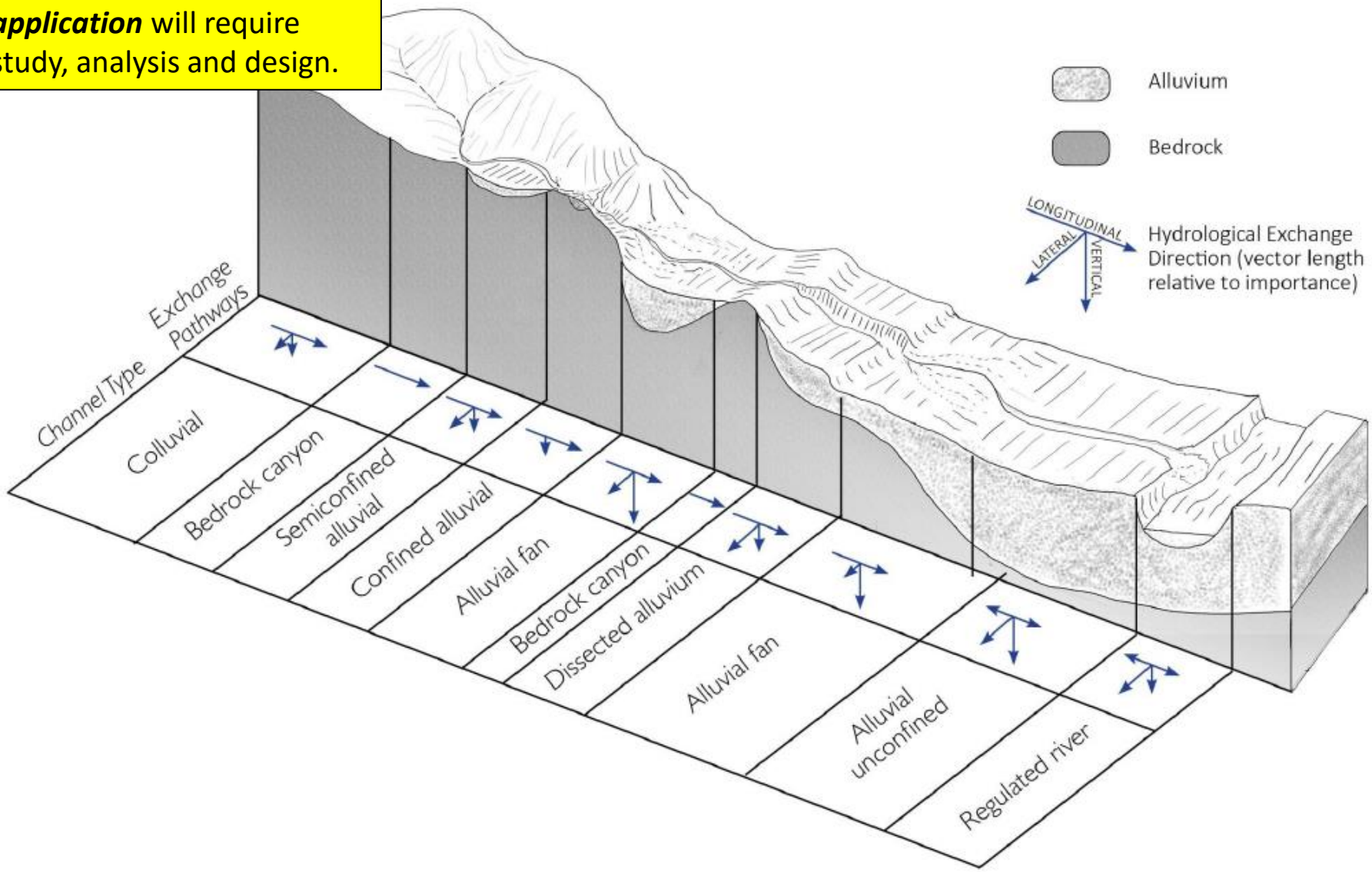
Restoration and water management recommendations

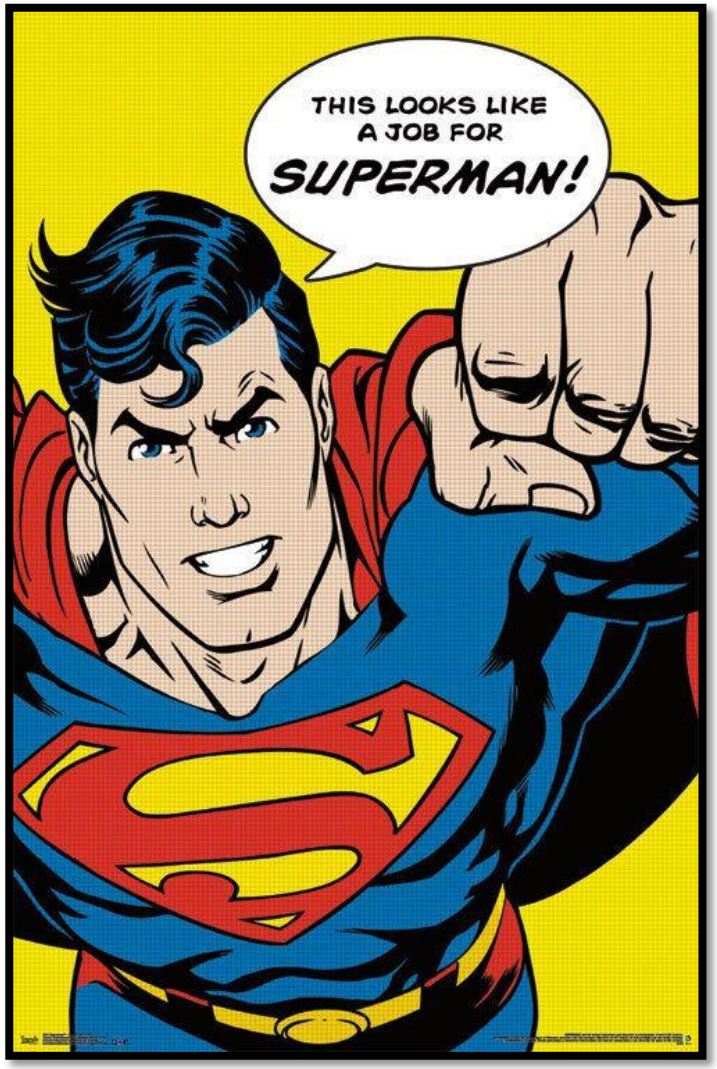
Dr. Doug Shields

This is a list of ***potential*** measures. A ***specific application*** will require study, analysis and design.



