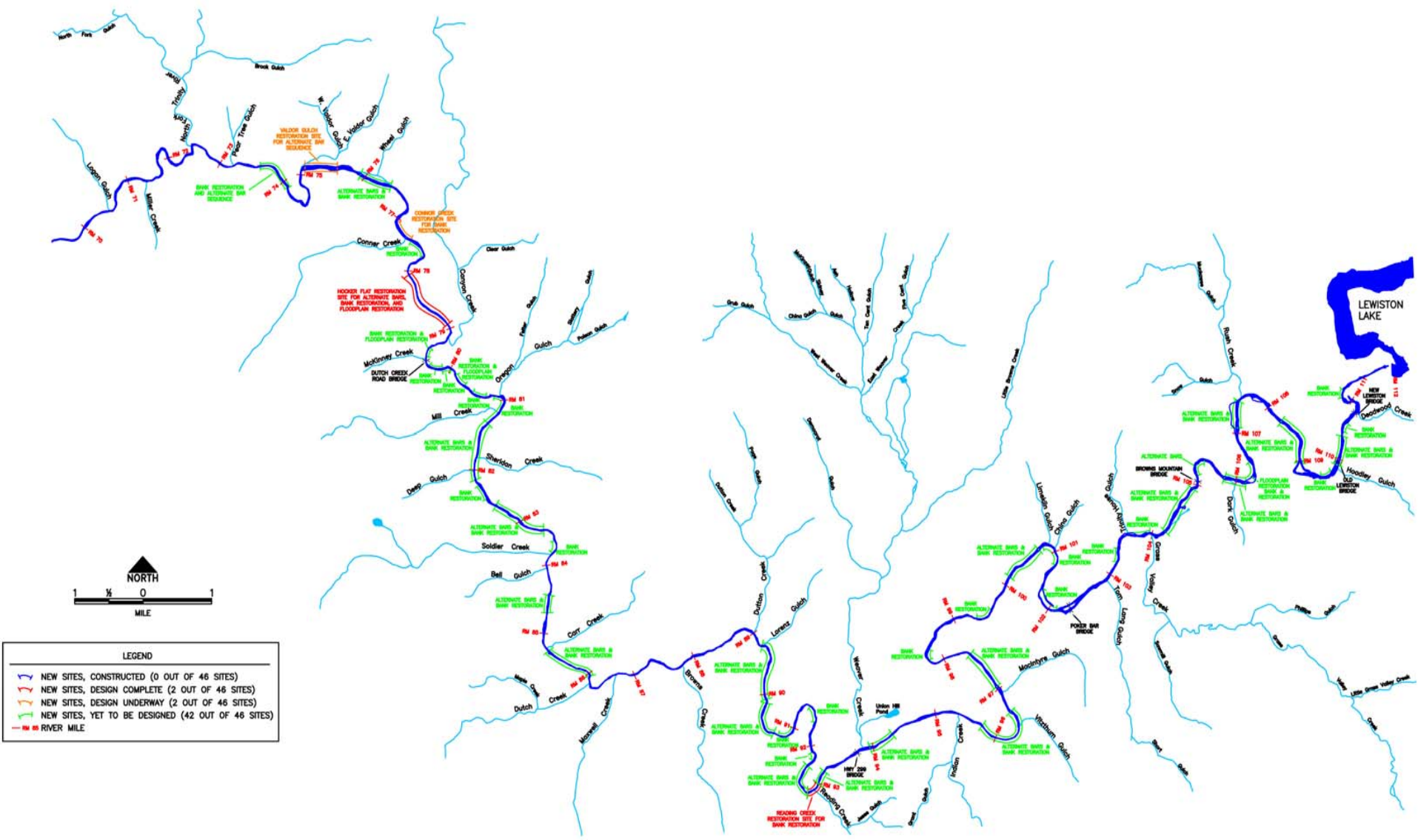


Anticipated floodplain features abandoned channels, vernal pools, wetlands

General Hypothesis No. 1

- Recreating a complex dynamic alluvial river channel will increase salmonid habitat quantity and quality (A smaller scale dynamic alluvial river can be recreated on a highly regulated river)

Proposed Rehab Sites



General Hypothesis No. 2

- Salmonid smolt survival will improve as a result of enhanced habitat and temperature conditions that increase growth and promote extended smoltification and reduced travel time associated with emigration

Major Conclusions

- A combination of channel rehabilitation, temperature control and timed releases will be necessary to reach restoration goals of at least doubling the chinook salmon production
- Different environmental accounts are needed for different water supply conditions
- An Adaptive Environmental Assessment and Management program is needed to efficiently determine annual reservoir release schedules and assess channel and fish population response

