

Assessing Functional Flows at a Global Scale

Implications for Environmental Flow Management Strategies in California

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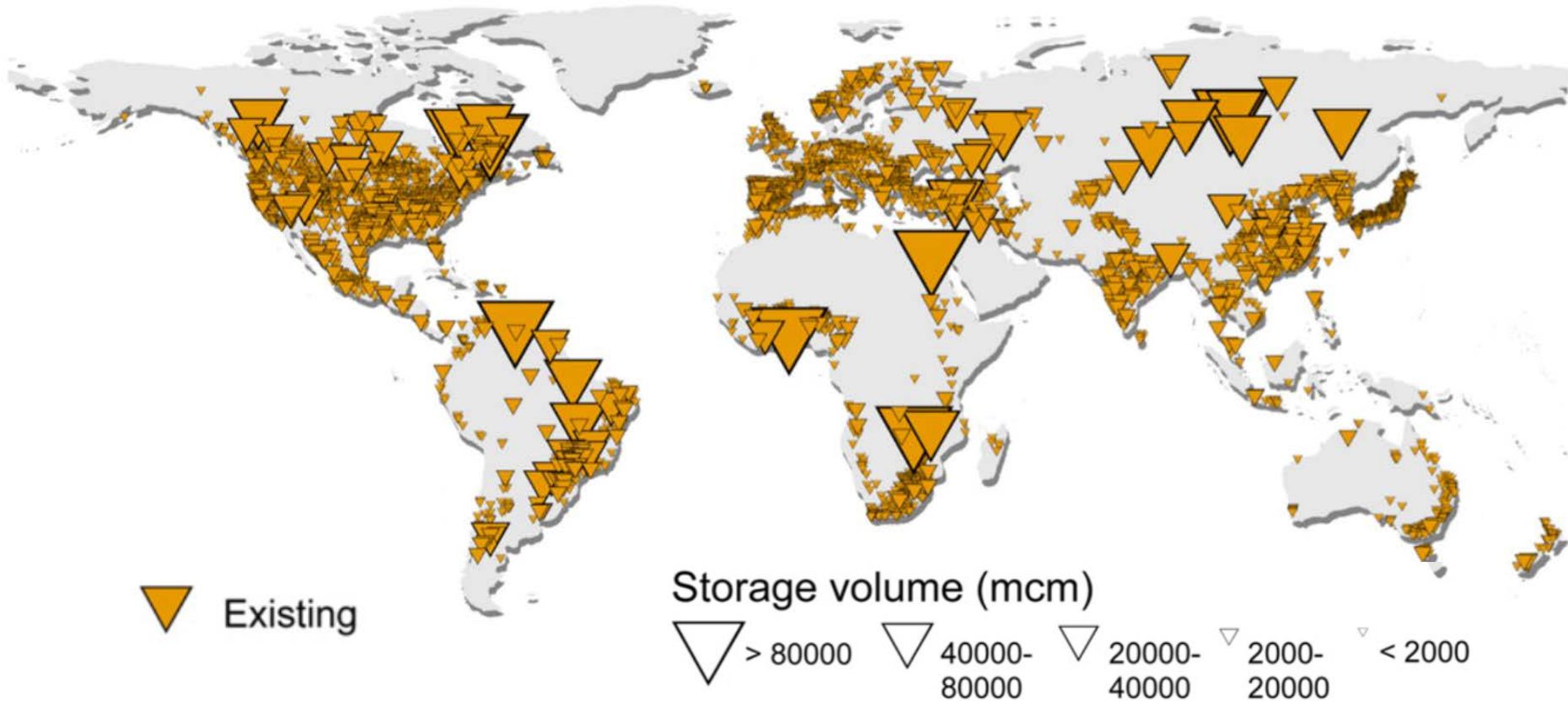
UCMERCED

Imagine a future...

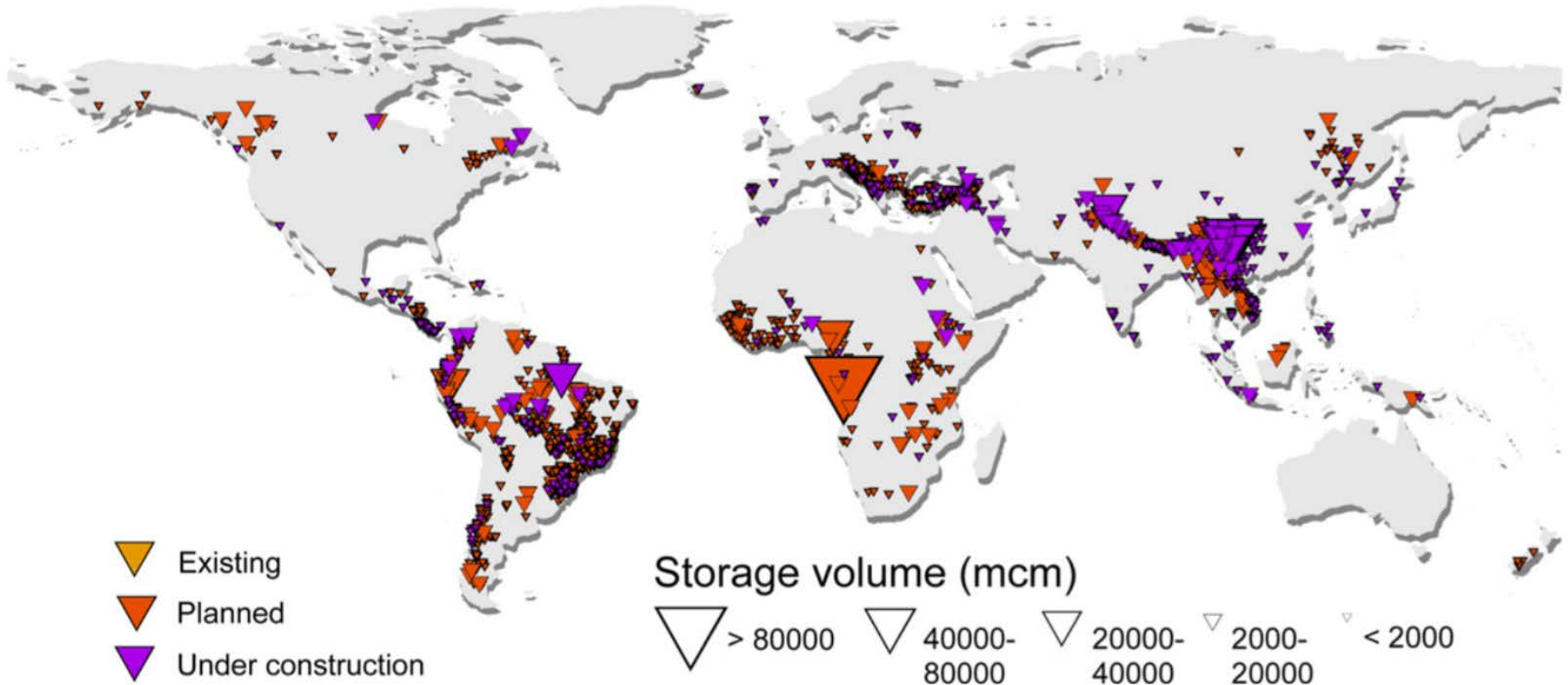
- Energy
- Food
- Safety
- Human Health
- Recreation
- Ecosystems



