

# Shoreline and Dock Modifications in Lake Washington



Jason Toft

Wetland Ecosystem Team  
School of Aquatic and  
Fishery Sciences  
University of Washington  
Seattle, WA



Lake Washington 1891



Lake Washington 2001



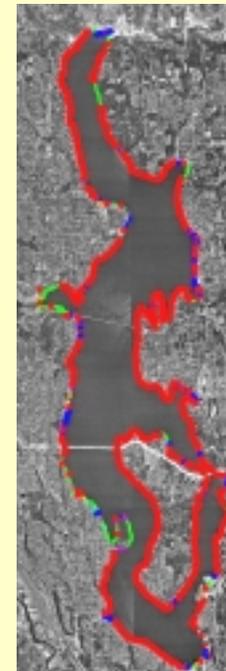
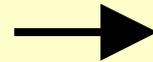
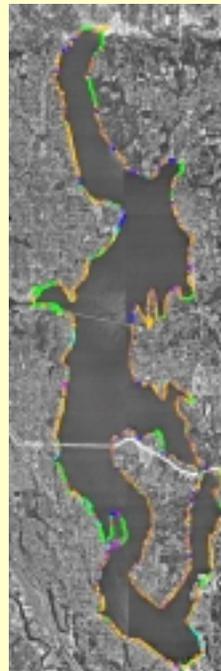
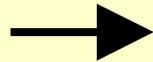
**Objective:** estimate to what extent the historical shoreline of Lake Washington has been modified by docks and shoreline retaining structures

→ juvenile endangered chinook salmon use the littoral zone in Lake Washington for rearing and migration to the ocean.

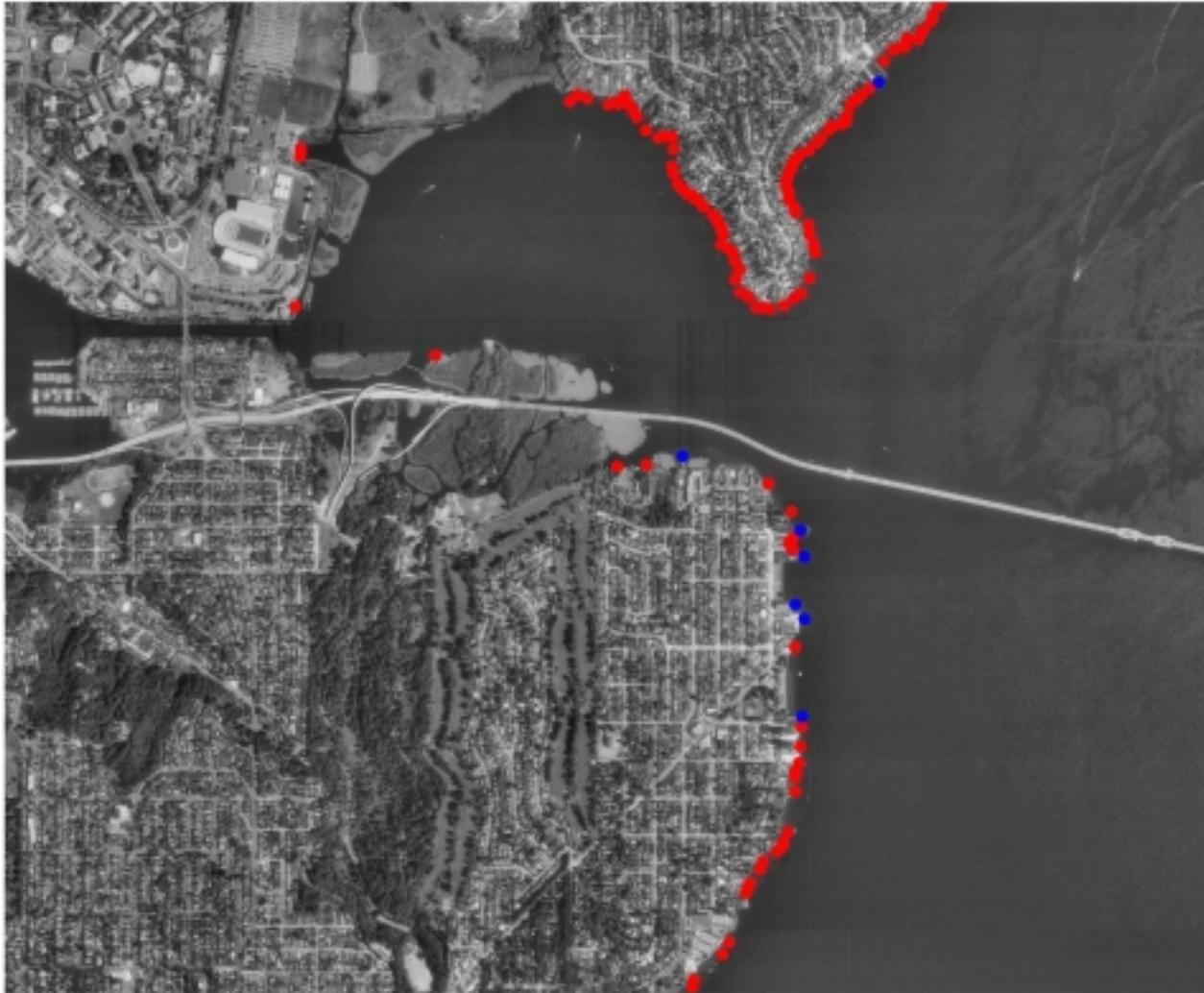


# Methods

1. Obtain Digital Orthophoto and Georeference Aerial Photographs (UW and Doug Houck).
2. Field Survey Shoreline Structures and Habitats.
3. Incorporate into GIS



