

Say No To Portaging!

Modifying Impediments to Recreational Boating

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*“If there is magic on this planet, it
is contained in water”*
--Loren Eiseley



Man's Impact



Picture: Peter Atkins



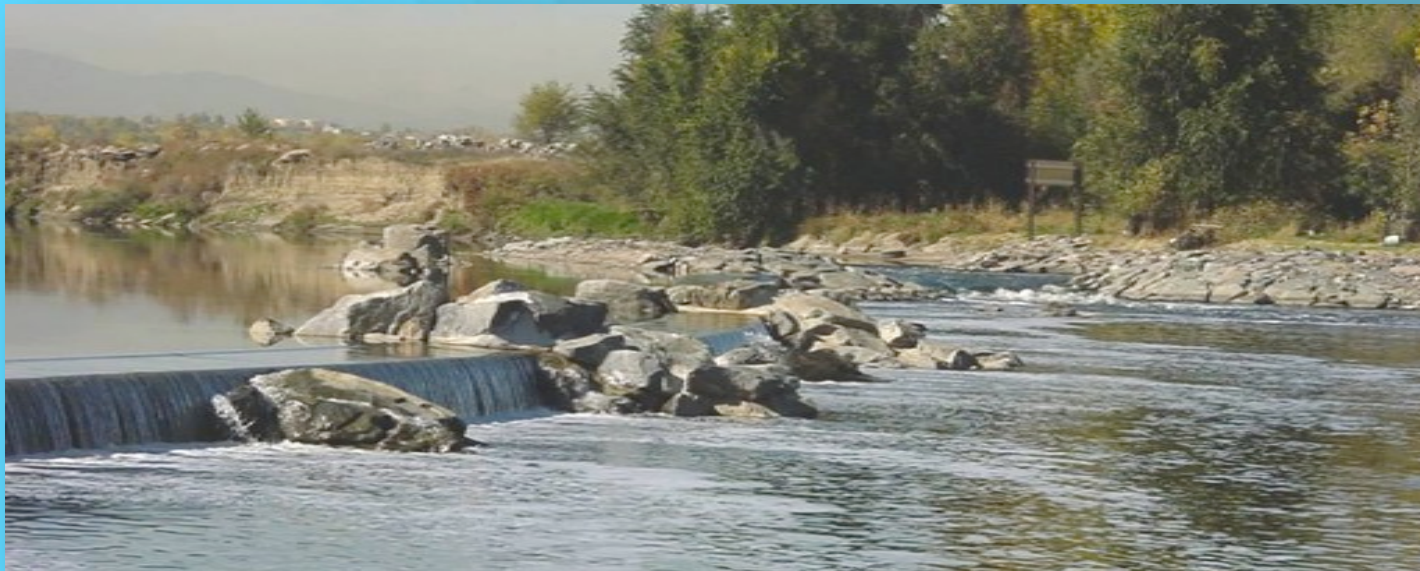
Picture: Bob Searns



Picture: Bob Searns