Existing Dams



Future Dams



Grill et al. 2015 Environ. Res. Lett.

Unregulated

North Fork America River

Regulated

South Fork Yuba River

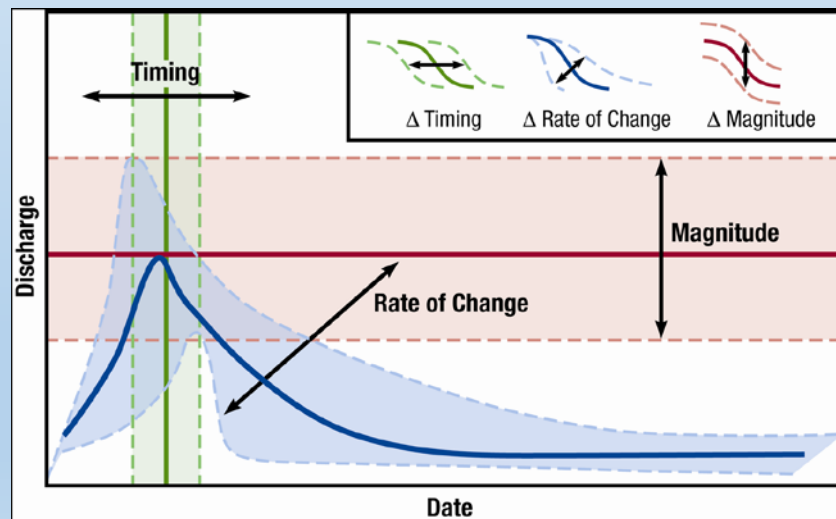


Viers & Santos 2014 Hydroinf. Conf.

