Ecological Effects of Dams

Dams fragment rivers and streams and transform free-flowing ecosystems into slow flowing lake-like ecosystems. As a result:

- **Aquatic biodiversity** declines because many riverine fish & mussel species can not endure when they cannot reach spawning and feeding areas. The extinction of all 20 mussel species in the U.S. has been attributed to dams.\(^1\) All fish species are migratory to varying extent, but the most vulnerable fish species are those that travel very long distances (100’s of miles) such as lake sturgeon, channel catfish, freshwater drum, sauger and walleye.

- The **altered habitat** is unsuitable for the native riverine community, causing the riverine food webs be altered. The native community suffers and becomes vulnerable to non-native species adapted to lake-like settings. The native fishes then can not successfully compete. Research in the Great Lakes region found that non-indigenous species were 2.4 to 300 times more likely to occur in reservoirs than in natural lakes.\(^2\)

- The **natural movement of water and sediment** is disrupted resulting in accumulation of sediment in the reservoir with channel & bank erosion below the dam. A projected 25% of U.S. reservoirs will be at least half full by 2018.\(^3\) Artificial flooding, sediment deposition, and erosion bury and damage riverine habitat, which is often critical rocky, steeper gradient rapid habitat.

- **Water quality** is altered. Nutrients & pollution accumulate in the reservoir. Water temperatures generally increase; other parameters, like dissolved oxygen, may be reduced as a result, which stresses the aquatic community and may shift species composition.
The Mississippi River is fragmented by thirteen hydropower dams upstream of the Twin Cities in addition to seven lock & dams downstream. Saint Anthony Falls was a natural waterfall so was historically a natural barrier. From the Twin Cities downstream to St. Louis the Mississippi River has been converted into a series of impoundments. Consequently, critical spawning habitat (rapids & falls) has been submerged & buried. Species that spawn in rapids & falls, such as lake sturgeon, paddlefish, and blue sucker, are now rare.

**Compelling Facts**

- In MN there are over 330 dams taller than 20 feet plus over 900 dams several feet tall in MN.\
- Freshwater extinction rates are 5 times that of terrestrial rates.\
- Sturgeon & mussels are the two most imperiled group of organisms on the planet.\
- Some fish migrate incredible distances in search of suitable spawning areas: walleye up to 160 miles, channel catfish up to 450 miles, lake sturgeon up to 800 miles, and paddlefish almost 2,000 miles.

**Minnesota Hydropower Sites**

**Dam Effects on Fish**

**Rapidan Dam, Blue Earth River**
This 87 foot tall barrier, built in 1910, has extirpated at least 24 species above the dam.

**Flandrau Dam, Cottonwood River**
15 species were eliminated above the dam. Since it was removed in 1995, 13 species have returned upstream of the dam site.

**Minnesota Falls Dam, Minnesota River**
This 18 feet tall 600 feet long dam extirpated 12 species. The dam was removed winter 2013 and already 3 of those species have returned to the restored rapids.

**Dams on the Red River of the North**
Because the Red River basin was fragmented by over 500 dams lake sturgeon could not reach suitable spawning areas so were eliminated. Now after 35+ barriers have been removed and lake sturgeon stocked, lake sturgeon are thriving and reproducing.

**Dams on the Lower Colorado River**
This river is one of the most fragmented rivers in the U.S.. It is now inhabited by 80 non-native fish species and only 9 native species, all of which are endangered.

**REFERENCES:**