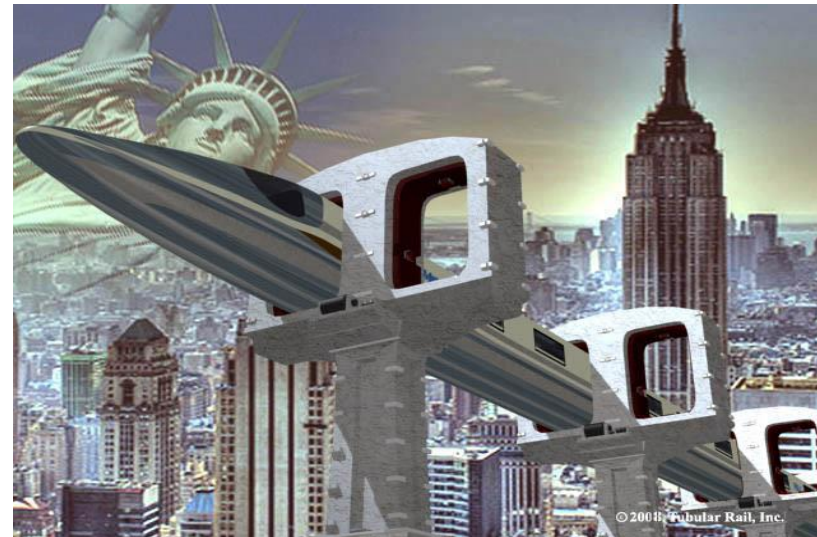


Tubular Rail Inc.