Impediments to Recreational Boating

- Dams
- Utility Crossings
- Grade Control Structures
- Diversion Structures

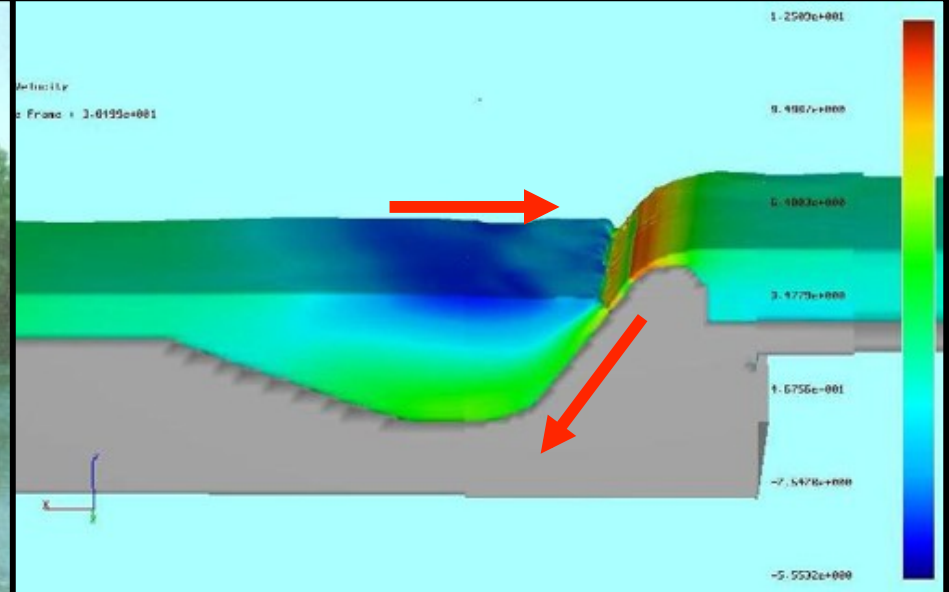


Problem Illustration

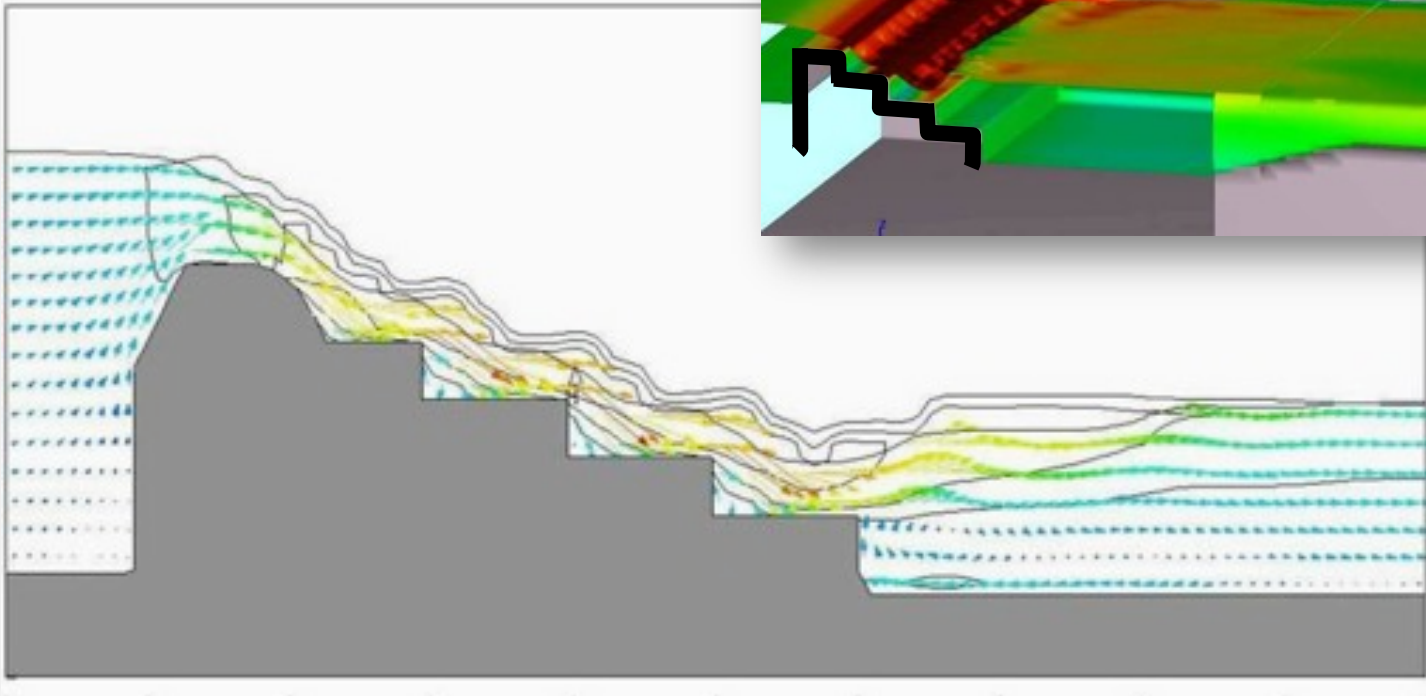
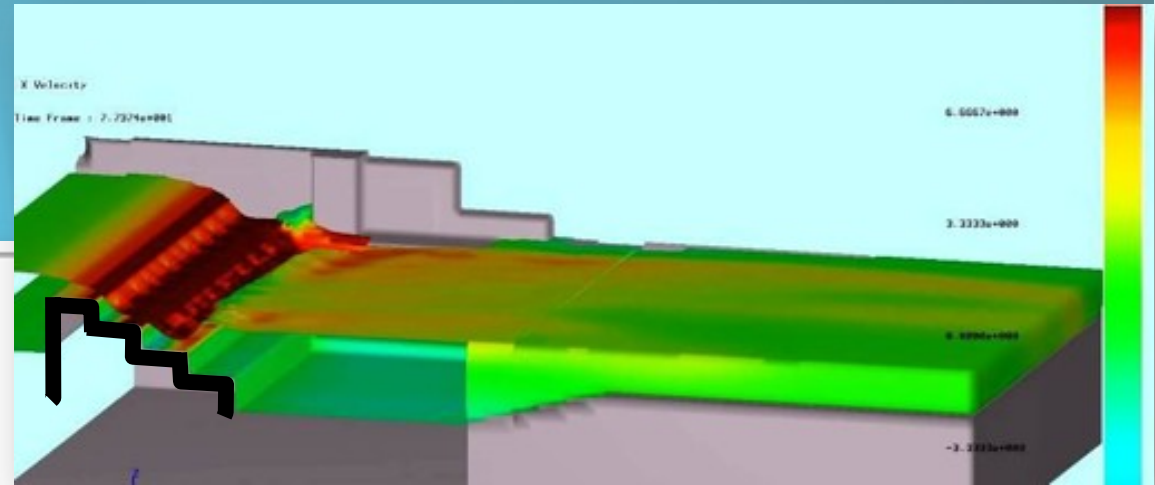
- Ogee and Sloping Dams are hazardous.
- Shape creates a re-circulating current that can trap victims.

