Appendix E – Environmental Reference Documents

E1 - 2015 Basic Impact Assessment Mitigations

2015 Basic Impact Analysis (BIA) Mitigations

Johnston Canyon Rock Scaling, Catwalk and Trail Repairs

Banff National Park

July 2015

April 2014

Canada

The current project involves a rock slope remediation program in the canyon, consisting of various tasks which together aim to reduce the hazards associated with rockfalls along the trail. The project will also involve repairs to the heavily worn trail tread and further upgrades to the railings.

Soils and Landforms

Mitigation Measures

- Minimize the number of vehicle/equipment trips on the fire-road trail, as much as possible;
- Avoid working during and directly after heavy rainfall events.
- Rehabilitate all areas where soil and/or vegetation damage has occurred as a result of project activities.
- Use appropriately placed downed wood, boulders and/or possibly signage where the fire-road trail connects to the Johnston Canyon trail above Catwalk #6 to deter public access following completion of the project.
- The contractor must have an appropriate spill management plan in place, including designated re-fuelling areas located at least 30 m from any water bodies, secondary containment for all equipment and re-fuelling area(s), and appropriate spill containment and clean-up materials for each piece of equipment, as well as appropriate training for all staff.

Vegetation

Mitigation Measures

- All equipment must be clean and weed free (pressure washed) prior to starting work at the site.
- Keep equipment and vehicle use to existing trails and trail treads as much as possible.
- Ensure all workers take care to minimize vegetation damage due to foot access, equipment set-up and operation.
- Minimize vegetation removal as much as possible, removing only that which is required to ensure the safety of visitors. This includes removal of moss, forbs, shrubs and trees in order to complete the rock scaling and trimming and hazard tree removal. All vegetation planned for removal will be reviewed with the Parks Canada Environmental Surveillance Officer (ESO) prior to removal.
- Areas of soil and/or vegetation damage will be restored in consultation with the Parks Canada ESO and Vegetation Specialists.
- Use appropriately placed downed wood, boulders and/or possibly signage where the fire-road trail connects to the Johnston Canyon trail above Catwalk #6 to deter public access following completion of the project.

Wildlife

Mitigation Measures

- Minimize the number of vehicle/equipment trips on the fire-road trail, as much as possible;
- The ESO will be notified immediately about any dens, litters or nests within or around the site. Any carcasses (road kills), bear activity, carnivore encounters or other aggressive wildlife or

nuisance wildlife encounters on or around the site should be reported immediately to Banff Dispatch at (403) 762-1470.

Aquatic Resources

Mitigation Measures

- In addition to minimizing the amount of rock scaling and vegetation removal as much as possible, the amount of soil, organic materials and rock dust/debris that will fall into the creek will be kept to a minimum through containment, collection and appropriate disposal of debris wherever feasible. Material that has fallen on the trail or catwalks will not be pushed into the creek. The contained and collected debris will be removed and disposed of in a manner deemed appropriate by the ESO.
- No asphalt will be permitted to fall into the creek and any old pieces that have slumped into the creek will be removed where it is safe to do so.
- All waste asphalt will be disposed of at an appropriate facility.
- Paving work in the rain should be avoided. If the work schedule requires work in the rain, the area of work must be isolated and appropriate sediment controls must be in place to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt and chemical surface sealants.
- Fuel will be in a double lined container within a pickup truck which will be used to transport fuel and top up stationary equipment as required. Spill kits will be on hand and kept near this equipment as well as on the refueling truck.
- Cement will be transported in bags and only opened prior to mixing. To protect the cement, but also to contain potential spillage, the stockpile of cement will be covered and bags opened singularly when required.
- During removal and installation of railings, wooden plywood or other suitable materials will be used or hung below the work area to contain debris from cutting, welding, grinding, etc. Welding rods will also be collected and disposed of appropriately.

13. SURVEILLANCE

Document whether surveillance (also referred to as compliance monitoring or site inspection) will be required while the project is underway, to verify that required mitigation measures are implemented.

__X__ Surveillance required
____ Surveillance not required

E2 - Interim Code of Practice: End-of-Pipe fish protection screens for small water intakes in freshwater

Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater

1 About this code of practice

This code of practice provides national guidance on the design, installation and maintenance of small end-of-pipe water intake fish screens to prevent entrainment and impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when a fish is held in contact with the intake screen and is unable to free itself.

