Overview of Fish Passage Design Approaches

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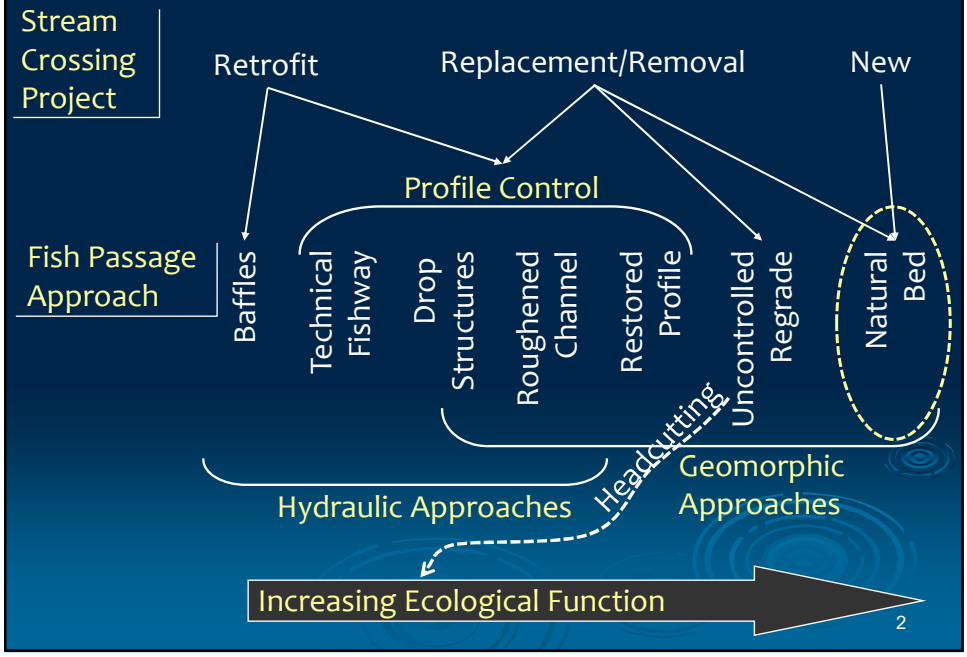
CDFW California Salmonid Stream Habitat Restoration Manual (SSHRM)
Part XII : Fish Passage Design and Implementation

⑩1

Design Approaches for Aquatic Organism Passage



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Stream Simulation

Natural Bed Options for Stable Streams

Sullivan Gulch Stream Simulation
Culvert Replacement

See:
USFS Stream Simulation Design Manual (2008)
CDFG SSHRM Part XII (2009)

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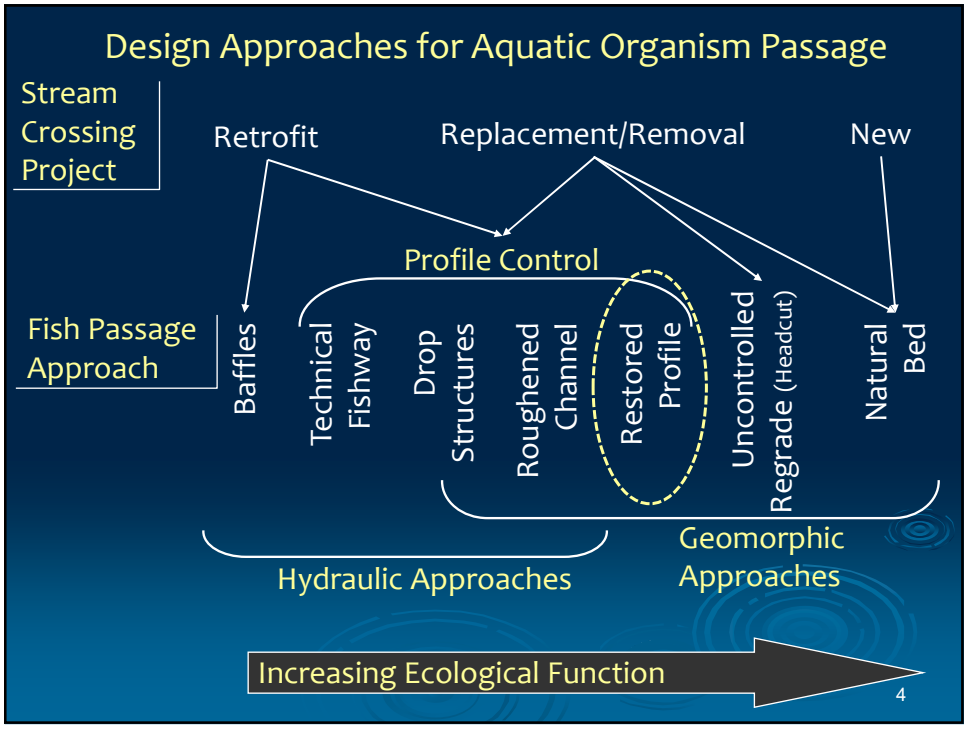
Design Approaches for Aquatic Organism Passage



