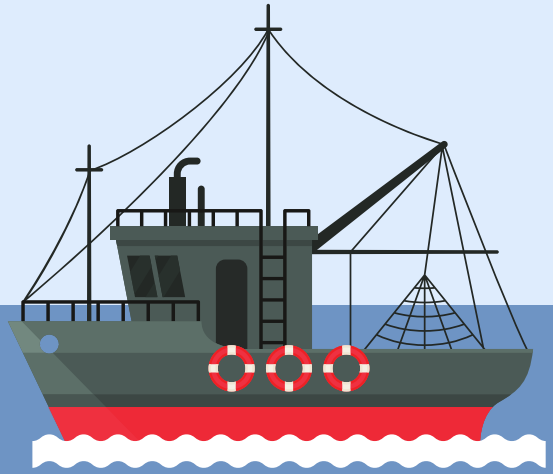
# FISH & MEN

## CURRICULUM RESOURCE



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MRS KRISTA LEBLANC

IB BIOLOGY HL
BIOLOGY 11/12
FOOD SCIENCE 12

# FISH & MEN

**A DOCUMENTARY BY DARBY DUFFIN & ADAM JONES | AVAILABLE TO RENT OR BUY ON AMAZON**
**2019 | UNITED STATES | 85 MINUTES | TRAILER** (https://vimeo.com/348950158)

## TEACHER'S GUIDE

This curriculum resource will guide teachers and students to enrich their viewing experience of the 2019 documentary *Fish & Men*. This resource is designed to help teachers frame discussions with their class, with viewing and post-viewing activities for the film as well as lessons and assignments relating to the themes of the film that can be completed after viewing.

## ABOUT THE FILM

Gloucester, MA, America's oldest fishing port struggles to survive. The American seafood appetite yearns for cod and is satiated by 90% imported fish. Lesser known, abundant species have little market appeal.

*Fish & Men* exposes the high cost of cheap fish in the modern seafood economy and the forces threatening local fishing communities and public health by revealing how our choices as consumers drives the global seafood trade. But, a new movement is underway - an opportunity to return sustainability to both fish and fishermen.

Thriving on local communities, pioneering fishermen and celebrated chefs are leading a revolutionary new model, a 'Catch of the Day' revival based on local, seasonal sustainable fish - introducing consumers to discover new varieties of storied seafood and reconnect us with those who risk their lives to harvest the bounties of the sea.

Source: https://www.imdb.com/title/tt3652088/ and http://fishandmen.com/

## ABOUT THE FILMMAKERS

Darby Duffin brings a unique blend of media experience to directing and producing his first feature documentary. Darby's company On a Mission Media produces short films for global brands, mini-docs for media outlets and original feature documentaries. Darby lives with his family in Houston, Texas where he is currently directing his second feature documentary and producing a feature narrative.

Adam Jones has directed hundreds of TV commercials and branded content projects in every major market in the the US for national and international brands like Nokia, Nascar, Holiday Inn, Philips, Nationwide and Progressive. Jones resides in Henniker, NH, and is represented in NY/LA for commercials by No Smoke. *Fish & Men* is Jones' first documentary feature.

Source: http://fishandmen.com/



# CURRICULUM OUTCOMES

## OCEANS 11 - LEARNING OUTCOMES ATTACHED TO THE FILM *FISH & MEN*

| UNIT | OUTCOME STATEMENT |
|---|---|
| **Structure and Motion** | **Oceans, Seas, Gulfs, and Straits:**<br>• Identify oceans and related water areas in the world and describe related science- and technologybased careers (OSM-1) |
| **Marine Biome** | **Life in the Oceans:**<br>• Explain the marine biome and describe the biodiversity of ocean life and determine interconnections that exist within the marine biome (MBIO-1) |
| | **Habitats:**<br>• Compare representative marine organisms and communities (MBIO-2) |
| | **Open Ocean Versus Coastal Areas:**<br>• Compare characteristics of the open ocean and coastal zones referencing terms and impact on local ecosystems (MBIO-3) |
| | **The Field Trip:**<br>• Develop and report appropriate sampling procedures to obtain quantitative data on the abundance of marine organisms at a local coastal area and describe and apply classification systems and nomenclatures to organisms found in the marine biome (MBIO-4) |
| **Coastal Zones** | **Identifying Coastal Zones:**<br>• Discuss the concept of coastal zones and how these vary around the world (CZON-1) |
| | **Variations in Coastal Zone Structure and Properties:**<br>• Describe and explain the causes and characteristics of major types of coastal zones (CZON-2) |
| | **The Importance of Coastal Zones to Humans:**<br>• Identify and explain sustainability and human use of an environment, including populations and resources, locally and globally (CZON-3) |
| | **Keeping our Coastal Zones:**<br>• List and discuss human interactions with the processes involved in the coastal zone environment, and describe competing views (CZON-4)<br>• Discuss the purpose and process of integrated coastal zone management and analyze a coastal zone management structure and the interrelationships found in a local area (CZON-5) |