The end-of-pipe fish screen code of practice describes best practices to follow when designing, installing, maintaining and cleaning low volume water intakes that have the potential to impact fish. This code of practice is for small-scale water intakes (e.g. irrigation, construction, municipal and private water supplies, mining exploration) where the water intake flow rate is up to 0.150 m^3/s, or 150 litres per second (L/s). Impacts related to fish habitat and changes in flow conditions are not covered by this code of practice.

When working in water, it is important to have a good understanding of local conditions. For example, water velocity, flow, depth, the type of fish species present and their abundance and swimming abilities are all important factors to consider when designing, installing, maintaining and

cleaning small end-of-pipe water intake fish screens. This code of practice provides necessary information and guidance on the measures to follow to ensure maximum protection of fish. The sizing and design specifications of fixed screens in this code are exclusively for fish that have a minimum fork length of 25 mm. Entrainment and impingement impacts on eggs and larval fish can be minimized by following the measures below.

A project review is not required when the conditions and measures set out in this code of practice **and** all applicable measures to protect fish and fish habitat are applied.

This code does not remove or replace the obligation to comply with all applicable statutory and regulatory requirements in place by other sections of the *Fisheries Act*, or other federal, provincial, or municipal legislation and policies associated with water extraction.

2 You can use this code of practice if:

- There are no aquatic species at risk present in the work zone or the **affected area**. Consult our aquatic species at risk maps to determine where at-risk populations occur in Canada and where their critical habitat is located
- The water withdrawal is for small-scale water intakes, where the water intake flow rate is up to 0.150 m^3 /s, or 150 litres per second (L/s)
- You incorporate the measures in this code of practice and all other applicable measures to protect fish and fish habitat

Request a project near water review when the works, undertakings or activities do not meet all the criteria listed in this section.

3 Measures to protect fish and fish habitat for end-of-pipe fish screens

1 Fish screen design

Three criteria need to be considered when designing a fish screen for water intakes:

- Effective screen area
- Screen material
- Screen shape

1.1 Effective screen area

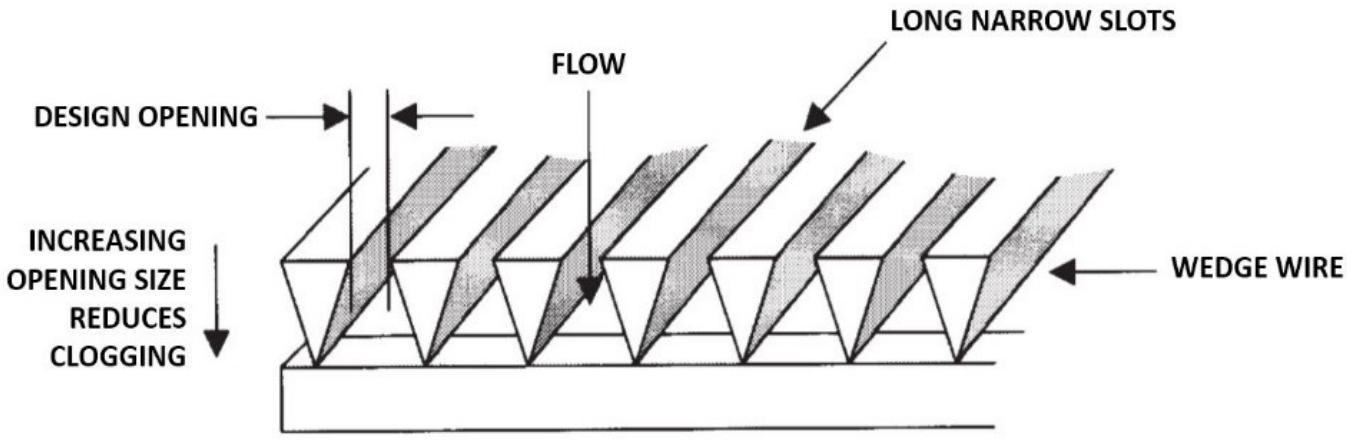
Larger screens reduce the approach velocity so fish are more likely to outswim the flow entering the intake. The screen area needed depends on the amount of water being withdrawn and the species of fishes that frequent the intake location. The total submerged screen area available for the free flow of water is referred to as the effective screean area.