# Dock Count



1 0 1 Miles

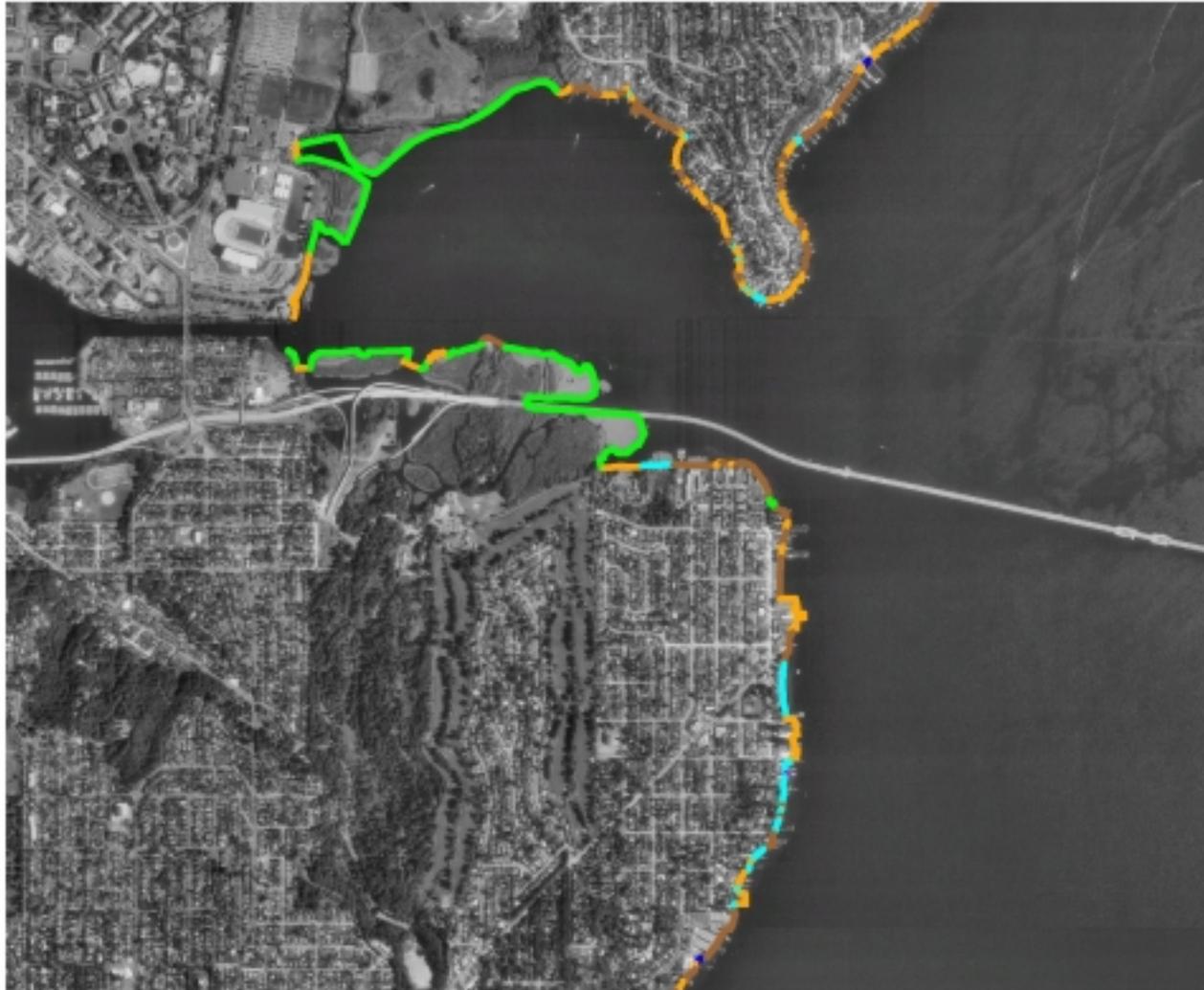
1. Hockett 1976: counted docks from 1942 to 1974.
2. Count docks from aerial photographs for the years 1962, 1974, 1990, and 1999.
3. Field Surveys: Sept. 2000 measurements of high/low docks, attached buildings/floating docks.