<https://vimeo.com/46239865>

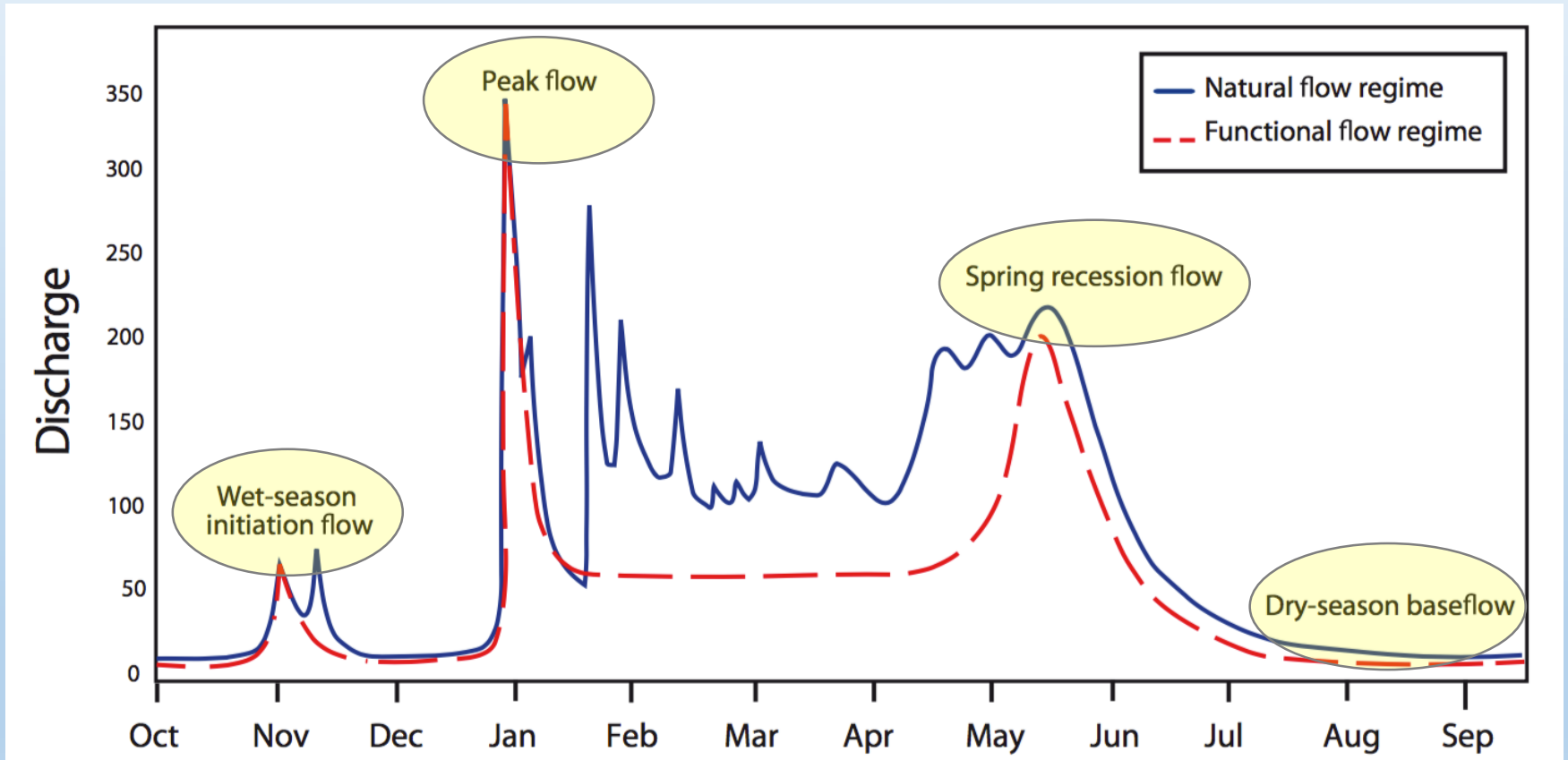
Identify Functional Flows

“To restore aspects of the flow regime that support key ecosystem functions and drive geomorphological and ecological processes.”



Magnitude
Frequency
Duration
Timing
Rate of Change

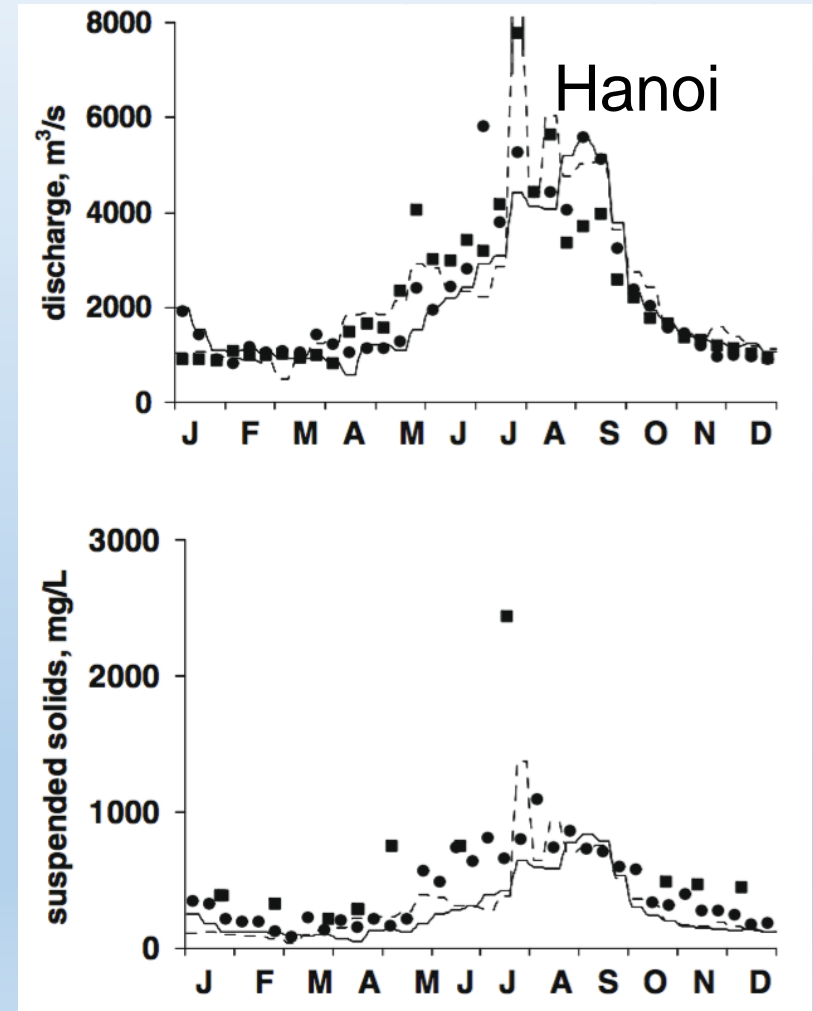
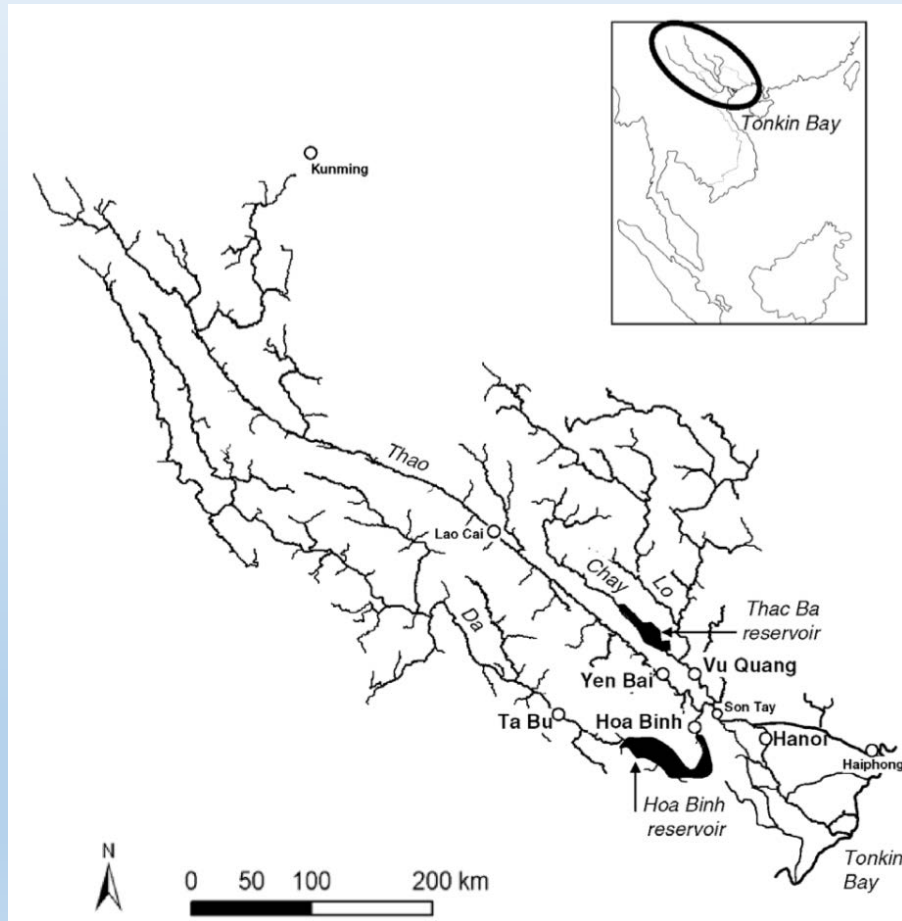
Key Functional Components Mediterranean-Montane River



