

Habitat

Aquatic Ecosystems

Natural home or environment for a animal, plant or other species

This class? Policies, acts and governing entities as well as private organizations attempts to better manage resources and decrease ways in which we negatively impact the environment. For this topic, habitat protection and conservation

Biodiversity = resilience; fish as major component of this ecosystem

We will focus on dams as our primary example and the impacts they have on native fish populations

- ▶ Overview/History
- ▶ Impacts on wildlife habitat, specifically fish
- ▶ Future or current policies and actions

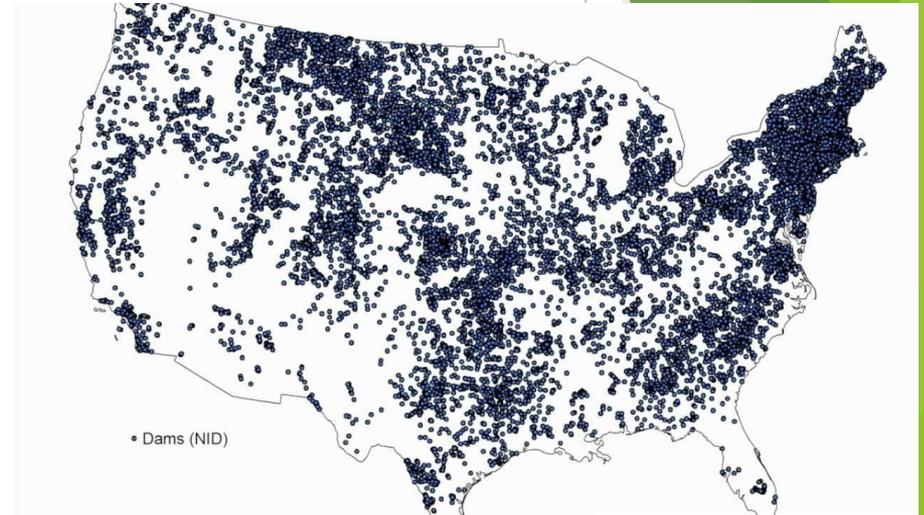
Start with clip from documentary DamNation: *Fisheries Conservation Foundation*





Brief History

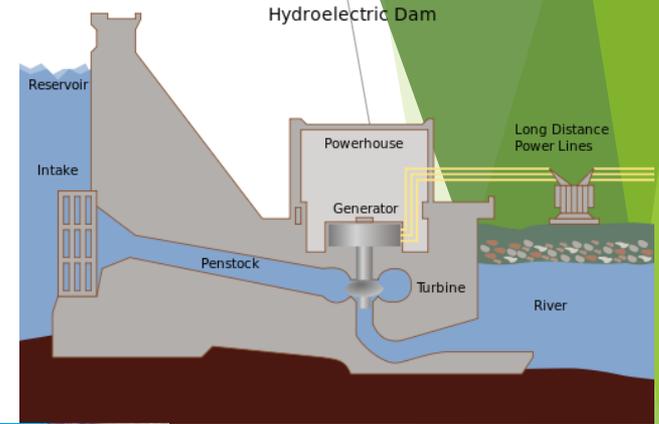
- ▶ Dam boom
 - ▶ 30,000 dams between 1950 and 1970
- ▶ Most of nation's power hydroelectricity
 - ▶ Half at one point
- ▶ To accommodate for urban sprawl and irrigation needs due to westward expansion, water supply needed
- ▶ Bureau of Reclamation and Army Corps heavily dammed the rivers of the western US
- ▶ First large dams in US dating back to 19th century
- ▶ Realization that we took it too far and that there are drastic environmental impacts, especially to freshwater aquatic habitats



Social and economic advantages of dams

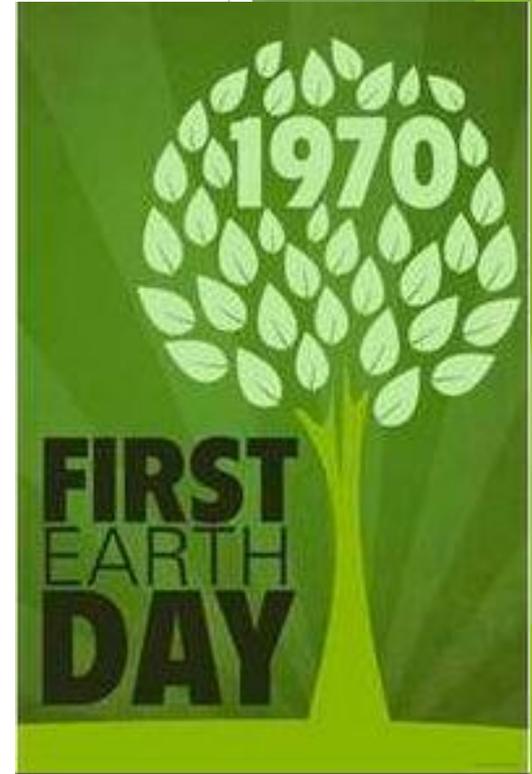
- ▶ Hydroelectric power
- ▶ Jobs
- ▶ Economic growth
- ▶ Water storage
- ▶ Irrigation
- ▶ Navigation
- ▶ Flood control
- ▶ Recreation
- ▶ Tourism

But what about the environment?