# CURRICULUM OUTCOMES

## OCEANS 11 - LEARNING OUTCOMES ATTACHED TO THE FILM *FISH & MEN* (CONTINUED)

| UNIT | OUTCOME STATEMENT |
|---|---|
| **Aquaculture** | **Farming, Fishing, and Food:**<br>• Identify, and compare aquaculture locations and species grown in Nova Scotia, in the rest of Canada, and globally (AQUA-1) |
| | **What Species? Where? Why?**<br>• Describe and identify groups of organisms raised through aquaculture and their geographic locations, referring to anatomy and physiology of a major species and ecology of cultured species (AQUA-2) |
| | **Water Quality:**<br>• Describe, measure, and analyze conditions for aquaculture operations (AQUA-3) |
| | **Site Acceptance by the Community:**<br>• Analyze site planning from various perspectives and report on both the risks and benefits to society and the environment (AQUA-4) |
| | **Marketing the Product:**<br>• Identify, analyze, and evaluate various aquaculture business opportunities (AQUA-5) |
| | **Aquaculture-Related Issues:**<br>• Explain aquaculture-related issues (AQUA-6) |
| **Fisheries** | **Fisheries are a Unique Resource:**<br>• Explain the importance of a sustainable fishery as a resource to global and local food supply and employment with reference to terminology (FISH-1) |
| | **Life Cycle:**<br>• Describe, identify, and analyze the external and internal anatomy of a major finfish or shellfish species that is part of the commercial fishery (FISH-2) |
| | **Models of Fish Stocks:**<br>• Construct, interpret, and evaluate various ecological factors (FISH-3) |
| | **Fish Population and Management:**<br>• Compile and organize fish population data and explain the dynamic interrelationships among the physical environment, the biological environment, and the health and distribution of a fish stock (FISH-4) |
| | **Technology in the Fisheries:**<br>• Compare the risks and benefits to society and the environment of applying scientific knowledge or introducing a technology to the fisheries (FISH-5) |
| | **What Does Management Mean?**<br>• Identify, describe, and analyze multiple perspectives of the main organizations in research and decision making in fisheries management in Canada (FISH-6) |

# CURRICULUM OUTCOMES

## BIOLOGY 11 - LEARNING OUTCOMES ATTACHED TO THE FILM *FISH & MEN*

| UNIT | OUTCOME STATEMENT |
|---|---|
| **Biodiversity** | **Classifying Living Things:**<br>• Describe and apply classification systems and nomenclatures used in the biological science (214-1)<br>• Use organisms found in local or regional ecosystems to demonstrate an understanding of the fundamental principles of taxonomy (316-5)<br>• Analyze and describe examples where scientific knowledge evolved, was enhanced, or revised as a result of new laws, theories, and/or technologies (115-7, 116-2) |
| | **Diversity Among Living Things:**<br>• Construct arguments to support a decision or judgment, using examples and evidence, recognizing various perspectives (118-6)<br>• Describe the anatomy and physiology of a representative organism from each kingdom, including a representative virus (316-6) |
| **Maintaining Dynamic Equilibrium I** | **Homeostasis:**<br>• Explain the importance of nutrition and fitness to the maintenance of homeostasis, debating the merits of funding specific scientific or technological endeavours and not others (117-4, 317-3)<br>• Explain, with specific examples, how behaviours such as tropisms, instinct, and learned, help to maintain homeostasis and identify multiple perspectives that influence a decision/issue (215-4, 317-8) |

## VISUAL ARTS 11 - LEARNING OUTCOMES ATTACHED TO THE FILM *FISH & MEN*

| UNIT | OUTCOME STATEMENT |
|---|---|
| **Creating, Making and Presenting** | • **CM 2.4:** Encourage peers to express individual approaches to and opinions of aesthetic forms in collaborative learning environments |
| **Understanding and Connecting Contexts of Time, Place, and Community** | • **Outcome 3:** Demonstrate critical awareness of and value the role of the arts in creating and reflecting culture<br>• **Outcome 4:** Respect the contributions of individuals and cultural groups to the arts in local and global contexts and value the arts as a record of human experience and expression<br>• **Outcome 5:** Examine the relationships among the arts, societies, and environments<br>• **UC 4.1:** Explore and share a developed appreciation for the diversity of art and artifacts from individuals and various cultures |

