Warm Up
What is an adaptation?

There are three major types of adaptations. See the examples below.

Physical adaptations: hollow bones in birds, hollow fur in polar bears, skin flaps on a flying squirrel
Chemical adaptations: proteins, poison, snake venom, melanin (protects your skin from UV light)
Behavioral adaptation: whale migration, lizards sitting in the sun, bird mating dance, bear hibernation

Fill in the adaptations below:

<table>
<thead>
<tr>
<th>Physical adaptation(s)</th>
<th>Zebra mussel</th>
<th>North American bullfrog</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical adaptation(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral adaptation(s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30 second brainstorm...Think of a physical, chemical, and behavioral adaptation for another animal.

Animal: ___________________________ Physical: ___________________________

Chemical: ___________________________

Behavioral: ___________________________

Label the diagram below with the following terms:
Photic zone (light)  Aphotic zone (no light)  Benthic zone (bottom)
Littoral zone (shoreline)  Limnetic zone (open water)
Amazing AIS Adaptations

Project Summary
All organisms have amazing adaptations that help them to survive and reproduce. Typically, only those organisms with advantageous traits will reproduce and carry their genes to the next generation. In this activity, you will be provided with specific adaptations for an aquatic invasive species (AIS). Using these traits, you will design an AIS that DOES NOT already exist, rather a creature of your imagination. Look over the two required tasks below.

**TASK 1:** Write a 1-page adventure story from the perspective of another organism that encounters your aquatic invasive species (ex. moose, osprey, beaver, duck, fish, human, etc.). This should include the invasive organism’s name, habitat, physical traits, food/energy source and means of energy collection, reproduction strategies, dispersal mechanism(s), and any other interesting facts. **Describe how your organism’s adaptations allow it to live in a wide range of conditions, grow fast, reproduce quickly, outcompete other species, and disperse easily.**

**TASK 2:** Draw an 8 ½” x 11” color portrait of the animal encountering your invasive organism in its habitat. Have fun, be creative, and surprise your classmates with your creation!

**Record the 5 traits from your adaptations card below and then pick one extra trait:**

<table>
<thead>
<tr>
<th>Habitat:</th>
<th>Physical feature(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy/feeding:</td>
<td>Reproduction:</td>
</tr>
<tr>
<td>Dispersal:</td>
<td>Pick one extra trait or behavior:</td>
</tr>
</tbody>
</table>

**Project Rubric**

<table>
<thead>
<tr>
<th></th>
<th>Exceeds</th>
<th>Meets</th>
<th>Does not meet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Story content</strong></td>
<td>☐ Explains in detail how the adaptations allow it to live in a wide range of conditions, grow fast, reproduce quickly, outcompete other species, and disperse easily.</td>
<td>☐ Describes briefly how the adaptations allow it to tolerate a wide range of conditions, grow fast, reproduce quickly, outcompete other species, and disperse easily.</td>
<td>☐ Does not clearly describe how the organism’s adaptations make it invasive.</td>
</tr>
<tr>
<td><strong>Story format</strong></td>
<td>☐ Entertaining adventure story ☐ Perspective of the animal encountering the AIS. ☐ Creative, descriptive title ☐ Clear beginning, middle, &amp; end ☐ &gt; 1 page in length ☐ Neatly typed (1.5 spaced)</td>
<td>☐ Adventure story  ☐ Perspective of the animal encountering the AIS  ☐ Title included ☐ Basic beginning, middle, &amp; end ☐ 1 page in length ☐ Neatly handwritten</td>
<td>☐ Adventure story ☐ Title not included ☐ Story confusing ☐ &lt; 1 page in length ☐ Illegible or poorly handwritten</td>
</tr>
<tr>
<td><strong>Portrait design</strong></td>
<td>☐ Creative colorful design showing the animal and AIS in its habitat ☐ All adaptations depicted; labeled ☐ Organism name included</td>
<td>☐ Simple colorful design showing the animal and AIS in its habitat ☐ All adaptations depicted ☐ Organism name included</td>
<td>☐ Black &amp; white design ☐ &lt;6 adaptations ☐ Name missing</td>
</tr>
</tbody>
</table>

**COMMENTS:**

© 2019 AIS Unit created by the Flathead Lake Biological Station and the Flathead Lakers. Funded by the Montana Department of Natural Resources and Conservation and FLBS.
# Story Outline

**Title:**

**Attention grabber**
(Call to adventure)

**Introduce main character**

**Set the stage**
(Time, place, mood, engage the 5 senses)

**Rising action**
(Main character faces a series of conflicts)

**Climax**
(Main character faces major problem and a main conflict arises)

**Falling action**
(Main character finds a way out of the adventure)

**Conclusion**
A Portrait of: ____________________________

Organism’s name

* Include labels for the 5 traits from your adaptation card!
Your task is simple: design your own aquatic invasive species. Describe your organism’s traits and how your organism lives in its environment. Be thorough because you will use this outline to complete your one-page story! **Be sure to explain how your aquatic invasive species:**

- Grows fast and reproduces quickly
- Spreads easily
- Outcompetes other organisms
- Lives in a wide range of conditions

A. **TYPE OF ORGANISM**
   What type of animal (ex. snail, mussel, crustacean (crayfish, zooplankton), fish, parasitic worm, amphibian, aquatic insect, etc.) is your aquatic invasive species?

