

Managing AIS

AIS Impacts on Agriculture

Student Reading A (1 of 2)

Agriculture is an important industry in Montana. Wheat is Montana's leading cash crop, and the state ranks fourth among the wheat-producing states in the nation. Montana is ranked 11th in the U.S. for total hay production and ninth for alfalfa hay. Alfalfa and alfalfa-grass mixtures, produced on approximately 1.25 million acres across Montana, account for about 75 percent of the state's total. Montanans also produce barley, lentils, dry peas, sugar beets, and a variety of dry edible beans (source: www.farmflavor.com/montana).

Irrigation is the dominant commercial use of the state's water resources, accounting for 96 percent of all surface and ground water withdrawn for any purpose, about 11 million acre feet (an acre-foot of water is the amount that would cover an acre one foot deep). To irrigate is to water crops by bringing in water from rivers or lakes via pipes, canals, sprinklers, or other man-made means. In places that have don't get a lot of rain or they get rain only in some seasons, irrigation allows farmers to grow crops without relying on rainfall alone. In areas that have irregular precipitation, irrigation improves crop growth and quality. By allowing farmers to grow crops on a consistent schedule, irrigation also creates more reliable food supplies. (source: www.nationalgeographic.org/encyclopedia/irrigation). Irrigated agriculture is also an important component of the state's economy. It directly produces economic benefits by increasing the supply and/or value of some crops, and it generates jobs and income for many Montanans.

How could invasive mussels impact this part of Montana's economy? Invasive mussels can settle in and grow on canals and pipelines; clog irrigation pumps, screens, and head gates; and reduce pumping capacity.

The direct impact of invasive mussels to agriculture is estimated to be \$5.75 per acre foot or \$61 million per year (source: dnrc.mt.gov/divisions/cardd/docs/misac-docs/dnrc_econ_one_pager_final_0119.pdf)

Short PSA: <https://www.youtube.com/watch?v=9IpI9-zKD8Y>



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Student Reading A (2 of 2)

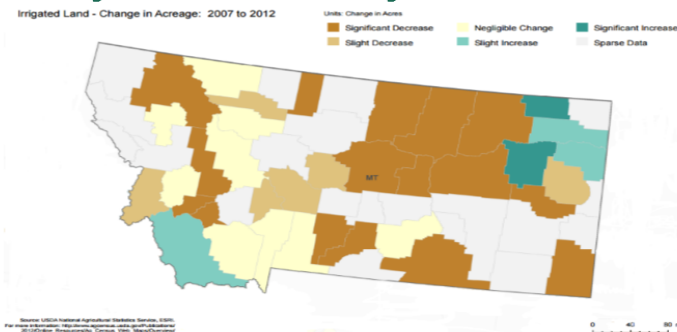


Irrigation and Montana Agriculture

The data provided by Montana producers lets us know what is produced in Montana using irrigation - from wheat to potatoes to sugar beets. NASS data help expand access to resources for Montana farmers to make business decisions and to diversify into new markets.

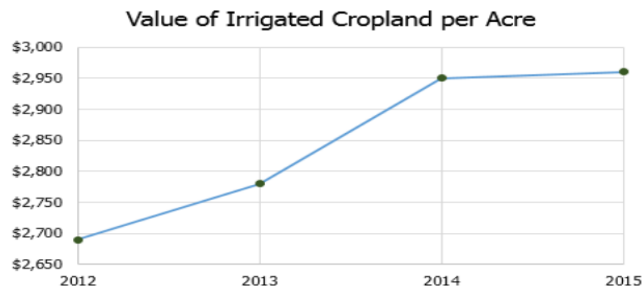
Montana's total number of irrigated acres in 2012 fell to 1,903,019 acres from 2,013,167 in 2007.

According to the 2012 U.S. Census of Agriculture.



Total value of irrigated cropland rose in 2015 to \$2,960.00 per acre.

An increase of \$10.00 per acre from 2014.



The cost to rent an acre of irrigated cropland in Treasure County, the most expensive county, was \$52.00 more than the state average for Montana in 2014.

Cost of Rent per Acre for Irrigated Cropland



United States Department of Agriculture
National Agricultural Statistics Service

Pondera County

The top county in Montana for producing winter wheat on irrigated land in 2014.

Pondera County produced 431,000 bushels of winter wheat on irrigated land in 2014.



