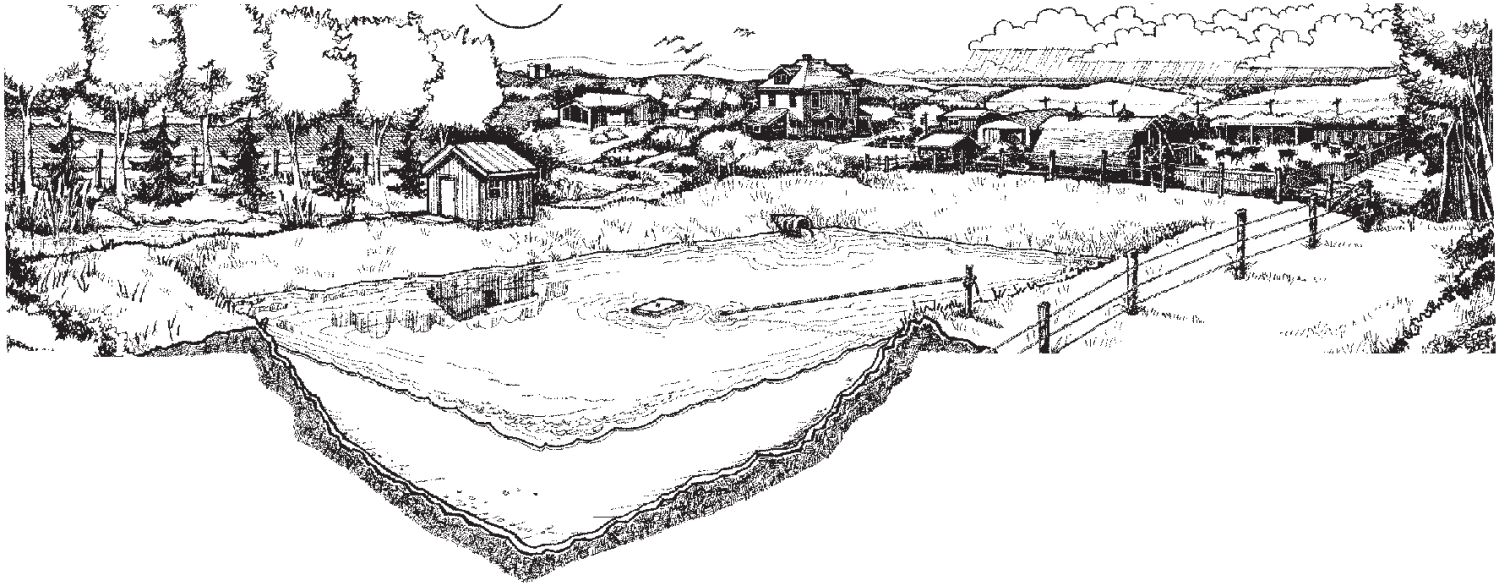
Trouble Shooting Guide for Dugout Problems



Dugout problems fall into two broad categories: water quantity and water quality. Problems can result from the watershed; the dugout location, design, and construction; the systems and equipment for pumping, aeration, and treatment; as well as management practices. This module is designed to identify the source of a problem and provide suggestions for correction. The troubleshooting guide starts by identifying typical symptoms of water quantity or quality problems. It systematically lists possible causes, identification features, suggestions for corrective action, and references for further information within the manual.

Symptom 1 Low Dugout Water Levels

Possible Causes	*What to Check For*	*How to Correct (Options)*	*For More Information See Section On:*
Inadequate watershed	• observe or measure the area contributing water to the dugout during runoff events	• enhance snow trapping in the watershed with shelterbelts, snow fences or crop stubble • pump water to fill dugout • develop another water source	• Watershed Runoff Potential and Dugout Sizing, page 19. • Appendix 4 Contacts and References, page 130. • Planning Farm Water Supplies, page 18.
Drought	• what are normal snow and rainfall amounts for your area? Information available from Environment Canada	• snow trapping • pump water from another source • increase water storage • develop another water source (back up) for drought proofing purposes	• Watershed Runoff Potential and Dugout Sizing, page 19.
Dugout too small	• compare annual water use and ice and evaporation losses with dugout size recommended • consider any future expansion, etc. • steady drop in water levels	• increase dugout size and/or add another source	• Watershed Runoff Potential and Dugout Sizing, page 19.
Seepage from dugout	• sand lenses or layers of silts and fractured clay	• use dugout sealing techniques • relocate dugout to suitable soil condition	• Large Scale Sealing Methods and Materials, pages 35–37.
Soil depositing in dugout	• soil erosion in watershed or watercourses draining to dugout	• use soil erosion techniques such as a grass cover and gated culvert inlets to the dugout to prevent sedimentation • remove sediment from dugout with a large trackhoe or dragline • use a 2 dugout system: one for a settling pond and the second for use	• Water Quality and Watershed Management, pages 26–28. • Dugout Design, page 32–34. • Sediment Removal, page 102. • Sedimentation Dugouts, page 34.