Yarnell et al. 2015 BioScience

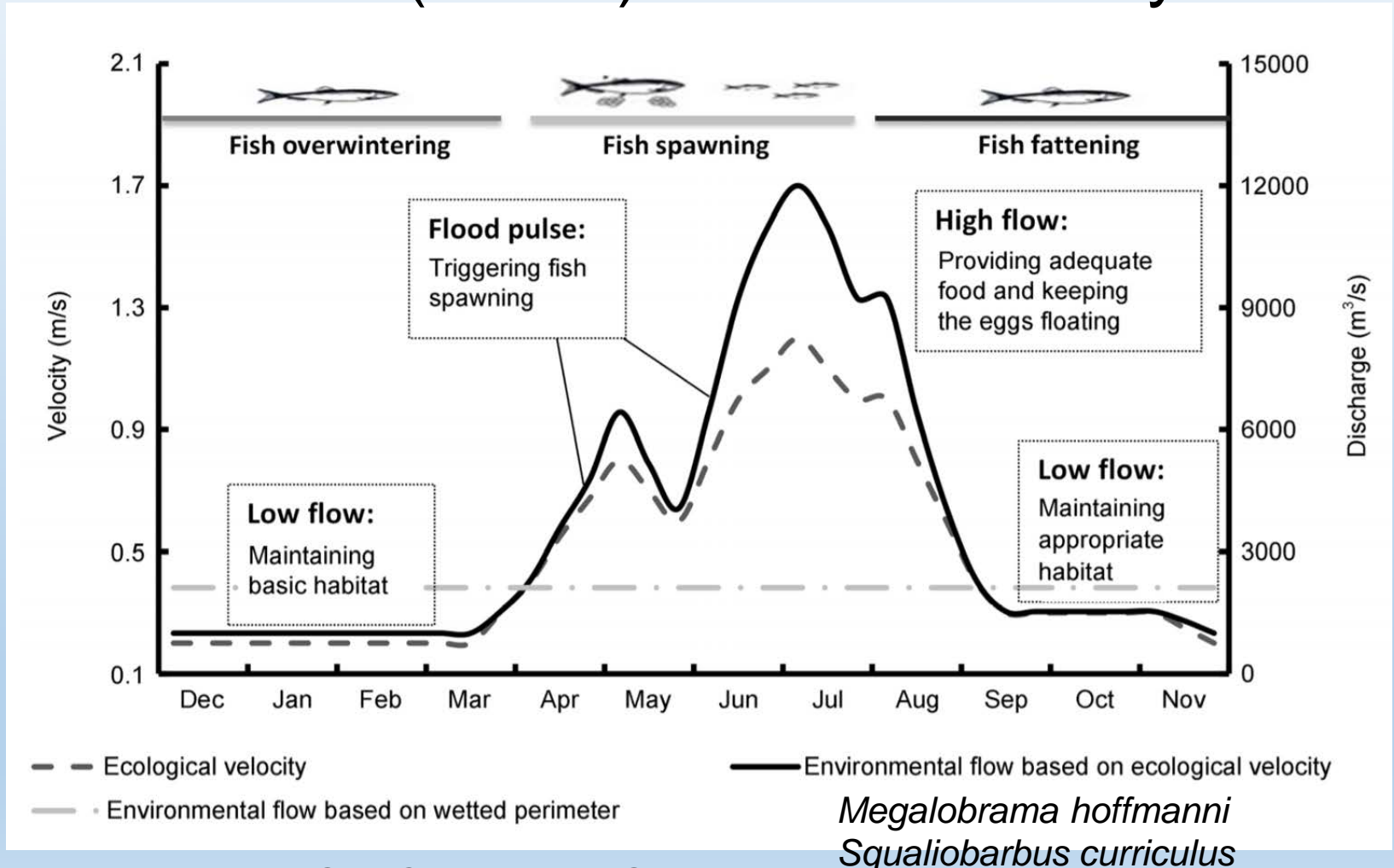
Subtropical-Monsoon River

Red River (Vietnam) – sediment transport



Le et al. 2010 J. of Asian Earth Sci.

