



# From Ocean to Table

Through role-playing, teamwork, and a little fate, this activity provides students with an opportunity to get an “insider’s” view of what it takes to be an active stakeholder in a commercial fishery. Whether a boat owner, dockside buyer, processing plant owner, distributor, or retail seafood store operator, each student will get a deeper sense of the complex factors that determine the viability of a commercial fishery. Students will learn to understand the real costs that contribute to eventual market value, as well as experience some of the unanticipated gains or losses that can occur at any stage along the way. In addition, students learn about seven common species that are fished in California.





**Grade Level:** 8-12,  
Community College

## Time Frame

### Preparation:

- 30 minutes to review complete module and prepare student materials.

### Facilitation:

- One 50-minute class period for core activity
- Additional 1-2 class periods for optional extensions

## Brief Overview

There are many steps involved in bringing a commercial seafood catch from the ocean to the dinner table. Each step is characterized by its own unique elements, with potential income and controlling expenses being two of the strongest drivers to determining success. External factors (weather, regulations, fuel prices) can also play a role in defining what it takes to get seafood from the ocean to the end user or customer.

## Skills/Outcomes

- Students will learn how to analyze various costs/benefits associated with a particular fishery and will understand the various roles performed by **stakeholders** of that fishery.
- Students will learn how to calculate estimated revenues and expenses using data from a chart.
- Students will learn about current common fisheries in California.
- Students will learn to evaluate real-world options and challenges related to a particular fishery.
- Students will be able to apply critical thinking and problem-solving skills to their analysis of various **stakeholder** terms and transactions.

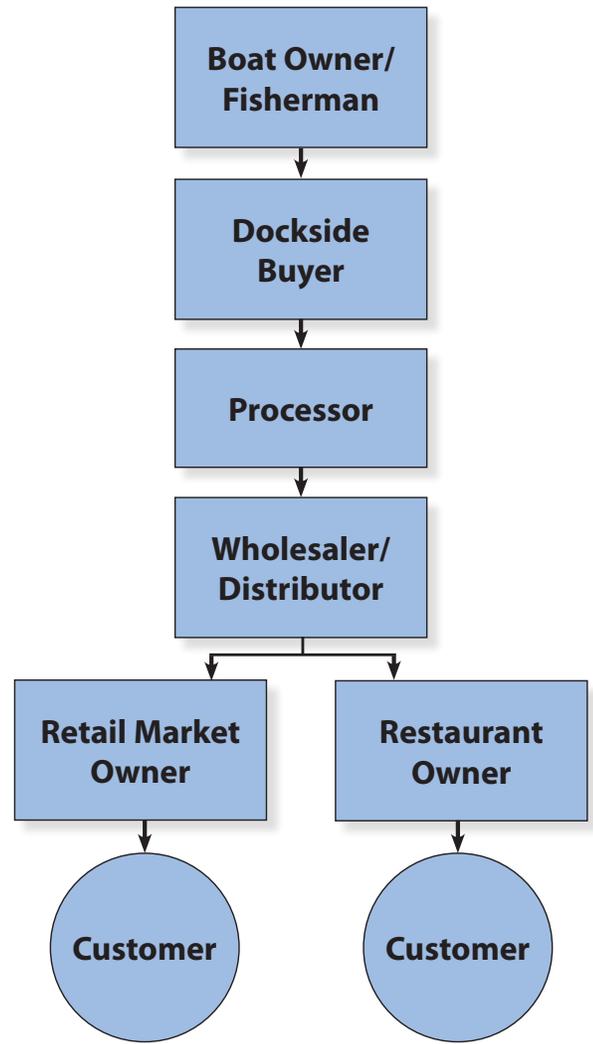


Figure 1. Stakeholders in the commercial fishing industry.



Lampara boat, circa 1930. (J. B. Phillips photograph; courtesy Tim Thomas, Monterey Maritime and History Museum.

