



FISHERIES AND OCEANS CANADA – PACIFIC REGION
FINAL DRAFT - FISH HABITAT RESTORATION GUIDELINES:
Emergency Juvenile Salmonid Relocation

Emergency Juvenile Salmonid Relocation – Drought-Related Low Flow Conditions

CAUTION

The following guidelines for emergency juvenile salmonid relocation are intended to be applied to juvenile salmon stranded in isolated habitats with elevated temperatures where there is a high risk of dewatering and fish mortality. The physical relocation of juvenile salmonids from isolated locations is a **last resort** option during extreme environmental conditions when the lack of intervention will likely result in mortality. Given that stranded salmonids are already stressed by environmental conditions, the additional stress and disturbance caused by handling can injure fish and cause immediate or delayed mortality. **The physical handling of fish must only be considered as a last resort by salmon experts and only undertaken with proper permitting / approvals in place.**

Before considering an emergency relocation of juvenile salmonids, **contact the “Observe Record Report” line at DFO.ORR-ONS.MPO@dfo-mpo.gc.ca or [1-800-465-4336](tel:1-800-465-4336)**. When contacting Fisheries and Oceans Canada (DFO) please include as much information as possible, such as the date of observation, location and description of isolated habitat, water temperatures, photographs of the site, and a list of experts supporting the process.

A drought reporting tool is also available through the Pacific Salmon Foundation at: psf.ca/report. Information reported through this tool will be shared with DFO.

Key factors when considering an emergency relocation of juvenile salmonids:

- Careful planning is essential, as handling fish can result in significant harm and mortality.
- Proper conditions are necessary for juvenile salmon relocations to be successful including suitable release sites, timing, flow conditions and water quality.
- Only crews using the appropriate equipment and comprised of experienced





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individuals should undertake juvenile relocation.

- Proper permitting must be in place in order to conduct relocation efforts (see *Permitting* below).

The following guidance is only for relocations of fish over short distances within the same stream.

Under no circumstances are salmon to be transferred above permanent or anadromous barriers, into hatchery facilities, or new watersheds without prior approvals in place.

Introduction

Many juvenile salmonids seek side channels and temporarily flooded areas as a risk/reward strategy. During droughts, these habitats are particularly susceptible to stranding, resulting in fish being exposed to isolated and diminishing habitats, elevated water temperatures and lack of dissolved oxygen; and therefore, may be candidates for relocation. This is due primarily to loss of watered habitat, but may also be related to increased vulnerability to predation, reduced foraging success and sub-optimal water quality. Emergency relocation of juvenile fish may be considered by salmon experts as a last resort when mortality is the likely alternative.

Preferred Alternatives

During drought conditions in the spring and summer, parts of the stream channel can become isolated from the mainstem. Sections of dry stream channel can result in isolated habitats that trap juvenile salmonids.

Due to acute stress caused by the physical handling of fish, especially during higher temperatures and drought conditions, an assessment should be completed to determine the feasibility of relocation and survivability. Subsequent actions may include leaving the fish if habitat is suitable and there may be other available options such as reconnecting isolated habitats to the mainstem channel to improve water flow.

Fish present in isolated habitats from the mainstem, may not require relocation if the pools or channels are deep and groundwater fed. Collecting data on pool and channel depth, water temperatures and dissolved oxygen will provide important information for determining the appropriate course of action.

Depending on the depth of the groundwater table and distance from the wetted channel, effective water quality improvement methods include:

- Manual trenching with hand tools to create a temporary wetted channel to facilitate water flow through isolated area.
- A temporary water diversion from another ground or surface water source. This could include utilizing gravity-fed systems (e.g., pipes) or pumps (with appropriate fish screens) to extract surface water.
- Supplementing stream discharge via water management actions, including flow releases from dams and reductions in water withdrawal.
- Using diffusers and aerators to add supplemental oxygen into the isolated habitat.



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Any proposed work that requires channel or flow modifications, and particularly if powered equipment is used, requires guidance from the Habitat Restoration Centre of Expertise. Be advised that lasting alterations to the stream channel are likely to require appropriate permits and approvals (see *Permitting* below).

Relocation Planning

Under the Fishery (General) Regulations (sections 54-56), it is unlawful to move salmon to a new system or above a permanent, natural barrier. Captured juvenile salmonids **must not** be transferred to a hatchery facility as this poses an unacceptable risk of introduction of diseases or parasites to other fish at the facility.

The following factors warrant attention when organizing an emergency relocation operation.