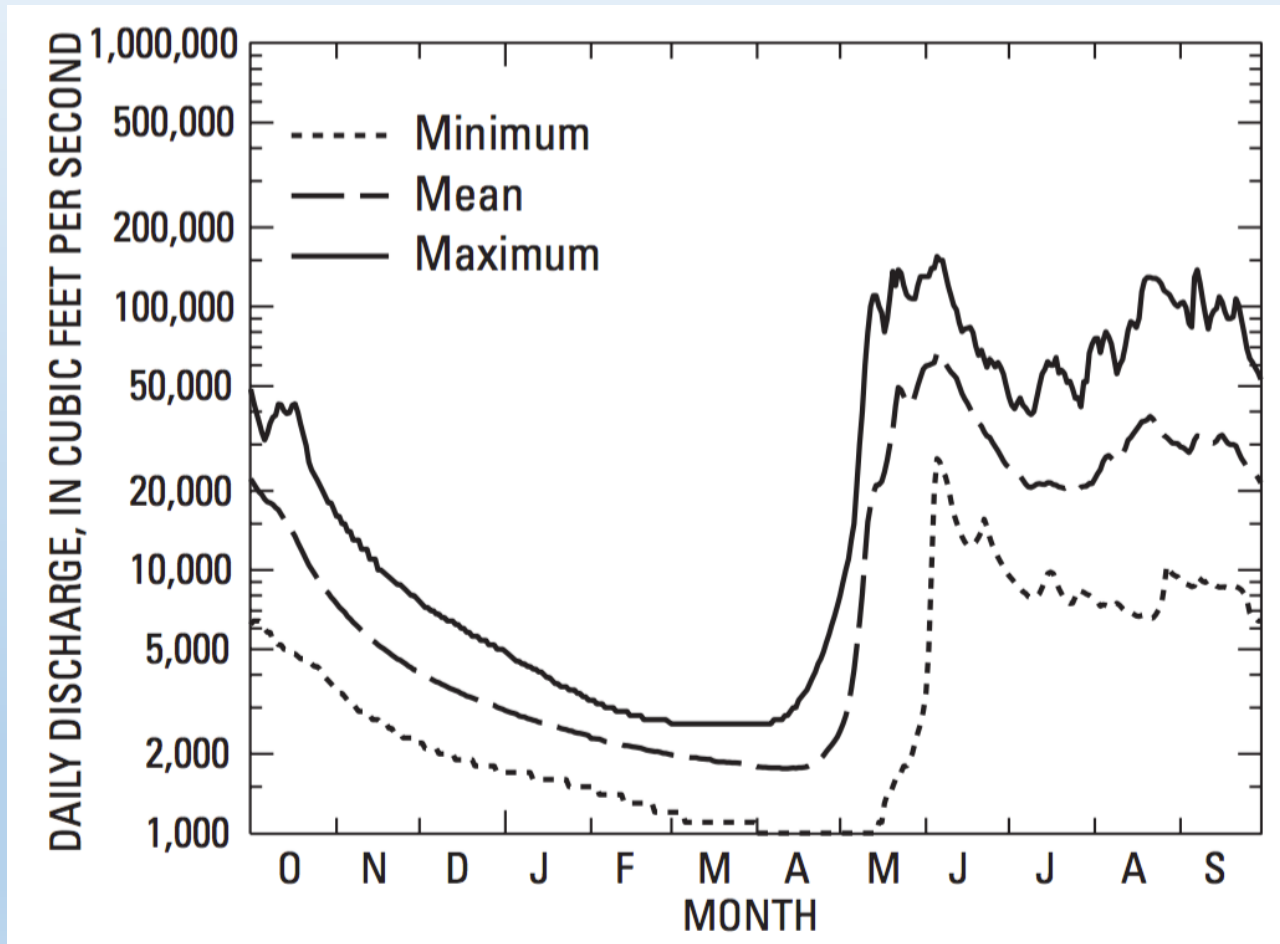
Subtropical-Monsoon River Pearl River (China) – fish life history



Wang et al. 2016 Sci. China Tech. Sci.

Boreal River

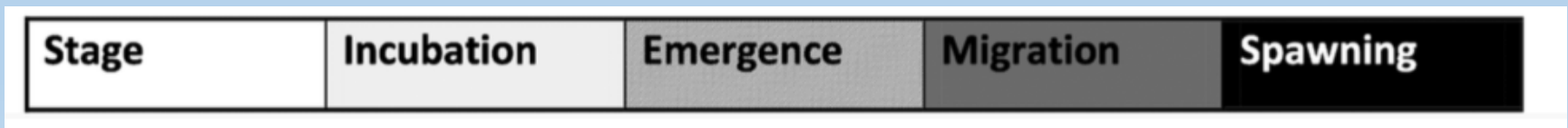
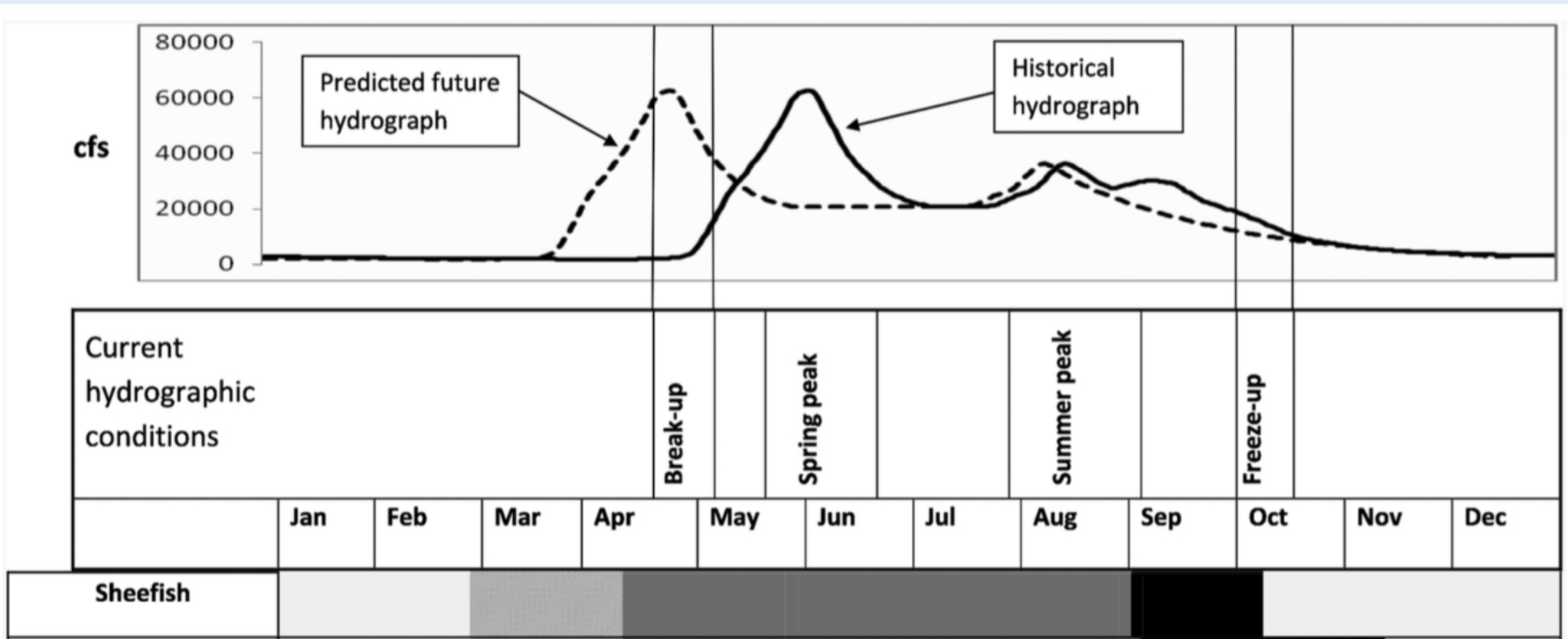
Kobuk River (Alaska, USA)