Restoration and water management recommendations

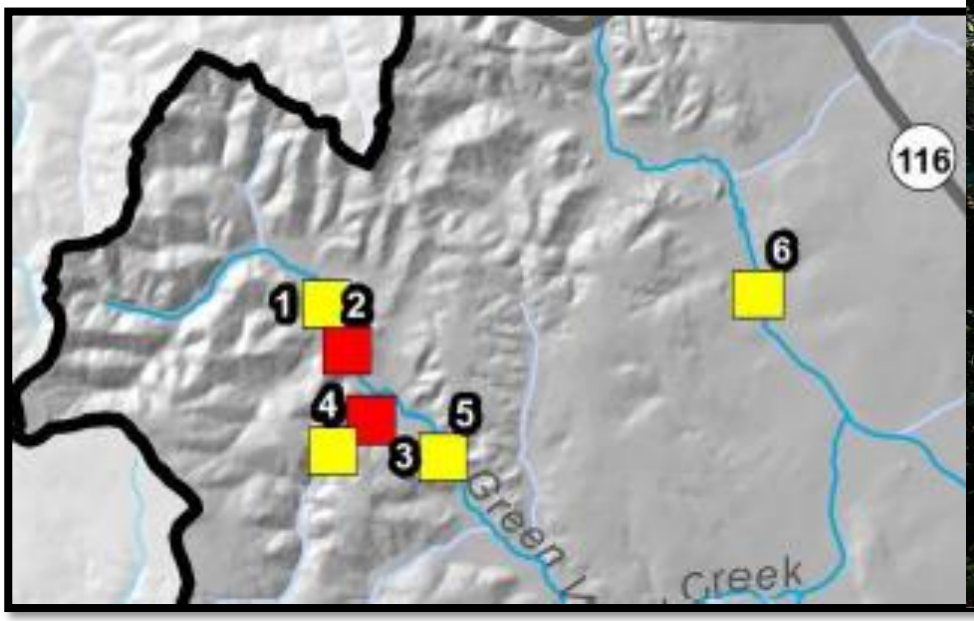
- Connection, connection, connection
- Water temperature
- Timing
- Sustainable complexity = wood, veg, channel form
- HALT to press disturbance of entrenchment



