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A Hierarchical Approach to the Classification of Bays and Estuaries in Southeast Alaska

The Alexander Archipelago in southeastern Alaska represents one of the largest and most complex estuarine ecosystems on earth. The purpose of this project is to develop a spatial framework to characterize the diversity and distribution of estuarine and nearshore habitats that reflects hierarchical relationships among ecological processes in the region. These range from climatic factors affecting large areas, hydrologic forces that affect large and intermediate bays down to local habitat characteristics that influence individual shoreline segments and estuarine stream channels.

Key to Symbols:

A Hierarchy of Coastal Ecological Units

- Zone of Climate / Maritime Influence
- Coastal Marine Basins
- Coastal Marine Sub-Basins
- Coastal Watersheds
- Shoreline Units

Depth



A Hierarchical Spatial Framework for Classification of Complex Estuarine Ecosystems

To describe the hierarchical nature of estuarine systems, and spatial complexity of watersheds in Southeast Alaska, we developed a framework to characterize ecological systems at a range of spatial scales as have been developed in terrestrial (Chapin et al. 1997) and freshwater ecology (Maretzke et al. 1998; Higgins et al. 2005).

1. Marine Zones

The North American Pacific Hydrologic and Climatic Zones are recognized as critical life zones based on the presence and absence of major climate factors, major biological features, and major biotic interactions.

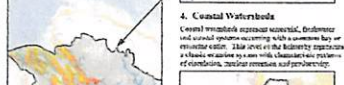
2. Coastal Basins

Coastal basins represent primary estuarine and nearshore ecosystems. They are defined by the Pacific Coast Range and the Alaska Peninsula, and are subdivided into the Pacific Coast Range, the Alaska Peninsula, and the Alaska Range. The Alaska Range is the divide between the Pacific Coast Range and the Alaska Peninsula.



3. Coastal Sub-Basins

Coastal sub-basins are smaller estuarine and nearshore ecosystems. They are defined by the Pacific Coast Range and the Alaska Peninsula, and are subdivided into the Pacific Coast Range, the Alaska Peninsula, and the Alaska Range. The Alaska Range is the divide between the Pacific Coast Range and the Alaska Peninsula.



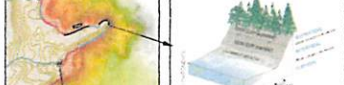
4. Coastal Watersheds

Coastal watersheds represent estuarine, freshwater, and nearshore ecosystems. They are defined by the Pacific Coast Range and the Alaska Peninsula, and are subdivided into the Pacific Coast Range, the Alaska Peninsula, and the Alaska Range. The Alaska Range is the divide between the Pacific Coast Range and the Alaska Peninsula.



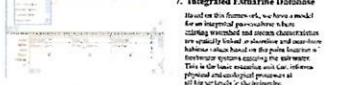
5. Shoreline Units (along shore)

Coastal ecosystems with specific spatial complexity of shoreline features and biological interactions. They are defined by the Pacific Coast Range and the Alaska Peninsula, and are subdivided into the Pacific Coast Range, the Alaska Peninsula, and the Alaska Range. The Alaska Range is the divide between the Pacific Coast Range and the Alaska Peninsula.



6. Tidal Zones (across shores)

Tidal zones are defined by the Pacific Coast Range and the Alaska Peninsula, and are subdivided into the Pacific Coast Range, the Alaska Peninsula, and the Alaska Range. The Alaska Range is the divide between the Pacific Coast Range and the Alaska Peninsula.

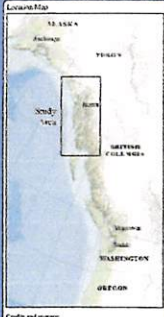


7. Integrated Estuarine Database

Based on this framework, we have a model for an integrated estuarine database that integrates spatial and temporal data on estuarine ecosystems across the region. This is the first such database in Southeast Alaska.

Estuarine Ecosystem Complex

The estuarine complex is characterized by interactions among terrestrial, freshwater and marine systems, as well as among biological processes between these systems. Key processes include tidal flow, sediment transport, and biological productivity, which are all influenced by the physical characteristics and habitat functions of individual estuarine ecosystems.



Credits and Acknowledgements

This work was supported by a grant from the National Science Foundation (NSF) and the National Oceanic and Atmospheric Administration (NOAA). We thank the following individuals for their contributions to this project: [List of names]

Map Data Sources

Map data were obtained from the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS).



SMALL FEMALE TRAPPED SKOWL
ARM P.O.W, UNIT 2 1976

LARGE MALE TRAPPED RAYMOND
COVE UNIT 1A MAINLAND 1976

BLACK DOTS ON MAP
WHERE THEY WERE CAUGHT

OVER →