# Key Subjects/Standards

## Mathematics, Economics, Natural Resources, Career Awareness

<b>National</b>	<p><u>Science:</u> NS.9-12.1 Science as Inquiry. NS.9-12.6 Personal and Social Perspectives: population growth, natural resources, environmental quality.</p> <p><u>Math:</u> NM-NUM.9-12.3 Number and Operations: compute fluently and make reasonable estimates. NM-PROB.PK-12.1-12.4 Problem-solving: solve problems that arise in mathematical and in other contexts; apply and adapt a variety of appropriate strategies to solve problems. NM-PROB.CONN.PK-12.3 Connections: recognize and apply mathematics in contexts outside of mathematics.</p> <p><u>Economics:</u> NSS-EC.9-12.2 Marginal Cost/Benefit. NSS-EC.9-12.8 Role of Price in Market System. NSS-EC.9-12.11 Role of Money.</p>
<b>California</b>	<p><u>Math:</u> Algebra I (3.0) Students solve equations and inequalities involving absolute values. Algebra I (5.0) Students solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step. Algebra I (10.0) Students add, subtract, multiply, and divide. Students solve multi-step problems, including word problems, by using these techniques.</p> <p><u>Economics:</u> Grade 12, (12.1) Students understand common economic terms and concepts and economic reasoning.</p>
<b>Ocean Literacy</b>	6. The ocean and humans are inextricably interconnected (b, e, g).

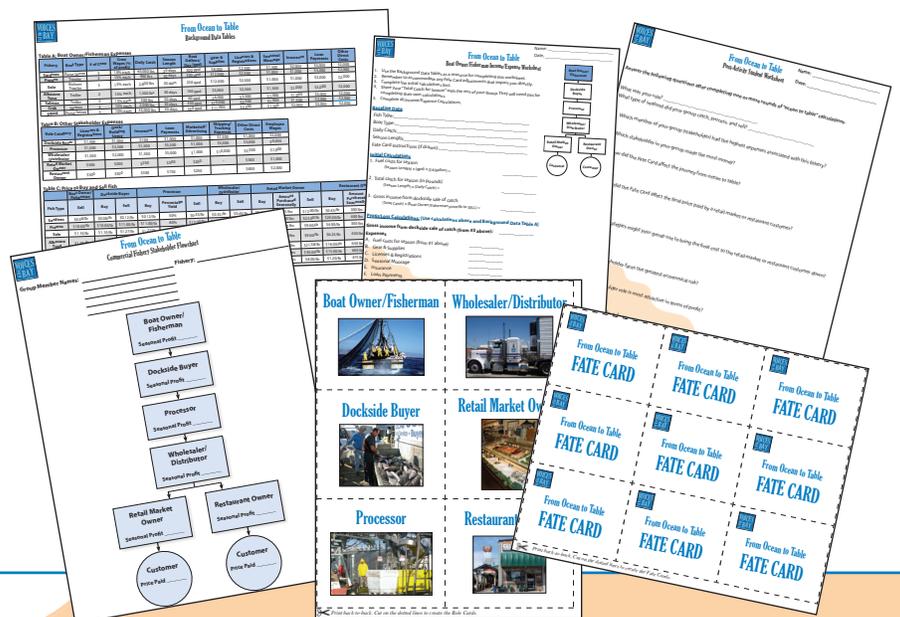
## Teacher Preparation

1. Read entire activity and review all student handout materials and the From Ocean to Table PowerPoint in advance.
2. Print/copy student handouts and other materials listed in the Materials List.
3. Arrange tables to accommodate groups of 6 students.

## Materials List

For a classroom of 30 students:

- 1 set of Role Cards per group of six students, cut into individual cards
- 3 sets of Income/Expense Worksheets per group of six students (worksheets represent 6 different stakeholders)
- 1 set of Fate Cards per class, cut into individual cards
- 1 Commercial Fishery Stakeholder Flowchart per group of six students
- 1 Commercial Fishery Stakeholder Flowchart transparency per class (optional)
- 1 Background Data Table sheet per student
- 1 Post-Activity Student Worksheet per student
- Pen/pencil for each student
- Calculator for each student or at least one for each group of 6 students





## Instructional Strategies/ Procedures

For a classroom of 30 students:

