Introduction to The Rocky Shore

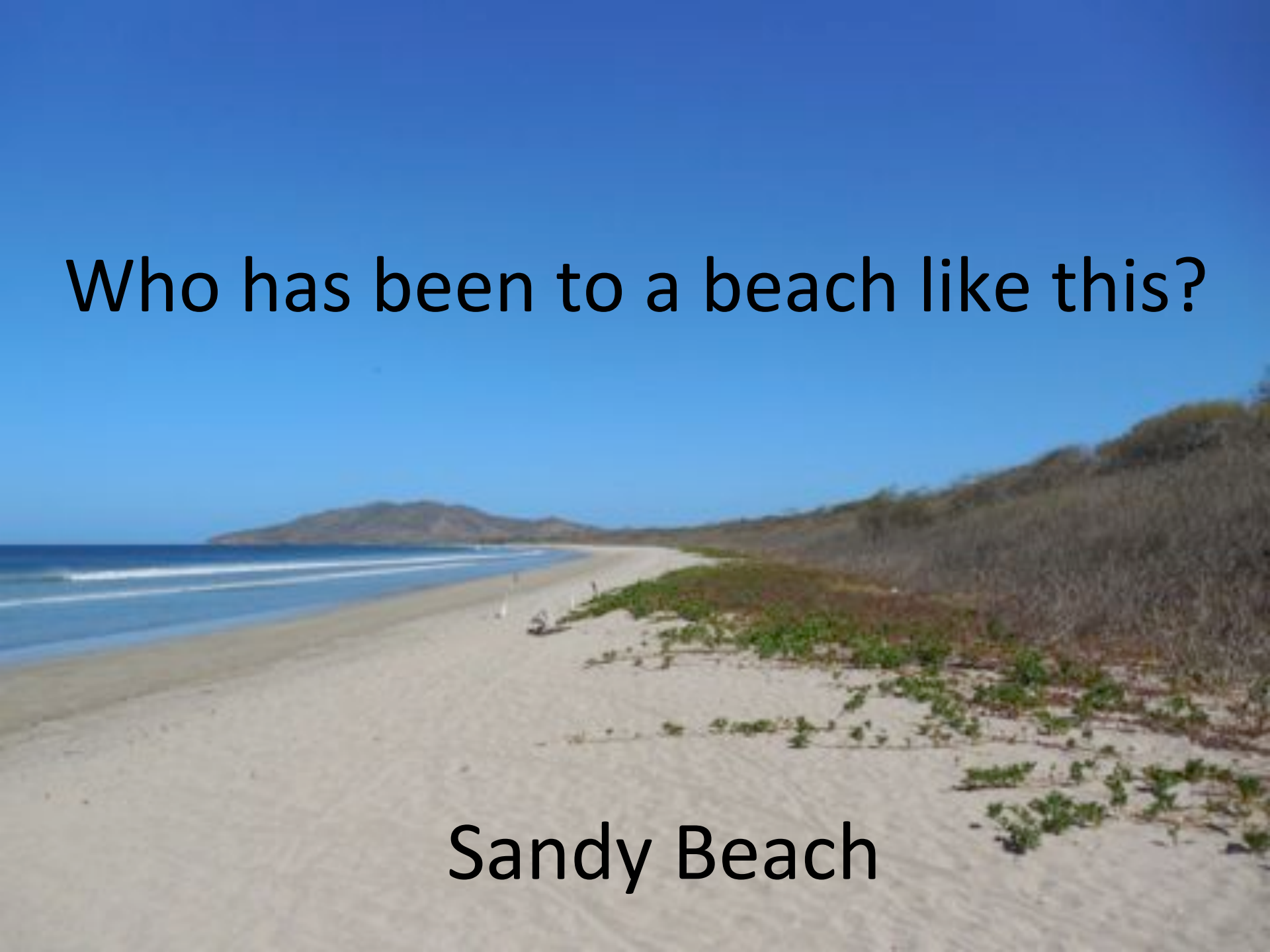
Northeastern University Marine Science Center
Nahant, MA

Northeastern University
Marine Science Center

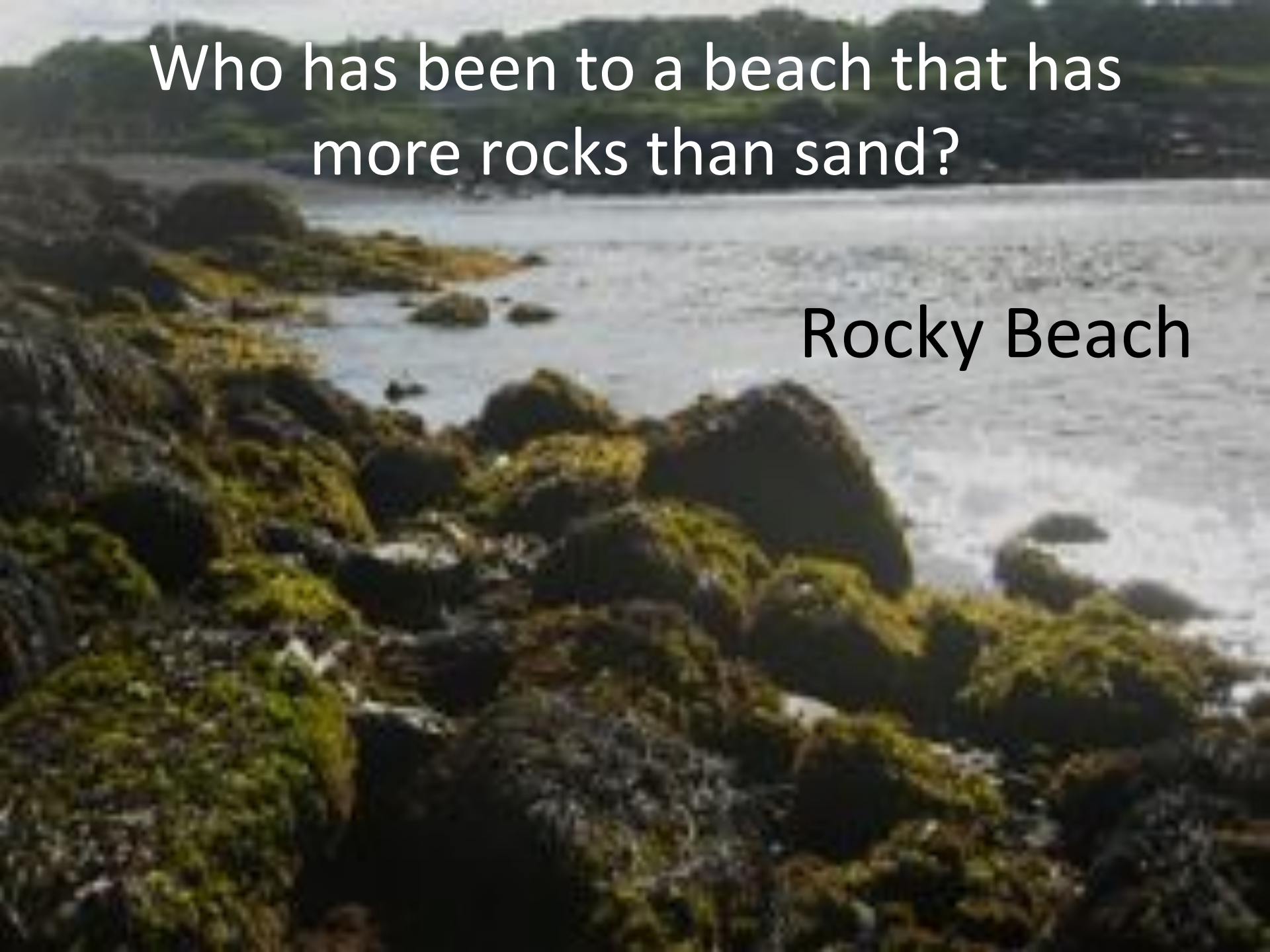
In New England, we have different types of beaches

