

Reducing Trout Losses From Irrigation Diversions

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Anglers, irrigators, and fisheries managers with the Wyoming Game and Fish Department have long recognized that trout are lost from rivers and streams each irrigation season. Depending on specific circumstances these losses can be substantial and include both wild and hatchery trout of all sizes.

The Problem

When water is diverted from streams to irrigation ditches, trout often follow the diverted flows and become "trapped" in the ditch. The problem is especially acute when a high percentage of existing stream flow is diverted into irrigation ditches (figure 1). This can occur during natural low flow periods when only a few ditches are diverting water or when flows are higher but

many ditches are diverting; the effect is the same.

In other parts of the country, various types of screens are used extensively and have proven effective at keeping salmon, steelhead, and trout from moving into irrigation ditches. However, screens are considered expensive, require some maintenance, and must periodically be replaced. Alternatives to screens such as electric barriers or special diversion designs are available, but these also have associated installation, maintenance, and operating costs.

How Irrigators Can Help

Studies conducted by the Wyoming Game and Fish Department and the Montana Department of Fish, Wildlife and Parks Department have

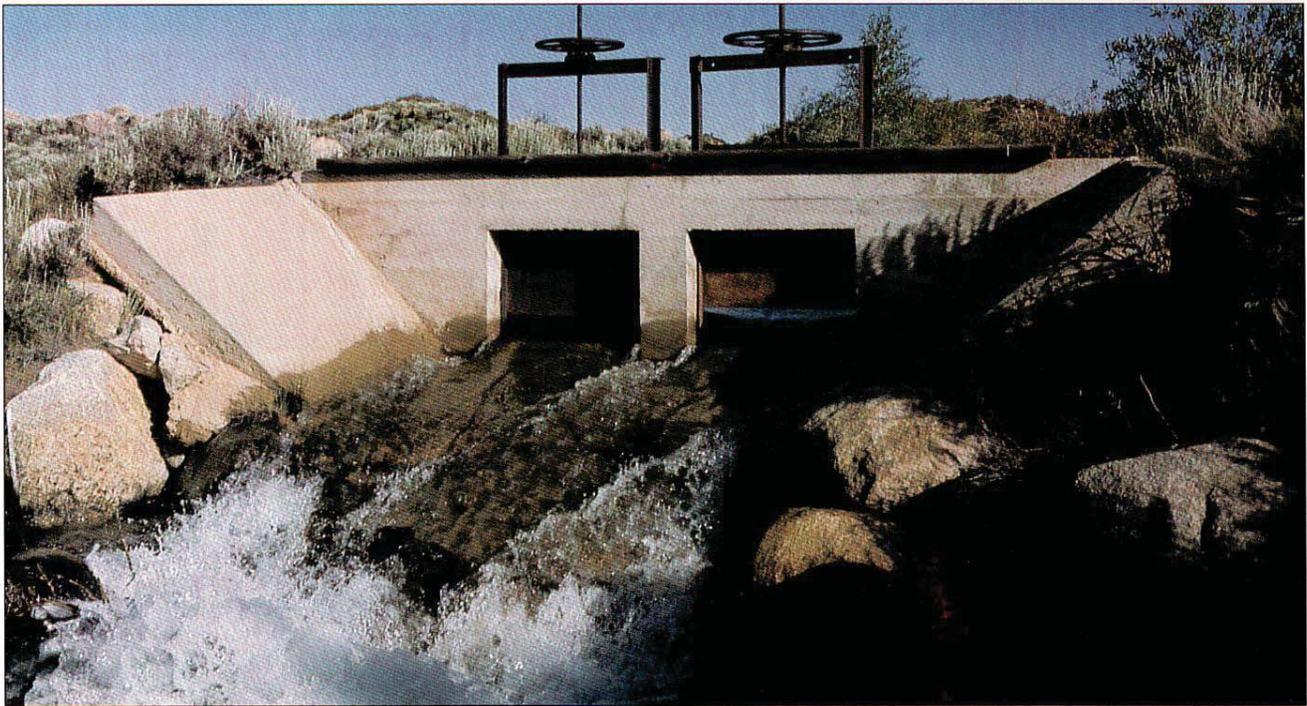
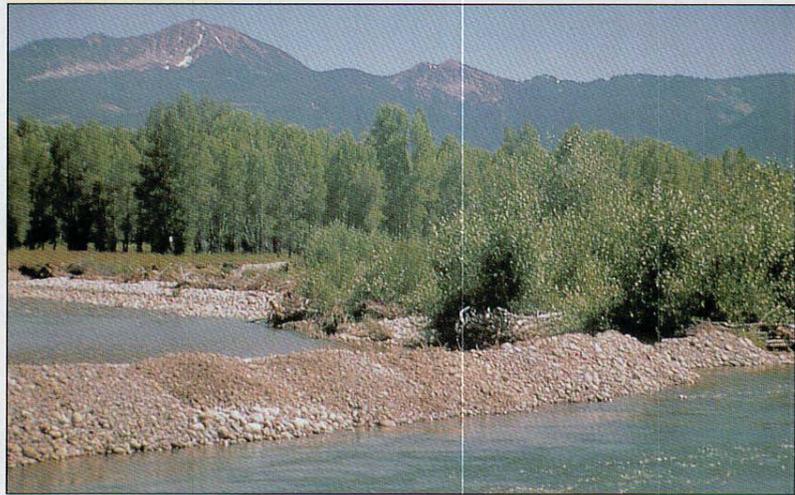