# CURRICULUM OUTCOMES

## MI'KMAQ STUDIES 11 - LEARNING OUTCOMES ATTACHED TO THE FILM *FISH & MEN*

| UNIT | OUTCOME STATEMENT |
|---|---|
| **Culture** | • **C3:** Demonstrate an understanding of the importance of the roles Mi'kmaw Elders continue to have in maintaining cultural values. |
| | • **C4:** Explore traditional and contemporary expressions of Mi'kmaw art, crafts, music, dance, and literature. |
| **Spirituality** | • **S1:** Demonstrate an understanding of the beliefs, customs, and values of traditional Mi'kmaw spirituality. |

## FOOD SCIENCE 12 - LEARNING OUTCOMES ATTACHED TO THE FILM *FISH & MEN*

| UNIT | OUTCOME STATEMENT |
|---|---|
| **Food Constituents** | **Food Constituents:**<br>• 1.1 Identify and describe science- and technology-based careers related to food science<br>• 1.2 Analyze a food package ingredient listing |
| **Preservation Factors** | **Food Microbiology and Food Safety: Preservation Microbiology:**<br>• 2.3 Describe the role that processing and food additives play in eliminating, inhibiting, or delaying the growth of spoilage microorganisms |
| | **Evolution of Food Preservation:**<br>• 2.6 Explain practical methods of food preservation |
| **Food Quality and Commodities** | **Food Commodities:**<br>• 3.1 Analyze the properties of specific food commodities<br>• 3.2 Select and use different resources and materials to collect information about their commodity<br>• 3.3 Devise and conduct an experiment on their commodity |
| | **Food Quality:**<br>• 3.4 Identify psychological factors used to market and develop food products |
| | **Product Development - Schemes and Stages:**<br>• 3.6 Explain how well a product is designed to meet consumer wishes |
| **Food Packaging** | **Food Packaging and Food Labels:**<br>• 4.1 Explain the functions and considerations for food packaging<br>• 4.2 Identify and explain the information required for labels on food products made in Canada<br>• 4.3 Design, develop, make, and present a food product identifying and anticipating major variables that may impact on the final quality of the product |

# BEFORE WATCHING THE FILM...

Name: _____

## INTRODUCTION


Nova Scotia is a peninsula that is surrounded by water. Our license plates say "Canada's Ocean Playground," yet many Nova Scotia residents are disconnected from the sea. Prior to watching the film please take a moment to pre-assess your ocean literacy by answering the following questions.

**1)** What images come to mind when you think of a fishery?

**2)** Do you know a family who makes their living working with fish? Jot down any details about the type of work this family does.

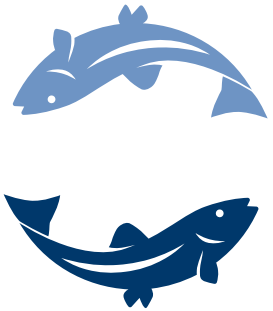
**3)** Do you or anyone you know want to be a fisher when they grow up? Why/why not?

**4)** Do you eat fish? Why/why not? Does your family have any rituals/customs with fish?

**5)** Make a guess: how much seafood does the average North American person consume per year?

**6)** Do you think fishing can be done in a sustainable way?

# VIEWING & POST-VIEWING ACTIVITIES



## VIEWING ACTIVITY

Although set in Gloucester, Massachusetts, the stories from *Fish & Men* could be told by our own neighbours. Gloucester is a harbour town, on the East Coast of the USA. Similar to Halifax, Gloucester is based on the Atlantic Ocean and has a longstanding history of fishing. Schooner boats from Lunenburg and Gloucester have come together to race since the 1920's as both communities fish the Grand Banks. As you watch the film, hopefully you will experience a paradigm shift. While viewing the film, please complete the following questions:

**1)** What is a fishery? What images should be included when we imagine fishing communities?

**2)** Why is it important to rebuild the fish stocks?

**3)** How have fishing licenses changed from the 1970s to today?

**4)** How does the temperature of the Atlantic Ocean affect the abundance of fish?

**5)** What is bycatch? Why is it important for people to think differently about bycatch?

**6)** What does it mean that trash fish can be transformed into cash fish?

# VIEWING & POST-VIEWING ACTIVITIES

**7)** Compare commercial fishing to family owned small boat fishing in the chart below.

| COMMERCIAL FISHING | FAMILY-OWNED SMALL BUSINESS FISHING OPERATION |
|---|---|
| | |
| | |
| | |

**8)** Examine the food package pictured to the right. What food marketing strategy or imagery is the company trying to portray to the consumer? Are these images about the product true? Explain.