Northeastern University
Marine Science Center

Who has been to a beach like this?

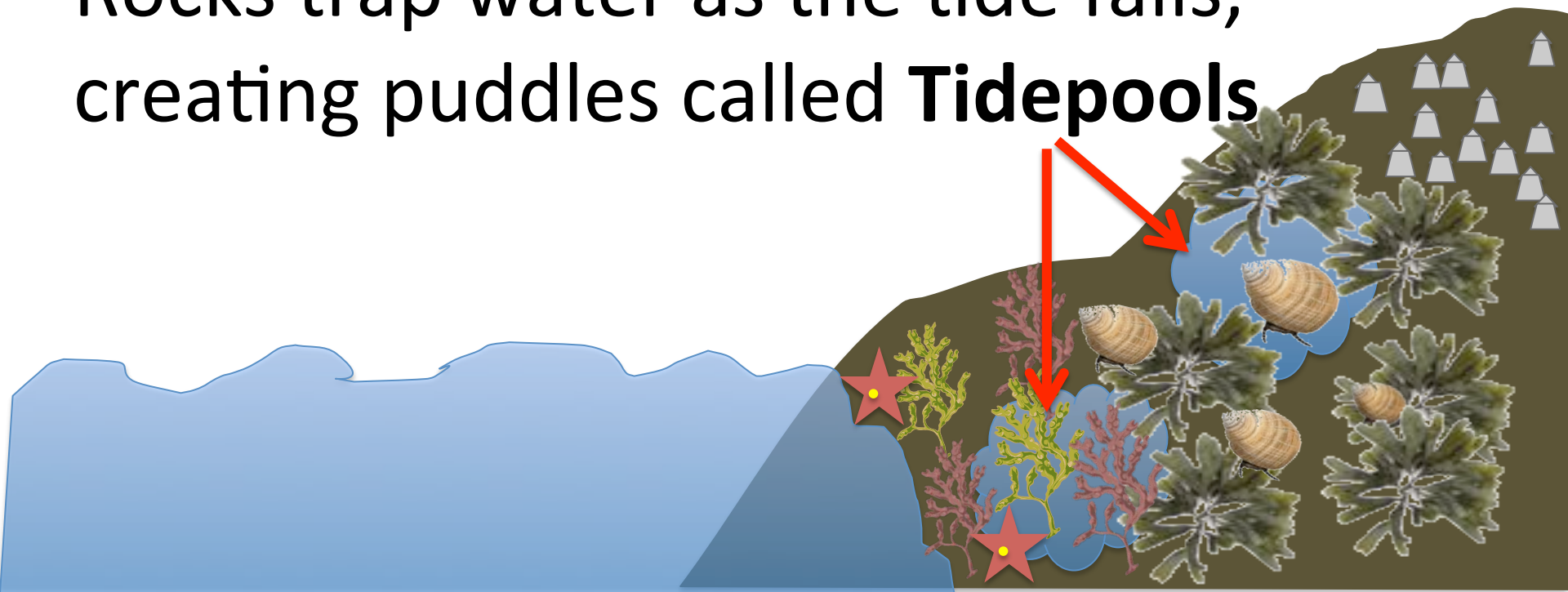


Sandy Beach


Who has been to a beach that has more rocks than sand?
Rocky Beach

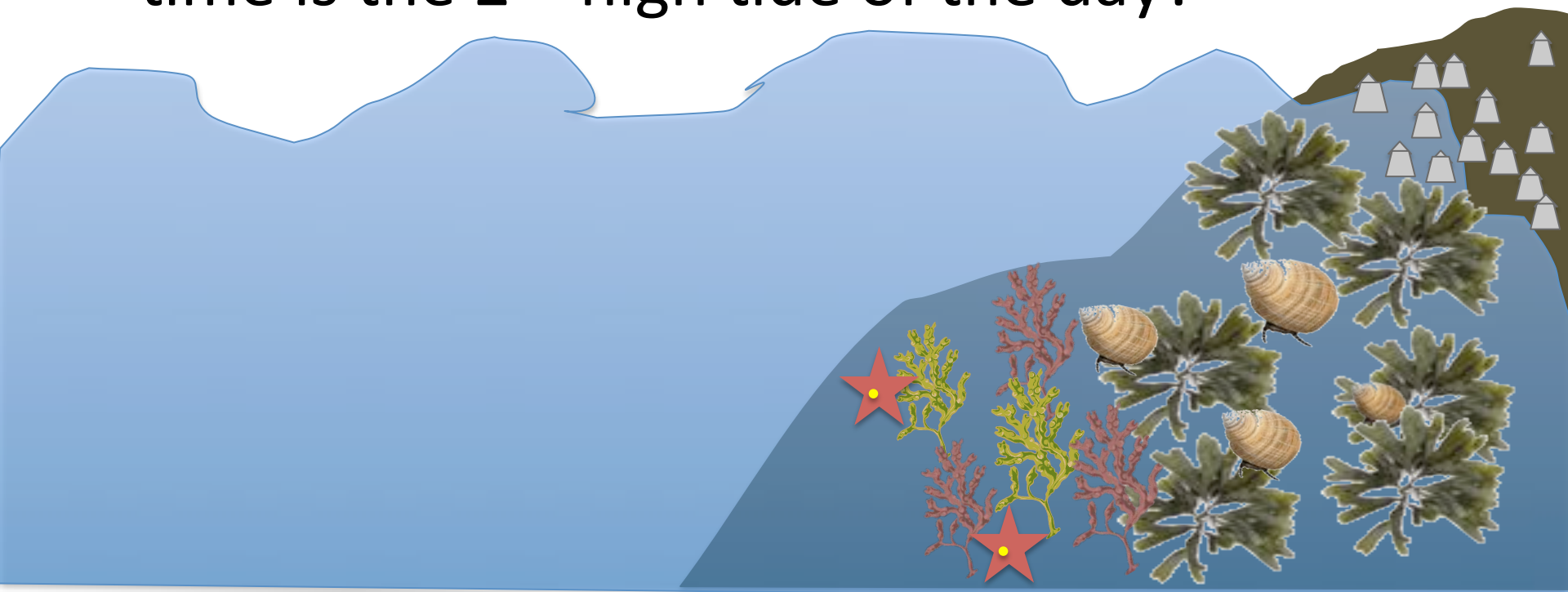
Low Tide

- When the water is low on the rocks
- In New England, there are 2 low tides per day
