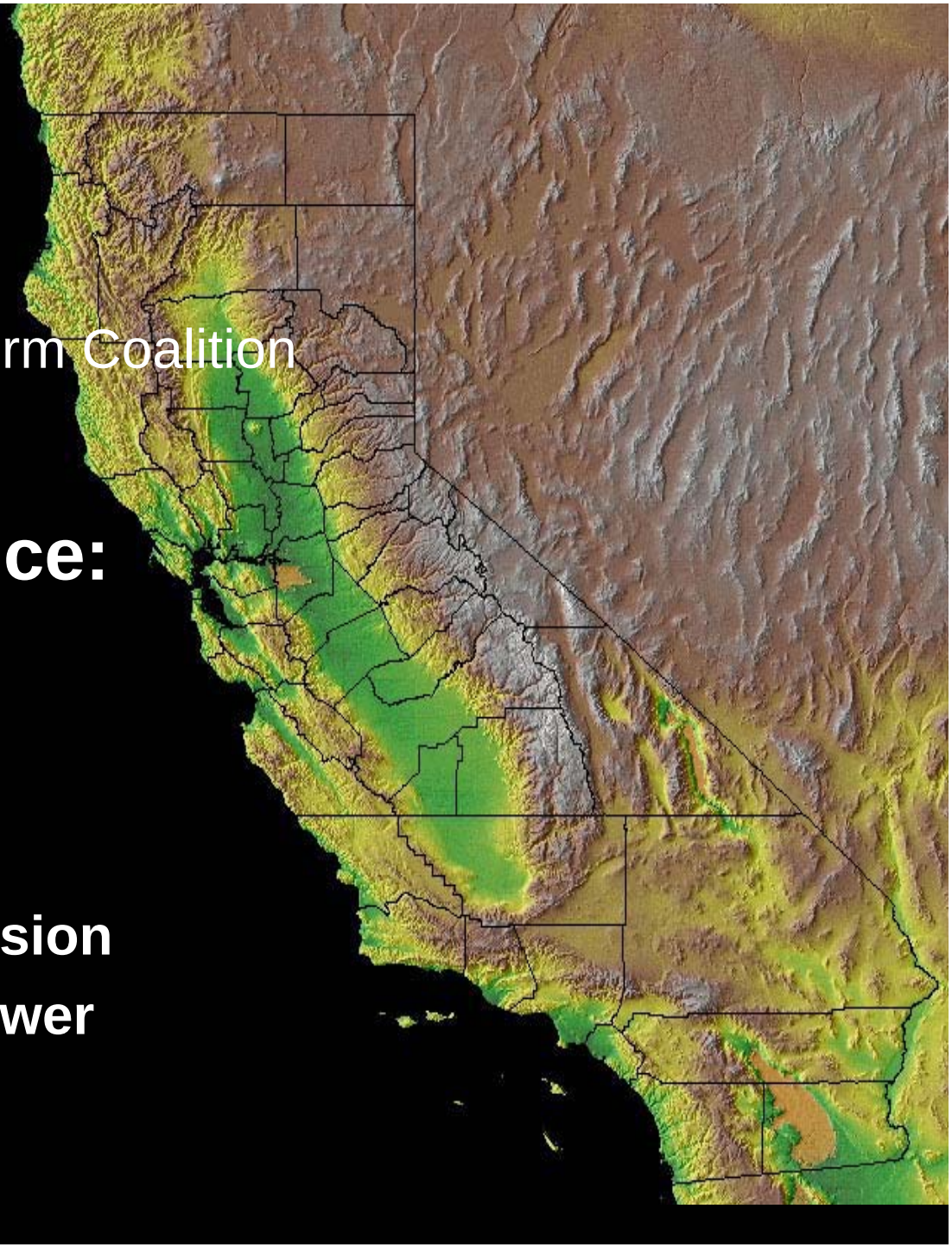
CHRC

California Hydropower Reform Coalition



Restoring the Balance: Hydropower and California's Rivers

California Energy Commission

IEPR Workshop - Hydropower

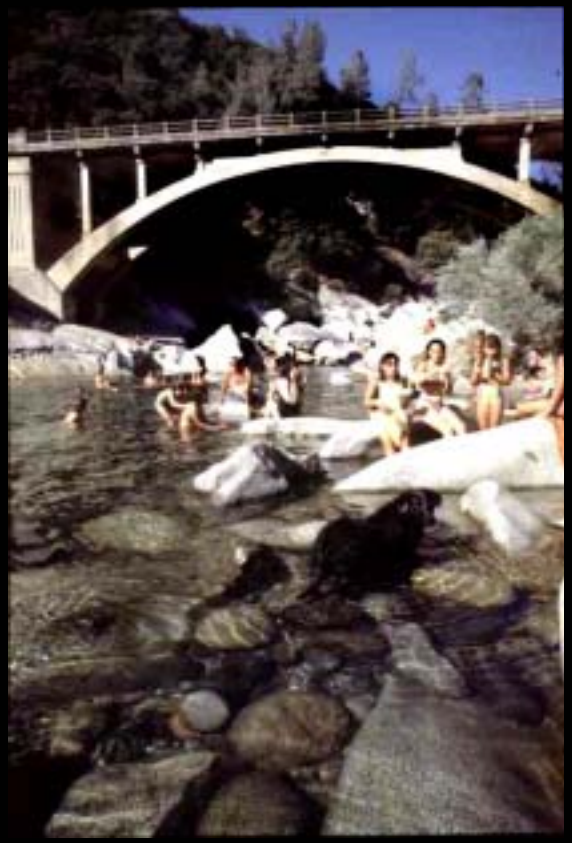
June 5, 2003

Sacramento, California

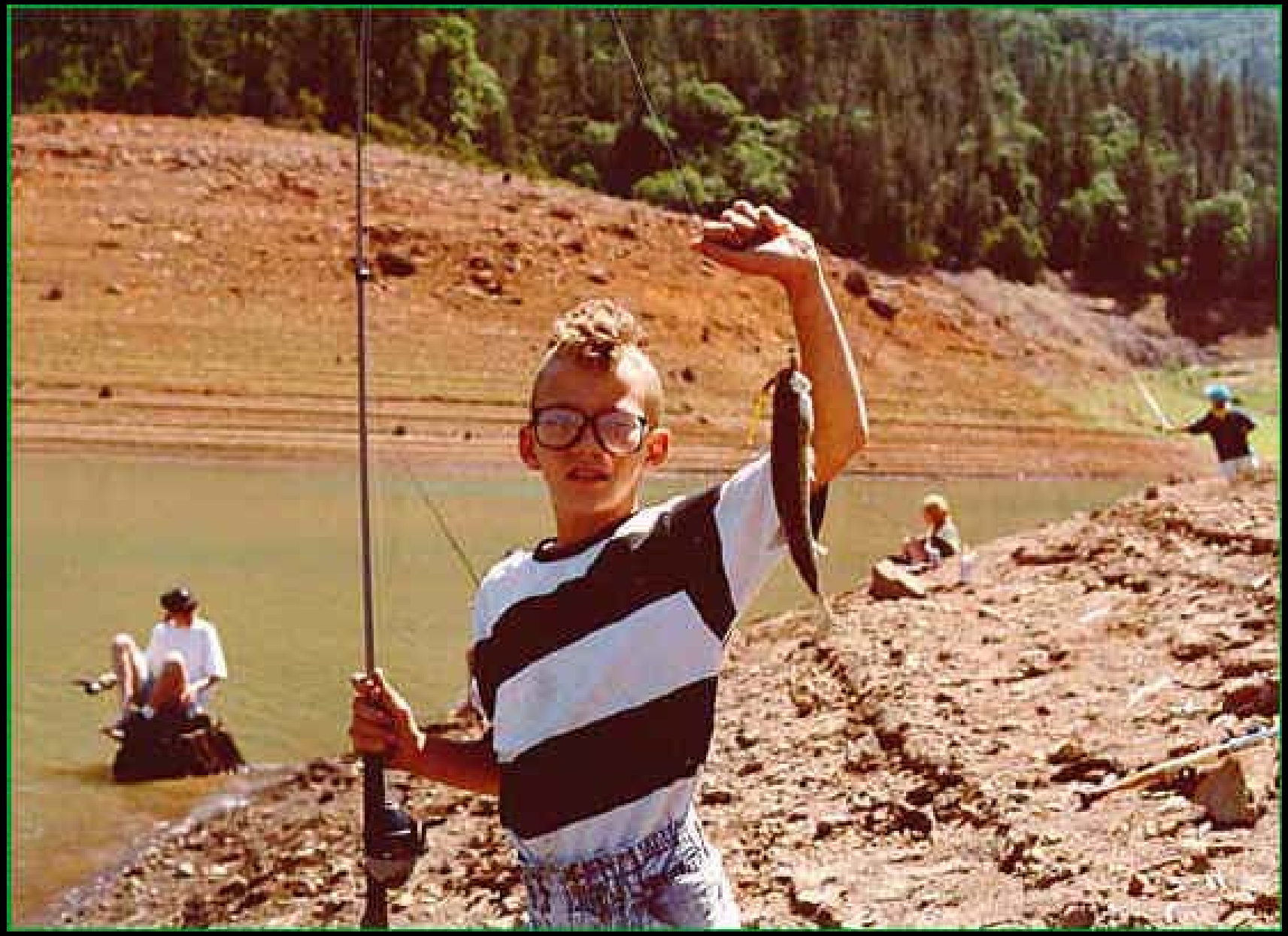
CHRC

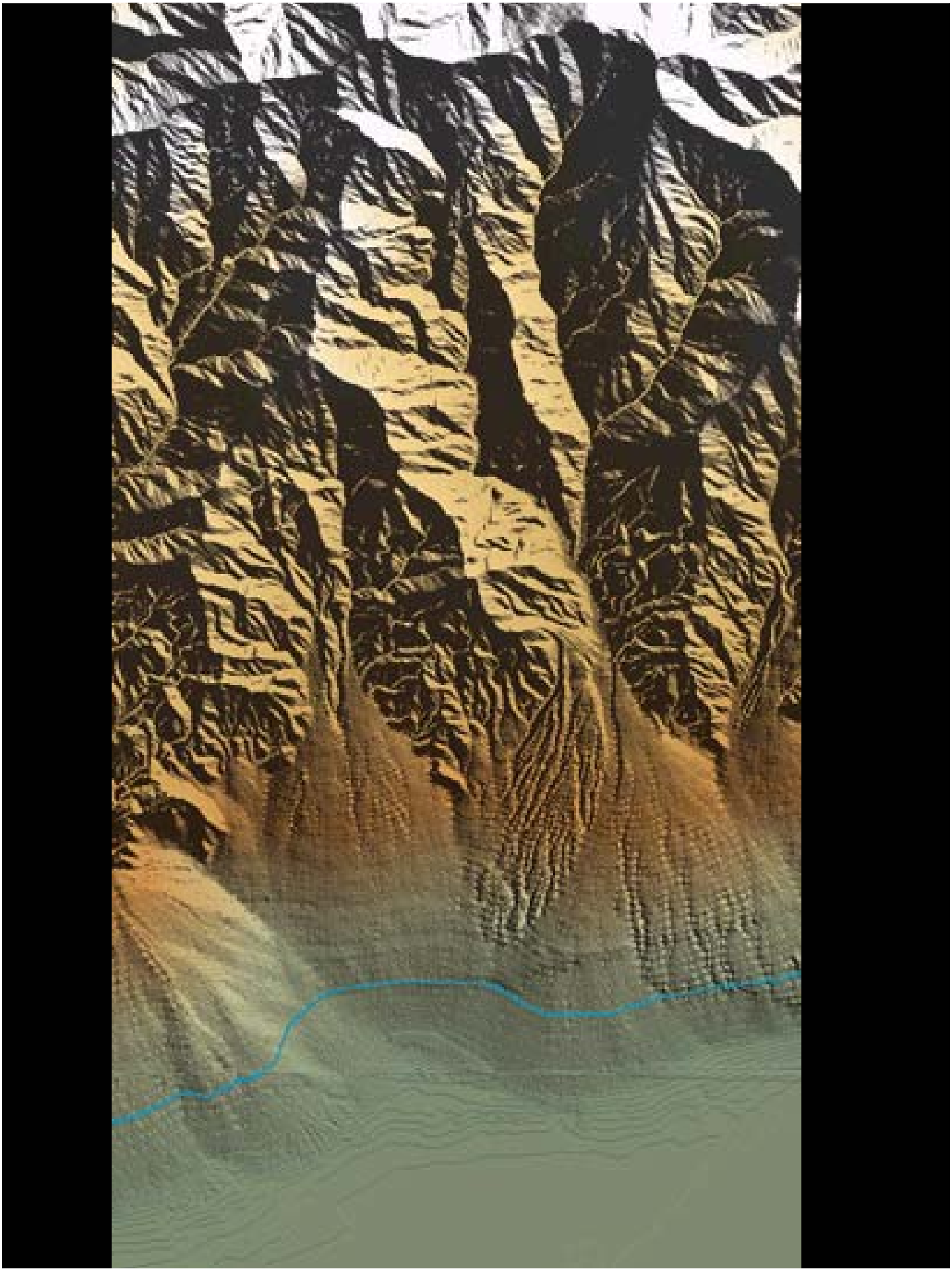
California Hydropower Reform Coalition

American Rivers
American Whitewater
California Outdoors
California Sportfishing Protection Alliance
California Trout
Foothill Conservancy
Friends of the River
Natural Heritage Institute
Trout Unlimited