Rethinking Ocean Transport and Storage of Fresh Water

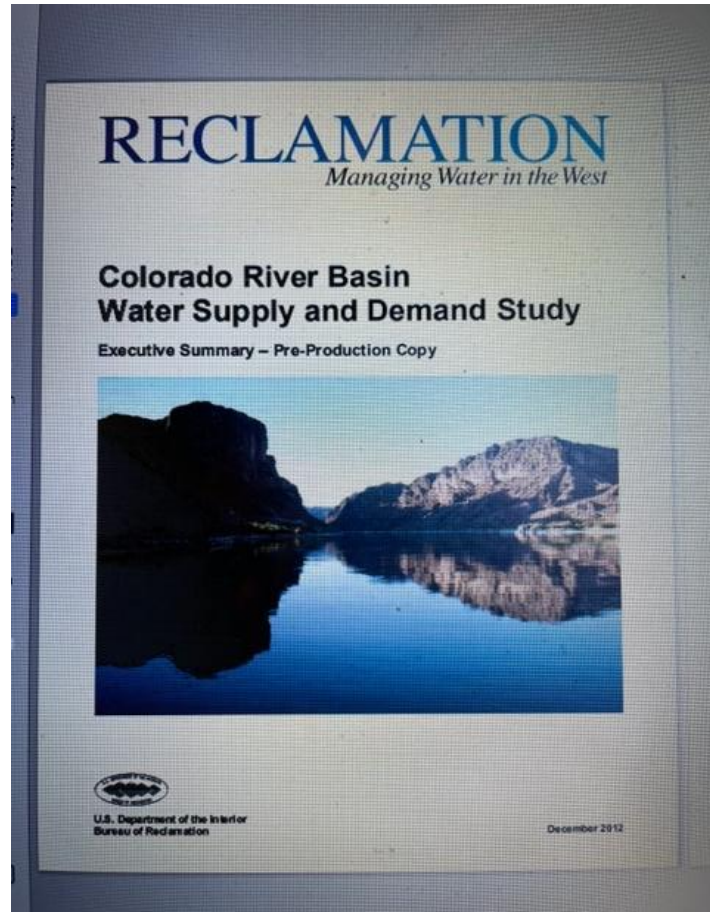
Solving the unit cost, energy cost and

Reservoir challenges

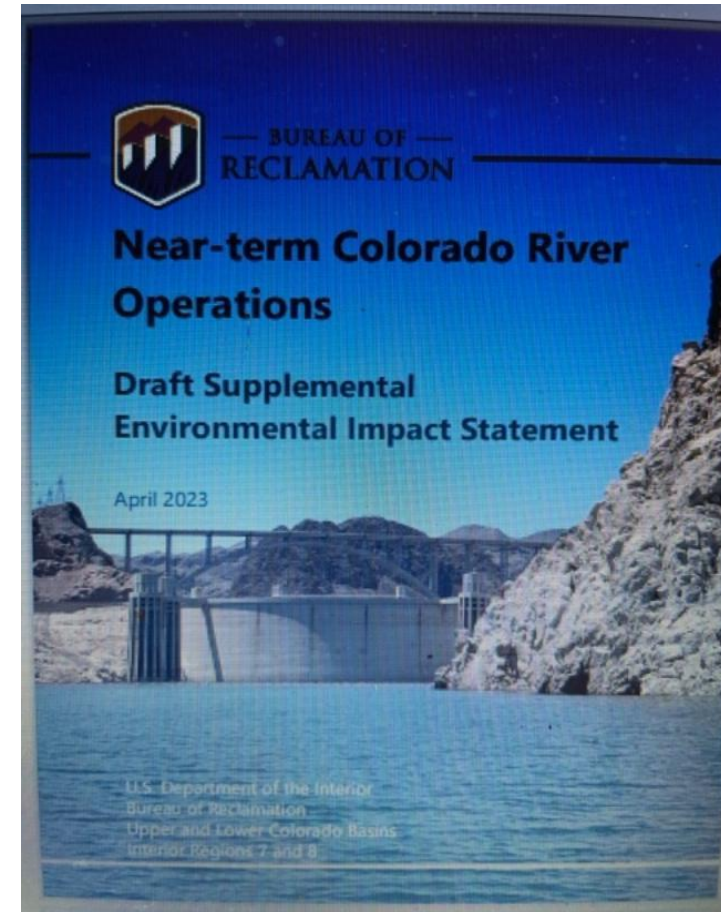
Source, transport, storage

Where's the Water?

Dec 2012



Apr 2023



Technology Readiness Levels

John Parker writes in National Defense

The Defense Department has adopted a classification system that segregates technology into nine levels with increasing maturity — measured by evidence of testing or prior use — corresponding to an increase in “technology readiness levels.” While reducing reliance on immature technologies may lower the risk of cost and schedule problems, it also ensures that nothing revolutionary, innovative or even new can make it into the system.

Conservation

Southern Nevada

New Source

Carlsbad Reverse Osmosis Plant

Legal Restriction

Arizona Building Permits Now Need the 100 yr. supply

-a form of Urban Growth Boundary?

Pay not to farm is not new water. Doesn't change underlying demand for those products.

-inflationary and will shift production

Of the “saved water” how much will be lost to evaporation?

