Eco Friendly Marina Planning

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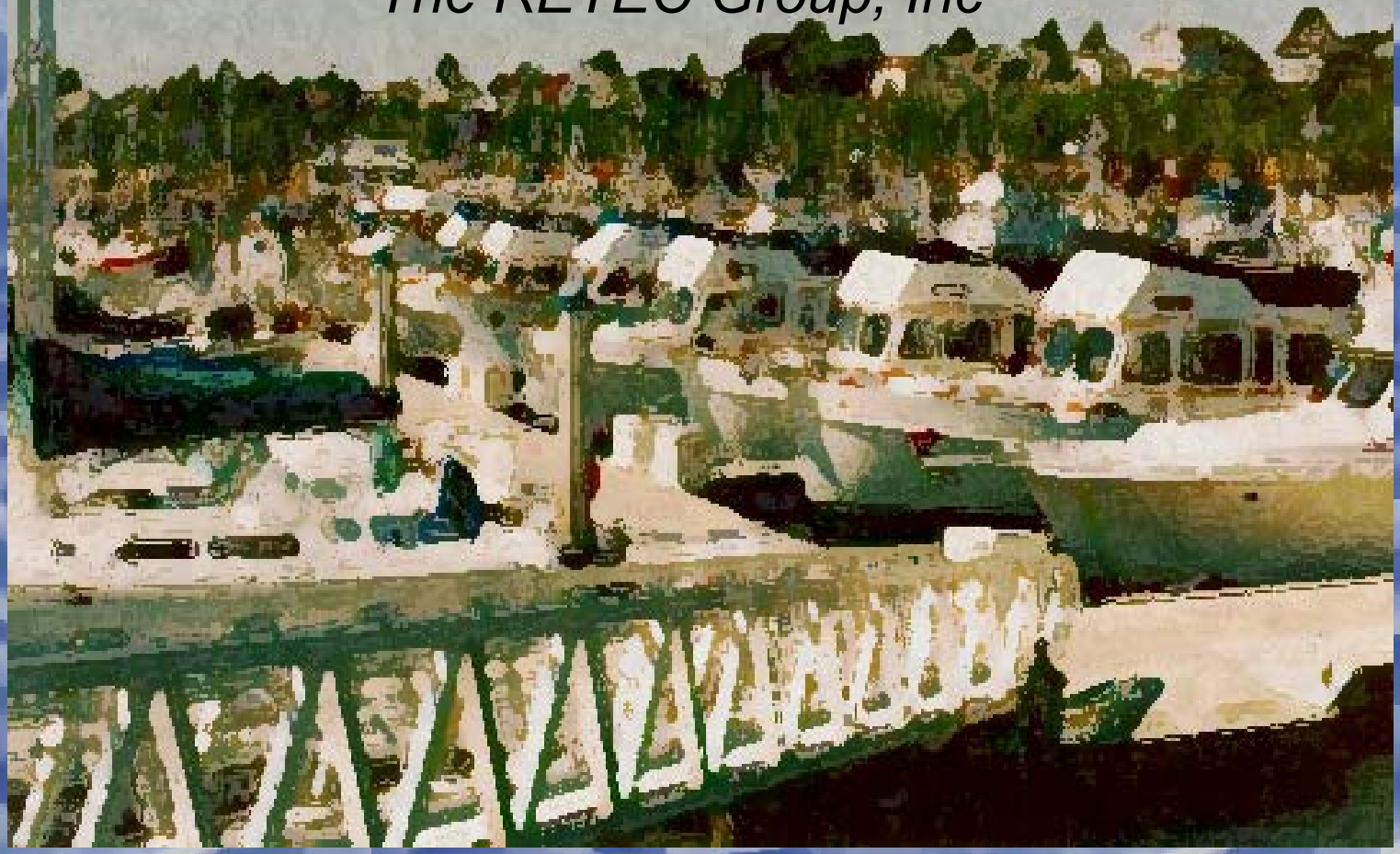
The RETEC Group, Inc