Pondera County

The top county in Montana for producing spring wheat on irrigated land in 2014.

Pondera County produced 1,051,000 bushels of spring wheat on irrigated land in 2014.



Gallatin County

The top potato producing county in Montana in 2014.

Gallatin County seeded 4,400 acres of potatoes on principally irrigated land in 2014.



Richland County

The top sugar beet producing county in Montana in 2014.

Richland County planted 11,900 acres of sugar beets on principally irrigated land in 2014.



\$83.00

The average cost to rent an acre of irrigated cropland in Montana in 2015.

This average was \$2.00 per acre higher than 2014.



www.nass.usda.gov/mt
1-800-835-2612



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AIS Impacts on American Indian Communities

Student Reading B (1 of 2)

Salish Kootenai College Students (enrolled tribal members or first-generation descendants) - Jedd Tougas, Brianna Harris, Mike Durglo, Gail Crawford, Nathan Depoe

As a group, Noyce interns from Salish Kootenai College (listed above) sat down in July 2019 to discuss aquatic invasive species and invasive species in general. Below, you will find several takeaways from the discussion. We, the Noyce interns, would like you to remember that these are our individual opinions and that we do not speak for our tribes or all tribal members. All tribes and tribal members are unique, and views about aquatic invasive species and culture will vary. Below, you will find our thoughts on invasive species:

- We (everyone) need to be aware of aquatic invasive species and develop procedures, like checking for ticks after we come out of the woods, specific to aquatic invasive species such as checking equipment and personal items for invasive species.
- As Native people, we have knowledge about the places where we live; this knowledge is specific to the plants and animals that are in our area. When invasive plants or animals enter an area, they disturb the relationship between native plants and animals. This changes not only the characteristics of the habitat, but means that specific cultural resources may be harder to find.
- Because invasive species change the natural habitat, the connection between people and the land is altered.
- As invasive species move into an area, they can eliminate or shift the location of native plants and animals, making it difficult or sometimes impossible to rely on traditional areas of use. This alters the relationships that have been created and maintained through thousands of years of living in connection to the land.
- Controlling the spread of invasive species means that programs and procedures need to be developed to reduce the effect on local habitats, which, in turn, costs money and resources. The money and resources that are used for invasive species programs could be used for other programs, such as education or public health. The additional requirements of these programs can also place strain on the programs that are already in place.
- As the number of people utilizing resources on the reservation increases, we must also increase educational efforts to help all people understand the impacts of invasive species, both aquatic and terrestrial. An increase in tourism can be both good and bad, while additional money is nice, we also experience increased susceptibility to invasive species and disease, which endangers the biodiversity in those areas.
- Invasive species may alter the area to such a level that people no longer wish to visit the area for our natural resources, which would decrease the cultural and economic wealth of the community.
- In a future where invasive mussels are in Flathead Lake, the impact on the SKQ dam could be huge, the efficiency of the power generation would be reduced, and maintenance costs would increase.



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Student Reading B (2 of 2)

We, the SKC Noyce interns, would like to thank you for considering our thoughts on aquatic invasive species on the Flathead Reservation. It is evident from the takeaways that aquatic invasive species, and invasive species in general, have the potential to impact many areas of modern and traditional life. So, it is crucial that we remain aware of potential risks and lessen their chances of occurring.

Salish Kootenai College (<https://www.skc.edu/>) is a private Native American tribal college in Pablo, Montana. The mission of Salish Kootenai College is to provide quality post-secondary educational opportunities for Native Americans, locally and from throughout the United States. The Noyce foundation provides scholarship money for students interested in teaching careers.