Yorkville Dam

- ⌘ Dam Constructed 1960-1961
- ⌘ Length of Dam 530 feet.
- ⌘ Height of Dam Varies 6 to 12 feet.
- ⌘ Length of Pool 1.8 Miles.
- ⌘ Area of Pool 111 Acres.
- ⌘ 102 Individual Properties Along the Pool
- ⌘ 30 People Killed



Dam Modification – Stepped Face Design

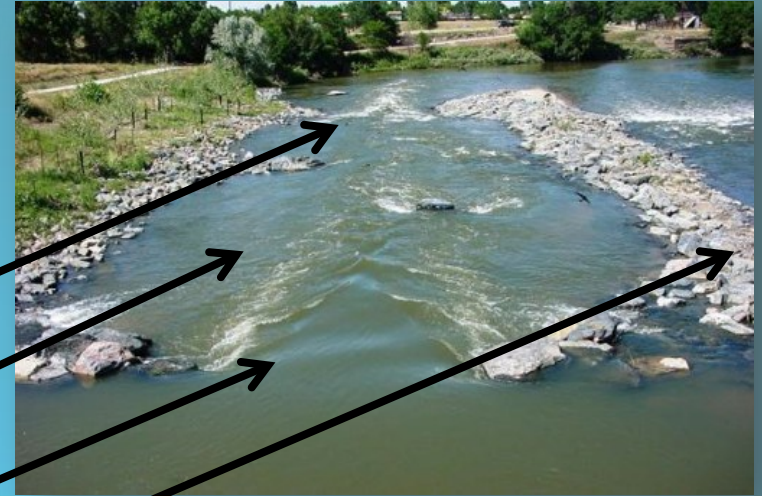


Dam Removal Considerations

- Ecological Impacts
- Economic Impacts
- Societal Issues
- Technical/Engineering Issues

Multi-Function Bypass Boat and Fish Passage

- Basic Components
 - Chute (ramp with drop)
 - Pools and Eddy Features
 - Entry and Control Sills
 - Separation Berm or Wall