Figure 1. Irrigation diversions are a common sight in Wyoming, but depending on the situation, they can cause the loss of both wild and hatchery trout.

Habitat Extension Services



Figure 2. Open-channel diversions require removing equal portions of the berm diversion over a three day period ending with the removal of the final third of the berm and closure of the irrigation ditch.



shown that by gradually reducing flows in irrigation ditches trout could be induced to move out of the canals. This technique has recently been applied in southwest Montana and demonstrates that gradual headgate shutdown can save substantial numbers of trout that would surely have perished if flows in the ditches had been shut off suddenly. Irrigators who gradually shut down their headgates or diversions can save trout by giving them the time they need to return to the stream.

To help reduce the number of trout lost in diversions the Wyoming Game and Fish Department recommends that flows in irrigation ditches be reduced gradually by three equal increments at least three days before the headgate or diversion is completely closed. The gradual three-day shutdown period is based on studies that showed this to be the amount of time needed for the most trout to move up and out of an irrigation ditch.

Gradual flow reductions can be remarkably beneficial to trout and can be applied whenever the ditch is scheduled to be closed, or whenever conditions favor decreasing flows in a ditch or canal. For example, this technique could be used effectively before each cutting of hay or at the end of the irrigation season.

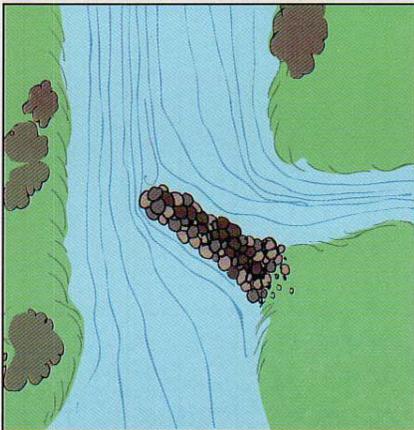
Here's How It Works

Although individual situations will vary, the basic goal is to reduce flows in the irrigation ditch by about one-third on successive days. The following examples illustrate how this can be accomplished with some common diversion setups.