Brabets 2001 USGS

Boreal River

Kobuk River (Alaska, USA) – fish life history

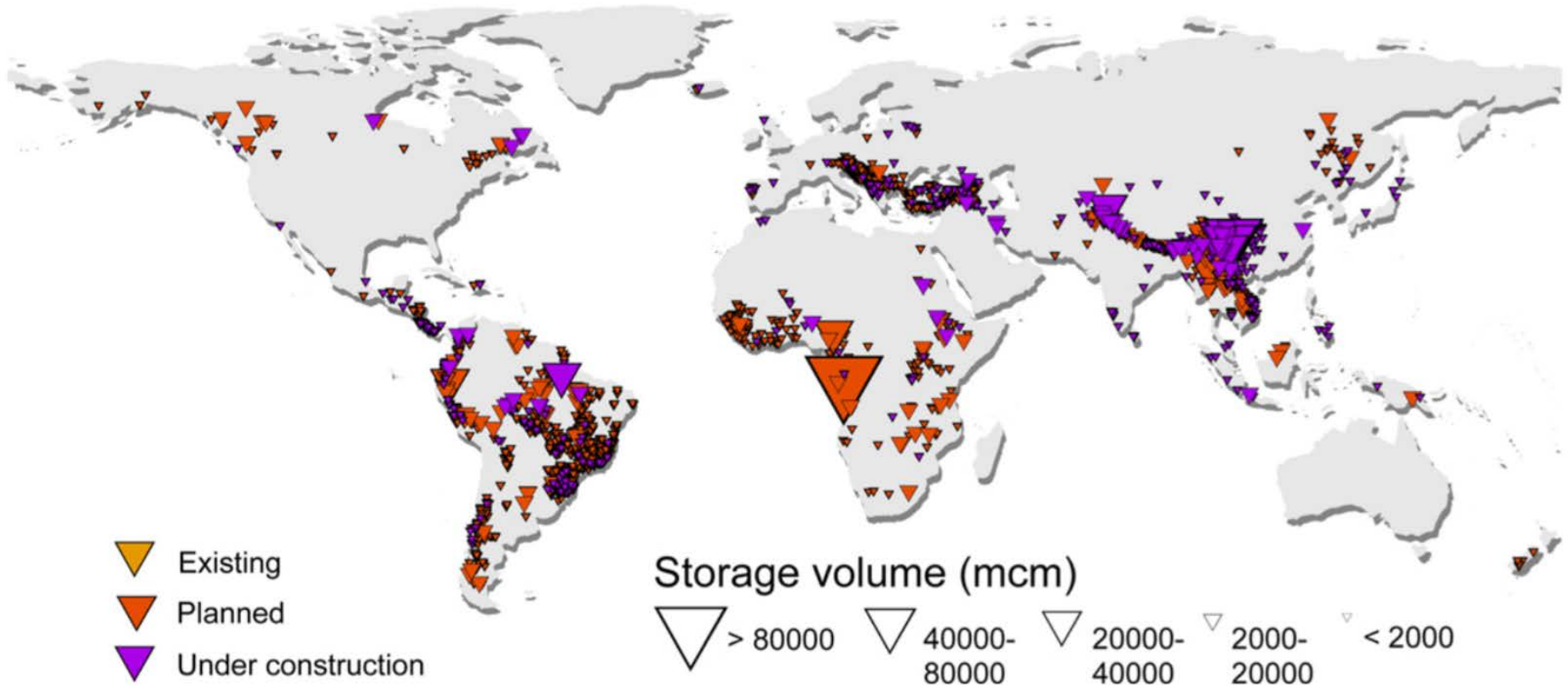


Global river classifications

Haines et al. 1988 App. Geo.