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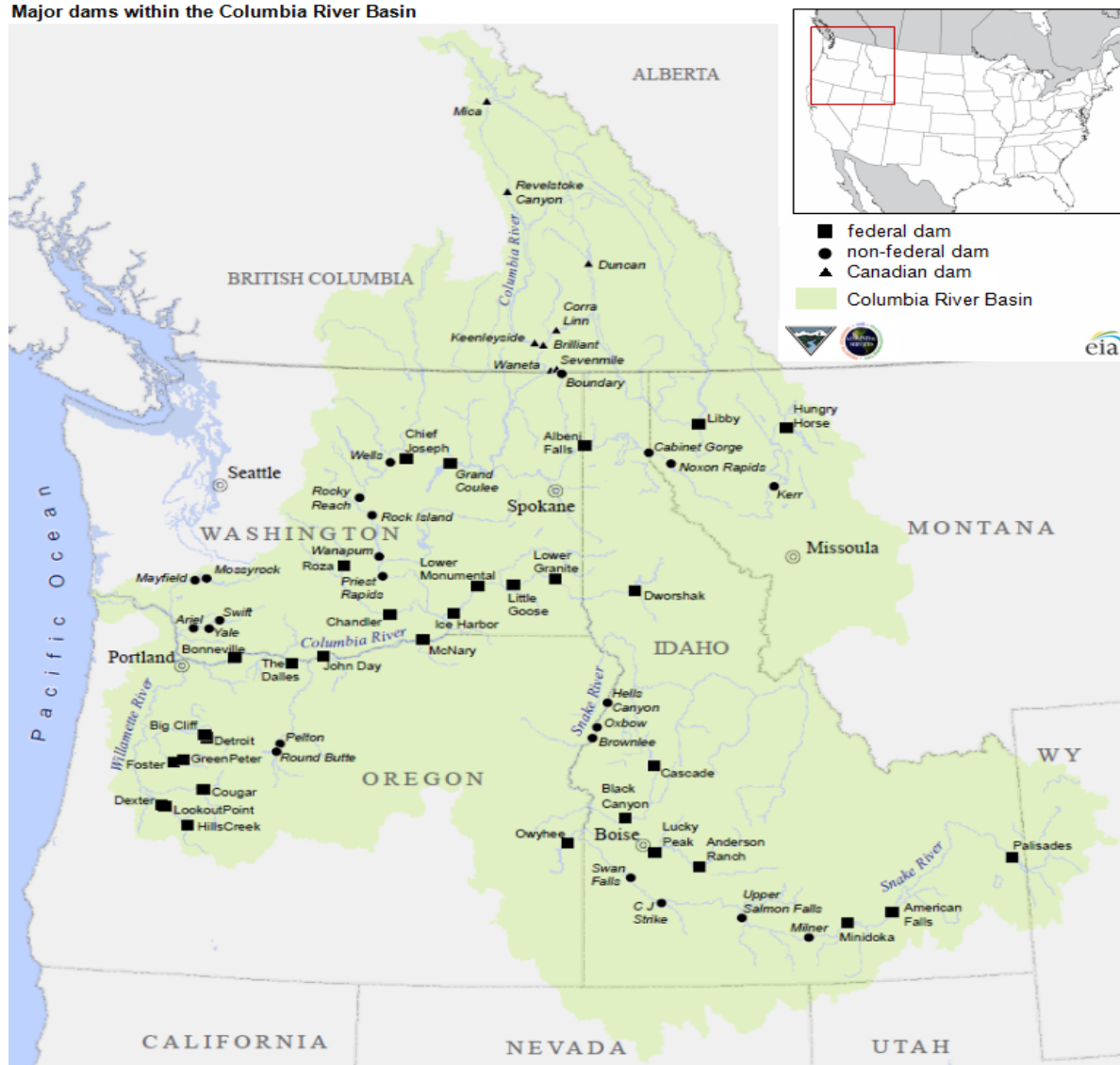


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AIS Impacts on Infrastructure: Electricity Generation Student Reading C (1 of 2)

Electricity generated by dams is an important clean and renewable energy source in the Columbia River Basin. Hydroelectric power plants located in the Columbia River Basin account for a little more than one third of all the hydroelectric capacity in the United States. The Columbia River runs from the Canadian Rockies and flows 1,214 miles through Idaho, Oregon, and Washington, but the river basin also includes parts of Montana, Nevada, Wyoming, and Utah. Hydroelectric power plants located on the river and its tributaries account for 29 gigawatts (GW) of hydroelectric generating capacity and contributed 44% of the total hydroelectric generation in the nation in 2012. Montana is the fifth largest producer of hydroelectric power in the nation, and six of Montana's ten largest generating plants produce hydropower (source: www.eia.gov).