Docks90

- Recreational Docks
- Large Marina Docks



# Shoreline Classification



1. Field Surveys: Sept. 2000 - Shorelines categorized as retained structure **riprap, vertical bulkhead, sloping bulkhead** and unretained shoreline **beach, naturally vegetated, landscaped.**

## Shoreline Structures

-  Riprap
-  Bulkhead - Vertical
-  Bulkhead - Sloping
-  Beach
-  Unretained - Natural Vegetated
-  Unretained - Landscaped
-  Pilings

1 0 1 Miles



# Shoreline General Habitat Surveys



1. Field Surveys: general categories of substrata, shoreline energy exposure, shoreline geomorphology, and upland cover.

## Substrata

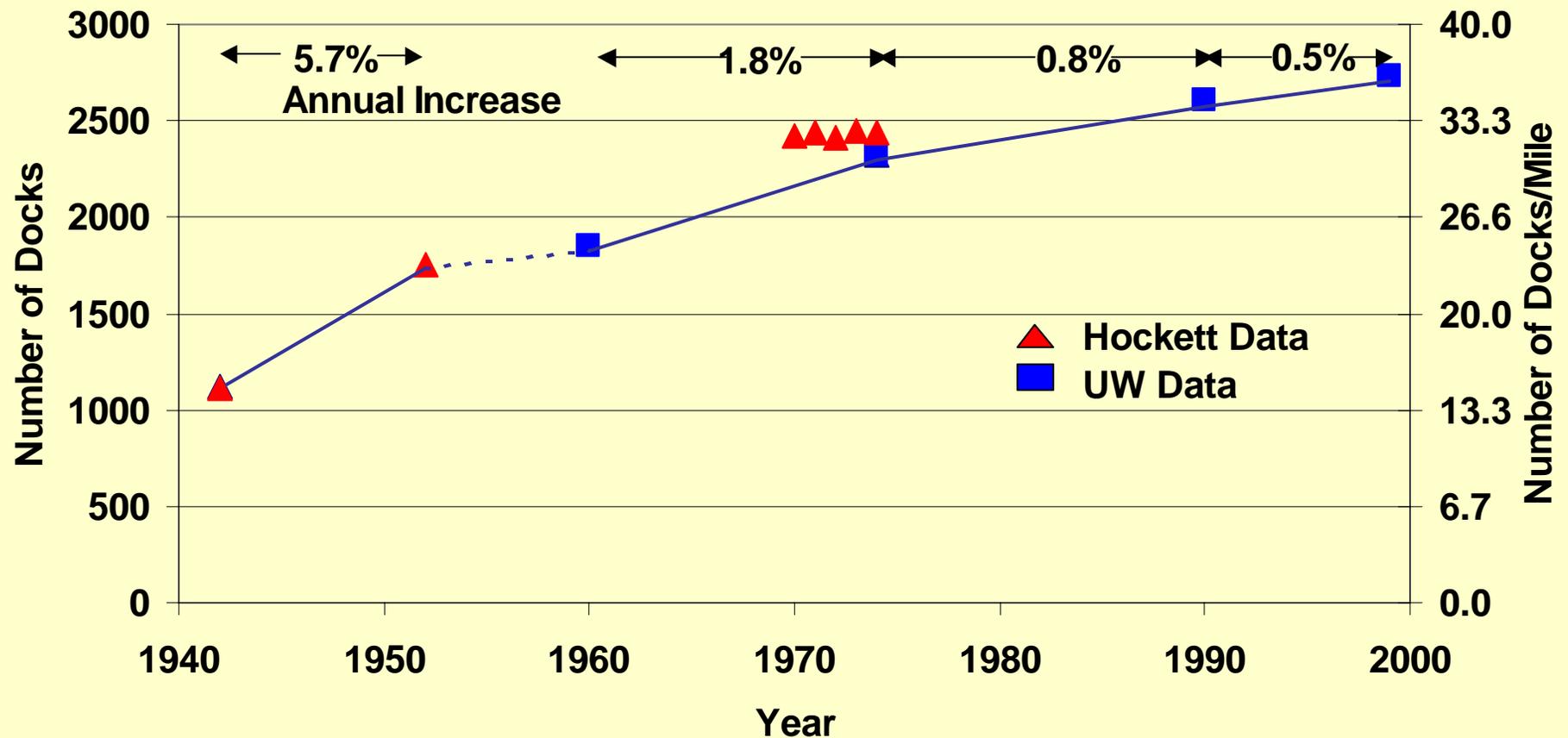
-  Mixed Coarse
-  Gravel
-  Sand
-  Mixed Fine
-  Mud
-  Organic
-  SAV
-  Unaccessible