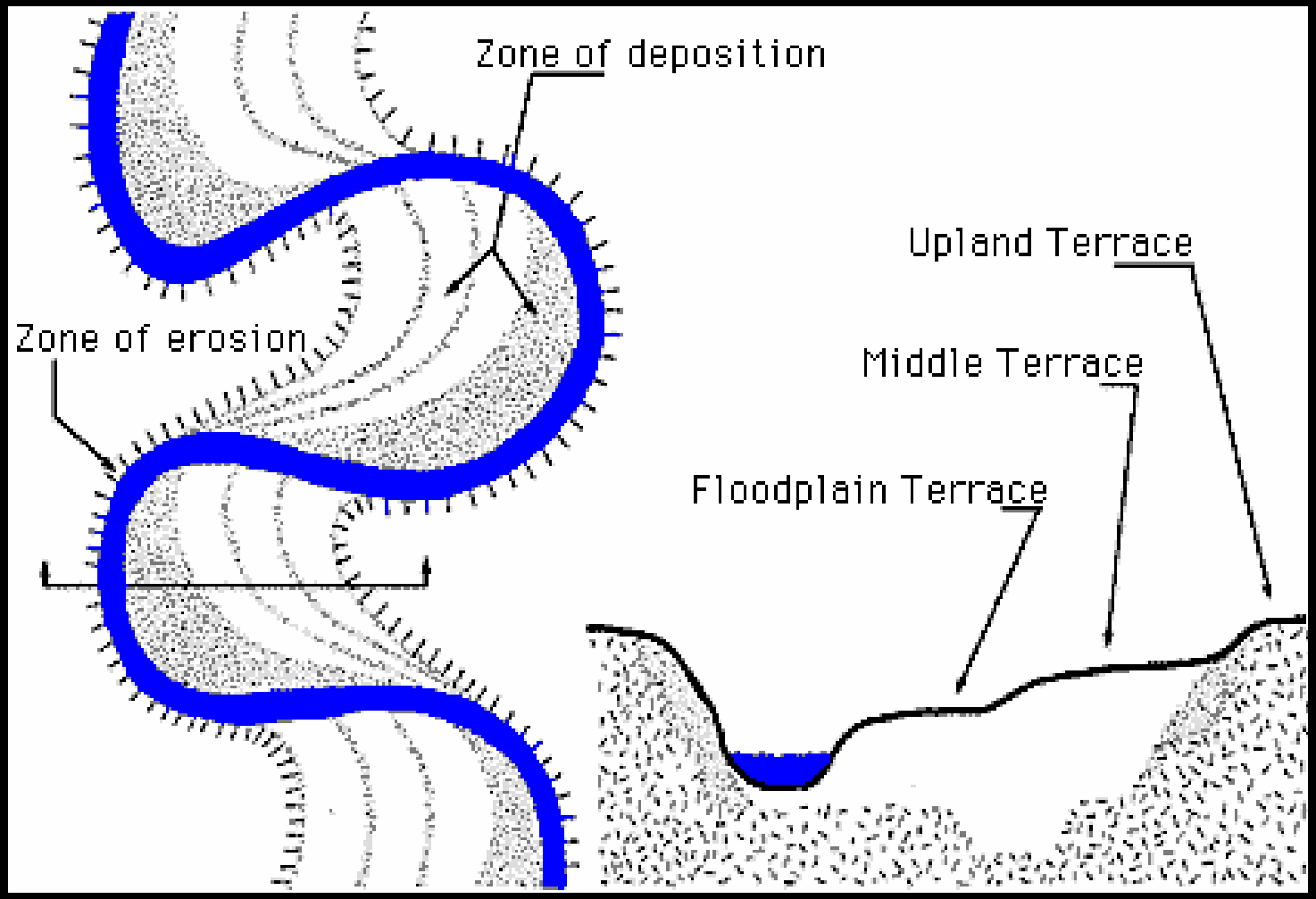


Powell

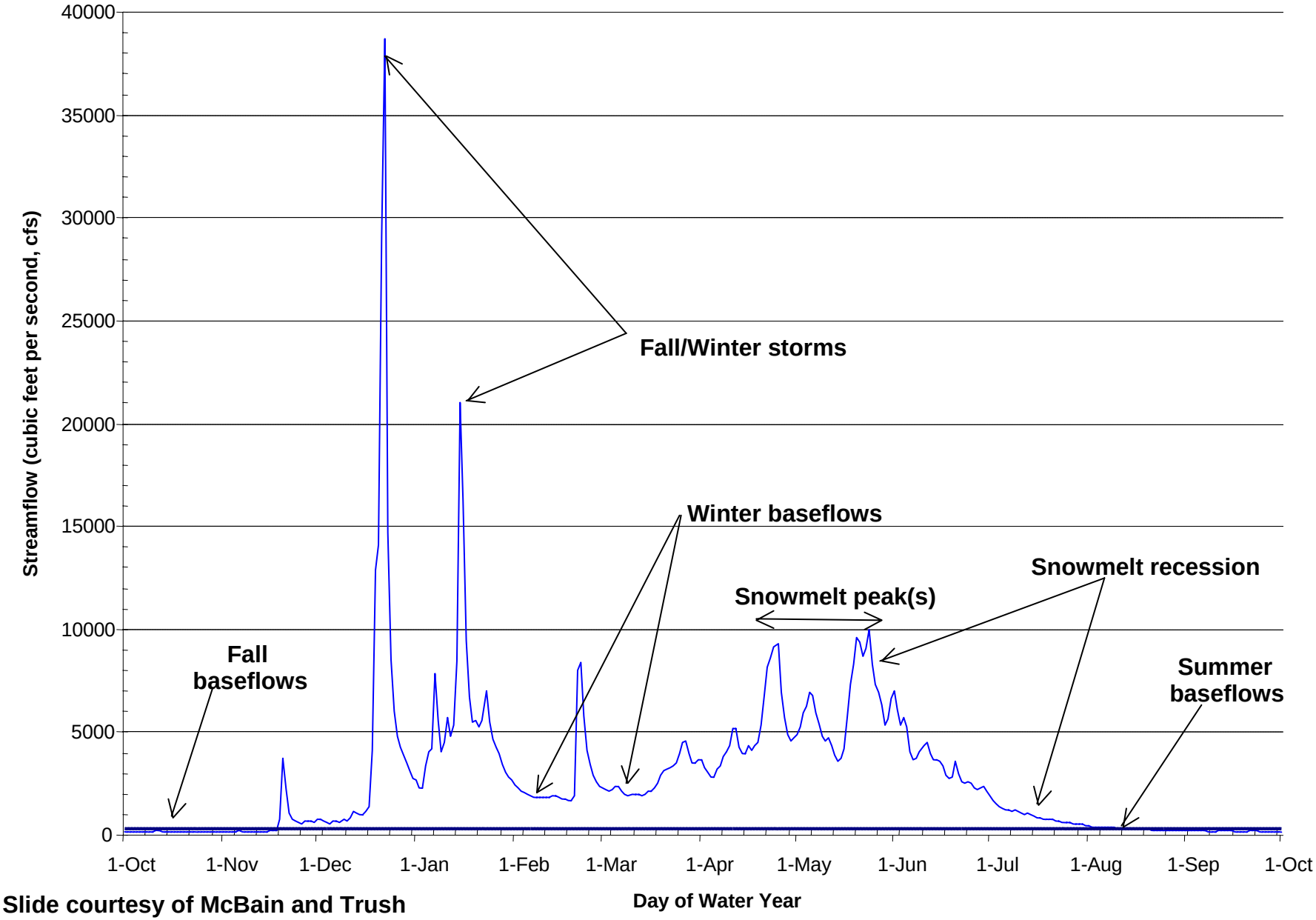




Flow variability creates river habitat

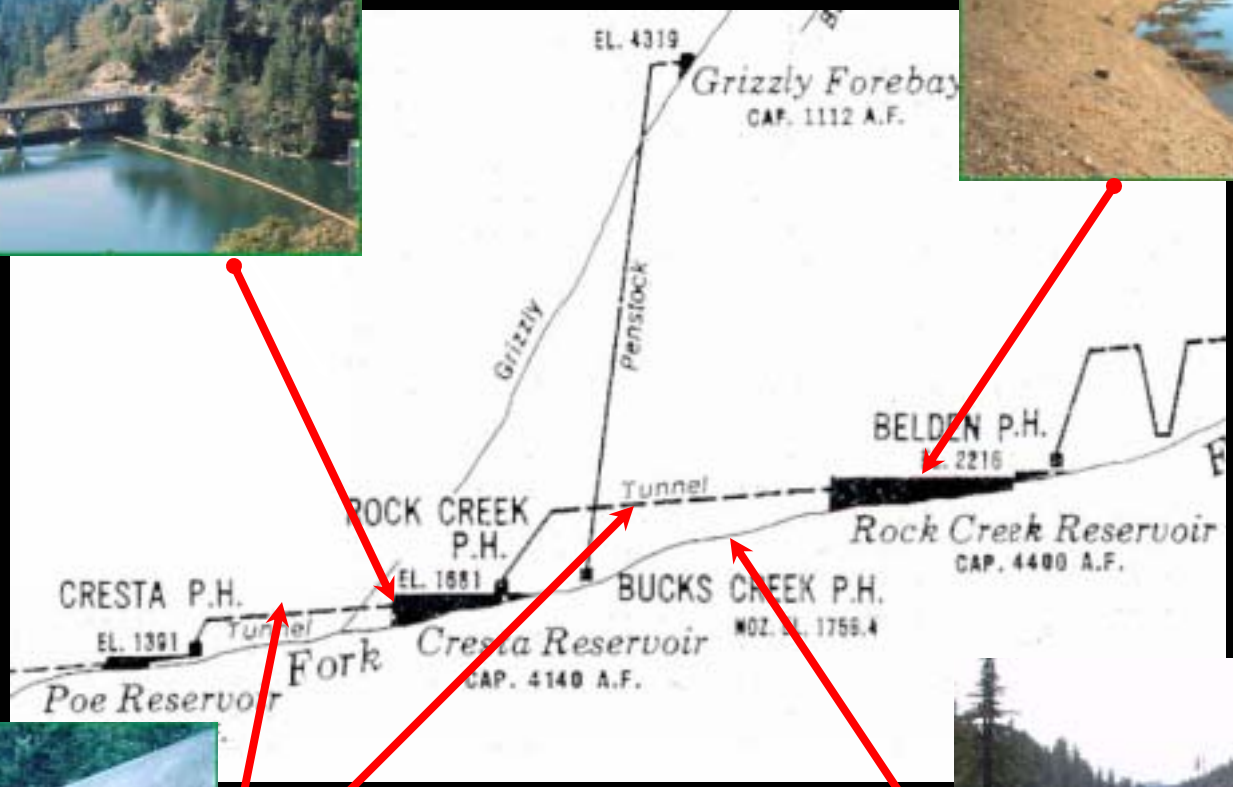


Characteristics of a Natural Hydrograph: Variability

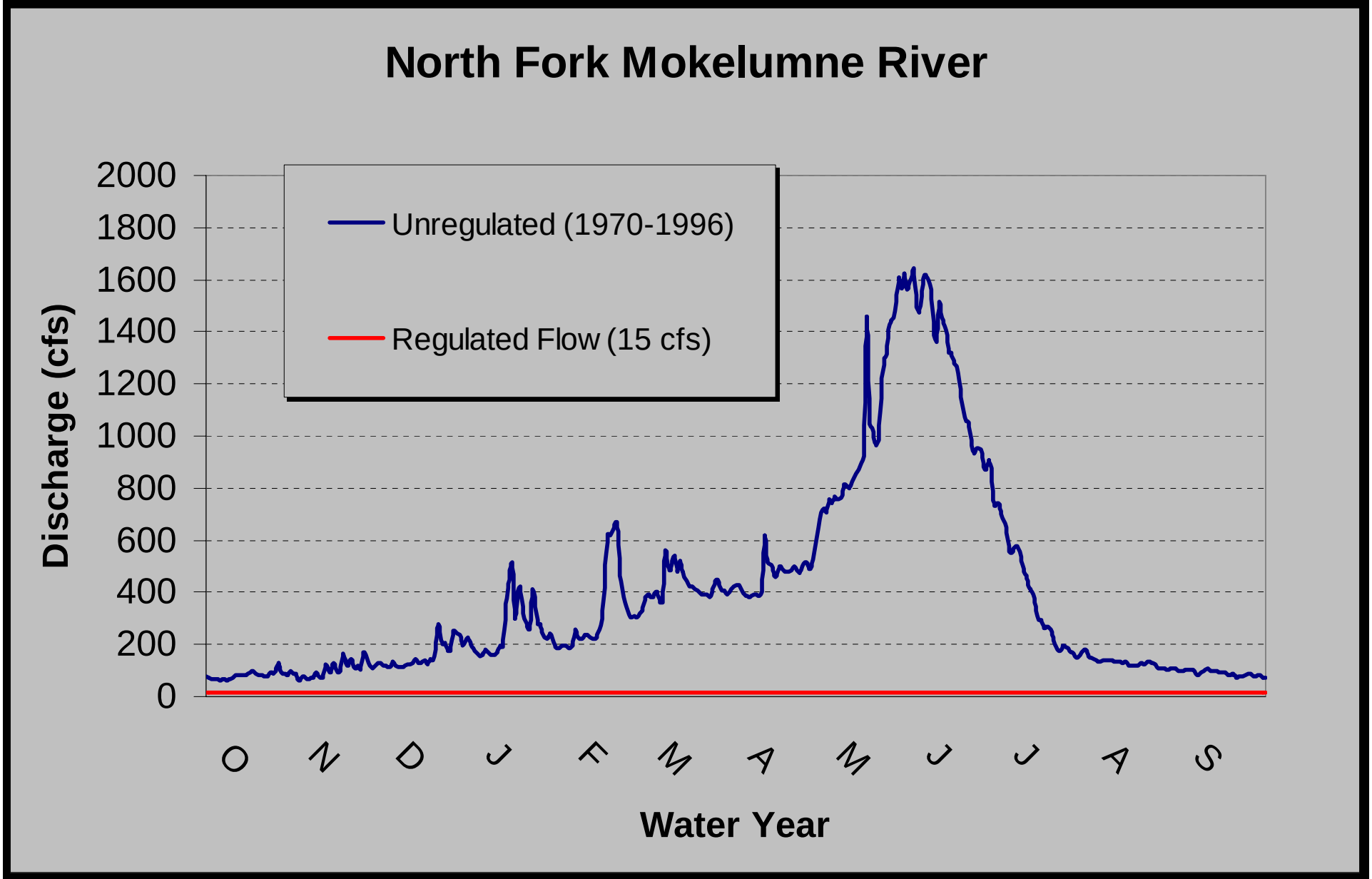


Slide courtesy of McBain and Trush

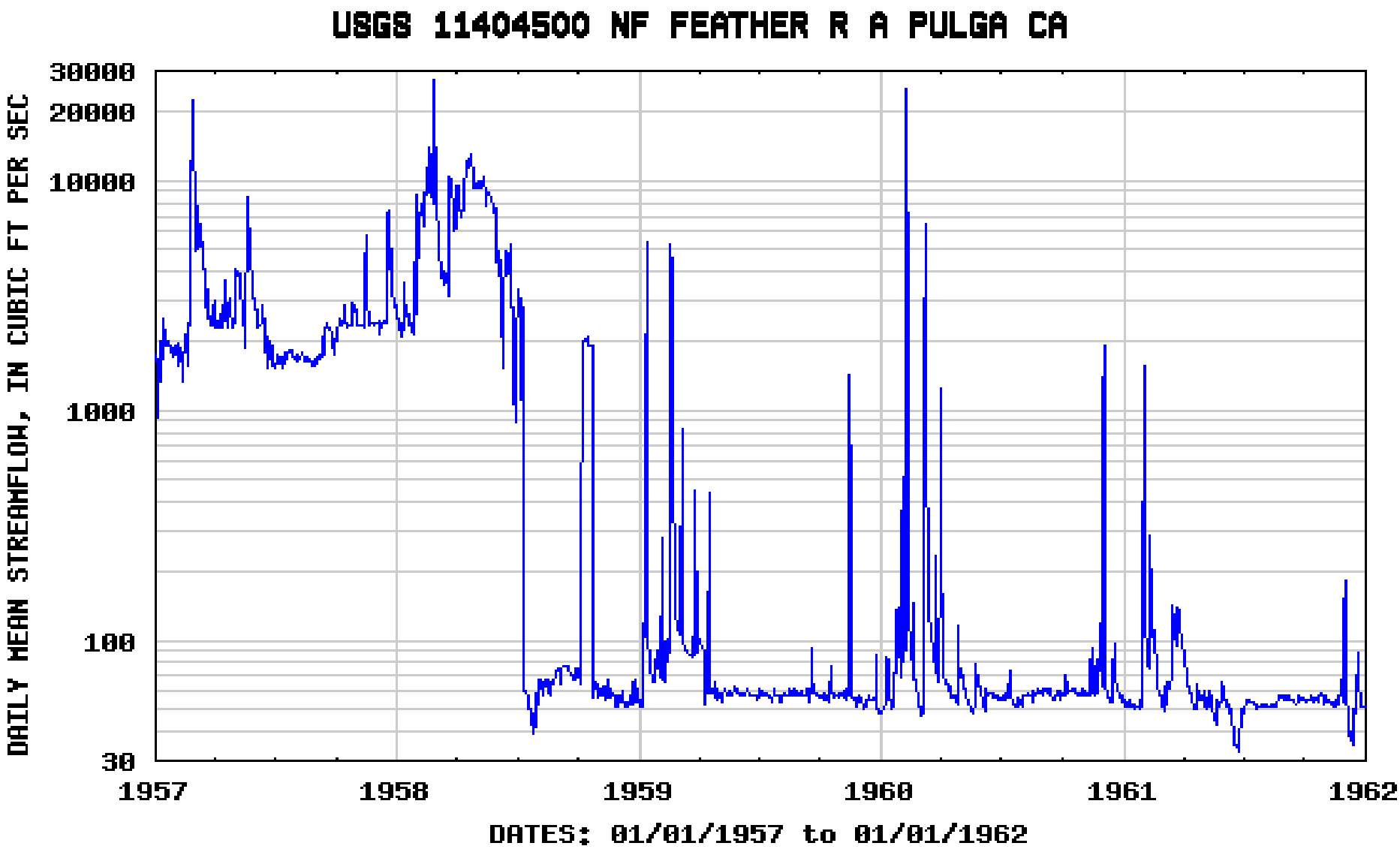
Typical California Hydropower Project

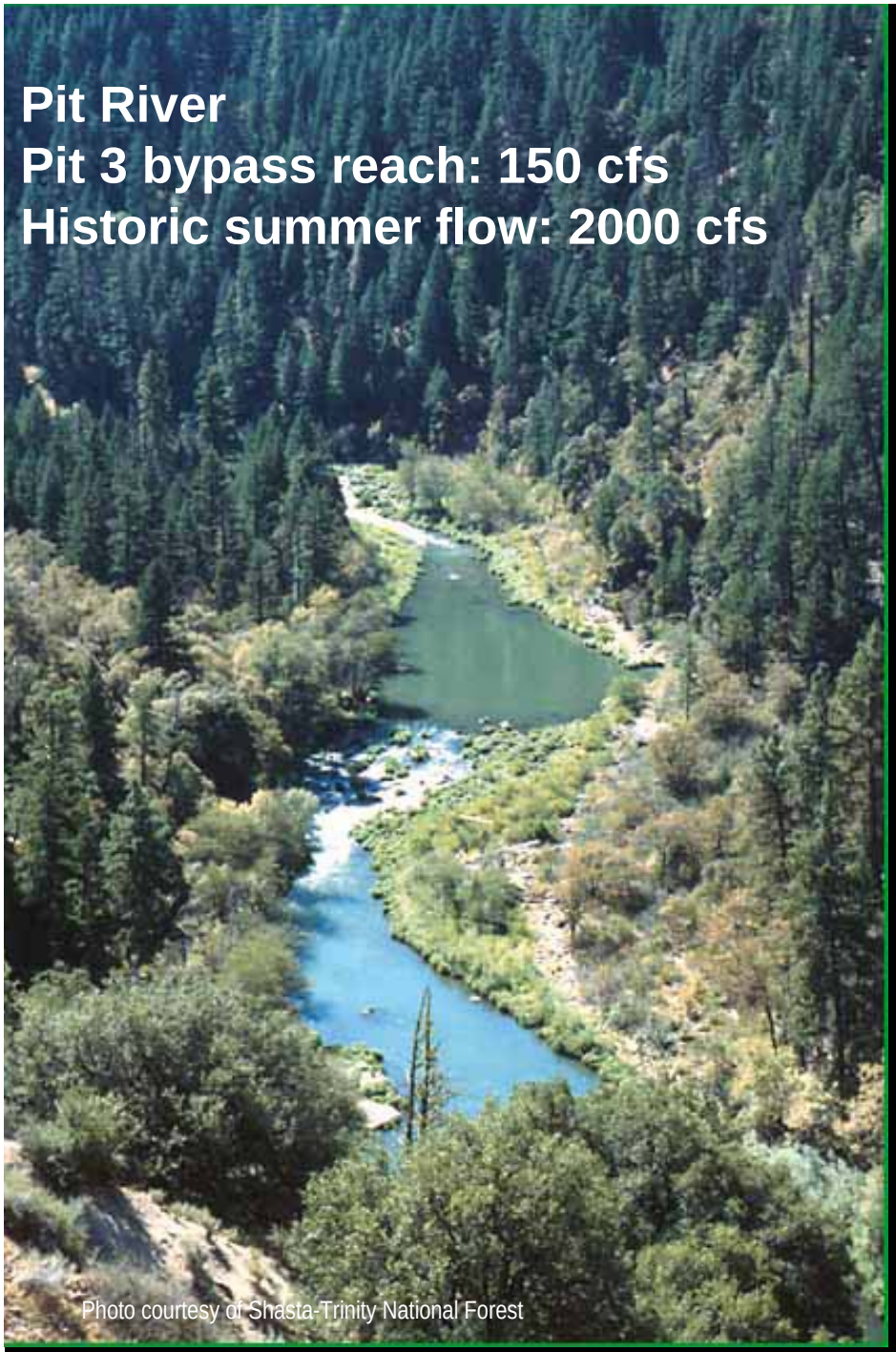