Restoration Techniques: Removal of Fish Migration Barriers

Culvert replacement with railcar bridge

Baffles in culvert



Removal of on-stream dam

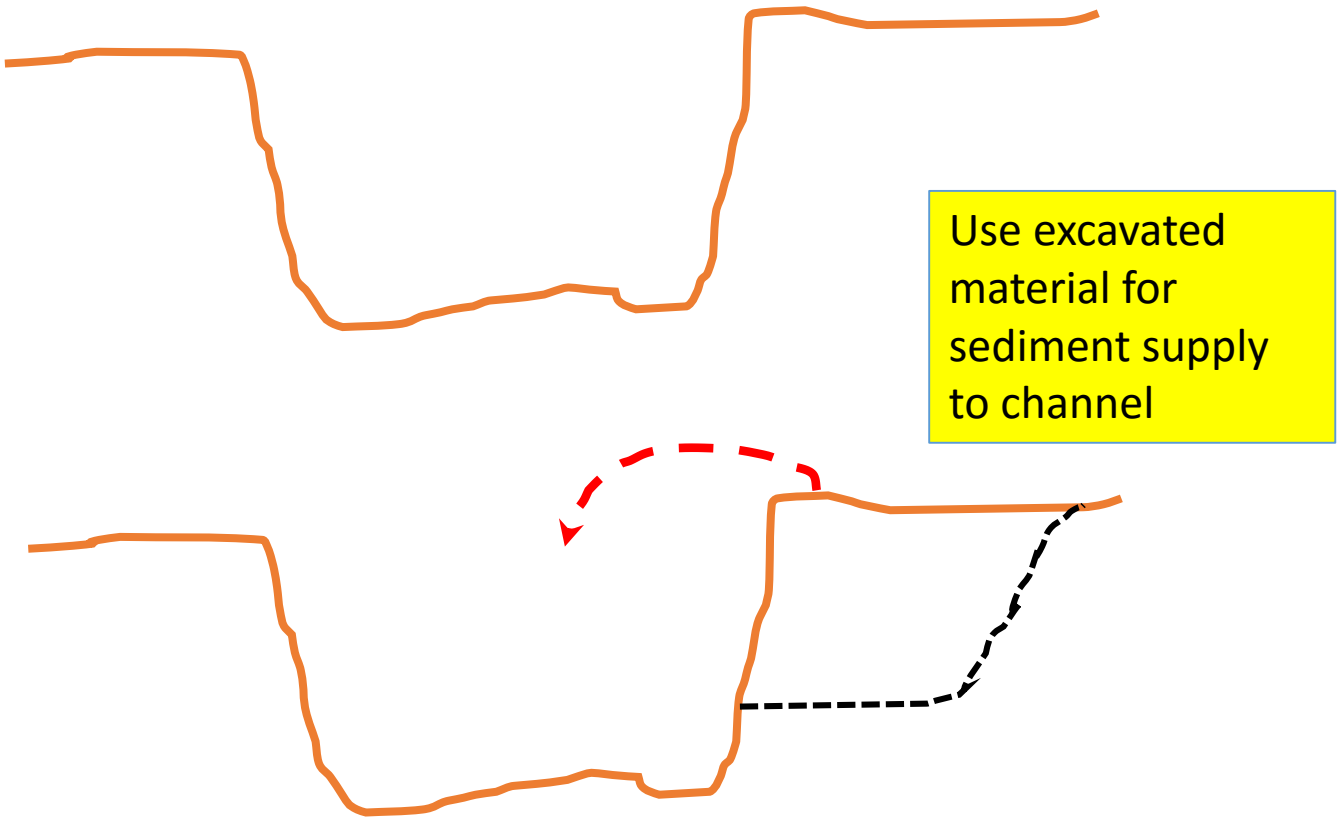
Restoration Techniques: Revegetation

Restoration Techniques: Placement of Large Wood in Streams

Artificial instream structures are not recommended.

Restoration Techniques: Gravel Augmentation below Dams

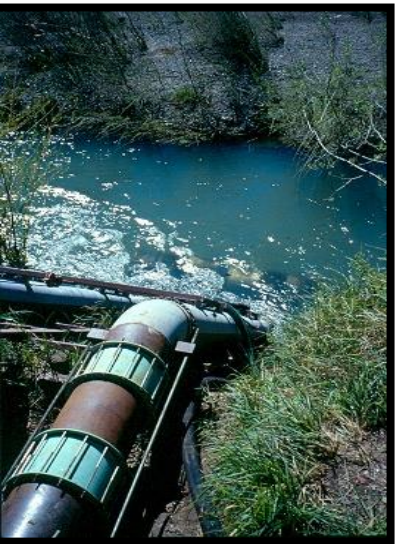
Restoration Techniques: Benching along Incised Reaches



