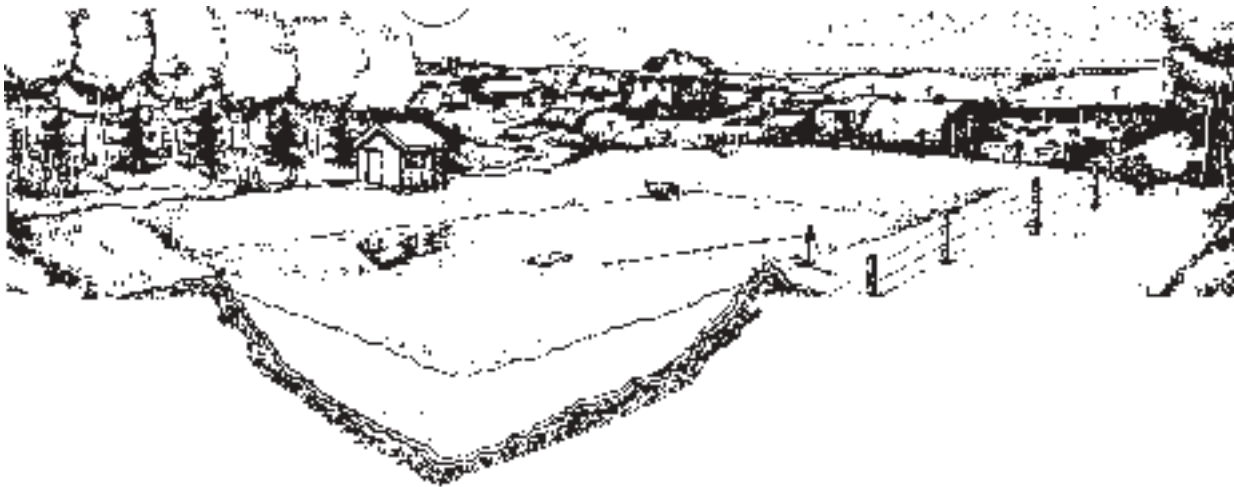


Trouble Shooting Guide for Dugout Problems



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	<ul style="list-style-type: none"> observe or measure the area contributing water to the dugout during runoff events. 	<ul style="list-style-type: none"> enhance snow trapping in the watershed with shelterbelts, snow fences or crop stubble pump water to fill dugout develop another water source 	<ul style="list-style-type: none"> Watershed Runoff Potential and Dugout Sizing Appendix 4 Contacts and References Planning Farm Water Supplies
Drought	<ul style="list-style-type: none"> what are normal snow and rainfall amounts for your area? Information available from Environment Canada 	<ul style="list-style-type: none"> snow trapping pump water from another source increase water storage develop another water source (back up) for drought proofing purposes 	<ul style="list-style-type: none"> Watershed Runoff Potential and Dugout Sizing
Dugout too small	<ul style="list-style-type: none"> compare annual water use and ice and evaporation losses with dugout size recommended consider any future expansion, etc. steady drop in water levels 	<ul style="list-style-type: none"> increase dugout source and add another source 	<ul style="list-style-type: none"> Watershed Runoff Potential and Dugout Sizing
Seepage from dugout	<ul style="list-style-type: none"> sand lenses or layers of silts and fractured clay 	<ul style="list-style-type: none"> use dugout sealing techniques relocate dugout to suitable soil condition 	<ul style="list-style-type: none"> Large Scale Sealing Methods and Materials
Soil depositing in dugout	<ul style="list-style-type: none"> soil erosion in watershed or watercourses draining to dugout 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Water Quality and Watershed Management Dugout Design Sediment Removal Sedimentation Dugouts

Possible Causes	What to Check For	How to Correct (Options)	For More Information See Section On:
Upstream blockages or drainage	<ul style="list-style-type: none"> upstream beaver dams, snow damming or sediment blockages in water courses upstream drainage or diversion reducing runoff to dugout 	<ul style="list-style-type: none"> use a tractor to remove snow dams or drifts that re-direct water runoff contact appropriate agencies responsible for beaver control and/or watercourse changes contact provincial government agencies responsible for drainage approvals 	<ul style="list-style-type: none"> Appendix 4, Contacts and References Appendix 4, Contacts and Reference

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	<ul style="list-style-type: none"> identify potential sources of contamination in the runoff area and seek professional advice on specific test parameters. 	<ul style="list-style-type: none"> discontinue using the water source and consult local health unit, doctor or veterinarian for their assistance remove the source of contamination wherever possible and replace gravel trench filters with floating dugout intakes seek advice from water treatment specialists. provide another source of uncontaminated water or install appropriate water treatment equipment install filtration and disinfection equipment install polishing treatment equipment, such as R.O. or water distillers install cistern to haul in water for household use and drinking 	<ul style="list-style-type: none"> Health Risks and Water Quality Standard Testing of Drinking Water Health Risks and Water Quality Intake Systems Steps in Water Treatment Steps in Water Treatment Steps in Water Treatment Steps in Water Treatment

