Al Irvine
New Graph Environment Ltd.
al@newgraphenvironment
250-777-1518
Date Original: 2025-07-30
Date Revised: 2025-07-31

Safety Plan - 2025-076-sern-skeena-fraser-fish-passage

The latest version of this pdf can be downloaded here.

This project has two primary goals. The first is to conduct fish passage (Phase 1) and habitat confirmation (Phase 2) assessments within the Tabor River, Willow River, and Lower Salmon River watershed groups. The second goal is to implement baseline monitoring at previously assessed and/or remediated crossings in the Nechako River, Upper Fraser River, Morkill River, and Francois Lake watershed groups. Fieldwork will include electrofishing at permitted sites and collection of environmental DNA (eDNA) samples.

A summary of potential sites for fish passage assessments, habitat confirmation assessments, and electrofishing is provided in Table 7 and Figure 3. Google Earth (KML) and Garmin (GPX) files for the proposed sites are available for download here.

New Graph Environment Employee Information

Al Irvine
Vehicle: 2013 Toyota Tundra black w/flatdeck and yellow can-am quad
Accommodation: 3396 Rosia Road, Prince George, BC V2K 4Y5

Lucy Schick
Vehicle: 2006 Pontiac Vibe red

Accommodation: 3990 Larisa Court, Prince George, BC V2K 0B1

Crew Members

New Graph Employees Al Irvine and Lucy Schick may be joined by other groups/individuals from the area. All crew member information and emergency contacts can be found below.

Table 1: Crew members details and emergency contacts

name	email	phone	satellite	emerg_name	emerg_email	emerg_phone
Allan Irvine	al@newgraphenvironment.com	250-777-1518	must be contacted by inreach first. Cannot cold call	Tara Stark	tara@newgraphenvironment.com	250-505-9854
Lucy Schick	lucy@newgraphenvironment.com	604-741-2032	807-790-9843	Sa Boothroyd	saboothroyd@gmail.com	604-740-7199

Equipment Checklists

PLEASE NOTE THAT EQUIPMENT CHECKLISTS ARE PROVIDED FOR THE OVERALL TEAM AND NOT ALL CREWS ARE REQUIRED TO HAVE ALL EQUIPMENT. ALTHOUGH ENCOURAGED FOR ALL ENVIRONMENTAL SCIENCE TECHNICIANS AND MONITORS TO HAVE THE PERSONAL EQUIPMENT NEW GRAPH ENVIRONMENT WILL HAVE ALL EQUIPMENT NECESSARY TO COMPLETE THE WORK.

MINIMUM REQUIREMENTS FOR EACH CREW MEMBER INCLUDES GOOD QUALITY AND APPROPRIATELY FITTING LIGHT WEIGHT WADERS AND SEPERATE WADING BOOTS (RUBBER SOLED), HAT, WATER AND A FOOD.

MINIMUM REQUIREMENTS FOR FIELD TRUCKS INCLUDE A QUALITY RADIO APPROPRIATE FOR FOREST SERVICE ROADS, OFF-ROAD CAPABLE TIRES IN GOOD CONDITION, SPARE TIRE, JACK, AND TOOLS.

MINIMUM REQUIREMENTS

Equipment	•	•	•
Equipment	•	•	•
GPS	Suncreen	Bugspray	Polarized glasses
Bear Spray	phone/camera	battery pack booster for phone	Hat
first aid kit personal	Waders	Wading Boots (Rubber-soled only)	Ski poles
water	food	gloves work	headlamp
clinometer	field vest (surveyors)	note book	Extra clothes
rain gear	hand lens	range finder	–