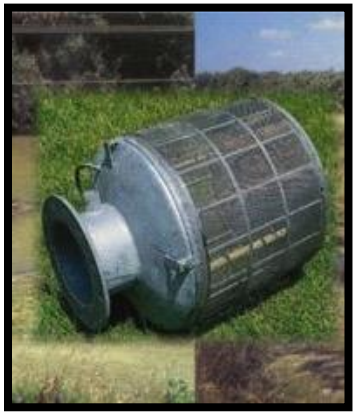
Referred to as “bank setbacks” below

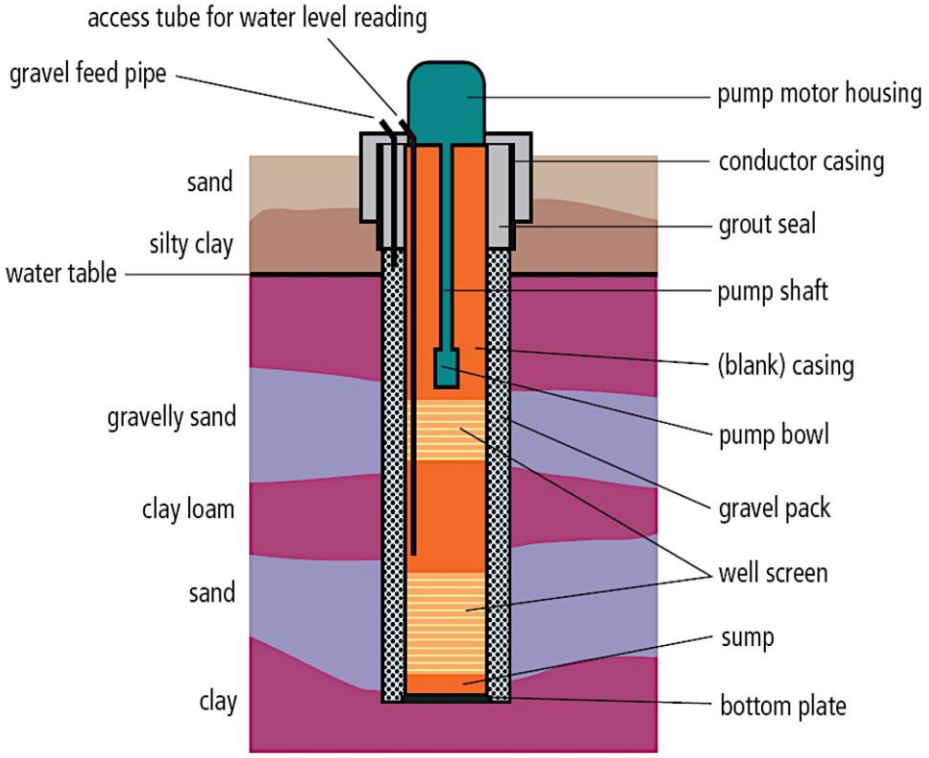
Water Management

Construction of off-stream ponds with winter diversions



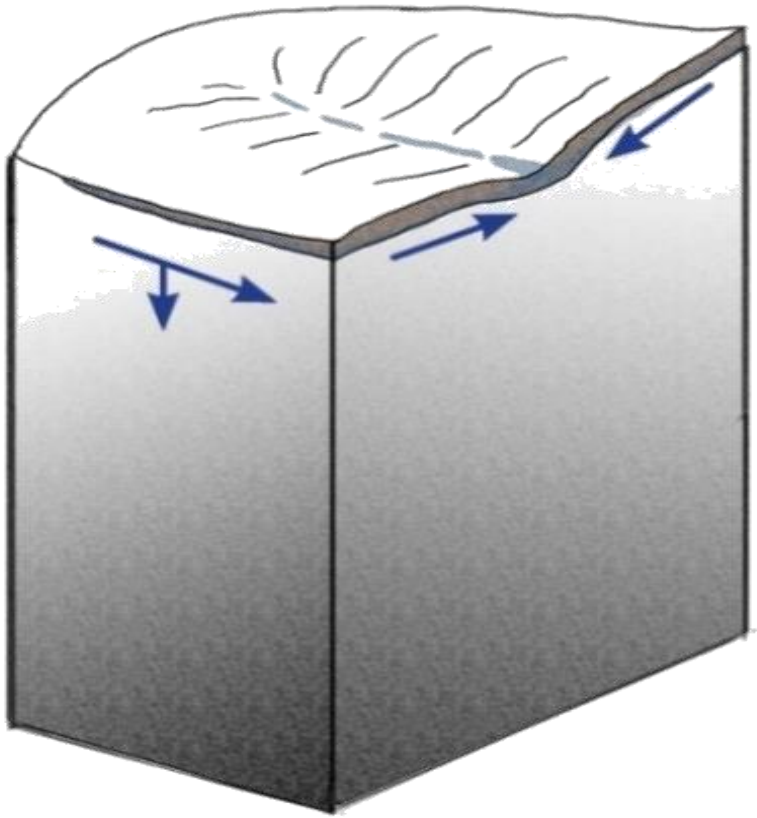
NMFS compliant fish screens on all diversions

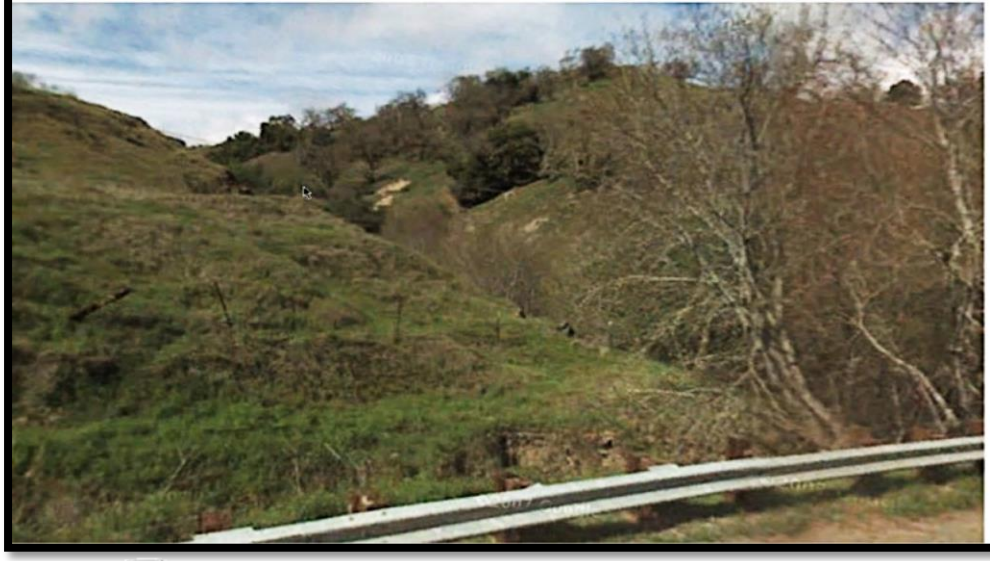


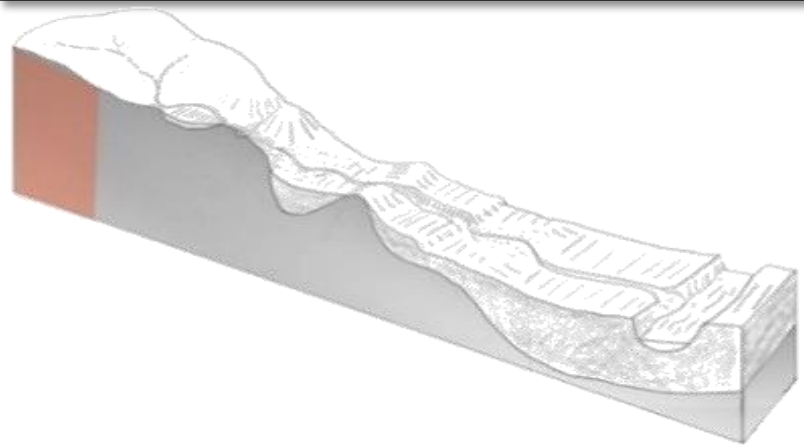


Along tributaries, construct/screen wells to avoid impacts on low water.