Pictures are representative of mapped project features.


North Fork Mokelumne River
Discharge (cfs)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Unregulated (1970-1996)
Regulated Flow (15 cfs)
O
N
D
J
F
M
A
M
J
J
A
S
Water Year

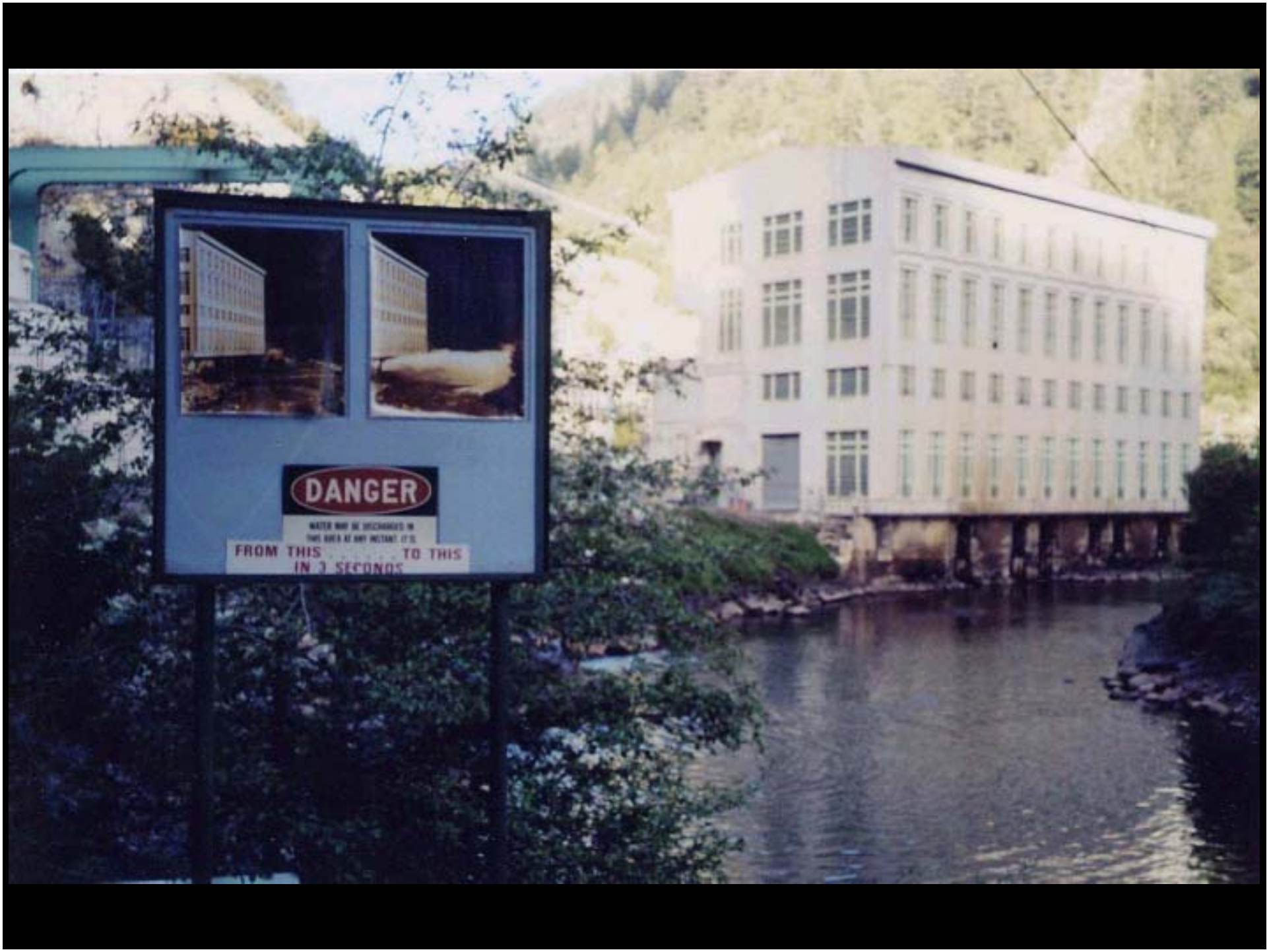
USGS


USGS 11404500 NF FEATHER R A PULGA CA
DAILY MEAN STREAMFLOW, IN CUBIC FT PER SEC
30000
20000
10000
1000
100
30
1957
1958
1959
1960
1961
1962
DATES: 01/01/1957 to 01/01/1962


