

## **Besser Museum**

### *Great Lakes Fisheries Project—Concept Plan*

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The goal of the Great Lakes Fisheries Project at the Besser Museum is to infuse fisheries-related content in a variety of locations on the Besser Campus and integrate the story of our fishery heritage with educational content that meets K-12 educational standards. Emphasis will be placed on STEM/STEAM skills and fostering of a sense of stewardship among visitors. With the fisheries inextricably linked to history, culture and ecosystems of the Alpena area, there is much to explore around this fascinating story. In addition, the Besser Museum holds two vessels of historical importance—the *F/V Katherine V* and the *R/V Chinook*. Representing key turning points in the story of the Great Lakes fisheries, these vessels will be at the center of exhibit interpretation.

As a first stage of exhibit development, we have identified three key learning goals that will permeate all areas of the Great Lakes fisheries exhibits. These overarching learning goals drive the interpretation at every level and are “big picture” messages that all visitors will walk away with:

1. The Great Lakes are an important natural resource.
2. Management is required to keep the Great Lakes fisheries sustainable and healthy
3. Great Lakes fisheries have changed over time and are still very active today.

We have four core exhibit areas. (Please refer to the provided plans and drawings for information on where each exhibit area is located.)

1. The Great Lakes Ecosystem & Recreational Fishing—in the lower level of the main building.
2. Native American Fisheries—a subset of a larger, renovated Native American gallery proposed for the first floor of the Besser Museum’s main building
3. The *Katherine V*—an outbuilding on the Besser Museum’s campus
4. The *R/V Chinook*—a second proposed outbuilding to be constructed near the *Katherine V*

Two ancillary exhibit areas also support the story:

- a. Research lab area—located in a classroom space on the Museum’s lower level
- b. Outdoor walkway to the *Katherine V* & the *Chinook*—outdoors, spanning the walk from the main building and between the *Katherine V* & *Chinook* exhibits.

We have proposed to tell stories of subsistence (Native American), commercial, and recreational fisheries across three eras: pre-Columbian, European settlement/commercial fishery development, and modern. The interpretative plan and exhibit descriptions below follow this sequential approach, assuming a traffic flow that begins in the Native American Gallery and

proceeds downstairs to the lower level of the Besser Museum. From there, visitors would proceed along the walkway behind the Museum building to the *Katherine V* (commercial era) and the *Chinook* (modern/science era). Traffic flow amongst the exhibit areas is not tightly controlled, and therefore each must stand on its own as an experience. Signage and wayfinding will help link the stories.

### **Design Process:**

The exhibit materials compiled to date, define an exhibit concept, not a final exhibit design. Our goal with this design process was to clarify key themes, delineate exhibit spaces, and provide platforms for development of layered and immersive learning experiences. There are two key areas for further development:

1. Exhibit experiences—while defined in their overall content goals, further design work will fill out exhibit experiences to become layered learning opportunities for visitor exploration. This includes development of exhibit graphics, technology components, and hands-on interactives.
2. Curriculum development—as a large component of this exhibit concept hinges on interfacing with local school groups, we anticipate a collaborative process that includes educators, content-area experts and students to build experiences that support K-12 standards.

### ***Partnering Opportunities:***

A key component of additional exhibit development will be collaborative partnerships. Through the conceptual design process, we've identified several opportunities, which we will pursue as the project moves forward:

1. Educator Advisory Panels—local educators will review exhibit concepts and provide input to ensure that experiences support Michigan's K-12 educational standards, particularly as they relate to STEM/STEAM initiatives.
2. Student Advisory Panels—student groups can provide input on design of activities and displays for the "Fish Lab" areas, and assist in developing prototypes for student research project displays.
3. Great Lakes Agency Advisory Panels— the DNR, FWS, NOAA, CORA, and the USGS, will all be invited to participate in content development, particularly of the "Agency Row" area in the *R/V Chinook* exhibit.
4. Great Lakes Stewardship Initiative— We will also partner with the current NOAA B-WET "Our Fisheries, Our Future" project, which serves ten schools (~800 students). The classroom will become the base for many school field trips, for those associated with the Northeast Michigan GLSI.
5. Grand Valley State University—can assist in providing video content through the *Lake Invaders – The Fight For Lake Huron* documentary production and video archives.