- Rocks trap water as the tide falls, creating puddles called **Tidepools**



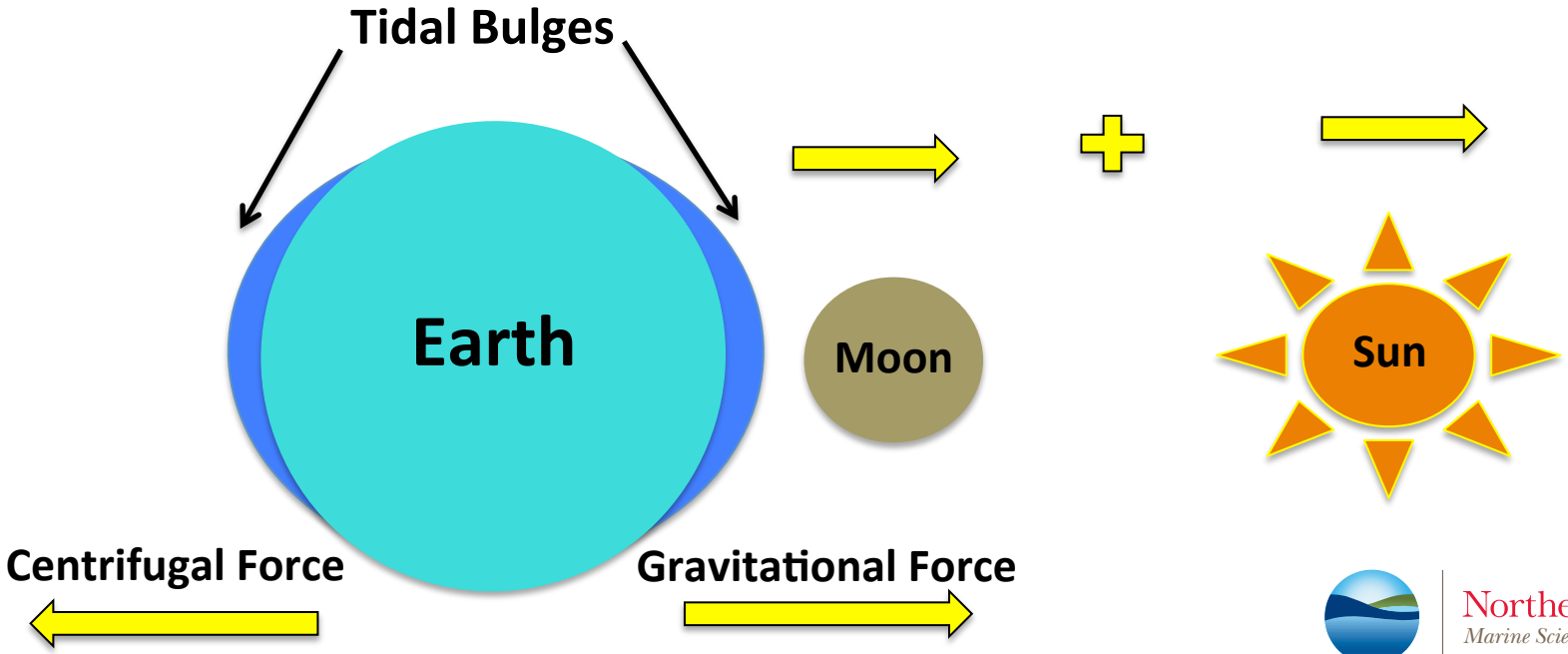
High Tide

- When water covers the rocks on the beach
- In New England, there are 2 high tides per day
- If the 1st high tide today is at 9am, what time is the 2nd high tide of the day?



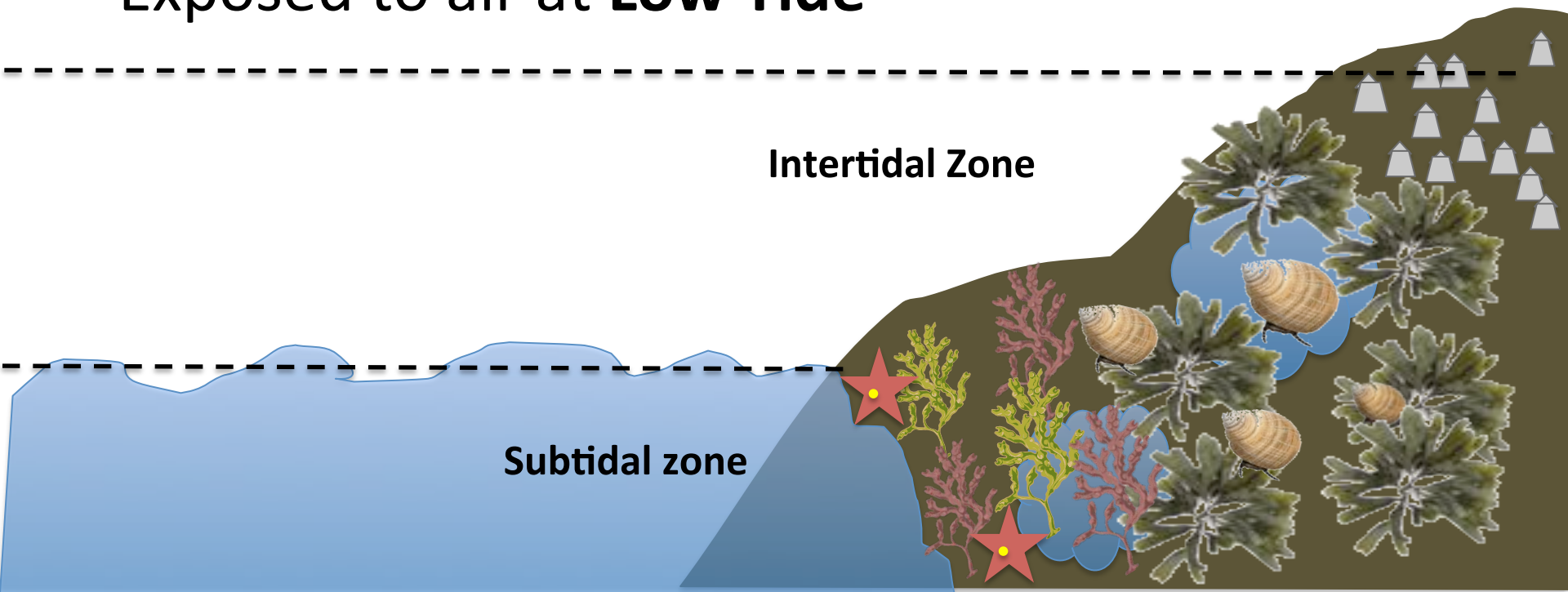
What cases the tides?

