**A Lesson plan for the NSF-ITEST project\***

**and the Michigan Invasive Species Grant Program#**

**“Promoting Student Interest in Science & Science Careers through Field Trips to the Belle Isle Aquarium”**

**and**

**“Educating Educators and their Students Everywhere about Invasive Species”**

 **Invasive Species in our Backyards**

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**Office of Science Lesson Planner Rubric**

**Target Grade:**  \_\_\_\_\_5th\_\_\_\_\_\_\_

**Driving Question**: **What invasive species live in our backyard?**

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| **Plan for success using NGSS:** Lessons and assessments should be designed in a way that allows students to engage in all three dimensions simultaneously. |
| **NGSS Performance Expectation(s):** | **The 3-Dimensions of the Next Generation Science Standards** |
| **5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food.** | **Science and Engineering Practices:** Eight practices that represent how scientists investigate the natural world. | **Disciplinary Core Ideas:** Key ideas in science that have broad importance. | **Cross Cutting Concepts:** Concepts that have connections across all domains of science. |
| **SEP:****Developing and Using Models****Modeling in 3–5 builds on K–2 models and progresses to building and revising simple models and using models to represent events and design solutions.** | **DCI****LS2.A: Interdependent Relationships in Ecosystems****The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.** | **CCC:****Systems and System Models****A system can be described in terms of its components and their interactions.** |
| **Learning Targets:** *(Written in a way that does not give away any scientific discovery opportunities)*1. **Identify invasive species that live in and/or around Michigan.**
2. **Create a model on how these invasive species disrupt our food web and/or food chain.**
3. **Describe the methods of how invasive species are controlled or destroyed in our city.**
4. **Present the disrupted food chain as a report in the form of podcast, videos and/or rap song to be displayed on class website.**
 | **Academic Language*:*** *(Students should* ***discover*** *these terms and concepts through scientific investigations)***Invasive species** - can be any kind of living organism—an amphibian (like the cane toad), plant, insect, fish, fungus, bacteria, or even an organism's seeds or eggs—that is not native to an ecosystem and causes harm. They can harm the environment, the economy, or even human health. **Food Web** - a system of interlocking and interdependent food chains.**Food Chain** - is a linear network of links in a food web starting from producer organisms and ending at apex predator species, detritivores, or decomposer species. A food chain also shows how the organisms are related with each other by the food they eat. Each level of a food chain represents a different trophic level. | **Materials:****Needed per class and per student group:** * **Computer with internet access for each student**
* **One journal book per group to document research**
* **Classroom access to Khan Academy on Clever**
* **Website access to** [**https://www.michigan.gov/invasives**](https://www.michigan.gov/invasives) **for research.**
* **Technology to record podcasts, videos and rap songs**
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|  | **3-Dimensional Learning Elements** |  |
| **Phenomena:** (*Real-world/natural occurrence used to create or support Driving Question Board and connects to each lesson within the unit)* Show several examples (photos) of invasive species that can be found in Lake St. Clair, Detroit River, or Lake Erie, such as zebra mussels or quagga mussels attached to a ship or pipe, sea lamprey attached to a lake trout, a coastal wetland entirely filled with purple loosestrife or phragmites. Ask students how these species might change the habitat that they are introduced into? | **Lesson Connection to Phenomena:** *(How does this investigation help students explain the phenomenon)*Students learn how to identify invasive species that are found in Michigan. They gain knowledge of how invasive species are disrupting the local ecosystem. Students can educate others about which invasive species live in our community or watershed and how they are controlled and/or destroyed.  |
| **Exploration, Discussion, Investigation Activities:**Exploration:1. Using computers have students go to Khan Academy in Clever (<https://khanacademy.zendesk.com/hc/en-us/articles/204577214-How-do-I-use-Khan-Academy-with-Clever-integration->). Have students search for and watch the video called “Introduced species and biodiversity.” This is a video which introduces the concepts of ecosystems and invasive species. (Teachers: you can pre-assign the video to students within Khan Academy) (10 minutes)
2. As a class, utilizing their computers, have students go to Khan Academy in Clever, search for the article called “Invasive species.” As a class, select students to read the article called “Invasive species.” This is an article that introduces the concepts of invasive species. (Teachers: you can pre-assign the article to students within Khan Academy) (10 minutes)

Discussion:With the assistance of the students, create an eco-diagram of the **Case study: Asian carp**The diagram should look something like this:1. Discuss with the students that we have just created an “Eco-Diagram.”
2. Break the students up into groups - 4 students in each group.

Investigation:1. Provide each group with a journal.
2. Explain the project to the class. Each group will complete the following:
	1. They will now research their own invasive species located in Michigan.
	2. They will create a model of how their invasive species disrupts the food web and/or food chain.
	3. They need to describe the methods of how their invasive species can be controlled or destroyed, or if no method is described, to propose their idea about how they think it could be controlled or destroyed. Alternatively, students can discuss how the invasion by their species might have been prevented.

Elaboration:* 1. Student groups will create a presentation of their invasive species and the disruption to the food chain. It should be completed as a group report in the form of podcast, videos and/or rap song to present to the class. (The groups’ reports will be pre-recorded to be shown at a later time in class or can also be shown at the school’s Science Day). Their reports may also be displayed on the class website, if there is a class website.
1. Provide the following websites for students to research invasive species in Michigan:
	1. Michigan Invasive Species at <https://www.michigan.gov/invasives>. This website has a lot of information for the students and is a great starting point.

\*\*\*Give the students at least 1 week maximum (one hour per day) to research and create their reports. This section is per class and the time is guided by the teacher. \*\*\*1. Show each group’s presentation on Invasive Species in class and encourage discussion or questions from the other students.

***Differentiation of instruction for exceptional learners:*** * Invasive Species on Quizlet <https://quizlet.com/> can be assigned by the teacher for further learning.
* Invasive species in Michigan – YouTube Videos Series by Jeffrey Ellis at: <https://www.youtube.com/watch?v=EqskoRWMXbA&list=PL-fE10S48PrkMavY5MxvKWhVg6tGW8c-x>
* Belle Isle Aquarium Website on Invasive Species at <https://www.biaquariumstem.org/educating-about-invasive-species.html>

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| **Formative Assessment(s):** *(Progress monitoring strategy used to assist with lesson adaptations based on students’ needs)* |
| **Student Artifact:** *(Tangible evidence of student learning)*Podcast, videos and/or rap song created by each student group and displayed on class website. The presentations will identify invasive species that live in and around Michigan or the Great Lakes, and how invasive species are controlled or destroyed in our city. | **Student Discourse:** *(What you should hear that is evidence of student learning; see Talk Moves)* 1) Discussion of invasive species that live in and/or around Michigan.2) Discussion on the creation of the model on how their invasive species disrupt our food web and/or food chain.3) Describing the methods on how invasive species are prevented, controlled, or destroyed in our city.4) Presentation of the disruptive food chain as a report in the form of podcast, videos and/or rap song to be displayed on class website. |
| **Learning Extensions:** *(Learning beyond the classroom)*Belle Isle Aquarium field trip:• Matter and Energy in Organisms and Ecosystems• Invasive Species Education Investigate how Invasive Species are controlled on Belle Isle: <http://www.detroitriver.org/projects/invasive-species-belle-isle.html> Investigate the impact of phragmites on Belle Isle and what efforts are being used to control it.Find out which invasive species are at the Belle Isle Aquarium. <http://detroitaquarium.weebly.com/invasive-species.html>  |
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