



# Water Wits

*aquatic safety, science, and stewardship  
education program*

**GRADES 9-12**



Dear Educators,

June 30<sup>th</sup>, 2015

With thousands of people enjoying activities on Oregon's waterways each year and rising demand for clean water resources, there is a need to educate people early about responsible waterway use. Humans and wildlife both need resilient waterways for health, safety, and survival. That's why we have developed this new K-12 educational curriculum, *Water Wits*!

This program aims to encourage awareness and responsible use of aquatic and marine resources. It goes beyond traditional boating and water safety education to include stewardship messages and scientific principles. It is designed to be interdisciplinary, academically rigorous, interactive, and student-led. We hope that by taking an integrated approach to thinking about water, this curriculum will spark a renewed interest in responsible waterway enjoyment for both educators and students.

*Water Wits* addresses 3 pillars of aquatic literacy:

**Safety:** what are the best practices for smart decision-making in, on, and around the water?

**Stewardship:** how can we reduce our impacts and manage water resources for people and wildlife?

**Science:** how do physics, engineering, ecology, and the social sciences explain and inform both of these?

The curriculum includes 12 complete lesson plans, divided into grade units (Kindergarten-2nd Grade, 3rd-5th Grade, 6th-8th Grade, and 9th-12th Grade). All lessons are aligned to state and national education standards, including Next Generation Science and Common Core, across multiple subjects. Each unit contains 3-4 lesson plans with suggestions for how to adapt the activity to best suit your students. Lesson plans include a list of aligned standards, background information, detailed instructions, and additional resources including printable worksheets and hand-outs. Each is designed to be completed in one class period, but many offer rich opportunities for extension and suggestions for additional activities are also included.

The *Water Wits* program includes concepts from all subjects: Science, Math, Social Studies, Language Arts, and Physical Education. It also fosters 21st-century skills including collaboration, critical thinking, problem solving, global awareness, and civic and environmental literacy. We encourage you to work with other educators at your school or in the community to create a cross-cutting implementation plan. Doing so will provide you with exciting professional development opportunities and enable you to reach students with different learning styles and interests!

While much of the *Water Wits* curriculum is designed to be academic in nature, the interactive activities and low-cost materials make the lessons adaptable for almost any setting. Determine the age range of your audience and set up the hands-on portions of appropriate lessons at public events, workshops, classroom visits, or your camp site.

For more information and additional support, or if you are interested in adapting this curriculum for your own organization or agency, please contact MariAnn McKenzie, Boating Safety Education Coordinator at [mariann.mckenzie@oregon.gov](mailto:mariann.mckenzie@oregon.gov) / 503-378-5158.

Thank you for choosing the *Water Wits* program. We hope that you and your students enjoy it!



Randy Henry, Boating Safety Program Manager



Sara Shaw Roberts, Curriculum Writer



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## Aligned Standards

### 2014 SCIENCE (NGSS)

- HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

### HEALTH BENCHMARKS

- HE.12.PE03.CC: Describe how physical environments affect health and well-being.
- HE.12.UI02.CC: Explain ways to reduce risk of injuries in and around water.
- HE.12.UI04.CC: Explain safe behaviors to reduce injuries during sports/recreational participation.
- HE.12.UI04.GS: Set a goal to wear appropriate safe equipment properly during sports and physical activity, even when peers may not.
- HE.12.UI08.CC: Describe methods for avoiding, responding to and recovering from climate-related physical conditions.

### COMMON CORE: WRITING, SPEAKING AND LISTENING

- Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- Integrate information presented in different media or formats as well as in words to develop a coherent understanding of a topic or issue.
- Prepare for and participate effectively in a range of conversations and collaborations with diverse partners.

## Activity at a glance

Students learn about the consequences of cold water immersion using videos, case studies, and survivor testimonials. A hands-on activity provides evidence for the impacts of cold water on the body. Strategies for surviving cold water immersion are also discussed.

## Materials

- Cold Water Bootcamp and Texas Parks and Wildlife videos (see Resources section for links)
- Projector linked to internet-capable computer to view videos
- Tubs of very cold water - about 10 inches deep and 10 inches wide
- Nuts and screws, assorted sizes
- Copies of Student Sheets (pgs. 3-4)

## Background Information

**Cold water immersion** can happen without warning and immediately impact your body's ability to move, react, and function. There are three stages of cold water immersion: shock, incapacitation, and hypothermia. **Shock** happens the first few seconds your body becomes submerged in cold water (which is technically classified as under 70 degrees). Symptoms include gasping, unable to catch one's breath, and hyperventilation. If your head went under when you fell into the water, you run the risk of breathing in water, which can be very difficult to recover from in windy or wavy

conditions. **Incapacitation** occurs after only about 10 minutes, and severely decreases your body's ability to move or do simple tasks such as grasping or holding onto things. At this stage, it becomes exponentially harder to swim, even short distances. The final and often fatal stage is **hypothermia**, in which movement is impossible and the brain begins to shut down. You lose consciousness and finally, your heart will stop.

**Without a life jacket, your survival time in cold water is around 10 minutes.**

**With a life jacket, you can survive for over an hour**

until hypothermia sets in. Since you lose any meaningful ability to swim after 10 minutes, this extra time is vital, allowing help to arrive.

The **1-10-1 Principle** is an important mantra for cold water survival. This states that you have *one minute* to get your breathing until control and calm yourself, *ten minutes* of meaningful movement, and *one hour* before you lose consciousness due to hypothermia.

Wear a life jacket, don't panic, and remember these rules to give yourself the best chance of surviving accidental cold water immersion.

## Objectives

Students will:

- Investigate the physiology of cold water immersion
- Experience the impacts of cold water immersion on mobility and other body functions
- Relate the stories told by survivors to their own experiences and decision-making



Image credit: coldwaterbootcampusa.org

**The first moments after a cold water immersion are critical. Without a life jacket most people will drown within minutes, even close to shore.**

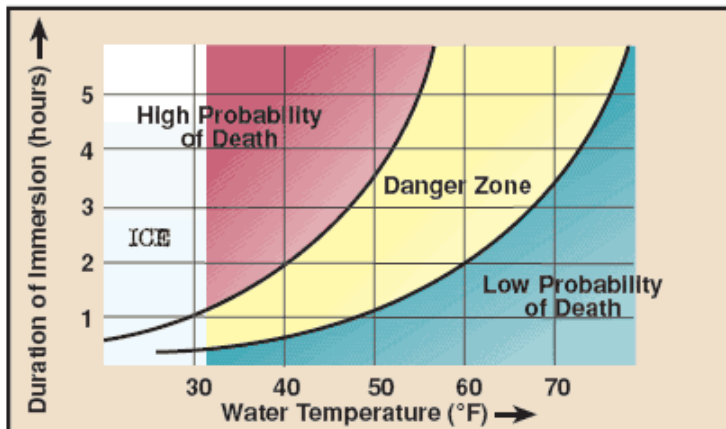
## Procedures

1. PREPARE THE COLD WATER TUBS: Fill one or more clear containers halfway with water. Add about a cup of ice. Set aside or in a fridge to keep cold.
2. Introduce the lesson briefly by asking if students have ever become suddenly immersed in very cold water. How did it feel? What reactions did they notice in their bodies? Tell students that they are going to learn about the physiology of cold water and how to survive it by watching two videos and then doing an activity to simulate cold water immersion.
3. First, watch *Cold Water Bootcamp*. This video follows several volunteers as they struggle to swim in very cold water. Note throughout the reactions you can observe in the volunteers when they first hit the water, and what happens over time, with and without a life jacket. Note that these volunteers are all extremely strong, experienced swimmers.
4. Next, watch *Never Happens*. This is a video showing testimonials from young people who watched their friends drown. Note that this is an emotional video, and may be a sensitive subject for some students present, so be aware and cautious before showing this.

FOR GRADES 6-8: Watch the shorter (10 min) version of *Cold Water Bootcamp*, and skip *Never Happens*. Instead of using nuts and screws, have students pick pennies only out of the tubs from an assortment of other coins.

5. Take some time after these videos for students to share their reactions before beginning the next activity.
6. Now students will simulate the impacts of cold water immersion on dexterity. They will reach into tubs of icy water and attempt to fit together matching nuts and screws. This replicates the feeling of being unable to grasp things, buckle a life jacket, or easily move in cold water. For large classes, use multiple tubs and give each student one minute to fit together as many nuts and screws as they can. *IMPORTANT NOTE: Some students are more sensitive to cold water than others. Monitor students carefully to ensure that nobody is reacting badly, and stop them if they begin to shiver or their skin becomes pale or blue.*
7. Discuss the experience. Were students surprised by the results? Was the exercise difficult for everybody or easier for some? How did their ability to perform the tasks change over time? It is especially important to emphasize their lack of dexterity and mobility. In a real-world situation, it is nearly impossible to hold onto anything or put on a life jacket after going into the water, which is why it's so important to be prepared and wear a life jacket at all times.

## COLD WATER SURVIVAL TIME



**The Danger Zone indicates where safety precautions and appropriate behavior can increase your chances of survival when immersed in cold water.**

Image credit: Creative Commons

Oregon State Marine Board 2015. Do not modify or reproduce without permission.

## Up close and personal with cold water

*Journal excerpts from “Cold Water Bootcamp” volunteer Jonah Pike, US Coast Guard*

Swim 1: “...I think I can make it, it’s mind over matter. I can do this...I immediately regret my cannon ball. The water on my face is painful. I start to hyperventilate and struggle to stay afloat. My hands are completely numb, I start to get disoriented. I don’t know how long it takes but my body starts to go numb, my senses are so confused right now. I know I am doggy paddling and I can’t keep more than half my face out of the water. Every kick of my feet feels like getting my legs beat with a broom handle. I finally swim in to shore. All I can remember is the tightening of my whole body... before the interview was over I was uncontrollably shaking violently. Dr Geizbrecht explained I wasn’t in hypothermia yet so my core temperature was still high enough to warm up normally. If I wasn’t even hypothermic and I was THAT incapacitated I can’t imagine really having my core temperature be in the low 90s.”