- The sun and the moon – but what force?
- Gravity
- The gravitational force of the moon on the earth pulls the water in the ocean towards the moon



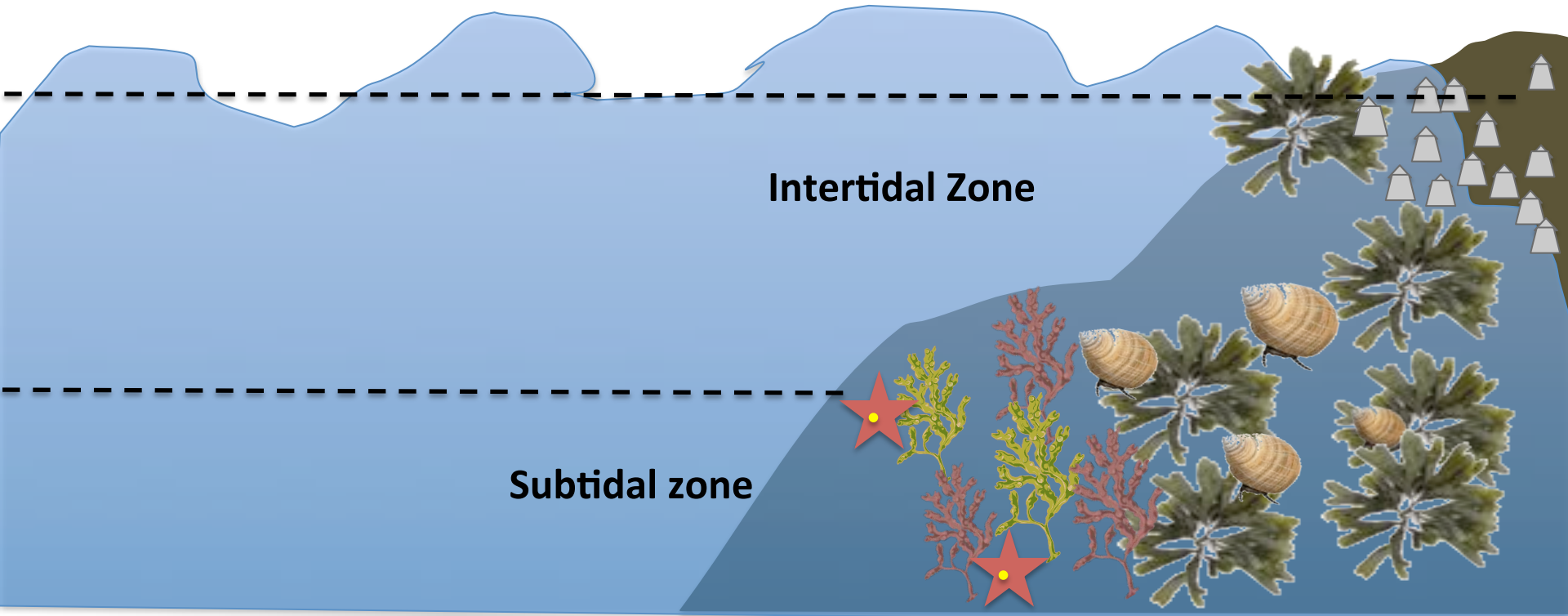
Intertidal Zone

- What does **intertidal** mean?
- Inter=between, Tidal=tides
- The area in between the high and low tide line on a beach
- Exposed to air at **Low Tide**



More about the Intertidal Zone

- Covered with water at **High Tide**
- Due to the rise and fall of the tides, intertidal organisms are covered with water for half the the time and exposed to air for the other half

