



## Final Draft - FISH HABITAT RESTORATION GUIDELINES: Emergency Adult Salmon Passage

# Emergency Adult Salmon Passage – Drought Related Low Flow Conditions

## CAUTION

The following emergency guidelines are intended to address immediate migratory challenges for adult salmon during extreme low flow and drought conditions.

The physical relocation of returning adult salmon over temporary obstructions is a **last resort** option to aid migratory efforts of salmon in extreme environmental situations when lack of intervention will likely result in pre-spawn mortality of adult salmon. Given the fragile reproductive state of adult salmon during their migratory journeys, stress caused by fish handling can injure fish and contribute to pre-spawn mortality. **The physical handling of fish must only be considered as a last resort by salmon experts.**

Before considering an emergency relocation of adult salmon, **contact the “Observe Record Report” line at [DFO.ORR-ONS.MPO@dfo-mpo.gc.ca](mailto:DFO.ORR-ONS.MPO@dfo-mpo.gc.ca) or 1-800-465-4336**. When contacting DFO please include as much information as possible, such as the date of observation, location and description of the possible obstruction(s), 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](http://psf.ca/report). Information reported through this tool will be shared with DFO.



Key factors when considering an emergency relocation of adult salmon are outlined below:

- Careful planning is essential as handling fish can result in significant harm and mortality.
- The proper conditions are necessary for adult salmon relocation to be successful including suitable sites, timing, flow conditions and temperatures.
- Only experienced crews and the right equipment can be involved.

Updated: August 2023





## Final Draft - FISH HABITAT RESTORATION GUIDELINES: Emergency Adult Salmon Passage

The following guidance is only for relocations for short distances of less than 50 meters. Under no circumstances are salmon to be transported in vehicles, or be transferred above permanent barriers or into new systems without prior approvals in place.

### Introduction

Adult salmon spawn during a limited timeframe and substantial delays can reduce their overall fitness, increase vulnerability to predation, and reduce spawning success. Drought condition water levels can introduce temporary obstructions to the natural migration of salmon, restricting their ability to navigate watercourses during these critical periods. Emergency relocation of migrating adult salmon may be considered by salmon experts as a last resort.

### Preferred Alternatives

Due to stress caused by the physical handling of fish, removing the cause of the obstruction should be the first course of action. Actions include ensuring minimum stream flow requirements are met, and modifying obstructions to facilitate fish passage. Please be advised that alterations to the stream channel are likely to require appropriate permits and approvals (see *Permitting* below).

Sections of dry stream channel can cause short-term migratory obstructions. Depending on the depth of the groundwater table and length of dry channel, effective passage improvement methods include:

- Manual trenching with a shovel or equipment to create a temporary wetted channel to facilitate fish passage.
- A temporary water diversion from appropriate sources. This could include utilizing gravity-fed systems (e.g., pipes) or pumps to extract surface water.
- Supplementing stream discharge via water management actions, including flow releases from dams and reductions in water withdrawal.

Other potential temporary obstructions to migration during low flow conditions include instream weirs, beaver dams, culverts, cascades, overgrown instream vegetation, and the accumulation of instream debris. Manual manipulation may facilitate passage past these types of obstructions.

Funding is frequently available under emergency conditions to address root causes contributing to migratory barriers for adult salmon. Exploring these options must take precedence before considering relocation of migrating adult salmon.

### 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.

Listed below are several factors that warrant attention when organizing an emergency relocation operation.

Updated: August 2023





## Final Draft - FISH HABITAT RESTORATION GUIDELINES: Emergency Adult Salmon Passage

- Relocation of migrating salmon requires **significant planning and experienced support** since handling adult salmon is much more difficult than working with fry and parr. Fisheries crews **must** include experienced biologists and technicians, and all crew members must have received proper training (see *Adult Salmon Handling Techniques* below).
- A **stream assessment** must be conducted by salmon experts including fisheries biologists and qualified professionals to identify temporary migratory obstructions and evaluate the potential impact on the salmon population to determine if intervention is warranted. For example, relocation may be futile if fish are moved over an obstruction when additional barriers exist before their spawning grounds, or water levels are too low to allow spawning.
- 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 pass the obstruction.
- The timing of specific operations should be considered as a measure to limit stress. Wherever possible, salmon should be relocated in the **early morning or late afternoon** when temperatures and overhead sun impacts can be reduced.
- Capture, handling, and relocation, particularly during low flow and warm water conditions, will stress adult salmon. **Increased caution is required when handling fish above 16°C as these sub-lethal temperatures are likely to increase stress and can reduce spawning success and egg survival; it can also impact later juvenile fish development. Any handling at 18°C or above is likely to lead to pre-spawn mortality.**
- Release locations must be appropriately planned such that salmon are relocated to areas with suitable water quality, depth, flow, shade for refuge, and in areas without exposure to high-velocity currents or high predator concentrations.
- Documentation of relocation activities is very important. At minimum, **report the reason, date and locations of relocation, stream, species, number of fish moved by species, duration of fish exposure to air, and document the activity with photographs**. A sample field data form for submission to DFO has been included in **Appendix A** below.