**9)** What costs are involved in running a fishing operation?

**10)** How can we estimate the population density of fish?

**11)** Not all researchers and fishing vessels are in disagreement with each other like in Massachusetts. What learning could be taken from the experiences between fishermen and researchers in Norway?

**12)** There are many major dangers in using factory trawler boats to fish versus smaller locally owned fishing boats. Why should we care about trawler boats in the ocean? What is the environmental impact of this type of commercial fishing?

**13)** What is aquaculture?

**14)** What dangers can exist for consumers eating fish from unregulated aquaculture farms?

**15)** What incredible local movements are starting to happen in the United States to support sustainable fishing?

**POST-VIEWING PARKING LOT ACTIVITY**

A famous quote from Maya Angelou is "Do the best you can until you know better. Then when you know better, do better." Use the parking lot space below to unpack some of your original ideas about fishing and small boat fishing families prior to watching the film, and then write how those ideas have shifted after viewing the film. An example is given below and we will discuss more after watching the film!

| I USED TO THINK... | NOW I KNOW... |
|---|---|
| **Example:** I didn't need to care about where my fish came from, nor did it matter what type of fish I ate. | **Example:** Every fish has a story! When I purchase a fish, I support a family, a community, and vote for sustainable fishing practices. I need to learn more about where my fish come from! |
| | |
| | |
| | |

# ASSIGNMENT: CATCH OF THE DAY

## INTRODUCTION

The documentary Fish & Men emphasizes that consumer choice drives the global seafood economy. There is a high cost for cheap seafood as Americans opt to import 90% of the seafood that they are willing to eat. The film showcases that 2 billion pounds of fish each year (17-22% of all bycatch) are labelled as discards and are returned into the water either dead or dying. Barton Seaver, chef, writer and one of the film's narrators warns that the American palate needs to diversify and people need to expand their view of edible seafood to include fisheries landings bycatch that is caught and can be sold or used in restaurants. Mr. Seaver suggests that "there is nothing wrong with the bycatch product, only the perception of the fish that are caught" (e.g. dogfish). He adds, "We ask fishermen to catch fish on our behalf and yet when they do, we aren't willing to eat what they actually are able to bring up."



To increase food literacy and ocean literacy, consumers need to be willing to move away from the fish stick and shrimp cocktail to purchasing whole fish and diversifying the types of fish they eat in a zero-waste sustainable local movement. In changing consumer food choices, the North American fishing industry would be able to sustain itself. We know that food marketing strategies rely on feeding the consumer limited information, scare tactics and false claims. It is time to take the power back and shift the narrative so that we see the catch of the day as an invitation for culinary richness in our restaurants and home kitchens and a movement that promotes sustainable fishing.

*"There is a farm in that ocean that we can use!"* - Sefatia Romeo Theken, Gloucester Mayor

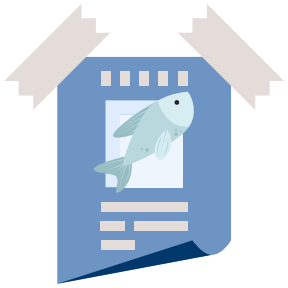
## ASSIGNMENT GOAL

For this assignment, you are asked to turn trash fish into cash fish! In a small group, you will work to create a Dock to Dish media campaign outlined below. You will research an uncommon fish that is easily found in your Ocean's waters but not normally found on a menu. Similar to Julia Child's use of monkfish on her cooking show, we know that a little education and celebrity influence goes a long way in creating a foodie trend. The "dock to dish" movement aims to mirror the farm to table movement of our cattle, poultry and produce farmers and reconnect local people with seasonal, sustainable fish caught right in their own harbours.

# ASSIGNMENT: CATCH OF THE DAY

## ASSIGNMENT OPTIONS

Alone, or in a small group you can opt to complete one of the following ideas:

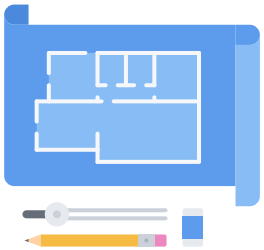


**1) A Catch of the Day Poster Campaign:**
Research a normally discarded bycatch fish from your local water. Create a poster containing the following information about your fish.