Paradigm Shift

- ▶ Shifting from predominantly utilitarian usage of environment to understanding negative impacts caused by humans
- ▶ Many say this began in the 1970's
- ▶ Leading to more government action in protecting the valuable resources within the country
- ▶ Referring back to the clip of Edward Abbey. I included a short clip of a radical environmental activist group called Earth First!
 - ▶ Placed a 100 yard "symbol" on Glen Canyon Dam
 - ▶ Symbol to free the river and all rivers
- ▶ **Do not remove all dams, just obsolete ones**
 - ▶ Energy producing and in close proximity to populated areas can stay
 - ▶ Low economic benefits and negative impacts on fish habitat need to go
- ▶ The "let nature run its course" mentality when discussing dams
 - ▶ Return rivers to natural state



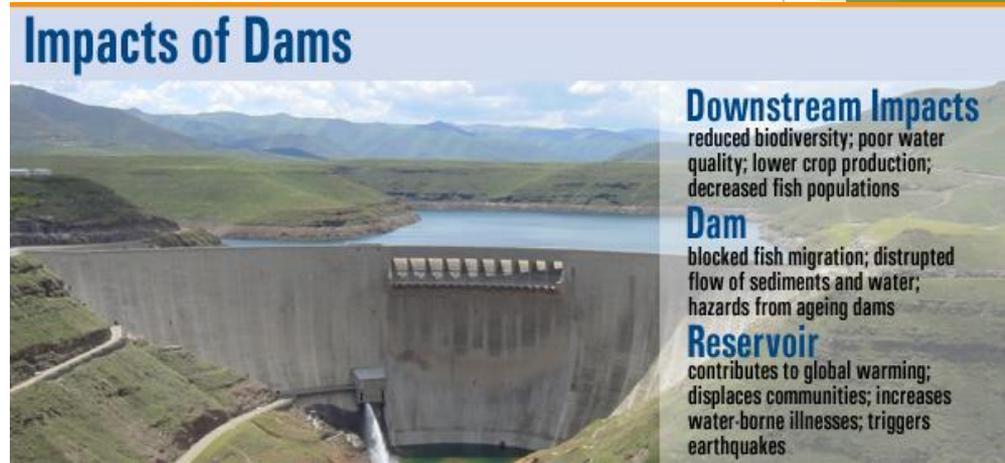
Restoring Habitat

- ▶ Removal of obsolete dams
 - ▶ *“Dams have a finite lifetime. It would be economically foolish to remove every dam in the country, but it would also be foolish not to rethink every dam in the country and try to decide which of the ones still make sense. Which can we get more value economically, aesthetically, culturally, morally and ecologically by sending it back to its natural state?” - David Montgomery, University of Washington, Geography Professor; PHD*
- ▶ Over 76,000 dams over 3 ft high built since the start of the 19th century (\cong 1 dam built everyday since Thomas Jefferson was president)
- ▶ Many have lost efficiency and serve no purpose but to deplete fish population
- ▶ Major economic growth and progression in last 200 years, but at the cost of other species
 - ▶ Understanding that recovery actions should be taken and careful consideration of future dams must be made
- ▶ Think about the resources our descendants will value most in 200 or 300 years
 - ▶ When a species is gone it's gone forever
 - ▶ Natural processes to occur then these protein/omega-3 rich fish will continue will around for future generations
 - ▶ Can harvest half of them, eat them and they will keep replacing themselves naturally
 - ▶ Look toward feeding future generations and ethically speaking, preserving another species

What happens when you dam a river?

Damming rivers has major consequences for wildlife habitat.

- ▶ Immediate local effects
- ▶ Downstream effects
- ▶ Upstream effects



<https://www.internationalrivers.org/problems-with-big-dams>

Immediate Local Effects

Altered ecosystem structure

- ▶ Water temperature, velocity, depth
- ▶ Dissolved oxygen levels
- ▶ Sun exposure
- ▶ Nutrient cycling
- ▶ Vegetation communities
- ▶ Wildlife species composition
- ▶ Riverbed and valley destruction

Damming rivers creates entirely new assemblages of aquatic factors, resulting in new compositions of plants, fish, and wildlife species.