Record of Decision (ROD)

- Set the policy for restoring the Trinity River
  - -Establishes initial hypotheses of system behavior
  - Specifies total volumes in each of 5 WY types
  - Allows flexibility in future scheduling within fixed annual volume
  - Calls for mechanical rehabilitation of the channel
  - Specifies sediment management
- Established a new management organization

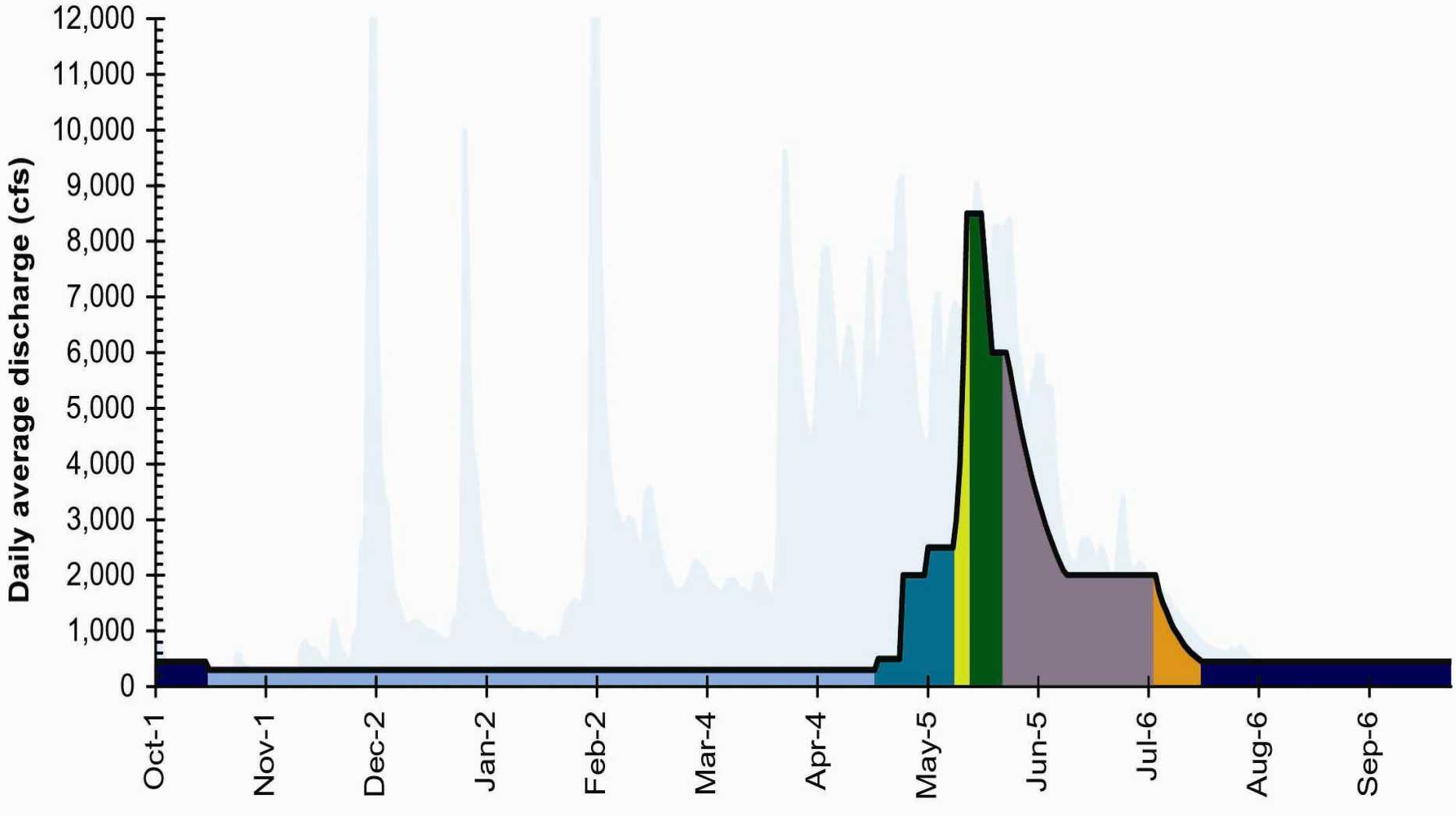
Annual Water Year Type Environmental Accounts

5 Water Year Classes Based On Reservoir Inflow Volumes

- Critically dry 369 kaf
- Dry 453 kaf
- Normal 647 kaf
- Wet 701 kaf
- Extremely wet 815 kaf