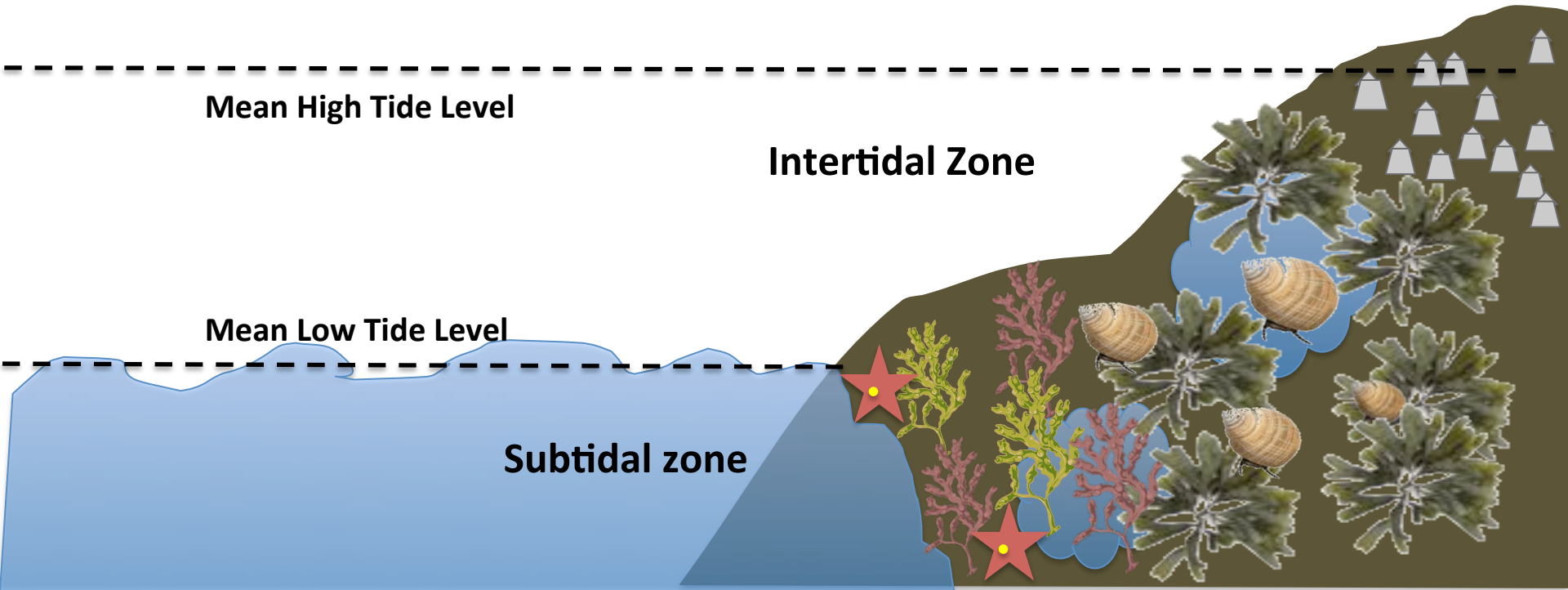


A Biodiverse Habitat

Many organisms live in the intertidal zone!

How many can you think of?

How do scientists classify organisms?



Molluscs

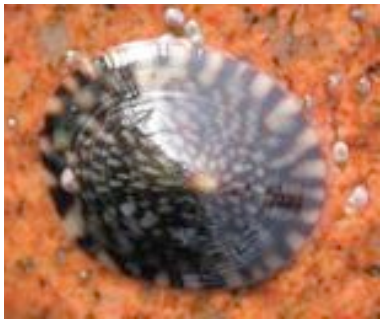
Blue Mussel
Mytilus edulis

Slipper snail
Crepidula fornicata

Dog whelk
Nucella lapilus

Smooth periwinkle
Littorina obtusata

Common periwinkle
Littorina littorea



Limpet
Tectura testudinalis

Nudibranch (sea slug)
Aeolidia papillosa

RED = INVASIVE SPECIES

Northeastern University
Marine Science Center

Crustaceans

RED = INVASIVE SPECIES

Acorn Barnacle
Semibalanus balanoides

Rock Shrimp
Palaemon elegans

Amphipod
Various

Green crab
Carcinus maenus

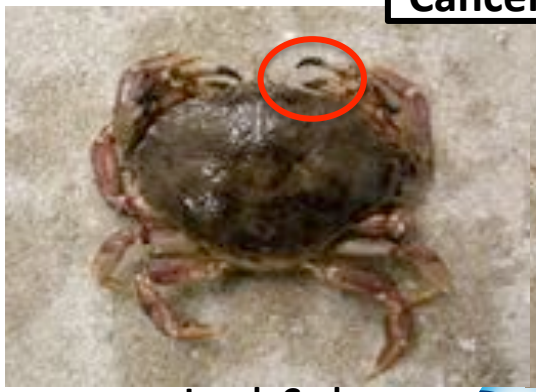
American Lobster
Homarus americanus

Spider crab
Libinia emarginata

Asian shore crab
Hemigrapsus sanguineus

Hermit crab
Pagurus longicarpus

Cancer Crabs



Jonah Crab
Cancer borealis

Rock Crab
Cancer irroratus

Northeastern University
Marine Science Center

Echinoderms

Forbes sea star
Asterias forbesi

Northern sea star
Asterias vulgaris

Blood star
Henricia sanguinolenta

Green sea urchin
Strongylocentrotus droebachiensis

RED=INVASIVE SPECIES

Cnidarians, Chordates, Bryozoans

Frilled anemone
Metridium senile

Stalked hydroid
Dynamena pumila

Sheath Tunicate (Sea squirts)
Botrylloides violaceus

Lacy crust bryozoan
Membranipora spp.