- What are the health benefits of consuming this fish?
- What is the carbon footprint difference in eating a locally sourced and produced fish versus one which is processed in Asia?
- Are there better health regulations when you eat a fish that was produced and prepared in Canada?
- Why should the consumer care about where the fish on their plate was raised?
- Is this type of fish exported to other countries? If so, what are some local dishes that feature this fish?
- Why is it important for us to use this local fish instead of returning it back once caught to the sea?
- Research or invent a recipe that uses this fish as a protein source. Include the recipe on the poster.

**2) Dock to Dish Video Segment:**
Pretend you are the host of a popular cooking show with a goal to get more Canadians to each local fish!

- Write a script for a segment that is going to feature a catch of the day segment with you as the celebrity chef.
- You are responsible for educating the audience about the incredible flavour, cost and convenience of the fish you have selected.
- As you prepare the fish for your audience take the time to connect them to the local story of the feature fish.
  - How can we slow climate change by cooking supper?
  - Who is helped when you buy and prepare fish from your local dock?
- No need to use real fish (although you are welcome to!) but you can improvise and use props instead.



**3) Local Aquarium Project:**
The mayor of your town has reached out to your expert group for assistance in setting up a publicly funded local aquarium that is going into your town that will support small boat fishing families.

- Draw the blueprints and include the keystone species that you will feature in your local tanks.
- What information do you want visitors to the aquarium to learn as they read the placards about the species and local conservation efforts that you are promoting in your community?
- How are we all connected to the ocean?
- Why is it important to support family owned fishing boats?
- How can working alongside fishing families help scientists learn more about the ocean?

**4) Fishing and My Family - A Digital Narrative:**
The film ends by talking about the importance of connecting food through storytelling with communities. The story is not only just about the fish, but also all the people that fisheries support. Does fishing run in your family?

- Tell the story of how your family is connected to the ocean using a digital platform.
- Use a digital platform such as Instagram, Google Sites, Google Slides to promote your family's culture and connection with the sea.
- You may include family photos from the past, local photos taken from your communities and stories that are shared around your kitchen table about the importance of sustainability and the ocean's health in keeping your family afloat.

# LESSON: COD FISHING & "NETUKULIMK"

Within Biology 11 and Biology 12, there is a central theme titled “Maintained Dynamic Equilibrium.” Biology 11 leads into Biology 12 with an understanding that there are dynamic moving interactions between populations and the environment and internally within the body systems and the person as a whole. The units centering around Ecology look at patterns and distributions of all organisms on Earth. In Oceans 11 and Food Science 12, we understand the importance of supporting local economies by purchasing sustainable local food from our Ocean. *Fish & Men* is an excellent example of the importance of living in harmony with the environment. The film has multiple connections with curriculum outcomes from many subjects and serves as an excellent cross curricular platform for students and teachers to work together promoting sustainable food choices that ripple back into our local communities prosperity for our local economy.

In many grades, students learn about ecological ordering of living things, and witness the cascade of how one population change can affect the entire hierarchy. The world is out of balance, and climate change is a reality. The students in our current classrooms are faced with a crippling reality that due to human greed, and a lack of appreciation for Mother Earth, we are on a frightening trajectory of global warming. **Two-eyed seeing** offers a welcomed breath of relief into our classrooms as we teach about sustainability, adopting truth and reconciliation into our classrooms. The Western traditional framework of quantitative science is not enough to help us out of this mess we have created. We need to listen to Canada’s Mi’kmaw Elders and bring the knowledge of **Netukulimk** into our classrooms so that holistic practices and policies can help heal our Oceans, land and all of its inhabitants. The lessons below consider the unit outcomes from Biology 11 STSE (Science, Technology, Society and Education), Mi’kmaw 11, and Visual Arts 11 in an effort to further develop global citizenship and scientific literacy.

**Purpose:** Netukulimk is the relationship we have with one another and the environment. Consisting of three components actions, beliefs and behaviours, it uses the living knowledge of the principles of sustainability, interconnectedness, spirituality and stewardship in connection with No’kmaq, the belief that all living things are related.

**Guiding Questions:**

- How can natural resources be used in a sustainable way?
- What are the consequences of unsustainable practices?
- What makes a successful ecosystem?
- How do different groups of people impact ecosystems?
- How have human relationships with the environment changed over time?