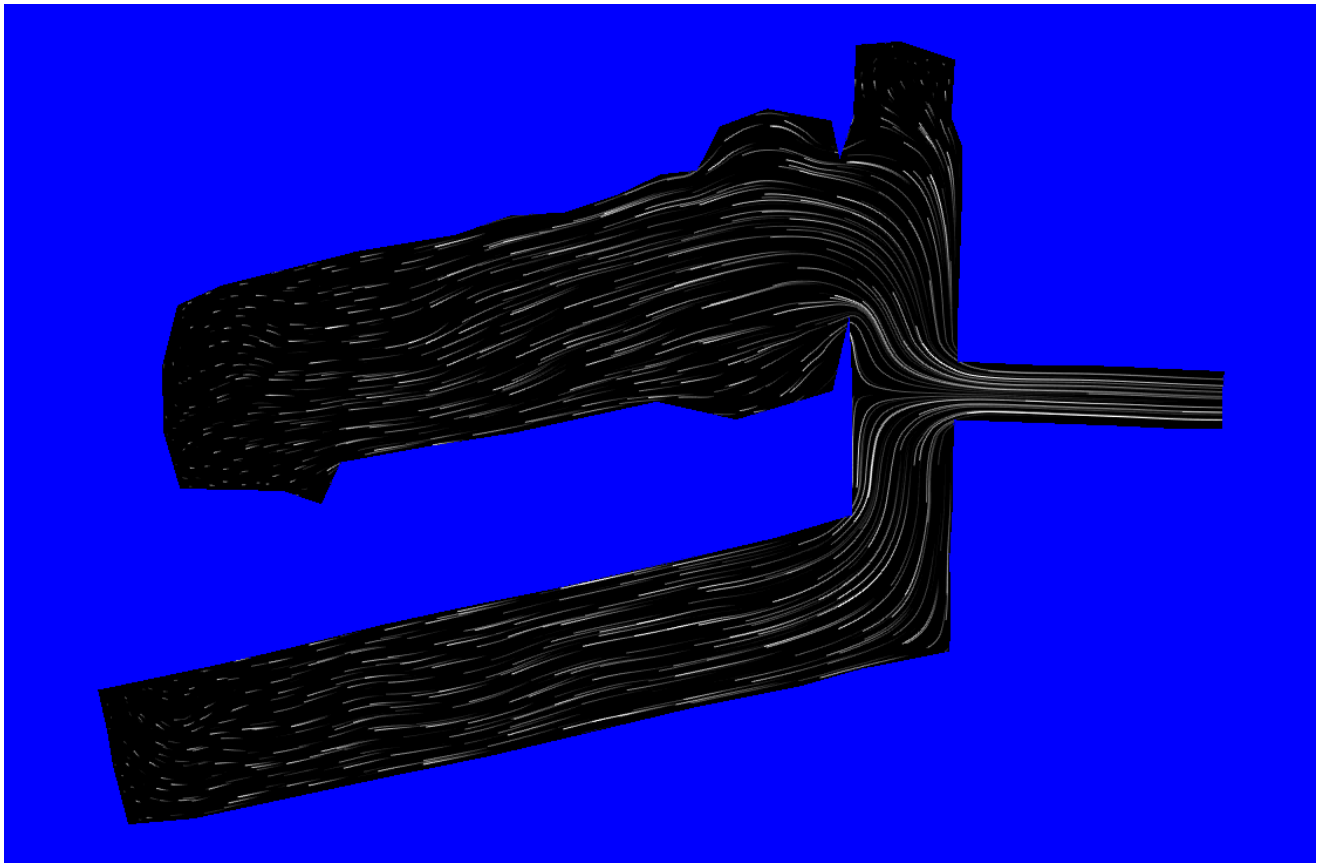


Harbor Definition

- Approach
- Entrance
- Interior
- Adjacent shore

