

# First Come, First Served

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**Suggested grade level:**  
6-12

**Subject Areas:** Environmental Science, Math, History/Anthropology, Economics, Government

**Activity Time<sup>1</sup>:**  
Prep time: 15 minutes  
Activity time: 45-60 minutes

**Setting:** Classroom

**Purpose:** To have students better understand the division of water within their watershed and to learn about water rights.

**Summary:** Students role-play various scenarios of competing water use as they learn about water rights and the principles of how water is "allocated" or divided in the Bear River Watershed.

**Objectives:** Students will:

- Learn the basic principles of prior appropriation and beneficial use;
- Role-play to demonstrate how water is allocated through prior appropriation;
- Evaluate current water management practices;
- Develop solutions to water management challenges such as drought;
- Analyze their individual and collective water-use values.



**Materials:**

- Copies of the *First Come, First Served Water User Cards* (1 classroom set)
- *Water Unit Squares* (2" x 2" squares of blue paper, 1 set of 87 squares)
- Copies of the *First Come, First Served Action Cards* (1 classroom set)
- Sticky notes (3 per student)

## Teacher Background

Two basic principles underlie western water law in the United States: prior appropriation and beneficial use. The prior appropriation system, originally developed by miners in California, was adopted by nine arid western states, including Utah, Idaho, and Wyoming. Under prior appropriation a water right is obtained by diverting water and putting it to a **beneficial use**. Historically, beneficial use applied to domestic, municipal, agricultural, or industrial uses, but

more recently has been expanded to include recreational and wildlife uses. A person whose **appropriation** is “first in time” has a right senior to one who later obtains a water right. In times of water shortages, **senior rights** must be fully satisfied before **junior rights** are met, sometimes resulting in juniors receiving no water at all. If water is not deemed to be put to beneficial use for a certain length of time, the owner of the water right may lose his/her right.

Water in the Bear River Watershed is allocated based on this system of prior appropriation and beneficial use. Myers' irrigation canal, with an 1862 water right, claims the earliest water right priority on the Bear River and also in the State of Wyoming. Other early water rights in the Basin are in the Bear River Canal Company in the Lower Bear River Valley (i.e., Box Elder County), and water users in both Cache and Bear Lake Valleys, whose water rights also date back to the early 1860s. These users, therefore, hold the earliest and most senior water rights.



Because the primary use of water in the Bear River Basin has always been for irrigation, the river has been managed to ensure the delivery of irrigation water to the various users. To guarantee a dependable supply of irrigation water, especially for late-season irrigation, water managers needed to develop reservoirs throughout the basin for storage, which established Bear Lake as an irrigation reserve. In 1898, diverting water from Bear River to Bear Lake was considered a viable solution to overly abundant natural flows in the early summer followed by late summer low flows, inadequate for irrigation. In 1902, Telluride Power Company (later called Utah Power

and Light) constructed the inlet and outlet canals in an effort to divert Bear River water into the lake for release during the agricultural growing season, a concept initiated by irrigators in Box Elder County. The Lifton Pumping Station, located at the north end of the lake, was constructed in 1914 to pump water from Bear Lake into the outlet canal. These modifications to the natural river system have helped create an active storage capacity of 1.4 million acre-feet in Bear Lake and allowed managers to regulate flow of the river.

The Bear River Compact has helped to redefine and regulate how Bear River water and storage in Bear Lake is managed. Specifically, it is an agreement between Utah, Wyoming and Idaho, that designates how the waters of the river are to be allocated or divided among the three states.

Only about 40% of the Bear River’s total flow is allocated for different beneficial uses for different users. The remaining water in the river enters the Great Salt Lake, a portion of which will be diverted to new water users. Utah in particular is planning to develop its portion of developable flow of approximately 220,000 acre-feet. (See the **Bear River Compact and Bear River Development in Utah** in Part 1 of the activity guide.)

## Procedure

### *Teacher Preparation:*

1. **Cut several sheets of blue construction paper into small squares (approximately 2” x 2”).** These are the *Water Unit Squares*, each representing 100 cfs of water from the river. You will need to make enough so that all of the *Water User Cards* can have their allocations met, plus about ten extra water units (about 87 squares).
2. **Divide students into 10 groups. Make 1 copy of the *First Come, First Served Water User Cards*.** Cut the cards out and place them in a hat or bag from which one student from each group will be able to draw. Remember, one card per group!
3. **Make one copy of the *First Come, First Served Action Cards* and cut the cards out.** Keep them separate to give to the Water Commissioner and to new water users.