Northeastern University
Marine Science Center

Brown Seaweed

Bladder wrack
Ascophylum nodosum

Rockweed
Fucus vesiculosus

Kelp
Laminaria saccarina

Red Seaweed

Irish moss
Chondrus crispus

Coralline algae
Corallina officianalis

Red stain algae
Hindenbrandia rubra

RED=INVASIVE SPECIES

Green Seaweed

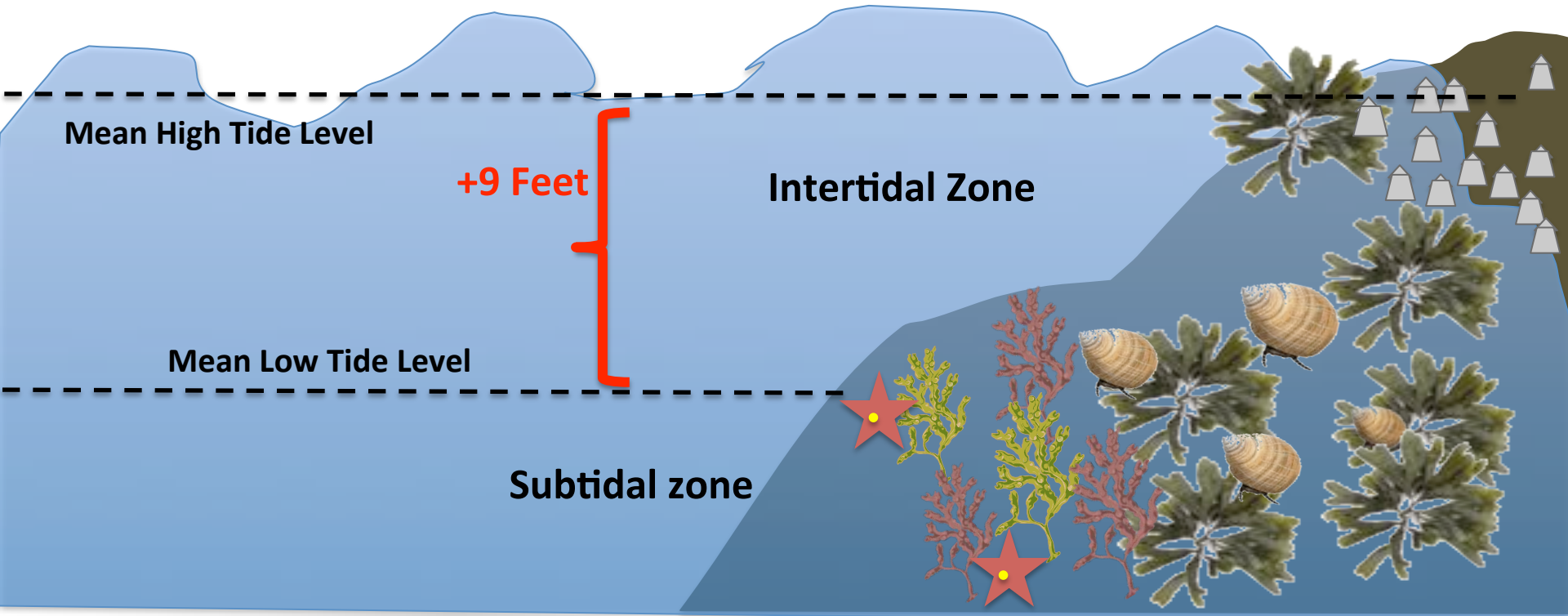
Sea lettuce
Ulva lactuca

Dead man's fingers
Codium fragile

Gutweed
Ulva intestinalis

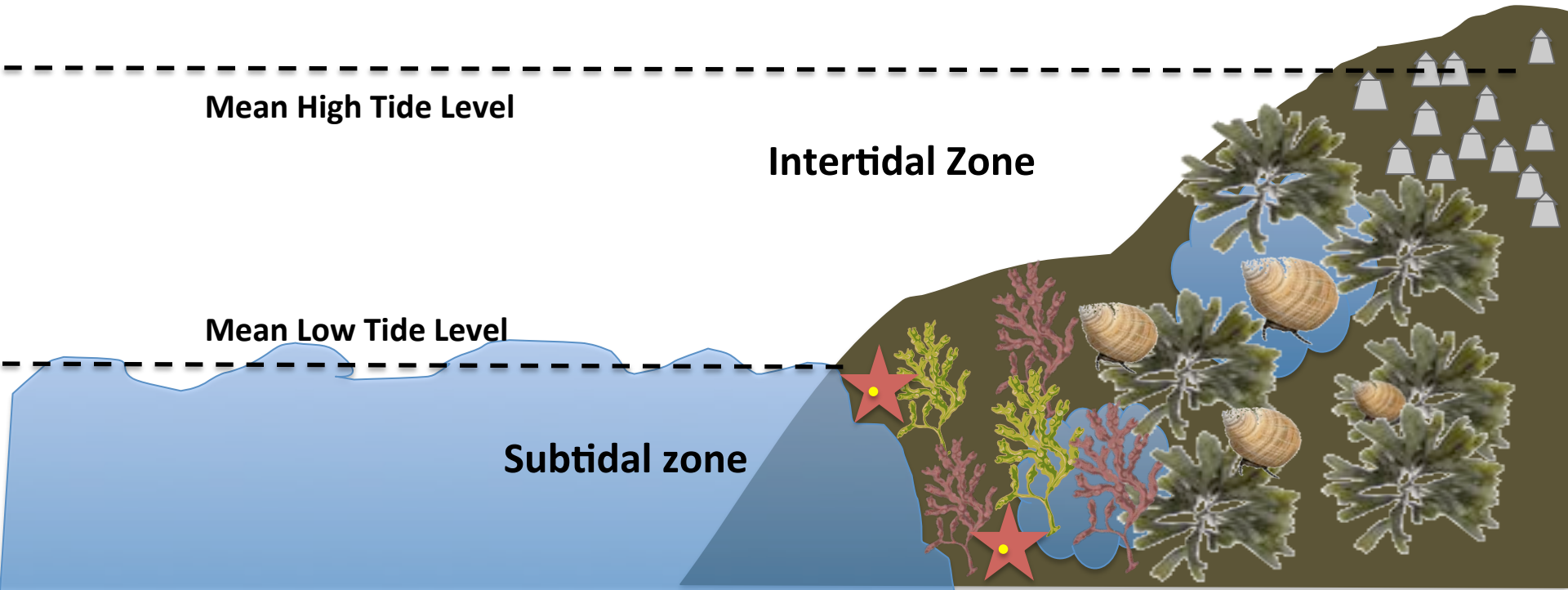
Remember the tides?

- Due to the rise and fall of the tides, intertidal organisms are covered with water for part of the time....



Tides make life challenging

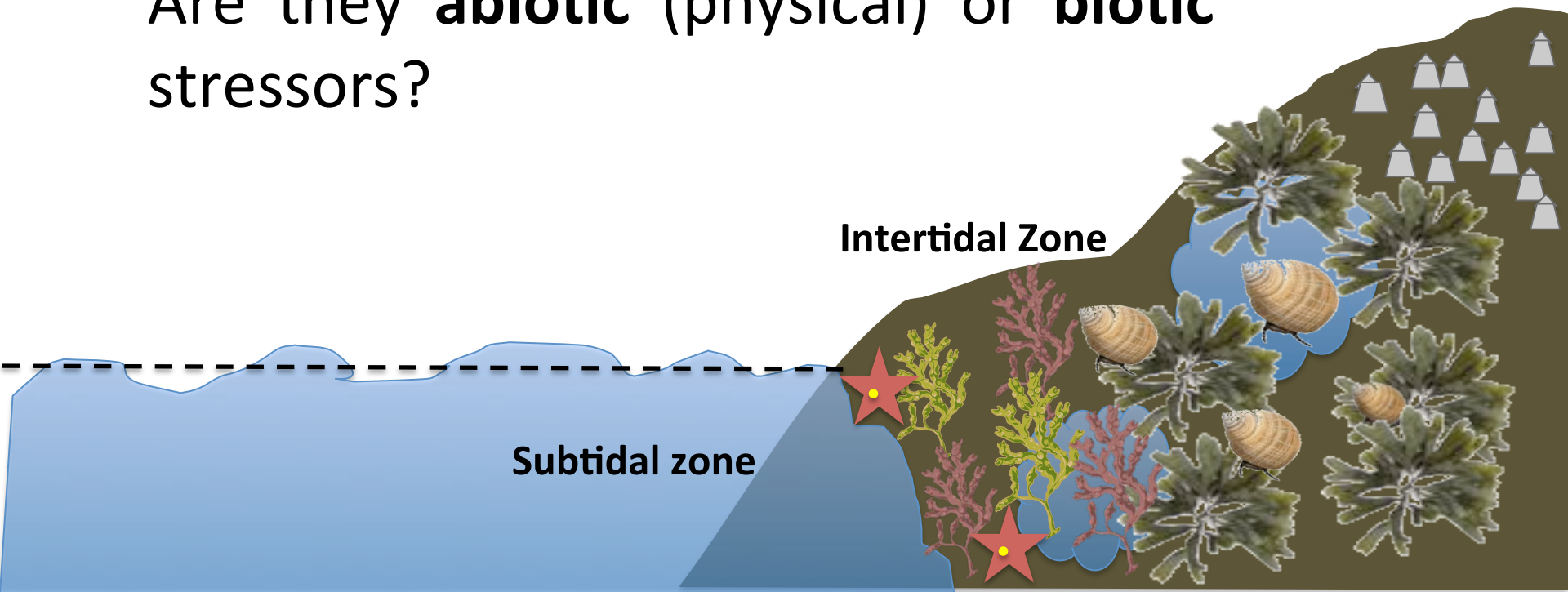
...and exposed to air for part of the time



How could this be stressful for intertidal organisms?

