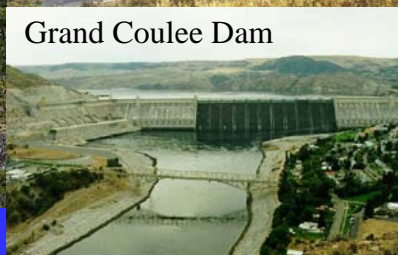
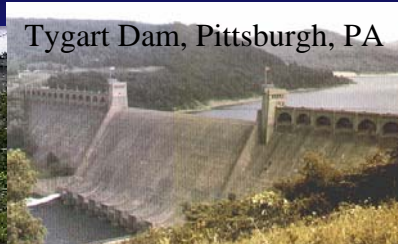


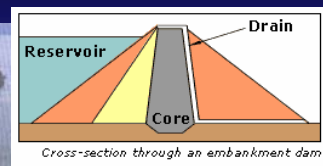
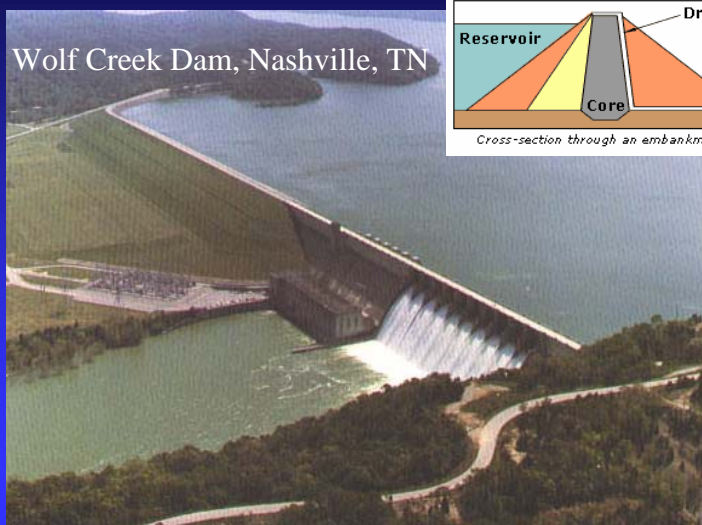
Topics

- Part I: Dam Engineering
 - ◆ Embankment and concrete dams
 - ◆ Outlet works
 - ◆ Spillways
 - ◆ Gates and valves
 - ◆ Energy dissipation
 - ◆ Dam safety