1 0 1 Miles



# Dock Counts

✦ year 2000 = 2,737 docks



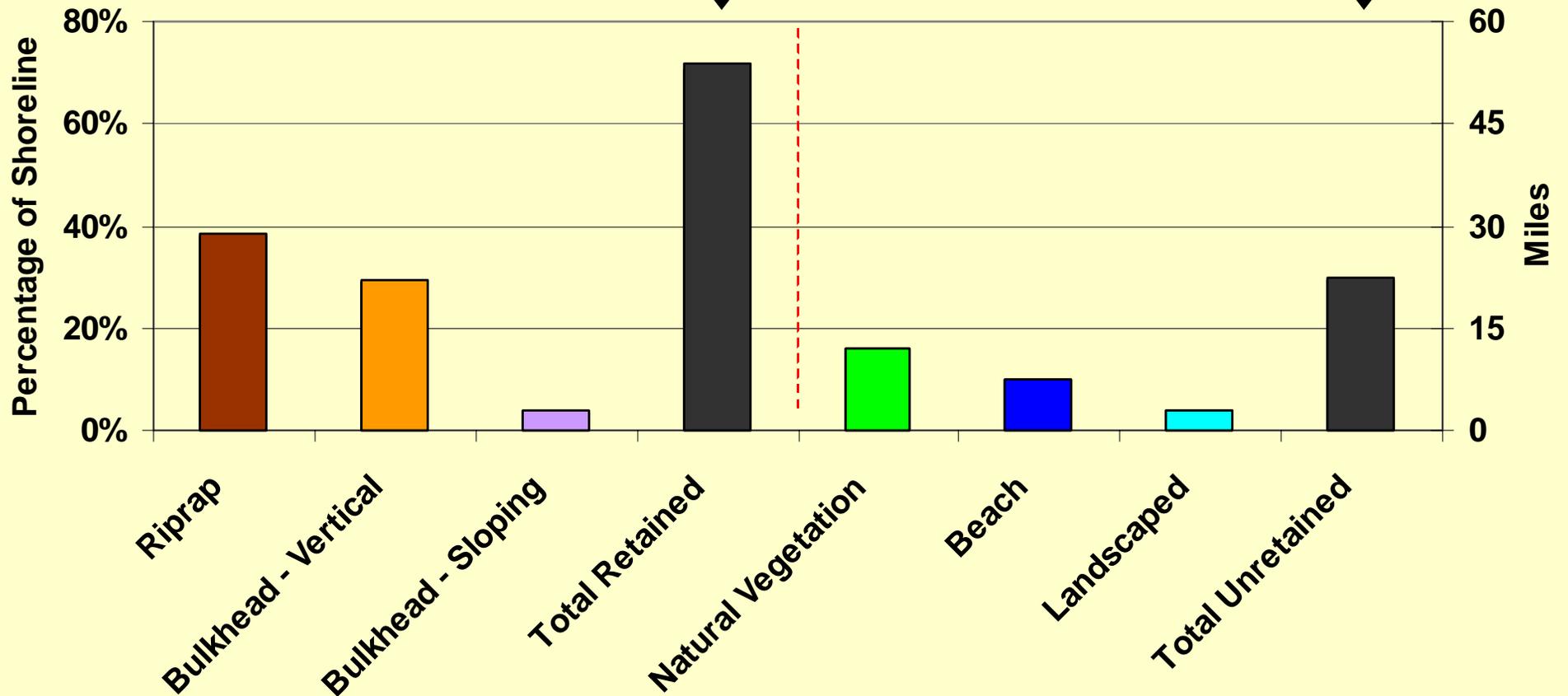
**More Details > increase of large marina piers vs. recreational, also with/without attached building, floating dock, high/low above water (2m).**