**Bridge-in:** Show the film *Fish & Men* and have the students complete the viewing and post-viewing activities worksheet. After the film, students will be shown an introductory video on the new term “Netukulimk” that is taken from the Ocean School Teacher Help Centre (2019). The video is narrated by a Grandmother Fish (Mi’kmaw elder) as she speaks to Little Fish and presents the history of cod. The little fish listens and learns the story from her grandmother and grows to be a grandmother herself, passing on the oral history and the importance of living in harmony with nature.

**Video Link:** https://youtu.be/HH5LynC6US0
**Created for Ocean School by:** Elder Albert Marshall, producer Cathy Martin and artist Shaela Kinting
**Inquiry Tool:** Netukulimk Ocean School, 2019

# ASSIGNMENT: COD FISHING & "NETUKULIMK"

## INTRODUCTION

Netukulimk, the Mi'kmaw way of living with nature, provides the perspective for a study of ecosystems. The interconnectedness of biotic and abiotic components of an ecosystem will lead to an understanding of energy input and matter cycling as we discuss food webs in Biology 11. We will analyse the impact of humans on ecosystems as we travel into our unit on Interactions within Populations.

Netukulimk teaches us 4 key understandings:

**1) Co-Existence:** Sustaining oneself without compromising the future, with our hearts and minds we are constantly finding, creating, and maintaining balance; taking care to not create an imbalance with the environment. Sustainability is a way to learn from the past to provide for the present while also ensuring the ability to provide for the future.

**2) Interdependence:** Recognizing the reciprocal relationship with nature to assure the survival of the environment and its people. Interconnectedness is being able to keep the bigger picture in mind with our actions.

**3) Community Spirit:** Connecting everything and everyone to guide our hearts and our minds in all of our actions. Spirituality leads to interconnectedness and the expression of gratitude and honour for everything and everyone including the concept of wejisqalia'ti'k, "from this earth we spouted."

**4) Respect and Responsibility:** Engaging as responsible community members who advocate for social/environmental action. Stewardship teaches responsibility and respect for one another and for the environment.

Despite the variety of size and ranges of ecosystems, two key principles govern them: **energy flow** and **chemical cycling**. Not only is it important for both energy flow and chemical cycling to happen internally, but externally, these underlying principles shape all ecosystems.

Currently scientists are reporting at an alarming rate that there are substantial changes in the world's ecosystems. In the film *Fish & Men* you will hear about the fishing industry and the decline of fish. Field surveys of Atlantic fish have revealed that the population is declining, and less offspring are being produced each year. Of the offspring that are produced, their size is decreasing each year as well.

**Why do you think that these changes are happening?**

The purpose of this lesson is for students to become a "knowledgeable traveler" as we work through the station set-up. We will learn as a group about cod fish anatomy and habitat, the effect of overfishing practices and will aim to focus on the development of sustainable fishing practices as we begin to develop an environmental stewardship plan that can be adopted by High School students.

# ASSIGNMENT: COD FISHING & "NETUKULIMK"

## GUIDED PRACTICE

We will travel through the following 4 stations. Please complete the questions in your notebook that are associated with each station. At the end of the 4 stations, you will be asked to film yourself using the app FlipGrid and report your findings. Please be prepared to share your travels with your classmates as we learn together.

## STATION 1 - WHAT IS A COD?

In your notebook, please take a moment to sketch and take notes about the Atlantic cod. Use Links 1 and 2 to help you navigate through the basic anatomy of the cod fish and learn about its location in Atlantic Canada. Once you have learned about the cod specifically, you will be asked to use Link 3 to build a marine food web. Lastly, please watch the video in Link 4.

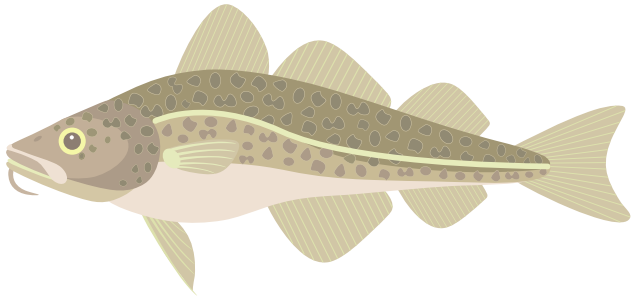
**1) Cod Characteristics, NOAA Website:** ttps://www.fisheries.noaa.gov/species/atlantic-cod

- How does the variety of food sources impact the ability of the Atlantic cod to survive?
- How could a change in water temperatures impact the food types available to cod?