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)	<ul style="list-style-type: none"> • 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 • organic plant material deposited in dugout • recycling of nutrients from dugout sediments causing increased algal growth • water intake near dugout bottom • deterioration of water quality in wet well 	<ul style="list-style-type: none"> • control algae and weed growth by employing control techniques • replenish oxygen with dugout aeration system • employ soil erosion techniques in watershed or watercourses, gated inlets or two dugout system • clean dugout with excavation equipment and steepen all slopes to reduce weed and algal growth • use screened culvert inlets and locate deciduous trees away from dugout • ensure dugout aeration is diffused at the dugout bottom • use a perforated pipe or device to diffuse oxygen instead of open ended hose • raise floating intake near surface • clean out large-diameter wet wells or abandon in favour of small-diameter wet wells 	<ul style="list-style-type: none"> • Dugout Management Practices • Dugout Aeration Systems • Sedimentation Dugouts • Water Quality and Watershed Management • Sediment Removal • Vegetation Control • Dugout Aeration Systems • Dugout Aeration Systems • Intake Systems • Wet Wells

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)	<ul style="list-style-type: none"> dugout aeration equipment not installed or working properly snow cover on dugout reducing sunlight and oxygen produced by growing plants 	<ul style="list-style-type: none"> check and maintain dugout aeration equipment where feasible carefully clean snow-cover from a portion of dugout surface 	<ul style="list-style-type: none"> Dugout Aeration Systems
Black smelly water after Home Treatment System only	<ul style="list-style-type: none"> filter system fouled with organic material and organic sediments in pressure tank and/or hot water 	<ul style="list-style-type: none"> clean or replace filter medium ensure adequate disinfection of water 	<ul style="list-style-type: none"> Steps in Water Treatment
Bottom dugout water entering from damaged intake pipe	<ul style="list-style-type: none"> damaged intake pipe hire a diver to repair water intake pipe 	<ul style="list-style-type: none"> hire a diver to repair water intake pipe 	<ul style="list-style-type: none"> Steps in Water Treatment

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	<ul style="list-style-type: none"> • soil erosion • recent runoff event • suspended clay particles that will not settle 	<ul style="list-style-type: none"> • employ soil erosion techniques and gated inlet • use a two dugout system • use coagulants in dugout to clear water 	<ul style="list-style-type: none"> • Dugout Design • Water Quality and Watershed Management • Sedimentation Dugout • Coagulation
Erosion in dugout	<ul style="list-style-type: none"> • soil erosion by wave action 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Dugout Construction • Steps in Water Treatment
Muskrats, ducks, mud-puppies	<ul style="list-style-type: none"> • abundance of cattails and tunnels into dugout banks • floating cattails 	<ul style="list-style-type: none"> • control cattails and remove muskrats by trapping, etc. 	<ul style="list-style-type: none"> • Dugout Management Practices
Contaminated Runoff	<ul style="list-style-type: none"> • test water for bacteria, chemicals and pesticides 	<ul style="list-style-type: none"> • remove contaminants and/or cause from watershed • divert any contaminated runoff around dugout • install water treatment equipment 	<ul style="list-style-type: none"> • Dugout Water Quality • Steps in Water Treatment
Human Activity	<ul style="list-style-type: none"> • swimming 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • brown to rusty coloured stains on clothes and plumbing fixtures 	<ul style="list-style-type: none"> • install dugout aeration system and/or iron removal treatment equipment if required • replace gravel trench filters with floating water intakes 	<ul style="list-style-type: none"> • Dugout Aeration Systems • Steps in Water Treatment • Intake Systems
Organic Matter in Water	<ul style="list-style-type: none"> • sloughy conditions around dugout • staining • abundance of organic material and peat soil in watershed or dugout area • decomposing plants and animals • excessive plant and algal growth in dugout • green to yellow colour (dissolved or particulate organic colour) • shallow dugout with flat slopes • watershed/watercourse vegetation containing clover etc. • excessive dosages of chemicals including copper sulphate for algal control resulting in man-made blooms of green algae • test for dissolved organic carbon 	<ul style="list-style-type: none"> • prevent flooding and slough conditions • re-locate dugout • coagulation treatment • re-locate dugout • cover organic material around the dugout with clay soil and grass cover • install aeration equipment • use gated inlet to allow clear water into dugout • control nutrients coming into dugout which encourage plant and algal growth • control algae and plant growth with a combination of biological, physical and chemical methods • install aeration equipment • steepen dugout slopes and deepen dugout • avoid planting vegetation that imparts colour • reduce/eliminate chemical dosages and allow zooplankton to re-establish and control green algae • use coagulants in the dugout or in home treatment to remove 	<ul style="list-style-type: none"> • Dugout Aeration • Dugout Design • Water Quality and Watershed Management • Dugout Management • Dugout Construction • Water Quality and Watershed Management • Appendix 3 Using Copper Products... • Steps in Water Treatment

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	<ul style="list-style-type: none"> • scale on plumbing fixtures, humidifier • grey colouring of clothes • test for hardness • gravel infiltration trench 	<ul style="list-style-type: none"> • install ion-exchange water softener • use water additives such as Calgon etc. • install a direct intake 	<ul style="list-style-type: none"> • Steps in Water Treatment • Intake Systems

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	<ul style="list-style-type: none"> • refer to symptom 5 for comments 		
Sloughy, musty, fishy smell	<ul style="list-style-type: none"> • algal growth 	<ul style="list-style-type: none"> • use algal control techniques • install activated carbon filtration 	<ul style="list-style-type: none"> • Dugout Management • Steps in Water Treatment
Rotten egg smell	<ul style="list-style-type: none"> • refer to symptom 3 for comments 		
Salty, bitter taste	<ul style="list-style-type: none"> • high total dissolved solids caused by groundwater seepage or increased mineralization in gravel trench 	<ul style="list-style-type: none"> • prevent poor quality water from seeping into dugout or relocate dugout • replace gravel filter trench with floating water intake 	<ul style="list-style-type: none"> • Planning • Intake Systems