## **Lower Level: The Great Lakes Ecosystem & Recreational Fishing**

### **Interpretive Plan**

This exhibit area serves as basic introduction to the Great Lakes fisheries story and an orientation to Besser's Fishery Heritage Display. Accessible year-round in the Museum's lower level, visitors will learn about common Great Lakes species—native, introduced and invasive. They will also develop a personal connection to the overall fisheries story through a "Recreational Fishing" exhibit.

### *Key Concepts:*

- Balance is required to maintain a healthy fishery—no one species in the Great Lakes exists by itself. All are part of a complex ecosystem that must remain in balance.
- The health of the Great Lakes impacts everyone who lives in the region—whether you are an avid fisherman, or just someone who lives in Michigan, the health of the Great Lakes impacts the economy and the environment.

### *Key Objects/Assets:*

- Taxidermy fish mounts

### **Exhibit Description**

Existing wall murals and a collection of taxidermy fish allow visitors to get "up close" to some common Great Lakes fish species. Interactive kiosks lining the wall installation allow visitors to explore whether the featured creatures are native to the Great Lakes, species that were introduced, or species that are considered invasive. Kiosks provide information on the Great Lakes watershed and allow visitors to learn about the roles that different fish species play in the overall Great Lakes ecosystem. Videos embedded on the kiosks may show fish spawning or schooling, and describe the areas of the Great Lakes that are best suited to them. This display area will be easily changed, allowing museum staff to rotate and tailor experiences to specific needs of visiting students or curriculum guidelines.

Adjacent to the fish species display, visitors can connect their own stories to the larger Great Lakes fisheries stories. Here, visitors will step into a fishing boat with their "catch!" They can hold up cutouts of local fish records and compare the sizes of different popular recreational sport fish. They can measure their catch and decide whether to keep or release the fish based upon fishing regulations and their personal motivations for fishing (sustenance or sport?). They will also have an opportunity to share their "fish story" by writing or drawing their memories of fishing. Visitors can submit their fish stories for posting, and can read what other visitors have submitted to the Museum. A video features local fishermen describing their connections to the Great Lakes fisheries. This fun, playful area encourages visitors to think about their time spent fishing, and perhaps to be inspired to go out and learn to fish—all with the goal of encouraging the next generation of Great Lakes stewards.

## **Lower Level: Research (Winter) Lab**

### **Interpretive Plan**

This space provides an outlet for community collaborative projects that involve the Great Lakes fisheries. Through program and curriculum development, local school groups will participate in projects to be displayed in this space.

### **Exhibit Description**

The center of the exhibit space an area that houses some of the "Fish Lab" experiences during the months when the outdoor displays are not accessible. Visiting school groups can use this classroom/lab space to conduct activities and research projects. The walls surrounding the lab space are multi-purpose for installations and presentations about local research initiatives and student projects. This area creates a public display area for school groups participating in Great Lakes fisheries projects

Graphics in the "Winter Lab" area define some of the key terms necessary to understand Great Lakes fisheries and fish communities. Terms and definitions of words such as "ecosystems," "predator-prey balance," "fish communities," "commercial," "subsistence," and "recreational fishing," are scattered throughout the classroom space, providing a quick guide to students embarking on projects. Visitors can also pick up printed orientation guides in the "Winter Lab" area. These guides will assist visitors as they tour the various exhibit spaces, and provide information on outside resources for visitors who wish to learn more.

One highlight experience in the "lab" area is an opportunity for visitors to use microscopes and try their hand at critical research tasks, such as aging a fish by examining otoliths and scales. Supporting materials (videos, charts, and driving questions) detail why identifying the age of fish is such an important task. Visitors can then follow the chain of their research to see how this information has been used to assess the health of the Great Lakes fisheries. Visitors may also be able to manipulate a computer model in a the lab, showing how the results of research are used by biologists to answer questions regarding mortality rates and causes, impacts from invasive species, what regulations are needed to address emerging problems.

Visitors can also take a "deep dive" into content provided by partner organizations through immersion in 3 different video bays. Each bay will present the challenges of managing the Great Lakes fisheries, and will encourage visitors to explore, and get involved in stewardship projects.

## **Main Level: Native Americans & the Fisheries**

### **Interpretive Plan**

Integrating Fisheries Heritage experiences into a larger exhibit of Native American history in the Alpena area, this section of Besser's Native American Gallery emphasizes human connections to Great Lakes natural resources. Visitors will learn how Native fishing began primarily for subsistence, but trade and sale of fish—commercial fishing—increased as settlements developed.