# Shoreline Structures

Lake Level:  
21.20–21.29 ft

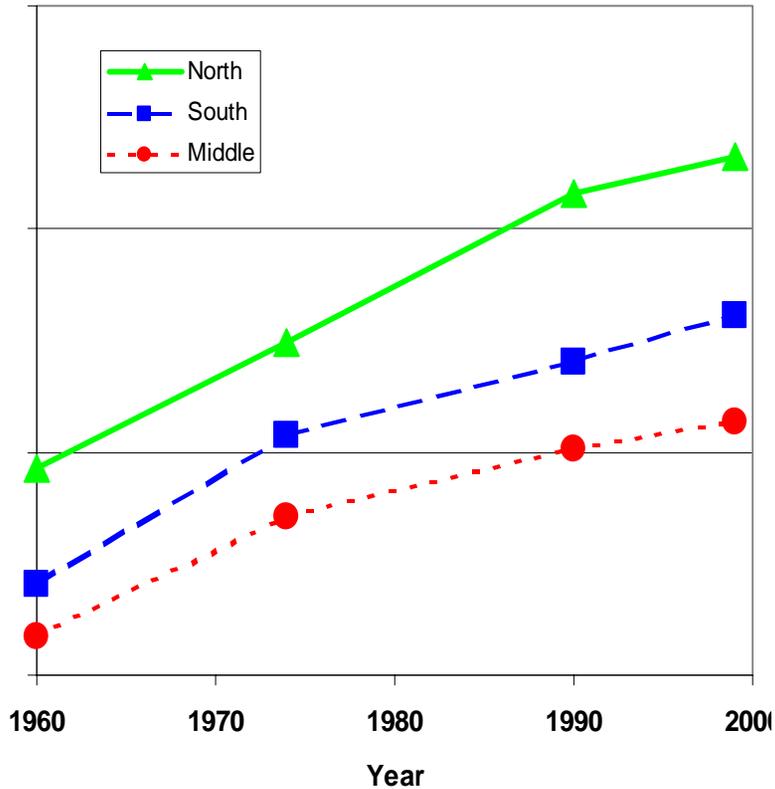
70.65%  
Retained

29.35%  
Unretained

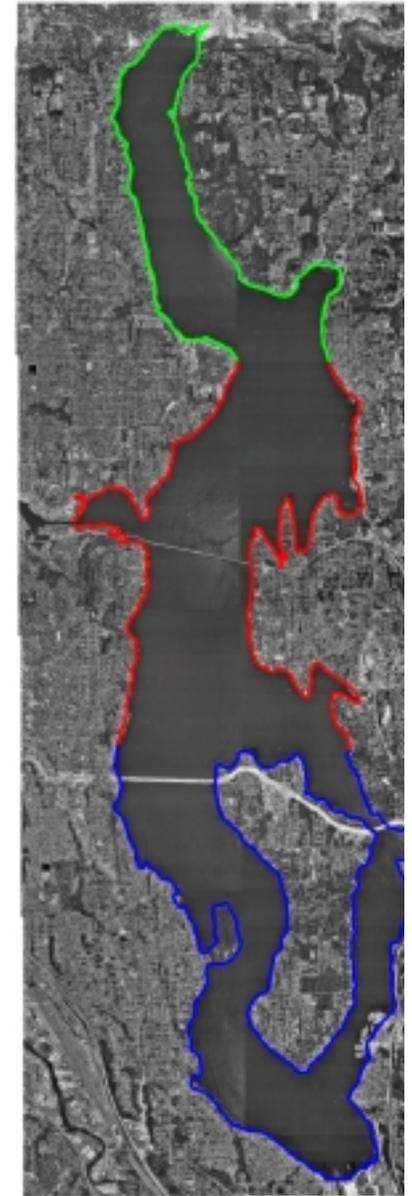
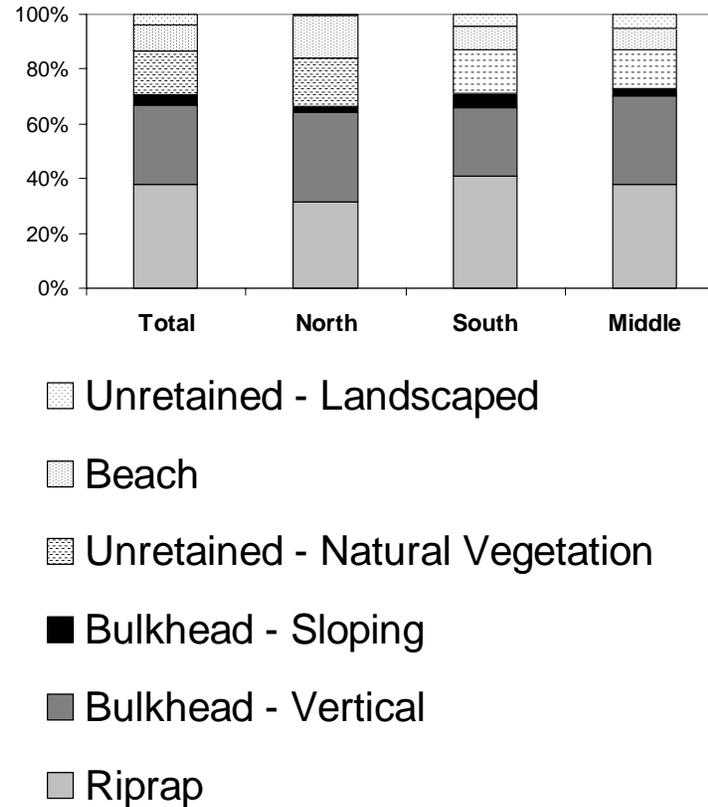