- Use the End-of-Pipe Screen Size Tool to determine the effective screen area for your project
    - to protect fish from impingement or entrainment, the approach velocity (i.e., the water velocity into, or perpendicular to, the face of an intake screen) should not exceed the values set for each species
    - you should apply a precautionary approach when a species is absent or unknown by using the ‘All/Unknown' option in the species selection list. This selection will determine the effective screen area for the weakest swimming fishes

1.2 Screen material

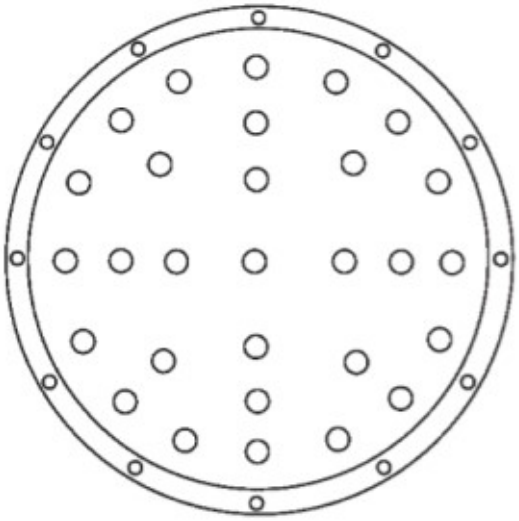
For a fish screen to prevent entrainment, the openings must be small enough so a fish cannot pass through. The narrowest dimension of any opening on the screen, regardless of opening shape, is referred to as the design **opening** (Figure 1). The maximum design opening for a fish of 25 mm fork length is estimated at 2.54 mm.

- Ensure the design opening of the screen material does not exceed 2.54 mm
- Ensure there are no protrusions on the screen surface of support structures that could injure fish
- Use welded wedge wire screens (Figure 2), whenever possible
- Ensure screen material is resistant to corrosion and UV light (i.e., brass, bronze, aluminum, monel metal, galvanized or stainless steel, plastics)
- Use material that minimizes clogging

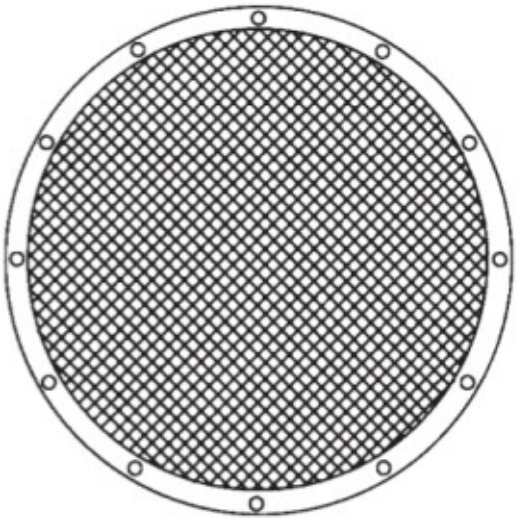


▶ Figure 1

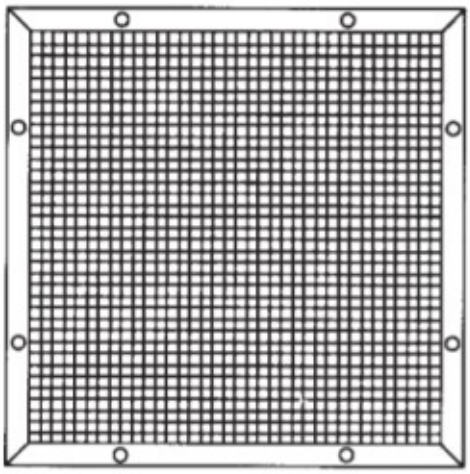
PERFORATED PLATE (PUNCHED)



