



# DUGOUT COVERS

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## WHAT IS A COVER

The benefits of using covers to improve water quality in Prairie dugouts (small on-farm reservoirs) were researched under the Canada-Saskatchewan Agriculture Green Plan Agreement. A cover is any artificial material designed to float on a body of water to enhance or protect the water quality.

## WHY INSTALL A COVER?

### **Covers improve water quality.**

A floating cover installed on a farm dugout can improve the quality of water by reducing algae growth. Covers block light from penetrating the water and so prevent photosynthesis. Algae blooms can therefore be reduced. Less algae means less organic matter in the water and less risk of blue-green algae growing. (Blue-green algae can produce toxins which pose a hazard to human or animal health if the water is consumed. For more information, see the **Water Quality Matters** publication "Prairie Water Quality Problems").

### **Covers will reduce evaporation losses.**

A floating cover on a dugout can also conserve the quantity of water by reducing evaporation (which in turn improves water quality). A typical dugout on the Canadian Prairie can lose 10,000 L (2100 gallons) of water per day in the summer through evaporation. In a year, more water can evaporate from an uncovered dugout than a typical family and farm



Algae blooms require a food supply (nutrients) and sunlight in order to grow

would actually use. When evaporation occurs, the organic and inorganic matter in the dugout are concentrated in the remaining water. Reduced evaporation in a covered dugout reduces this concentrating effect, resulting in improved water quality.

## HOW DO COVERS IMPROVE WATER QUALITY?

Water quality improvements that can be noted almost immediately after dugouts are covered include:

- fewer and less severe algae blooms, which in turn reduces the potential for blue-green algae to produce toxins which may be a hazard when the water is consumed;



- conserved water supply due to reduced evaporation losses; and,
- reduced water temperatures in the summer, making the water more desirable for domestic use.

Over the longer term, the water quality will improve due to the decreased production of algae. Although not as dramatic as other treatment technologies discussed in the **Water Quality Matters** series, improvements will include:

- water that is safer for chlorination, due to decreased levels of dissolved organic carbon (DOC), and therefore lower levels of disinfection by-products (trihalomethanes);
- water that is easier to treat for safe domestic use due to decreased turbidity;
- water with improved aesthetic characteristics, due to decreased colour and turbidity; and
- water with a pH level that is less alkaline and more suitable for domestic use.



Covers stop light transmission and prevent the growth of algae. They also reduce evaporation

## WHAT KIND OF COVER WORKS?

A modified plastic swimming pool cover was studied. It was a low density polyethylene virgin resin with colour additive and UV inhibitors, and was constructed with incorporated air pockets to assist in flotation. The total gauge was 12-14 mil, and it was shipped in rolls

51" wide. The cover was tied back at the corners of the dugout and weighted with bricks suspended from submerged "skirts" to keep it in place. This cover reduced photosynthesis more effectively than black plastic studied previously.

## WHAT DOES IT COST AND HOW LONG DOES IT LAST?

The covers cost about \$1200 per panel (about \$3/m<sup>2</sup>). A standard dugout would require two or three panels for complete coverage, for a total cost of \$2400 to \$3600. The life expectancy of the cover is about four years, after which time the plastic starts to break down from exposure to the sun and it becomes difficult to remove the cover.

## HOW IS A COVER INSTALLED AND MAINTAINED?

The covers were designed to float over about 70% of the surface area of a dugout at full supply level. This allows for some water consumption without having to adjust the cover anchoring system. Each cover panel is pulled over the water and is floated into position. Weights (usually bricks) keep the panel skirts submerged. Each corner is secured with a rope tie-back anchored on land.



These covers float with submerged skirts, and are anchored to the shore at each corner

A covered dugout must be aerated to keep oxygen in the water. Continuous aeration (24 hours a day) using a small 1/8 hp compressor is ideal, but a windmill aerator could also be used, although less effectively.

Covers should be installed in spring *BEFORE* algae blooms occur in a dugout. If a cover is installed when an algae bloom is already occurring in the dugout, the light blockage will cause the algae to collapse and die. This will reduce oxygen levels and increase hydrogen sulphide levels in the water. It could also trigger the release of toxins from blue-green algae. Humans and animals must *NOT* drink water from a dugout for at least two weeks after the collapse of a blue-green algae bloom.

Proper maintenance includes inspection of the cover every two weeks in summer and once a month in winter. Each inspection should also make sure the aeration system is working. As summer water levels drop, the cover must be re-positioned to keep the skirts submerged and prevent wind from getting underneath the cover. The air release holes in the cover should be positioned to prevent a build-up of air from the aeration system.

Covers on dugouts are generally left to freeze in place over the winter to prevent wear and tear associated with removing them. Final adjustments before freeze-up are critical. The cover tie-backs should be secured and all skirts submerged. In spring, covers should be inspected to prevent damage from ice thrusting (although that is not common).

## WHAT ARE THE LIMITATIONS WITH COVERS?

- Covers alone will *NOT* make dugout water safe for drinking. Additional treatment including disinfection is required prior to human consumption.

- Seams (between the panel and the skirt) and anchoring points are the weakest places in any cover. Very strong winds can tear seams or even blow covers off the water.
- Wind damage occurred on some study sites, and at one location, the wind was severe enough to destroy the cover.

## THE BIGGER PICTURE

Covers can play a positive part in overall management of water quality in dugouts and small reservoirs. More research is needed about the benefits in water quality and conservation, and to assess the value of covers against their cost.

Of the 10 producers involved in the study who responded to a survey,

- 50% stated the covers improved water quality;
- 60% noticed a decrease in evaporation from the reservoir; and
- 60% stated the overall performance of the covers was satisfactory to excellent.

For further information on rural Prairie water quality and treatment technology:

- contact your local Prairie Farm Rehabilitation Administration office (PFRA is a branch of Agriculture and Agri-Food Canada);
- read the other publications in PFRA's **Water Quality Matters** series;
- get a copy of "Rural Prairie Water Quality: Searching for Solutions for On-farm Users" available from PFRA; or
- read Prairie Water News, available from PFRA, or on the Internet at [www.quantumlynx.com/water](http://www.quantumlynx.com/water)

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