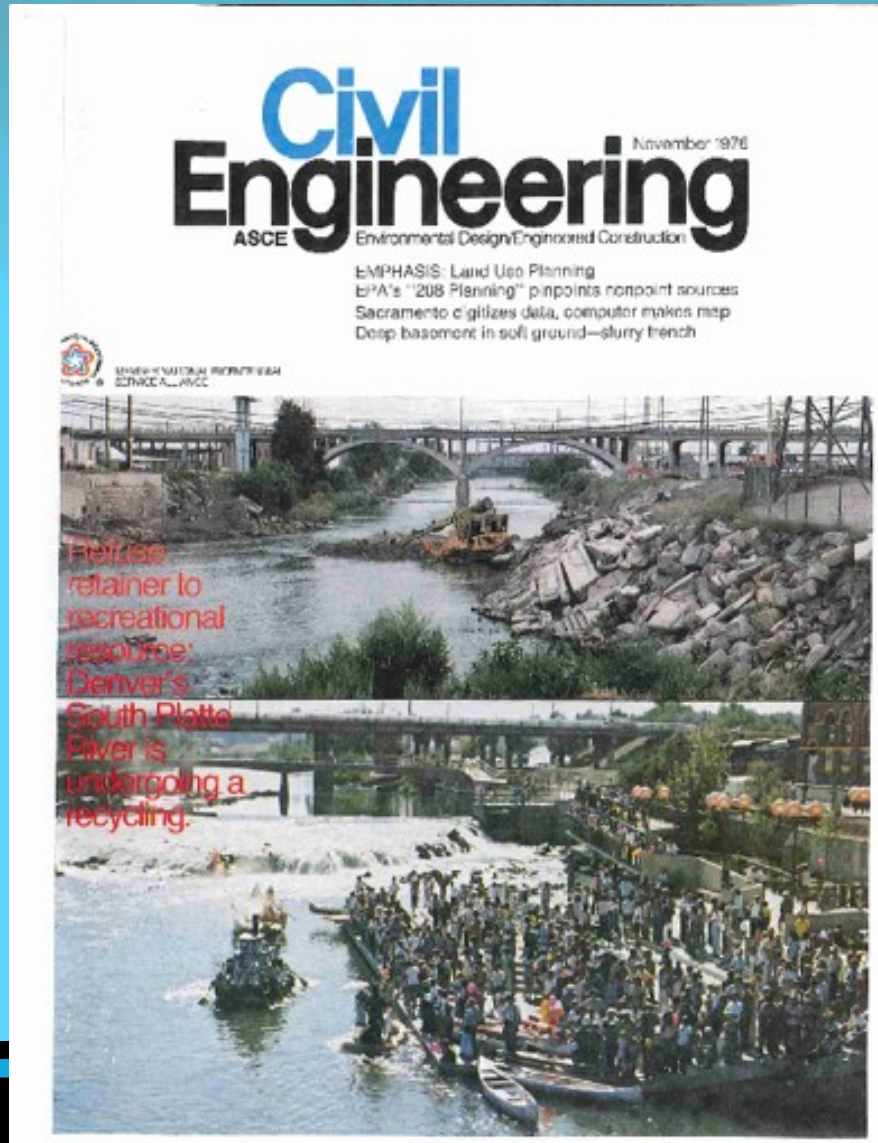


Multi-Function Bypass Design Considerations

- Maintain function of structure
- Accommodate full range of flows and flood events
- Satisfy Environmental and Recreation objectives
- Protect public health, safety and welfare
- Economics



Confluence Park, Denver, CO



- 1965 Flood Brought focus to S. Platte River
- PRDC Formed - River rehab enthusiasts
- Confluence Park constructed 1975
- “Seed Project” for S. Platte Greenway
- Irrigation Diversion Dam Modification
- First Urban on-stream whitewater venue in U.S.