Colluvial
< 6 months continuous flow

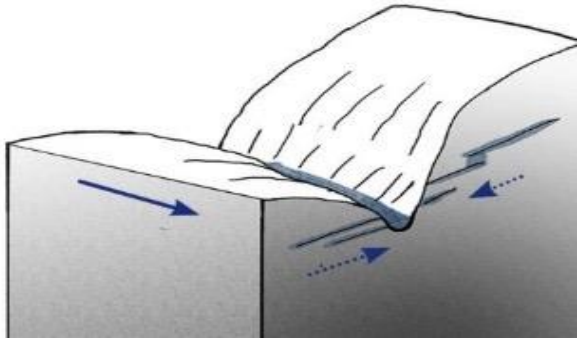


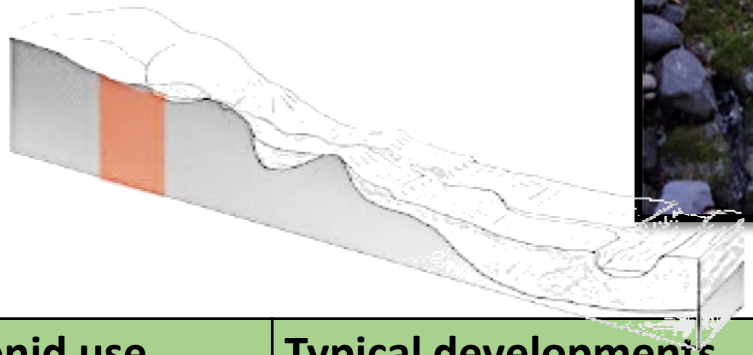


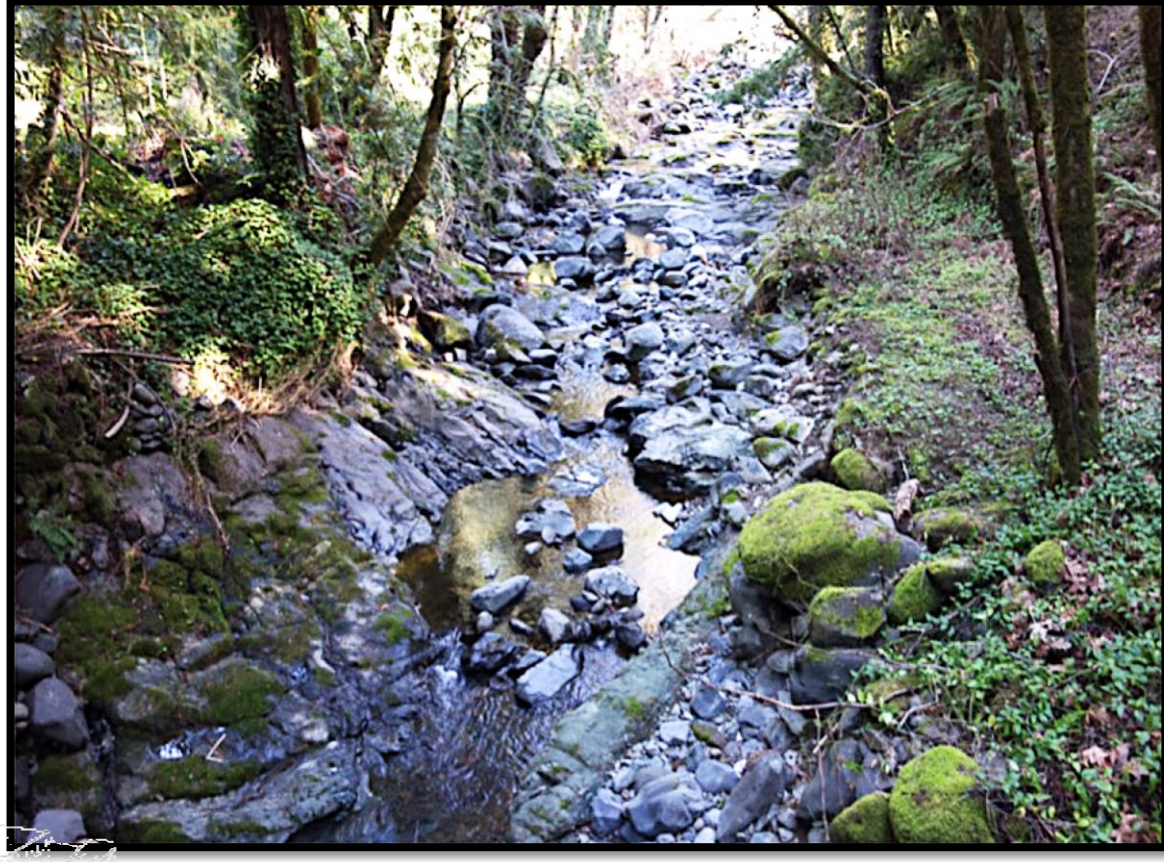


Salmonid use	Typical developments	Restoration recommendations
• Low to no use • Aquatic invertebrates and amphibians	• Housing • Hillside vineyards • On-stream reservoirs	• Residential stormwater BMPs (+infiltration) • Riparian corridor vegetation Keep water moving downstream and downslope cool and clear