Pit River
Pit 3 bypass reach: 150 cfs
Historic summer flow: 2000 cfs
Photo courtesy of Shasta-Trinity National Forest

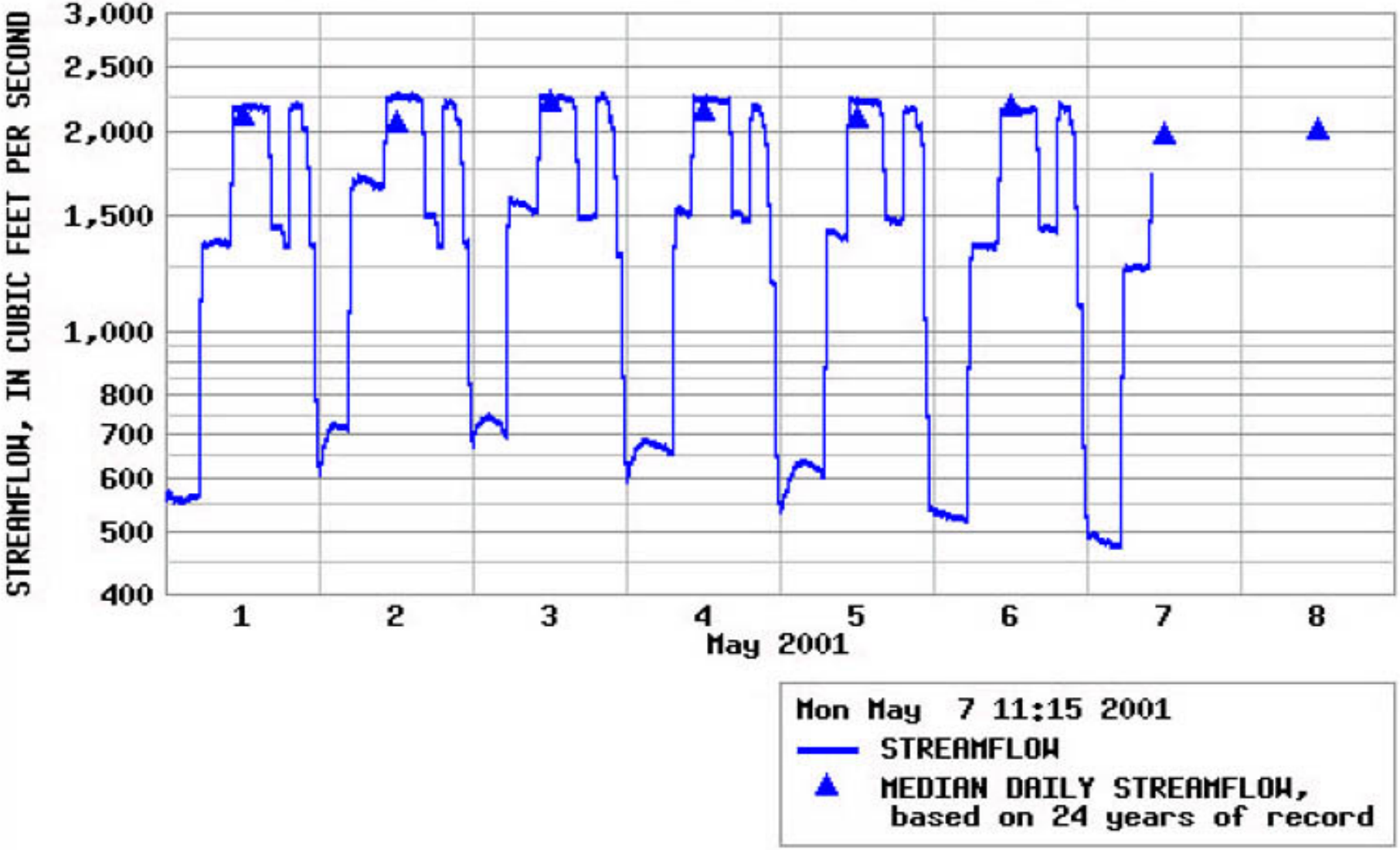
Pit 3 diversion tunnel
Diameter: 19 feet Capacity: 3315 cfs

North Fork Feather River
Cresta bypass reach: 50 cfs
Historic summer flow: 800-1200 cfs


DANGER
FROM THIS ..... TO THIS
IN 3 SECONDS

USGS

11355010 Pit R Bl Pit 1 Powerhouse



Provisional Data Subject To Revision

Map courtesy of CPUC

CALIFORNIA STATEWIDE HYDROELECTRIC POWER PLANTS

CALIFORNIA ELECTRICITY PRODUCTION

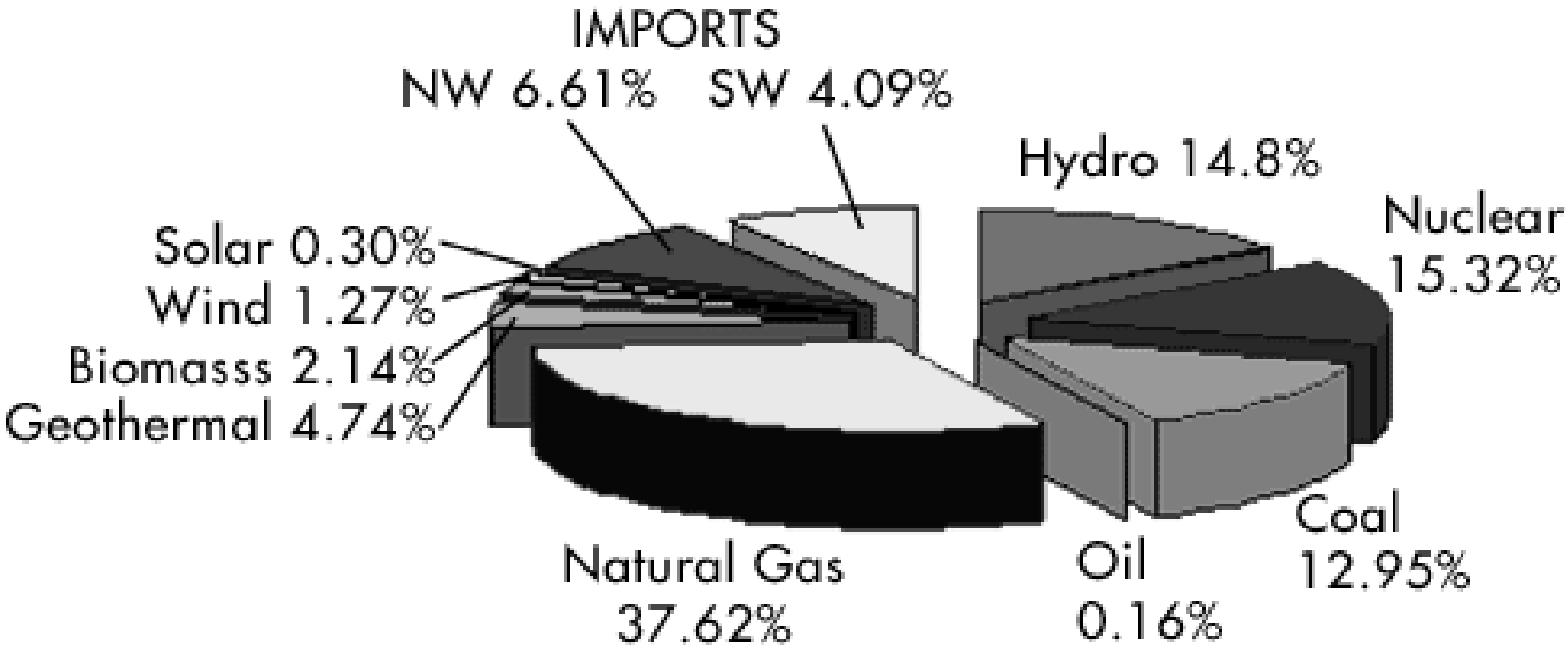
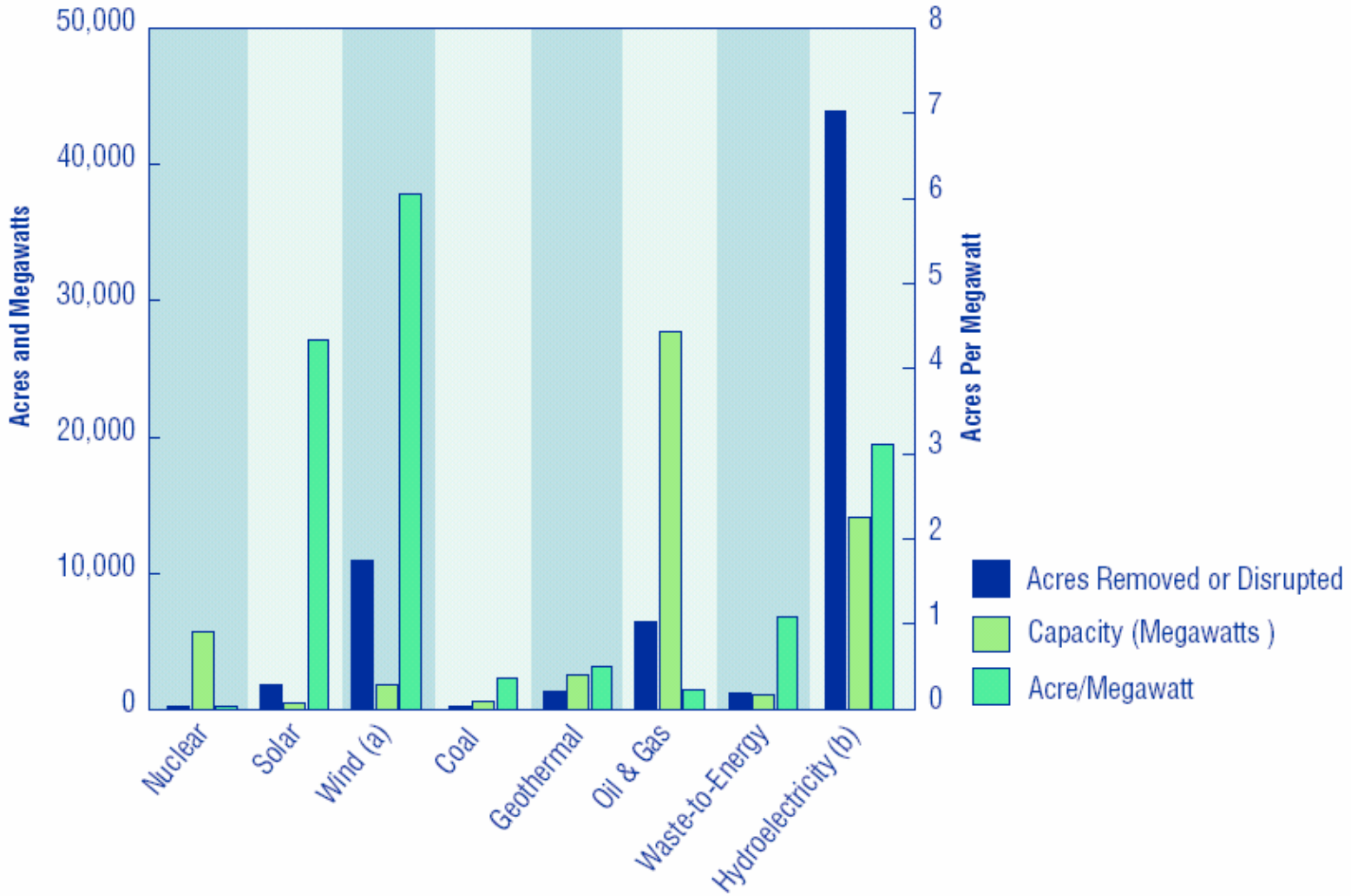
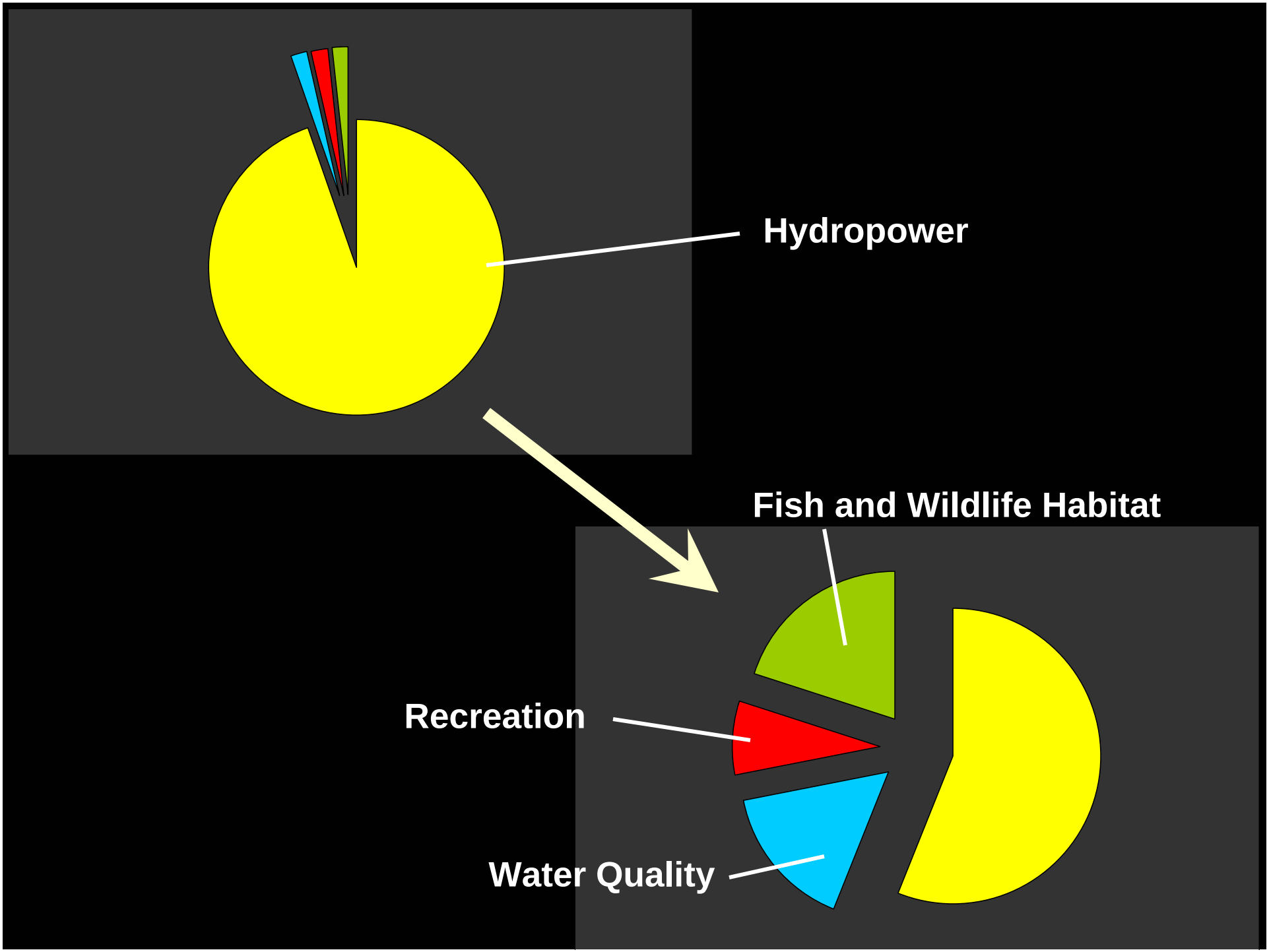