Possible Causes	What to Check For	How to Correct (Options)	For More Information See Section On:
Upstream blockages or drainage	• upstream beaver dams, snow damming or sediment blockages in water courses	• use a tractor to remove snow dams or drifts that re-direct water runoff	
	• upstream drainage or diversion reducing runoff to dugout	• contact appropriate agencies responsible for beaver control and/ or watercourse changes	• Appendix 4, Contacts and References, page 130.
		• contact provincial government agencies responsible for drainage approvals	• Appendix 4, Contacts and References, page 130.

Symptom 2 Human or Animal Sickness Caused by Water Contamination

Possible Causes	What to Check For	How to Correct (Options)	For More Information See Section On:
Water Contamination	• identify potential sources of contamination in the runoff area and seek professional advice on specific test parameters	• discontinue using the water source and consult local health unit, doctor or veterinarian for their assistance	• Health Risks and Water Quality, pages 74–77. • Standard Testing of Drinking Water, pages 74–77.
		• remove the source of contamination wherever possible and replace gravel trench filters with floating dugout intakes	• Health Risks and Water Quality, pages 74–77. • Intake Systems, pages 44–47.
		• seek advice from water treatment specialists	• Steps in Water Treatment, pages 84–88.
		• provide another source of uncontaminated water or install appropriate water treatment equipment	• Steps in Water Treatment. pages 84–88.
		• install filtration and disinfection equipment	• Steps in Water Treatment, pages 84–88.
		• install polishing treatment equipment, such as R.O. or water distillers	• Steps in Water Treatment, pages 84–88.
		• install cistern to haul in water for household use and drinking	

Symptom 3 Black Smelly Water in Dugout

Possible Causes	*What to Check For*	*How to Correct (Options)*	*For More Information See Section On:*
Depletion of dissolved oxygen levels in dugout water (summer)	• abundant algae and weed growth and decay • cyanobacteria growth • grass clipping appearance to water • dark green slime floating or deposited along dugout banks • dirty water after runoff and reduced water depths in dugout	• control algae and weed growth by employing control techniques • replenish oxygen with dugout aeration system	• Dugout Management Practices, pages 102–110. • Dugout Aeration Systems, pages 52–56.
		• employ soil erosion techniques in watershed or watercourses, gated inlets, or two dugout system	• Sedimentation Dugouts, page 34. • Water Quality and Watershed Management , pages 26–28.
		• clean dugout with excavation equipment and steepen all slopes to reduce weed and algal growth	• Sediment Removal, page 102.
	• organic plant material deposited in dugout	• use screened culvert inlets and locate deciduous trees away from dugout	• Vegetation Control, page 103.
	• recycling of nutrients from dugout sediments causing increased algal growth	• ensure dugout aeration is diffused at the dugout bottom • use a perforated pipe or device to diffuse oxygen instead of open ended hose	• Dugout Aeration Systems, pages 52–56. • Dugout Aeration Systems, pages 52–56.
	• water intake near dugout bottom	• raise floating intake near surface	• Intake Systems, pages 44–47.
	• deterioration of water quality in wet well	• clean out large-diameter wet wells or abandon in favour of small-diameter wet wells	• Wet Wells, page 47.

Possible Causes	What to Check For	How to Correct (Options)	For More Information See Section On:
Depletion of dissolved oxygen levels in dugout water (winter)	• dugout aeration equipment not installed or working properly • snow cover on dugout reducing sunlight and oxygen produced by growing plants	• check and maintain dugout aeration equipment • where feasible carefully clean snow-cover from a portion of dugout surface	• Dugout Aeration Systems, pages 52–56.
Black smelly water after Home Treatment System only	• filter system fouled with organic material and organic sediments in pressure tank and/or hot water	• clean or replace filter medium • ensure adequate disinfection of water	• Steps in Water Treatment, pages 84–88.
Bottom dugout water entering from damaged intake pipe	• damaged intake pipe	• hire a diver to repair water intake pipe	• Steps in Water Treatment, pages 84–88.