### *Key Themes:*

- Native American fishing techniques—tools and techniques that Native populations used to harvest whitefish and lake trout and other species from the nearshore reefs and tributary rivers of Lake Huron.
- Locations of local Native American encampments—connecting locations where Native Americans lived to concentrated populations of fish. Some Native American encampments were located near known spawning areas in the lower Thunder Bay River for sturgeon, walleye, and suckers. Spring spawning provided much-needed sustenance after long winters in Northern Michigan.
- Changes to Native American fisheries as Europeans moved into the Alpena area—fishing nets, fishing line, and fish hooks all influenced how Native Americans harvested fish. With this influence, Native fisheries began to change from subsistence to commercial fishing, and Native Americans are still involved in commercial fishing in Northern Michigan today.

### *Key Objects*

- Dugout canoe
- Objects from the archaeological record

### **Concept Description\***

The story of Native Americans and their relationship to the fisheries is highlighted by a dugout canoe. This object will tell the story of Native fishing techniques—with spear and torch after dark—which were used to harvest whitefish and lake trout concentrated at time of spawning on nearshore reefs of Lake Huron. Surrounding murals, graphics, and audio experiences detail how Native Americans used dugout canoes for not only fishing, but transportation and gathering food.

Visitors will find casework, containing Native American fishing equipment that has been found through archaeological research in the area—fish bones, and evidence of camp fires found in the area. A layered map of the Alpena area shows how Native American encampments are congruent with known fish spawning areas of the lower Thunder Bay River.

Visitors can explore and try their hand at Native subsistence fishing techniques through simple hands-on interactives, while an immersive video or VR experience allows them to travel in a

dugout canoe in search of fish along the waterways in the Alpena area. They will experience the difficulties of survival through long Northern Michigan winters, and the bountiful harvest of fish that became available in the spring spawning season.

Diving deeper into the Native American fisheries stories, visitors will learn that some of the first commercial fishing operations in the area were run by Native Americans. Large-scale murals depict the rise of commercial fishing, and continued involvement by Native Americans in the industry. Visitors will also have an opportunity to weigh in on Native fishing rights, as they explore legal action that was taken to ensure access to fishing grounds and techniques.

An audio or video station completes the Native American fisheries area, giving agency to the local Native Americans whose ancestors called the Alpena area “home.” Accounts from modern Native fisherman detail the struggles and triumphs of their involvement in the fisheries, while encouraging visitors to think about *all* the different people who are impacted by the health of the Great Lakes. We are seeking a Native fishing heritage advisor from the Sault Ste. Marie and/or Bay Mills tribes - tribes who most frequently fish northern Lake Huron - to assist with the messaging and interpretation of this story.

### **Programming Opportunities**

- Explore fishing equipment—through an exploratory experience, visitors can compare and contrast Native fishing equipment with European fishing equipment. What were the pros and cons of each? How did trade impact the changes in fishing equipment technologies? What do implements tell you about the type of fish that were being harvested?
- Native American rights—through a programmed experience, visitors can consider regulations that were put in place to benefit recreational fisherman. They can learn how these regulatory changes worked to the detriment of commercial fishing, Native fishers in particular, and debate legal action that was taken on the part of Native American fisheries to restore rights that they once had.

*\*The Native Americans and Fisheries story is part of a larger Native American Gallery renovation.*

## **Walkway to the *Katherine V* & *R/V Chinook*:**

### **Interpretive Plan**

Bridging the span of time from the “Native American Fisheries” area and the commercial fishing messages represented by the *Katherine V*, this outdoor pathway highlights milestones and key statistics in the evolution of the Great Lakes fisheries.

### **Key Concepts:**

- Changing role of the Native fisheries—at first, Native fishers supplied most of the fish for European settlers, but then joined them in fishing industries with fishing gear devised by Europeans. Native fisheries were eventually overrun by commercial European operations, although Natives continued to fish.
- Fisheries drove settlement in the Alpena area—The first settlement of Alpena County was on Thunder Bay Island—where the livelihood was commercial fishing. Fishing supplies, salt, and empty kegs were carried by up-bound schooners and the salted fish were transported to markets, to the south and east, by down-bound schooners. Fishing operations cropped up along the shores of Thunder Bay, but eventually the center of fishing became Alpena as its settlement and deep-water shipping capabilities evolved.