Confluence Park, Denver, CO



1976



1996

Confluence Park, Denver, CO



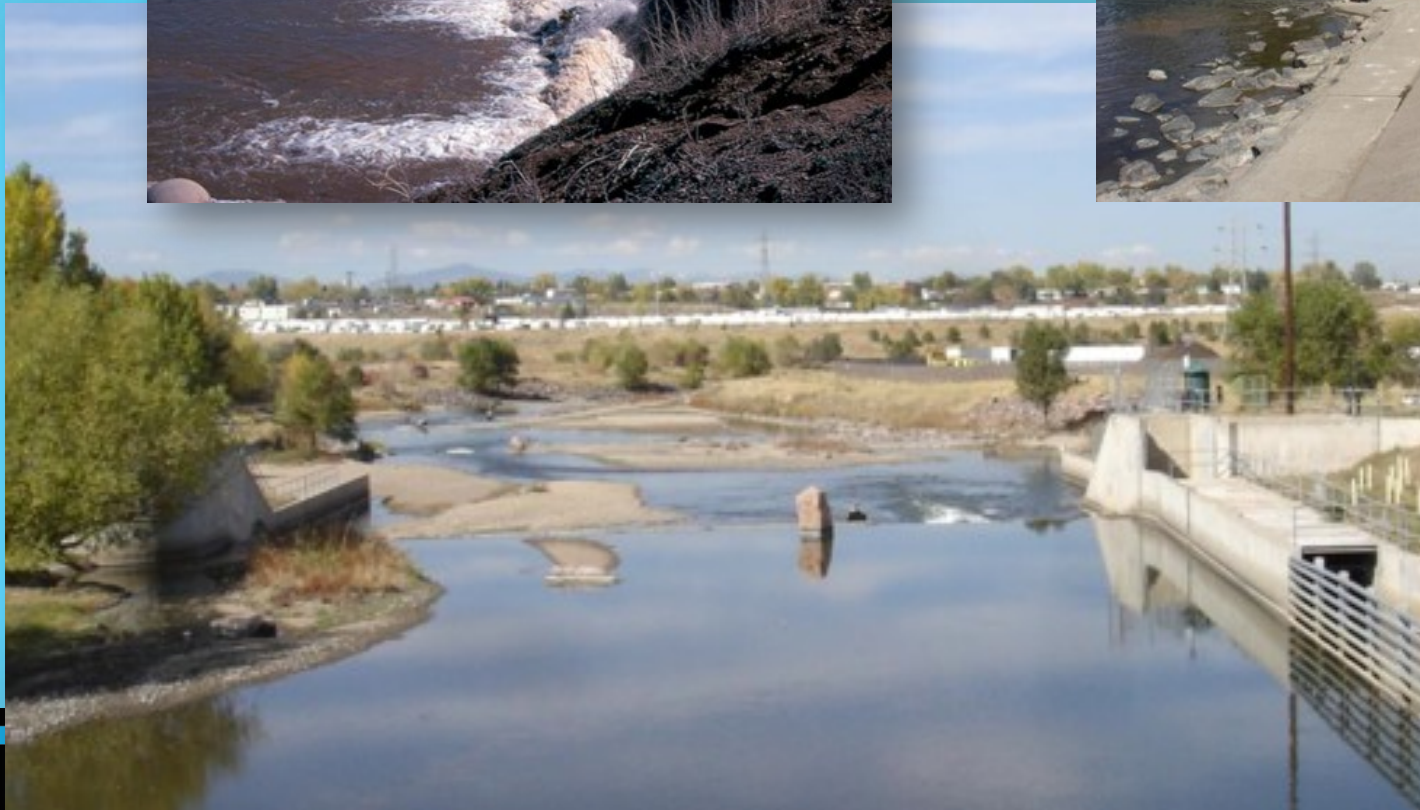
3rd Avenue Dam, Denver, CO



3rd Avenue Dam, Denver, CO



Union Ave Dam, Englewood, CO



Florida Ave Dam, Denver, CO



Utility Crossings/Drop Structures

S. Platte River, Denver, CO



Sheet Pile Check Dam



Sanitary Sewer Crossing



19th St. Stream Gauging Station



Stabilization Drop Structure

16th St Grade Control Structure, Denver, CO



Ditch Diversion Structure, Littleton, CO



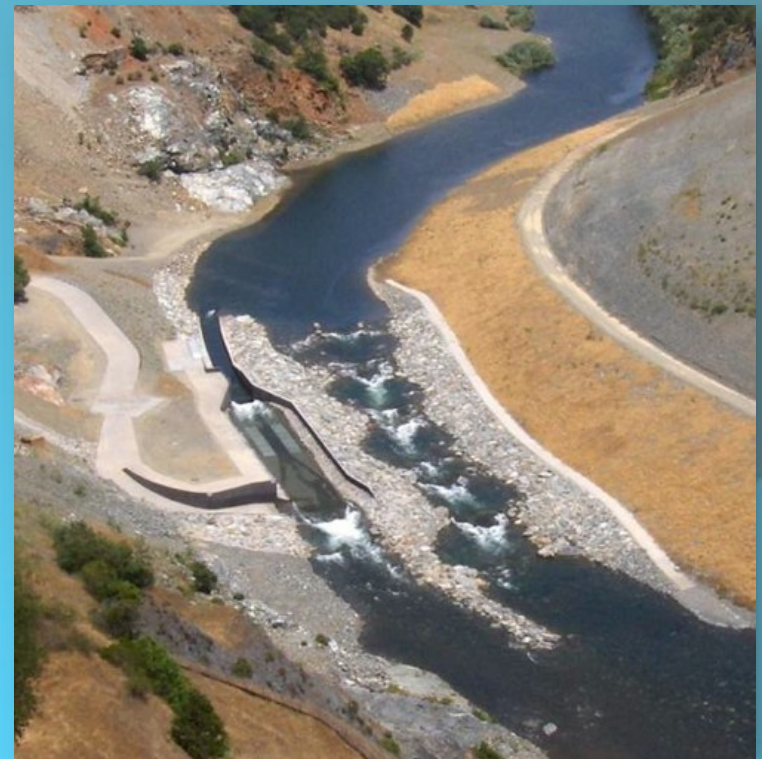
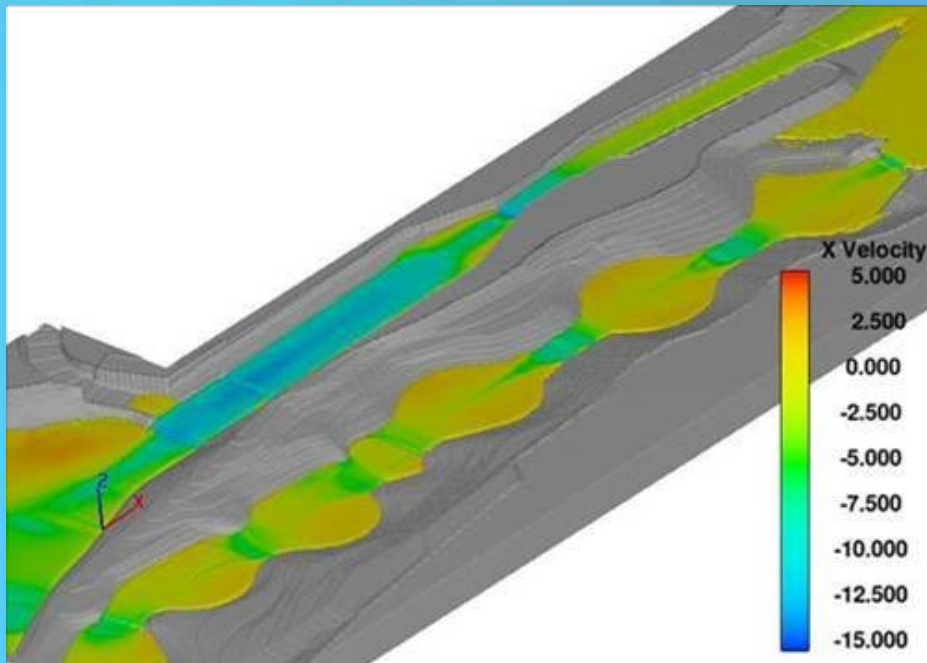