Table 3: Crew Equipment Checklist - SEE NOTE ABOVE FOR MINIMUM REQUIREMENTS

Crew Equipment Checklist	•	•	•
glasses safety	Oakton Multimeter	Hand saw	Backpack Electrofisher
stop nets x 4	salt blocks	loose salt	dip nets x 2
Linesman Gloves x 3	tape measure hand	tape measure eslon	pilon x 2
Measuring board	Scale	Permits	Backroads Mapbook
Locational maps	Fish ID book	Background Documents	radio handheld
Satelite communicator	Field Safety Plan	first aid kit level 1	First Aid binder stocked
Site Cards / Field Guide	Minnow Traps	Catfood	Flagging
Laptop w/basecamp	GPS cable	Lazer level	Assessment cards fish passage
UAV radio	UAV	UAV landing pad	UAV GC tape
UAV safety plan (when required)	UAV registration	UAV license	UAV radio license
UAV backpack	Flow meter	ATV	Throw bags
polaski	shovel	fire extinguisher backpack	fire extinguisher pressurized
bucket rigid x 2	bucket foldable	clove oil kit w/ instructions	gloves leather
hard hat	steel toed boots	sharpies	ATV gas
ATV lock	UAV battery charger	wader disinfectant kit	GPS batteries
ATV helmets	Battery booster	Compressor 12V	Rubber boots (no-slip soles)
Small BT Speaker (for bears)	large backpack	–	–

Table 4: eDNA Equipment Checklist - SEE NOTE ABOVE FOR MINIMUM REQUIREMENTS

eDNA Equipment Checklist	•	•	•
field vest (surveyors)	note book	GPS	eDNA sampler
Car adaptor for charging eDNA batteries	Aluminium filter membrane housings x10	Filters	Extra hose
Nalgene bottles	Bleach Decontamination Bottle	Rinse bottle	Forceps/tweezers
95% ethanol	Colman cooler	Ice	Silica beads
Coin envelopes	Ziploc snack bags -medium	Ziploc snack bags -large	Nitrile gloves
3 jars/bowl/cups	–	–	–

Table 5: CABIN Equipment Checklist - SEE NOTE ABOVE FOR MINIMUM REQUIREMENTS

CABIN Equipment Checklist	•	•	•
clinometer	field vest (surveyors)	note book	GPS
phone/camera	Waders	Wading Boots (Rubber-soled only)	Turbidity Meter LaMotte 2020e
bucket rigid x 2	sharpies	wader disinfectant kit	GPS batteries
Colman cooler	Ice	Ziploc snack bags -medium	CABIN field sheets
clipboard	Gloves (rubber, neoprene)	Inside bottle waterproof label - use waterproof paper	Duct tape and tool kit
Densiometer	Velocity metre OR Meter stick	Measuring Tape	15 or 30cm ruler
Hand Level	Calculator	Tent pegs	CABIN Benthic Kick Net
Sieve	White tray	Squeeze Bottles	Spoon/tweezers
Bucket	Cabin sample jars	Formalin	–

Table 6: Truck Equipment Checklist - SEE NOTE ABOVE FOR MINIMUM REQUIREMENTS

Equipment	•	•	•
Hand saw	radio truck	Satelite communicator	first aid kit level 1
polaski	shovel	fire extinguisher backpack	truck tow rope
truck/car jack	Battery booster	Compressor 12V	pilon x 2
Tow strap	cloth or paper towel	–	–

Nearest Hospitals

Figure 1: University Hospital of Northern British Columbia - 1475 Edmonton St., Prince George, BC V2M 1S2 - 250-565-2000

Emergency Response Plan

New Graph Environment's detailed emergency response procedures can be found here. These procedures should be reviewed and an emergency response plan should be completed for each job site. Our Emergency Responce Plan template can be downloaded here.

Driving

We will be driving on forest service roads where it is essential to exercise caution and adhere strictly to all radio use protocols to ensure our safety. Proper communication on these roads helps prevent accidents by keeping everyone informed about vehicle movements and road conditions. Please review the resource road safety and radio use sections of our Health and Safety plan so that everyone stays safe.

Field Plan

Fieldwork will focus on baseline monitoring in the Nechako River, Upper Fraser River, Morkill River, and Francois Lake watershed groups, and fish passage (Phase 1) and habitat confirmation (Phase 2) assessments in the Tabor River, Willow River, Lower Salmon River. Activities will include electrofishing at permitted sites and the collection of environmental DNA (eDNA) samples. Crews from McLeod Lake Indian Band and other partners will support the fieldwork.

Fieldwork methods will result in products feeding reporting formats such as our 2023/2024 report. We generally follow procedures in:

- fish passage assessments (Ministry of Environment 2011)
- habitat confirmations (Fish Passage Technical Working Group 2011).

Information on fish presence/absence, species composition, density, and distribution limits is useful for prioritizing crossings for fish passage restoration and informing follow-up monitoring. To support this, electrofishing, minnow trapping, and eDNA sampling may be conducted where appropriate. Standard Fish and Fish Habitat Inventory Field Forms (site cards) are used to collect habitat data. The field guide for completing these forms is available here.