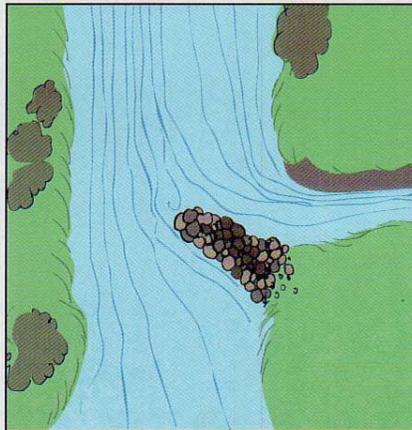
Open-Channel Diversions

For open-channel diversions irrigators can simply remove equal portions of the diversion over a three-day period (figure 2). On the first day, remove about one-third of the structure starting with the part of the diversion farthest away from the ditch (illustration 1). Follow the same procedure over the next two days until the diversion is completely removed and the ditch is closed.

DAY ONE



DAY TWO



DAY THREE

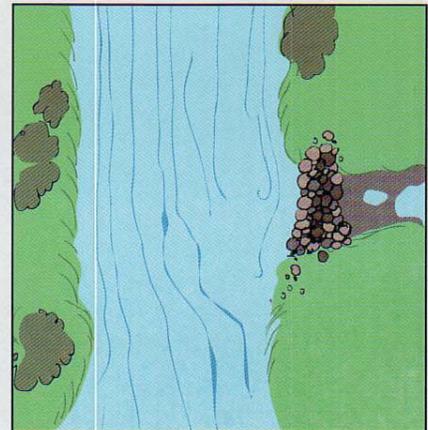


Illustration 1. To reduce flows in an open-channel diversion, remove about one-third of the instream structure on the first day, remove about one-half of the remaining structure on the second day, and eliminate the rest of the berm and close the mouth of irrigation ditch on the third day.



Figure 3. One way to reduce flows past twin headgates is to close one side completely on the first day, and then follow the procedure described for a single headgate for the other side. Alternatively, planks could be used to simultaneously reduce flows by one-third on both sides over two days, and on the third day, both headgates could be screwed down.

Screw-down Headgates

For screw-down headgates (illustration 2), a board can be placed **vertically** over the diversion on the first day to reduce flows by one-third. On the second day, another board can be placed over the diversion to reduce flows by another one-third, and on the third day the headgate can be shut down completely. Boards can be placed so the force of the water holds them in place. For twin headgate systems (figure 3), one side can be completely closed, and the procedure outlined above can be used for the remaining headgate.

Plank Headgates

For plank-type headgates (illustration 3), a board can be placed **horizontally** across the bottom of the headgate to reduce flows by about one-third. On the second day, place another board on top of the first one to reduce flows by another one-third, and on the third day, close the headgate completely. Boards can be placed so that the force of the water holds them in

