



Rockweed Biology

Biology

Reproductive ecology
Food web dynamics

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Rockweeds (furoid algae) are intertidal seaweeds that are lithophytes (rock-loving)



Fucus vesiculosus

Bladder wrack, Lady wrack, rockweed



Ascophyllum nodosum

Rockweed, Norwegian kelp, Knotted wrack, Knobbed wrack, Asco, Sea whistle, Egg wrack

Rockweeds are ecologically important

Perennial, foundational species and primary producers



There is LOTS of variability among geographic locations
The natural world is not static

Ascophyllum nodosum is the commercially harvested furoid in Maine
Harvested for centuries in the north Atlantic



Rockweed reproduction is influenced by physical and chemical factors

Males, females or hermaphrodites

External fertilization



Coral. Photo by Greg Bunch, www.amnh.org



Purple urchin. Photo by S. Anderson, www.lifesci.ucsb.edu

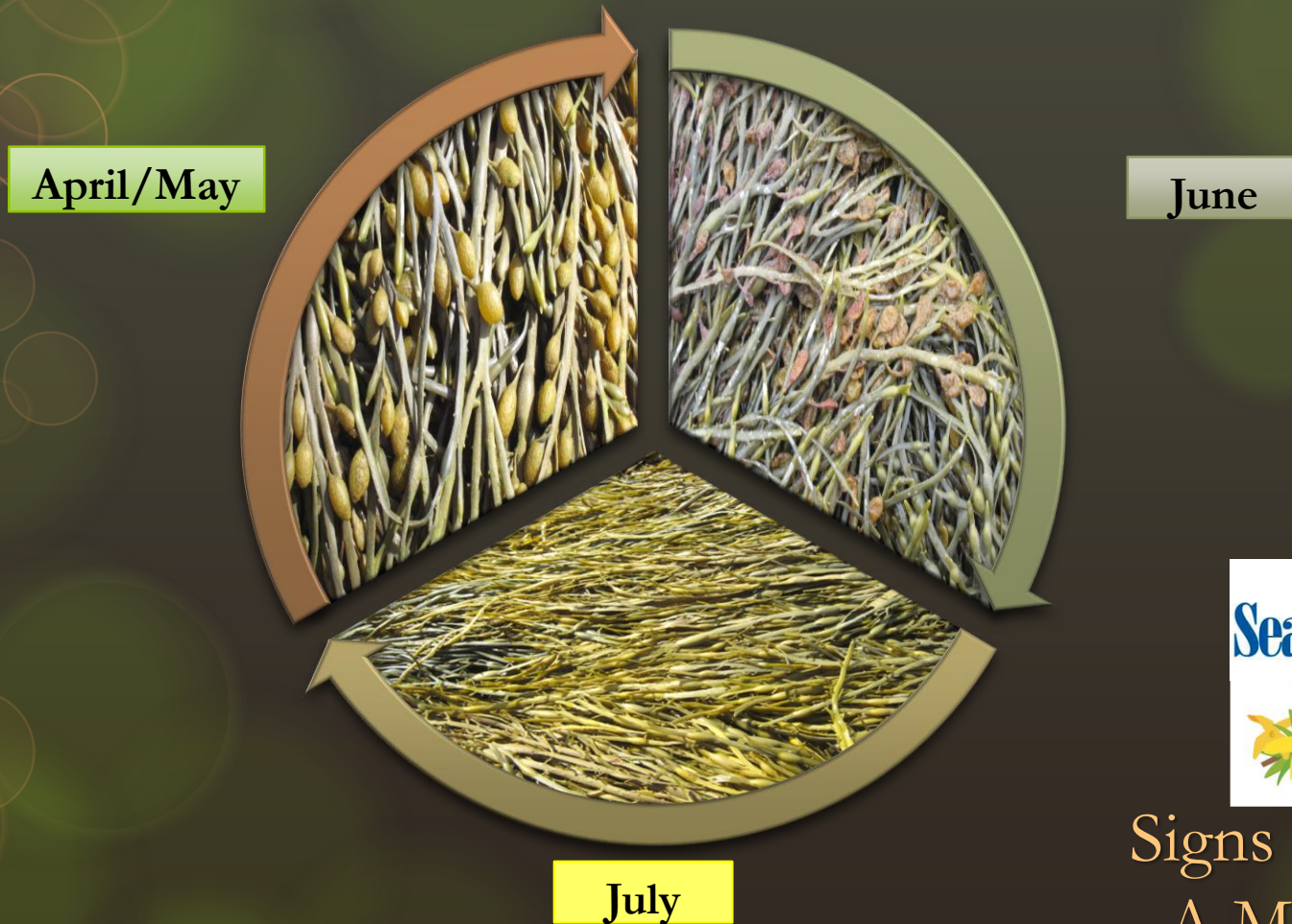


Ascophyllum nodosum



Fucus vesiculosus

Phenology (timing of natural phenomena) of *Ascophyllum nodosum* reproductive initiation, maturation and gamete release is associated with photoperiod and water temperature



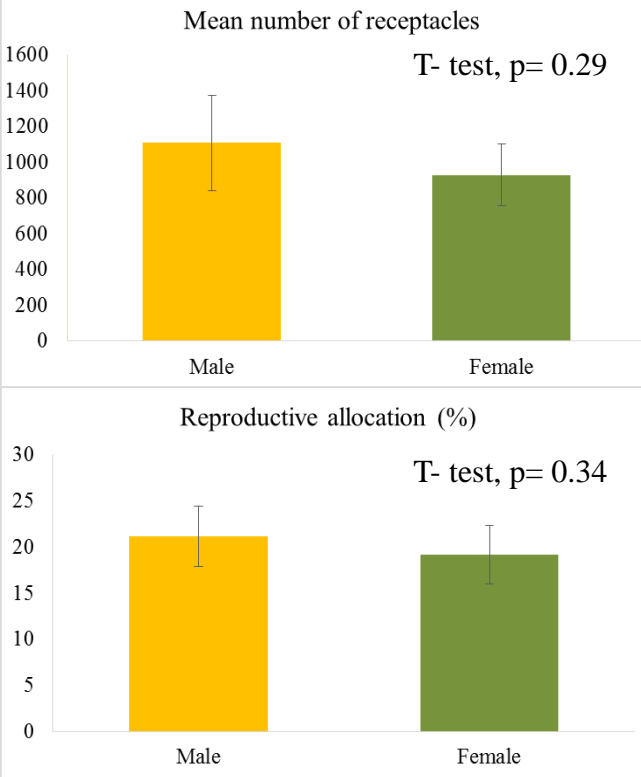
Signs of the Seasons:
A Maine Phenology
Program

Ascophyllum nodosum has separate male and female individuals; the sex ratio is 1:1



Ascophyllum nodosum reproductive allocation varies spatially and temporally

Ascophyllum nodosum



Castine, ME (2014)