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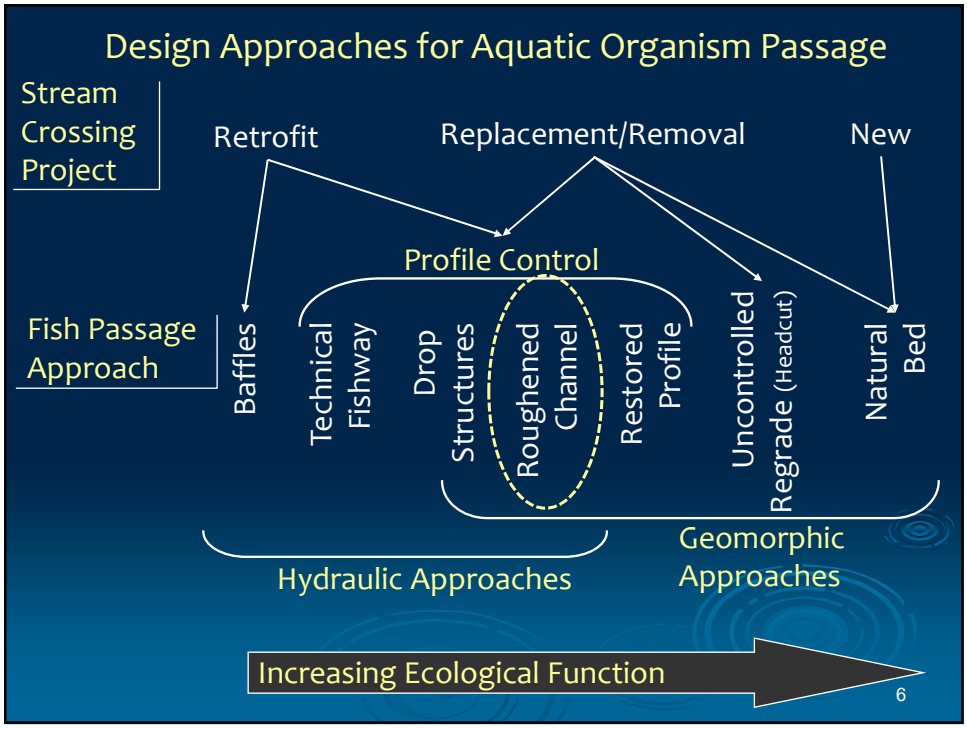
Profile Restoration
Restoring the profile of an incised channel downstream of a crossing
From Christine Chann
San Pedro Creek
Watershed Coalition
See:
CDFW Fish Bulletin 185 (2024)
CDFG SSHRM Part XII (2009)

❿5


Design Approaches for Aquatic Organism Passage
Stream Crossing Project
Retrofit
Replacement/Removal
New
Profile Control
Fish Passage Approach
Baffles
Technical Fishway
Drop Structures
Roughened Channel
Restored Profile
Uncontrolled Regrade (Headcut)
Natural Bed
Hydraulic Approaches
Geomorphic Approaches
Increasing Ecological Function
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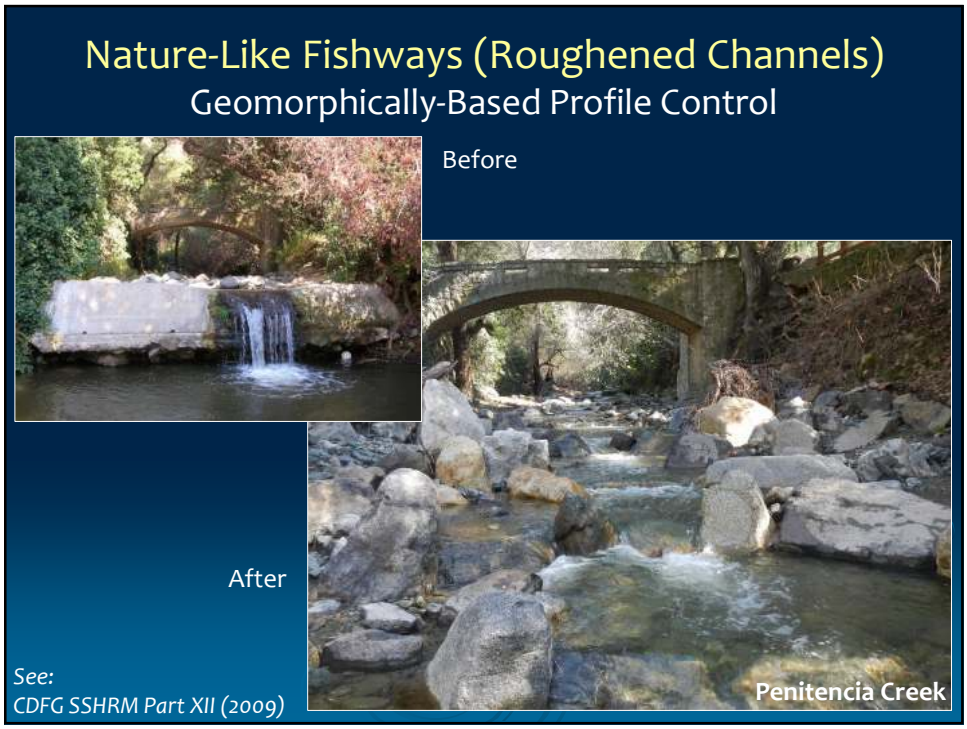
❿6