Neglected
Warning Sign

American River, Auburn California



American River, Auburn California

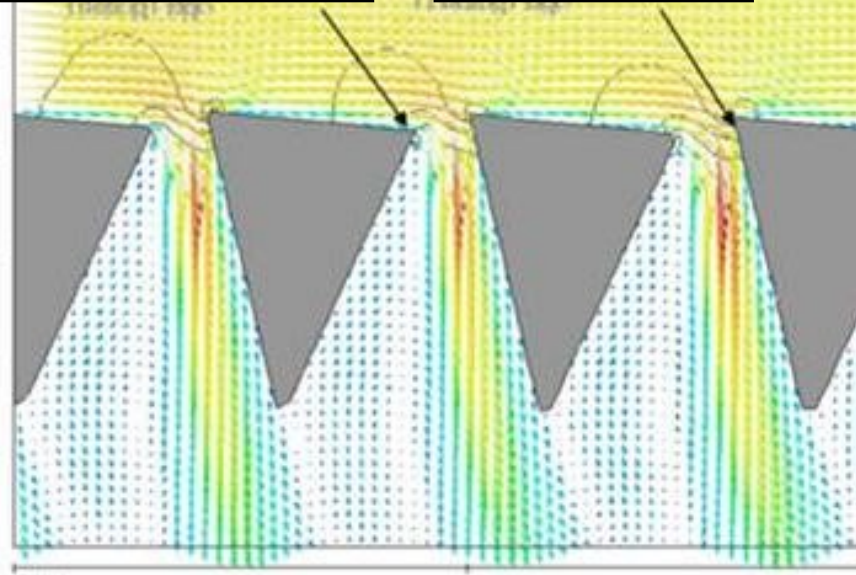
- Restoration of Former Partially Constructed Auburn Dam



American River, Auburn California

Low Pressure Coanda Effect Pulls Water In

Leading Edge Deflects Water In



Big Hole River – Divide, Montana

- Ogee Shape = Keeper Wave



Big Hole River – Divide, Montana



Modeling Techniques

- Refinement of details for:
 - Public Safety
 - Boating Features
 - Fish Passage
 - Erosion Protection
 - Range of Flow Analyses
 - Structure Function

