## ACTIVITY 1: WATCH A GREAT LAKES NOW SEGMENT

This activity is a video discussion of a *Great Lakes Now* episode segment.

First, inform students that they will be watching a *Great Lakes Now* segment discussing the Northern Madtoms in the St. Clair River near Lake Huron. During the video they need to jot down four things they took away from the video using the **4 Notes Summary Protocol**.

Then, if students are not already familiar, introduce them to the 4 Notes Summary Protocol, which they will use after they finish watching the video, where they write down one of each of the following notes:

- **Oooh!** (something that was interesting)
- **Aaah!** (something that was an ah-ha moment)
- **Hmmm…** (something that left them wanting to know more)
- **Huh?** (a question they have afterward)

Next, have students watch the segment from episode 2211 of *Great Lakes Now* called **Searching for Madtoms**.

Last, have students complete their individual 4 Notes Summary and then discuss those in groups of 3-4 students.

***Teaching Tip: Use the Student Handouts to help students organize their thinking in writing around each of the lesson protocols.***

**Post-Video Discussion**

After the groups have had time to go over their 4 Notes Summaries, invite a handful of students to share out some of their notes, eliciting at least 1-2 of each of the 4 Notes and listing those somewhere for the whole group to see.

Ask students to turn back and talk with their groups to make connections between the *Great Lakes Now* video and what they remember from the warm-up activities.

**How is what we saw in the video related to what we discussed earlier in this lesson during the warm up?**

After giving the groups some time to talk, bring the whole group back together for a shareout and discussion of ideas.

In this culminating discussion, the goal is to help students make connections between the video segment and what they discussed during the warm up activities earlier in the lesson about what they knew about **fish.**

Once the discussion finishes, have each student write a "**Sum It Up**" statement in their notebooks. This is a single sentence that captures the big idea of what was just learned.

Have 2-3 students share out their **Sum It Up** statements before concluding this activity.

## ACTIVITY 2: READ ABOUT MADTOMS IN THE GREAT LAKES

While technology can help us image the underwater depths, divers are still largely responsible for documenting many of the species we know about, including Northern Madtoms. One group of divers set out on an underwater treasure hunt and instead found some Northern Madtoms. Their dive was documented for *Great Lakes Now*.

*Image Credit: Great Lakes Now*

In this activity, students will use a **Think Pair Square Protocol** for discussing what they will read about this very topic.

First, have students partner up and distribute the article **No Petting For These Cats** by Kathy Johnson from *Great Lakes Now*. Allow time for students to individually read the article, and have them jot down three things they took away from the article using the **Rose Thorn Bud Protocol**—in their notebook or using the handout.

Then, give students time after reading to discuss the article that they read with their partner. Have students share their rose, thorn, and bud with each other, including how those points connect to each other. The pair should come up with a statement to summarize all of their article takeaways.

Next, have two student pairs join up, standing near each other to form the four corners of a square, to discuss the article and what they talked about in their pairs. Encourage them to come to a consensus about which point they found most important or interesting in the article.

***Teaching Tip:***
***If the reading level of the article is going to be tough for some students to read individually, have partners or small groups read the article together aloud while each follows along.***

Last, have each group craft a summary statement of the most important point from their discussion and ask for a volunteer in each group to share that key point with the whole group.

As student groups share their most important point, record their ideas on the board and have students copy the list of student ideas down into their notebooks.

Once the shareout is complete, ask students to return to their groups and discuss one last question based on the article:

**Based on the article, what are some reasons it might be difficult to spot Northern Madtoms in the Great Lakes?**

After giving the groups some time to discuss this question, invite conversation from the whole group to see what consensus can be reached.

Be sure to encourage students to support their claims with evidence and reasoning as they discuss in the whole group.

# ACTIVITY 3: CLASSIFICATION AND GROUPING GAME

*Image Credit: Gary Abud, Jr.*

In this activity, students will play a game to learn about how scientists classify and group organisms based on their traits and have to make systematic decisions. The whole group will be provided a set of game cards—one card per student—and they will have the task of working together to put all of the cards into groups of 4 based on which items on the cards they think go together. *The challenge is some items can be classified in multiple groups.*

This activity practices a variety of scientific skills including—among others—communication, evaluation, developing and using models, and collaboration. Just like scientists use the features of organisms to classify them and group them together, students will have to consider the properties of each item on their cards—including doing some outside research in some cases to learn more about each card—until they can determine how to group all of the cards.