### **Concept Description**

Wooden pilings of various heights line the walkway from the back of the Museum’s main building to the out-buildings containing both the *Katherine V* and the *Chinook*. Visitors are drawn outdoors by these interesting sculptural elements, reminiscent of dock timbers. As they pass through the outdoor “corridor,” visitors will find outdoor-grade graphics that carry photographs and text. As they make their way toward the outbuildings, content is arranged in a timeline fashion, transitioning from subsistence fishing to the height of commercial fishing in the Great Lakes Region.

## **Fishing Vessel *Katherine V***

### **Interpretive Plan**

The *Katherine V* exhibit area presents the history of Great Lakes commercial fishing. Visitors will learn about the evolution of commercial fishing, and how modern fishing techniques and improved trade ultimately put strain on what was thought to be an “endless” supply of Great Lakes fish.

### **Key Concepts:**

- Ice played a crucial role in the fisheries—the availability of ice made packing and shipping of fresh fish practical, extending the reach of commercial fisheries. Ice cutting, crushing and storing became a support industry in the Alpena area. The proximity of many lumber mills in Alpena was a convenient source of sawdust for insulating stored ice.
- Changes in fishing technology made harvesting large quantities of fish possible—gillnet lifters and nylon nets made it possible for a single boat to fish several miles of nets each day. Gas and diesel engines replace sail-powered boats, allowing vessels to fish the deeper & colder waters further from shore. Fishing boats like the *Katherine V* became obsolete when gillnet fishing was largely prohibited in the 1960s.
- The *Katherine V* saw significant changes on the Great Lakes—during her service from 1928 to 1970. Water quality was threatened, habitats and food webs changed, and invasive species, including the most devastating early invader, the sea lamprey, were introduced.

### **Key Objects/Assets:**

- *Katherine V*
- Kahlenberg Diesel engine
- Nets and fishing gear (props and historical)
- Fisherman’s clothing and tools
- Ice crusher
- Oral histories from Great Lakes fishermen/women
- Videos about Great Lakes commercial fishing and invasive species

### **Exhibit Description**

As visitors make their way from the walking path and enter the structure that houses the *Katherine V*, introductory graphics outline the exhibit area. Here they will learn about the specifics of the vessel—its structure, the Native Americans who built the *Katherine V*, and where the vessel was built. Large-scale murals behind the boat set the scene for the stories being told—life in the then-booming business of commercial fishing.

A fishing village facade surrounds the *Katherine V*. One stop in the village is a fish market, illustrating the products available in the 1930s, and their overall cost per pound. Through an installation of re-created fish, visitors will quickly learn that herring, chubs, lake trout, walleye, perch, whitefish, and various types of smoked fish were all available to purchase. Near the fish



market, a fishing gear shop displays various nets, tools, and implements used by commercial fisherman. Advertisements, posters, and images are scattered throughout the fishing village, offering glimpses into period commerce practices. For example, one shop may advertise the “best fishing nets” (gill nets), while another may boast repairs to diesel or gas boat engines.

An ice-crusher is also on display in the fishing village area. This object carries the story of ice and fish. With ice being cut, and stored (packed in local sawdust), for the first time, the Alpena-area fisheries were able to pack and ship fresh fish--not just the salted/cured variety. With fresh, rather than salted, fish and increased trade opportunities demand for fisheries product increased, driving production to all-time highs.

Mannequins or life-sized silhouettes aboard the *Katherine V* display period clothing, while surrounding reader rails interpret various jobs held by those on the crew. As visitors explore the areas around the *Katherine V*, they will discover how fishing boats were powered—progressing from oars, to sails and eventually to the fully restored Kahlenberg diesel engine from the *Katherine V* displayed on the south end of the building. Each new technology allowed fisheries to be more efficient, harvesting larger quantities of fish, in deeper waters.