Swim 2: “I’m swimming next to Tim and luckily I get chosen to wear the life jacket. I feel bad for Tim but I can’t bring myself to volunteer to switch with him. During class I learn that a large amount of people who drown in cold water do so within a few meters of safety. If that fact alone doesn’t scare people into wearing their life jacket, I really don’t know what will. Today is so much colder than yesterday, and the wind is blowing. I figure out quickly that with the life jacket on I don’t need to move my arms to stay afloat. I tuck my arms close to my side and quit moving them. I look at Tim swimming next to me and the pain on his face makes me feel guilty for effortlessly floating next to him. I know it has been five or ten minutes now and I feel fine. My body is numb, but I’m not in pain and I feel totally coherent. I look back at Tim again, now his face is going under the water every couple of strokes—he’s done. I’ve been in the water fifteen minutes now and I start freestyle swimming towards the boat... When I get on the boat I am in total awe of how much different the swim was with a life jacket.

I learned so many things from this experience. Cold water is something to be feared because it doesn’t look any different than warm water and yet it is a hundred times more dangerous. I learned how to swim when I was four and grew up in pools and lakes like many others, but when I jumped in the water without a life jacket it was a crippling feeling. I also feel like it was a very controlled environment I swam in, a harbor with no waves at all. When I was swimming with no life jacket at times my nose was barely out of the water. If I fell off my boat in the lake, it would not be as calm of an environment. I would fall in the water and while I struggled to control my breathing a wave would splash my face, I would suck in water, and it would all be over.

If you do wear a life jacket and make smart decisions when you end up in the water, you can greatly increase your chances for survival and/or rescue. Hypothermia can’t kill you without a life jacket—you’ll be dead before you get there.”

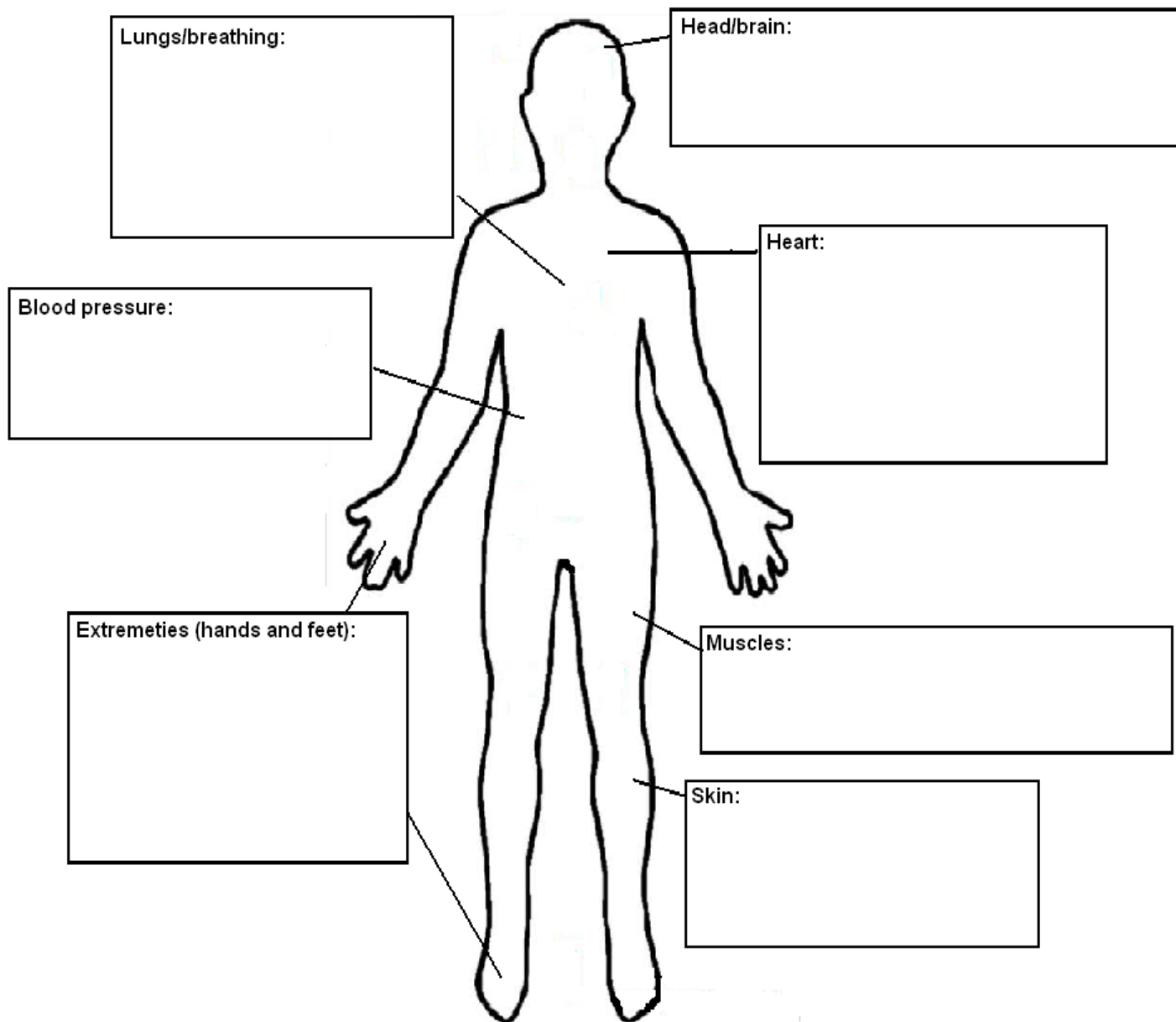
## Round-table Discussion

After reading the above excerpts, discuss the following in small groups:

1. What words or phrases jumped out at you, from the journal excerpts or the videos?
2. Have you ever had a similar experience where you came close to a dangerous situation in cold water? How did you deal with it?
3. Will your decisions or actions when out boating or on cold water be different in the future? If so, how?

## Physiology

Based on what you have learned, list all of the possible physiological responses to cold water immersion expected for each part of the body:

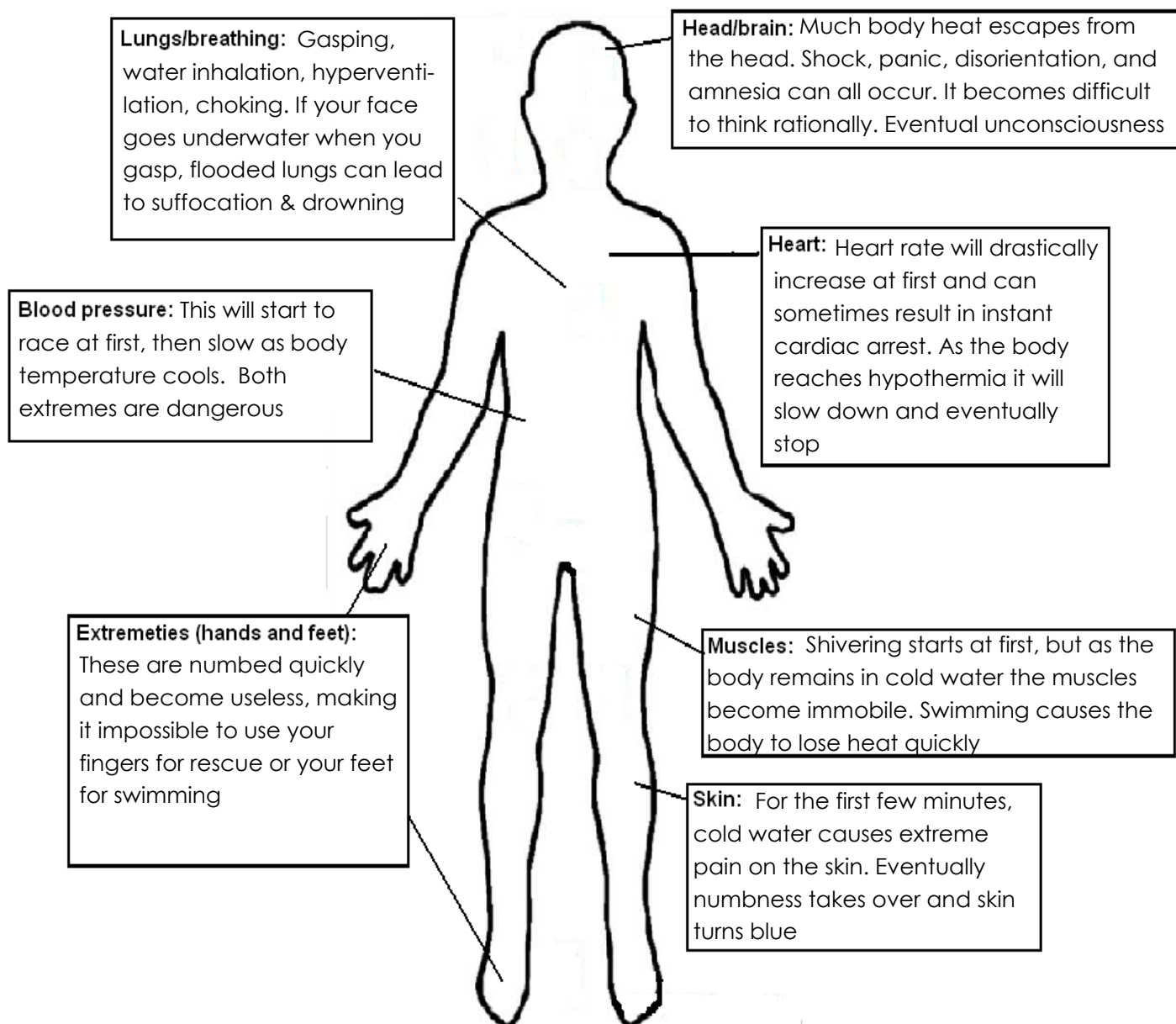


### Answer the following:

1. What is your survival time in cold water with and without a life jacket?
2. What is the 1-10-1 Principle?
3. What is the first step all boaters should take to prevent drowning in the event of an accident?