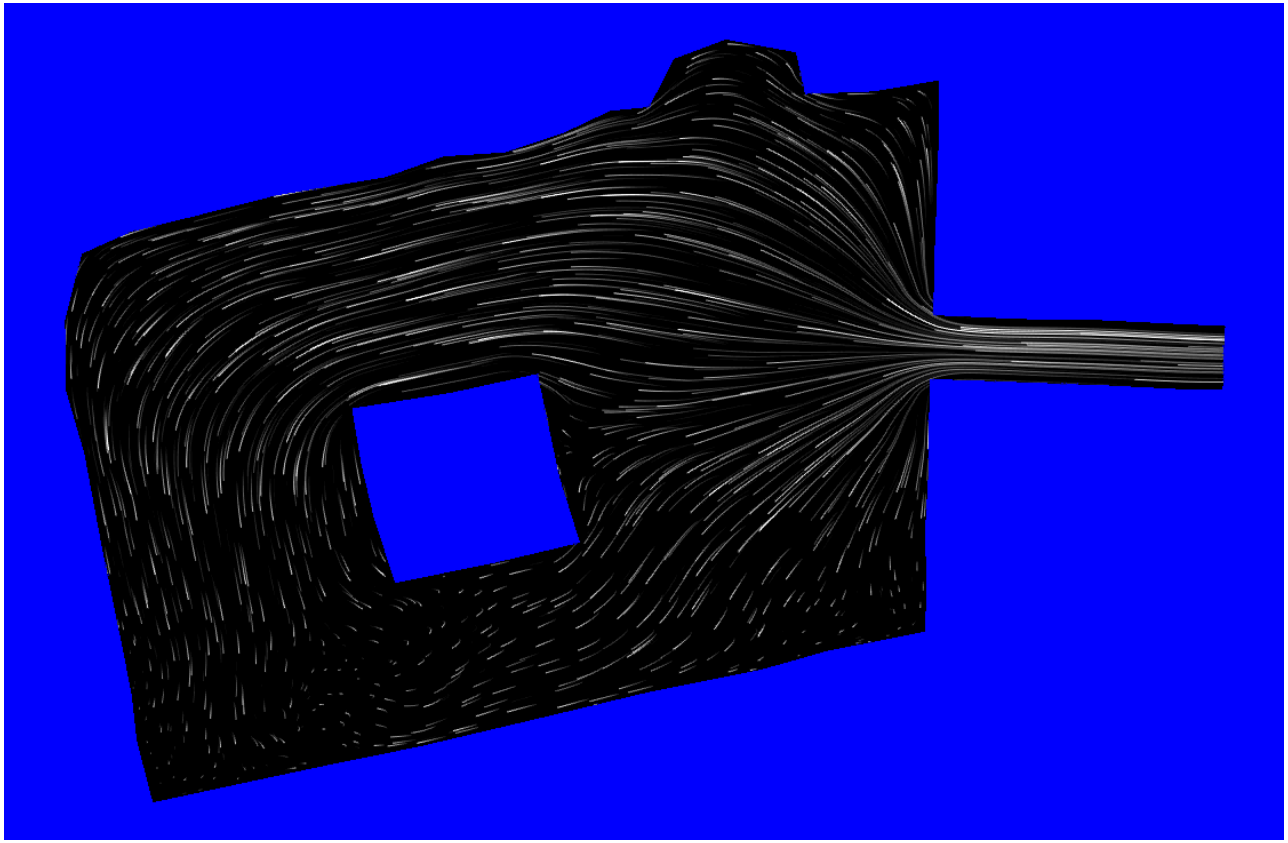
Modern Marina Design Considers Water Quality as the "Green" Standard