**2) Atlantic Cod (Gadus morhua), Animal Diversity Web:** https://animaldiversity.org/accounts/Gadus_morhua/

**3) Build a Marine Food Web:** https://www.sciencelearn.org.nz/resources/1525-build-a-marine-food-web

**4) What happens when a food web gets out of control? Viewing Station:** https://www.youtube.com/watch?v=Vtb3I8Vzlfg



## STATION 2 - WHAT IS A KEYSTONE SPECIES?

**1) Please watch the following video:** https://www.youtube.com/watch?v=_IWw8Ruz8Uo

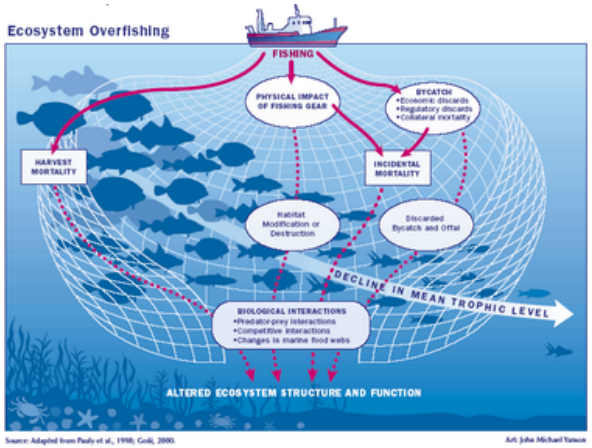
- What is a keystone species?
- What are the 5 categories of 5 keystone species that are outlined in the video?

**2) Please visit:** https://www.nationalgeographic.org/encyclopedia/keystone-species/

- Revisit the cod food web you built in Station 1 - what keystone species can you identify?

Keep this information handy, as we will be revisiting keystone species next week!

# ASSIGNMENT: COD FISHING & "NETUKULIMK"




Retrieved from: http://see-the-sea.org/topics/commerce/OVERFISHINGfromPEW.gif

## STATION 3 - OVERFISHING A FOOD WEB OUT OF BALANCE: TRADITIONAL VS MODERN TOOLS

**1) Please visit the following links:**

- https://panicinthenorthatlantic.weebly.com/what-is-overfishing.html
- https://www.worldwildlife.org/threats/overfishing
- https://oceana.ca/en/our-mission
- https://www.youtube.com/watch?v=YR0stdpbQsI

**2) Thinking questions:**

- What are the 5 major causes of overfishing?
- How does overfishing affect biodiversity and Atlantic cod food webs?
- What is bycatch?
- What types of fishing methods have the most environmental impact with regards to bycatch?
- How does this affect the trophic levels involved in the cod food web?

## STATION 4 - GRAPHICAL ANALYSIS

**1) Visit this link:** http://www.seaaroundus.org/data/#/taxon/600069?chart=catch-chart&dimension=eez&measure=tonnage&limit=10

- Look at the tonnage of Cod caught per year in different waters. Note in the graph linked above, Canada isn't doing the least amount of harm, but moreover, the waters contained fewer cod to catch.

**2) Please read the following document:** https://oceana.ca/en/publications/reports/oceans-opportunity-economic-case-rebuilding-northern-cod

- Construct a t-chart outlining the pros/cons surrounding the economic case for rebuilding the Northern Cod population.

| REASONS TO SUPPORT THE CASE FOR REBUILDING NORTHERN COD | REASONS COUNTERING THE CASE FOR REBUILDING NORTHERN COD |
|---|---|
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# LESSON: APPLICATIONS OF "NETUKULIMK" THROUGH ART

Gyotaku is the Japanese art of fish painting. Traditionally used by people who fish, it was a method to record the size and species of a catch. Using ink, the external surface of the fish is painted with ink and then the fish is pressed onto rice or mulberry paper allowing an exact copy of the fish to be recorded. This technique allowed Japanese fishers to both record and eat their catch. Since its functional beginning, Gyotaku has become an art form. Prints are no longer just plain black ink outlines, but colorful reproductions of the original species. Gyotaku art has been displayed at museums around the world. (Sutera, 2011)

In Biology 11, students learn about the internal anatomy of fish and also use dichotomous keys to classify their fish. We complete fish dissections using a local fish in our dissection from Fisherman's Market on the Bedford Highway. We don't acknowledge or do many activities that value the external anatomy of the fish. Mi'kmaq education about fish sustainability is a welcomed addition to Biology 11. The Mi'kmaq worldview as seen with two-eyes will allow the knowledge of fishing to travel into Biology 11. Education is needed among younger harvesters in the Mi'kmaq community as well as Biology 11 travelers about species identification. The cod moratorium continues, but the Mi'kmaq people continue to fish using traditional practices that are sustainable with regards to salmon.