Figure III-6 Acres of Habitat Removed or Disrupted



(a) Wind farms disrupt, but do not eliminate, most wildlife habitat values. Wind turbines harm birds in areas like Altamont Pass.

(b) The 43,862 acres shown is the land area flooded by PG&E reservoirs only. It is a representative figure used to illustrate land and aquatic habitats eliminated by hydroelectric facilities. The total number is substantially higher. The MW capacity figure is for all California hydro production. The addition of all hydroelectric facilities acreage would increase the number of acres needed per megawatt. The efficiency number for PG&E's hydroelectric system is 11.2 acres/MW.


Hydropower
Fish and Wildlife Habitat
Recreation
Water Quality

FERC Relicensing Process

Five years, every 30-50

Comprehensive baseline and mitigation studies

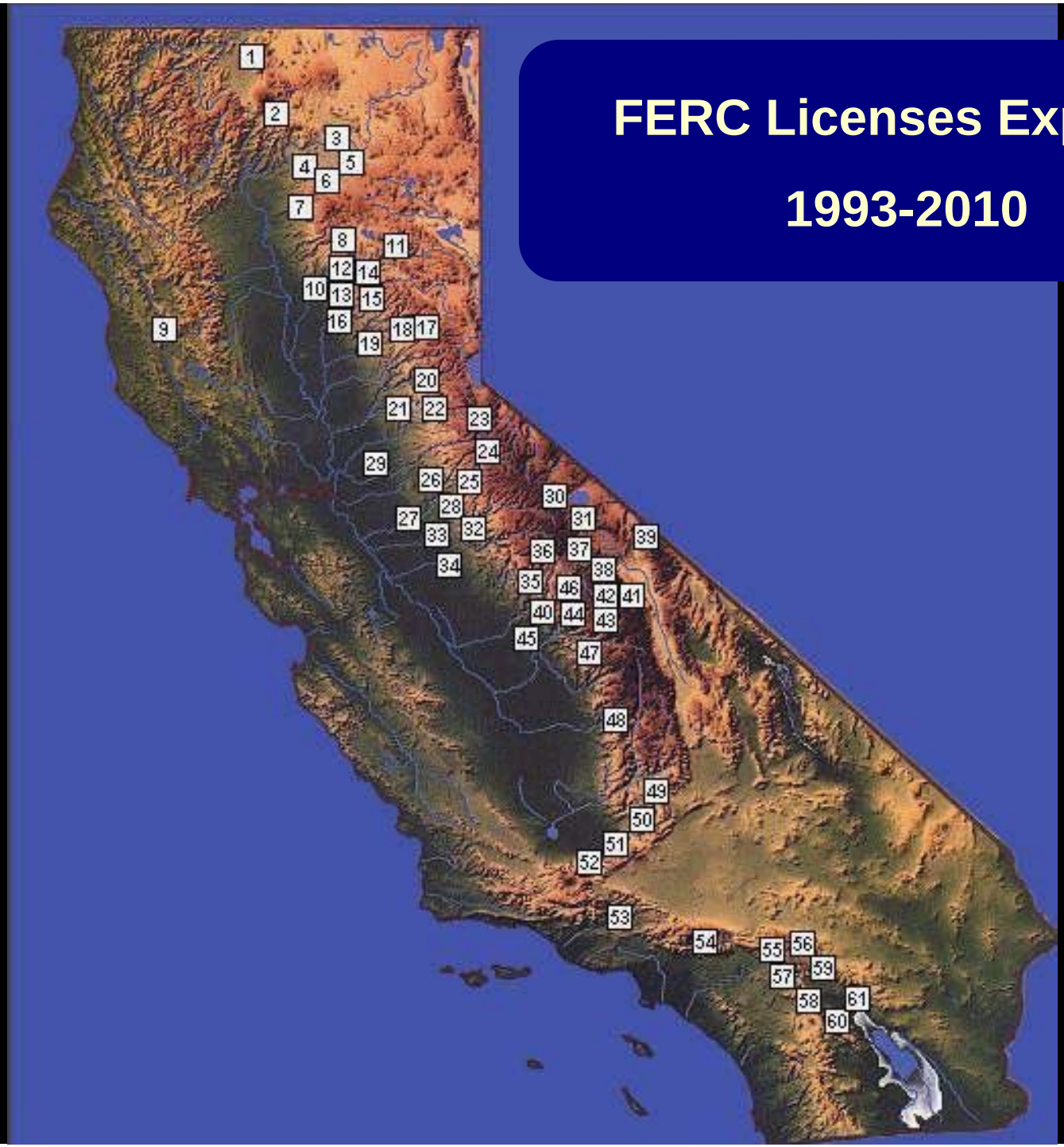
“Equal consideration”

Water quality, public lands, fish passage

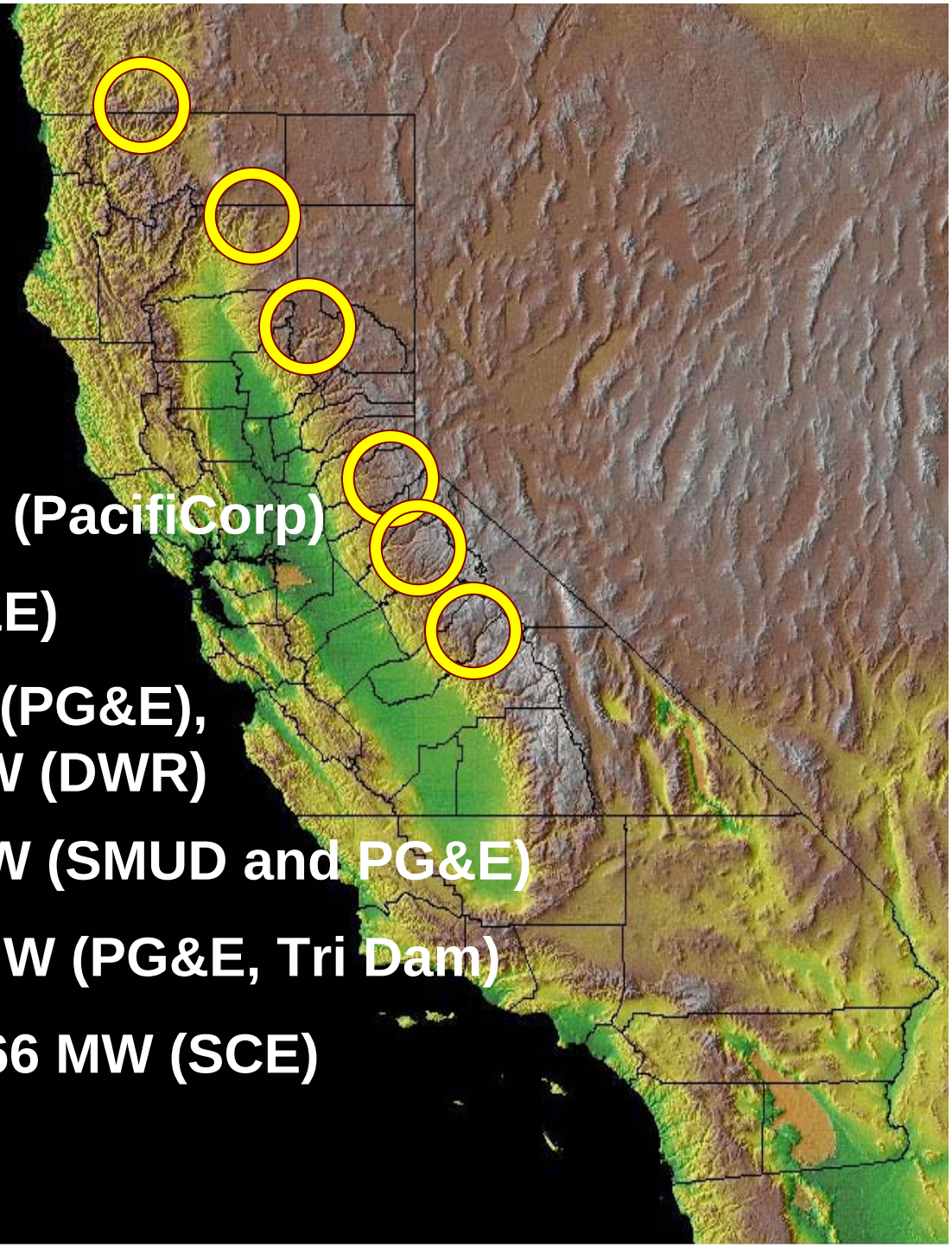
Possibility of collaboration and settlement