<http://voices.nationalgeographic.com/2010/05/18/fish-run-through-it-the-importance-of-maintaining-and-reconnecting-free-flowing-rivers/>



<https://www.pinterest.com/pin/18279554938986094/>

Immediate Local Effects

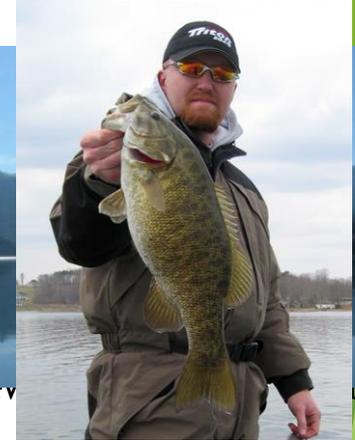
Altered ecosystem structure

- ▶ Water temperature, velocity, depth
- ▶ Dissolved oxygen levels
- ▶ Sun exposure
- ▶ Nutrient cycling
- ▶ Vegetation communities
- ▶ Wildlife species composition
- ▶ Riverbed and valley destruction

Damming rivers creates entirely new assemblages of fish, and wildlife species.



www.algomacountry.com



<http://www.virginia-outdoors.com/smithmountainlake.html>

Downstream Effects

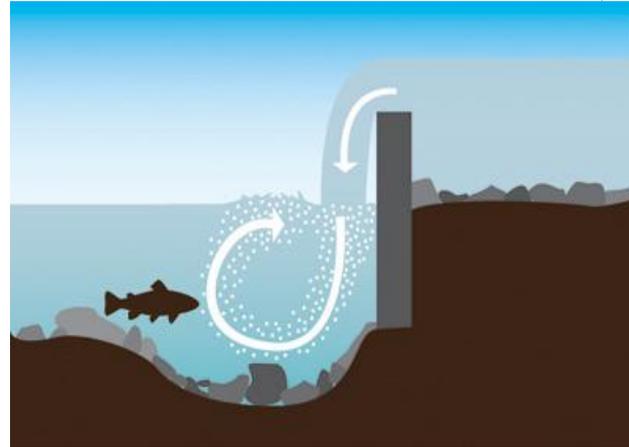
- ▶ Habitat fragmentation
- ▶ Altered sedimentation and erosion
- ▶ Halted nutrient cycling



<http://www.experiencegr.com/blog/post/feisty-fishes-fall-and-winter-steelhead-fishing-in-grand-rapids/>



http://www.montereycountyweekly.com/news/local_news/cal-am-s-decision-to-strengthen-the-san-clemente-dam/article_ad4f13e1-28eb-5b1b-82c7-a1cc4473b547.html



<http://www.dec.ny.gov/outdoor/81401.html>

Upstream Effects

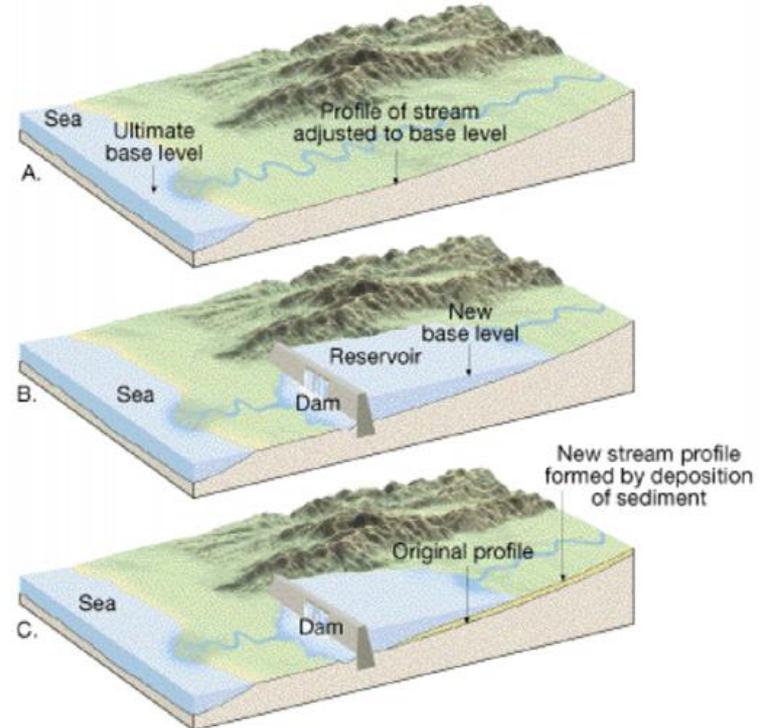
- ▶ Elevated stream base level
- ▶ Reduced stream downcutting and erosion
- ▶ Increased meandering



http://geol.umd.edu/~jmerck/geol342_1501/lectures/10.html



http://geol.umd.edu/~jmerck/geol342_1501/lectures/10.html



<http://web.arc.losrios.edu/~boroug/RiverDiagrams.htm>

How can planners mitigate these problems?