Weighted Mean	594.5 kaf
Mean annual inflow	1,200 kaf

Wet WY Release Schedule



TRFES Table 8.9
Critically Dry WY

Date	Release (cfs)	Hydrograph Component	Management Target
Oct 1 - Oct 14	450	Fall baseflow	≤56°F at confluence of the North Fork Trinity River
Oct 15 - Apr 22	300	Winter baseflow	Provide the maximum amount of spawning habitat.
Apr 22 - Apr 24	300 - 1,500	Ascending limb	Reach peak flow
Apr 24 - May 29	1,500	Peak flow	Provide non-lethal water temperatures to Weitchpec for steelhead smolts (≤ 59°F) until May 22, and coho salmon smolts (≤ 62.6°F) until May 29 Inundate bar flanks (1,500 cfs)

TRFES Table 8.9
Critically Dry WY

Date	Release (cfs)	Purpose	Benefits
Oct 1 - Oct 14	450	Provide optimal holding/spawning temperatures for spring- and fall-run chinook adults	Provide suitable temperatures, reducing pre-spawning mortality and increasing egg viability
Oct 15 - Apr 22	300	Provide best balance of spawning and rearing habitats for all anadromous salmonids in the existing channel	Increase spawning and rearing habitat while minimizing dewatering of redds (dewater less than 5% of redds) of salmonids
Apr 22 - Apr 24	300 - 1,500	Ramp to peak flow (according to OCAP) safely for human use	Reduce travel time of outmigrating steelhead smolts
Apr 24 - May 29	1,500	Sustain steelhead and coho salmon smolt production by providing non-lethal temperatures for survival Discourage riparian vegetation establishment along channel margins	Transport limited amounts of surface fine sediment (<8mm)

What is an AEAM Program?

- AEAM Program manages restoration by:
  - -Gathering scientific evidence
  - -Testing hypotheses related to:
    - Rehabilitated river channel
    - Managing sediments
    - Designing annual flow release schedules
  - Assessing progress toward goals of a dynamic alluvial channel and salmon restoration

Adaptive Environmental Assessment And Management

- The AEAM approach to management relies on teams of scientists, managers, and policy makers jointly identifying and bounding management problems in quantifiable terms

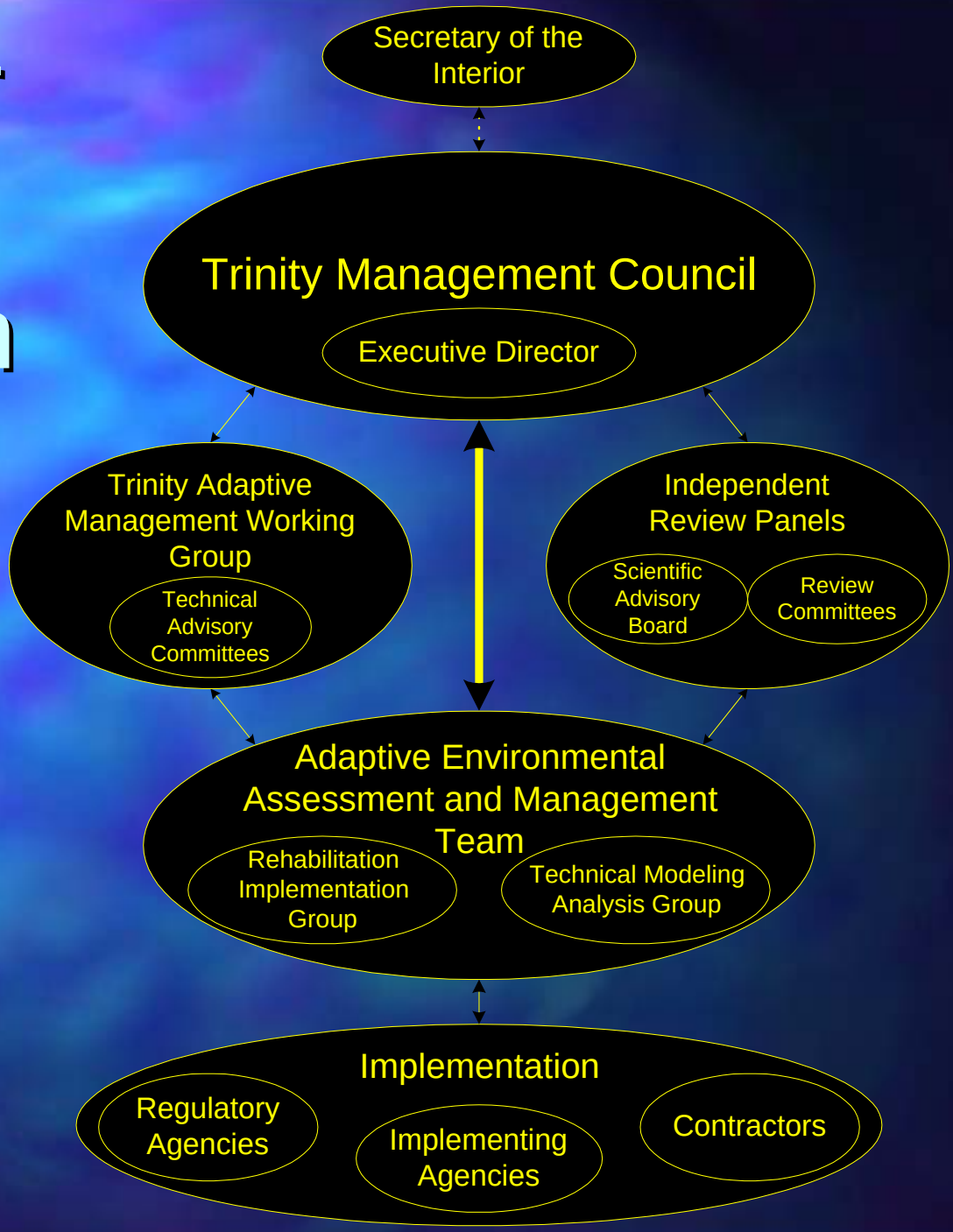
AEAM (con't)