5 Males, 5 Females

receptacles

Dry Weight of receptacles

Dry weight of vegetative

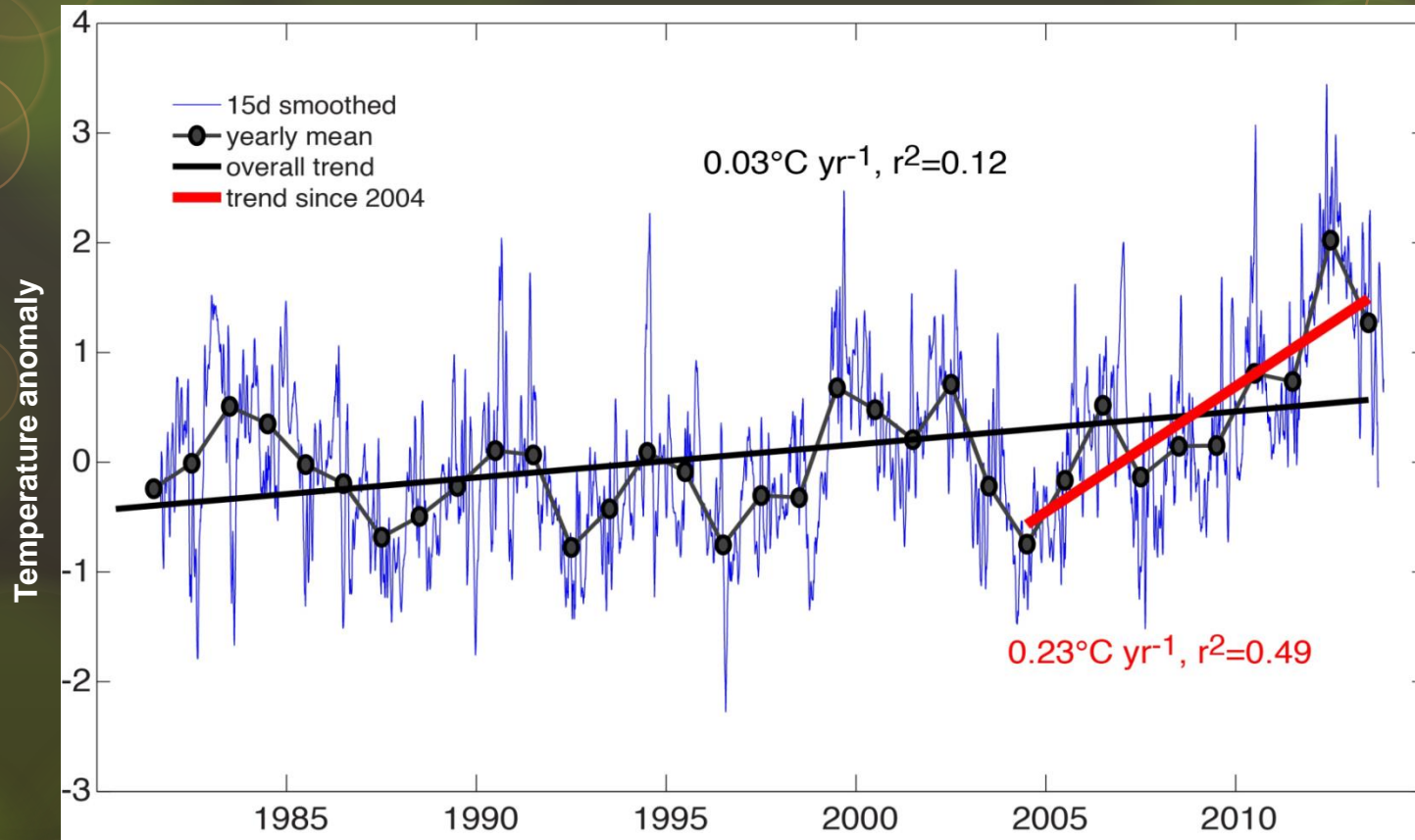
Changes in climate can influence reproduction in rockweeds

Ascophyllum nodosum gamete release is associated with water temperature at high tide (Bacon and Vadas, 1991)

3-7 weeks in the spring, 6° C: onset, 10° C: midpoint, 15° C: termination of gamete release



Changes in temperature may influence reproductive timing of *Ascophyllum nodosum*



Long-term Gulf of Maine temperature trends from NERACOOS Buoy E.

Image acquired from http://www.seascapemodeling.org/seascape_projects/assets_c/2014/01/

The contribution and importance of surplus furoid eggs, sperm and zygotes is uncharacterized



- Changes in climate may shift reproductive timing and/or reproductive output
- Changes in rockweed reproduction may have trophic implications

Point of View



- Harvesting practices do not remove the whole organism
 - Harvesting does not remove genetic diversity
 - Harvesting modifies, but does not eliminate, foundational characteristics
- *Ascophyllum nodosum* has resilient wound repair and recovery over time (natural disturbances such as ice scour)

Point of View

- Heaps of research to continue and to initiate
 - 2010 Rockweed Research Symposium- priorities
 - DMR Rockweed Fishery Management Plan Team
 - DMR Rockweed Working Group



Point of View

Comparable industry in Maine- Balsam Fir tipping