## Physiology

Based on what you have learned, list all of the possible physiological responses to cold water immersion expected for each part of the body:



### Answer the following:

1. **What is your survival time in cold water with and without a life jacket?** One hour or more with a life jacket, 10 minutes without one
2. **What is the 1-10-1 Principle?** In cold water you have 1 minute to get your breathing under control, 10 minutes of swimming time before your muscles shut down, and an hour before you lose consciousness
3. **What is the first step all boaters should take to prevent drowning in the event of an accident?** Wear a life jacket every time!



### Extension Activities

- Have students look for recent newspaper articles describing drowning accidents in their local area. Discuss why the situation may have occurred, what the victims did right and/or wrong, how the situation could have been avoided, etc.
- Start an informational campaign on campus or in the community. High school students can visit the classrooms of younger students to teach them about water safety. Put flyers up around the school encouraging students and faculty to always wear a life jacket and to always boat sober.
- Assign students the task of designing a five-minute “presentation” to teach their family members about cold water dangers, what to do if they go into the water, and accident prevention. Families can then come up with a boating/water safety plan of their own.

### Additional Resources

- Cold Water Bootcamp: videos and additional resources—[coldwaterbootcampusa.org](http://coldwaterbootcampusa.org)
- “Never Happens” video and additional resources—<http://tpwd.texas.gov/fishboat/boat/safety/>
- Cold water physical responses (for Student Sheet #2)—[www.ussartf.org/cold\\_water\\_survival.htm](http://www.ussartf.org/cold_water_survival.htm)
- Physiology of “Polar Plunges” article—<http://www.ibtimes.com/polar-bear-plunge-physiology-what-cold-water-dip-new-years-day-does-your-body-1523686>



### Oregon State Marine Board Boating Education Program

PO Box 14145  
Salem, OR 97309



***Serving Oregon's recreational boating public through education, enforcement, access, and environmental stewardship for a safe and enjoyable experience.***

**For more information please contact MariAnn McKenzie,  
Boating Safety Education Coordinator:**

**[mariann.mckenzie@oregon.gov](mailto:mariann.mckenzie@oregon.gov)  
503-378-5158**

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## Aligned Standards

### 2014 SCIENCE (NGSS)

- HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
- HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

### SOCIAL SCIENCE CORE

- HS.61. Analyze an event, issue, problem, or phenomenon, identifying characteristics, influences, causes, and both short- and long-term effects.
- HS.62. Propose, compare, and judge multiple responses, alternatives, or solutions to issues or problems; then reach an informed, defensible, supported conclusion.

### COMMON CORE: SPEAKING AND LISTENING

- Conduct short as well as more sustained research projects to answer a question or solve a problem, and synthesize multiple sources on the subject.
- Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

## Activity at a glance

Students learn about the impacts of aquatic invasive species and prevention strategies used by boat manufacturers, then work in teams to design the ultimate invasive species-proof boat using the latest technology and creative solutions.

## Materials

- Copies of student worksheets (pgs. 3-4)
- Graph paper or blank paper for sketching designs
- Copies of "Stop The Spread" hand-out for students to take home (pg. 7)
- Projector, computers, internet access (optional)

## Background Information

Pollution such as trash and oil spills is a well-known problem for organisms and ecosystems. But there is another threat which is just as dangerous though not as well understood: biological pollution, in the form of **invasive species**. These are plants and animals ranging from algae and seagrass to snails and fish which are not **native** to the region. Invasive species compete with native species for resources like food and space, and are often aggressive and fast-growing. Left unchecked, they can eventually completely replace native ecosystems and the species which live there.

There are a number of **vectors**, or pathways, which transport invasive species to new habitats. The release of pets from home aquariums or classrooms, illegal stocking of lakes or streams with sports fish, and accidental hitchhikers on tsunami debris or driftwood are all culprits. The

biggest vector, however, is transport ships. Many aquatic species spend their larval stage as **plankton**, meaning they drift freely in the water. Eventually some of these species attach to a hard surface. At either stage they can be transported across oceans by ships, either in **ballast** (which is the water boats pump into their holding tanks as a counter-weight) or on the sides of the vessel itself. This growth is known as **biofouling** and can damage ships while also creating drag which slows boats down.

Scientists are still searching for solutions, and seeking to understand the many complex impacts of invasive species. An obvious solution, and one required by law, is that boaters must thoroughly clean their boats inside and

out when leaving any water body AND before entering another. While not 100% effective, this can help prevent the spread of some species.

An emerging area of nautical engineering is designing boats which are less likely to transport invasive species. Advances in features such as ballast systems and anti-biotic paints could help prevent aquatic invasive species at the source. The challenge is that these boats must also be safe for both humans and the environment. For example, some copper-based paints which are used to prevent biological growth on the sides of boats can be toxic to other marine species. Future scientific research must find the solutions best for both people and the environment.



Image credit: Creative Commons

## How can marine engineers reconcile the need for safe, fast boats with the need to prevent aquatic invasive species?

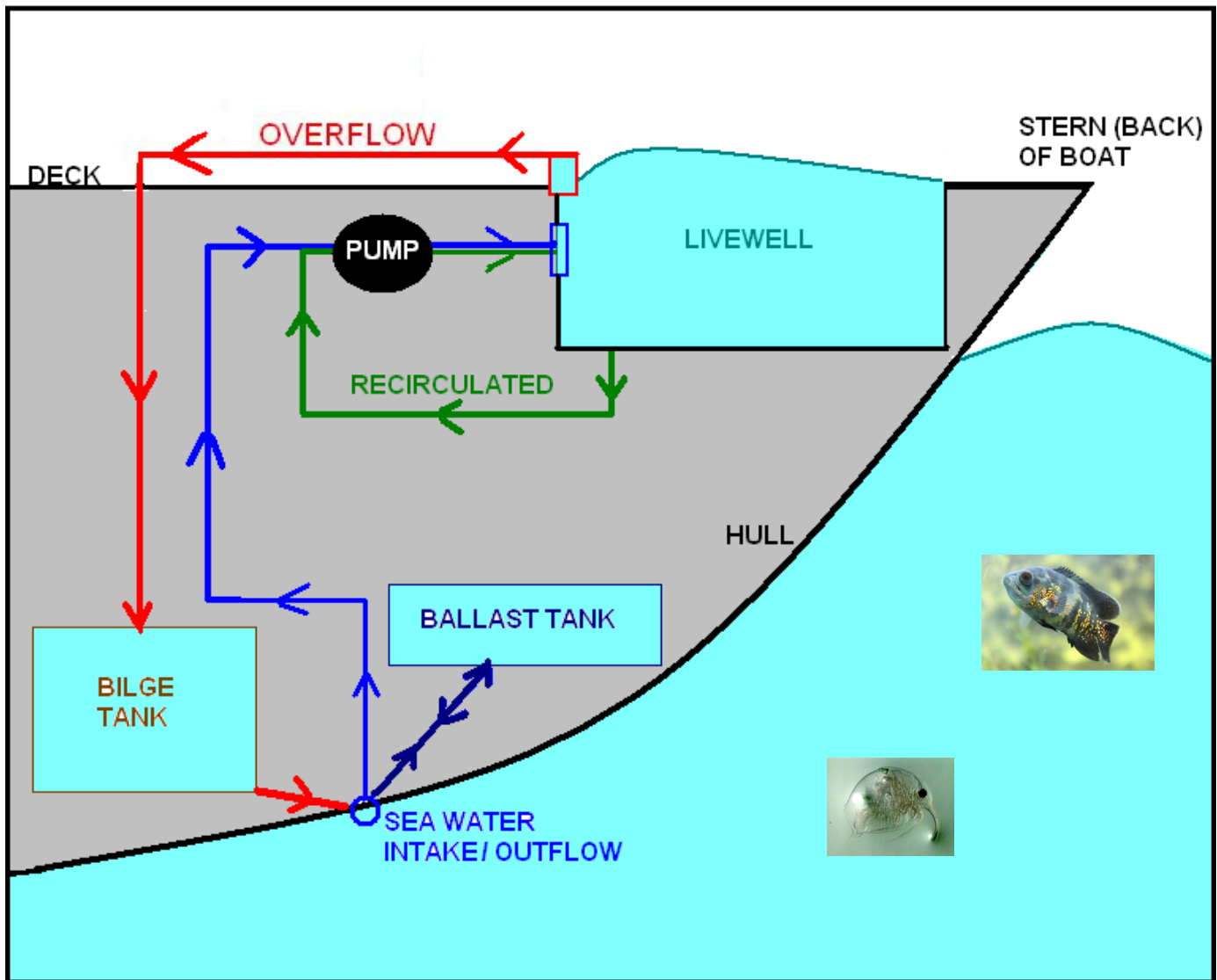
## Procedures

1. Introduce the topic of invasive species, vectors, and threats they pose to habitats. If you have already discussed this topic before, this should be a brief review. If this is a new concept for students, be sure to define the vocabulary and fully discuss the *Background Information* on pg. 1.
2. If time allows watch the videos and/or review selected “Additional Resources” as a class to introduce the concepts.
3. Share the “Stop the spread of aquatic invaders” poster and the boat plumbing schematic. This will help set the stage for students to design their own boats.
4. Discuss current anti-fouling techniques currently used or being researched. If time and computers are available, students may research this independently.
5. Introduce the activity: students will become engineers seeking to create the best design for an anti-invasive species boat. They must work together and think both creatively and scientifically.
6. As a class, come up with a list of specifications that all boat designs must comply to. These don’t need to be too detailed or constraining, but should include basics such as: the boat must float, it must carry evenly distributed weight, it must be safe for humans, and must not cause major damage to the environment. You may also designate size requirements.
7. Break students into small groups of “design teams” (4-6 students each). Before beginning their sketches, groups must answer the following questions together:
  - What type of boat will we design? (sailboat, motorboat, barge, etc.)
  - What is the boat used for? (recreation, commercial shipping, etc.)
  - What features will we design to prevent the transport of invasive pests?
  - How will we incorporate these features while still meeting the required specifications?
7. Start engineering! Give groups ample time to discuss, design, and ultimately draw their ideal “pest-proof” boat. Special features should be labeled. Encourage students to work together, providing guidance or assistance if necessary. Your role as the facilitator should be that of the “project manager”, ensuring all teams are following the agreed-upon requirements.
8. At the end of the class period, have each group present their design. Students may vote on the best design, or you as the “project manager” may select the best design based on feasibility, creativity, and how well specifications were followed. Remind students that in the real world, this is often how the process goes: engineering firms compete for the job by pitching their designs to the manufacturers.