Global hydrobelts

Future Dams



Management Opportunities

Reservoir Controls



Diversions

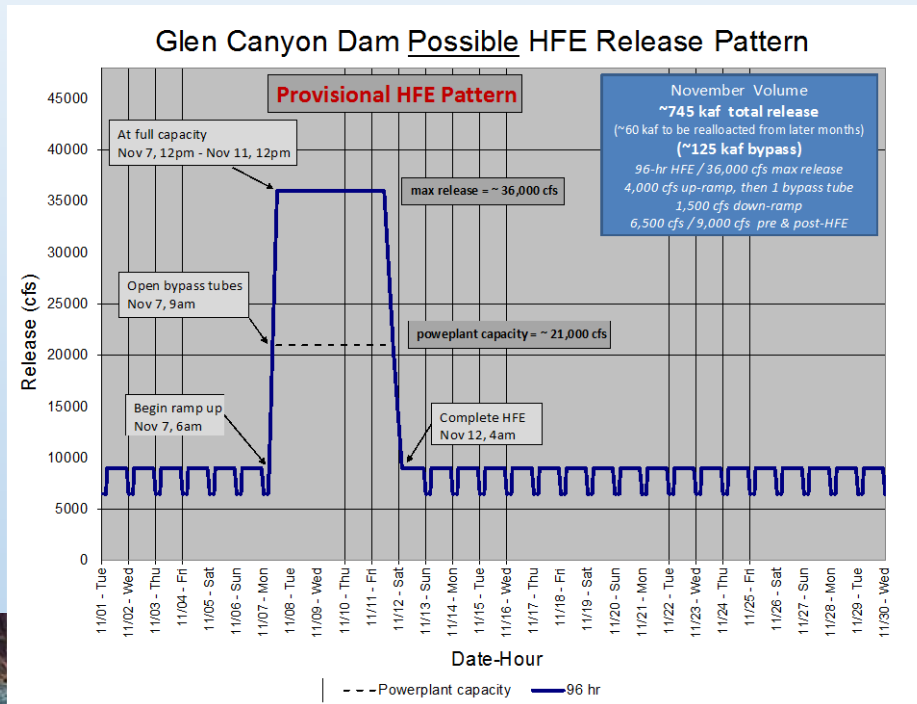


Floodplains



Reservoir Controls

Colorado River (USA) – sediment transport

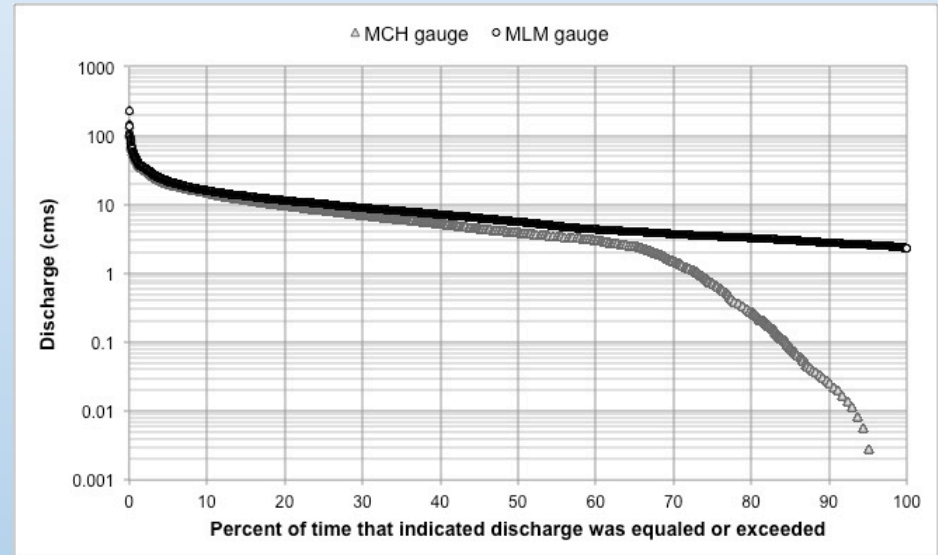


<https://www.nps.gov/grca/learn/nature/hfe.htm>

Poff & Schmidt 2016 Science

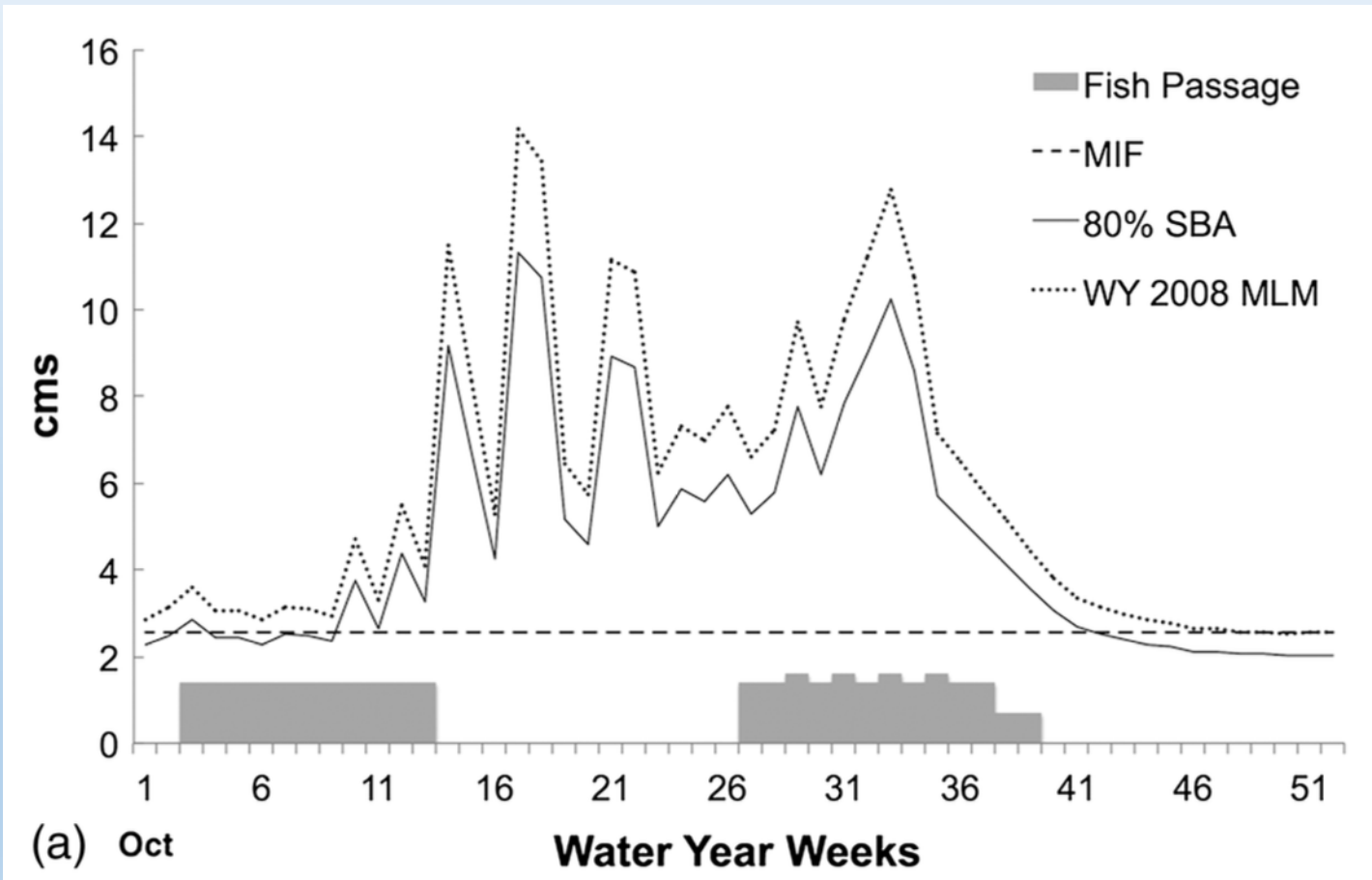
Diversions

Mill Creek, CA – fish life history