Bedrock
generally perennial flow

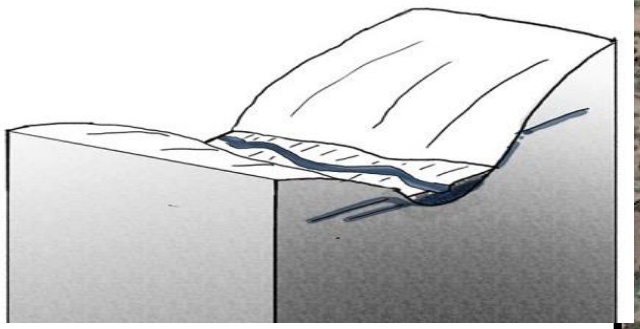


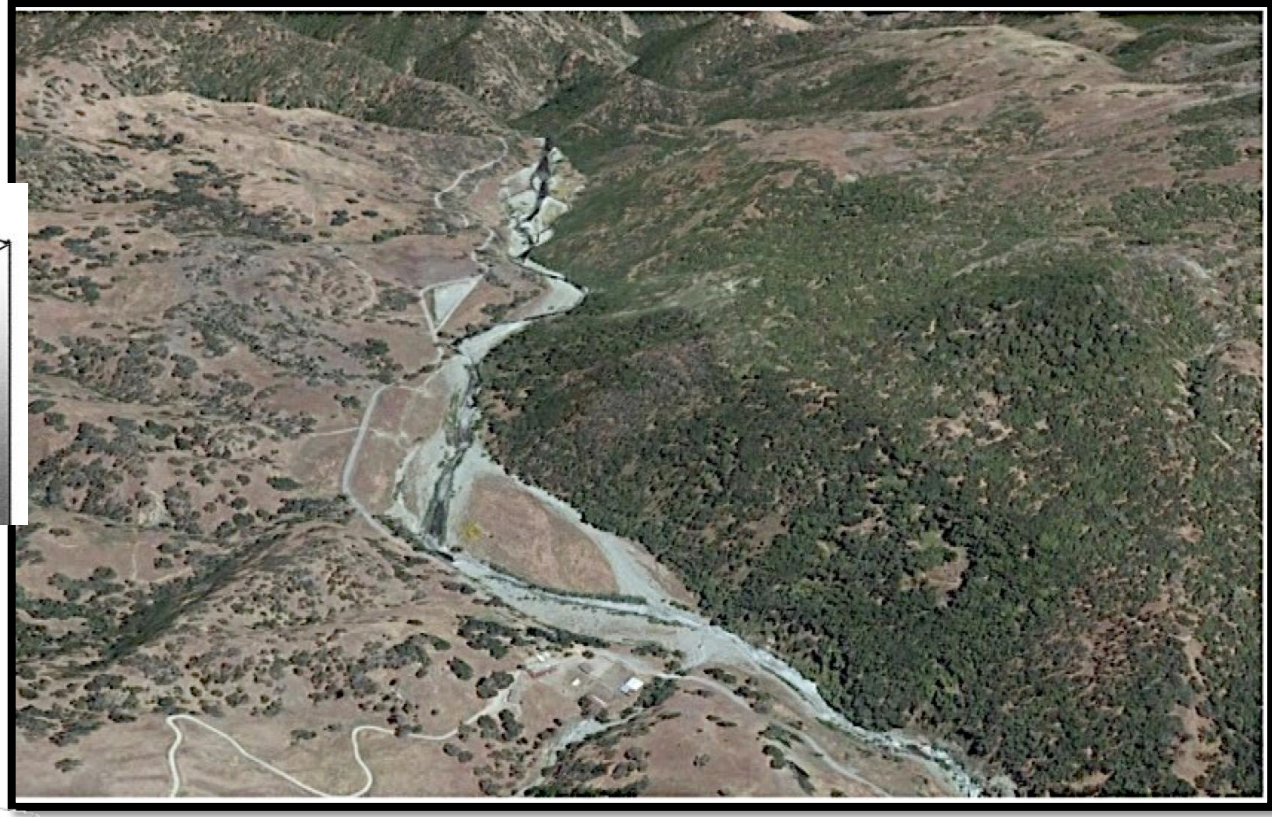


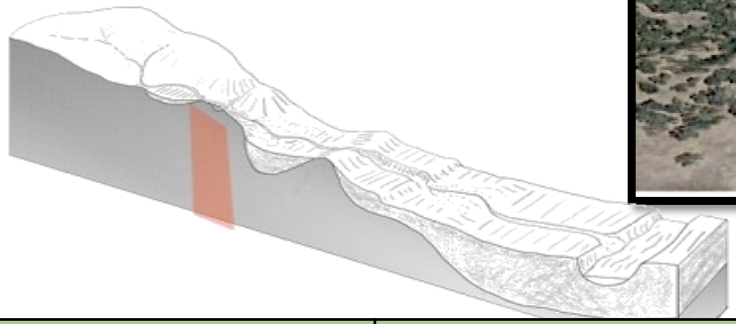


Salmonid use	Typical developments	Restoration recommendations
• Spawning • Egg incubation • Rearing • Adult and smolt migration	• Reservoirs • Diversions • Near-channel wells • Illegal diversions for marijuana production	• Protect • Convert summer direct diversions to winter only with storage • Revegetate riparian corridor • Remove migration barriers • Large wood