Major dams within the Columbia River Basin



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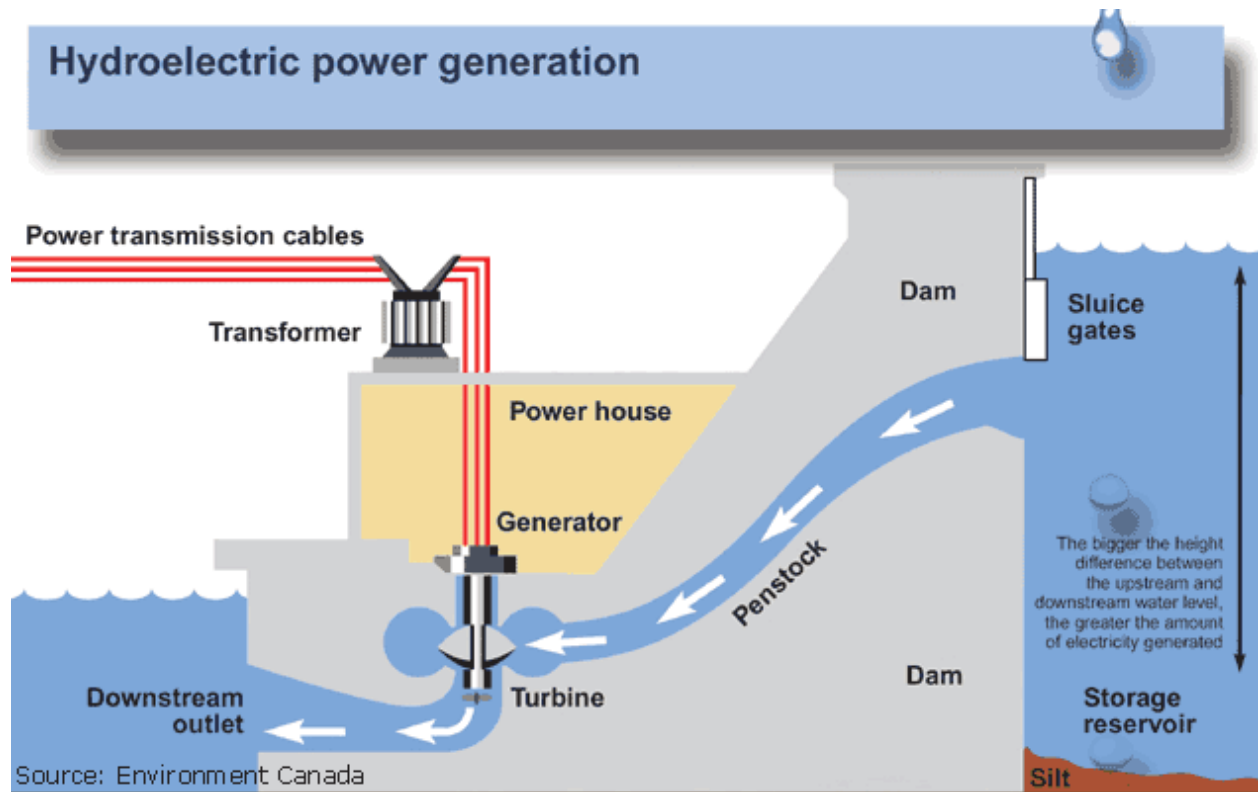
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Student Reading C (2 of 2)

How do we get electricity from water? The dam stores lots of water behind it in the reservoir. Near the bottom of the dam wall is the water intake. Gravity causes it to fall through the penstock inside the dam. At the end of the penstock, there is a turbine propeller which is turned by the moving water. The shaft from the turbine goes up into the generator, which produces the power. Power lines are connected to the generator that carry electricity to homes. The water continues past the propeller through the tailrace into the river past the dam (Source: www.usgs.gov).



How do aquatic Invasive species impact hydropower? In particular, zebra and quagga mussels can grow on intake structures, penstocks, gates and valves, and instrumentation, as well as clog pipeline used in the cooling water, fire protection, and drinking water systems, which requires the facility to be shut down and cleaned. It's not just hydropower that could be affected. Any facility that relies on using water from lakes or streams, such as thermoelectric power plants, industrial facilities, water treatment plants, mining operations, and households that supply their own water, are all susceptible to mussels. Any water intake structure, such as pipes and screens, can become restricted and clogged. This reduces how fast water can move through the system, and may even shut down operations.