### Setting the Stage

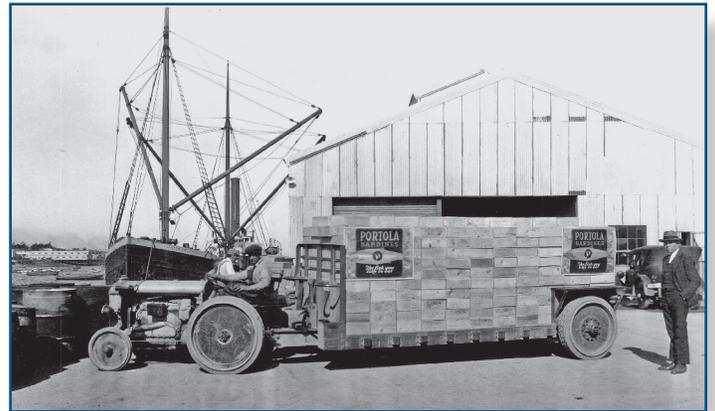
1. Show students the From Ocean to Table PowerPoint presentation. These slides will introduce students to common fisheries in the Monterey Bay National Marine Sanctuary and the **stakeholders** engaged in these fisheries.
2. Divide students into groups of 6 and have each group sit together at a table.
3. At each table, place the following pre-sorted items:
  - a. 1 set of Role Cards, shuffled and face down
  - b. 3 sets of Income/Expense Worksheets (6 stakeholder roles to a set)
  - c. 1 Background Data Table sheet per student
  - d. 1 Commercial Fishery Stakeholder Flowchart per group
4. Have each student draw a Role Card from the pile on their table. Have students read the information on their Role Card and inform their tablemates of the role they selected.



Dockside seafood business in Moss Landing. (Photo: Lisa Uttal.)

## Facilitating a Practice Round

5. Have students find the Income/Expense Worksheet corresponding to the role they selected.
6. Review the Income/Expense Worksheets and Background Data Tables with the whole class. Remind students of the progression from ocean to table illustrated in Figure 1 above and reproduced on each of their Income/Expense Worksheets. For most **stakeholders**, they will need to obtain a number from the **stakeholder** above them before they can complete their own worksheet.



Portola brand sardines were trucked from the cannery to the wharf for overseas shipment. Domestic shipments of sardines were done via railroad. (A. C. Heidrick photograph; courtesy Tim Thomas, Monterey Maritime and History Museum.)

7. Select a single fishery and have all student groups complete a practice round using the data from the same fishery. An alternative approach is to conduct a practice round with the whole class, walking them through each calculation step for one **stakeholder** role or for all roles in a given fishery. Do this practice round prior to introducing the Fate Cards. Use the outline below to facilitate this practice round.
  - a. Have students complete the top portion of the worksheets first, based on information on the Background Data Table sheet. Only the Boat Owner/Fisherman will use Table A.
  - b. The Boat Owner/Fisherman must complete his or her “Total Catch for the Season” (#2) before the **Dockside Buyer** and the **Processor** can begin their calculations.
  - c. The **Processor** must complete his/her “Yield from Purchased Catch” (a percentage of the total catch delivered by the **Dockside Buyer**) before the **Wholesaler/Distributor** can begin their calculations.
  - d. The Retail Market Owner and Restaurant Owner can complete their entire Income/Expense Worksheet from information on the Background Data Table sheet.



Blocks of ice at the Moss Landing Harbor. (Photo: Lisa Uttal.)

8. After all students have demonstrated their ability to read the data tables and complete the worksheet calculations, have them select a blank Income/Expense Worksheet that corresponds to their selected role.
9. Explain to the students that no two fishing seasons are identical in the world of commercial fishing and that fate can impact any or all **stakeholders** in a given fishery at

any time. Brainstorm with the students for a minute or two on what factors might affect their expenses or income at any stage in the journey from ocean to table. After this brainstorm, invite one student per group to draw a Fate Card, return to their group, and after reading the information on the card out loud to their group, place the card in the center of the table for group reference.