Confined alluvial
6-12 months of flow

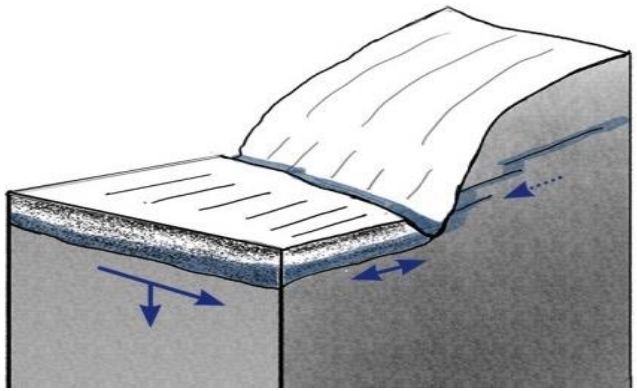


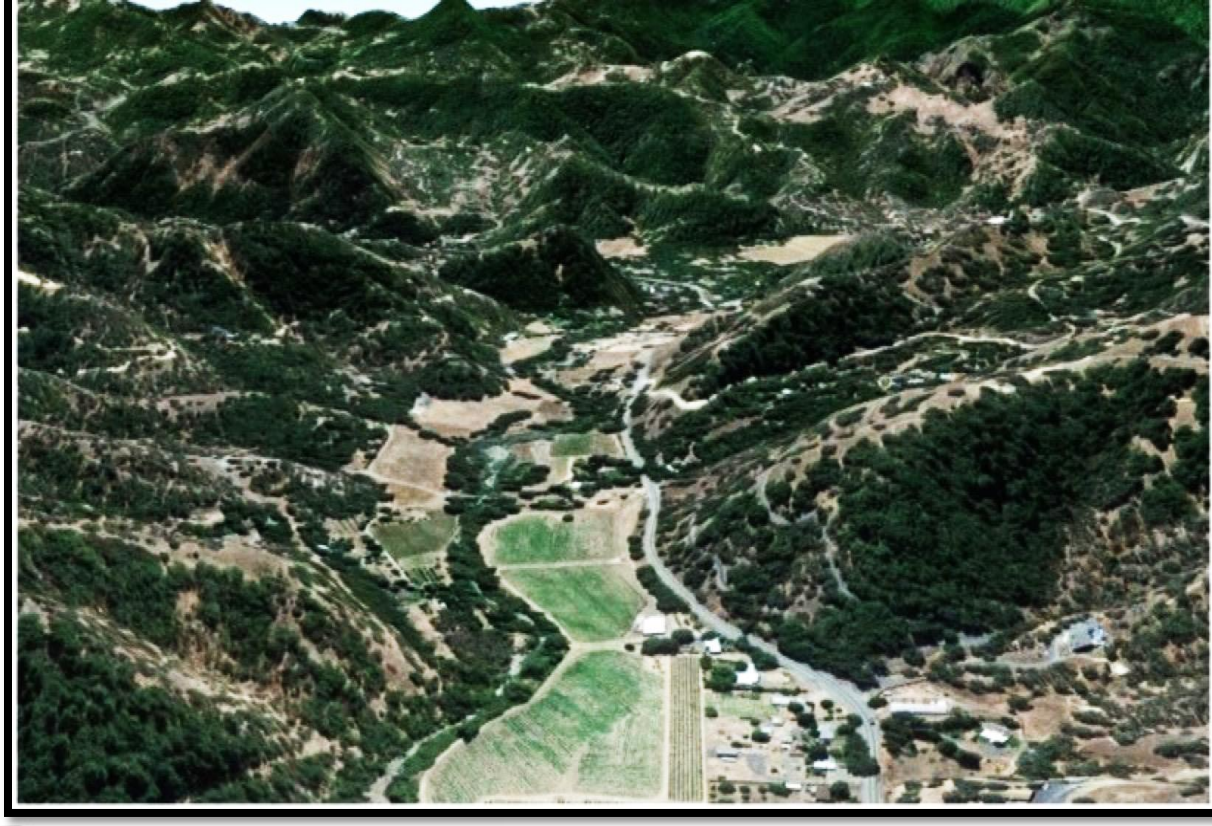


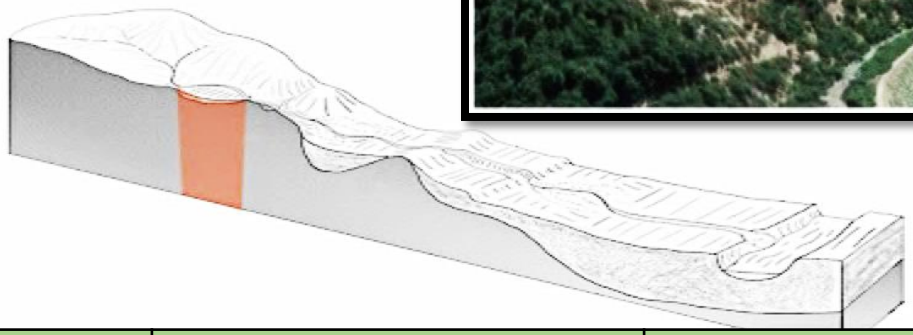


Salmonid use	Typical developments	Restoration recommendations
• Spawning • Egg incubation • Rearing • Adult and smolt migration	• On-stream reservoirs • Diversions into off-stream reservoirs • Near-channel wells • Direct diversions	• Along tributaries, construct/screen wells to avoid impacts on low water • Convert summer direct diversions to winter only with storage • Revegetate riparian corridor • Remove migration barriers • Large wood

Semiconfined alluvial
10-12 months of flow

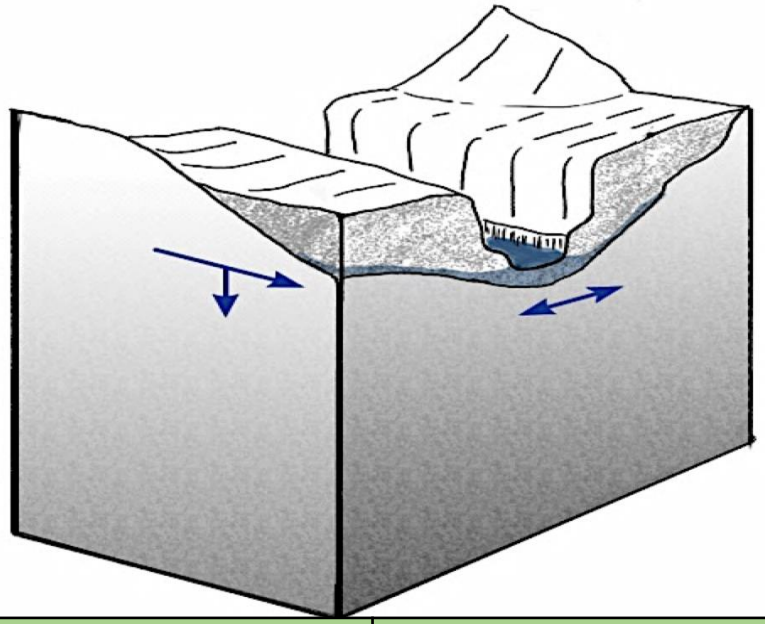


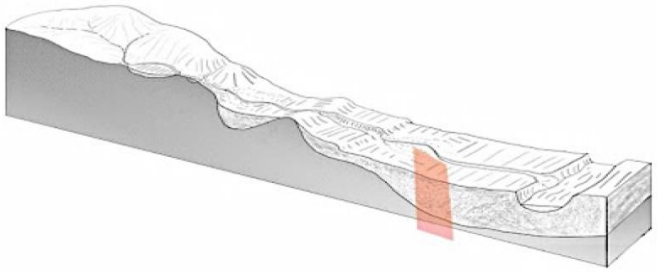




Salmonid use	Typical developments	Restoration recommendations
• Spawning • Egg incubation • Rearing • Adult and smolt migration	• Wells in floodplain • Floodplain development • Direct diversions • Diversion into off stream storage	• Use numerical model to manage wells and diversions • Revegetate riparian corridor • Remove migration barriers • Large wood • Bank setbacks • Grade control