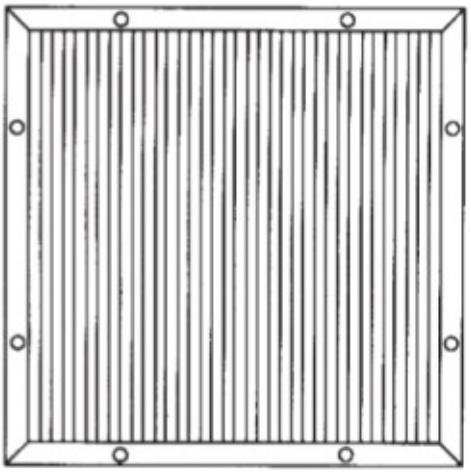
CIRCULAR MESH SCREEN



SQUARE MESH SCREEN

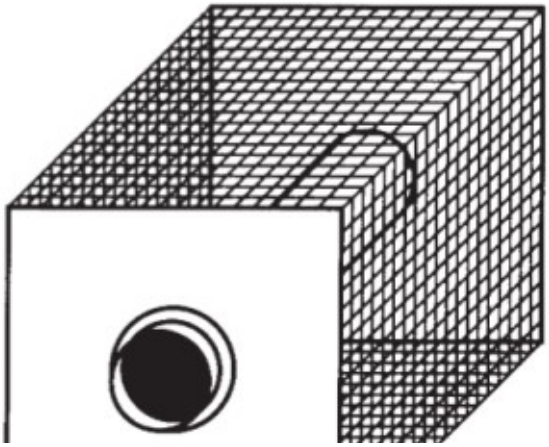


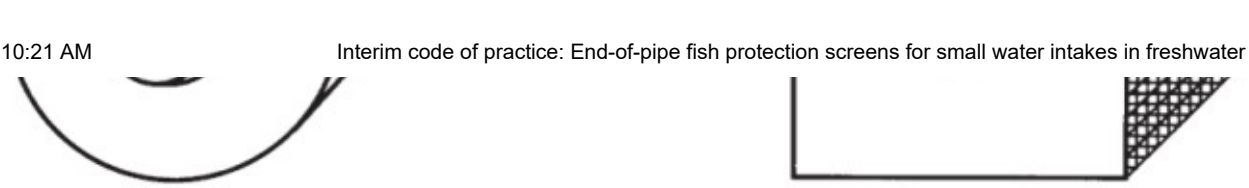
SQUARE WEDGE WIRE SCREEN



DRUM OR CYLINDER WITH PERFORATED PIPE

BOX-TYPE WITH MESH SCREEN



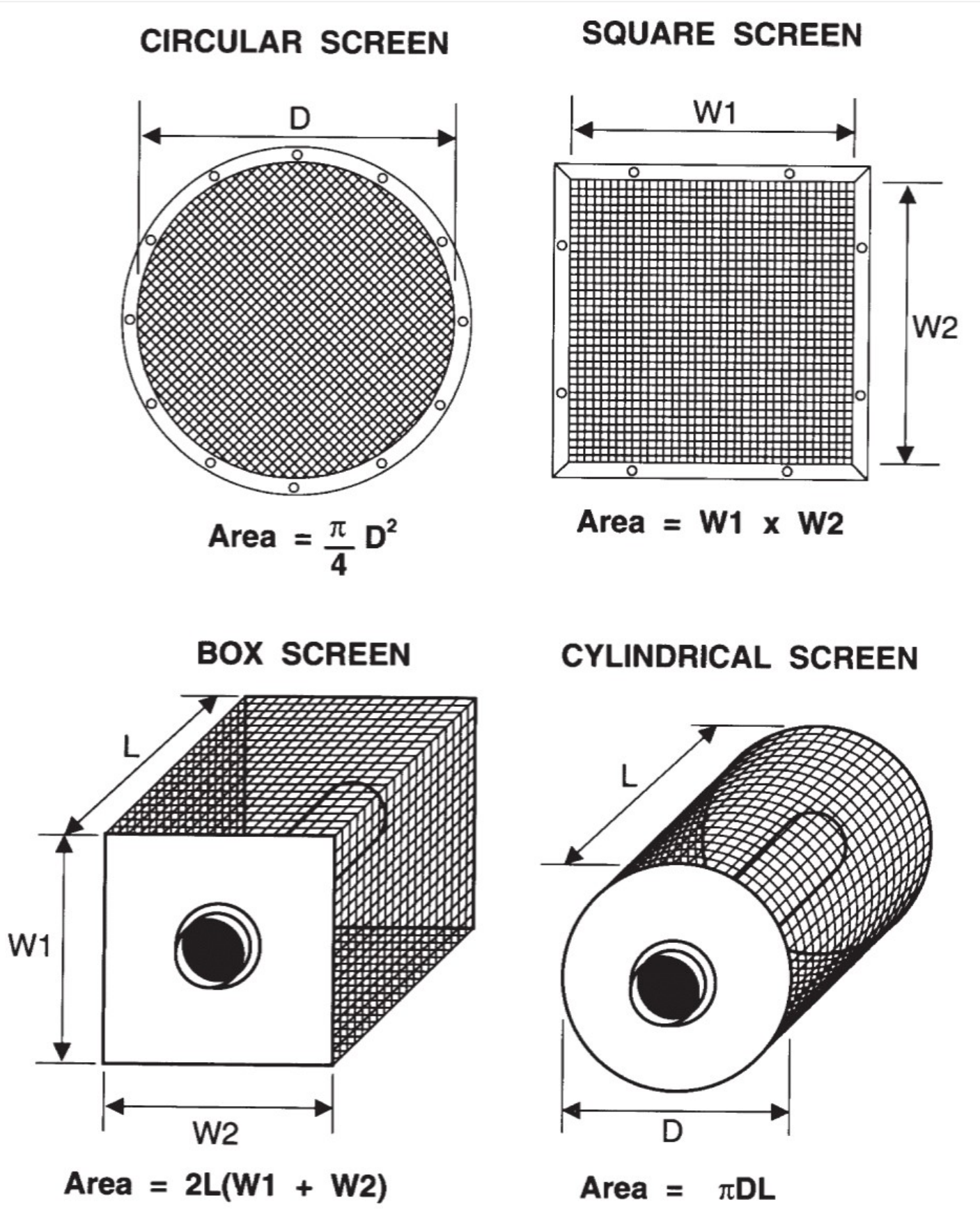


▶ Figure 2

1.3 Screen shape

Use a manifold on designs where the flow would be uneven across the surface of the screen (e.g.: cylindrical or box type) (Figure 3).

- Ensure the manifold is equal distance from the outer screen
- Cap the end of the manifold with a solid material


CIRCULAR SCREEN
D
Area = π/4 D²
SQUARE SCREEN
W1
W2
Area = W1 x W2
BOX SCREEN
L
W1
W2
Area = 2L(W1 + W2)
CYLINDRICAL SCREEN
L
D
Area = πDL

▶ Figure 3

2 Fish screen installation

Consider the following best practices when installing a fish screen:

- Plan in water work, undertaking or activity to respect timing windows to protect fish including their eggs, juveniles, spawning adults and/or the organisms upon which they feed and migrate
- Place screens away from natural or man-made structures that may attract fish that are migrating, spawning, or in rearing habitat
- Place screens in waters with low concentrations of fish throughout the year
- Orient the screen so any natural water flow passes across the surface of the screen material
- Place screens a minimum of 30 cm above the bottom of the watercourse to prevent the entrainment of sediment and benthos that dwell in the substrate
- Ensure all openings for guides and seals are smaller than the opening width of the screen material (2.54 mm) so fish cannot pass through
- Ensure there is enough structural support to prevent sagging or collapsing of the screen panel
- Account for the areas blocked by supports while meeting the effective screen area recommended in this code of practice
- Protect large screens with trash racks fabricated of bar (150 mm spacing is typical) or grating in areas where there is debris loading (i.e. woody material, leaves or algae mats)
- Check the approach velocity directly in front of the screen to ensure it does not exceed the designed approach velocity at any location
- Avoid withdrawing water from the littoral zone when possible
- When possible, avoid withdrawing water, or reduce the rate of water withdrawal, during critical timing windows to diminish the likelihood of entraining eggs and larval fish

3 Screen maintenance and cleaning

Debris or damage to screens can cause uneven intake flow across the screen surface. Uneven flow may result in higher intake velocities on some sections of the screen, increasing the likelihood of impinged fish. You can verify the pump's approach velocity to assess the need for screen cleaning using a flow meter. Keeping fish screens clean maintains their effectiveness for supplying water and protecting fish.

- Properly maintain cleaning apparatuses, seals and screens
- Turn off intake pump prior to the removal of the screen for cleaning and/ or maintenance

4 Project notification

Please submit a Notification Form to your regional DFO (Fisheries and Oceans Canada) office to help us improve this fish and fish habitat protection guidance over time.