Diversions

Mill Creek, CA – fish life history



Floodplains

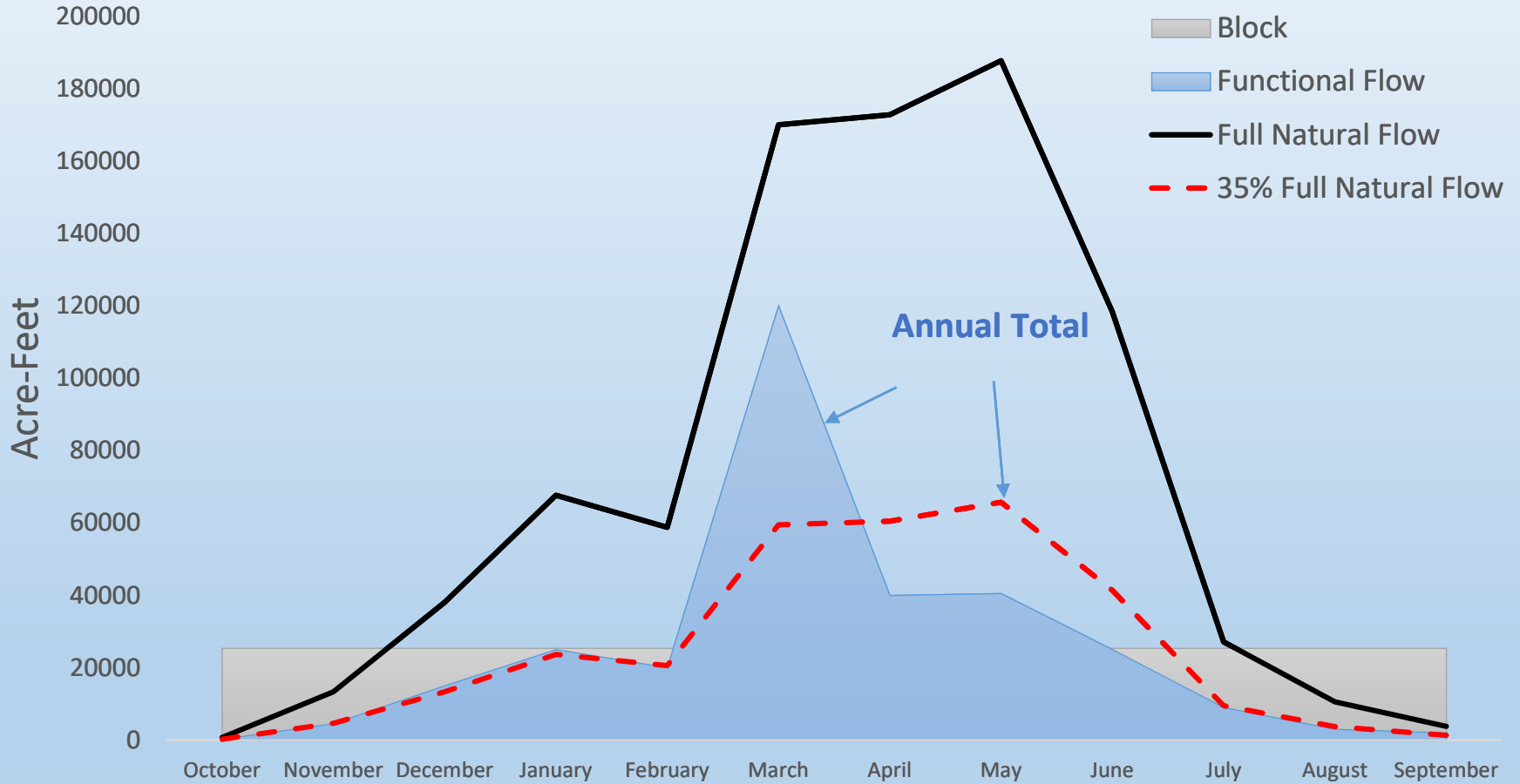
Cosumnes River & Yolo Bypass, CA



Jeffres et al. 2008 Env. Bio. of Fishes

Merced River Functional Flows

Merced River below Merced Falls Water Year 2016



Flood Types



Acknowledgements



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<http://www.us-china-cerc.org/>

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