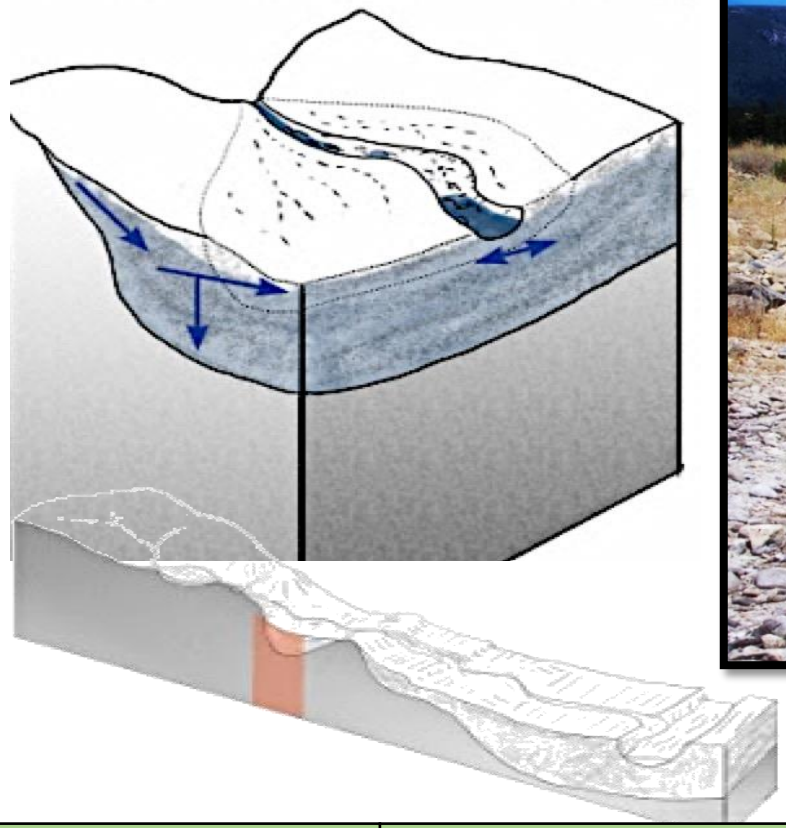
Dissected alluvium
8-12 months of flow





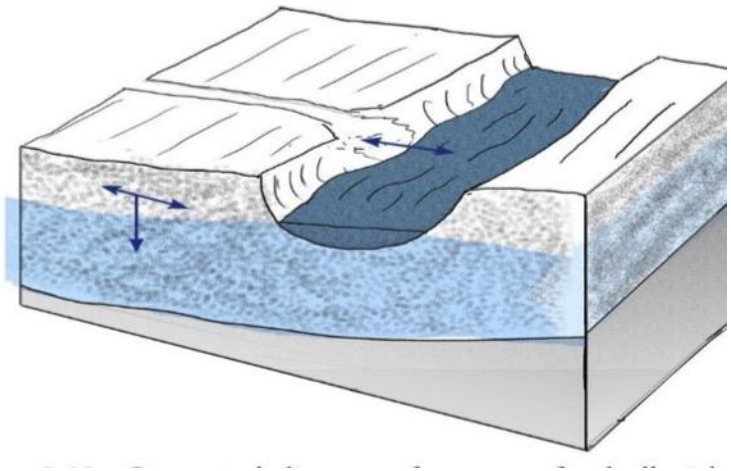
Salmonid use	Typical developments	Restoration recommendations
• Spawning • Egg incubation • Rearing • Adult and smolt migration	• On-stream reservoirs • Direct diversions into off-stream reservoirs • Wells	• Use numerical model to manage wells and diversions • Revegetate riparian corridor • Remove migration barriers • Large wood • Bank setbacks • Grade control

Alluvial fan
5-9 months of flow



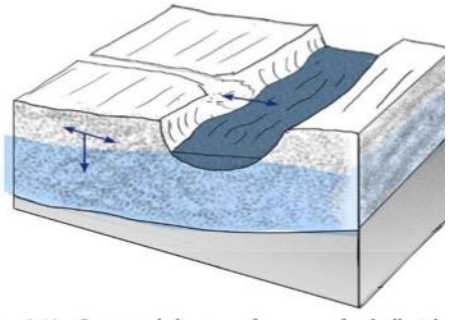
Salmonid use	Typical developments	Restoration recommendations
• Adult and smolt migration	• Wells • Direct diversions into off stream reservoirs	• Use numerical model to assess effects of main stem river flow stage on water levels • Revegetate with oak savannah • Remove migration barriers

Unconfined alluvial
3-6 months of flow



Salmonid use	Typical developments	Restoration recommendations
• Adult and smolt migration • Spawning and rearing in limited locations	• Gravel mining • Channelization/incision • Flood plain development • On-stream reservoirs • Direct diversion into off-stream reservoirs • Wells	• Evaluate effects of developments using numerical model • Revegetate riparian corridor • Remove migration barriers. • Large wood • Bank setbacks • Grade control

Regulated
Continuous flow



Salmonid use	Developments	Restoration recommendations
• Adult and smolt migration • Spawning and rearing in limited locations	• Large reservoirs • Gravel mining • Channelization • Floodplain development • Wells	***Just below Coyote Dam and the Narrows*** • Manage for salmonids • Use model to evaluate surface and groundwater interactions ***Just below Coyote Dam*** • Widen river channel and complex riparian corridor through work with willing landowners • Gravel augmentation ***Remaining reaches of the Russian River*** • Winter and spring spawning and rearing for Chinook • Native warmwater species • Minimize gravel mining in river channel • Improve riparian and aquatic habitats