Passive Integrated Transponder (PIT) tagging equipment is available and may be used to mark fish captured at electrofishing sites. Tagging can support long-term monitoring by providing data on population size and fish movement upstream and downstream of crossings. An overview of the tagging process is available here. To anesthetize fish prior to PIT tagging, we use a clove oil solution at 0.1mL/L (1:10,000), which provides effective sedation with minimal residual effects (Fernandes et al. 2017). The solution is prepared by dissolving clove oil in ethyl alcohol at a 1:9 ratio before mixing into water (Fernandes et al. 2017).

Digital field forms are used to collected data, utilizing Mergin Maps, which syncs with QGIS and supports offline use. Instructions for setting up Mergin Maps and using the digital field forms can be found in the Fish Passage Guidebook. Users should send their Mergin usernames to enable project sharing and form access.

A field guide to freshwater fish identification, such as *Field Key to the Freshwater Fishes of British Columbia* by McPhail and Carveth (1993), can be useful during fieldwork. It is available for download here.

Check In Procedures

Call, text, or InReach Tara Stark (2505059854) each morning to share the plan for the day (i.e. name of roads and sites). Check in time is before 7pm each evening although we regularly check in throughout the day (ex. at arrival to site, 1pm and 4pm) on the InReach or by text and report position/provide updates.

Procedures for Failed Check-In - for Check in person

Procedures are summarized in Figure 2. If phone call or InReach check-in is not received by 7pm send text to InReach units, call or text cell phones of field crew members. If no response please call accommodations then personal emergency contacts to see if they have heard anything. Wait 1 hour and text InReach, text or call cell phones and personal emergency contacts and accommodations again. Repeat after 2 hours (9 pm) - if no response then notify the RCMP of a missing persons in field.