**EXTENSION:** Use activities from the *Watershed and Invasive Species Education (WISE) Program* as an introduction or accompaniment to this lesson—see pg. 5 for more information.

**Additional option:** Over the course of a few weeks, students can build models of their boat designs using household and/or classroom materials.

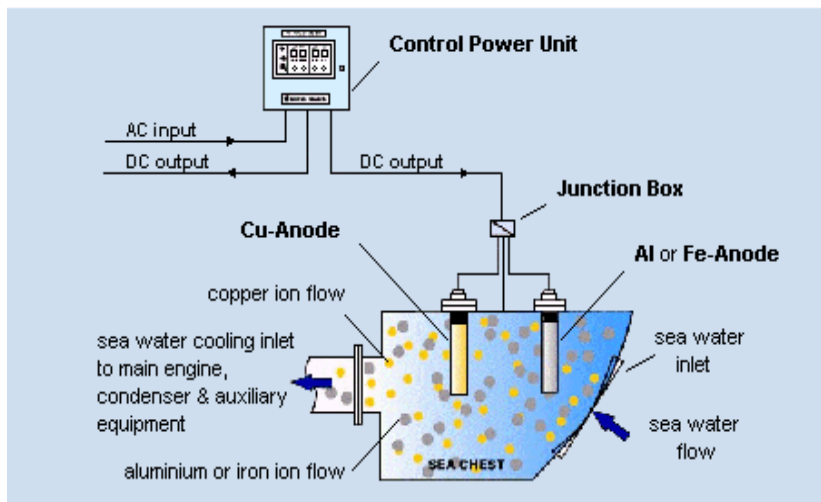
## Simple Boat Plumbing Schematic



Note the directions that water flows in and out, remembering that sea water can contain planktonic invasive species.

Can you identify the areas most at risk for accumulating or storing aquatic invaders? Use this schematic to help engineer your own boat, modifying it to reduce the risk of pest species while still performing the necessary plumbing.

## Stopping the Invasion: Modern Anti-Fouling Techniques



*Schematic Layout of Electrolytic Anti-Fouling System*

Image credit: [www.cathwell.com](http://www.cathwell.com)

**Electrolytic antifouling systems** is one of the most commonly used methods to fight biofouling. A pair of anodes (through which electricity flows, as in a battery), one made of copper and the other aluminum or iron. When sea water passes over the anodes, the electric charge produces copper ions which are then carried through the entire boat's plumbing system. This prevents organisms from settling in the pipes.

**Electro-chlorination** can also be used, in which the salt in sea water is converted to chlorides through electrolysis, but it is more complex and costly to operate.



**Ultrasonic antifouling systems** are environmentally friendly, and do not introduce chemicals or metals into the water. They work by producing bursts of sonic energy in multiple frequencies simultaneously. This creates an alternating pattern of positive and negative pressure. These in turn create and implode microscopic bubbles, creating tiny jets that scrub the boat's hull. In addition, these sonic bursts can destroy single-celled organisms such as algae, removing that first link in the food chain and thus reducing the ability of other organisms such as mussels to settle on the boat. These systems can also help improve fuel efficiency, but are very expensive.



**Antifouling paints** are designed to deter the attachment of organisms and/or slow their growth. They contain copper or other "biocides" which slow fouling, but can be highly toxic to other marine life. Some also contain silicone, which creates a smooth surface on which is difficult to attach. Other paints even contain tiny fibers which prevent plankton from adhering.



## Additional Resources

### *Invasive Species*

Stop the Spread of AIS: <http://seagrant.oregonstate.edu/sites/default/files/sgpubs/onlinepubs/g06003.pdf>

Hood River News—Invasive mussels found on boat in Ontario: <http://www.hoodrivernews.com/news/2015/apr/29/invasive-mussels-found-boat-ontario/>

Teacher resources list: [www.invasivespeciesinfo.gov/resources](http://www.invasivespeciesinfo.gov/resources)

Resources to teach students about aquatic invaders: <http://www.sgnis.org/kids/index.html>

Invasive Species Information Node: <http://invasivespecies.nbio.gov>

Habitattitude—preventing aquatic pet/plant introductions: <http://www.habitattitude.net/>

Oregon Invasive Species Council: <http://www.oregon.gov/OISC/>

### *Boat design and engineering*

American Society for Mechanical Engineers—Boat design: <https://www.asme.org/engineering-topics/articles/transportation/boat-design-an-open-sea-for-mechanical-engineers>

VIDEO—Designing a faster boat hull: <http://www.engineering.com/Videos/ProductDesignChannel/Videoid/2604/Designing-A-Faster-Boat-Hull.aspx>

VIDEO—Boat Manufacturer Shares Design to Prevent Invasive Species Spread: <http://kstp.com/article/stories/s3694432.shtml>

Marine anti-fouling systems: <http://www.cathwell.com/technical/details-on-electrolytic-antifouling/>

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# STOP THE SPREAD OF AQUATIC INVADERS



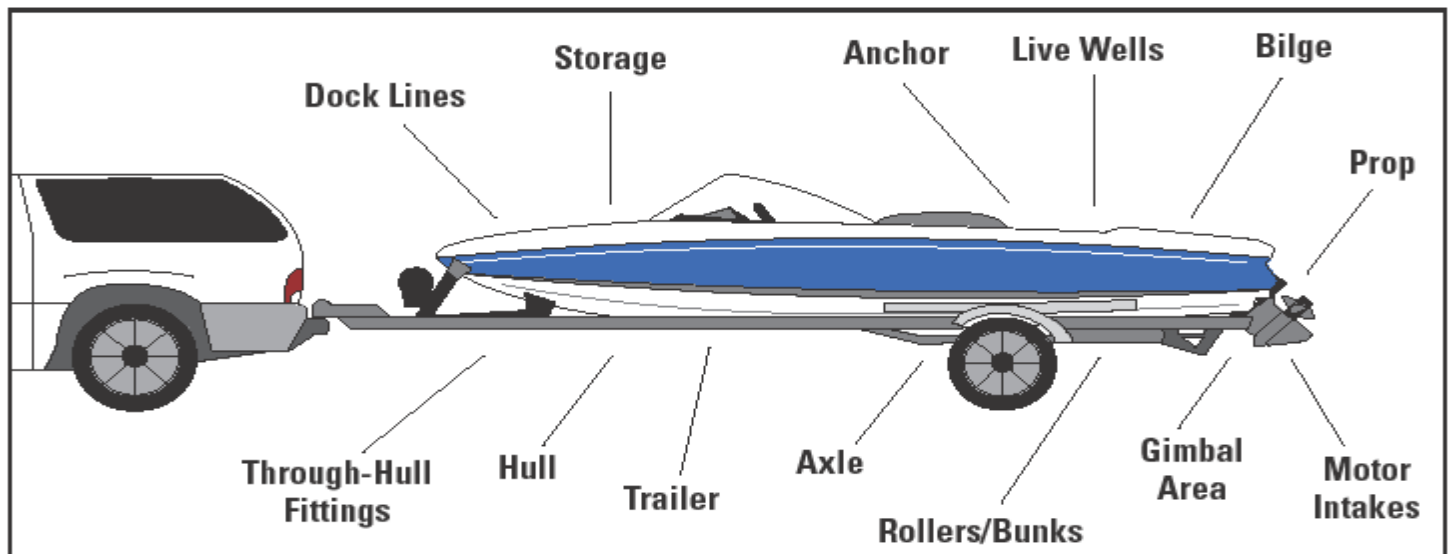
**Before launching and before leaving...  
INSPECT EVERYTHING!**

**CLEAN** all aquatic plants, animals and mud from your vehicle, boat, motor or trailer and discard in the trash. Rinse, scrub or pressure wash, as appropriate away from storm drains, ditches or waterways.

Motorboats, kayaks, canoes, drift boats and other watercraft can carry destructive quagga and zebra mussels, New Zealand mudsnails and aquatic plants—invasive species that cause serious economic and environmental damage to lakes, streams, irrigation and water delivery systems. To halt the spread of these destructive invaders, clean, drain and dry your boat.

**DRAIN** livewell, bilge and all internal compartments.

**DRY** your boat between uses if possible. Leave compartments open and sponge out standing water.



Oregon requires boaters to have an Aquatic Invasive Species Permit. Information:  
[www.dfw.state.or.us](http://www.dfw.state.or.us) or [www.boatoregon.com](http://www.boatoregon.com)  
Report invasive species, 1-866-INVADER



the OREGON  
CONSERVATION  
STRATEGY







### Aligned Standards

#### 2014 SCIENCE (NGSS)

- HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
- HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

#### OR SOCIAL SCIENCE

- Analyze the impact on physical and human systems of resource development, use, and management and evaluate the issues of sustainability.
- Analyze an event, issue, problem, or phenomenon from varied or opposing perspectives or points of view.
- Propose, compare, and judge multiple responses, alternatives, or solutions to issues or problems; then reach an informed, defensible, supported conclusion.
- Engage in informed and respectful deliberation and discussion of issues, events, and ideas.