### *Warm Up:*

1. **Tell the students that water rights in the Bear River Watershed dictate who gets water in what amount, and water is allocated based on the idea of “first in time, first in right.”** Describe the analogy of standing in lunch line and how it relates to the idea of “first in time, first in right.” The person who is in the front of the lunch line fills his or her plate first. The person who arrived last can fill his or her plate only if there is food left after all the other people in line have filled their plates. In western water law, water is allocated in a similar way and is referred to as the doctrine of prior appropriation. Water users that developed uses for water first retain “senior” rights. For example, a farmer that began using Bear River water in 1860 will have rights that are senior to a farmer that began using Bear River water in 1900.
2. **Ask students to list what they think are beneficial uses of water.** Are all these water uses beneficial? For example, is filling a swimming pool as important as providing water for drinking? What if the first person in line at a punch bowl uses half of his/her drink to cool down? Is that fair to the other water users? To address this problem, water laws dictate that water must be put to beneficial use. Beneficial uses include drinking, watering crops, cooling industrial machinery, recreation, and instream use.
3. **Make sure students understand that meaning of the term cfs (cubic feet per second).** For simplicity, the amount of water withdrawn by each user is measured using cfs. Cubic feet per second are used to measure water in motion. (For additional information, see the **Common Units of Water Measurements** table in Part 1 of the activity guide.)

*The Activity:*

- 1. Divide your class into 10 groups. Each group will represent one water user. Assign one student to be the Water Commissioner. Tell the rest of the student groups that each group is going to play a role in the following water rights game.**
- 2. Have one student from each group (except the Water Commissioner) draw a *Water User Card* from the hat or bag.**
- 3. Tell the groups that each water user card has a “priority number” based on when their water right was established and a “type of use” classification.** The “priority number” will be used when water (represented by the *Water Unit Squares*) is allocated based on prior appropriation. The group with priority #1 has the most senior water right (the oldest water right); the group who drew the highest number (#10) has the most junior water right.
- 4. Have each group read their card to determine their role, priority, type of use, and amount of water to which they are entitled.** Remind the students that these are fictitious water users, but are similar to actual water users in the Bear River Watershed. Once students are done reading their cards to themselves, go around the room and have students introduce who they represent and their priority number.
- 5. Round 1 (a year with sufficient streamflow):** Explain that each blue *Water Unit Square* represents 100 cfs. For the first round, make sure that there are enough *Water Unit Squares* to satisfy the allocation of each water user (represented by each group) plus ten extra squares (87 squares total). The extra squares represent water that remains in the stream.
- 6. Spread the blue *Water Unit Squares* on the floor to represent the river.** Tell students that they will first allocate the “water” according to the law of prior appropriation.
- 7. Have one student from each group collect the number of squares to which they are entitled, according to their *Water User Card*.** Water users should take turns according to prior appropriation. (Water users with senior water rights [lowest priority number] should go first.) When students come up to get their water, have them introduce themselves to the rest of the class (i.e., who they represent and how much water they have a right to.) Two hundred cfs is represented by two squares; three hundred is represented by three squares and so on.
- 8. Ask students what they think of the water rights system so far.** Does everyone feel that he or she is satisfied? Does it seem fair?

9. **Round 2 (a drought year):** Have students return all of their *Water Unit Squares* to the river, then have the Water Commissioner read the *Drought Card* aloud. The Water Commissioner should remove about half of the *Water Unit Squares* from the river.
10. **Repeat step 7.** This time there will not be enough water in the river to satisfy all of the water users, and the junior users will have to go without water while the senior users receive their full entitlements. Do they feel this is fair? Which water users are left without all the water they require?
11. **Explain that the number of water users are constantly changing.** To demonstrate, remove three students from three different groups. Give each of these students *Action Cards 1, 2, or 3*. Each *Action Card* represents a new demand for the water.
12. **Have the Water Commissioner replace all the *Water Unit Squares*.**
13. **Round 3 (new water uses): Incorporating the three new action cards, repeat step 7.** In the case that the priority numbers on the Action Cards are the same as those on the original User Cards, students should gather their water squares at the same time. Is there enough water for all users? If not, which ones will go without water under the allocation system? Discuss how the addition of new users affects old users.