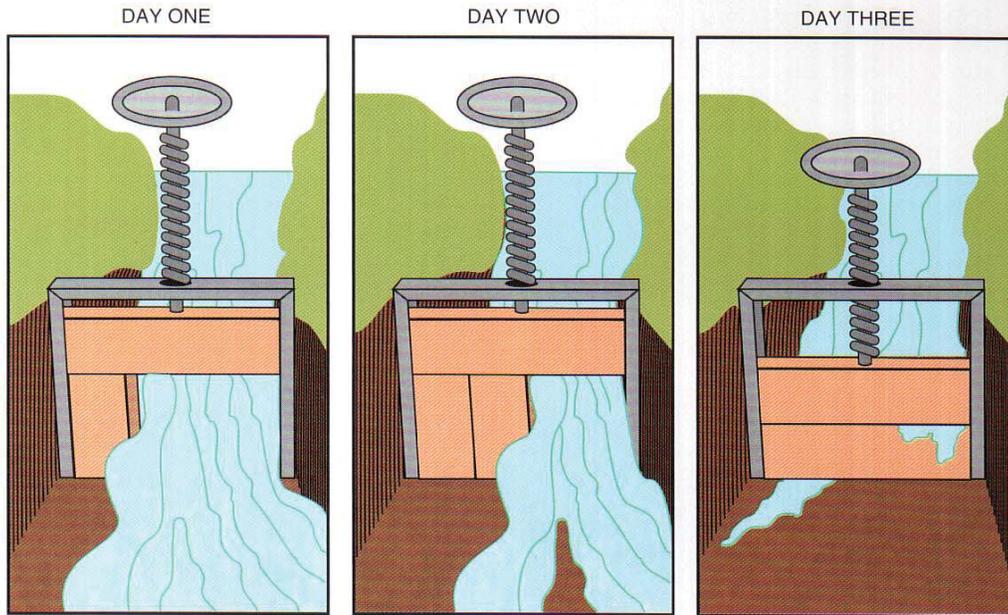


Illustration 2. Boards can be used to gradually reduce flows below screw-down headgates. On the first day, place a board (or several) vertically across the headgate to block about one-third of the opening. The force of water can be used to hold the boards in place. Block half of the remaining opening on the second day, and on the third day close the headgate completely.

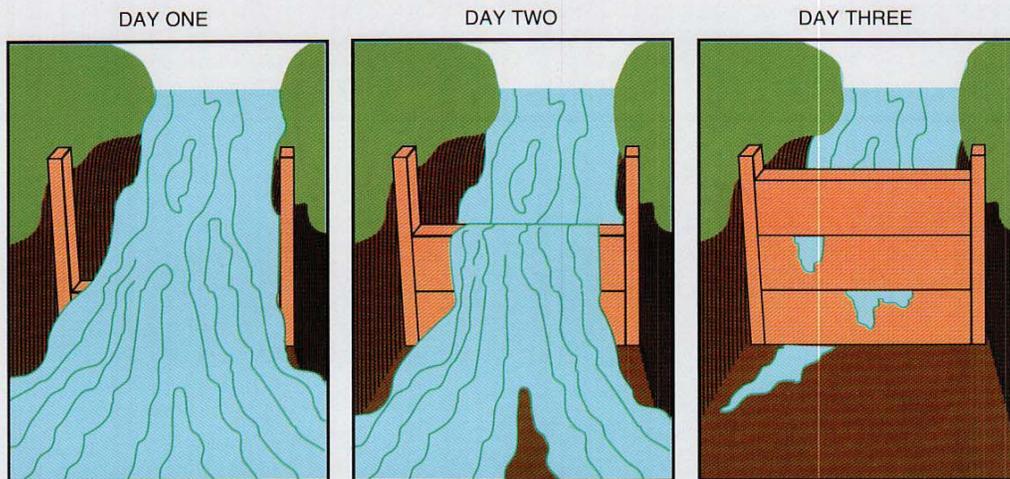


Illustration 3. Reducing flows below plank headgates can be a bit more of a problem than with screw-down headgates, but it is not insurmountable. If it appears that trout cannot jump the planks placed horizontally in the headgate, it may be necessary to contrive a system of vertical planks.

place. For twin headgate systems, one side can be completely closed, and the procedure outlined above can be used for the remaining headgate.

Although trout will be able to jump over the first board if it is not too large, they will not be able to pass it if it is large or if the water is too shallow on the downstream end. If this appears to be a problem, it may help to cut a slot in the lower board or to contrive a system that allows the boards to be placed **vertically** as you would for a screw-down headgate.

Other Considerations

The staggered flow reduction in an irrigation ditch gradually reduces trout habitat. Fish respond to this habitat reduction by moving up the ditch until they either reach a stream or until they find another suitable location within the irrigation ditch. When they encounter suitable habitat, often in the form of pools, rocks, or brush, they tend to halt their up-canal movement. Because of this, reducing flows is less ef-

fective in ditches with many pools than those that are more channelized or homogenous.

Because trout will move faster and farther in canals with more uniformly smooth bottoms, it is beneficial to remove debris, large rocks and to fill holes where feasible. This is especially important in the area immediately below headgates which often contain a large pool.

For more information on this subject, please contact the area fisheries supervisor in the Wyoming Game and Fish Department office nearest you.

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This publication is one in a series of habitat extension bulletins produced by the Wyoming Game and Fish Department. Call 1-800-842-1934 for additional information or assistance.