Nature-Like Fishways (Roughened Channels)
Geomorphically-Based Profile Control
Before
After
See:
CDFG SSHRM Part XII (2009)
Penitencia Creek

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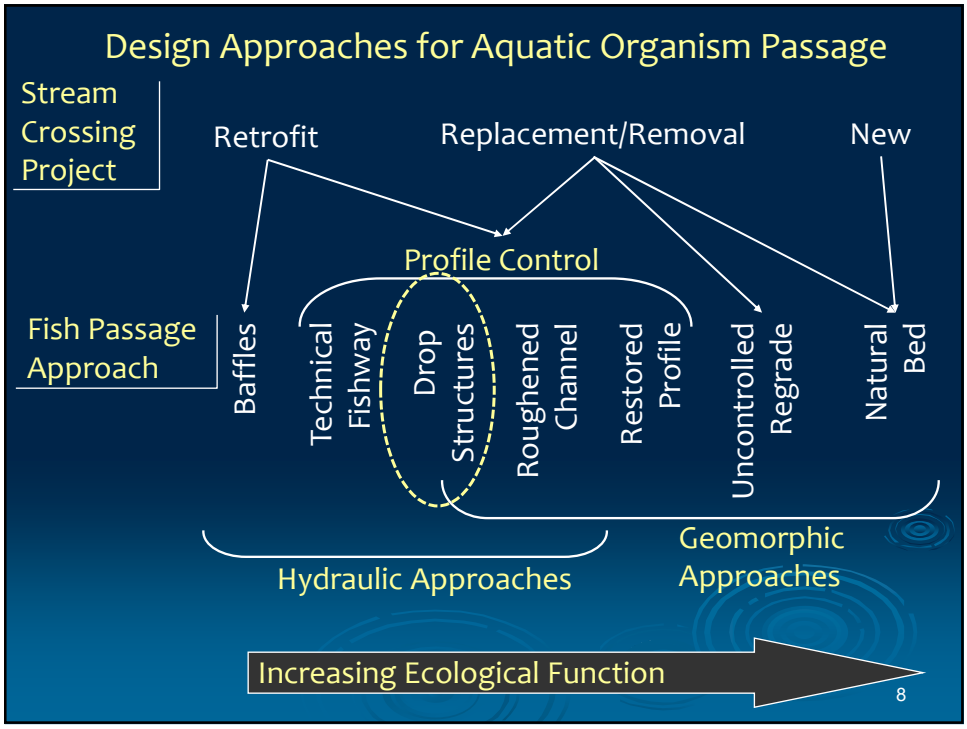
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Boulder and Log Weirs

Drop Structures for Profile Control

Boulder Weirs

Log Weirs

Covered in CDFW Fish Bulletin 183 (2024) and CDFG CA SHRM Part XII (2009)