## Completing a Round of “Ocean to Table”

10. Next, either assign each group a different fishery or have them select a fishery of their choice from the seven options (sardines, prawns, sole, etc.) available in the Background Data Tables. Using their specific fishery, have the student groups complete a round of “ocean to table” calculations. Remind students to address their Fate Card as part of their calculations.
11. Once the students in each group complete their Income/Expense Worksheets, have them share with each other the outcomes from their collective calculations and complete the Commercial Fishery Stakeholder Flowchart. Allow table groups time to discuss their own group’s outcomes, especially the final prices paid by the retail and restaurant customers.



Duarte's Fish Market, circa 1900.  
(Courtesy Tim Thomas, Monterey Maritime and History Museum.)

## Reflection and Discussion

- Hand out to each student the Post-Activity Student Worksheet and allow students 10-15 minutes for completion.
- Invite each table group to report briefly to the whole class the outcome of the journey from ocean to table for their particular fishery, how fate affected them, and the final price paid by the retail or restaurant customer for their fish when it reached the table. For additional discussion questions, have students share their responses from the Post-Activity Student Worksheet.
- If time allows, or a second class period can be used, have the students repeat the activity in a different **stakeholder** role, with a different fishery, or with different Fate Cards. Remember to distribute a new set of Income/Expense Worksheets. Again, have the groups share their results. Did specific fisheries have the same outcomes as in the first round? If not, what factors contributed to a change in the outcomes?
- Have students discuss, either in their groups or as a whole class, the insights from this simulation. Have them review the collection of flow charts where they recorded Seasonal Profit for each step for a particular fishery. Were they surprised by any of the outcomes? Given what they have learned so far, which fishery seems the most lucrative? The least lucrative? Are some fisheries operating at unsustainable margins? Are these fisheries delivering good value to the retail and/or restaurant customer?



Processing at the Moss Landing Harbor, 2008.  
(Photo: Lisa Uttal.)

## Extensions & Connections

- If time allows, have each group of students try all seven fisheries. After completing all seven, have them discuss the potential challenges associated with each fishery.
- Have students research one or more of the fisheries profiled in this activity. How has the length of seasons varied over the years? What has contributed to these variations? Are the job opportunities increasing or decreasing in this fishery? What is the future outlook for this fishery? What factors will contribute to that future?
- Have students research local retail or restaurant prices for fish. What causes variation in these prices from one vendor to the next? From season to season? Do these prices vary from one community to another? What might cause some of these variations?



## Background

Fisheries are many things to many people. A fishery is defined by a particular seafood species and the collection of people and businesses that bring that seafood to the market. Worldwide, almost 40 million people are directly engaged in fishing and fish farming (i.e. **mariculture** and **aquaculture**) as a full-time or part-time occupation, and fishery products account for 15-16% of global animal protein intake. Overall, Americans are increasing their consumption of seafood as more products become available and more people realize the associated health benefits of eating seafood. As of 2007, the U.S. annual per capita consumption of seafood and shellfish (in pounds of edible meat) was 16.3 lbs/person, up from 15.2 lbs/person in 2000. Putting that volume in terms of value, the U.S. population spent an estimated \$61.9 billion for fishery products in 2004.

There are many stages involved in the catching, processing, distribution, and preparation of seafood. Figure 1 illustrates a basic flow chart of the typical stages in an active fishery. Many fisheries are more complex, involving numerous markets regionally or globally, with prices constantly in flux based on **supply and demand**.

Simply put, the fisherman and crew bring their catch to the harbor to be unloaded. They may sell their catch to a **dockside buyer** (who is probably buying many different types of fish from many different fishermen), who in turn sells it to a **processor** (who will process the catch) who sells it to a **wholesaler/distributor**. These distributors will then sell and deliver the catch to retail markets or restaurants, where it is ultimately purchased (usually at a much higher price than what the fisherman first sold it for) by a customer or **consumer**.



Offloading catch at Moss Landing Harbor, 2009. (Photo: Lisa Uttal.)



Liberty Market on Fisherman's Wharf, 1965. (MacDougall King photograph; courtesy Tim Thomas, Monterey Maritime and History Museum.)