The direct impact of invasive mussels to infrastructure in Montana is estimated to be \$47 million per year (source: dnrc.mt.gov/divisions/cardd/docs/misac-docs/dnrc_econ_one_pager_final_0119.pdf)

Short PSA videos: <https://www.youtube.com/watch?v=YvdqiBaUZao> and <https://www.youtube.com/watch?v=Wg3fzGkBsFw>



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AIS Impacts on Fishing

Student Reading D (1 of 2)

Have you ever been fishing in Montana? Do you have a favorite fishing hole or fishing lake? Fishing provided an important food source for many Native American tribes in Montana as well as early settlers to the region. Now, many people come to Montana just to fish in our lakes and streams. The state of Montana's tourism website (www.visitmt.com) invites anglers to visit Montana with these words: "Fishing in Montana is a dream come true. Wade into crystal clear lakes or pebble-filled trout streams. Cast your line in the Paradise Valley or on Flathead Lake, only two of many prized locations for anglers in Big Sky Country."

The Flathead Basin has 31 different species of fish living in its lakes and rivers. These fish include our important native species such as bull trout and westslope cutthroat trout. Many of the fishing guides around Flathead Lake take their clients on day-long fishing trips for the lake trout living in the cool, deep waters of Flathead Lake. Many other valuable native fish species live throughout Montana including white sturgeon, mountain whitefish, and grayling. Several non-native game fish were introduced into Montana to provide a variety of angling opportunities throughout the state.

In a recent poll, 87% of Montanans are outdoor recreation enthusiasts and 96% believe that the outdoor recreation economy is important to the economic future of the state (2018 MTOOR Economic Report). In 2017, anglers spent \$919.3 million fishing in the state. Montana Fish, Wildlife, and Parks estimates that people spend over 1 million "angler days" fishing in our lakes and reservoirs (an angler day is defined as the time spent fishing by one person for any part of a day).

Recreation is important to Montanans' quality of life and the local economy. It's also the reason many visitors come to the state. Invasive mussels can devastate Montana's premier fisheries—impacting tourism and recreational angling—and can damage boats, motors, and other recreational equipment. Additionally, infestation can make recreation difficult, as mussels can establish on docks, beachlines, boat ramps, and watercraft.

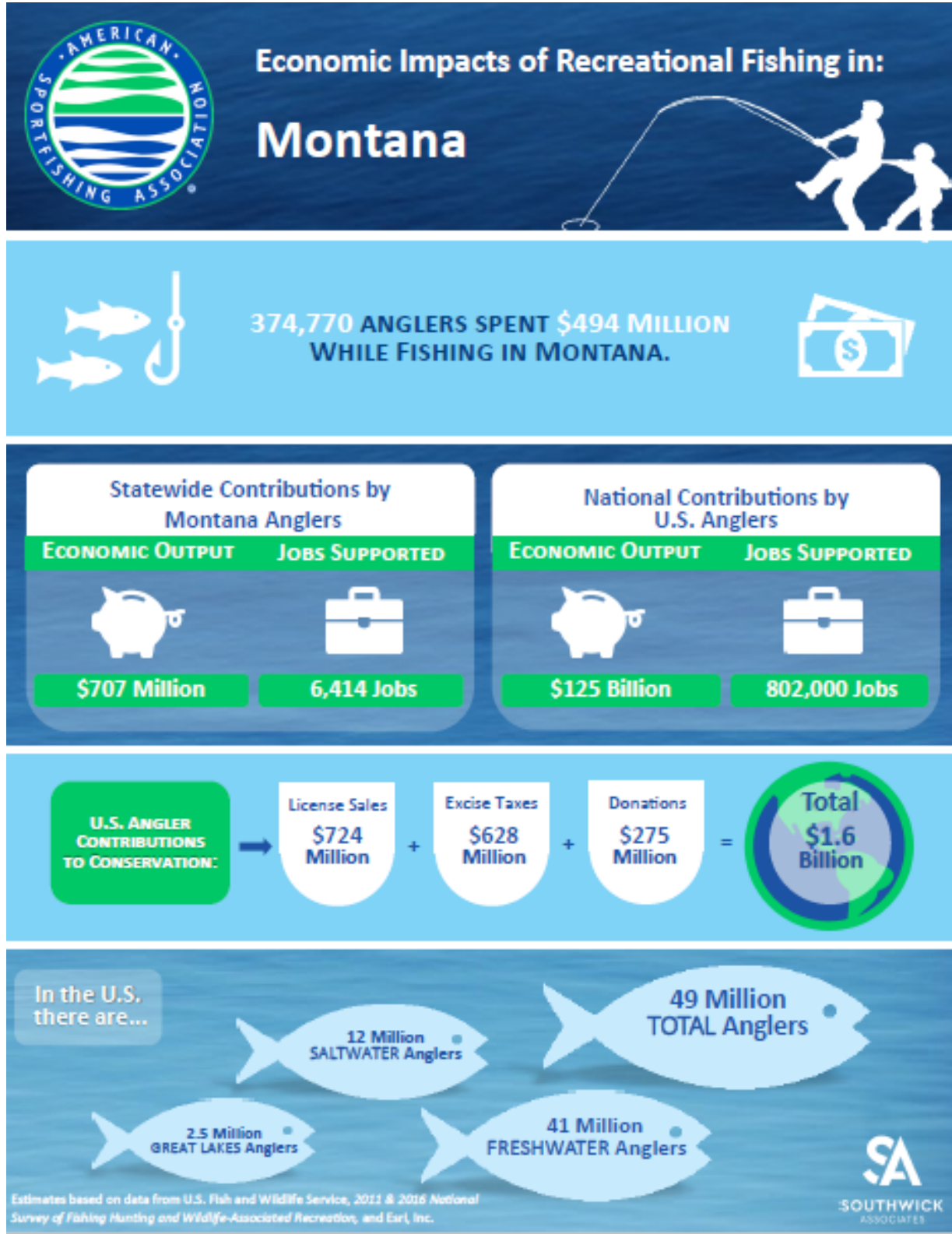
The direct impact of invasive mussels to recreation is estimated to be \$122 million per year (source: dnrc.mt.gov/divisions/cardd/docs/misac-docs/dnrc_econ_one_page_final_0119.pdf).