**Purpose:** The purpose of this lesson is to educate students about salmon fish characteristics, to introduce students to the fabulous art work of local Mi'kmaq artist Alan Syliboy as they practice Gyotaku. From this lesson, discussions about how to preserve and improve salmon habitats with regards to current community land practices will develop.

**Lesson Timeline:** 3 classes (75 minute) investigation

**Bridge In:**

- Who is local Mi'kmaq artist Alan Syliboy?
- What can we learn through external examination and appreciation of salmon anatomy?
- Can we connect our biological nomenclature of salmon anatomy through the art stylings of Alan Syliboy to honor the life cycle of the salmon fish?

**Input from You:** Students will be provided with the materials/directions/handout and links to create a fish print (Gyotaku). Students will use the biology nomenclature charts and anatomical keys that are outlined in their Biology 11 textbook. The materials required for the painting impression are ink (purchased through Staples) and mulberry/rice paper (ordered through Amazon). Anatomical labels can be put onto the fish print using pens/rulers. The background design should be completed using the stylings and illustrations that are inspired by Mr. Alan Syliboy. Each student will create a piece of Gyotaku.

Art by Alan Syliboy, http://www.alansyliboy.ca/

**Guided Practice:** The image to the right will be posted on the Google Classroom for Biology 11, and also on the front board to start the class.

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## INTRODUCTION

**Links to be posted on Google Classroom:**

- Who is Alan Syliboy? http://www.alansyliboy.ca/about/
- Educational uses of Gyotaku link from the Smithsonian Institute: https://ocean.si.edu/conservation/get-involved/educational-uses-gyotaku-or-fish-printing


Retrieved from: https://ocean.si.edu/conservation/get-involved/educational-uses-gyotaku-or-fish-printing

The teacher will lead students through the process of preparing the fish for printing. The whole fish will be purchased from a local shop. Students will create their own fish prints!

## PROCEDURE

**1)** Select your fish!
**2)** Place fish (flat side down) on top of rice paper.
**3)** Using the colored inks provided, paint your fish with the appropriate size paint brush.
    - Make sure to cover the entire surface of the fish. Include the eyes, fins, and all the scales!
    - Spread the ink evenly over the fish so that only a thin yet solid layer shows.
**4)** Visually line your white rice paper up over the fish so that the fish is positioned where you would like it to print. Place on top of fish.
**5)** Press firmly, covering the entire fish's surface.
    - Important: Do not let the paper move!
**6)** Carefully remove the paper and set aside to dry.
**7)** Repeat if desired!

Students will create a fish print and then will label the external anatomy of the fish. Once the print is dry, they will design the background of the fish print using the styling of Alan Syliboy. A follow-up lesson will be a complete internal bony fish dissection following the outline printed in the Biology 11 textbook.

## CLOSURE

**In the final 5 minutes of class, show this video:** http://seafood.ocean.org/videos/ocean-wise-sustainable-seafood/

**Pass out the take-home Exit Card:**

- Students will visit the website Ocean Wise (http://seafood.ocean.org/sustainable-seafood/) or they can download the Ocean Wise app to their personal device.

**Prompt:**

- Research a sustainable seafood species using Ocean Wise (based out of Vancouver). Identify the fishing methods that are used for this sustainable practice.

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**ASSESSMENT**

| Criterion | Emerging (0-1) | Novice (2-3) | Apprentice (4-5) | Apprentice (4-5) | Masterpiece (8-9) |
|---|---|---|---|---|---|
| **Task Completion** | The student does not complete the assignment. Major details are missing. The impression of the fish shows very poor detail. | Student completes half of the assignment and then stops. The impression of the fish shows poor detail. | Student completes ¾ of the assignment or does not include the background or anatomical landmarks. The impression of the fish shows good detail. | Student completes ¾ of the assignment or does not include the background or anatomical landmarks. The impression of the fish shows good detail. | Student completed the entire assignment, includes background in styling of Alan Syliboy, anatomical landmarks. The impression of the fish shows excellent detail. |