1.6a GRR Lamprey Student Worksheet

Name:_____

Part 1) Sea Lamprey Reading Jigsaw

Group A- FS 4: From the **start** to **Where Are Sea Lampreys Found**? Describe a sea lamprey: How do sea lamprey kill fish? How much fish do sea lampreys kill each year? What is the lifecycle of sea lamprey?	Group B - FS 4: From **Where Are Sea Lampreys Found?** to the **End**. How and when did sea lamprey get into the Great Lakes? What is the impact of the sea lamprey invasion? What can be done about sea lampreys?
Group C – FS5 pg. 1 **How are sea lampreys controlled?** to **Traps.** Describe how lampricides kill lamprey and how they are used. Describe how barriers prevent lampreys from reproducing. What is a benefit to using a barrier?	Group D– FS5 From pg. 2 **Traps** to **end of page**. How effective are traps? Why are they used? How do pheromones and alarm cues control lamprey populations?

The Whitewater Restoration Plan calls for the partial or complete removal of the 6th Street Dam. This would create more fish spawning habitat, especially for Great Lakes Sturgeon, and allow the white water rapids to be returned to the river. Analyze the information below and determine whether or not you support the removal of the dam.

Current Condition of the Dam

The Sixth Street dam is 160 years old and was last worked on more than 90 years ago. The Michigan DNR estimates it will only last 10-20 more years, and a 2015 report estimated it would cost $8.7 million to repair and maintain it for another 50 years. Even when well maintained, the dams and the strong currents around them are dangerous. The Grand Rapids Fire Department rescues an average of 10 people per year from downtown, and there were 40 injuries and 5 deaths from 2005-2016.

Is the Current Dam Effective?

Two seal lamprey escapement events have been noted upstream of the Sixth Street dam. Larval sea lampreys were collected from Lowell Creek in 1962 and the stream was treated with TFM (3-trifluoromethyl-4'-nitrophenol) in 1965. Larval sea lampreys were collected from the Rogue River during 2008, resulting in a treatment in 2009. The source(s) of escapement for each event is unknown. The fish ladder on the 6th street dam has had modification and repairs to increase its ability to stop lamprey migration in the past few years.

1. What are the risks to continuing to use the current dam?	2. What are the benefits of continuing to use the current dam?

New Barrier Structure

The current plans call for the building of a new adjustable hydraulic structure (AHS) approximately one mile upstream of the Sixth Street dam. The proposed AHS is designed to have 1) a height barrier that sea lamprey should not be able to jump and 2) have the ability to control the river speed so that sea lamprey cannot swim upstream. The barrier would be adjustable so that it only serves as a barrier during the times of year the sea lamprey is spawning (swimming upstream to breed).

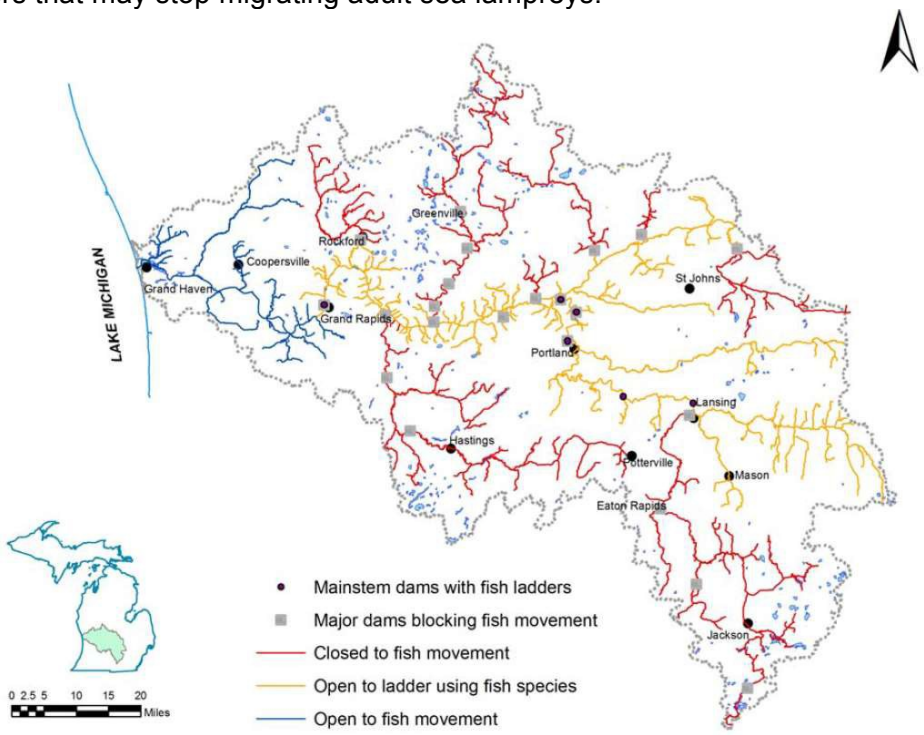
The new barrier would allow for the whitewater restoration to the Grand River. It would increase the ability of other fish and boaters to travel upstream most of the year. It would increase fish spawning sites. If successful, this project could help to advance the Sea Lamprey Control Program's understanding of barrier technologies and operations.

Because the design is unique, there is no data available to say how successful it will be at preventing sea lamprey from migrating upstream.