4.0 Imports to Southern California

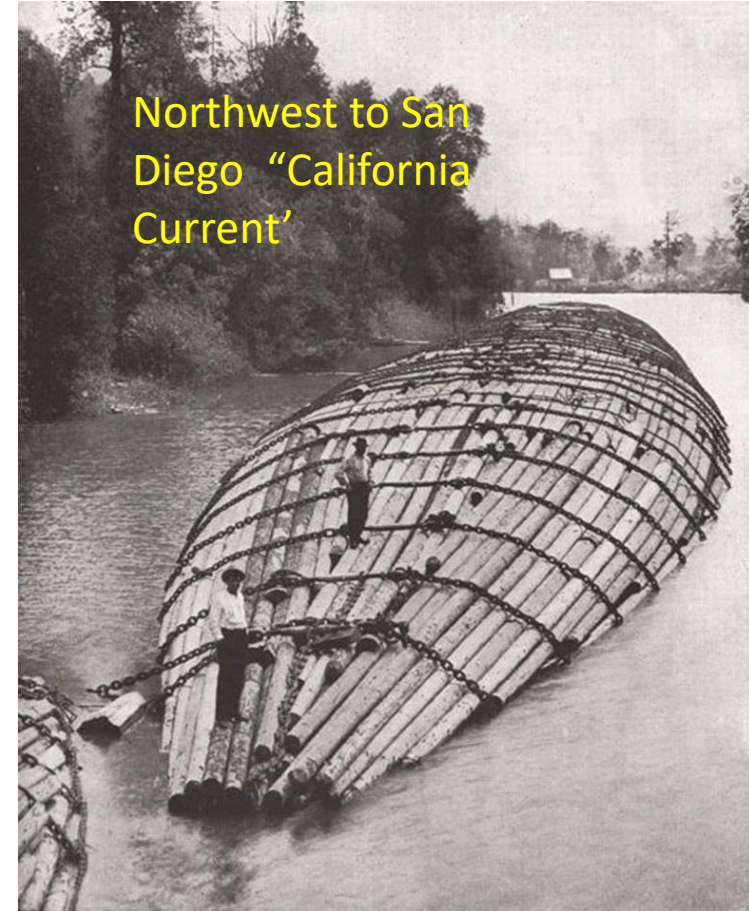
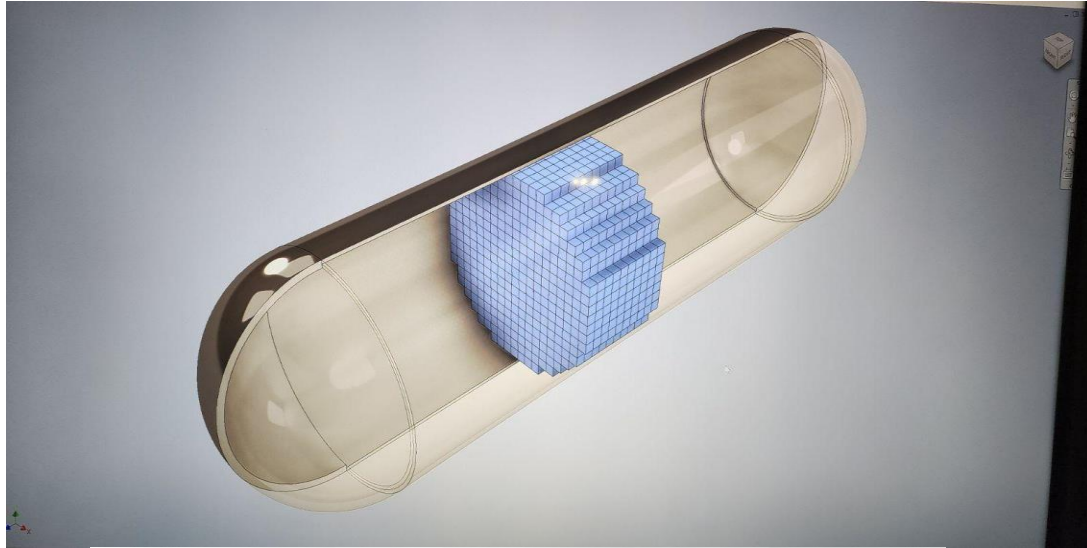
This group of options is focused on importing high-quality water from other regions using ocean routes to Southern California coastal areas. Potential sources of water include the Columbia River, rivers in Alaska, or icebergs. Delivery mechanisms include sub-ocean pipelines for Columbia River supplies, tanker ships for Alaskan river supplies, or tug boats for icebergs. *All of the options in this group require extensive transport or conveyance of water from the source regions to Southern California and require relatively complex facilities and operations to integrate the supply within the current water supply system in Southern California.*