Short PSA video: <https://www.youtube.com/watch?v=HuNx6JG7Ji4>



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AIS Impacts on Homeowners

Student Reading E (1 of 2)

Montana is known for its natural beauty. Montanans and visitors alike enjoy the many and varied scenic views of mountains, canyons, river valleys, forests, grassy plains, and badlands. The western portion of the state has a lot of lakes and rivers providing ample opportunity for water-based recreation. Many people choose to make their home on or nearby a lake or a river because they enjoy the sights and outdoor opportunities these locations provide. Anyone who swims, fishes, or boats in rivers or lakes, or takes walks or lives along a shoreline in Montana can appreciate the value of clean water.

Invasive mussels threaten our enjoyment of the region's lakes and rivers. The invasive mussels multiply quickly, covering rocks and docks. Their razor sharp shells easily cut bare feet and skin. When the mussels die off, they wash ashore creating a deep carpet of shells and produce unpleasant smells.

Homeowners along a lake will experience these negative impacts directly, having to wear shoes walking along the beach or into the water where they once went barefoot. The layer of dead mussels may become so deep that the homeowner might have to pay to have the debris removed. The presence of invasive mussels may also reduce the value of their property. The decrease in lakeshore property values could potentially be as much as a half a billion dollars. In turn, local governments will also be harmed. Revenue from property taxes will decline in proportion to declines in property values with annual losses estimated to be \$4 million (source: dnrc.mt.gov/divisions/cadd/docs/misac-docs/dnrc_econ_one_pager_final_0119.pdf). Local governments rely on property tax revenue to pay for schools, repair roads, and provide emergency services like fire and police protection.