*Wrap Up:*

1. **Have students discuss the activity.** What are some of the impacts of the entire river being allocated? How might water be divided if there were no formal allocation system?
2. **Have students discuss how seasonal fluctuations in river flow may affect the distribution of water in the Bear River Watershed.** There is plenty of water in the early spring from spring snowmelt, but flows diminish in the late summer. What are some creative solutions to address this issue? (E.g., use more efficient irrigation systems, plant less water intensive crops, rest croplands, etc.)
3. **Ask students to develop a list of water uses that weren't included in the game (e.g. boating, hunting, transportation, etc.).** Ask them to consider non-human water uses such as use by plants, animals, ecosystems, etc.
4. **Have the students write their own lists of water uses that they regard as "beneficial."** Have them rank their lists in order of the uses they value from highest to lowest.
5. **Pass out three sticky notes to each student. Have students write their top three water uses on the sticky notes (one use per note).**

- 6. Make three blank graphs (X- and Y-axes) on the board, large enough so that each sticky note can be one unit on the Y-axis.** Label the graphs #1, #2, and #3.
- 7. Label the X-axes with the eight major water users (Urban, Recreation, Earth Systems, Energy, Business and Industry, Rural Agriculture, Fish and Wildlife, Native Cultures).**
- 8. Have students come up to the board and place their sticky notes on the graphs.** Their #1 water use should go on the graph labeled #1 and so on. If their water use is more specific than the eight categories, they should choose the category that they think it best fits (for example, “boating” could go into recreation; “fishing” could go into business and industry, recreation, or fish and wildlife).
- 9. When all of the students have placed their sticky notes on the graphs, you will have a visual representation of the class’s water use values.** Discuss the results. How can the needs and values of human and non-human water users be recognized and met? Do students think their water-use values are different than those listed as beneficial uses?

### Assessment

Have students:

- Demonstrate how water shortages affect water users differently according to their ranking under prior appropriation;
- Discuss the pros and cons of our water allocation systems;
- Describe how seasonal changes in water flows may affect all users of water.

### Extensions

- Have the students write their own water user cards and action cards using actual water users, priority dates, and amounts allocated for local water users in their community. They will have to identify several major water users and do research to find out the pertinent facts and figures. Then, have the class repeat the game using these actual water users or teach it to another class.
- Combine this activity with the Watershed Management activity in Stream Side Science.

## Resources

Project WET (Water Education for Teachers). 2005. *Discover a Watershed: The Colorado Educator's Guide*. Bozeman, MT: The Project WET International Foundation.

Utah Division of Water Resources. 2004. *Bear River Basin: Planning for the Future*. Salt Lake City: State of Utah, Natural Resource, Division of Water Resources.

Utah Division of Water Resources. 1999. *Bear River Development*. Salt Lake City: State of Utah, Natural Resource, Division of Water Resources.

## e-Links

Bear River Watershed Information System

<http://bearriverinfo.org>

History of the Bear River Compact

<http://waterrights.utah.gov/techinfo/bearrivc/history.html>

Idaho Department of Environmental Quality

<http://www.deq.state.id.us/>

Project WET (Water Education for Teachers)

Publications, products, and programs for students, teachers, agencies, and citizens.

[www.projectwet.org](http://www.projectwet.org)

Utah Division of Water Quality

Information about beneficial uses in Utah

<http://www.waterquality.utah.gov/>

Utah Division of Water Rights History of the Bear River Compact

<http://waterrights.utah.gov/techinfo/bearrivc/history.html>

Wyoming Division of Environmental Quality, Water Quality Division

<http://deq.state.wy.us/wqd/>

Activity 4: First Come, First Served  
Water User Cards

Water User: Bare Lake Compact  
Priority Number: **1**  
Type of Use: Interstate treaty

Your state and two other states, which share the watershed, signed an interstate treaty in 1953 that guarantees a water right of **2500 cfs** per day to establish an irrigation reserve in Bare Lake. Although there are older water rights on the river, the treaty holds the highest priority and must be satisfied before all other water users receive their water.

Water User: Blue Water Ranch and Canal  
Priority Number: **2**  
Type of Use: Agriculture

Blue Water Ranch and Canal in Wyoming provides water to farmers for more than 200,000 acres of croplands. The water is used to grow vegetables, alfalfa, corn, and other products. Blue Water holds the first water right to the river, in 1862. The ranch has rights to divert **2000 cfs** per day.