Linear Basin Flushing Behavior



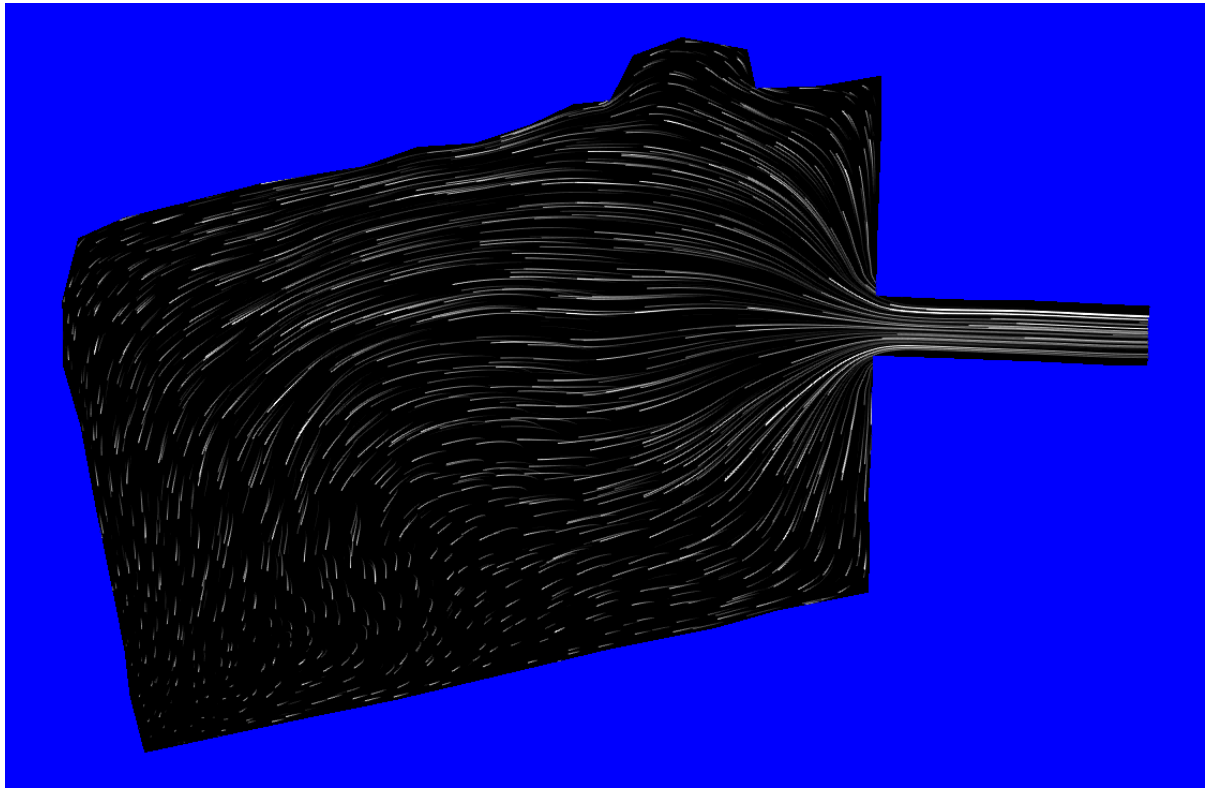
- *Poor water exchange to back of basins*

Island Basin Flushing Behavior



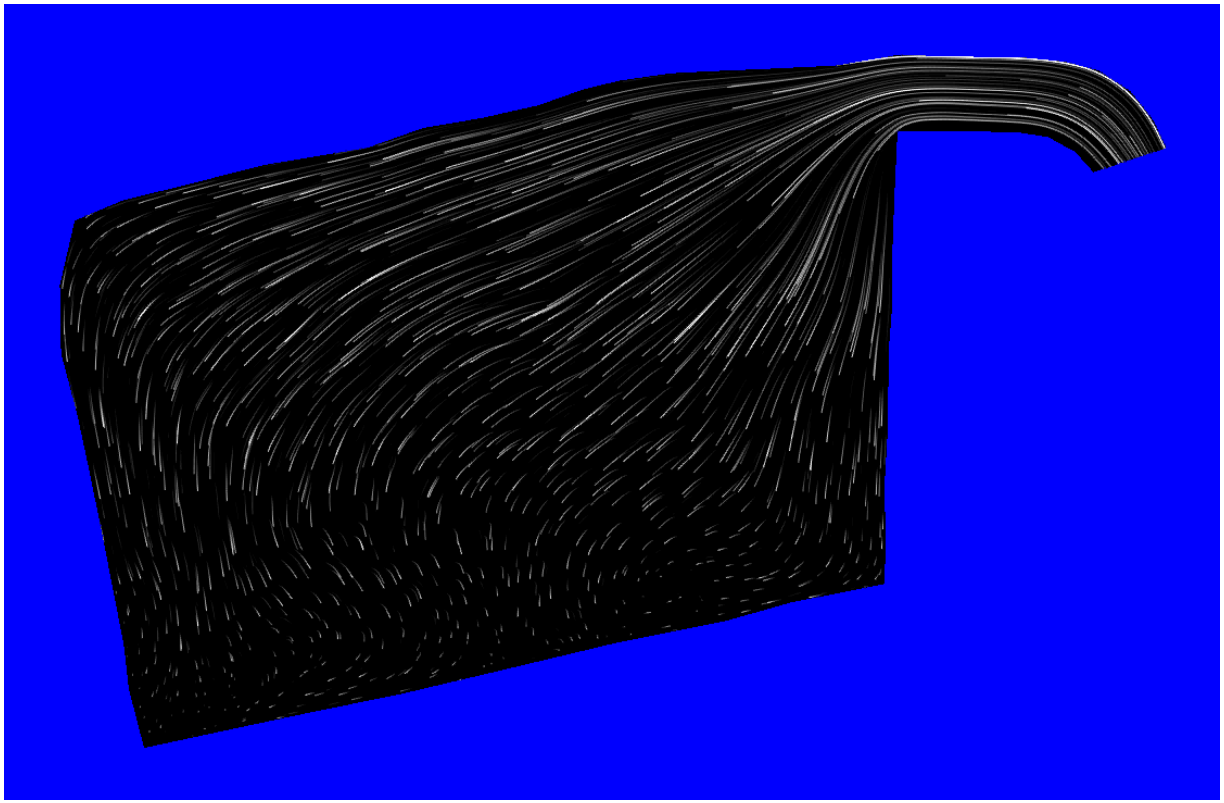
- *Reasonable circulation with 75% open basin*