Symptom 4 Dirty Dugout Water

Possible Causes	*What to Check For*	*How to Correct (Options)*	*For More Information See Section On:*
Soil erosion of watershed and watercourses	• soil erosion • recent runoff event • suspended clay particles that will not settle	• employ soil erosion techniques and gated inlet • use a two dugout system • use coagulants in dugout to clear water	• Dugout Design, pages 32–34. • Water Quality and Watershed Management, pages 26–28. • Sedimentation Dugout, page 34. • Coagulation, page 105.
Erosion in dugout	• soil erosion by wave action	• protect eroded dugout banks with erosion prevention materials like filter cloth, plastic, or riprap • install water treatment system including coagulants and sand filter	• Dugout Construction, pages 35–41. • Steps in Water Treatment, pages 84–88.
Muskrats, ducks, mud-puppies	• abundance of cattails and tunnels into dugout banks • floating cattails	• control cattails and remove muskrats by trapping, etc.	• Dugout Management Practices, pages 102–110.
Contaminated runoff	• test water for bacteria, chemicals, and pesticides	• remove contaminants and/or cause from watershed • divert any contaminated runoff around dugout • install water treatment equipment	• Water Quality and Watershed Management, pages 26–28. • Steps in Water Treatment, pages 84–88.
Human activity	• swimming	• eliminate swimming	

Symptom 5 Discoloured Water and Staining

Possible Causes	*What to Check For*	*How to Correct (Options)*	*For More Information See Section On:*
Iron in Water	• brown to rusty coloured stains on clothes and plumbing fixtures	• install dugout aeration system and/or iron removal treatment equipment if required • replace gravel trench filters with floating water intakes	• Dugout Aeration Systems, pages 52–56. • Steps in Water Treatment, pages 84–88. • Intake Systems, pages 44–47.
Organic Matter in Water	• sloughy conditions around dugout	• prevent flooding and slough conditions • re-locate dugout	
	• staining • abundance of organic material and peat soil in watershed or dugout area	• coagulation treatment • re-locate dugout • cover organic material around the dugout with clay soil and grass cover	
	• decomposing plants and animals • excessive plant and algal growth in dugout	• install aeration equipment • use gated inlet to allow clear water into dugout • control nutrients coming into dugout which encourage plant and algal growth	• Dugout Aeration, pages 52–56. • Dugout Design, pages 32–34. • Water Quality and Watershed Management, pages 26–28.
	• green to yellow colour (dissolved or particulate organic colour)	• control algae and plant growth with a combination of biological, physical and chemical methods • install aeration equipment	• Dugout Management Practices, pages 102–110.
	• shallow dugout with flat slopes	• steepen dugout slopes and deepen dugout	• Dugout Construction, pages 35–41.
	• watershed/watercourse vegetation containing clover etc. • excessive dosages of chemicals including copper sulphate for algal control resulting in man-made blooms of green algae	• avoid planting vegetation that imparts colour • reduce/eliminate chemical dosages and allow zooplankton to re-establish and control green algae	• Water Quality and Watershed Management, pages 26–28. • Appendix 3 Using Copper Products…, pages 128–129.
	• test for dissolved organic carbon	• use coagulants in the dugout or in home treatment to remove	• Steps in Water Treatment, pages 84–88.

Symptom 6 Mineral Scale and Grey Discolouring of Clothes

Possible Causes	*What to Check For*	*How to Correct (Options)*	*For More Information See Section On:*
Calcium and magnesium hardness	• scale on plumbing fixtures, humidifier • grey colouring of clothes • test for hardness • gravel infiltration trench	• install ion-exchange water softener • use water additives such as Calgon, etc. • install a direct intake	• Steps in Water Treatment, pages 84–88. • Intake Systems, pages 44–47.

Symptom 7 Taste and Odour in Water

Possible Causes	*What to Check For*	*How to Correct (Options)*	*For More Information See Section On:*
Iron in water	• refer to Symptom 5 for comments		
Sloughy, musty, fishy smell	• algal growth	• use algal control techniques • install activated carbon filtration	• Dugout Management Practices, pages 102–110. • Steps in Water Treatment, pages 84–88.
Rotten egg smell	• refer to Symptom 3 for comments		
Salty, bitter taste	• high total dissolved solids caused by groundwater seepage or increased mineralization in gravel trench	• prevent poor quality water from seeping into dugout or relocate dugout • replace gravel filter trench with floating water intake	• Dugout Siting, pages 29–30. • Intake Systems, pages 44–46.