**The Rules of the Game**

1. All cards must end up in one group
2. All groups must contain exactly four members
3. Students may not trade cards with others
4. Any student in the room may talk with any other student in the room about their cards
5. Students go to the group where their card belongs, but they may switch groups as they get more information
6. Students may do Internet research, as needed, to learn more about the item on their card
7. A rationale must be provided for each group's final selection of members

**Materials**

- Dry erase boards/chart paper and markers
- Devices to access the Internet for research
- Set of grouping cards (see **Teacher Handouts**)

**Setup / Procedure Notes**

1. Review the **Teacher Handouts** and prepare the game cards ahead of time.
2. There are multiple connections to make between items to form partial groups, but only one classification will group all the cards.

First, explain to students that they will be conducting a classification activity by playing a game where they will group things according to their properties. Let them know that groups of four items can be made by making connections between the properties of different items.

Next, distribute one item card to each student face down. Tell them not to peek until after everyone gets their card. Inform them that the items written on their cards have three other items that can go with them to form a similar group based on their properties. It's their job to work together and figure out which sets of cards should go together to form a group.

Then, distribute the visual medium that they will use to show their rationale and keep track of any information as they form their group. Whether you're using dry erase boards, chart paper, or some other medium for students to share their rationale for their grouping, inform them that the goal is to make their thinking visible about how they arrived at their grouping. Explain the rules to the game and check for understanding with a few students.

Last, allow students time to work together to figure out how they will group their cards. Inform them that there is only one configuration that will allow all the cards to be in a group such that there are four groups.

**Making Thinking Visible**

Remind them that for making their thinking visible to show how they grouped their cards, they will want to have a **claim** (which cards go in the group) based on **evidence** (what features they considered) and **reasoning** (how those features connect within this group better than any other group.

Once all the groups have formed and have their set of members finalized, give students time to show their thought process visually before giving each group time to present to the whole group and explain their thinking. Give students the option to respond or ask questions as they hear from each group and more information arises about the sets of items.

# ACTIVITY 4: MADTOMS INFOGRAPHIC

In this activity, students will further learn about Madtoms by researching them to create an infographic that synthesizes their learning and visually communicates what they've learned to others about Madtoms.

Students will need access to computers and the Internet for this activity. Using an infographic creating tool, such as Canva, Google Slides, etc., students will work with a partner to summarize what they've learned about Northern Madtoms thus far, conduct any additional research that they feel is necessary, and create an infographic to communicate what they've learned to others. They can work with a template or create an infographic from scratch.

This project-based activity is open ended and has only a driving question, resources, and framework for setting up the project. Adapt this framework to fit your students.

**Driving Question**
How might we visually communicate information about Northern Madtoms in order to educate and inform others?

**What Makes an Infographic Stand Out?**
The hallmark features of an infographic are:

- Great Graphics
- Clearly Organized Information
- Information is Concise
- Descriptive Titles and Subheadings
- Informative Data
- Specially Formatted Facts
- Great Use of Space and Layout

**Evaluating Performance on This Task**
Teachers can consider a performance rubric for evaluating the infographics students create that utilizes the categories above—or includes others—and rates the categories on a scale of 1–3, where 1=not evident; 2=somewhat evident; and 3=evident.

*Note: When you introduce and set up this project, be clear that students need to keep track of, and cite, their information sources in a separate document with their infographics when they turn them in.*

*Image Credit: Great Lakes Now*

**Research Resources**
Students can use the resources available from Great Lakes Now in this episode and lesson, review this **Madtoms Fact Sheet** from Michigan State University's Natural Features Inventory of Michigan, this **Assessment and Update Status Report on the Northern Madtom** from the Committee on the Status of Endangered Wildlife in Canada, or conduct their own additional research. The Madtoms Fact Sheet from MSU is like an infographic in the way that it chunks information, but it is unlike an infographic in that the information is displayed in text only and there is a lot of information.

*Note: An additional article is included in the resources section of this lesson entitled* ***Turning the Tables by Kathy Johnson****. It goes into depth about the spines, venom, and stings of the Northern Madtom—an important aspect of the fish that should be included in the infographic—so be sure to make this article available in print or online for students to read during their project research.*

**Presentation & Feedback Session**
Have partners pair up with other partners to present their infographics to one another. Instruct students—prior to presenting—that they will need to provide one piece of feedback and ask one question to their presenters. They should use the **Notice and Wonder Protocol** for this to keep the feedback structured and constructive. You may wish to model this format for students ahead to help them familiarize themselves with how to give good feedback and ask questions posed as a wonder.