B. **HABITAT**
   Describe, in detail, your animal’s habitat. Where specifically in the habitat does it live (shallow water along the shoreline, under rocks, along the bottom of a stream, attached to surfaces, within the photic zone, drifting with the currents, in the sediment, etc.)? Which abiotic or physical/non-living conditions (temperature, currents, light, wave action, etc.) impact where it lives? **What does it do to increase its ability to live in those conditions?**

C. **PHYSICAL FEATURES**
   What does it look like? **How quickly does it grow and how big does it get?** How does it sense its environment (eyes, chemoreceptors to sense chemicals in the water, electromagnetic waves, etc.)? How does it blend into its environment (shell pattern, camouflage, warning coloration, etc.)? How does your animal move about? Appendages (limbs/legs), in groups, alone? When does it need to move? How does it use movement to catch prey or to avoid predators? Is it more active during a certain time of the year or day? How does the animal protect itself? From what does it need to be protected?
D. ENERGY/FEEDING
How does your animal get energy? What does it eat? How does it get food? How does it feed its offspring? When does it eat? How often? Are there any special or unusual feeding behaviors? **How does it compete with other organism in the environment for limited food resources?**

E. REPRODUCTION
Does your animal reproduce sexually, asexually, or both? Does it have mating seasons or behaviors it uses to attract a mate? Does it use internal or external fertilization? Does it produce eggs or have live birth? If so, how many? **How often or fast does it reproduce?** Does it have spawning grounds? Is there any parental care of young? If so, how long does it occur and by whom?

F. DISPERAL
**How does your animal spread throughout the environment?** Can it travel long distances? If so, how? Can it survive out of water for a period of time? If so, how long?

G. OTHER
Please describe all other important adaptations (traits and/or behaviors) the animal uses for survival. For example, does it migrate, hibernate, or change its coloration during the year? **Be creative and enhance its invasive characteristics!**
Amazing AIS Adaptations

Story Planning Sheet – Plant / Algae

Name __________________________

Student Worksheet (7 of 8)

© 2019 AIS Unit created by the Flathead Lake Biological Station and the Flathead Lakers. Funded by the Montana Department of Natural Resources and Conservation and FLBS.

Your task is simple: design your own aquatic invasive species. Describe your organism’s traits and how your organism lives in its environment. Be thorough because you will use this outline to complete your one-page story! Be sure to explain how your aquatic invasive species:

- Grows fast and reproduces quickly
- Spreads easily
- Outcompetes other organisms
- Lives in a wide range of conditions

A. TYPE OF ORGANISM
What type of plant, algae, or phytoplankton is your aquatic invasive species?

B. HABITAT
Describe, in detail, your organism’s habitat. Where specifically in the habitat does it live (shallow water along the shoreline, along the bottom of a stream, attached to surfaces, within the photic zone, drifting with the currents, etc.)? Which abiotic or physical/non-living conditions (temperature, currents, light, wave action, etc.) impact where it lives? What does it do to increase its ability to live in those conditions?

C. PHYSICAL FEATURES

General: What does it look like? How quickly does it grow and how big does it get? Does anything eat it? Does it produce defensive spines, chemicals, or toxins?

Plant: Does it grow close together or spread out? Does it have roots that anchor it to the bottom or does it float on the surface? Is it a fully submerged plant or does it partially emerge from the surface? What do its leaves look like?

Algae: Does it grow on the bottom, in floating mats, or is it plankton that drifts with the currents?
D. ENERGY/FEEDING

How does it compete with other organisms in the environment for limited sunlight? How do its leaf and/or growth pattern help it to get as much sunlight as possible? What is its seasonal growth pattern? Does it grow earlier in the season and/or at a faster rate than the organisms? Does it shade other organisms?

E. REPRODUCTION

General: Does your organism reproduce sexually (with flowers) or asexually (via mitosis, such as fragmentation), or both? When does it reproduce (all year, seasonally)? How fast does it reproduce? How does it reproduce (all year, seasonally)? How fast does it reproduce?

Plant: Does it produce flowers? If so, what do they look like, how many are produced, and when do they bloom? Does it have traits that attract pollinators? Does it produce seeds? If so, how many?

F. DISPERSAL

How does the organism spread throughout the environment? If it produces seeds, how do they spread (ex. water currents, attached to bird feathers, eaten and then dropped in feces elsewhere, etc.)? Does it fragment? Does it produce bulbils or vegetative tissue that can pop off and grow? Can it travel long distances? If so, how? Can it survive out of water for a period of time? If so, how long?

G. OTHER

Please describe all other important adaptations or traits the organism uses for survival. For example, does it form a symbiosis with other organisms, grow on the surface of other organisms, or change its growth pattern during the year? Be creative and enhance its invasive characteristics!