# Docks and Shoreline Types per Section of Lake Washington

Change in Dock Frequency

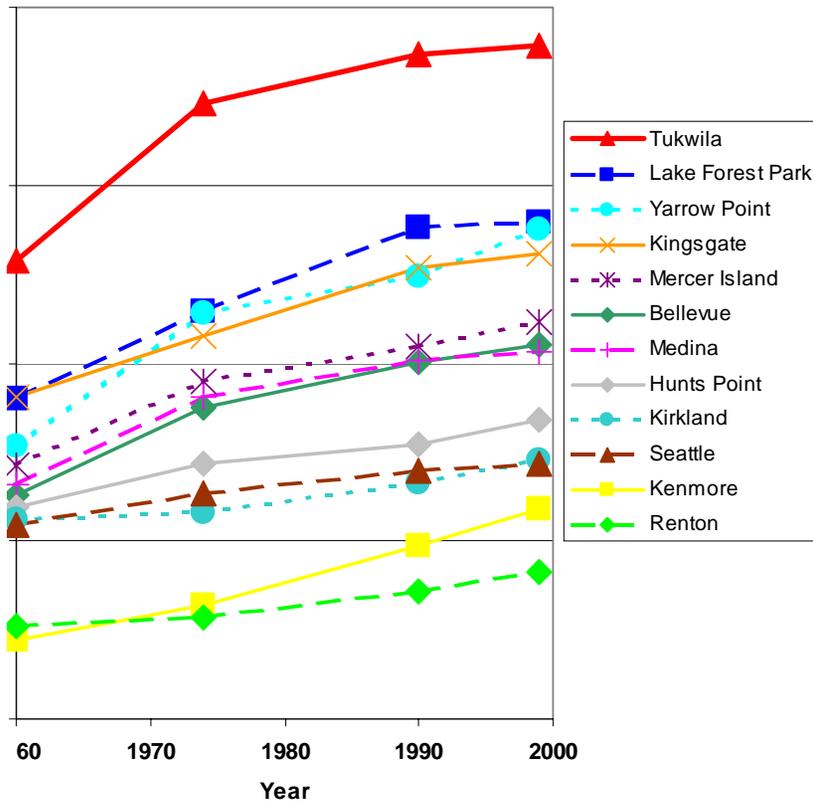


Percentages of Shoreline Type

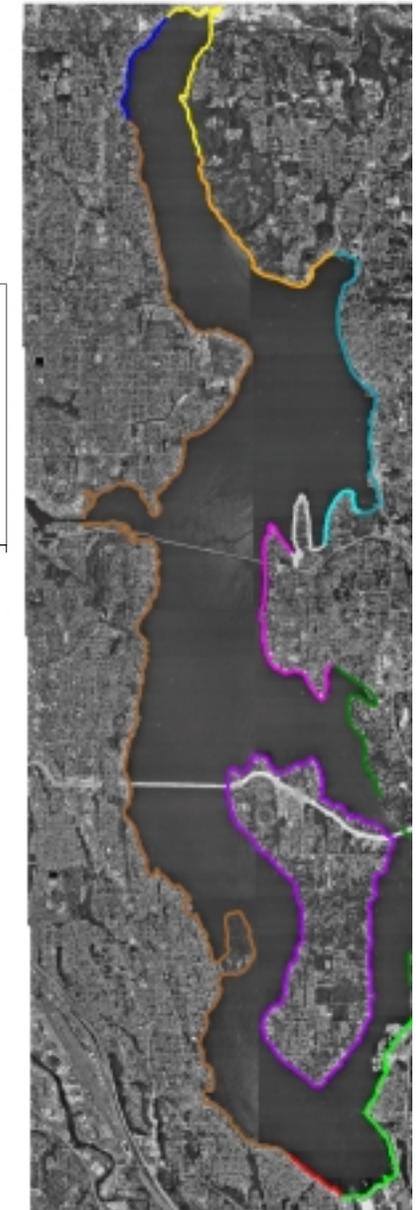
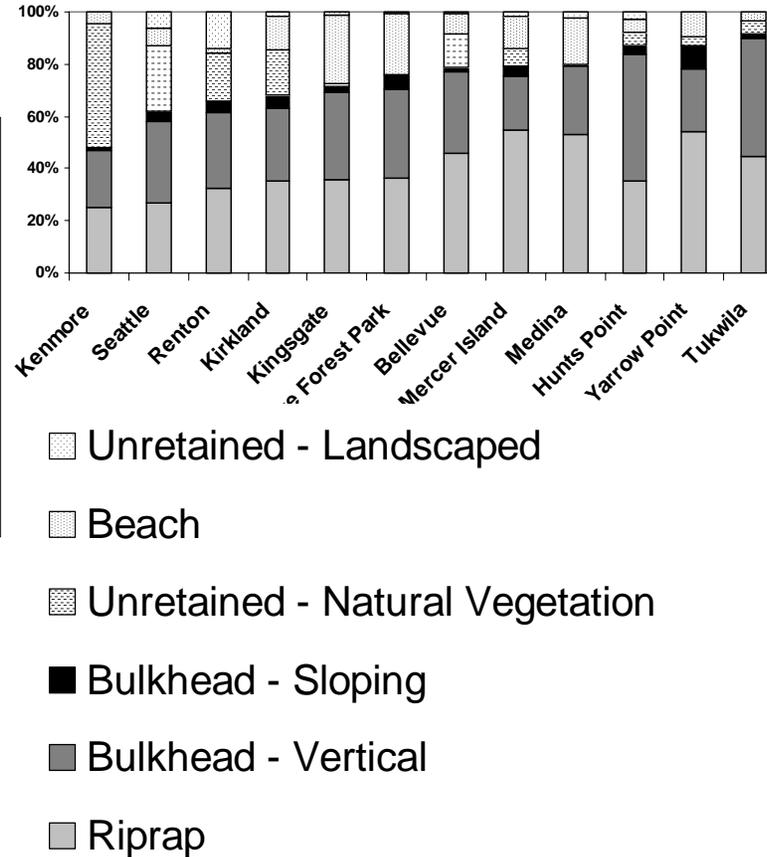