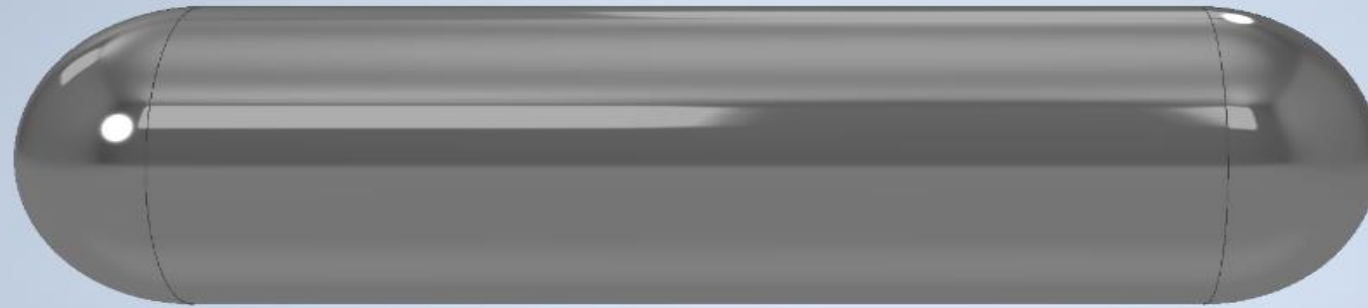
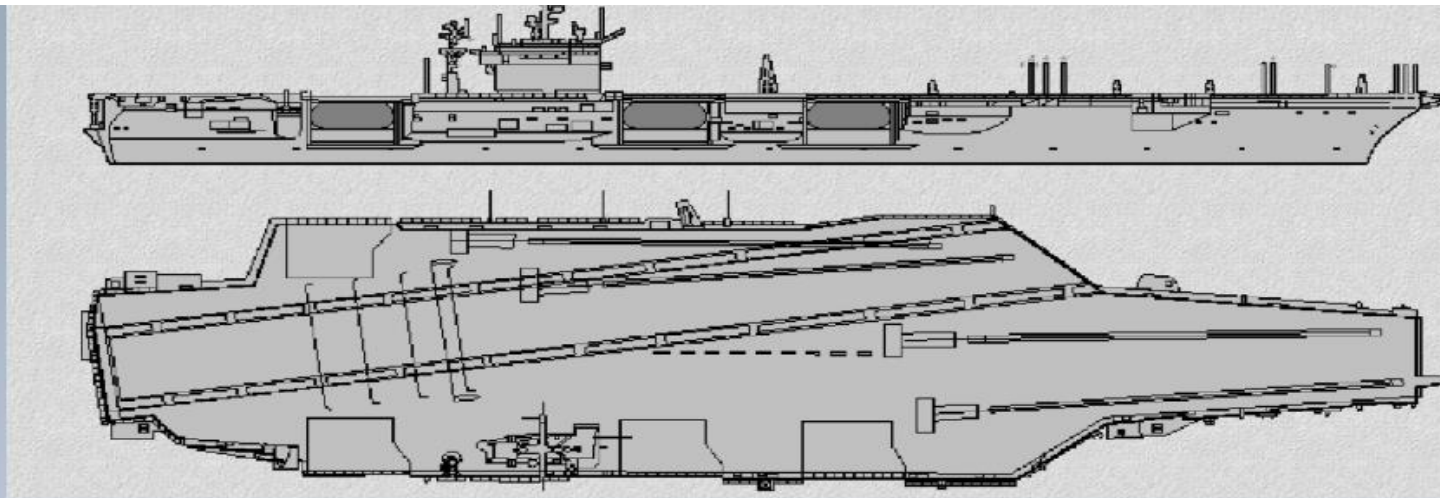
Four representative options were developed from this group of options to reflect the differences in potential location of imported water, modes of transport and conveyance, and associated impacts. The representative options are:

- Columbia River Imports
- Icebergs
- Tankers
- Water Bags

Where is the “ What If “ approach?