> You must download and save this PDF form to your computer before filling it out.
> How to download and open a PDF form

Notification form

(PDF (Portable Document Format), 41 KB (KiloByte))

5 Contact us

If you have questions regarding this Code of Practice contact the Fish and Fish Habitat Protection Program located in your region.

6 Glossary

Affected area

Area within which potential impacts from works, undertakings or activities are likely to occur.

Approach velocity

The water velocity measured directly in front of the intake screen.

Benthos

Organisms that live on or in the bottom sediments of a body of water.

Design opening

The narrowest dimension of any opening on the screen, regardless of opening shape.

Effective screen area

The area of the open spaces available for the free flow of water, including screen material but excluding major support structures.

Entrainment

Occurs when a fish is drawn into a water intake and cannot escape.

Fork length

The straight line distance measured from the tip of the nose to the fork of the tail of a fish.

Impingement

Occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.

Intake flow rate

The amount of water withdrawn over time.

Littoral zone

The shallow water near shore. The depth of the littoral zone varies but is generally 2-5 meters deep in most freshwater systems.

Date modified:

2020-02-06

E3 – BFU Whirling Disease Protocol

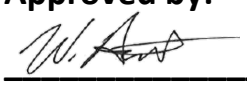
Whirling Disease in Banff National Park (BNP), Alberta

Direction for *Permitted Users* conducting water-related activities in BNP

Interim Direction

This information and permit conditions are to be added to Restricted Activity Permits, Development Permits or other tools used to permit researchers, contractors, partners, stakeholders, etc who are working in muddy or aquatic environments in BNP but not handling fish. If handling fish, there is a more rigorous protocol to be followed.

Approved by:



Date: *updated* 15 November 2016

Bill Hunt
Parks Canada Incident Commander Whirling Disease Event, Fall 2016
Resource Conservation Manager, Banff Field Unit, Parks Canada.

Whirling Disease in Banff National Park (BNP), Alberta

Direction for *Permitted Users* conducting water-related activities in BNP

The following document is intended to provide consistent direction, in the form of permitting conditions, for anyone who is conducting work in or near water bodies, ephemeral or otherwise, or involved in the use or transportation of surface waters in Banff National Park.

Background

In August 2016, Whirling Disease was detected in some waters in Banff National Park. This is the first documented case of this disease anywhere in Canada and Parks Canada is committed to reducing the spread of this disease, in part, by managing our work and the work performed by external proponents within Banff National Park. While there are no human health concerns, effects on native fish populations can be very significant with 90% mortality being reported in other jurisdictions. The parasite attacks juvenile fish and causes spinal deformity (whirling swimming pattern) and discoloration (blackened tails). Some species of fish, or individual fish, can be infected but show no visible symptoms at all.

Whirling Disease is a parasitic freshwater disease that affects most salmonids. Species of particular concern in Alberta include: Westslope Cutthroat Trout (federally and provincially listed as a *threatened* species) Bull Trout (provincially listed as a *threatened* species), Rocky Mountain Whitefish, Rainbow Trout, Brook Trout, and Brown Trout. The disease is spread by a small parasite that goes through both spore and planktonic life stages, which infect both fish and aquatic tubifex worms.

HOW IS WHIRLING DISEASE SPREAD?

The disease is most often spread by (in descending order):

1. **Movement of fish** (fish stocking) or parts of fish (use of live or dead baitfish). All of these activities are illegal in Banff National Park.
2. **Movement of mud** that is laden with the resistant spore stage or infected tubifex worms. Likely vectors include dirty waders, boats, and construction equipment.
3. **Movement of water** that is transporting the planktonic life stage called a TAM

The spore life-stage is incredibly small and hard to destroy. Spores that sink to the bottom of water bodies can remain viable in sediment for about 3 years. The only effective means of killing the spores include hot water (90C) or 10 minutes soaking in effective detergents (quaternary ammonium-based cleaners); pro-longed freezing (7 days at -20^{0}C) or complete desiccation (drying) for at least 24 hours (less if exposed to direct sunlight). Therefore, preventing the movement/transport of mud from infected water ways (where spores are most often found) is of critical importance.