#### COMMON CORE: SPEAKING AND LISTENING

- Initiate and participate effectively in a range of collaborative discussions with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

Continued on next page...

### Activity at a glance

Students play the roles of various stakeholders in a “town hall meeting”-style debate. Competing interests and issues must be reconciled to reach a resolution about whether or not debris in the local river should be removed.

### Materials

- Copies of *Town Meeting Instructions*, 1 per student
- Copies of *Town Meeting Announcement*, 1 per student OR posted somewhere in classroom
- Copies of stakeholder role pages, enough for the number of students playing each role
- Access to computers and internet (optional)

### Background Information

**Resource managers**, the people responsible for making decisions about **natural resources** such as rivers, lakes, and beaches, face a number of challenges. Many different people like using these resources for different purposes and will fight for their right to use them. These places are often habitats for commercially important or endangered species. It can be very difficult to balance these competing needs, especially in situations where human safety is threatened.

A common example of such a situation in Oregon is when **woody debris**—fallen trees, branches, or logs—appears in rivers used by boaters. This can present a number of hazards for people, causing damage to boats, blocking passage and navigation, and forming dangerous underwa-

### Objectives

Students will:

- Research viewpoints, opinions, and perspectives to put themselves in the shoes of a stakeholder
- Explore issues of ecology, human safety, economics, and recreation
- Use speaking and critical thinking skills to engage in debate with classmates
- Consider all viewpoints to compromise and devise an acceptable solution



Image credit: Creative Commons

### How do people balance ecological and human concerns when making decisions about resource management issues?

ter features called **strainers** which can entangle and capsize boats and their occupants.

However, woody debris also provides a number of benefits to river ecology. The pools created by fallen trees are critical habitat for fish, especially juvenile fish, and accumulate **organic materials** eaten by these fish. Each year millions of salmon make the arduous journey from the ocean up Oregon's rivers to lay their eggs, and woody debris provides vitally important resting places. Since salmon are a species of both ecological and economic importance, river debris is often left in place by resource managers. Woody debris can also help with flood management by absorbing and redirecting the force of the

water flow, stabilizing stream banks and protecting them from erosion. This can help protect river-front properties.

The question of whether or not woody debris should be removed from a river is often a contentious one and requires careful consideration to balance the need for human safety and recreational access with potential ecological benefits. Resource managers use a number of tools to help them make these decisions. One of these is holding community **“Town Hall” meetings** inviting all people with an interest in the issue, or **stakeholders**, to discuss the problem. This allows everyone to be heard and to take part in devising a solution which is best for both people and wildlife.

**COMMON CORE: SPEAKING AND LISTENING**

- Conduct short as well as more sustained research projects to answer a question or solve a problem, narrow or broaden the inquiry when appropriate, synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

**HEALTH BENCHMARKS**

- Explain ways to reduce the risk of injuries in and around water.
- Advocate for safe alternatives to risky situations in and around water.

**Procedures**

1. Introduce with an announcement: our "town" (i.e., classroom), "Salmon River" will be holding a meeting to discuss a hazard recently discovered in our local river. Each student will take on the role of a particular stakeholder (define this term) and prepare some talking points and statements to share their opinion on the issue. Discuss some things they may want to consider when preparing:
  - What would their "character" think about the issue based on their background, wants, and needs?
  - How can a community of people reach a consensus on a controversial issue?
  - What are the best methods for framing a persuasive argument?
2. Distribute the *Town Meeting Announcement*. This will provide some information and details about the issue. Provide further information as needed from the Background Information.
3. Distribute the *Town Meeting Instructions* sheet. Tell students they must follow these rules when debating so we can remain civil and respectful.
4. Assign stakeholder roles and distribute *Role Information* sheets. If time allows, have students conduct research to better understand their assigned stakeholder (see "Options" box to right). Take care to balance the number of students assigned to each role: this could influence the outcome. Each student will decide for themselves, *based on their role sheet*, if they are for or against ("pro" or "con") the Resolution.
5. Allow time for students to prepare talking points, opening and closing statements, and rebuttals. Encourage use of the *Town Meeting Instructions* sheet to prepare. Guide preparations using further information provided in the Additional Resources.
6. The Moderator (played by the teacher and/or a student-see the Moderator role sheet) convenes the town meeting by reading the rules aloud.

**OPTIONS FOR THIS EXERCISE**

This activity was designed to be very flexible depending on the amount of time and resources available. If you are limited to one class period, give students a few minutes to brief themselves on their roles and prepare some talking points, then use the remaining time to hold the debate, making sure enough time is left at the end to conclude and discuss.

If you have more time and access to computers, students can spend a class period thoroughly researching their roles and preparing opening and closing statements. Alternately you can introduce the activity and assign roles the class period before holding the debate, and have students conduct background research as a homework assignment.

There are also opportunities to extend this activity for several weeks. Visit a local river to look for debris and analyze whether it might constitute a hazard or good habitat. Invite a fish biologist, ODFW agent, or Marine Patrol officer to speak with your students about their experiences with similar issues. Have students work in stakeholder groups to conduct background research, strategize, and prepare their statements. As a final wrap-up assignment, ask students to write papers detailing the viewpoints of all the stakeholders, the trade-offs (ecological, social, etc.) involved, and a defense of their personal opinions on the issue.



**Don't forget—Oregon's State Animal the Beaver also needs woody debris to build its dams!**

## Procedures (continued)

7. The first statements will be made by the Marine Patrol Officer to offer details about the debris and potential safety concerns, reading the official report. NOTE: this role should only have one speaker, but you may assign more students to play this role—see Stakeholder sheets
8. The Moderator opens the floor to those wishing to oppose the resolution (“con” participants) who make their opening statements.
9. The Moderator asks for opening statements by those supporting the resolution (“pro” participants), who can also offer rebuttals to statements made by the “con” side. These initial arguments should succinctly state the advantages or disadvantages of the resolution.
10. The Moderator opens the floor up to everyone. He/she should closely monitor speaking times and enforce the two-minute limit for statements. The meeting continues with stakeholders from each side taking turns providing clear evidence to support their arguments. To encourage participation, each student should be required to make at least one statement; to accommodate this, you may need to modify the speaking time limits.
11. The Moderator calls for final closing statements. If time is running short you may limit these to 1 minute or less. At least a couple of representatives from each side should speak, concluding their main points and attempting to persuade those present.
12. Moderator asks for a vote on the resolution. This should be conducted anonymously by the Moderator. The Town Council Members may vote, but the Moderator may not.
13. The results of the vote are announced. A 70% majority is required to pass the resolution (this may be calculated by the Town Council). If this majority has not been achieved, the meeting goes into a Recess while the Town Council members *re-frame the resolution based on the comments made during the meeting*. This will likely involve finding a compromise or middle ground that more people will feel comfortable with.
14. The new resolution is read aloud, and the Moderator conducts another vote. As before, if there is no majority consensus, the resolution must be re-framed by the Town Council.
15. The Moderator announces, “Resolved!”, followed by another reading of the agreed-upon resolution, and he/she officially closes the meeting.
16. Wrap up the activity with a discussion of the experience. Questions to ask the class may include:
  - Were students pleased with the outcome? Why or why not?
  - Do they think there were any groups/people that were not represented at the meeting that should have been?
  - Do they feel that such public forums are a useful tool for communities to make decisions?
  - Do they feel everyone’s voice was heard and treated fairly?
  - What would they change about the proceedings if they were in charge and why?
  - What was the most challenging aspect of this activity?

**NOTE: The following instructions and stakeholder roles were designed for a class of about 30 students. Adapt as needed.**

## ATTENTION RESIDENTS!

We will be holding a public meeting to hear comments and vote to decide on the resolution:

### THE WOODY DEBRIS CURRENTLY OBSTRUCTING SALMON RIVER WILL BE REMOVED.

A majority “yes” vote will mean that the debris will be removed immediately and entirely. A majority “no” vote means the debris will be left in the river as it is. If the town is unable to reach a majority vote, the resolution will be re-framed based on public comments.

**BACKGROUND INFORMATION:** A large pile of woody debris (fallen tree branches) has been reported in the Salmon River at a site popular with boaters and fishermen (see map below for exact location). It has not yet caused any major accidents, though the state has received several complaints from concerned boaters claiming it is a navigation hazard. However, this area is part of the annual salmon run and such debris provides vital habitat for salmon and other fish. Some people have expressed a desire to remove the debris to protect boater safety and access, while others have spoken out for leaving it to help the salmon population.

All public opinions and comments are welcome. Representatives from the Oregon Department of Fish and Wildlife (ODFW) and our local Marine Patrol Office will also be present to offer their professional opinions.