There are many dynamic elements along the path from ocean to table. Fish populations, themselves, may vary from year to year due to basic biology, ocean conditions, or spawning success. Declining fish populations have led to more restrictive regulations, shorter seasons, and lower **quotas** for many species, thus reducing the flexibility and economic viability of many fishing businesses today. External factors, including weather, ocean temperatures, fuel prices, **supply and demand**, and the overall state of the economy, can play a large role in any stage of the fishing and seafood industry. Fishermen and business owners must remain flexible and accommodate for these dynamic factors that make up what is referred to as the **market economy**. While it can be challenging, if all goes well, the result can be a successful and profitable business.

# Resources for Teachers

## References Specific to this Activity

- Lipton, D. 2004. *Understanding Fish Pricing: From Production to the Table*. Maryland Sea Grant Extension. College Park, MD. Available from: <http://www.mdsg.umd.edu/programs/extension/aquaculture/finfish/factsheets/FF5>.
- Pomeroy, C. and M. Dalton. 2005. *Market Channels and Value Added to Fish Landed at Monterey Bay Area Ports*. California Sea Grant College Program. San Diego, CA. Available from: [http://repositories.cdlib.org/csgc/rcr/MA05\\_01/](http://repositories.cdlib.org/csgc/rcr/MA05_01/).
- Pomeroy, C. and M. Dalton. 2003. *Socio-Economics of the Moss Landing Commercial Fishing Industry*. Monterey County Office of Economic Development. Available from: [www.psmfc.org/efin/docs/otherpublications/ML\\_Cmcl\\_Fishing\\_Ind\\_Report.pdf](http://www.psmfc.org/efin/docs/otherpublications/ML_Cmcl_Fishing_Ind_Report.pdf).
- Starr, R.M., J.M. Cope, and L.A. Kerr. 2002. *Trends in Fisheries and Fishery Resources: Associated with the Monterey Bay National Marine Sanctuary from 1981-2000*. California Sea Grant College Program. La Jolla, CA.

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### Research and Review

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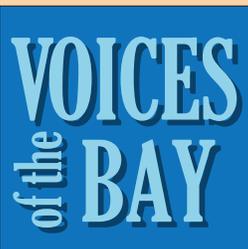
NOAA's Office of National Marine Sanctuaries  
Seaberry Nachbar

### Additional Credit

Boat Owner/Fisherman data adapted with permission from the activity "Going Fishing" by Jeff Manker.

### Original Artwork

© Ray Troll & NOAA Fisheries Service's "Green Seas/Blue Seas Project" (<http://swfsc.noaa.gov/GreenSeas-BlueSeas>)



## Vocabulary

**Aquaculture:** The farming of freshwater and saltwater organisms.

**Consumer:** A person or organization that uses a particular product or service.

**Dockside buyer:** A person or company, located on popular fishing docks or wharfs, that buys seafood directly from fishermen.

**Mariculture:** A specialized branch of aquaculture involving the cultivation of marine organisms for food and other products in the open ocean or an enclosed section of the ocean (e.g. prawns, oysters, seaweed, abalone).

**Market economy:** An economy that operates by voluntary exchange in a free market and is not planned or controlled by a central authority; a capitalist economy.

**Processor:** Fish processors can be divided into two categories: primary and secondary processors. Primary processors are involved in the cleaning, filleting, and quick freezing of fresh seafood. Secondary processors take the product from the primary processor and further process it by canning or further cutting seafood products for retail markets.

**Quota:** A portion of a total allowable catch allocated to a particular boat, fishery, region, or nation.

**Stakeholder:** A person or organization that has a stake in a particular entity or resource such as a business, natural resource, or community.

**Supply and demand:** As demand for an item increases, supplies diminish and prices rise. If supplies are increased or demand decreases, prices fall. The relationship between "supply" and "demand" determines the price of a particular product.

**Total Allowable Catch (TAC):** The catch limit for a particular fishery, generally for a year or a fishing season. TACs are usually expressed in weight or for larger species, in numbers of fish.

**Wholesaler/Distributor:** A business that sells, transports, and delivers goods to a retailer or other entity that then sells to the end customer or consumer. Price conscious consumers often try to avoid further mark-ups in price by purchasing directly from a wholesaler.

**Yield:** In fisheries, yield is the percent of the original product available for sale after processing. The yield generally refers to the edible or marketable part of the seafood catch after cleaning, removing unwanted parts, etc.