### Relocation Methodology

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

**The overall health of the affected 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.

Updated: August 2023





## Final Draft - FISH HABITAT RESTORATION GUIDELINES: Emergency Adult Salmon Passage

- Gentle capture techniques must be implemented including use of appropriately sized beach seine nets and/or fish traps.
- **Gill netting is not permitted.**
- Only nets with soft mesh are to be used as knotted twine causes skin injuries, split fins, and removes the protective mucus.
- Mesh should be appropriately sized for the target fish. Eye and other physical injuries can occur if the mesh size is too large for a particular size class of fish.
- Overloading nets must be avoided as fish in a full net can be crushed or injured, and crowded salmon will have an elevated stress level. This is particularly problematic for smaller female adult salmon and incidental bycatch of other fish.
- Immediately release fish after capture. Do not hold fish in a seine net for more than 15 minutes in optimal holding conditions (e.g., deep pools with shade and favourable water quality).
- Do not transport more than one to three fish at one time, according to the size and weight of the fish.
- When traps are used, designs can incorporate wings to guide fish horizontally along the stream's width, and trap elements can include a fyke-style entrance to effectively confine and retain fish until relocation can occur. Locate traps in areas with suitable flows and high dissolved oxygen. **Traps should not be left unattended for extended periods of time** (e.g., more than 4 to 6 hours), especially during warm temperatures and low flow conditions.
- A temporary barrier at the downstream end of the collection site (e.g., a stop net) may

be installed to keep fish confined during active relocation operations, but should be removed as soon as possible.

- Adult salmon must be moved in water using equipment such as sealed brood transport tubes.
- When captured salmon are required to be retained for a short period of time, refuge areas (e.g., appropriately sized tubes) should provide shade and maintain suitable water quality conditions (e.g., dissolved oxygen and water temperature) to reduce stress to fish upon relocation.

### Adult Salmon Handling Techniques

Proper handling techniques are crucial to minimize stress, injury, the accidental release of milt or eggs, and mortality. Only people with knowledge and experience with the following techniques should be handling fish.

- Handle salmon as gently and minimally as possible. Stress harms fish and increases the risk of injury.
- Always keep fish wet to minimize air exposure and maintain protective mucus layers.
- If netting is required during handling, use a soft, knotless nylon or rubber mesh net that is large enough to carry one to two adult salmon. Alternatively, use wet hands or, if necessary, use non-abrasive gloves (e.g., cotton gloves wetted with a suitable water conditioner) when handling fish.
- Use both hands to support a fish from underneath, ensuring its body weight is evenly distributed. When holding a fish, support its body horizontally with the tail and vent pointing slightly upwards to

Updated: August 2023





## Final Draft - FISH HABITAT RESTORATION GUIDELINES: Emergency Adult Salmon Passage

prevent expelling eggs or milt, also avoid bending or twisting the body. Do not squeeze or apply excessive pressure on the fish's body, especially around the abdomen as this could damage developing eggs or milt. Do not support a fish only by its tail as it could cause separation of its spinal vertebrae.

- Minimize excessive handling and the time fish are out of the water. Handle and release them promptly to reduce stress and prevent injury.
- **Do not handle salmon when they are spawning.**

### Permitting

The relocation of adult salmon requires obtaining appropriate permits and approvals. **A Scientific Licence** 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 adult salmon relocation. 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 licence, 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 licence 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.

### 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 adult salmon handling and relocating adult salmon. This ensures the best practical outcomes for individual fish.

Before starting any relocation activity, and for questions or additional information on conducting an emergency adult salmon relocation, please **contact your DFO Community Advisor or member of DFO's Habitat Restoration Centre of Expertise:** <https://www.pac.dfo-mpo.gc.ca/sep-pmvs/contact-eng.html>.





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### Appendix A: Sample Adult Salmon 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 <sub>2</sub>	% O <sub>2</sub>	pH	Turbidity NTU	WATER LEVEL
OBSTRUCTION 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"/> Fyke net <input type="checkbox"/> Other net (explain in Comments) <input type="checkbox"/> Brood transport tube <input type="checkbox"/> Air (bubbler) <input type="checkbox"/> Other (explain in Comments)	<b>CLOUD COVER</b> <input type="checkbox"/> Clear <input type="checkbox"/> Scattered <input type="checkbox"/> Partly Cloudy <input type="checkbox"/> Cloudy <input type="checkbox"/> Overcast	
# ADULTS							<b>PRECIPITATION</b> <input type="checkbox"/> None <input type="checkbox"/> Light <input type="checkbox"/> Med <input type="checkbox"/> Heavy	
RELOCATED BYCATCH (#, species, stage, etc.)							<b>OTHER ENVIRONMENTAL OBSERVATIONS:</b>  	
TOTAL # FISH RELOCATED (male/female)								

**COMMENTS:** (e.g., general observations, fish health/mortality, estimated average length, trap set time etc.) – **PLEASE ATTACH PHOTOGRAPHS**

Updated: August 2023