Open
Low-Aspect Basin Flushing



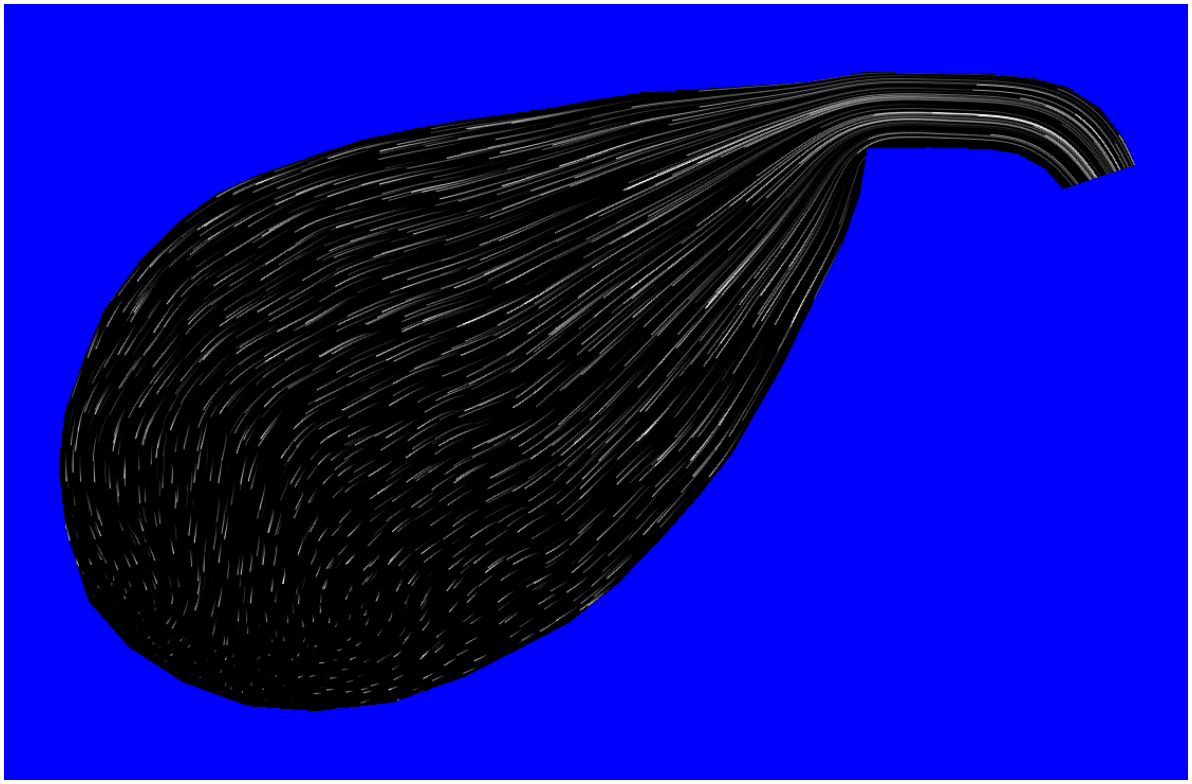
- *Better circulation except in corners*