# Docks and Shoreline Types per City Jurisdiction of Lake Washington

## Change in Dock Frequency

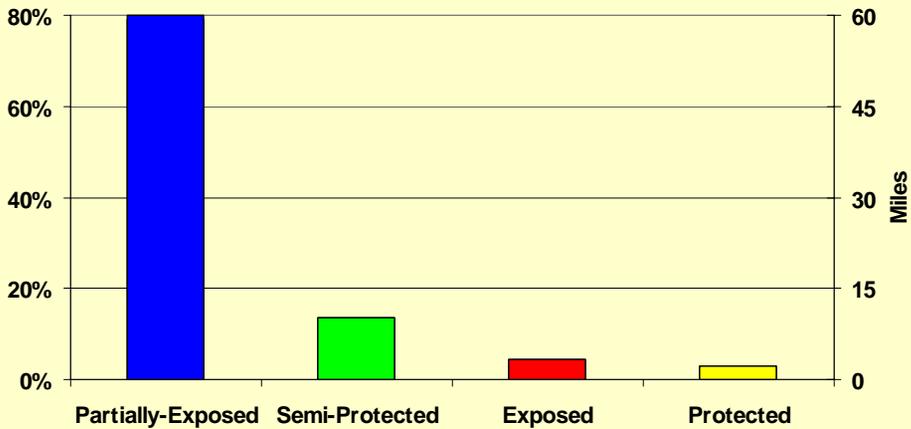


## Percentages of Shoreline Type

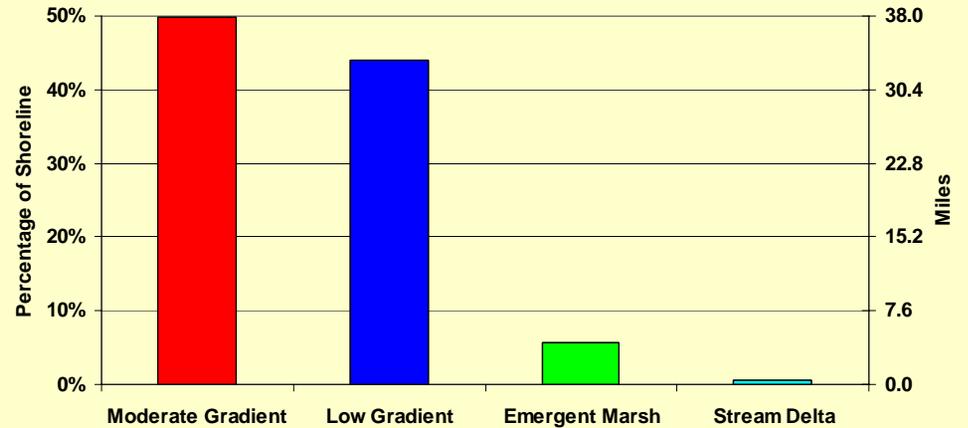


# Shoreline General Habitat Surveys

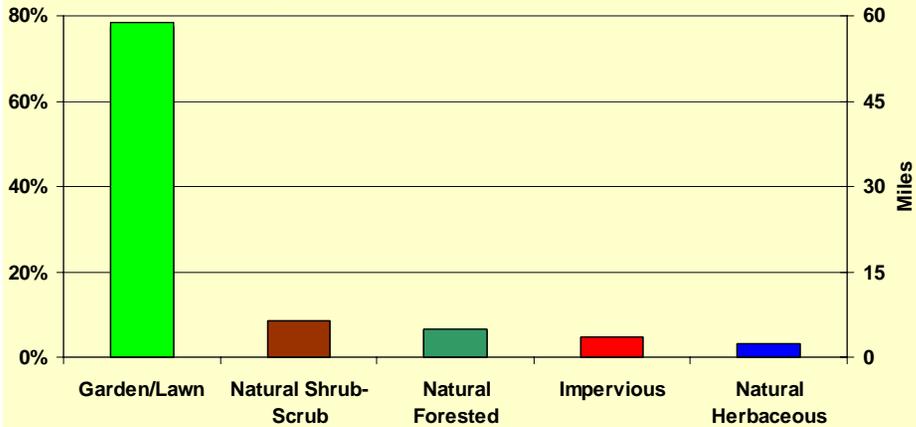
## Shoreline Energy



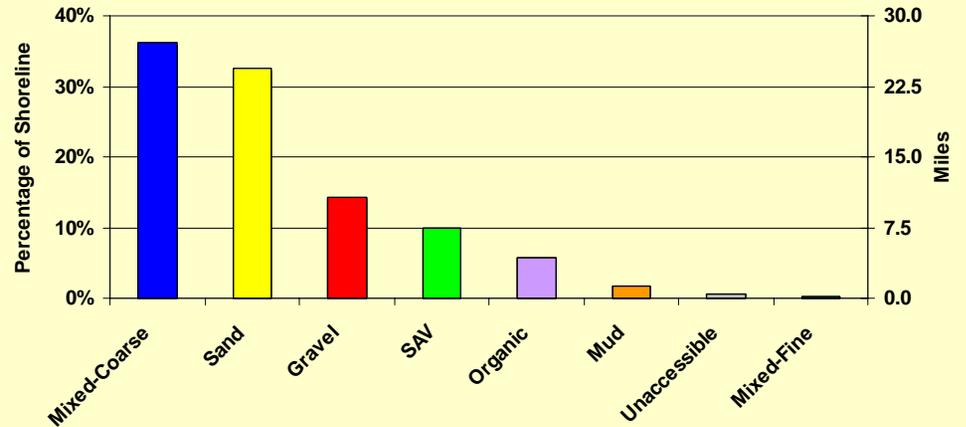
## Shoreline Geomorphology



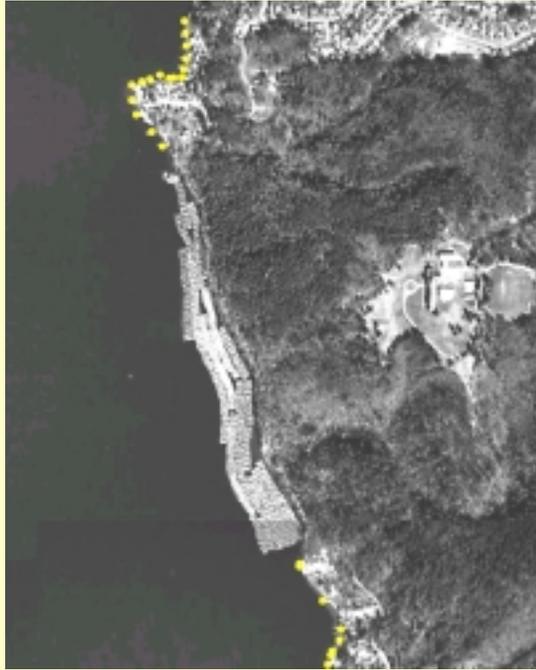
## Upland Cover



## Shoreline Substrate



# Conclusions



1974



1999

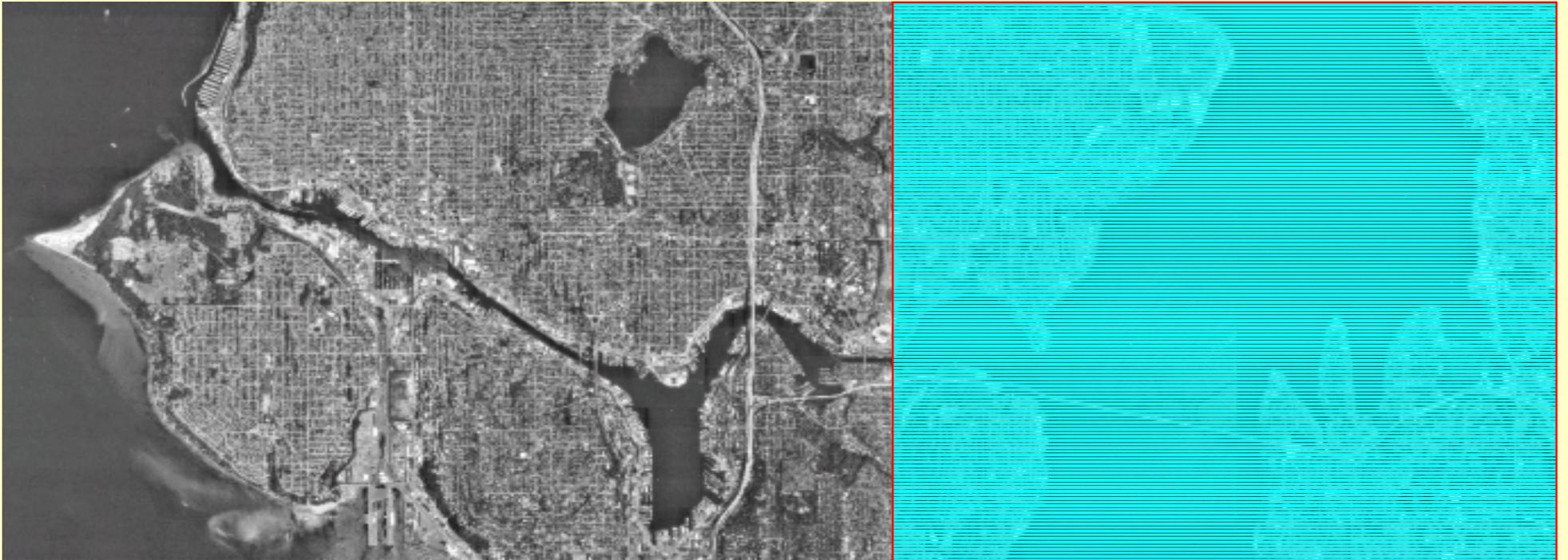


## Research Directions:

1. How Juvenile Salmonids, their prey resources, and their predators react to docks and shoreline modifications as opposed to natural habitats.

# Ongoing Research

Ship Canal ← Lake Washington



## Shoreline and Dock Modifications in Lake Washington

JD Toft

Prepared for King County Department  
of Natural Resources



University of Washington  
SCHOOL OF AQUATIC  
& FISHERY SCIENCES

<http://www.fish.washington.edu/>

→ publications site  
→ online pdf #106

[tofty@u.washington.edu](mailto:tofty@u.washington.edu)