FERC Licenses Expiring

1993-2010



Major Ongoing Relicensings in California



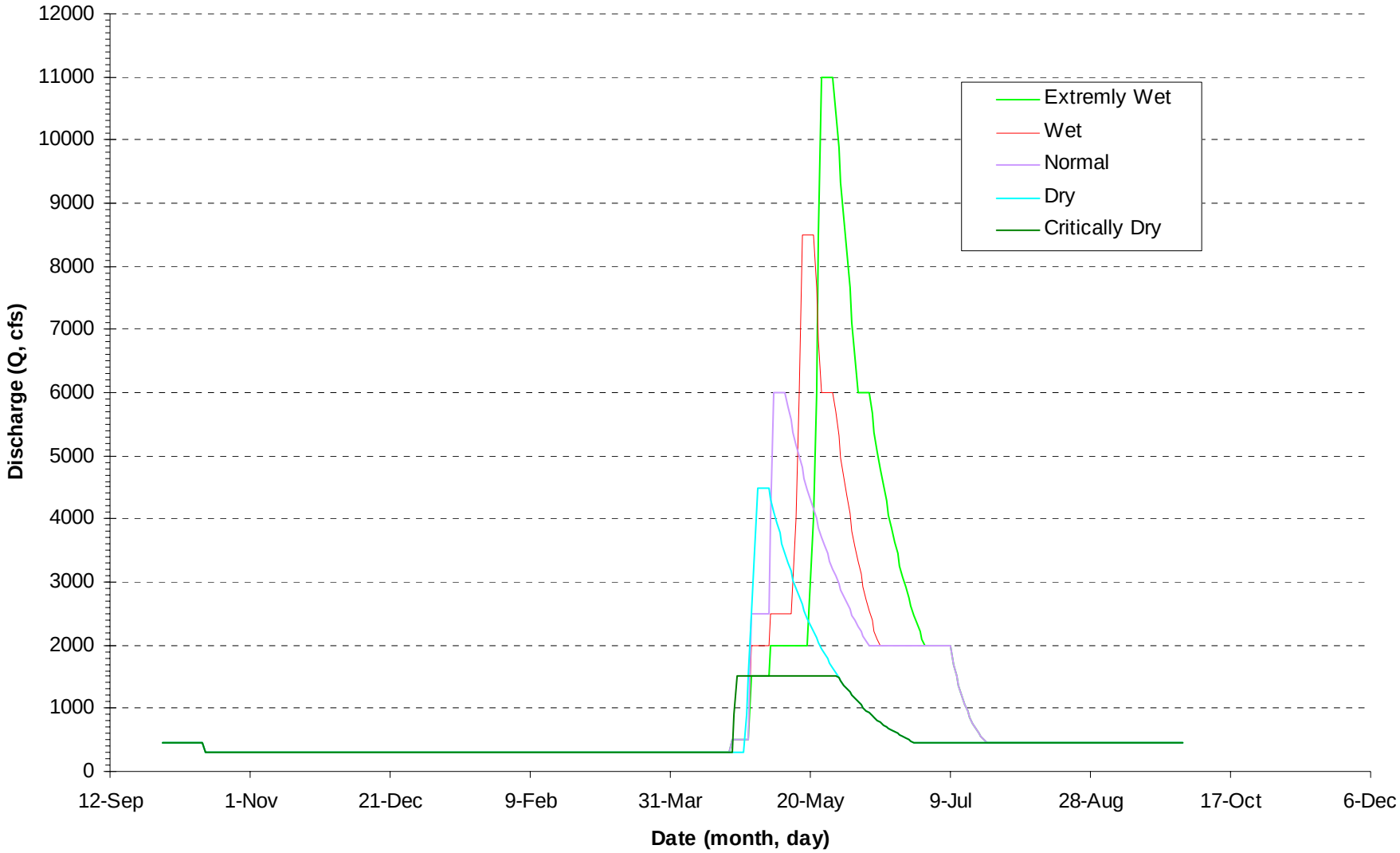
- Klamath River - 160 MW (PacifiCorp)
- Pit River - 317 MW (PG&E)
- Feather River - 664 MW (PG&E),
  2,166 MW (DWR)
- American River - 729 MW (SMUD and PG&E)
- Stanislaus River - 257 MW (PG&E, Tri Dam)
- San Joaquin River - 1,166 MW (SCE)

Relicensing outcomes

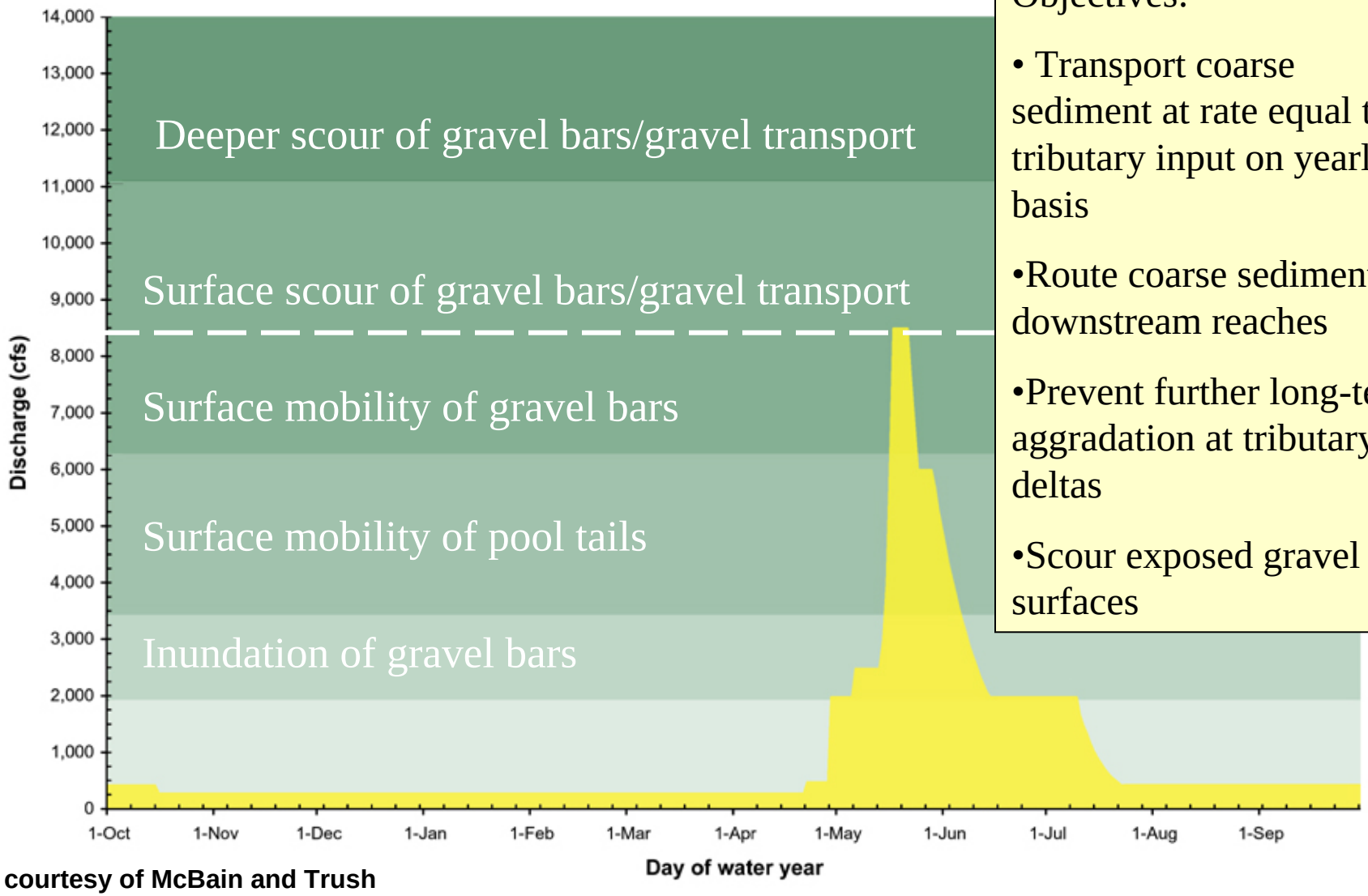
- CHRC goals include:
  - restored hydrograph
  - fish passage
  - temperature and water quality
  - watershed restoration
  - compatible recreation
- Specific to each proceeding, depending on resources, economics, technical feasibility

Slide courtesy of McBain and Trush

Develop Flow Releases for Individual Water Years



“Normative Hydrograph”: Geomorphic Objectives



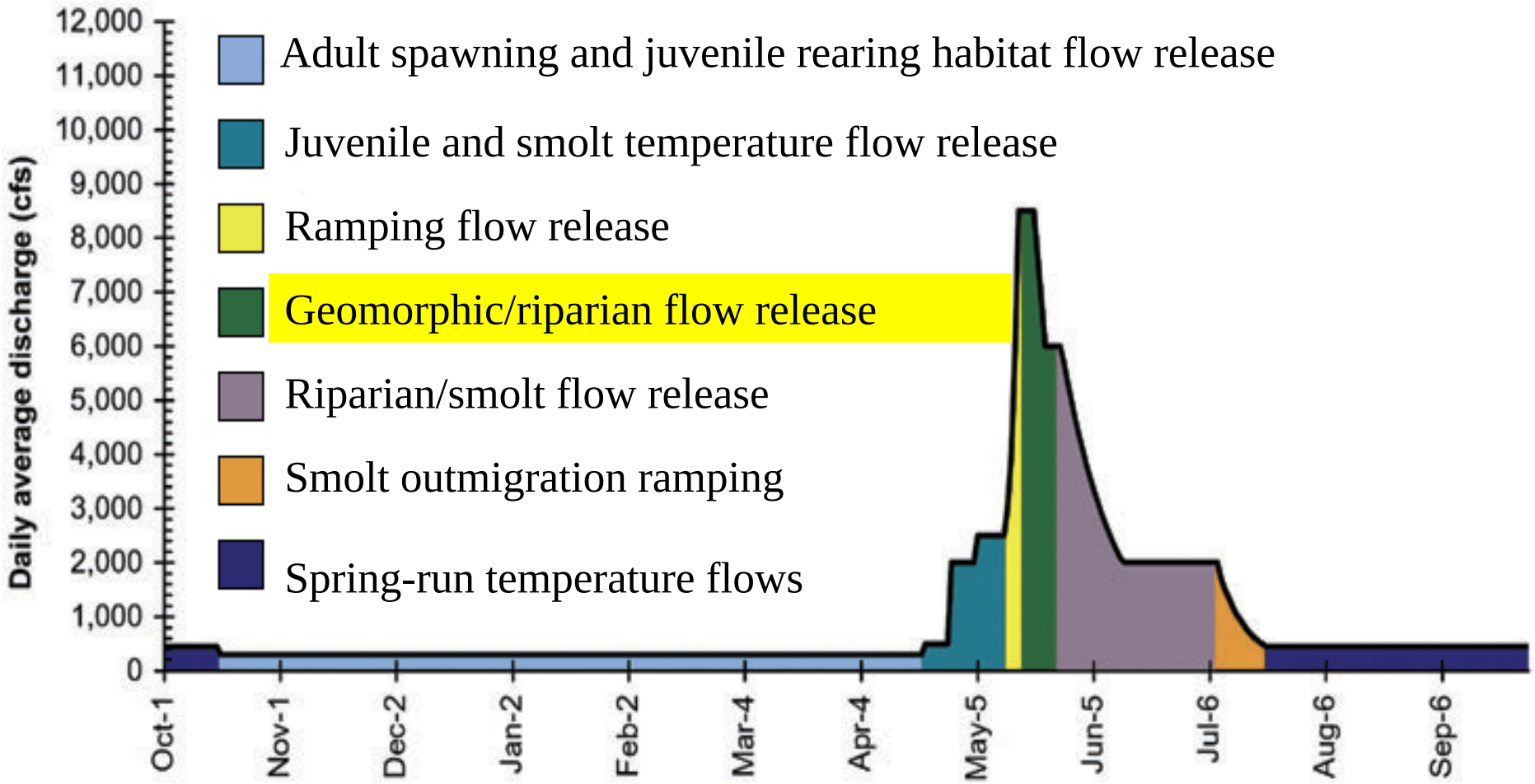
Objectives:

- Transport coarse sediment at rate equal to tributary input on yearly basis
- Route coarse sediment to downstream reaches
- Prevent further long-term aggradation at tributary deltas
- Scour exposed gravel bar surfaces

