The Blue Mud Shrimp Mystery

Newport, Oregon
Upogebia pugettensis

Blue Mud Shrimp

- A native species that lives in the mud flats of estuaries in the Pacific Northwest
- Can grow up to 15 cm (about 6 in)
Burrow Dwellers

- Mud shrimp live in Y-shaped burrows they create
- The burrows are about 3 feet deep
- Many other organisms live with the shrimp in the burrow
- They take advantage of the “home” created by the mud shrimp
- The other organisms include phytoplankton and clams
Blue Mud Shrimp Burrow

(Quarter shown for size reference)
Fish Bait

- Mud shrimp are commonly used by the locals as fishing bait, but they are not eaten by people
- Mud shrimp eat detritus and phytoplankton
Invasive Species

- The isopod *Orthione griffenis* is an invasive species that arrived in the Pacific Northwest from Asia.
- This isopod is similar to the more familiar pill bug or “rolly-polly”.
Isopod Infection

- The isopod enters the shrimp’s gill chamber and prevents the shrimp from reproducing by sucking its blood and stealing its nutrients.
- The shrimp remains alive, but in a zombie-like state.
Ballast Water Stowaways

- Scientists believe the isopod was introduced to the West Coast by dumping of ballast water of ships
  - A ballast is a compartment in a boat or ship that holds water. Filling the ballast allows for increased stability of a ship.
  - A ship will fill its ballast in one area of the world and dump that same water in a different area of the world.
  - Any organisms within that water are also dumped, introducing a species into a new ecosystem.
Population Effects

Isopod Population

Blue Mud Shrimp Population
Food Web Example

Humans → Bears
Humans → Salmon
Bears → Zooplankton
Salmon → Zooplankton
Salmon → Mud Shrimp Larvae
Mud Shrimp Larvae → Phytoplankton
Mud Shrimp Larvae → Detritus
Zooplankton → Phytoplankton
Sun → Phytoplankton
Sun → Detritus
Critical Thinking Questions
Notebook Entry

• Predict the effects of the disappearance of the Blue Mud Shrimp on the ecosystem/food web. Please use at least three complete sentences.

• What are some other possible ways invasive species can be introduced to an area? Please be thorough.

• Explain at least one way that an invasive species affects your daily life. (“It doesn’t” is not a correct answer!)
So Now What?

- Scientists are studying invasive species around the world to determine their effects on ecosystems.
- How can we learn more about the Blue Mud Shrimp and other species affected by the influx of invasive species?
Play ESP Animation
Environmental Sample Processor

- ESP is one way that scientists collect bio-data in the field in real time over a sustained period.
- ESP is a way to remotely collect information about which organisms are present in an aquatic environment.
- ESP could be used to determine the number of shrimp and isopod larvae present using DNA signatures.
ESP at Work

ESP Arrays

Blue – Shrimp
Red – Isopods
Green – Plankton
Pink - Bacteria

ESP image showing few shrimp larvae present (blue) and many isopod larvae present (red)