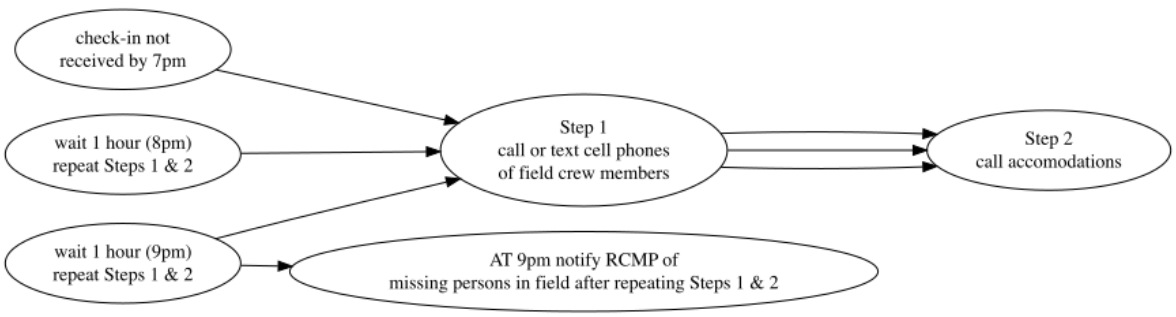

Figure 2: Procedures for failed check-in

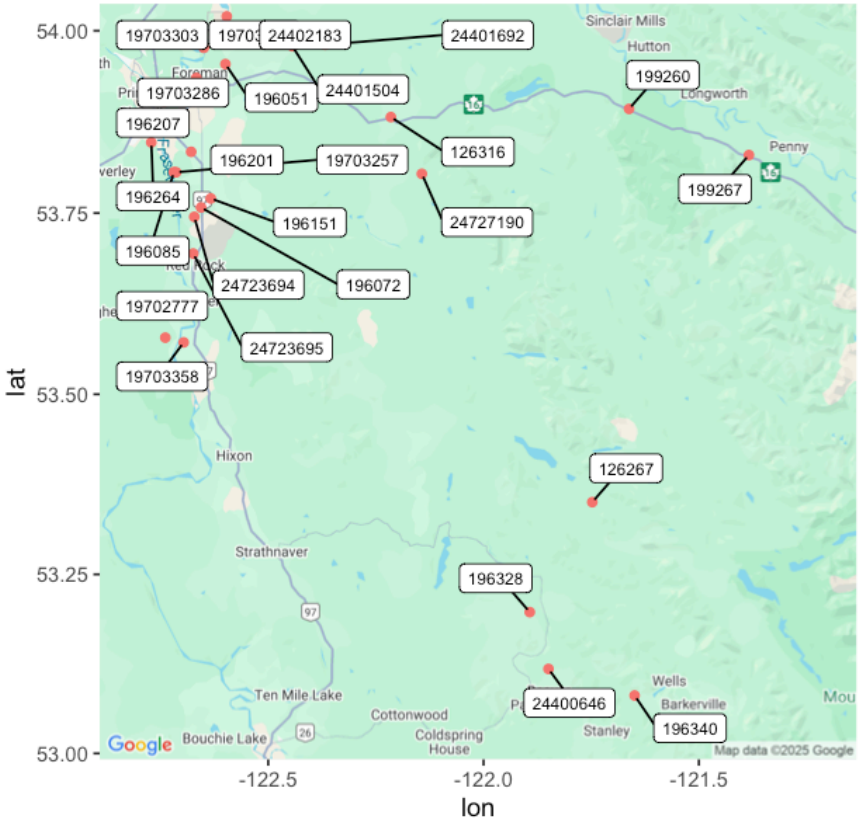

Figure 3: Map of potential sampling areas.

Table 7: Potential Phase 1 assessment, Phase 2 assessment, and Electrofishing Locations

id	stream_name	utm_zone	utm_easting	utm_northing	watershed_group_code	pscis_assessment_comment
7622	Unn Flows Into Fraser Lake	10	388738	5997154	FRAN	Pipe is a potential barrier to fish passage - failed threshold for length, gradient, not embedded, constricted inlet, Inlet drop, and outlet drop. There are bars vertically agains the inlet and the sies of the stream are eroding around them.
126267	Stephanie Cr.	10	583374	5911978	WILL	–
126290	Hay Creek	10	537250	5991350	WILL	–

id	stream_name	utm_zone	utm_easting	utm_northing	watershed_group_code	pscis_assessment_comment
126316	Wansa Creek	10	551588	5970657	WILL	–
196051	Unnamed	10	526285	5978523	TABR	–
196072	Cale Creek	10	522679	5956610	TABR	–
196085	Tabor Creek	10	518502	5962002	TABR	Fish observed at outlet.
196151	Cale Creek	10	524160	5957999	TABR	Beaver dam at inlet.
196201	Haggith Creek	10	521127	5965112	TABR	14m fill depth.
196207	Hudson Bay Slough	10	516996	5972733	TABR	Outlet control.
196264	Parkridge Creek	10	515025	5966533	TABR	–
196328	Archer Creek	10	573972	5894796	WILL	–
196340	Slough Creek	10	590481	5882133	WILL	–
199171	Tributary To Fraser Lake	10	388945	5997015	FRAN	Very nice stream with good flow and abundant gravels upstream and downstream. Landowner indicated sockeye spotted along shoreline years ago. Massive outlet drop. Deserves habitat confirmation and consideration for replacement if no natural barriers upstream. There is a PSCIS assessed site (assessment_id = 7622) upstream that is a barrier. MoTi chris_culvert_id: 1790951. 12:12:56
199172	Scotch Creek	10	388276	5996951	FRAN	Very nice little stream with excellent flow for this time of year on a dry year. Crossing downstream on Gala Bay Road was fully embedded and passible at the time of the assessment. There is a historic chinook observation within this stream. This could be valuable Chinook rearing habitat and connectivity within the system should be restored, should no natural barriers be observed on a habitat confirmation assessment. MoTi chris_culvert_id: 1794198, 1794199. 12:47:26
199173	Tributary To Nechako River	10	398947	5996427	NECR	Very nice stream with excellent flow for this time of year on a dry year. Very large deep outlet pool with extensive erosion undercutting the main pipe and 0.6 m overflow. Locally known as Dog Creek. Chinook captured upstream and downstream of Dog Creek FSR in 2021, 2022, and 2023 reported here https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=62942. Connected to the Nechako River with observed chinook points downstream adjacent to the confluence. Road edge is failing at the culvert and eroding into stream. Highly degraded site upstream that would be a good candidate for restoration. MoTi chris_culvert_id: 1794340. 13:43:26
199190	Clear Creek	10	425559	5996140	NECR	High value habitat, wide channel with good flow and gravels. Known chinook system downstream. Culvert is very damaged near outlet.