3. What are the advantages to the AHS?	4. What are the risks associated with the AHS?

Potential Extent of Lamprey Habitat

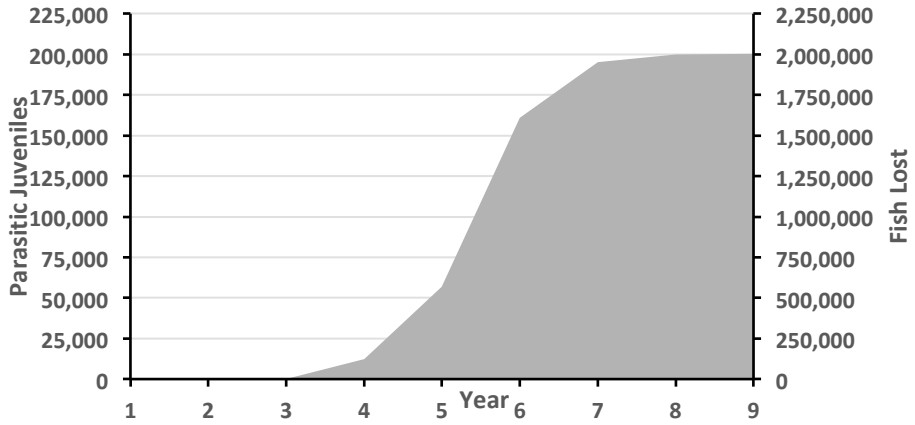
If there is not an effective sea lamprey control structure in the Grand River a Grand Rapids, the sea lamprey will have access to more than 1,900 miles of new stream to inhabit. Below is a map showing the current barrier locations along the Grand River watershed. , the areas in yellow are likely to become infested with sea lampreys and the areas in red are reaches with barriers that may stop migrating adult sea lampreys.



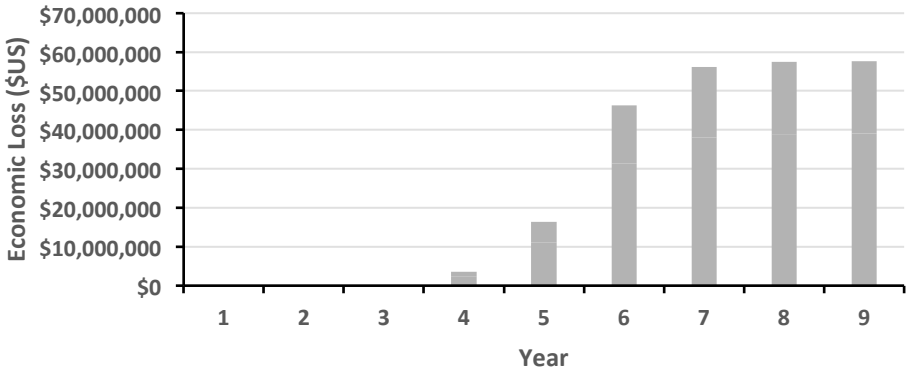
5. Looking at the map above, how likely would it be that the area of the watershed you live in would become infested with sea lamprey if the barrier in Grand Rapids was removed or stopped working? Why?

Economic Loss due to Fish Death.

If the new AHS fails, than there will be an increase in sea lamprey in Lake Michigan. The graphs below show the impact a larger sea lamprey population would have on fishing in Lake Michigan.



Graph 1. The number of juvenile (young) lamprey added to Lake Michigan (left axis) and estimated number of fish lost (right axis) from a hypothetical escapement event in the Grand River.



Graph 2. The economic loss from fish killed by sea lamprey from a hypothetical escapement event on the Grand River. The horizontal axis indicates the years following the escapement event.

6. How many years after sea lamprey have access to the Grand River does it take to impact the number of fish caught? Why might this be?

7. Do the effects of removing the barrier stabilize over time? Yes or No, and how do you know this?

Costs of Sea Lamprey Treatment:

Historical costs of lampricide treatments conducted upstream of the Sixth Street Dam.

Year	Tributary	Treatment Description	Chemical Cost	Staff Cost	Total Cost
1965	Buck Creek	Buck Creek, including Sharps Creek	$2,685	$1,356	$4,041
1965	Lowell Creek	Lowell Creek, including Foreman Creek	$322	$329	$651
1965	Rush Creek	Rush Creek, including the West Branch	$1,875	$1,355	$3,230
2009	Rogue River	Rogue River from just downstream of Division Road	$64,461	$47,250	$111,711

Estimated Costs of Sea Lamprey Lampricide treatments to Grand River– if barrier fails.

Description	Cost-estimate
Scenario 1 (tributary only treatment)	**$4,847,000**
Scenario 2 (mainstream and tributary treatment)	**$7,247,000**

8. Why might there be such large differences in historical and estimated treatment costs?

9. What assumptions are being made about the cost of treatment if the barrier fails?

Probability Assessment of implementing the new AHS Barrier

Below sea lamprey escapement events are scored based on multiple factors.

Probability assessment for escapement scenarios in the event of a barrier failure, removal, or construction of a new barrier.

Scenario	Probability	Mitigation	Operational Cost	Capital Cost	Fiscal Impact	Score (Probability x Fiscal Impact)
No escapement	80%	Monitoring	$335,000	$591,000	1	80
Escapement; no treatment required	15%	Monitoring; upstream trapping; portable barrier installation	$1,185,000	$775,000	3	45
Escapement; tributary treatment	<5%	Barrier repairs; treatment	$4,847,000	$15,508,300	4	20
Escapement; mainstream and tributary treatment	<1%	Barrier repairs; treatment	$7,247,000	--	5	5

10. What two factors are taken into consideration when determining the Score for each scenario? Why would you need to include both of these factors?

Write a paragraph using Claim/Evidence/Reasoning to tell why you do or do not support the removal of the 6th Street Dam and replacing it with an Adjustable Hydraulic Structure. *You may attach an additional paper if you need more space.*

Data and information from: Sea Lamprey Control Needs and Considerations Grand River, Lake Michigan 2018 United States Fish and Wildlife Service