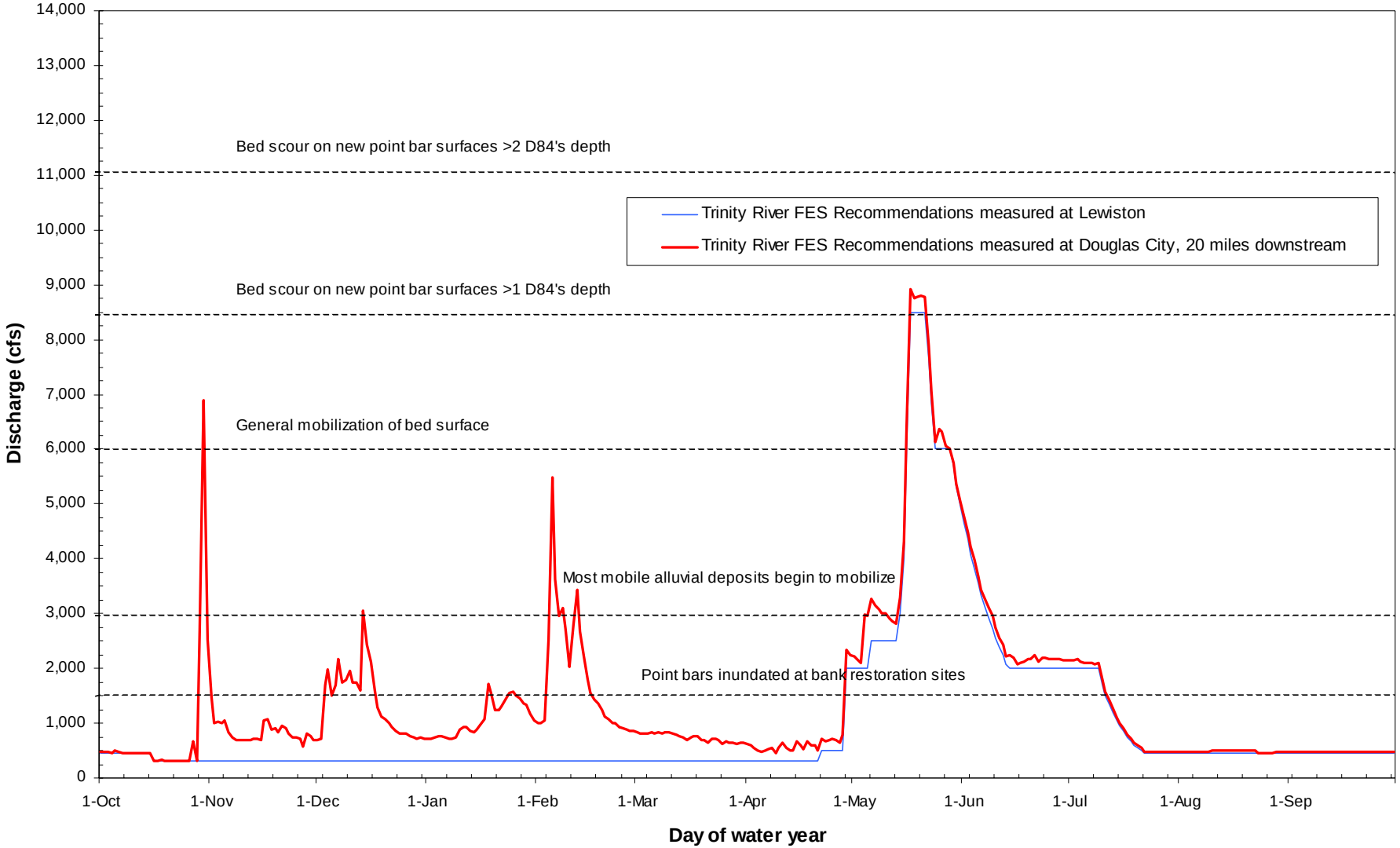
Slide courtesy of McBain and Trush

Slide courtesy of McBain and Trush

“Normative Hydrograph”: Fishery Objectives



Reconstructed Hydrograph Combining Dam Releases with Tributary Flows



Slide courtesy of McBain and Trush

FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON, D.C. 20426

NEWS RELEASE

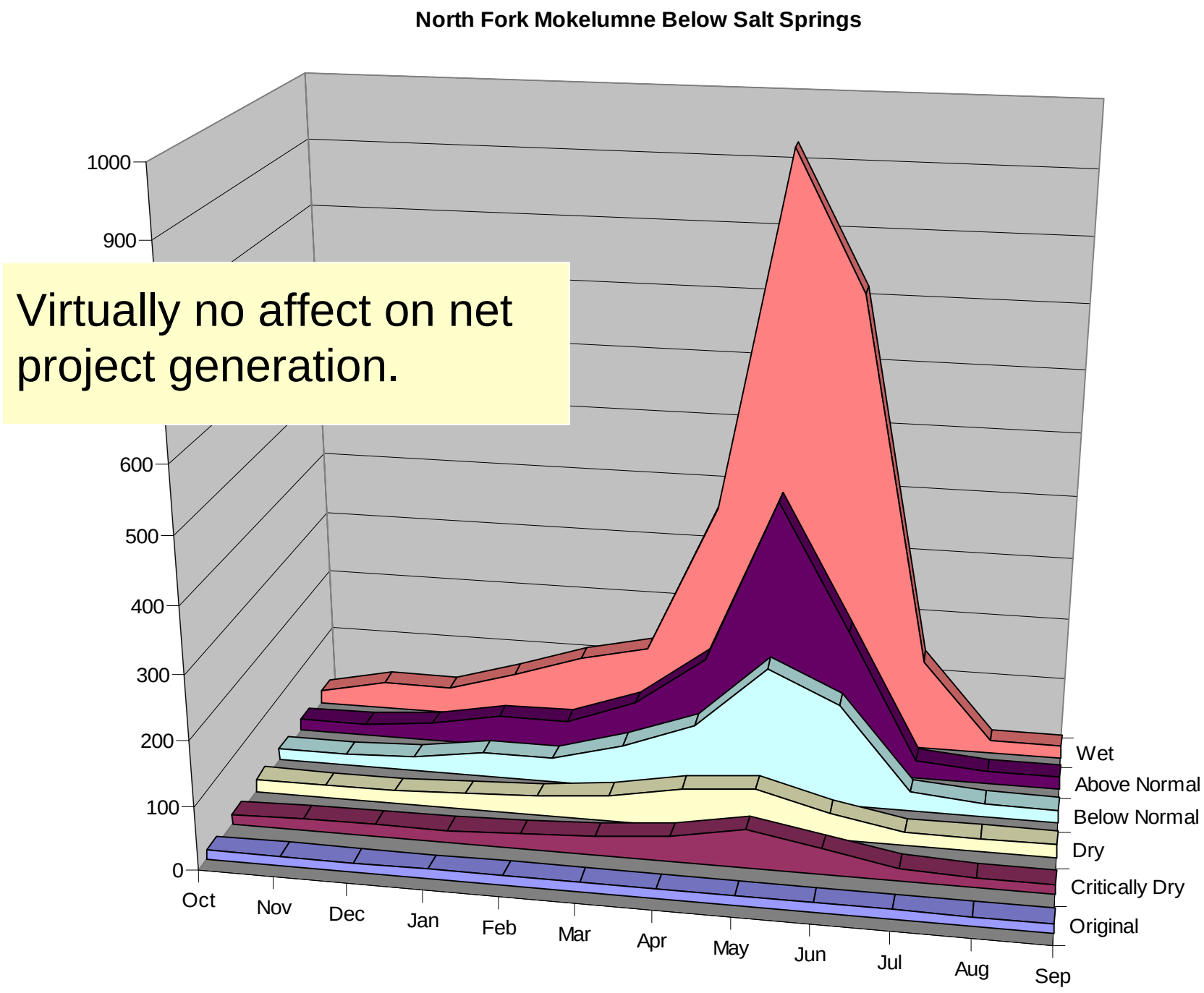
NEWS MEDIA CONTACT:

FOR IMMEDIATE RELEASE

15 year average net reduction in energy output due to relicensing: 1.6%

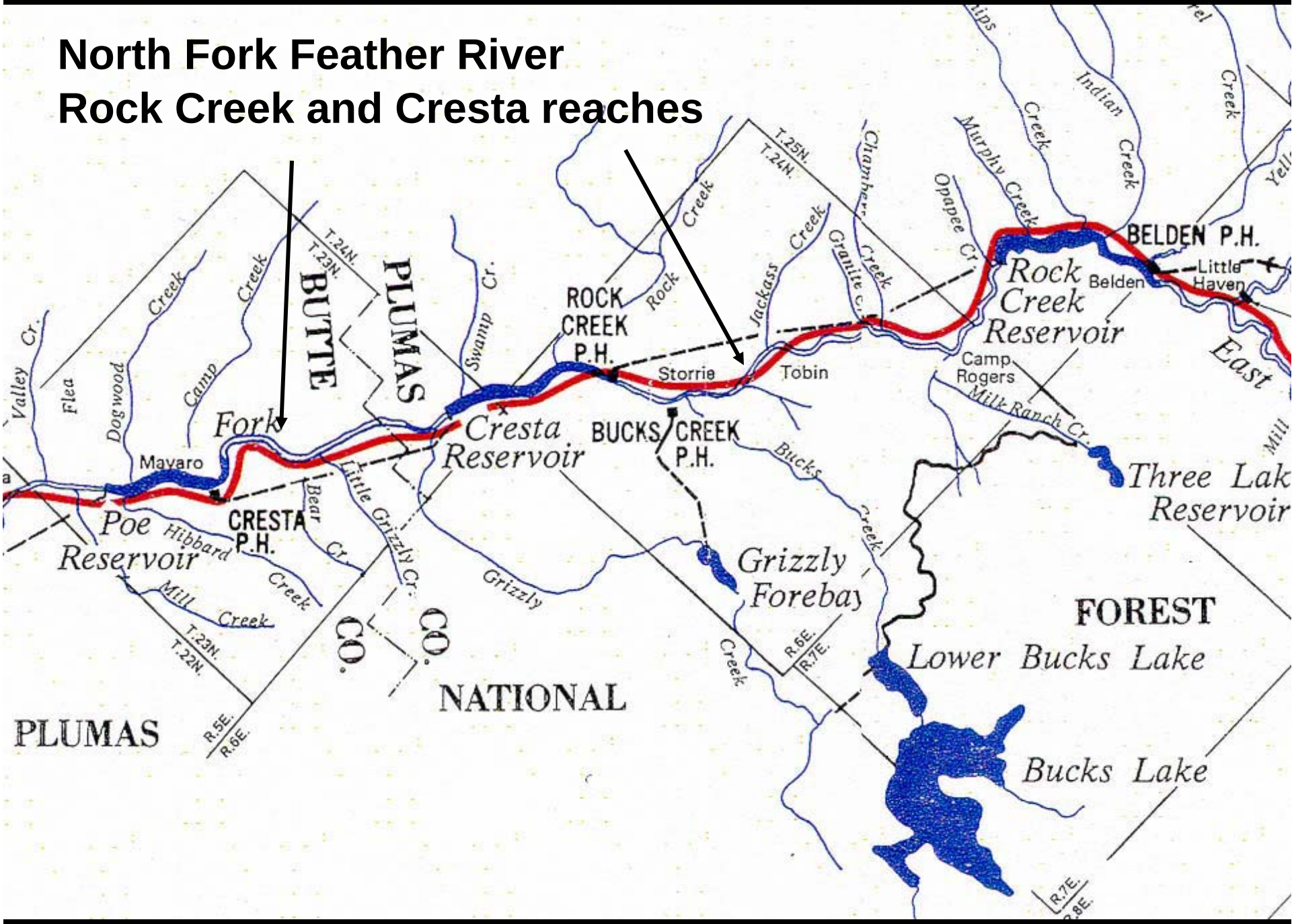
Source: FERC 603 Report to Congress, 2001

Map courtesy of CPUC

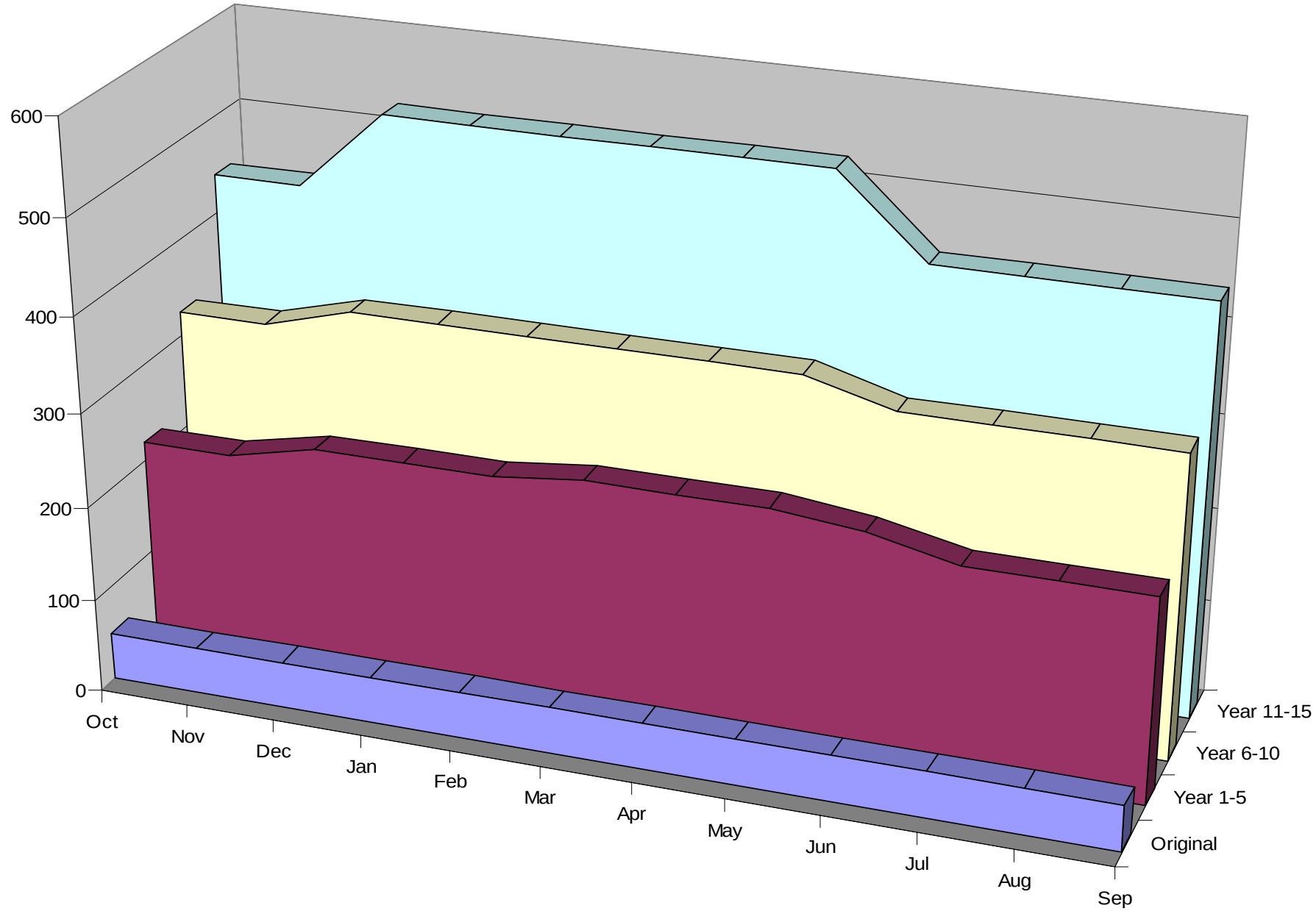


Virtually no affect on net project generation.