Water User: Happy Valley Irrigation District  
Priority Number: **3**  
Type of Use: Agriculture

Happy Valley Irrigation District (HVID) has the right to divert **700 cfs** per day to deliver to its shareholders (local farmers, homeowners, and commercial users) for irrigating and landscaping. HVID has been an important part of the local economy since its establishment in 1897.

Water User: Flying B Ranch  
Priority Number: **4**  
Type of Use: Agriculture

The Flying B has been owned and operated by the Johnson family since it was first homesteaded in 1898. The ranch includes 11,000 acres, plus grazing allotments on public land. It produces beef cattle, hay, and winter wheat, using **200 cfs** per day.

Water User: Shady Grove  
Priority Number: **5**  
Type of Use: Industrial

This small town was founded by Mormon pioneers in 1901 and has historically been a farming community. Now the town has been discovered by tourists and retirees, and the town's economy is thriving on this new source of income. The town's water right entitles it to **600 cfs** per day from the river.

Activity 4: First Come, First Served  
Water User Cards

Water User: Pacific Power Company  
Priority Number: **6**  
Type of Use: Hydroelectric Power

The Pacific Power Company partnered with the federal government to build Race Dam in 1927, which produced hydroelectric power for thousands of customers in the region. In order to efficiently operate the dam's generating turbines, a minimum of **200 cfs** per day must flow through the dam at all times.

Water User: Narrows City  
Priority Number: **7**  
Type of Use: Drinking water

Narrows City started as a sleepy ranching town, but its population has exploded in the past thirty years. More than 50,000 people now call "home," with thousands more moving to the city and surrounding area every year. The city's original water right on the river is dated 1930, and it is entitled to **800 cfs** per day with this water right.

Water User: First Beef Company  
Priority Number: **8**  
Type of Use: Industrial

First Beef Company was established in 1979 and has one packing plant that is located near the river. The company is a major employer in its county and has a water right of **100 cfs** per day.

Water User: Front Range Water Authority  
Priority Number: **9**  
Type of Use: Drinking water

Front Range County, which is outside the boundaries of the watershed, has a large population and limited water supplies. In 1981, it established a water right on the river. The county diverts **500 cfs** per day to supplement groundwater supplies.

Water User: Migratory Birds National Wildlife Refuge  
Priority Number: **10**  
Type of Use: Natural Systems

This refuge was established in 1985 by order of Congress. The refuge has rights to **100 cfs** per day of instream flow to create habitat for white pelicans, blue heron, the snowy plover, egrets, and other migratory birds. Several endangered fishes also have habitat in this refuge.

**Action Card #1**

Priority Number: **8**

Type of Use: Natural Systems

Recent scientific studies have revealed that a native species of trout is in danger of extinction due to the increased water temperatures that result when the river's flow falls below 300 cfs. In order to stabilize the population as mandated by the Endangered Species Act, at least **300 cfs** per day minimum instream flow is required.

**Action Card #2**

Priority Number: **2**

Type of Use: Agricultural

The Northern Wasatch Indian Tribe's reservation encompasses approximately four hundred square miles of high desert sagebrush. Until recently, the tribe has not received agricultural water to which it is entitled. In the last five years, the tribe has waged successful legal battles to ensure delivery of its water allocation. The reservation was created in 1895, and is also the tribe's water right date based on a federal doctrine. The tribe has partnered with the state government to build the necessary water delivery infrastructure to serve the reservation and will now start withdrawing their full entitlement of **500 cfs** per day.

**Action Card #3**

Priority Number: **11**

Type of Use: Recreation

In one of the states in the watershed, recreational users (commercial rafting companies, kayakers, fishermen, and others) have united to lobby the state legislature to guarantee minimum instream flows. A bill has passed that requires **400 cfs** per day minimum instream flow for recreation, fish, and wildlife. However, this instream flow requirement is a junior water right to all previous water rights and will only come into play if there is sufficient water in the river.

**Drought Card**

The winter snowpack this year was only 50 percent of normal. More than 90 percent of the river's flow comes from snowmelt, so there is significantly less water in the river. Remove half of the **Water Unit Squares** from the river. This represents the lower snowpack, plus the additional loss of water from the river to evaporation and seepage into the dry soil.