- ▶ Regulated instream flows
- ▶ Artificially increased dissolved oxygen content
- ▶ Selective temperature withdrawals
- ▶ Fish ladders, stocking, and management
- ▶ Dam removal



http://blog.oregontive.com/breakingnews/2008/05/feds_issue_final_plan_to_help.html



http://dels.nas.edu/global/besr/gsc_dam_removal



<https://usresponserestoration.wordpress.com/tag/new-england/page/2/>



<https://www.wildlife.ca.gov/Fishing/Hatcheries/Nimbus/Species-Raised>

Tradeoffs for Planners

- ▶ Economic Value
 - ▶ Energy production vs. conservation
- ▶ Recreational Value
 - ▶ Kayaking vs. ski-boating
 - ▶ River vs. lake fishing experiences
- ▶ Aesthetic Value
 - ▶ Lake vs. river
 - ▶ Developed vs. natural
- ▶ Cultural Value
 - ▶ Historic valley vs. new opportunities

Decision-making is driven by
Science doesn't prove right and wrong--it'



<http://www.outdooradventurecenter.com/category/river-trips/>



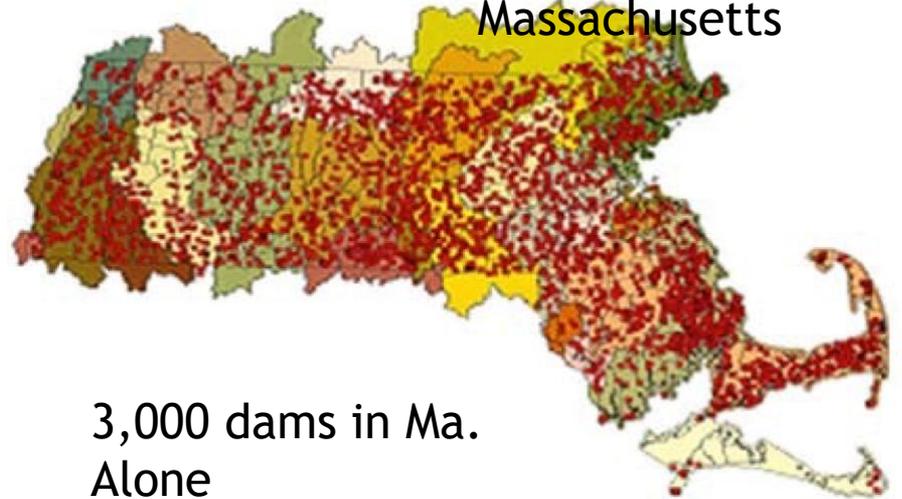
<https://brownledge.org/sailing-watersports/waterskiing-wakeboarding/>

Policies Regarding Dam Removal

Policies behind dam removal

- ↯ Example taken from Massachusetts Department of Environment Protection
- ↯ Wildlife Protection Act
- ↯ Endangered Species
- ↯ Sediment Management
- ↯ In-Stream Management
- ↯ Massachusetts Contingency Plan
- ↯ Channel/Riparian Restoration

Picture of all the
dams in
Massachusetts



3,000 dams in Ma.
Alone

Getting Started with Dam Policies

- ✎ In the beginning during the dam boom several Acts were created: the Endangered Species Act and National Environmental Protection Act, and Wetlands Protection Act.
- ✎ Since then dozens of policies and organization have been created to help deal with certain aspects surrounding dams. From the department of Homeland Security to the Department of Energy, or Department of the Interior.



During The Lifespan

- ✚ During the lifespan the dam is under constant monitoring from various regulations and commissions like FERC - Federal Energy Regulatory Commission
- ✚ They keep track of the health and safety of the dam
- ✚ Also if the dams are producing enough power to how much water is pumped through the dam



Initiating Dam Removal

- ↯ The average age of a dam is about 52 years old so they are degrading and not fulfilling their energy quota or, endangering the environment or human life all across the country
- ↯ They are being petitioned and ordered to be dismantled for many reasons
 - ↯ Impounding contaminated sediment
 - ↯ Increase water temps in rivers which increases eutrophication
 - ↯ They could have structural damage that could prove disastrous to humans if the dams fail



During and After Dam Removal

- ↯ You need a plan for every detail surrounding the dam
- ↯ The NEPA, ESA, and Wetland Protection Act can be deciding factors for dam removal.
- ↯ You have to have a contingency plan
- ↯ Soil and sediment management and removal plan
- ↯ In-Stream management for sediment
- ↯ River/Stream bank Restoration
- ↯ Constant monitoring during and after the project