- Relocation of fish requires **significant planning and support**. Field crews must include individuals experienced in capture methods and fish handling (see *Juvenile Salmonid Handling Techniques* below).
- A **stream assessment** must be conducted by salmon experts including fisheries biologists and qualified professionals to identify and evaluate the potential impact on the salmon population to determine if intervention is warranted. For example, relocation may be unnecessary if juveniles are located in a deep, groundwater fed pool.
- Engage a salmon expert to determine whether fish are in distress due to drought conditions. Proper assessment by knowledgeable experts is critical before drawing conclusions or undertaking any relocation efforts.
- Careful assessment of the upcoming **weather forecast** is a critical step as precipitation and increased flows may be adequate to naturally reconnect isolated habitats to the mainstem.
- The timing of specific operations should be considered as a measure to limit stress. Wherever possible, fish should be relocated in the **early morning** when temperatures and overhead sun impacts can be reduced.
- Capture, handling, and relocation, particularly during low flow and warm water conditions, will further stress fish. **Increased caution is required when handling fish above 16 °C as these water temperatures are likely to increase stress and can result in immediate or delayed mortality.**
- Release locations must be appropriately planned such that juvenile salmonids are relocated to areas within the same stream with suitable water quality, depth, flow, shade for refuge, and in areas without exposure to high-velocity currents or high predator concentrations. Fish should also only be released in areas that have low densities of fish.
- Documentation of relocation activities is very important. At minimum, **report the reason, date and locations of relocation, stream name, species, estimated number of fish moved, and document the activity with photographs**. A sample field data form for submission to DFO is included in **Appendix A**.



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Relocation Methodology

Appropriate relocation methods can vary based on the species of salmonid, the equipment available, and the unique conditions at the relocation sites.

The overall health of the isolated fish and potential risks associated with relocation must be weighed against the projected benefits of the relocation before deciding on whether mitigation is required.

The following provides some guidance for selecting equipment and basic methodology. If unsure about relocation, please contact your local Community Advisor or Restoration Biologist.

- Appropriate capture techniques must be used to reduce the handling time of fish and the associated stress.
- Correct form of capture equipment must be used based on the location of the stranded fish and the number of personnel involved in the relocation.
- Suitable equipment for fish capture includes “Gee” style minnow traps, beach seines, pole seines, and dip nets.
- Mesh size on nets and traps must be a suitable size to avoid physical injuries to fish being caught in them. Typically, 1/8” or smaller is recommended.
- Overloading of nets and traps must be avoided to reduce the risk of injury and minimize stress to fish.
- Gee traps must be used in groups to prevent overcrowding of fish in any one trap (i.e., one Gee trap/metre² at a minimum.)
- Immediately remove fish from seine nets and pole seines after capture and put into oxygenated transport containers. Fish left in seines longer than 15 minutes have a high chance of mortality.
- Traps must be checked a minimum of every 24 hours and fish immediately moved into oxygenated transport containers.
- Juvenile salmonid relocations may take multiple days if the number of fish is significant.
- Containers for relocation include transport tanks, garbage buckets, and 20 L buckets. These containers must be oxygenated with air stones using bottled oxygen, or battery air compressors (bubblers).
- Ensure that fish are transported in low densities where the bottom of the container is still relatively visible. Use a lid on the container to reduce stress of the fish and oxygen demand.
- Dissolved oxygen and temperatures must be monitored regularly during relocation transport in order to maximize fish health.
- Conduct relocation as early in the day as possible to safeguard against water temperature increases during transportation. **Undertaking relocations when the air temperature is 25 °C or over is not recommended.**
- Transport tanks should only be used if proper road access is available, and personnel trained in their operation are available to assist.



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- When relocating fish, ensure proper water temperature acclimation is conducted before releasing juvenile salmonids.
- If there is a water temperature difference of 3 °C or more between your transport container and the release location, ensure that you bring the temperature to within 2 °C by incrementally adding small amounts of stream water to your container, until the container temperature is within 2 °C of the release site temperature.
- Where possible, disperse the relocated fish around the release site to make sure that they are spread out as much as possible.
- or smaller, knotless mesh, and with no gaps between the frame and net where fish could get caught).
- When using Gee-style minnow traps, only open and remove fish once you are completely ready to reduce the chance of injury inside the trap once it is out of water. The fish must be released into a bucket or container that has a larger diameter than the trap to ensure no fish accidentally land on the ground.
- Consider the use of a water conditioner (e.g., Vidalife) when possible, to ensure a proper mucus level is maintained during relocation. 1 mL of Vidalife for 15 L of water. Contact your Community Advisor or Restoration Biologist to procure.
- Avoid dumping the buckets at the release location, this can cause injury to the fish. Immerse the lip of the bucket in the water while gently tipping the bucket keeping the lip submerged at all times, the fish should be gently drawn out.