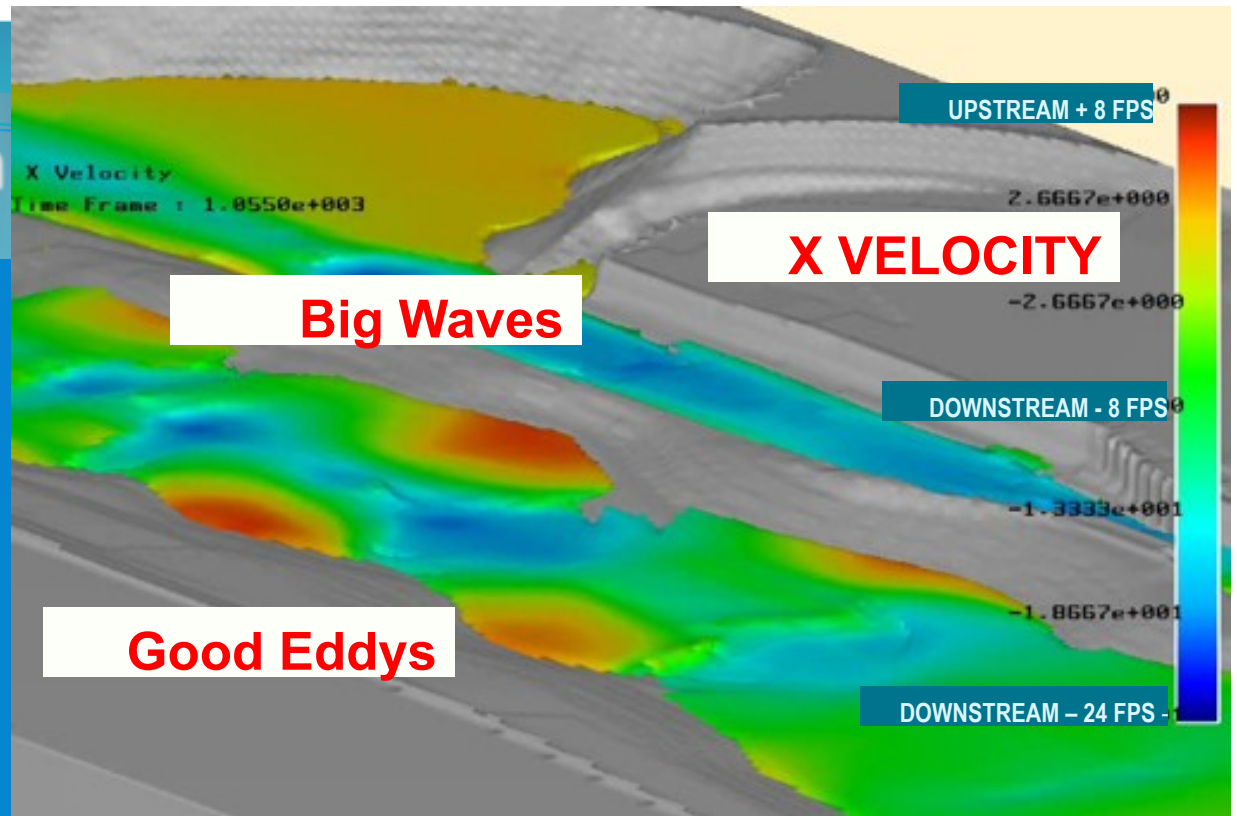


- Physical Models
- Numerical Models

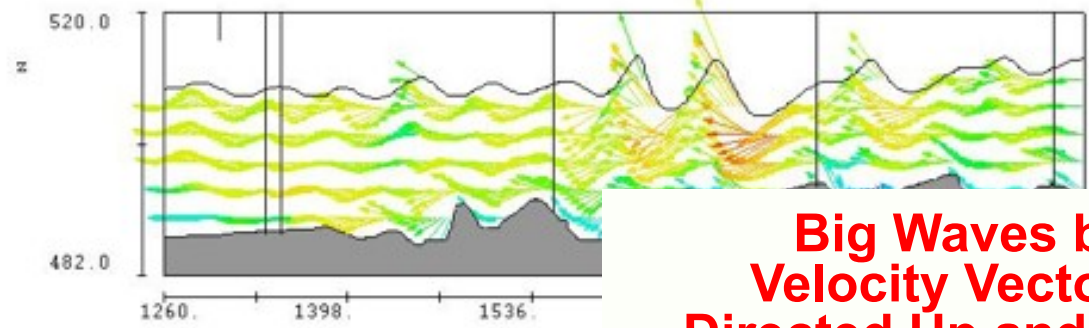


Whitewater Design

- Flow-3d Used To Design Recreational Whitewater Bypass Channel (7 Ft Drop Over 600 Ft)
- Results Documented for Fun Whitewater without Dangerous Hazards