The planktonic life-stage is called a triactinomyxon (TAM). These microscopic organisms float in the water column waiting to attach to a live fish and inject their lethal contents into the fish through its skin or gills. Although the TAM stage is more vulnerable to hot water, effective detergents, freezing or desiccation, it is a concern because it is often more mobile as it floats in the water column. For this reason, movement of water also needs to be prevented (e.g. water withdrawal permits for hydro-seeding, paving crews, etc).

SIMPLIFIED PERMIT CONDITIONS:

If you have been issued a permit to conduct a) work in-stream, b) work in wet or muddy riparian areas, or soils that are seasonally wetted (ephemeral) or c) pumping or moving of surface water, you are required to follow these decontamination protocols:

1. **PREVENTION**: Do not allow equipment to enter a watercourse or wet riparian area, or to pump or transport water, unless the equipment has been properly decontaminated **before AND after** use in different waterbodies. The current extent of Whirling Disease in Alberta is not known, so your equipment may already be contaminated or may become contaminated during use. Never move equipment between water bodies without applying the following decontamination protocols.

2. **PRE-CLEAN**: When you leave a work area **remove all mud**. The most resistant life stage is the myxospore and these spores settle into the mud. By washing off all mud (in an area where the rinse water will not re-enter the watercourse, a storm water system, or sanitary sewer system) you can reduce the chances of spreading this disease.

3. **HOT WASH or DISSINFECT**: At an appropriate facility, where wastewater will not re-enter a watercourse (either through storm water or sanitary water treatment), wash or disinfect your equipment as follows:

    a. **HOT WASH** – use a low pressure hot water wash system (e.g. Hotsy) to apply very hot water (90^oC) across all equipment surfaces for at least 10 minutes. Appropriate PPE is required to prevent injury when using water at these temperatures*. For smaller items or in remote locations - boiling at 90^oC for 10 minutes will also destroy the spores.

    OR

    b. **DISSINFECT** – For equipment that cannot withstand these temperatures, (e.g. glued fabrics such as inflatable watercraft, aqua-dams, Gore-Tex, etc.) use regular water to remove any residual mud and destroy the TAM stage. However, extra diligence must be taken, in disinfecting this equipment in order to destroy the spore stage. All equipment must be <u>soaked</u>, for at least 10 minutes, in an appropriate concentration of disinfectant* (see link to Table 1). Disposal of rinse water containing disinfectant may go into sanitary sewers (spores should be chemically destroyed) provided quantities are diluted enough not to impact your local wastewater treatment plant by killing bacteria. Contact your WWTP for approval if disposing of more than 45 gallons in any given day.

4. **DRY:** Allow all equipment to dry thoroughly (fully dry + 24 hours) before being used in each new waterbody. Drying is ONLY effective if every surface is completely dry. Again, this is why removal of **<u>ALL</u>** mud is so important, as it aids effective drying. Note - Freezing, for 7 or more days, will also kill spores and TAMs provided temperatures remain below -20^0C .

Note – follow all manufactures MSDS and instructions for use of Personal Protective Equipment.

Table 1: Available QAC's and Manufacturer's Concentrations.

Note the list below is intended to aid you in application of these protocols, but should not be considered exhaustive or as an endorsement of these specific products or manufactures. Other products with Quaternary Ammonium Cations (QAC) as the active ingredient are also effective. Such chemicals are also known as quats.

Brand Name	Manufacturer	QAC Active Ingredient(s)	QAC Concentration (as supplied)
Quat Plus	Dustbane	n,n-dialkyl –n, n-dimethyl ammonium chloride	4.8%
Quat Plus M5	Dustbane	n,n-dialkyl –n, n-dimethyl ammonium chloride	7.7%
Vanguard	Dustbane	Didecyl dimethyl ammonium chloride n-alkyl; dimethyl benzyl ammonium chloride	2.88% 1.92%
Pinosan	Dustbane	Didecyl dimethyl ammonium chloride n-alkyl; dimethyl benzyl ammonium chloride	1.44% 0.96%
Quat 128	Sanicare	Didecyl dimethyl ammonium chloride Dimethyl benzyl ammonium chloride	5.07% 3.38%
SparQuat 256	Spartan Chemical	Dialkyl dimethyl ammonium chloride Alkyl dimethyl benzyl ammonium chloride	5-10% 5-10%