Short video: <https://www.youtube.com/watch?v=YZBZLjHa2Zc>



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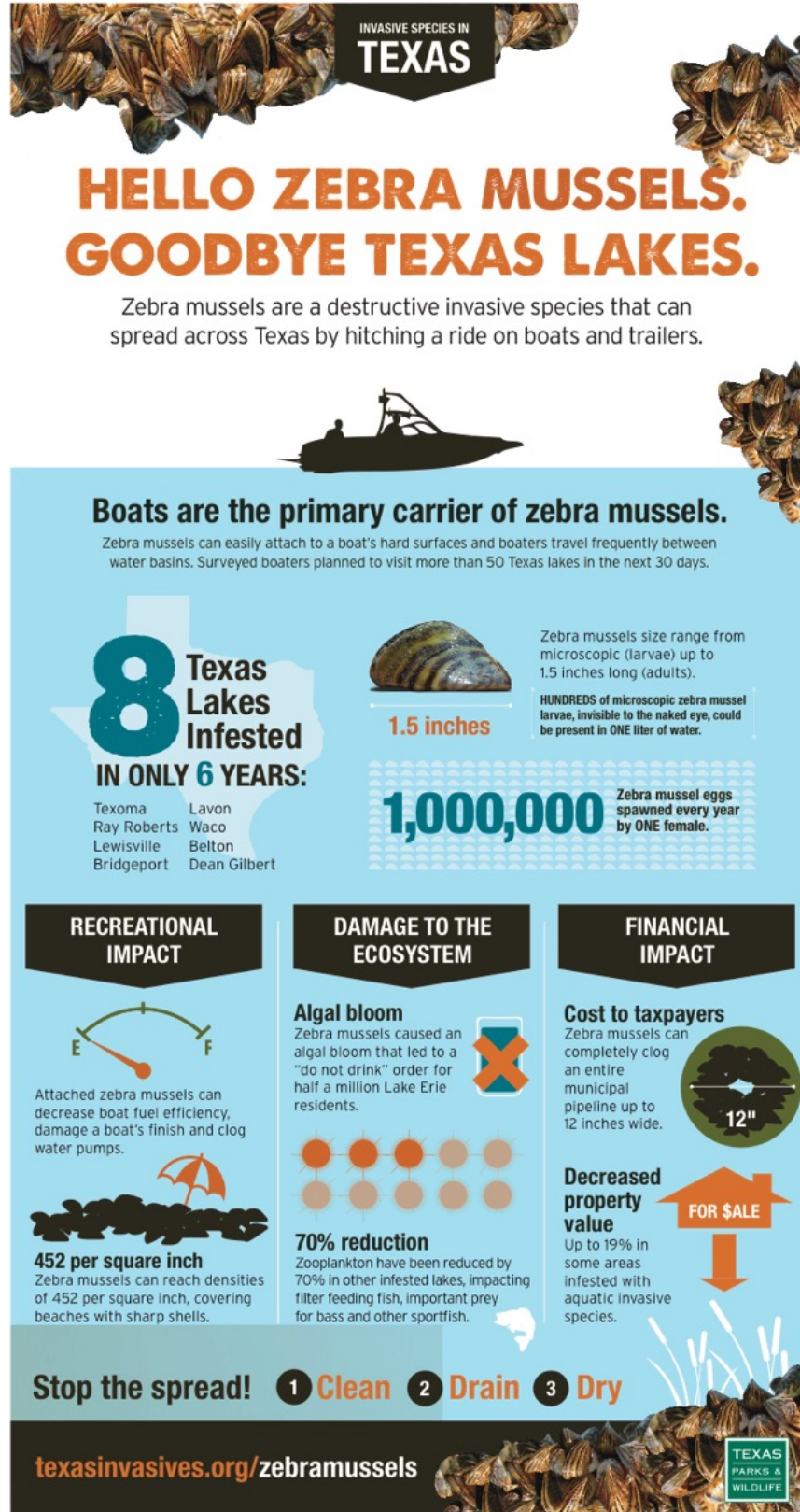
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Student Reading E (2 of 2)

Impacts of zebra mussels on another state can be seen in this infographic.