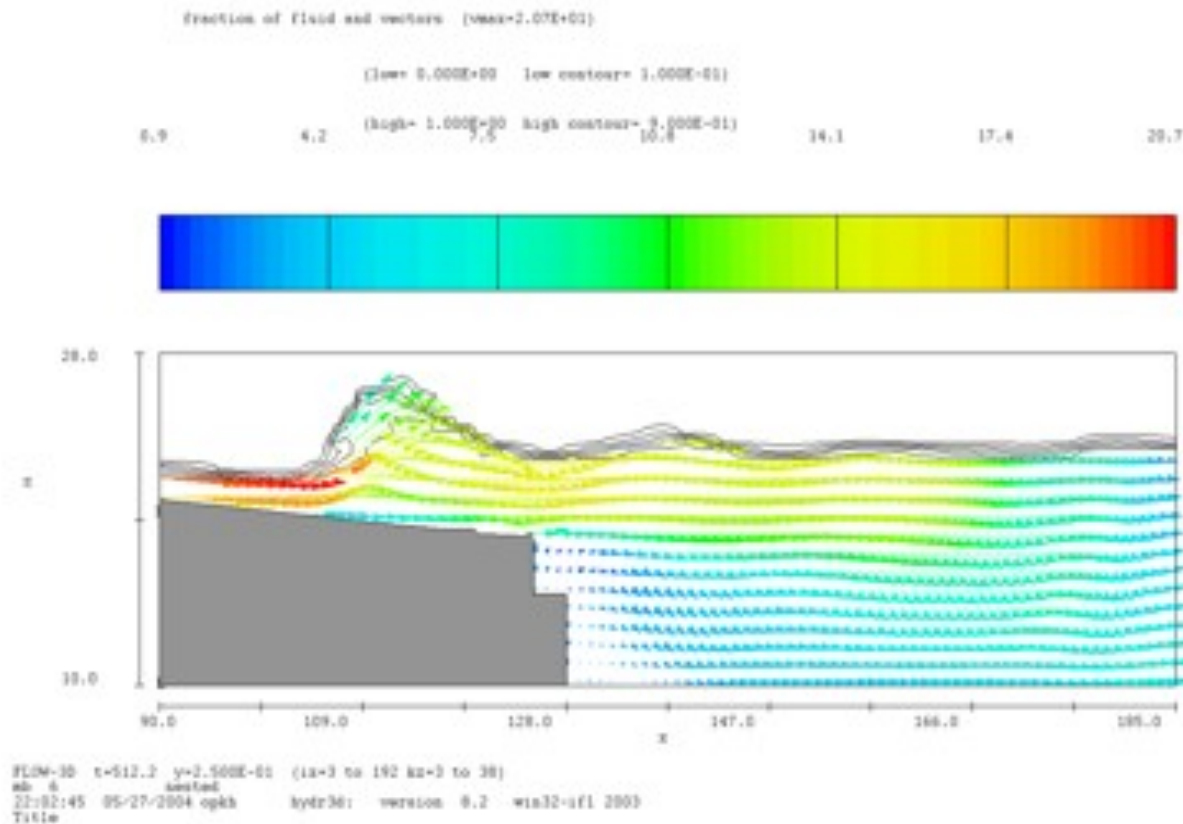
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DESIRED WHITEWATER WAVE

Side Profile in 3d Computer Model



Conclusions

Modification of an existing river/stream structure offers a feasible alternative to full dam removal.

- Function of structure can be maintained
- Provides
 - Public Health & Safety Benefits
 - Environmental Benefits
 - Recreation Benefits
- Advanced 3-D modeling or physical modeling can identify and reduce safety concerns and confirm flow conditions and performance for multiple uses.

Getting There

STAKEHOLDERS

- Irrigation Districts
- Municipal Water Suppliers
- Utility Companies
- Riparian Landowners
- Riverfront Development
- Business/Economic Development

PARTNERS

- Passionate Citizens/River Enthusiasts
- Whitewater, canoe, boating clubs
- Government Agencies
- Non-Profit Organizations
- Tourism/Chambers of Commerce

PERSISTENCE!

- Foster passion for river improvement
- Regular meetings
- Host events and river trips
- Focus on river safety and environmental benefits
- Keep volunteers and local leaders interested

Thanks!



The End