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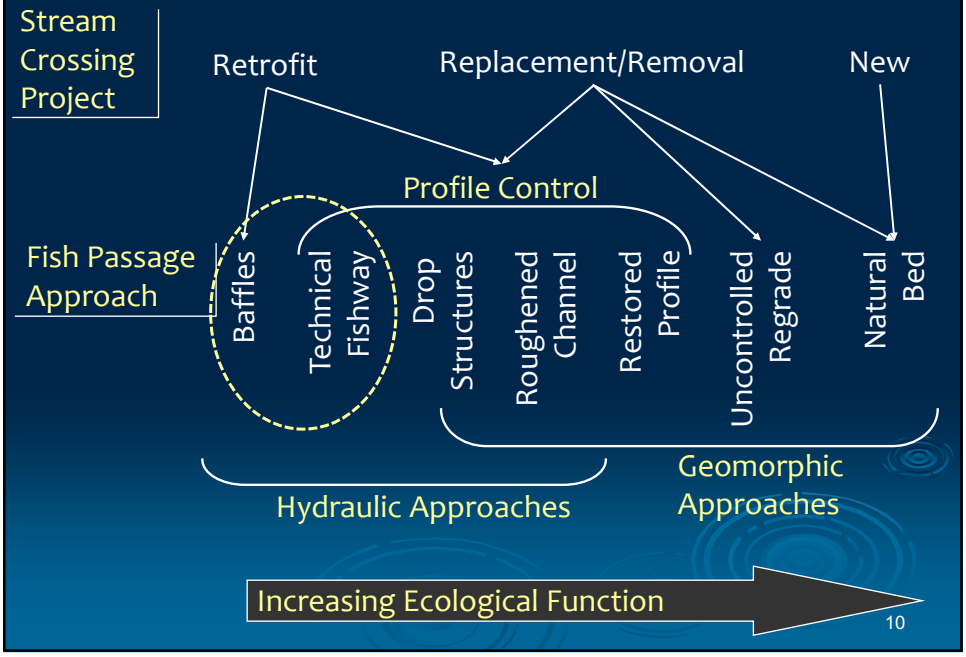
Design Approaches for Aquatic Organism Passage



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Technical Fishways
Profile Control

Vortex
Pool & Chute
Fishway

Peacock Creek, Smith River, Calif.

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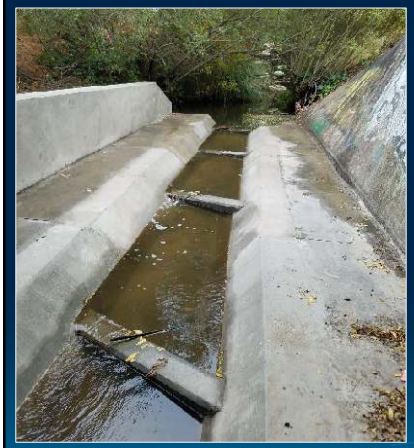
Fish Baffle Retrofits
Hydraulic Design



Angled Baffle Retrofit
Pinole Creek at -80

Corner Baffles in
Slipped Line Culvert

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Stream Simulation

Example of a Small Stream Crossing Application

McGarvey Gulch

4-foot Dia. CMP on Low-Volume Road

Steelhead Trout Stream

Inlet

Outlet Headwall and Apron

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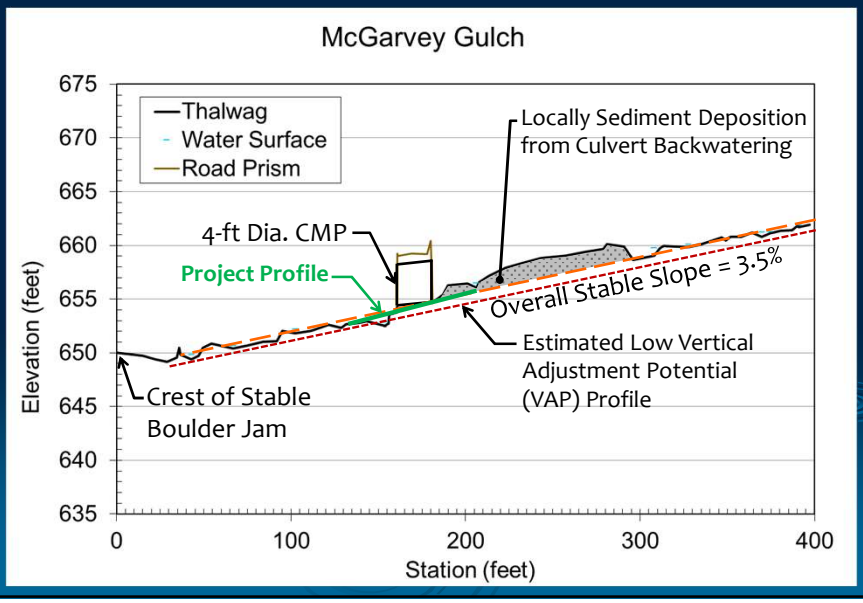
Stream Simulation

Example of a Small Stream Crossing Application



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Stream Simulation

Example of a Small Stream Crossing Application

Upstream Channel (beyond culvert influence)
Serves as Reference Reach for Design

Reference Reach:

Channel Type: Plane Bed (rapid)
Channel Slope = 3.5%

Ave. Active Chnl Width = 5.4 ft
Ave. Bankfull Width = 7.5 ft

Channel Controls: Cobble, Colluvial Boulders

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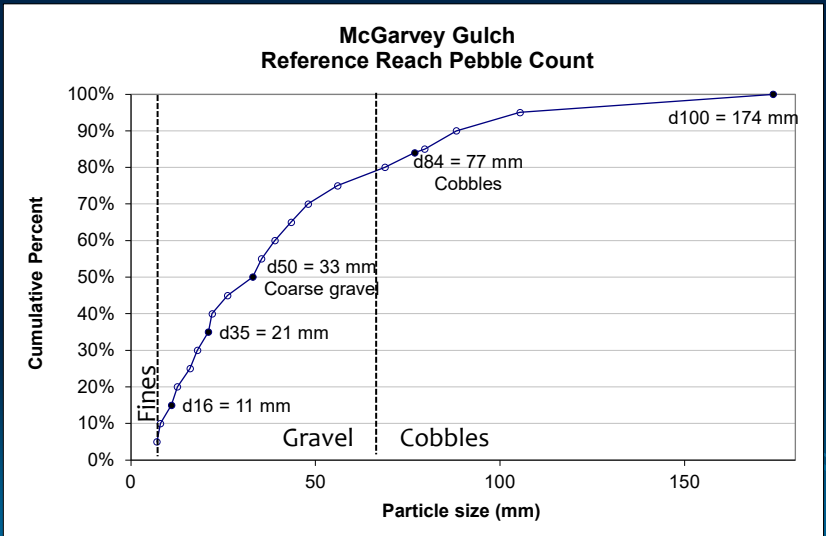
Stream Simulation

Example of a Small Stream Crossing Application



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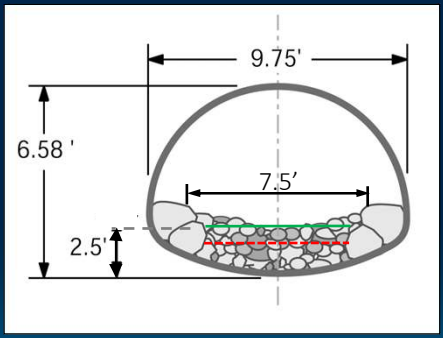
Stream Simulation
Example of a Small Stream Crossing Application

McGarvey Gulch Crossing Design



- Pipe-arch Metal Culvert
- Span = 1.3*Bankfull Width
- Invert Embedded 2.5 feet below Project Profile
  (1.5 feet below Low VAP Profile)
- Large Rocks inside along Culvert Walls form Banks

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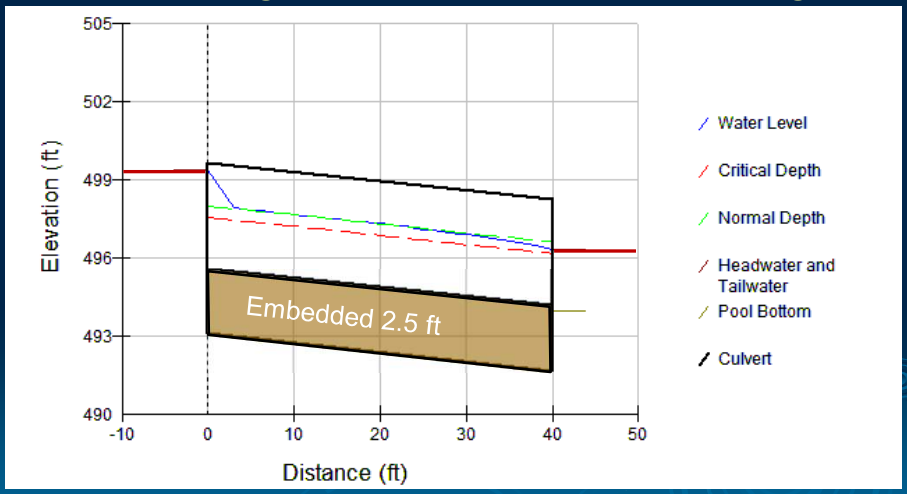
Stream Simulation
Example of a Small Stream Crossing Application
Checking Culvert Capacity at Q100 with FishXing



- ✓ HW/D<1.0 (Headwater below Soffit)
- ✓ Subcritical Flow in Culvert (Outlet Controlled)

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Stream Simulation

Example of a Small Stream Crossing Application

McGarvey Gulch Post-Project

Photo: Matt Stoecker

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