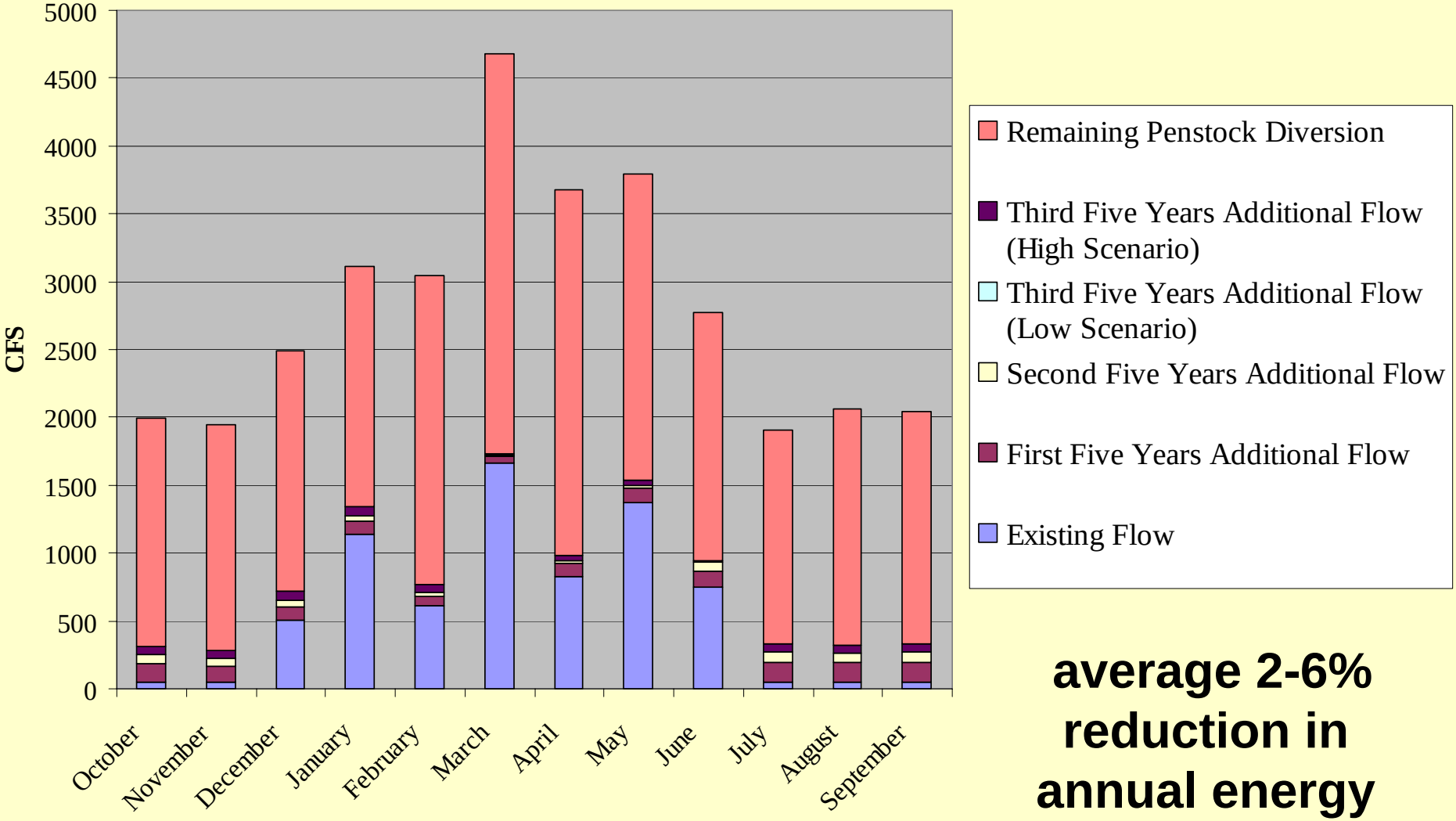
North Fork Feather River
Rock Creek and Cresta reaches



North Fork Feather below Cresta Dam



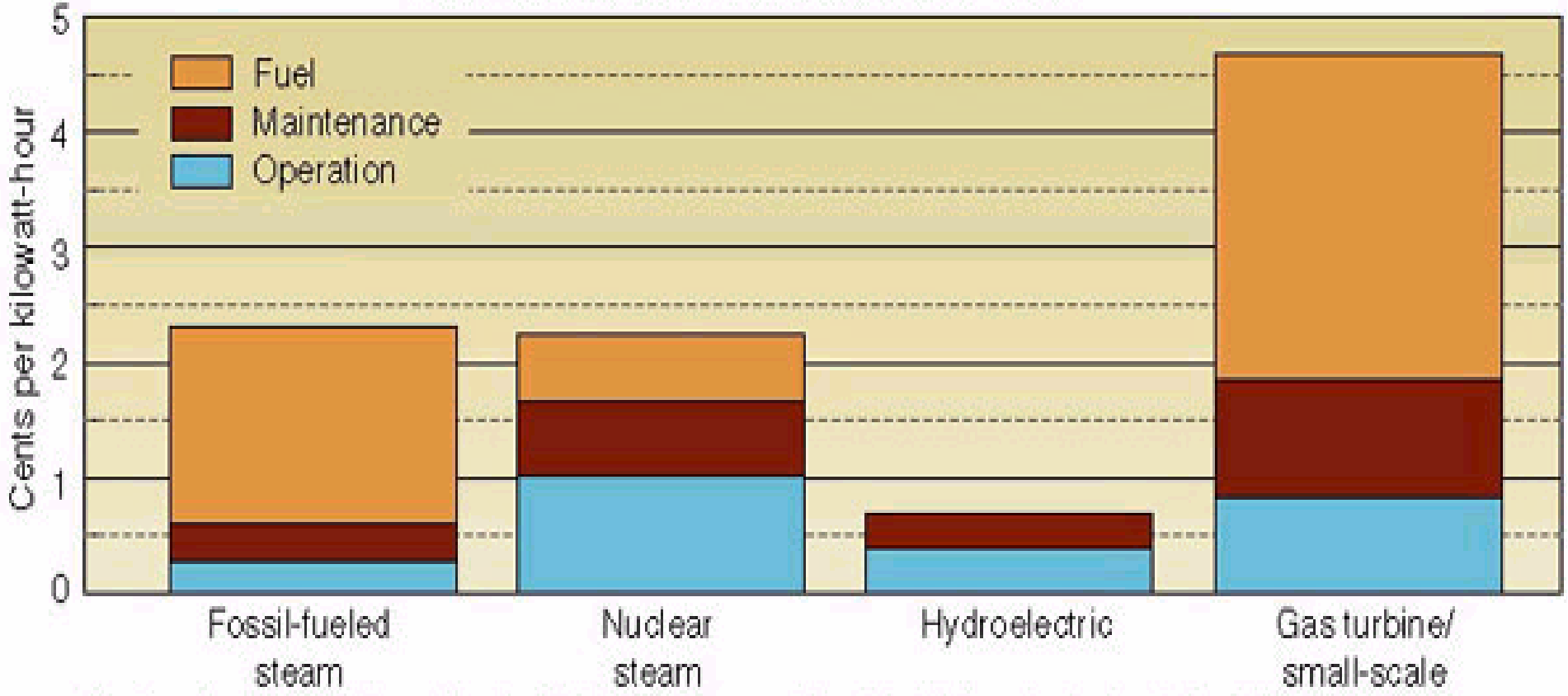
North Fork of the Feather at Cresta
Monthly Average River Flows and Penstock Diversions



average 2-6% reduction in annual energy

Average per KWh Power Production Expenses

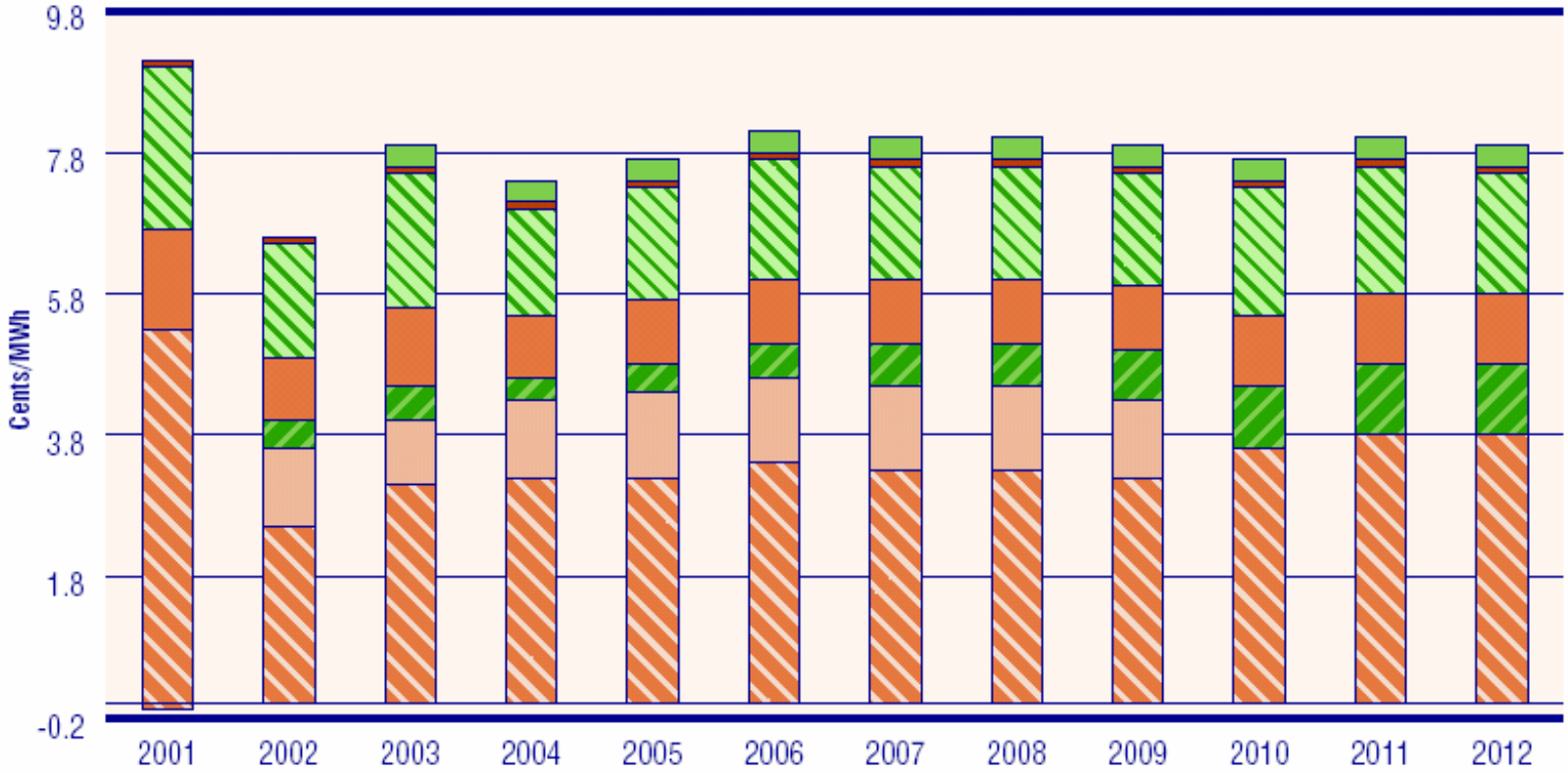
Investor-owner electric utilities, 1990-1994



Note: Operation expenses include rent. Hydroelectric includes pumped storage. Small-scale includes internal combustion, wind, and solar.
Source: EIA/DOE, *Financial Statistics of Major U.S. Investor-Owned Electric Utilities*, 1994. Table 14.

Figure III-2-5

PG&E Generation Cost Components ($ Nominal)



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Utility Debt	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Other Utility Contracts	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Utility QF Contracts	2.3	1.6	1.9	1.5	1.6	1.7	1.6	1.6	1.6	1.8	1.8	1.7
Utility Plants	1.4	0.9	1.1	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
Spot Market	-0.1	0.4	0.5	0.3	0.4	0.5	0.6	0.6	0.7	0.9	1.0	1.0
DWR Financing	0.0	1.1	0.9	1.1	1.2	1.2	1.2	1.2	1.1	0.0	0.0	0.0
DWR Contract	5.3	2.5	3.1	3.2	3.2	3.4	3.3	3.3	3.2	3.6	3.8	3.8

Source: Energy Commission Staff

Table I-2
Expected Net New Generation Additions

Year	Status	New Generation
2002	Construction	2,538
	Financing	0
	Commission Review	0
	Renewables	165
	Sub Total	2,703
2003	Construction	2,997
	Financing	77
	Commission Review	391
	Renewables	55
	Sub Total	3,520
2004	Construction	2,687
	Financing	1,070
	Commission Review	360
	Renewables	0
	Sub Total	4,117
2002-04	**Total MW**	**10,340**

Assume 16% capacity reduction at relicensed utility hydro:

580 MW reduction

by 2040

LET'S TURN OFF THE T.V. AND GO WATCH THE FALLS.
TOO LATE. THEY'VE TURNED OFF THE FALLS SO WE CAN WATCH T.V.
Rowles ©01
Journal of Business

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California Hydropower Reform Coalition

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American Whitewater
California Outdoors
California Sportfishing Protection Alliance
California Trout
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