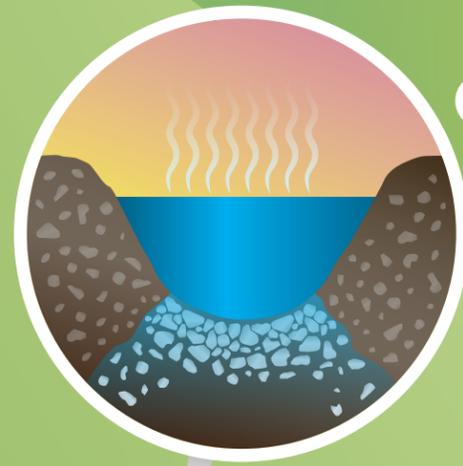


# Irrigation – Conventional Practices

Much of Oregon's irrigation infrastructure is over 100 years old. Though representing a significant part of the West's agricultural heritage, the old equipment is responsible for high operation and maintenance costs and significant liability risks in the form of flooding or accidental drownings. Open canals also lose water due to evaporation and seepage. Roughly 20–50 percent of the water never reaches its farmland destination, meaning less water is delivered to farmers during drought years and more water is diverted from the river. Old river diversions and fish screens can also cause problems for fish and the environment.



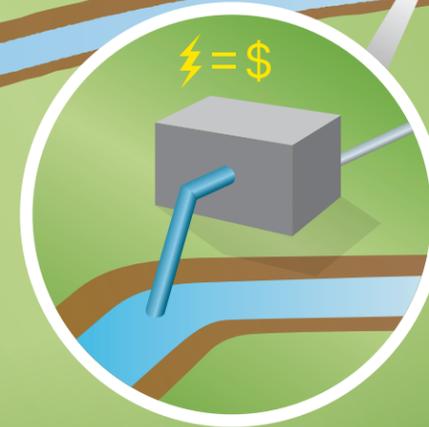
**1 Diversion Dam and Manual Headgate**  
Water is diverted from the river and filtered through a fish screen as it flows into an irrigation district's open canal. The amount of water that enters the canal is controlled manually by a headgate.



**2 Water Loss**  
Earthen canals lose 20–50 percent of diverted water through seepage and evaporation. During drought years neither farmers nor the river get as much water as they need. Open canals also create opportunities for contaminants to enter the water supply, affecting both farmers and water quality in rivers.



**4 Delivery On-farm**  
A wheel line disperses water to crops. Typical wheel lines lose 16 percent of their water due to leaks and another 14 percent due to worn or incorrectly sized nozzles. Farmers order water on a calendar schedule regardless of crop need. Irrigation district staff operate headgates throughout the district on a daily basis to move water between lateral canals so that it is available for use on schedule.



**3 Expensive Pumps and Manual Gates**  
Manually operated gates divert water from the main canal into laterals. Each farm is responsible for pumping water out of the lateral canal for watering crops. Pumping is energy intensive and expensive. The district has to divert extra water, called "end-spill," to ensure there is enough to flow past the last farm's pump.

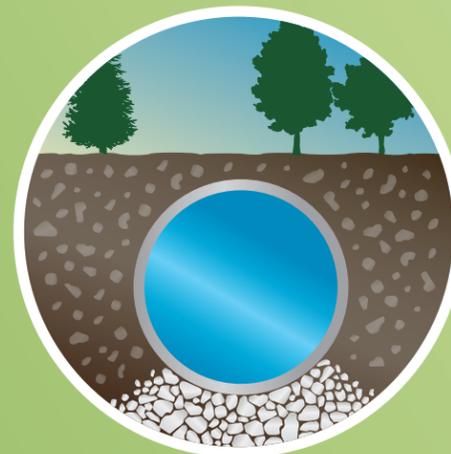
# Irrigation – Modernized Practices

Modernizing an irrigation system involves replacing open canals with pipes. Piping eliminates water losses and leaves more water for farmers and rivers. Pipes are pressurized by gravity or a central pumping station, reducing or eliminating the need for on-farm pumping and the associated maintenance and repair costs. Excess gravity pressure in a pipe can be harvested and sold as renewable, “in-conduit” hydroelectricity, creating a new revenue source for agricultural communities. Where needed, additional environmental improvements can be made at the river diversion and fish screen to allow fish to move freely up and down the river.



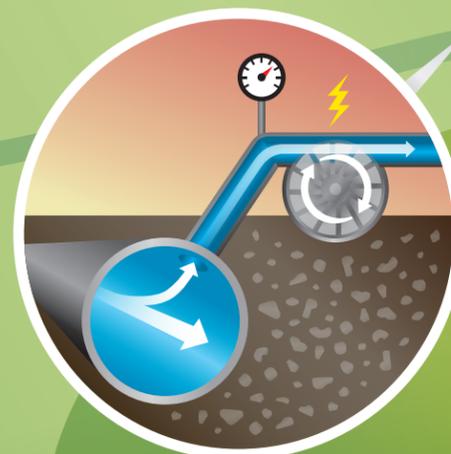
## 1 Improvements at the Diversion

Where appropriate, modifying or removing the dam allows fish to move freely up and down the river to spawn. Water is diverted with an automated headgate, through a fish screen and into a pipe, reducing operating expenses and increasing fish protection.



## 2 Underground Pipe

Open canals are replaced with an underground pipe, eliminating water loss due to seepage and evaporation. Piped water is pressurized by gravity or central pumping stations. Piping also ensures that contaminants do not enter the irrigation water.



## 3 Pressurized Water, Multiple Benefits

Secondary pipes carry water to farms. Automated valves maintain optimal water pressure. Pressurized water eliminates the need for costly, individual farm pumps. Excess gravity pressure at specific locations can be harnessed as in-conduit hydropower. A cap at the end of each pipe eliminates end-spills.



## 4 On-farm Improvements

At the farm, soil sensors determine when and how much to irrigate. Powered by water pressure, an automated, 90-percent efficient center-pivot system saves time and additional water.

