

Ecology and Habitat

The background image shows a rugged coastal landscape. In the foreground, there are large, dark, wet rocks covered in thick, dark seaweed. The rocks are scattered across the lower half of the frame. In the middle ground, a line of lighter-colored, reddish-brown rocks or a path runs horizontally across the scene. Behind this, a dense forest of green coniferous trees covers a hillside that rises towards the top of the frame. The sky is a clear, pale blue, occupying the upper portion of the image.

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Rockweed Research Priorities Symposium
10 February 2010

Overarching Questions

- Why is knowledge about ecology and habitat important?
- What do we know about the ecology of places where rockweed grows?
- What do we know about ways rockweed serves as habitat for other species?
- What are our gaps in knowledge about rockweed ecology and habitat?

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Why is knowledge about ecology and habitat important?

- Nutrient Cycling/Budgets (turnover, carbon, energy)
- Nearshore Physical Affects
 - Currents, Storms, Run-off
 - Erosion, Sedimentation/trapping
- Habitat and Refuge
 - Invertebrates
 - Fish
- Foraging Habitat
 - Grazers
 - Invertebrate predators
 - Fish
 - Birds

What do we know about ecology where rockweed grows?

- Exposed and sheltered rocky shores
 - Substrate ranges from bedrock to cobble
 - Grows to greater length in sheltered areas
- Northern hemisphere, circumglobal
- Relatively free from anthropogenic nutrient pollution
- Can be nursery areas for fish, lobster , and a variety of invertebrates
- Can be feeding areas for birds, i.e., eiders, black ducks

What do we know about ways rockweed serves as habitat for other species?

- Attachment for Epifauna/Epiphytes
- Refuge for Invertebrates, Fish to hide
- By Serving as a Habitat for Invertebrates and Fish, Rockweed can be a Place for Finding Food and can be Food to Some Species as well.

Rockweed as Habitat

- Habitat for Epiphytes
- Habitat for Invertebrates
- Grazing and Predation by Invertebrates
- Foraging and Refuge for Fish
- Foraging for Birds

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Architecture of Habitat

- Structure changes between low and high tide
- Rockweed bed assemblage of branched shoots within clumps
- Structure measured by number of branches, lateral and dichotomous on each shoot, length and thickness of shoot
- Density of clumps structural component at scale of bed
- At smallest scale epiphytes living on shoots and/or receptacles

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Plant Architecture:

leads to structure of rockweed beds

- Base

- Hold fasts

- Sheltered from light and wave action

- Primary shoots and clumps widely spaced

- Middle

- Most complex lateral and dichotomous branches with/without epiphytes

- Distal

- Less complex with few laterals and epiphytes

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Invertebrate Communities

- Size Ranges from Small Harpacticoid Copepods (0.06mm) to Snails (>1cm)
- Abundances
 - Can be very high- example 22,000 m² juvenile mussels
 - Geographical variation can be great within regions
 - Seasonal changes-lowest in winter
- Community Composition
 - Seasonal changes-species appearance/disappearance
 - Major groups represented year-round
 - Can vary according to substrate plants attached to

Dynamics of Canopy Invertebrates

- Most are Motile
 - Move within and between beds
- Movement influenced by physical factors
 - Temperature-cooler lower regions
 - Moisture at low water
- Turnover is high with short life span, high reproductive capacities and ease of emigration

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Habitat for Fish

- Types: Resident vs. Visitor Fish
 - Rock Gunnels vs. Pollock
- Visitors often have Juvenile Stages that use the Rocky Intertidal as Nursery Ground
- Visitors often move in and out of Rocky Intertidal with Tide
 - Juvenile Pollock leave on Falling Tide and return on Rising Tide

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Habitat for Foraging Fish

- Rocky intertidal has great taxonomic diversity for potential prey
- Passamaquoddy sampled fish foraged mostly on crustaceans (consistent with other regions of the globe)
- Invertebrates associated with algae comprise the greatest average volume in stomachs

Refuge for Fish from Predation

- Small fish comprised diet of at least 6 species of piscivorous fishes in Passamaquoddy Bay-at risk from 16 fish species
- Piscivorous birds forage during day at all stages of tidal cycle
- Many birds prefer to forage in fucoids rather than open water (example common tern vs. kingfisher)
- Presence of predators (birds and fish) can be seasonal depending on species

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Foraging by Birds

- Invertebrate Predators
 - Common eiders, black ducks, and mallards can use rockweed as a main foraging habitat
 - Buffleheads, scoters, sandpipers, and plovers also forage there but not primary foraging habitat.
- Fish predators
 - Cormorants, loons, herons, terns, grebes, kingfishers, mergansers, (osprey)
- Bird predators
 - Black-headed gulls and Bald Eagles feed on eider ducklings

What are our gaps in knowledge about the ecology where rockweed grows and rockweed as habitat? *...just a few for thought...*

- How much habitat loss and/or change in habitat structure is too much?
- How might the role of rockweed as habitat change with different harvest levels?
- What is the role of low trophic level species in affecting rates of recovery for commercially important species?
- What are the feeding preferences of invertebrates, fish and birds, and how is it affected by changes in structure and/or invertebrate abundance resulting from harvesting?

The End