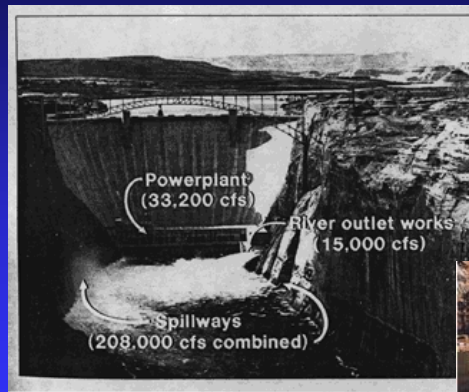
Concrete dams



Embankment dams

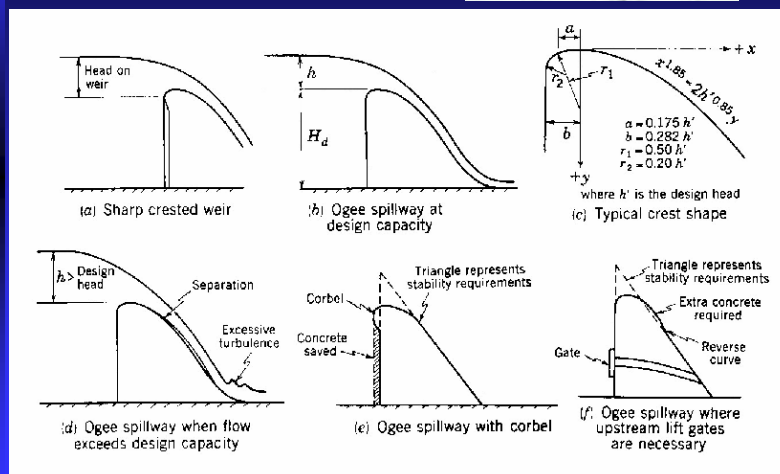


Dam outlet works

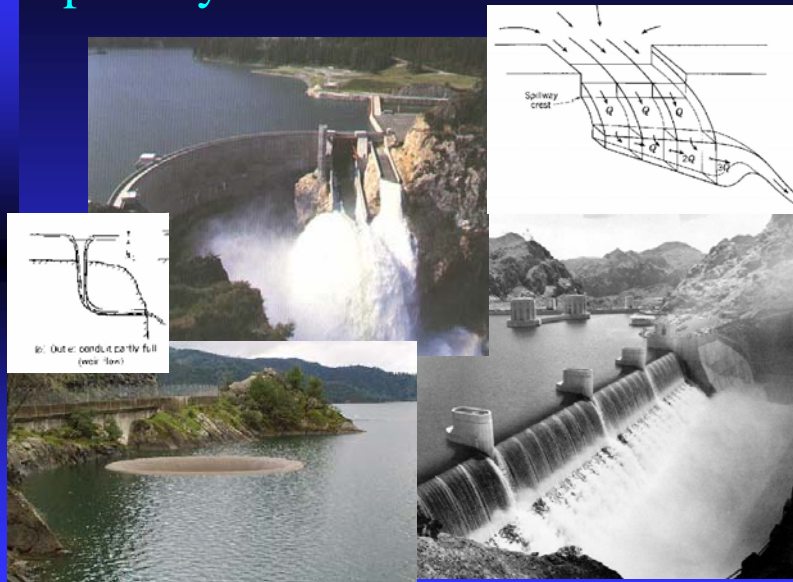


Glen Canyon Dam and Grand Canyon controlled flood

Spillway design



Spillways...



Spillway gates



Stilling basins



Dam maintenance & rehabilitation

Gate failure at Folsom Dam, CA

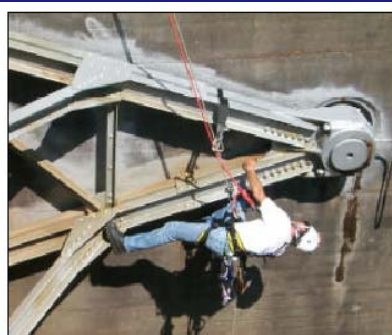


Figure 3: Inspecting radial tainter gates using rope access techniques.

Topics

- Part II: River Engineering
 - ◆ Open channel hydraulics
 - ◆ River morphology
 - ◆ Stream restoration
 - ◆ Diversion works
 - ◆ Fish passes
 - ◆ Inland waterways & navigation

Navigation systems



Fish passes



Topics

- Part III: Other topics
 - ◆ Hydroelectric plants
 - ◆ Pumping stations
 - ◆ Stormwater conveyance/storage systems
 - ◆ Infiltration-based BMPs
 - ◆ Flood damage mitigation

Hydroelectric facilities: Generators



The right powerhouse of Grand Coulee contains nine 125 MW turbine generators.

Hydroelectric facilities: Pumps

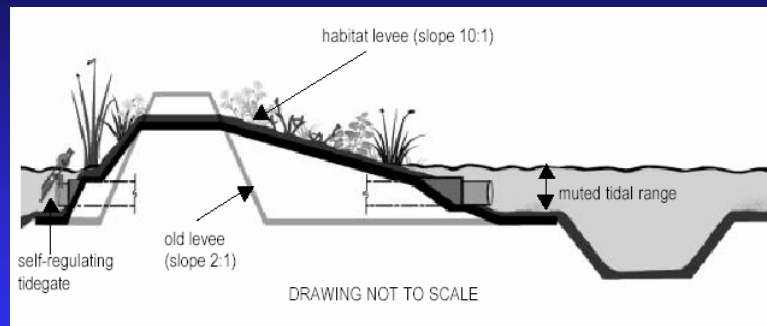


These units provide 67,500 horsepower of pumping power and can be reversed during times of high power demand and made to act as generators. In the generator mode, these units can provide 50 megawatts of electrical power.

Storm water management



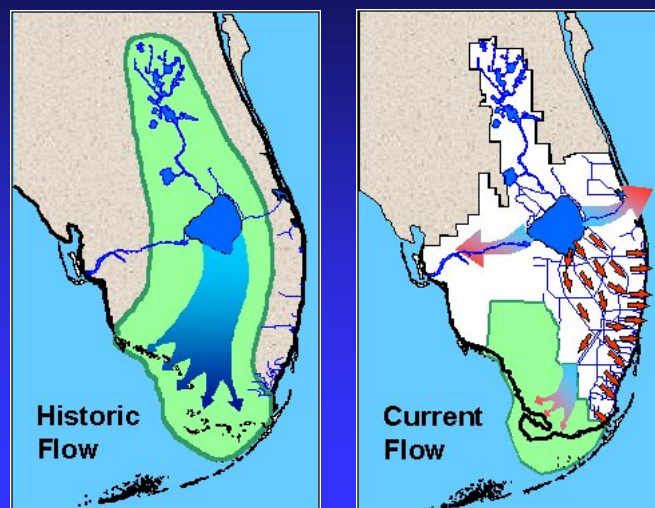
Levees



Case Study: Dead River Flood, Marquette County, May 2003



Case Study: Everglades Restoration



Case Study: Fish Passage in the Pacific Northwest

- Threats to salmon include:
 - ◆ Poor water quality
 - ◆ Lack of water due to diversions
 - ◆ Hydropower dams
 - ◆ Habitat destruction