id	stream_name	utm_zone	utm_easting	utm_northing	watershed_group_code	pscis_assessment_comment
						There are holes on bottom of pipe about 5m from outlet where water is running through and under the pipe. Culvert is angled down near outlet. Good candidate for replacement. MoTi chris_culvert_id: 1806163. 12:15:10
199237	Snowshoe Creek	10	650784	5934858	MORK	High value spawning and rearing habitat upstream. Massive outlet pool with erosion indicates culvert is extremely under sized. Candy et al 2002 notes chinoook spawning in this system. MoTi chris_hwy_structure_road_id: 3751. 17:54:33
199260	Tributary To Sugarbowl Creek	10	587921	5972449	MORK	Large stream with abundant gravels present upstream suitable for spawning. Massive outlet drop with powerline riparian cleared downstream of the highway. Old growth cedar hemlock riparian within Sugar bowl grizzly den provincial park. Follow up with habitat confirmation recommended. MoTi chris_culvert_id: 1992815. 11:30:20
199267	Driscoll Creek	10	606373	5965784	MORK	Big beaver dam near inlet of culvert spanning across whole channel approx 1.2m high. Boulders in pipe near inlet creating small drop and increasing velocity. Channel widens downstream, high value habitat. RB and CCG confirmed upstream and downstream with chinook observed way downstream at mouth. Low gradient upstream and downsteram with decent outlet drop so resampling to determine chinook presence could be insightful. MoTi chris_culvert_id: 1992674. 14:54:00
199278	Teepee Creek	11	344022	5862734	UFRA	Very nice stream with salmon point in FISS located upstream. Very good flow with some pools present to 80cm deep upstream. Unassessed railway crossing approximately 200m upstream. There is no crossing at the pipeline but construction activities have resulted in a small cascade of boulders at the pipe which is similar to the natural cascade section

id	stream_name	utm_zone	utm_easting	utm_northing	watershed_group_code	pscis_assessment_comment
observed approximately 50m upstream. Railway crossing downstream which is ranked as a barrier. MoTi chris_culvert_id: 1467202. 12:56:09						
12200024	–	10	515409	5989806	LSAL	–
12202167	–	10	496209	5999657	LSAL	–
19702777	–	10	517279	5936628	TABR	–
19703257	Tabor Creek	10	518845	5961982	TABR	–
19703286	Bittner Creek	10	521864	5976392	TABR	–
19703295	–	10	526448	5985791	TABR	–
19703303	Bertschi Creek	10	522978	5980978	TABR	–
19703358	Trapping Creek	10	520105	5935908	TABR	–
24400646	Rucheon Creek	10	577020	5886032	WILL	–
24401504	Tsadestsa Creek	10	536470	5981315	WILL	–
24401692	–	10	541465	5981577	WILL	–
24402183	–	10	541358	5981709	WILL	–
24723694	Cale Creek	10	521645	5955176	TABR	–
24723695	Red Rock Creek	10	521513	5949553	TABR	–
24727190	Wansa Creek	10	556416	5962053	WILL	–

References

Fernandes, I. M., Y. F. Bastos, D. S. Barreto, L. S. Lourenço, and J. M. Penha. 2017. “The Efficacy of Clove Oil as an Anaesthetic and in Euthanasia Procedure for Small-Sized Tropical Fishes.”*Brazilian Journal of Biology = Revista Brasleira De Biologia* 77 (3): 444–50. https://doi.org/10.1590/1519-6984.15015.

Fish Passage Technical Working Group. 2011. “A Checklist for Fish Habitat Confirmation Prior to the Rehabilitation Fo a Stream Crossing.”https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/land-based-investment/forests-for-tomorrow/checklist-for-fish-habitat-confirmation-201112.pdf.

McPhail, J. D., and R Carveth. 1993. “Field Key to the Freshwater Fishes of British Columbia.”https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/field_key_to_freshwater_fishes_of_bc_field_size_water_resistant_version.pdf.
Ministry of Environment. 2011. “Field Assessment for Determining Fish Passage Status of Closed Bottom Structures.” BC Ministry of Environment (MoE). https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/land-based-investment/forests-for-tomorrow/field-assessment-for-determining-fish-passage-status-of-cbs.pdf.