Image credit: Creative Commons



Image credit: Google Earth

**Rules for participating in a Town Hall Meeting (to be read before each meeting is convened):**

1. All attendees must remain respectful and courteous at all times
2. Anybody who wishes to speak must first raise their hand and be formally recognized by the Moderator before speaking
3. No interrupting or speaking out of turn
4. There is a **two-minute time limit** for each statement and/or rebuttal. This will be strictly enforced by the Moderator
5. The Moderator and Town Council Members retain the right to dismiss or ban from speaking any participant who does not follow the above rules

**Tips and suggestions for speaking at a public forum**

1. Know your material—research your speaking points thoroughly to avoid giving false information
2. Utilize evidence and scientifically-supported information to strengthen your arguments. Select key evidence which best supports your main points—avoid overwhelming the audience with facts
3. Speak clearly, loudly, and slowly so that everybody can hear and understand you
4. Prepare an opening statement, closing statement, and a list of main talking points
5. Focus on two or three clear, well-supported arguments rather than many weak ones
6. Avoid personal attacks on members or groups on the opposing side—this is grounds for dismissal
7. Anticipate potential rebuttals from the opposing side, and prepare responses for these
8. Understand that others will not share your opinion and be open-minded to diverse viewpoints

**Typical structure of a Town Hall Meeting**

- Moderator officially convenes the meeting and reads the rules above
- A representative will offer an official report relating the key points of the issue being resolved
- Those opposing the resolution (the “con” side) wishing to speak will offer opening statements
- Those supporting the resolution (“pro”) wishing to speak will offer opening statements and/or may rebut points offered by the “con” side
- The discussion continues with participants each taking turns to speak, guided by the Moderator
- Moderator calls for closing statements
- When the conversation has reached a natural stopping point OR 20 minutes are remaining, the Moderator calls for a vote
- If there is no majority consensus, the Town Council re-frames the resolution and offers it again for vote. This continues until a majority can be reached (may require additional Town Hall Meetings)

## The Moderator

This is arguably one of the most challenging and important roles of the entire meeting, because the Moderator is responsible for making sure the meeting runs smoothly and that participants remain civil. The Moderator enforces all rules, and has the power to dismiss or ban from speaking any participant who does not follow those rules. As such they need to be very familiar with all rules and proceedings. She or he officially opens and closes all meetings and calls for votes, and is the only person who may count the votes. She or he is also responsible for carefully timing all speakers and enforcing the two-minute-per-turn time limit. The Moderator coordinates with Town Council Members as needed, especially in the case of a re-framing of the resolution and a re-vote. The Moderator monitors the discussion, keeping speakers on-topic and directing the discussion as needed. In the case of a “lag” in the discussion, the Moderator may pose a question to help spark continued conversation. However, it is essential that the Moderator remains neutral throughout the meeting. (S)he should not offer any personal opinions or attempt to steer the discussion in any way.



*Image credit: www.freestockphotos.biz*

The Moderator also needs to have a strong grasp on the subject matter, so as to be able to help guide the discussion and ask stimulating questions. She or he should be familiar with the history of the issue, steps taken to date, the pros and cons of each side, and potential trade-offs for different interests or stakeholders. The Moderator should have excellent communication skills, be highly organized, be able to command the room, and be able to make quick decisions and judgment calls when necessary.

This role may be played by the Teacher, shared by 1-2 students, or a combination of the Teacher and a student working together.

### Resources for preparation and research

- [Real Democracy: The New England Town Hall Meeting and How It Works](#) by Frank M. Bryan
- An interview with Candy Crowley, moderator for the 2012 Presidential debate: <http://www.cnn.com/2012/10/10/politics/crowley-debate/>
- 20 Tips to Host an Effective Townhall: <http://prtini.com/20-tips-to-host-an-effective-townhall-online-or-in-person/>
- King County, WA Woody Debris page: <http://www.kingcounty.gov/environment/watersheds/general-information/large-wood.aspx>
- Management and use of large wood in rivers: <http://evidence.environment-agency.gov.uk/FCERM/en/SC060065/MeasuresList/M5/M5T3.aspx>

### Town Council Members (3-4 people)

Council Members have been elected by their community to represent the interests of the community as a whole. While each Council Member likely has their own interests and agendas, their job is to advocate for the desires of their constituents while also seeking the best solution for the majority. They must weight the needs of any one person or group with the needs of the community as a whole. At the same time, they must represent the larger interests of the local and state government, including economic budgets, practical limitations, and under-represented groups such as children and minorities. They pay close attention to the legal aspects of any discussion, and must be able to identify the short-term as well as long-term impacts of decisions. Councilors may be career politicians but they are also often businesspeople, activists, lawyers, educators, or economists.



Image credit: Creative Commons

At a public forum such as a town hall meeting, the Council Members are responsible for upholding the democratic process. In other words, they make sure that everybody's voice is being heard and that as many interests as possible are being represented. They do this in cooperation with the Moderator by asking questions that help to facilitate the discussion, offering insights which the general public may not have, and voicing their own concerns about the issue. They act in support of the Moderator to help enforce meeting rules and civility, and if necessary may also exercise the power to dismiss an aggressive speaker. In the case of a vote which does not achieve a majority (70%) consensus, the Councilors are responsible for re-framing (re-writing) the resolution. For example, if the majority of voters don't agree with the resolution "All dogs must be kept on leashes in all public areas", the Councilors may need to re-frame this as something like, "Dogs displaying aggressive behaviors towards people or other dogs must be kept on a leash in public areas." The term *aggressive behaviors* would then need to be defined and agreed upon by the voters. Re-framing a resolution almost always involves finding a compromise between the two opposing sides, and often requires creativity and cooperation on the part of Council Members to get a majority consensus.

### Resources for preparation and research

- [Real Democracy: The New England Town Hall Meeting and How It Works](#) by Frank M. Bryan
- 20 Tips to Host an Effective Townhall: <http://prtini.com/20-tips-to-host-an-effective-townhall-online-or-in-person/>
- King County, WA Woody Debris page: <http://www.kingcounty.gov/environment/watersheds/general-information/large-wood.aspx>
- Salem, OR City Council page: <http://www.cityofsalem.net/CityCouncil/Pages/default.aspx>
- How Local Government Works: <http://www.thepeoplesbudget.org.uk/start/localgov/>
- How City Councils Work: <http://people.howstuffworks.com/government/local-politics/city-council.htm>

### Marine Patrol Officer (1 person or more)

A Marine Patrol Officer is essentially a police officer on the water. They ensure the safety of boaters and all others who use freshwater and saltwater areas, both recreationally and commercially. These may include swimmers, water-skiers, fishermen, shipping vessels, and non-motorized boaters such as kayakers and rafters. Marine Patrol Officers protect these users' safety by enforcing all the rules and laws on the water. These laws may pertain to safety but also include environmental regulations, such as pollution and fishing limits. Generally they patrol the waterways on their own boats labelled "Sherriff" or "Marine Law Enforcement". Officers may work for a separate state agency, a division of the state police, or a special unit within a local sheriff's office or police department. They work in cooperation with state agencies such as the Oregon Department of Fish and Wildlife (ODFW) and the Oregon State Marine Board (OSMB).



*Image credit: Creative Commons*

Regardless of who they work for, if it happens on the water, the marine patrol is generally responsible for it. They are responsible for investigating events such as boating accidents, drownings, and other fatalities which happen in, on, or near the water. Sometimes they are even called upon to remove dangerous aquatic wildlife, such as alligators, snakes, or sharks. Just like traffic officers, Marine Patrol officers stop any boaters they suspect of engaging in illegal activities while boating (such as alcohol or drug use) and issue tickets or arrests. A Marine Patrol officer needs to have excellent knowledge of marine law, good judgment, and strong "people skills" to interact with diverse members of the public. Above all, their main concern is for public safety and the safety of their own officers.

Part of the job of a Marine Patrol officer is to make public appearances, both to help raise awareness about safety issues and to provide testimony or details about a particular case or issue. For this Town Hall Meeting, the Marine Patrol Officer is responsible for reading the following official report on the Salmon River debris issue:

*OFFICIAL REPORT: We first received calls about the Salmon River debris about two months before this meeting. Marine Patrol officers were dispatched to investigate, and determined that the debris present was small and did not constitute a safety concern. A few weeks after that, officers determined that the debris pile had grown significantly since it was first reported and could pose a threat to navigation and human safety. The debris is approximately in the middle of the channel, half a mile downstream of the bridge, in a location which already has limited navigation due to the presence of a wide sand bar on the eastern bank. The debris pile is in a round shape, about 10 feet in radius and is visible at both high and low tide. At this time it has not caused any major accidents but there have been a few instances of entanglement with fishing gear.*

### Resources for preparation and research

- Marine Patrol Officer Career Information: <http://criminologycareers.about.com/od/Law-Enforcement-Careers/a/Career-Profile-Marine-Patrol-Officer.htm>
- Oregon Boating Regulations: <http://www.oregon.gov/OSMB/BoatLaws/pages/regulations.aspx>
- Oregon Law Enforcement Program—What Marine Patrols do: <http://www.oregon.gov/osmb/boatlaws/pages/leprogram.aspx>



## Fish & Wildlife Biologist (2-3 people)

The mission of the Oregon Department of Fish & Wildlife (ODFW) is “to protect and enhance Oregon’s fish and wildlife and their habitats for use and enjoyment by present and future generations”. Essentially, it is the agency responsible for managing all of the state’s natural resources. Sometimes this means protection and conservation, while at other times it means removing harmful weeds or invasive species. Sometimes certain habitats are changed to improve habitats for ecologically important or socially desirable species. Other projects undertaken by ODFW include restoring native animal populations to their historic range, restoring wetlands, and tagging endangered or threatened species to track their movement and survival. Much of the agency’s annual budget comes from the sale of fishing and hunting licenses, and hunting and catch limits are carefully monitored.



*Image credit: Creative Commons*

To work as a biologist for an agency such as ODFW, you must have at least a bachelor’s degree in a natural science such as Fisheries and Wildlife Science, Ecology, or Biology as well as several years working in the field of conservation or resource management. Many scientists have advanced degrees and decades of experience. Biologists must be experts not only in local flora and fauna, but also in data collection and project management. They must be aware of current research in their field and be sensitive to local cultural issues, such as fishing as the main food or income source for local families. Biologists spend a lot of time outdoors doing habitat restoration, collecting samples, and monitoring ecosystem changes. They also have to spend a lot of time in front of a computer, recording and analyzing data and preparing reports to help other ODFW staff make decisions about wildlife management.

Habitat and wildlife management requires a lot of work, so ODFW biologists rely on volunteers to help with many of their projects. One such project is the Salmon and Trout Enhancement Program (STEP). Based on local needs, scientists and volunteers work together to assess stocks (populations) of these species, restore their habitats, and raise new stocks in hatcheries. These species are of high concern not only because they provide a lot of food and money for Oregonians; they are a vital link in marine and aquatic food chains. Due to climate change, dams, loss of habitat, and pollution, some species are declining. ODFW biologists are taking steps to change this. Salmon need the pools and shelter provided by woody debris such as fallen trees and large branches to survive their long journey up-river: without it, fish have nowhere to rest or find food. Many salmon conservation efforts focus on placing woody debris where these fish live. Doing so has been proven to help more fish survive and increase stocks.