How many intertidal stressors can you think of?

Are they **abiotic** (physical) or **biotic** stressors?



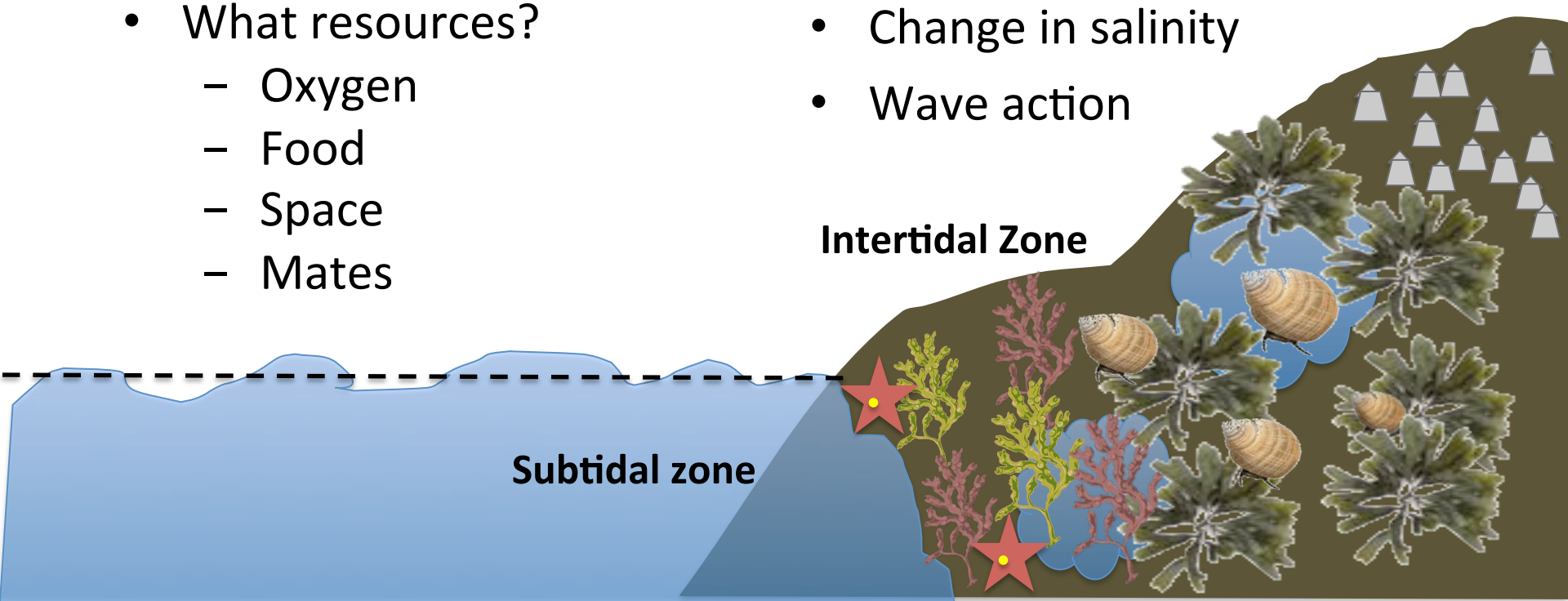
Intertidal Stressors

Biotic

- Predators: from both land and sea
- Competition: for limited resources in a tide pool
- What resources?
  - Oxygen
  - Food
  - Space
  - Mates

Abiotic

- Desiccation: drying out
- Change in temperature
- Change in salinity
- Wave action



Zonation

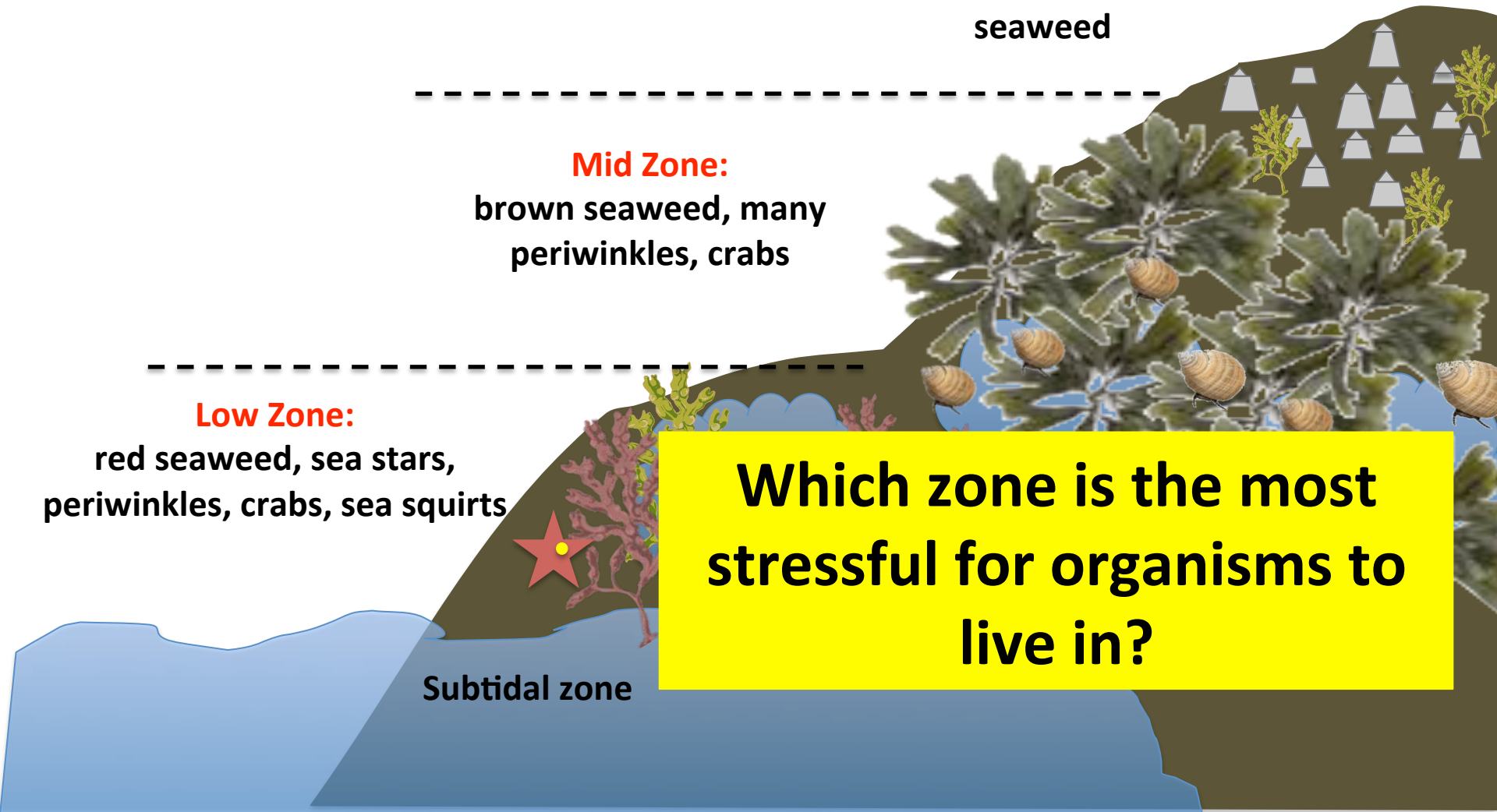
The intertidal is organized into distinct zones with different organisms living in each zone