Media, activated with QR codes, helps convey audio and video stories, providing another layer of interpretation. An oral history station conveys the voices of local residents involved in the commercial fishing industry. Personal stories help convey the “boom town” feel of fishing villages, while also beginning to introduce the ultimate collapse of the fisheries. Video stations display footage of gill nets being hauled in from power tugs (like the *Katherine V*), in contrast to more modern trap nets, which are now used on the Great Lakes, illustrated by DNR video taken aboard local vessels. Videos produced by partner agencies can be leveraged to show how the invasion of sea lampreys put further strain on the Great Lakes. Visitors will learn how sea lampreys threw the food web out of balance, by depleting lake trout populations, which allowed alewife and smelt populations to explode.

### **Programming Opportunities:**

- Through a guided experience, visitors can analyze commercial fishing data and compare yields of the past with those of today. While the Great Lakes could supply Michiganders with fish on a regular basis in the early 20th century, how much could they supply the State’s population today?
- For those with tablets/smartphones, self-guided experiences will be provided by use of QR codes linking the visitor to information hosted by the Museum and other members of the Great Lakes Fisheries Heritage Trail.  
(<http://www.miseagrant.umich.edu/explore/fisheries/great-lakes-fisheries-heritage-trail/>)
- On board tours of the *Katherine V* highlight the efficiency of the gill net lifter. Could visitors imagine pulling in miles of net without such a labor-saving device? Visitors can attempt to pick up a section of net to feel the weight and bulk.

Walkway to the *RV Chinook*: The “dock” connecting the *Katherine V* and the *RV Chinook* will be used as an opportunity to inform the visitor of the collapse of whitefish, lake trout, and walleye caused by invasive species (sea lampreys during this time period) and overfishing, setting the stage for the era of research and rehabilitation efforts, toward which the *RV Chinook* played a central role.

### **Research Vessel *Chinook*:**

The *Chinook* exhibit area interprets recovery of Great Lakes fisheries following the mid-20<sup>th</sup> century collapse, how the modern fisheries differ from the past, how the agencies worked together to bring about recovery, and challenges to keep them sustainable under multiple threats to the Great Lakes. Visitors will learn how science and research has been used to restore and maintain a healthy fishery, while new threats continue to challenge Great Lakes stewardship.

#### **Key Concepts:**

- The Great Lakes fisheries require management to stay healthy—years of inadequately regulated fishing combined with ecosystem disrupting invasive species created some complex problems in the Great Lakes. Balance is required to maintain the fisheries—balance of competing uses, balance of predators and prey in the ecosystem, and management of the effects of invasive species are all necessary.
- Scientific research has guided policies, practices, and actions —collaborative decisions are made based on research findings. Research on the Great Lakes has led to a number of measures all aimed at helping the recovery and maintenance of the fisheries.

#### **Key Objects/Assets:**

- *R/V Chinook*
- Clothing, props, and tools from research vessels
- Laboratory equipment
- Oral histories from Great Lakes researchers
- Agency booths describing their roles
- Videos about Great Lakes research projects and life aboard the *Chinook*.

### **Exhibit Description:**

Stepping from the “boom town” feel of the *Katherine V*, visitors follow an outdoor path that serves as a transition to the *R/V Chinook* exhibit area. A series of outdoor-grade graphic panels reinforce the mounting pressures on the Great Lakes. As visitors move toward the *R/V Chinook* exhibit, the stage is set for the intervention of research to improve the condition of the Great Lakes.

Entering the *R/V Chinook* area, visitors discover a very different feel—science dominates this space, in stark contrast to the “hustle and bustle” of the *Katherine V* exhibit. Visitors will find large scale graphics and charts that immediately present problems—overfishing, habitat

destruction, and invasive species all took a heavy toll on the fisheries, leading to a collapse in the 1950s-1960s. The centerpiece of the exhibit—the *R/V Chinook* itself—illustrates how resource agencies collect information used to manage the Great Lakes fisheries. Life aboard the vessel is conveyed through mannequins or silhouettes, with typical clothing, positioned to perform the duties on board. Reader rails around the *Chinook* highlight the importance of collecting data—visitors can contemplate summaries of actual data sets collected by the *Chinook* and see how they were used to make positive changes for the Great Lakes fisheries. Those with their own tablets/smartphones can access data and summaries using QR codes that take them to agency research sources. Looping video located over the deck of the *Chinook* shows daily survey activities such as trawling and survey-gillnetting, measuring samples and recording data.