### Resources for preparation and research

ODFW main page: <http://www.dfw.state.or.us/agency/>

ODFW Biologist/Natural Resource Specialist job description: <http://dfw.state.or.us/hr/docs/hrInsertBio.pdf>

The Salmon and Trout Enhancement Program: [http://www.dfw.state.or.us/fish/STEP/docs/SS11\\_SalmonTrout.pdf](http://www.dfw.state.or.us/fish/STEP/docs/SS11_SalmonTrout.pdf)

Salmon Ecology 101: [http://www.pebblescience.org/pdfs/salmon\\_ecology\\_fact\\_sheet.pdf](http://www.pebblescience.org/pdfs/salmon_ecology_fact_sheet.pdf)

Woody Debris and Fish Conservation: <http://anrcatalog.ucdavis.edu/pdf/8157.pdf>

## Recreational Boater (3-4 people)

Oregon's waterways offer many opportunities for recreation, one of the most popular of which is boating. From small streams and lakes to mighty whitewater rapids to the ocean, Oregon has some of the best opportunities for recreational boating in the U.S. A boat allows people to explore isolated waterways, go fishing or hunting, and enjoy scenery they would never have access to on foot. Motorboats, sailboats, rafts, kayaks, canoes, kite boards, and jetskis (also known as personal watercraft or PWC's) are all different types of boats which provide fun outdoor experiences. Boating also allows the opportunity for friends and families to spend time together away from screens and offices. Whether for adventure or relaxation, about 29% of US households has at least one member who boats, according to a 2011 USCG survey.



*Image credit: Creative Commons*

Recreational boaters come from all walks of life, but they are united by their love for our shared waterways and the desire to be able to enjoy them now and into the future. In order to do so, boaters require access to waterways and waterways which are safe, navigable, and unpolluted. If people are unable to get into the water, or navigate it safely, they may be less likely to go boating. Many people use boats for recreational hunting, fishing, birding, or wildlife viewing, so boaters also generally want waterways with healthy populations of fish and other wildlife. Sometimes, in order to protect the environment, boating is limited or temporarily banned. This is a trade-off that some, though not all boaters are willing to make. Boating can be a dangerous activity if not done safely, and just like when driving a car, boaters must follow certain "rules of the road" on the water including speed limits and passing other boats safely. Important laws governing boating safety include mandatory life jacket use for children 12 and under when the boat is in motion, and the use of alcohol or drugs—any person in control of the boat must be sober. If boaters break any of these rules they are subject to being pulled over by Marine Law Enforcement and may be given a ticket or even arrested.

Many boaters are actively involved with government and legislation surrounding boating issues. These issues range from the building of boating facilities, to conservation of waterways, to the regulation of fishing catch limits, and more. There are a number of local, state, and nationwide advocacy groups for boaters, not all of which take the same stances on certain issues (see Resources below). Ultimately it is the boater's personal interests, experiences, and knowledge which determines how they stand on the issues affecting them.

### Resources for preparation and research

Recreational Boating and Fishing Foundation: <http://takemefishing.org/boating/overview/>

BoatUS Action Alerts: <http://www.capwiz.com/boatus/home/>

National Boating Foundation: <http://www.n-b-f.org/issues.html>

Public Use of Oregon's Rivers and Lakes: <http://www.oregon.gov/OSMB/access/docs/navigabilitybrochure.pdf>

Responsive Management Boating Demographics: <http://www.responsivemanagement.com/boating.php>

## Commercial Fishers and Fishing Guides (3-4 people)

For many centuries, fish which populate rivers for at least part of their lives, such as salmon, have been an important source of food and income for the Pacific Northwest. Over time, changes in habitats and in fishing methods have majorly influenced the fishing industry.

Commercial fishing is the industry of harvesting large amounts of fish for profit and is done by a range of large– and small-scale operations, from corporations to family businesses. Targeted species range from fish to mussels, clams, shrimp, squids, lobsters, and more, but in general very few species support most of the commercial fishing industry. Millions of tons of these species are caught each year and sold in markets around the world, making it a very important part of the global economy. In the US, commercial fishing provides about two million jobs and 185 billion dollars each year. Many different methods are used to capture fish including nets, lines, traps, and trawling.



*Image credit: pixabay.com*

In Oregon, much commercial fishing takes place in large rivers such as the Rogue and the Columbia (which alone sees over one million salmon every year). Salmon populations vary from year to year, sometimes appearing in great abundance while at other times there are not enough for every boat to catch enough to make a profit. Each commercial fishing operation has a limit on how many fish they may catch in a day or a season, depending on that year's stock assessments, which are performed by biologists to determine the population of each species. In years when there are few fish, it is very difficult for commercial fishermen to make a living and they sometimes suffer huge economic losses. Because they depend on healthy fish populations for their livelihood, fishermen are often very interested in and supportive of fish conservation efforts. However, their operations also require safe and navigable waterways, free of large debris or other dangerous obstacles.

There are others in the fishing industry besides commercial fishers who are reliant on clean water and good fish populations for their livelihood. Fishing guides, for example, make their living by taking recreational fishers out on their boats. Fishing guides need to have access to good fishing spots to support their business. Rivers with good fish habitat which are also easy to navigate are the most popular with fishing guides and recreational fishers alike.

### Resources for preparation and research

Pacific Fisheries Management Council: [www.pconcil.org](http://www.pconcil.org)

Voices of the Fisheries—Interviews and videos: <https://www.st.nmfs.noaa.gov/humandimensions/voices-from-the-fisheries/index>

History of Commercial Fishers—Columbia River salmon: [http://americanhistory.si.edu/onthewater/exhibition/3\\_6.html](http://americanhistory.si.edu/onthewater/exhibition/3_6.html)

A guide to Oregon's commercial fishing vessels: <http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/25066/SGNO681981.pdf?sequence=1>

National Fisherman—news and blogs: <http://www.nationalfisherman.com/>

**General Public (6-8 people or more)**

As a member of the Salmon River community, you want to know how this issue affects you and want to make sure that the final decision serves your best interests. Choose one of the following roles, working together with others in this group to make sure that each person is representing a different role. **Use the following profiles and provided resources to formulate a clear viewpoint for your character (you may be pro, con, or undecided).**

**Seafood restaurant owner:** Your restaurant serves local seafood caught in the Salmon River, and you work with local fishermen to buy their catches fresh off the boat. How will the presence of woody debris help or harm the amount of local seafood you are able to buy? Will you be able to sustain your business?

*Start here:* [http://www.nmfs.noaa.gov/stories/2012/03/05\\_localocean\\_laura\\_anderson.html](http://www.nmfs.noaa.gov/stories/2012/03/05_localocean_laura_anderson.html)

**Environmentalist:** You are concerned about habitat, biodiversity, and pristine waterways. You may not know much specifically about woody debris, but you do know that it can serve as an important habitat for many different species.

*Start here:* <http://www.environmentoregon.org/>

**Reporter/Journalist:** While you may have your own opinions about this issue, you are mostly concerned with getting a good story. Ask stimulating and potentially antagonistic questions to get the conversation flowing in an interesting, exciting way.

*Start here:* <http://www.wikihow.com/Read-and-Speak-Like-a-TV-News-Reporter>

**Aspiring politician:** Are you a Republican or Democrat? What issues do you care about? And what stance will help you, as a potential candidate, to get the most votes? As somebody looking to appeal to the masses, you may choose to go with the majority opinion, or opt to speak out for your own opinions.

*Start here:* <http://goingpolitical.com/how-to-become-a-politician/>

**OSMB staff:** As the first point of contact with waterway users, Marine Board staff must be able to balance individuals' concerns about boating and environmental issues with the best decisions for the waterway as a whole— people AND wildlife. They rely on good relationships with Marine Patrol Officers and ODFW scientists to make these decisions. At meetings they may represent the interests of both boaters and other waterway users.

*Start here:* <http://www.oregon.gov/OSMB/>

**Birder/Wildlife viewer:** As an avid wildlife enthusiast you are most concerned with how the presence of woody debris affects birds, especially endangered or migratory species. Do some research to find out if woody debris provides habitat or other resources for birds or other animals.

*Start here:* <http://audubonportland.org/>

**Boat shop owner:** Your business is boaters, and for years you've done very well selling supplies and equipment to Salmon River boaters and fishermen. With woody debris obstructing part of the river, how will this affect you? Will it decrease boating and make you lose business, or increase fishing and actually help your profit margin?

*Start here:* <http://www.bloomberg.com/consumer-spending/2012-05-15/the-real-cost-of-owning-a-boat.html#slide2>

**You may also choose to invent your own character not on this list. If you do so, make sure that you do the necessary research to understand your character's perspectives, experiences, wants and needs.**

## Additional Resources

Woody Debris Fact Sheet: <http://www.ct.gov/deep/lib/deep/fishing/restoration/largewoodydebrisfactsheet.pdf>

Woody Debris Management 101: <http://www.hrwc.org/wp-content/uploads/2013/03/Clean-and-Open-Method.pdf>

King County, WA Woody Debris page—FAQs, procedures for considering public safety, “Living with Large Wood” poster: <http://www.kingcounty.gov/environment/watersheds/general-information/large-wood.aspx>

Root ball causes two drownings in the Willamette River: <http://registerguard.com/rg/news/local/33213262-75/man-drowns-in-river-near-springfield.html.csp>

What is “Natural Resource Management”? : <http://www.landlearnsw.org.au/production-chains/nrm>

The Ecosystem Management Approach: <http://www.snre.umich.edu/ecomgt/emapproach/whatisem.htm>

Tips for Performing Well in a Debate: <http://www.wikihow.com/Perform-Well-in-a-Debate>

Debating Matters Top Tips: <http://www.debatingmatters.com/getinvolved/toptips/>

Guide to a Public Forum Debate: <http://debate.uvm.edu/dcpdf/PFNFL.pdf>



*Image credit: Creative Commons*

**Juvenile salmon rest in a calm pool before continuing their long journey to the sea.**

### Oregon State Marine Board Boating Education Program

PO Box 14145  
Salem, OR 97309



***Serving Oregon's recreational boating public through education, enforcement, access, and environmental stewardship for a safe and enjoyable experience.***

**For more information please contact MariAnn McKenzie,  
Boating Safety Education Coordinator:**

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**We're on the Web!  
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# Boating Safety 101



Make sure all gear and people are balanced



Don't make sudden movements that could tip the boat over



Stay seated at all times when boat is in motion



If your boat does capsize, **STAY WITH IT!** Most boats will float even when upside-down. And a boat is much easier to spot by rescuers than a person!