Juvenile Salmonid Handling Techniques

Proper handling techniques are crucial to minimize stress, injury, and mortality. Only people with knowledge and experience, while using the following techniques, should be handling fish:

- Handle fish as gently and minimally as possible, while also reducing air exposure during moving. Stress through handling increases the risk of mortality and injury. Minimize how long fish are in the nets to the smallest extent possible.
- Ensure that the fish are kept as wet as possible and out of the air to reduce drying out their protective mucus.
- When using dip nets ensure that they are not overly crowded as fish at the bottom can be injured by the weight of those above. Use dip nets that have the lowest risk of harming the fish (e.g., 1/8" mesh size

Permitting

The relocation of juvenile salmonids requires obtaining permits and approvals beforehand. A **Scientific License** from DFO (<https://www.pac.dfo-mpo.gc.ca/fm-gp/licence-permis/forms/licence-sci-permis-eng.pdf>) is required for the capture of fish for scientific, experimental or educational purposes. There is no fee when the permit is for juvenile salmonid relocation. To expediate your request please note in your application that it is for emergency relocations.



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For relocations in British Columbia, a provincial Scientific Fish Collection Permit (<https://portal.nrs.gov.bc.ca/web/client/-/scientific-fish-collection-permit>) is also typically required. For this provincial license, permit holders are required to submit a summary report within 90 to 120 days (depending on the region) of the expiry of the permit. The cost of a license is currently \$25.

Note that any direct habitat alterations (for example, channel construction or dam breaching) are likely to require additional permits and approvals from DFO, provincial, territorial, municipal, and/or Indigenous governments.

future, please contact the Fisheries and Oceans Canada for guidance on habitat restoration.

Conclusion

These guidelines outline general best management practices, but they are not exhaustive. It is important to work closely with qualified experts who have experience in fish handling and relocation. This ensures the best practical outcomes for individual fish. Although these guidelines are targeted to juvenile salmonids, other fish species may be encountered and in accordance with the guideline should be salvaged along with target species.

Before starting any relocation activity, and for questions or additional information on conducting an emergency juvenile salmonid relocation, please **contact the “Observe Record Report” line at DFO.ORR-ONS.MPO@dfo-mpo.gc.ca or 1-800-465-4336.**

To increase the resiliency of streams to drought conditions and climate change as well as help prevent the need for salmon relocation in the





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Appendix A: Sample Fry Relocation Field Data Form

RELOCATION DATE(S) AND TIME:		CREW (AND EXPERTISE):							
REASON FOR RELOCATION:									
STREAM NAME:	GPS COORDINATES		WATER QUALITY						
			Temp °C	mg O ₂	% O ₂	pH	Turbidity NTU	WATER LEVEL	
SALVAGE LOCATION	N	W						<input type="checkbox"/> Extremely Low <input type="checkbox"/> Below Normal <input type="checkbox"/> Normal	
RELEASE LOCATION	N	W							
OBSTRUCTION AND RELEASE LOCATION DESCRIPTIONS:									
SALMON SPECIES	CHINOOK	CHUM	COHO	PINK	SOCKEYE	EQUIPMENT USED	WEATHER		
OBSERVED ONLY:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Seine net <input type="checkbox"/> Gee/minnow trap <input type="checkbox"/> Dip net <input type="checkbox"/> Other net (explain in comments) <input type="checkbox"/> Air (bubbler) <input type="checkbox"/> Other (explain in Comments)	CLOUD COVER <input type="checkbox"/> Clear <input type="checkbox"/> Scattered <input type="checkbox"/> Partly Cloudy <input type="checkbox"/> Cloudy <input type="checkbox"/> Overcast		PRECIPITATION <input type="checkbox"/> None <input type="checkbox"/> Light <input type="checkbox"/> Med <input type="checkbox"/> Heavy
# JUVENILES							OTHER ENVIRONMENTAL OBSERVATIONS:		
RELOCATED BYCATCH (#, species, stage, etc.)									
TOTAL # FISH RELOCATED									
COMMENTS: (e.g., general observations, fish health/mortality, estimated average length, trap set time etc.) – PLEASE ATTACH PHOTOGRAPHS									