A large food-web graphic sets the stage for the concept of “balance” in the Great Lakes, while surrounding photos of mussels, gobies, or *Cladophora* (algae), show how the food web can be thrown out of balance by even very small, seemingly harmless invaders – zebra and quagga mussels - creating a catastrophe for the recovering fish populations and threatening commercial and recreational fishing. Visitors can weigh cause and effect—what causes imbalances in the food web, and what impacts they have. One example they can explore is that of alewife overpopulation—dramatic historical photos of deceased alewives littering local beaches show the scale of the problem. Visitors will see that the solution of the time was to introduce salmon to the Great Lakes, as they consumed alewives. While salmon introduction led to an explosion of recreational fishing, they proved exceptionally vulnerable to later disruptions to the food web. Zebra and quagga mussels depleted the salmon's principal food supply—the once over-abundant alewife. Visitors will learn that the *R/V Chinook* was the DNR's primary tool for measuring how Lake Huron responded to salmon, lamprey control, lake trout stocking, and other stocking or rehabilitation programs.

Video presentations highlight how research efforts keep pace with changing and emerging threats through collaboration amongst a variety of agencies—the DNR, FWS, NOAA, CORA, and the USGS. As visitors walk alongside the *Chinook*, “Agency Row” will occupy a number of small labs on their right. Each U.S. resource agency working on Lake Huron will be given a space to profile their work and current initiatives. An oral history station features the voices of actual Great Lakes researchers, presents the scientific process, and introduces visitors to the skills necessary to work as a Great Lakes researcher.

The highlight of the *R/V Chinook* display is an immersive “Fish Lab.” This space encourages visitors to explore and try their hand at a variety of Great Lakes research initiatives. As a programmed space, activities in the “Fish Lab” will rotate, with opportunities for local school group collaborations. For example, visitors may participate in identifying the age of a fish! Using microscopes to examine otoliths and scales, visitors can try their hand at this important research duty. Supporting materials (videos, charts, and driving questions) detail why identifying the age of fish is such an important task. Visitors can then follow the chain of their “research” to see how this information has been used to assess the health of the Great Lakes fisheries. Visitors may

also be able to manipulate a computer model in a Fish Lab, showing how the results of research are used by biologists to answer questions regarding mortality rates and causes, impacts from invasive species, what regulations are needed to address emerging problems.

As visitors exit the *R/V Chinook* experience, they will find a computer kiosk that allows them to explore the health of Lake Huron today. Visitors will learn that while some things are improving, research is always identifying new questions! On one hand—lake trout are reproducing. But, what will they eat and can they recover to former numbers with their prey so depleted? Whitefish are declining, especially in Thunder Bay. But, what is causing the decline, and what can be done to prevent it? Surrounding graphics encourage visitors to consider what they can do to help in Great Lakes stewardship—from simple measures like disposing of trash properly, being thoughtful about their use and disposal of plastics, to joining a research project.

A short loop pathway out the north end of the *Chinook* display will take the visitor back to the main pathway. Along this short loop visitors will learn about future issues for the Great Lakes such as the newly negotiated 2020 Consent Decree with 1836 tribes, the status of Asian carp and control of fish migration through the Chicago Canal.

#### **Programming Opportunities:**

- Visitors can explore the effects of invasive species using research and explore impacts to the food web. For example, participants, including school classes, can explore how mussels can re-engineer a food web to the disadvantage of some fish species, ultimately answering the questions: how did mussels contribute to the collapse of salmon and are they now contributing to the decline in whitefish reproduction?
- Fish Lab activities—the Fish Lab will be a collaboratively programmed resource agency space, with emphasis placed on curriculum and activities developed for and by local school groups. Some examples include:
  - Exploring the diets of different fish species, compare diets to what prey is available in Lake Huron (do Chinook salmon diets suggest why they have declined dramatically in recent years?), their age and growth graphs, and how the results are used by biologists to build computer models.
  - Changes in lake trout mortality rate and number of spawning-age lake trout as lamprey wounding increased over time, then declined as sea lamprey control became more successful on Lake Huron. Students can access some data sets and interpret what those might tell them about the lake trout populations. The data sets will be formatted such that students can be challenged with projects that will hone their math skills in exercises that meet Michigan's educational standards (designed with the guidance of the Educator Advisory Panel).
  - Basic analyses—what is the age distribution of this day's catch of lake trout? How to compute mortality rate, how to compute missing data in a length-weight data listing, etc.