Large Scale Water Bundles for Ocean Transport and Offshore Storage

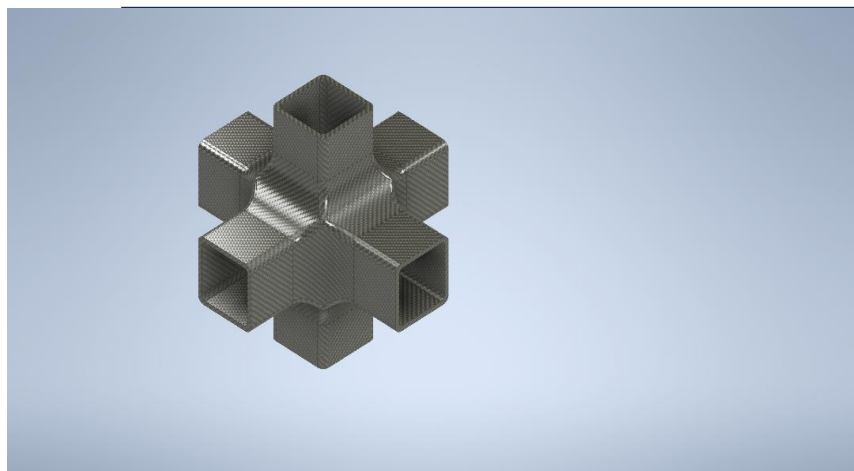
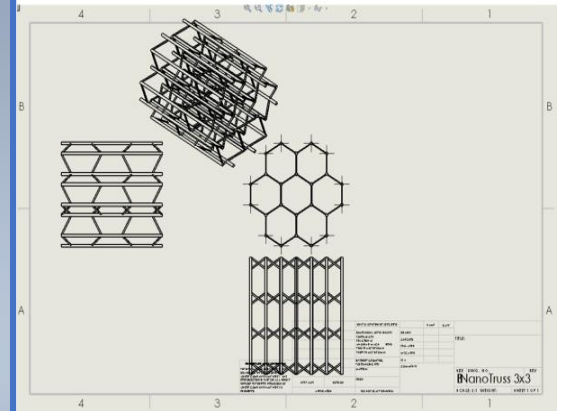
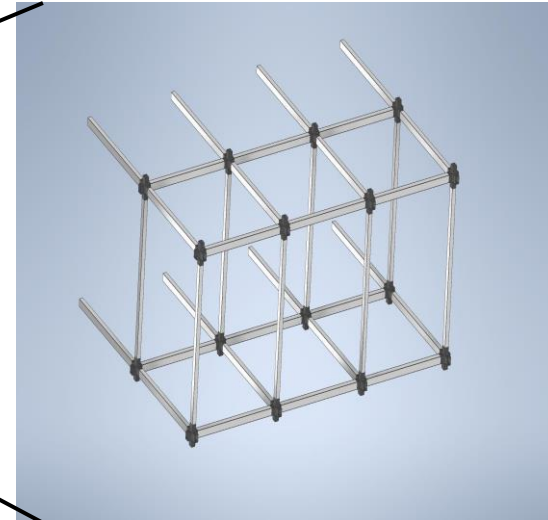
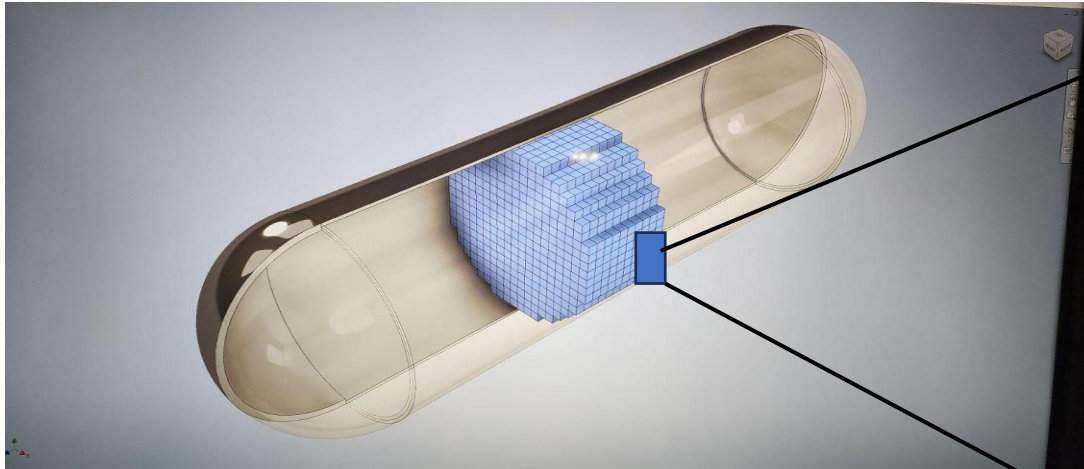




3000 acre feet
Dimensions 1200' x 330' 330'