Offset Entrance Flushing Behavior



- *Strong circulation around basin*

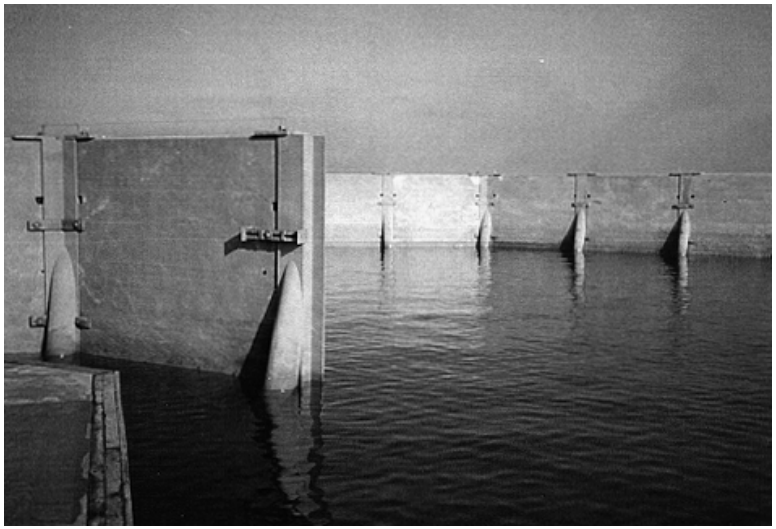
Teardrop Basin Flushing Behavior



- *Full flushing and circulation*

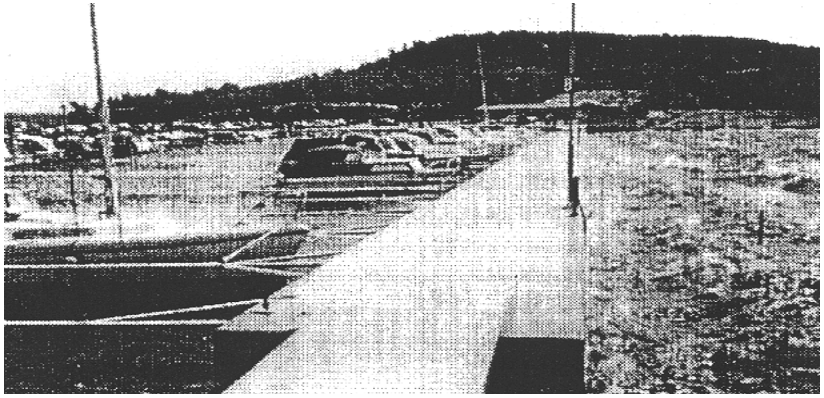
Typical Harbor Protection Needs

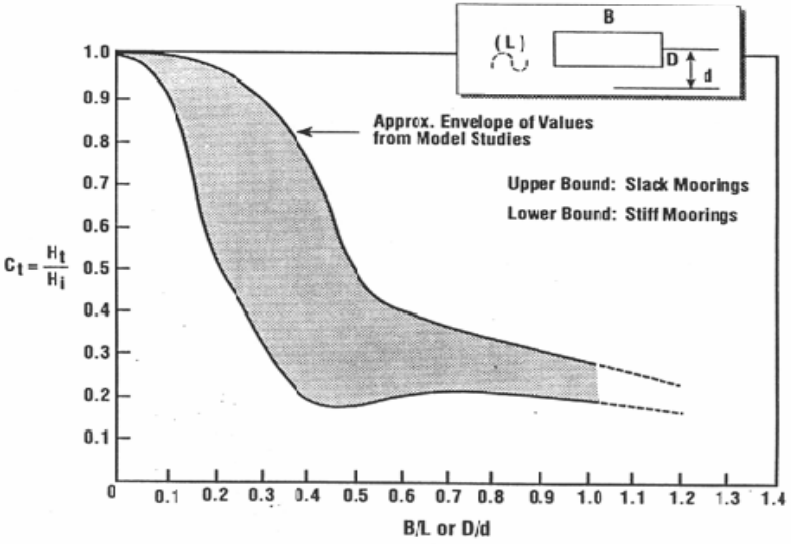
Breakwaters



- *As the Engineer wanted it*
  - *Wide footprint*
  - *Solid core/blocks waves*
  - *Rough/porous surface*
- *As the Regulators dictated it*
  - *Zero footprint/ Open/porous near bottom*
  - *Partially blocks plus reflects waves*