- An AEAM program combines assessment and management. Most agency and task force structures have not allowed both to go on simultaneously

AEAM (con't)

- AEAM avoids the pitfall of requiring the costly assessing of more and more descriptive data before proceeding with policy initiatives. Instead, annual actions are adopted as learning experiments in a fluid feedback structure that mandates vigorous self-critiquing and peer review at every stage, such that evaluation and corrective information is disclosed quickly and strategies modified or discontinued accordingly

Trinity River AEAM Organization



Trinity Management Council (TMC)

- **Executive Director**
- U S Fish and Wildlife Service
- U S Bureau of Reclamation
- U S Forest Service
- National Marine Fisheries Service
- Hoopa Valley Tribe
- Yurok Tribe
- State of California
- Trinity County

Adaptive Environmental Assessment and Management Team (AEAMT)

- Technical Modeling and Analysis Group (TMAG)
- Rehabilitation Implementation Group (RIG)

Technical Modeling and Analysis Group (TMAG)

- Fisheries Biology/Physiology/Population Dynamics
- Fluvial Geomorphology/Hydraulics Engineering
- Riparian Ecology/Wildlife Ecology
- Water Quality/Temperature
- Hill Slope Geomorphology/Watershed Hydrology
- Information Management/Computer Modeling

Rehabilitation Implementation Group (RIG)

- Civil/River Mechanics/Hydraulic Engineering
- Engineering Technician/Surveyor
- Contracting Officer
- Contract Technical Representatives
- Part-time support from:
  - Construction Inspector
  - Construction Contract Specialist
  - Realty Specialist
  - Field Engineer

Trinity Adaptive Management Working Group (TAMWG)

- Stakeholders
  - Recreation
  - Environment
  - Landowners
  - Commercial Fishing
  - Sport Fishing
  - Timber
  - Power
  - Agriculture
  - Water Users
- Technical Advisory Committees

Independent Review Panels

- Scientific Advisory Board
- Peer Review Committees
  - Agencies
  - Tribes
  - Outside experts

First Steps

- The Trinity Management Council in place
- Staffing of the AEAM program
- Implementation of the Record of Decision

Implementation

- Bridge removal/replacement
- Channel rehabilitation and gravel augmentation
- Integrate models and concepts in TRFES to develop annual prediction and assessment process
- Develop refined river sampling design for baseline and annual comparisons
- Contract management-RFP based
- Establish peer review process to assure science based assessments and management actions

Implementation Process

- Objectives (ROD)
  - E.g. Maximize smolt growth rate and at least double smolt production to achieve escapement goals
- Hypotheses (TRFES)
  - E.g. Factors influencing smolt growth rate, habitat limitations, channel evolution
- Experimental Design (TRRP)
  - E.g. Escapement, annual flow schedule, assessing evolving habitat and channel shape, annual growth and production estimates, gravel augmentation and sediment routing

Implementation Process (con't)

- Integrated Modeling, Expected Outcomes
  - Physical
  - Biological
  - Numerical
  - Empirical
- Objective Specific and Long Term Monitoring
  - Baseline, Trends, Processes- RFP driven
- Assessment, Testing Hypotheses, Comparing Predictions and Monitoring Results
- Adapting, Restate hypotheses when TRFES assumptions are not supported