One Billion Gallons
Made from buoyant plastic

Design challenge minimize cost by minimizing material
built in the water
depth



Sources

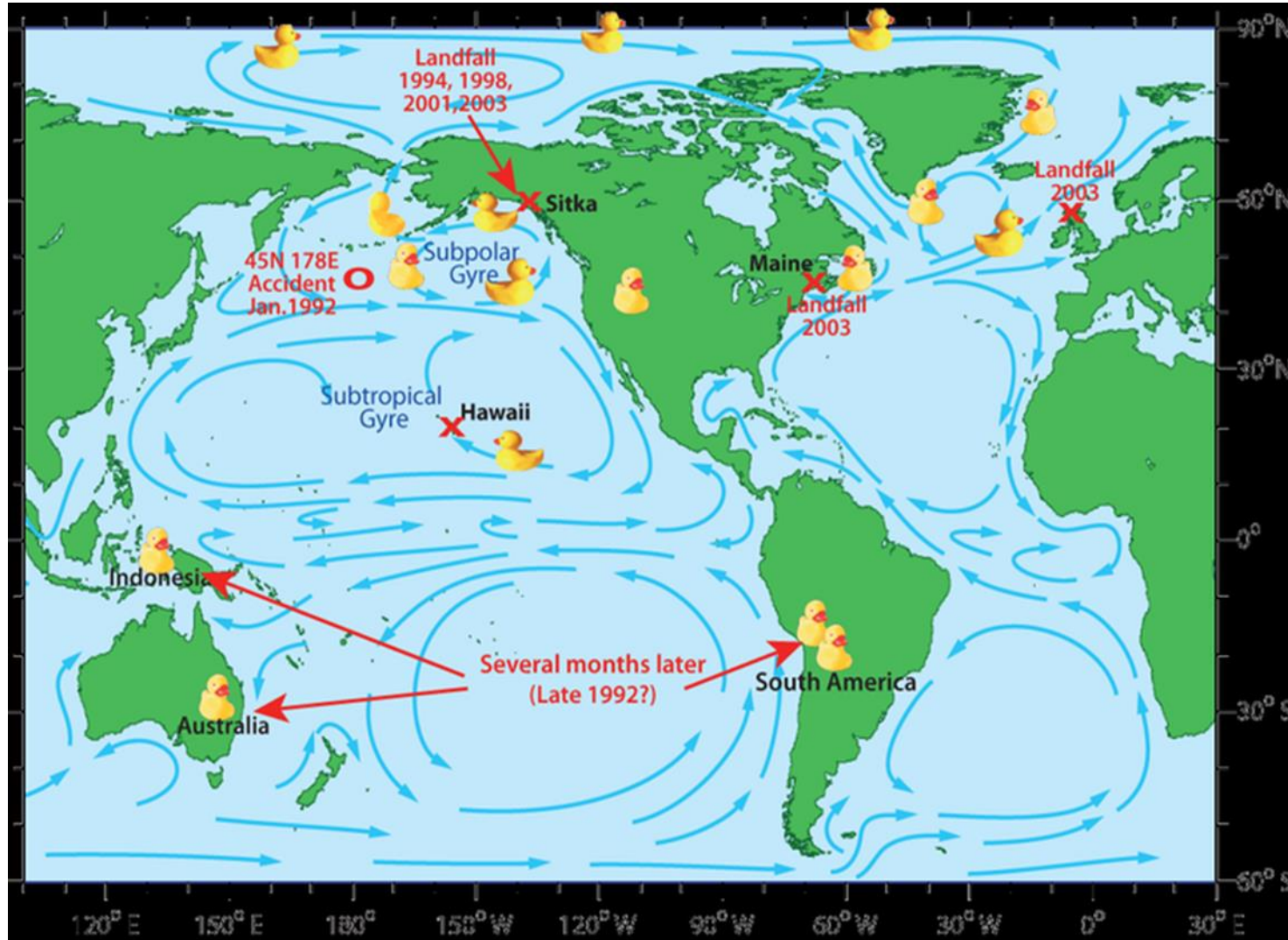
- North from Rivers
- Southeast Coastal Alaska (Sika), Aleutians Oregon (Columbia River) and Canadian Rivers.
- Favorable Currents
- South and Southwest
- Los Angeles is 2300 miles from the Equator
- Kiribati 3300 miles from LA
- Colorado River Headwaters are over 1500 miles from LA
- Ocean capture of ITCZ (itch)

Intertropical Convergence Zone



<https://en.wikipedia.org/wiki/File:IntertropicalConvergenceZone-EO.jpg>

Ocean Currents



Next Steps

- Partner with water authority
- MWD of So Cal, So Nevada Water Authority, Arizona etc.
- San Diego or even Coastal Mexico
- Utilize University Access for low cost but high quality design and costs study (\$7500) Cap Stone Project
- Students are graded, not the project (removes bias)