Rocky Shore Zonation

High Zone:
barnacles, some periwinkles, green seaweed

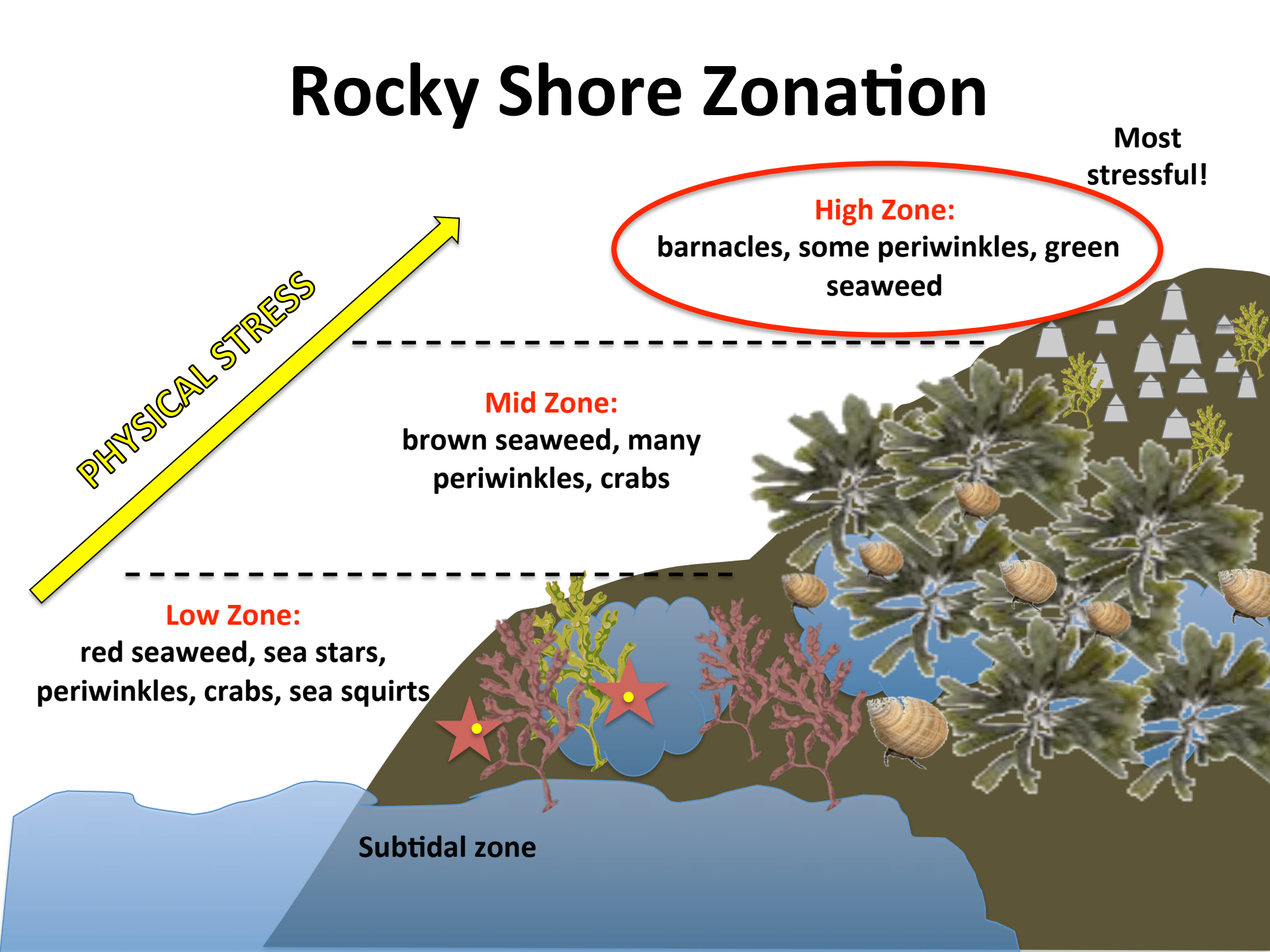
Mid Zone:
brown seaweed, many periwinkles, crabs

Low Zone:
red seaweed, sea stars, periwinkles, crabs, sea squirts



Which zone is the most stressful for organisms to live in?

Rocky Shore Zonation



What's so interesting about the rocky shore?

Why do scientists want to study the rocky shore?

- Easy to access
  - Don't need a boat, or SCUBA gear or a submarine
  - Walk right to your study site
- Large amount of Biodiversity
  - Many different types of organisms live here
- Distinct zones lead to many questions to test with experiments:
  - For example, "Why do barnacles live in the high zone?" – Let's find out!

How do scientists study the rocky shore?

Example 1

Document organisms living in distinct zones

– Tools:

- Quadrat and transect tape to designate an area to sample

Transect Tape

- Clipboard, pencil, datasheet to record data

- Field Guide to identify organisms

How do scientists study the rocky shore?

Example 2

Document abiotic, physical conditions in tidepools

Tool:	To Measure:
Thermometer	Temperature
Hydrometer	Salinity
Digital pH Meter	pH
Dissolved Oxygen Meter	Oxygen content

Hydrometer

Who cares?

- The rocky shore
  - Is an important habitat for many organisms
  - Serves as a barrier that protects the coast from storms, wind, and waves
  - Is an excellent place for people to study diverse marine environments
  - Is a great place for tidepooling and other forms of recreation

Where did the intertidal zone go?

It's high tide, so the intertidal zone is now covered by water!

Come back in a few hours to explore!

Thanks for exploring the

Rocky Shore

with us today!

Northeastern University
Marine Science Center