For safety, everyone on board should wear a life jacket at all times — adults AND kids. Children 12 & under must wear one when the boat is in motion— it's the law!

**I PLEDGE TO USE THESE SAFE PRACTICES WHEN ON A BOAT.**

SIGNED: \_\_\_\_\_

**DID YOU KNOW?**  
Life jackets are available to borrow at many Oregon Waterways! For a list of sites, visit: [www.oregon.gov/osmb](http://www.oregon.gov/osmb)

Draw a picture of your family having a fun day on the water here!



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**1-10-1 Principle**—in cold water, you have *one minute* to get your breathing until control and calm yourself, *ten minutes* of meaningful movement, and *one hour* before you lose consciousness due to hypothermia.

**Acceleration**— in physics, is the rate of change of velocity of an object.

**Action and Reaction**—in every interaction, there is a pair of forces acting on interacting objects. Each reaction is in response to the initial action.

**Aeolipile**—also known as a “Hero’s Engine”, it is a simple bladeless steam turbine which spins when the central water container is heated. Torque is produced by steam jets exiting the turbine, much like a rocket engine.

**Anglers**—Men, women, or children who fish.

**Aquatic**—of or relating to water.

**Balanced and unbalanced forces**—If two individual forces are of equal magnitude and opposite direction, then the forces are said to be balanced. An object is said to be acted upon by an unbalanced force only when there is an individual force that is not being balanced by a force of equal magnitude and in the opposite direction.

**Ballast**—heavy material, such as gravel, iron, or water, placed low in a vessel to improve its stability.

**Biofouling**—the gradual accumulation of waterborne organisms on the surfaces of structures in water that contributes to corrosion of the structures and to a decrease in the efficiency of moving parts.

**Blubber**—The thick layer of fat between the skin and the muscle layers of whales and other marine mammals. It insulates the animal from heat loss and serves as a food reserve.

**Boat**—all watercraft used or capable of being used as a means of transportation on the water, including a seaplane on the water (not in flight) but NOT including boathouses, floating homes, air mattresses, beach and water toys, or single inner tubes.

**Booms**—a temporary floating barrier used to contain an oil spill and prevent it from reaching the shoreline. Booms help to concentrate oil in thicker surface layers so that skimmers, vacuums, or other collection methods can be used more effectively.

**Buoyancy**—the ability or tendency to float in water or air or some other fluid.

**Capsize**—to overturn in the water.

**Catch limits**—also known as bag limits; laws imposed on fishermen restricting the number of animals within a specific species or group of species they may kill and keep. Size limits and fishing seasons sometimes accompany catch limits.

**Chemical dispersants**— a common tool used after oil spills to break up oil slicks on the water surface into smaller particles and increase the oil's rate of degradation by wind or wave action.

**Cold water immersion**—When one’s body completely enters cold water. The definition of cold water is

variable. For practical purposes, significant risk of hypothermia usually begins in water colder than 77° F.

**Density**—the degree of compactness of a substance.

**Deposition**—the geological process in which sediments, soil and rocks are added to a landform or land mass. Wind, ice, and water, as well as sediment flowing via gravity, transport previously eroded sediment, which, at the loss of enough kinetic energy in the fluid, is deposited, building up layers of sediment.

**Drought**—a prolonged period of abnormally low rainfall; a shortage of water resulting from this.

**Equilibrium**—a state in which opposing forces or influences are balanced.

**Erosion**—A type of weathering in which surface soil and rock are worn away through the action of glaciers, water, or wind.

**Force**— In physics, something that causes a change in the motion of an object.

**Friction**—the resistance that one surface or object encounters when moving over another.

**Habitat**—the natural home or environment of an animal, plant, or other organism.

**Hydrologic cycle**—the storage and movement of water between the *biosphere* (the regions of Earth occupied by living organisms), *atmosphere* (the blanket of gases surrounding the Earth), *lithosphere* (the rigid outer part of the earth, consisting of the crust and upper mantle), and the *hydrosphere* (all the waters on the earth's surface, such as lakes and seas).

**Hyperventilation**—a condition characterized by abnormally prolonged and rapid breathing, resulting in decreased carbon dioxide levels and increased oxygen levels that produce faintness, tingling of the fingers and toes, and, if continued, alkalosis and loss of consciousness.

**Hypothermia**—a medical emergency that occurs when your body loses heat faster than it can produce heat, causing a dangerously low body temperature.

**Incapacitation**—occurs within 5 – 15 minutes in cold water. Vasoconstriction decreases blood flow to the extremities in an effort to preserve heat in the core, thereby protecting the vital organs but allowing the periphery to cool. Within this critical time frame you will lose meaningful movement in your hands and feet, and then your arms and legs.

**Inertia**—a tendency to do nothing or to remain unchanged.

**Invasive species**—an organism (plant, animal, fungus, or bacterium) that is not native and has negative effects on our economy, our environment, or our health.

**Involuntary reaction**—there are two types of involuntary reactions, *autonomic* and *reflex*. The autonomic nervous system controls the body's internal environment without conscious intervention and helps to regulate vital functions. A reflex is an involuntary response to a stimulus, such as withdrawing your hand from a hot surface before you become aware of the heat.

**Irrigation**— is the watering of land to make it ready for agriculture.

**List**—a nautical term for when a boat tilts towards one side.



**Marine mammals**—a diverse group of species including whales, polar bears, dolphins, and otters that rely on the ocean for their existence. All of these species have the five characteristics of mammals: they are warm-blooded, have hair or fur, give birth to live young, nourish their young with mother’s milk, and breathe air.

**Mass**—a measure of the number of atoms in an object. The basic unit of measurement for *mass* is the kilogram.

**Mitigation**—The elimination or reduction of the frequency, magnitude, or severity of exposure to risks; the minimization of the potential impact of a threat or warning.

**Morphology**—the shapes of river and stream channels and how they change over time.

**Native species**—an organism (plant, animal, fungus, or bacterium) that is naturally found in a region. These can be either endemic (found only within a particular region) or indigenous (found both within the region and elsewhere).

**Natural resources**—anything that people can use which comes from nature. People do not make natural resources, but gather them from the earth. Examples are air, water, wood, oil, wind energy, hydro-electric energy, iron, and coal.

**Newton’s First Law**—every object will remain at rest or in uniform motion in a straight line unless compelled to change its state by the action of an external force.

**Newton’s Second Law**—The acceleration of an object as produced by a force is directly proportional to the magnitude of the force, in the same direction as the force, and inversely proportional to the mass of the object.

**Newton’s Third Law**—For every action, there is an equal and opposite reaction. The statement means that the size of the forces on the first object equals the size of the force on the second object.

**Non-point source pollution**—water and air pollution from many diffuse and sometimes unknown sources.

**Oil skimmers**—a machine that separates a liquid from particles floating on it or from another liquid, such as oil.

**Organic materials**—matter composed of organic compounds that has come from the remains of organisms such as plants and animals and their waste products in the environment.

**Overfishing**—a non-sustainable use of aquatic or marine resources in which the supply of fish and other animals is depleted or exhausted.

**Plankton**—small and microscopic organisms drifting or floating in the sea or fresh water, consisting chiefly of tiny plants and algae, small crustaceans, and the eggs and larval stages of larger animals.

**PFD**—Personal Flotation Device

**Point source pollution**— a single identifiable source of air, water, noise or light pollution.

**Porous**—having minute spaces or holes through which liquid or air may pass.

**Reservoir**—a large natural or artificial lake used as a source of water supply.

**Resource manager**—a person who develops conservation and rehabilitation plans for nature reserves, land, rivers, and other natural resources, so that people can use these resources in an ecologically sustainable way.

**Shock**—lasts for only about a minute after entering the water and refers to the effect that cold water has on your breathing. Initially, there is an automatic gasp reflex in response to rapid skin cooling; this can lead to hyperventilation. If the head goes underwater, water may be breathed into the lungs during the gasp.

**Slicks**—a film or layer of oil floating on an expanse of water, especially one that has leaked or been discharged from a ship.

**Stakeholders**—people who can affect, be affected by, or have personal interest in an issue.

**Strainer**—a common river hazard consisting of sticks or branches. Water passes through these but solid objects like boats or people do not, similar to a kitchen strainer. Even boaters wearing life jackets can drown if they are washed into a strainer, because they can get trapped underwater against the branches by tons of water pressure.

**Sustainable**—capable of being maintained at a steady level without exhausting natural resources or causing severe ecological damage.

**Town Hall Meeting**—an informal public meeting at which community members discuss issues and concerns.

**Vectors**—a pathway by which non-native species are transported or carried to new environments. This can include currents, boats, humans, or other organisms.

**Volume**—the amount of space that a substance or object occupies, or that is enclosed within a container.

**Water scarcity**—the lack of sufficient available water resources to meet the demands of water usage within a region.

**Woody debris**—large wood that falls into a stream or river, including logs, branches, and root balls. This debris can cause dangerous hazards in rivers for boaters.

**Oregon State Marine Board  
Boating Education Program**

PO Box 14145  
Salem, OR 97309



***Serving Oregon's recreational boating public through education, enforcement, access, and environmental stewardship for a safe and enjoyable experience.***

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