Floating Attenuators

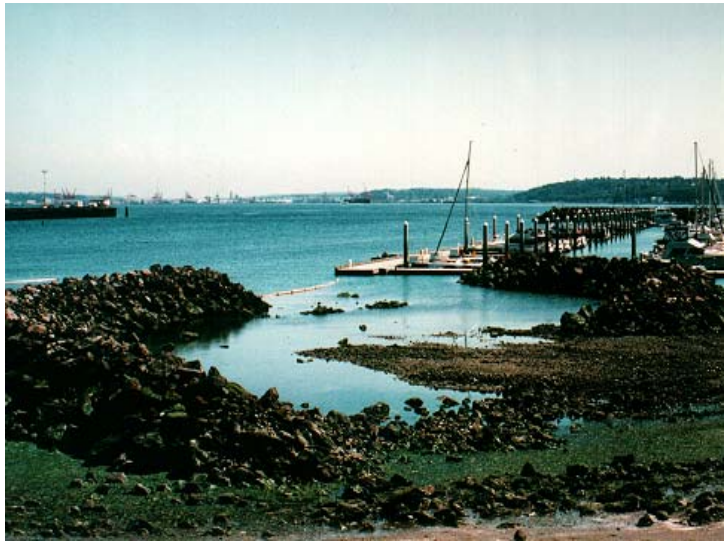




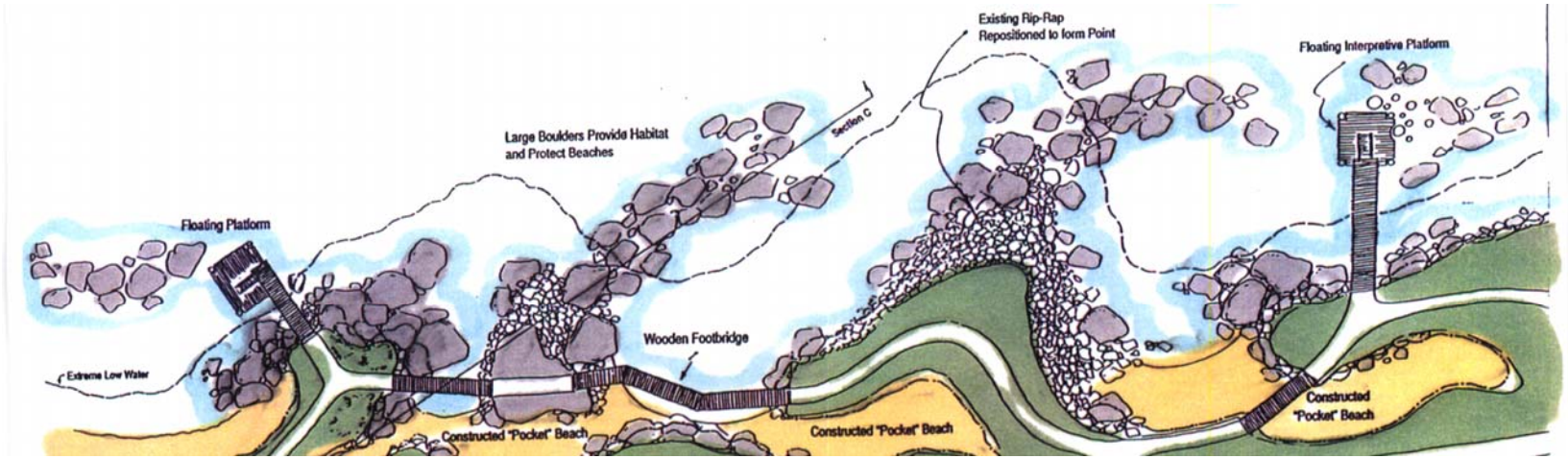
- *Partially block waves*
- *Only work up to 3 – 4 second wave periods*

- *Floats may need to reach to half the water depth to work*
- *Floats may need to be 30 ft wide to work*

Typical "Green" Shoreline Details



- *Target specific habitat types*
- *Develop 3-D solutions for hydraulics and behavioral needs*
- *Incorporate aesthetic elements*



"Green" designed Breakwaters and Shoreline Protection

- *Replace continuous walls and revetments with segmented structures and beaches*
- *Reverse engineer structure composition to conform with the biotic community needs*

Properly Detailed Harbors Offer Tranquility and Good Water Quality

- Curved basins flush better and are more tranquil

- Rectangular basins have poor circulation and are agitated

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Planning to Reality