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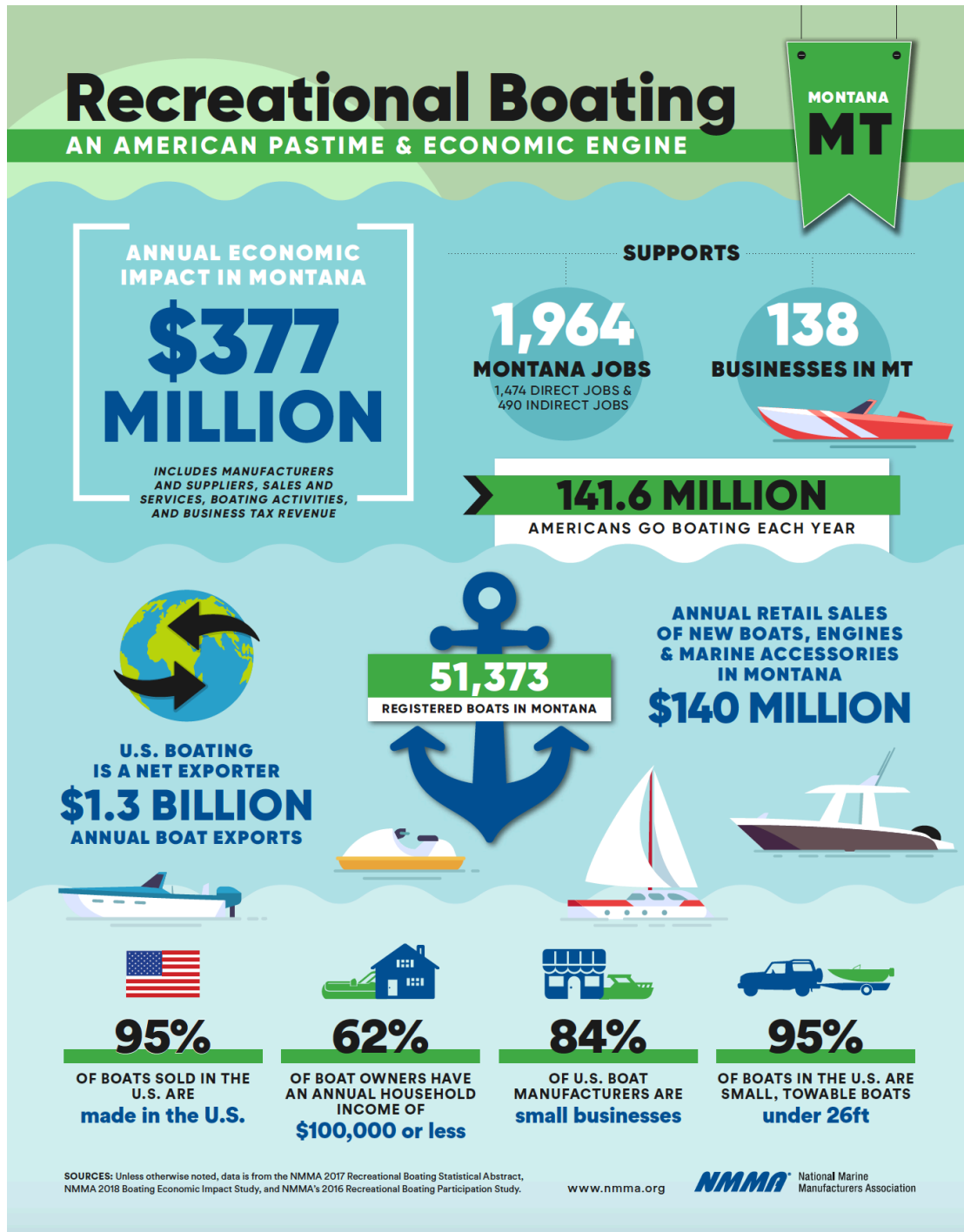


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AIS Impacts on Watercraft

Student Reading F (1 of 2)

Jet Skis, Paddleboards, Kayaks, Canoes, Motorboats, and Sailboats are all types of watercraft that Montanans and tourists use to enjoy the lakes around Montana. Millions of people go boating each year and contribute millions to local economies. Take a look at the information on Montana from National Marine Manufacturers Association. These numbers only include motorized watercraft and sailboats.



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Student Reading F (2 of 2)

All watercraft, both motorized and non-motorized, are required to stop at inspection stations in Montana. There are over 20 inspection stations along major highways into Montana, with many ringing the Flathead Basin and Columbia River Watershed. These stations are run by a variety of organizations including the Confederated Salish and Kootenai Tribes, the Blackfeet Nation, Missoula County, Glacier National Park, Bighorn National Recreation Area, and the Whitefish Lake Institute as well as Montana Fish, Wildlife, and Parks. In 2018, they inspected 109,000 watercraft and found 16 with zebra/quagga mussels and 170 transporting aquatic weeds (source: FWP Watercraft Inspection Station report 2018).

Recreation is important to Montanans' quality of life and the local economy. It's also the reason many visitors come to the state. Invasive mussels can devastate Montana's premier fisheries—impacting tourism and recreational angling—and can damage boats, motors, and other recreational equipment. Additionally, infestation can make recreation difficult, as mussels can establish on docks, beachlines, boat ramps, and watercraft.

The direct impact of invasive mussels to recreation is estimated to be \$122 million per year (source: dnrc.mt.gov/divisions/cadd/docs/misac-docs/dnrc_econ_one_pager_final_0119.pdf).

Short PSA Video: <https://www.youtube.com/watch?v=bFWStxjygbU>



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