

## **CAMP Fish Community Sampling Protocol**

Fish community monitoring is conducted using two sets of gear (standard gang index gill nets and small mesh index gill nets) at approximately the same time of year within a given waterbody. Fixed gill net locations are resampled each year of monitoring.

For lakes, the set locations were selected to provide even distribution across the waterbody or basin while avoiding bias towards certain habitat types or species preferences. For riverine sites, set locations were selected based on the practicality of sampling at a given location. Set locations were chosen to encompass the full extent of the sampling area, and as many habitat types as possible given flow conditions. If/when necessary, in riverine environments, net gangs may be split up to accommodate the limited area available for deployment; in such instances all meshes for the gang are set concurrently and in close proximity.

### **Sampling Gear**

#### **Standard gang index gill nets for large-bodied fish**

Standard gangs consist of five separate nets, each a different mesh size. Each net is 25 yards long, cut to approximately 2 yards deep and is seamed on to #30 leadline and 3/8" floatline. All mesh is light green twisted nylon that is tied on the half.

The specifications for each mesh are:

- 2" stretched mesh measure 210-3, 45 mesh deep;
- 3" stretched mesh measure 210-3, 30 mesh deep;
- 3 3/4" stretched mesh measure 210-3, 24 mesh deep;
- 4 1/4" stretched mesh measure 210-4, 21 mesh deep; and
- 5" stretched mesh measure 210-4, 18 mesh deep.

Gangs are assembled by joining the nets floatline-to-floatline and leadline-to-leadline. Gangs are organized with the meshes in sequence (2", 3", 3 3/4", 4 1/4", and 5"). The ends of each gang have 4 m long sideline bridles.

#### **Small mesh index gill nets for small-bodied fish**

Small mesh gangs consist of three mesh sizes, each constructed as a separate net. Each net is 10 m long and 1.8 m deep with an integral float and leadline (Swedish gill nets). Mesh sizes are 16 mm, 20 mm and 25 mm stretched mesh measure. All mesh is multi-strand clear monofilament.

Gangs are assembled by joining the nets floatline-to-floatline and leadline-to-leadline. Gangs are organized with the meshes in sequence (16 mm, 20 mm, and 25 mm). The ends of each gang have 4 m long sideline bridles.

### **Gillnetting Method**

Each gang is clearly marked with either Fisheries Branch flags or the Scientific Collection Permit number and agency name on net buoys. Nets are set perpendicular to the nearest shore, except in riverine locations where current dictates that nets are set parallel to the flow.

A standard gang is set at every sample location. At approximately every third set location a small mesh gang is attached to the standard gang. The largest mesh end of the small mesh gang is attached to the smallest mesh end of the standard gang. If fewer than nine standard gangs are set, a minimum of three small mesh gangs are set.

The following information is collected at every gill net site:

- Type of index net and site location: standard gang (labelled as GN-#) or small mesh gang (labelled as SN-#);
- Date and time set and pulled;
- Field crew initials;
- GPS coordinates at each end of the gang (GPS coordinates should be UTM, NAD 83, and UTM Zone 14 or 15);
- A digital photo of the nearest shoreline to each site using a GPS-linked camera;
- Water depth at each end of the gang to the nearest decimetre;
- Water temperature;
- Secchi disc depth;
- Proximity and orientation to shore (main channel, flow, perpendicular, parallel);
- Any unusual shoreline conditions (e.g., wave action, plumes, ice, eroding banks);
- Local weather conditions (e.g., wind direction and air temperature);
- Water velocity for riverine sets (none/standing, low, medium, high);
- Substrate (based on the anchors): compaction (hard vs. soft) and composition (gravel, boulder, bedrock, sand, mud, etc.);
- Aquatic vegetation present (none, low, medium, high);
- Quantity of debris present in the net (none 0%, low <5%, medium 5-15%, high 16-25%, very high >26%, gang destroyed, gang lost); and
- Type and percentage of debris present (e.g., aquatic vegetation, aquatic moss, silt/mud, sticks, algae, terrestrial vegetation, clams).

Gill nets are set for approximately 24 hours. Set times are lower (approximately 16 hours) for the lower Churchill River at the Little Churchill River site to minimize Lake Sturgeon mortality. An additional measure to minimize sturgeon mortalities includes immediate termination of the sampling program at any location if the number of Lake Sturgeon mortalities reaches eight.

If conditions result in a set of over 36 hours in duration at more than two sets on a waterbody, the sets are repeated. If sets exceeding 24 hours result in fish that are in too poor a condition to collect individual metrics the entire sample is discarded and the set repeated.

### **Fish Sampling**

A fish number is assigned, and individual metrics are taken from all specimens of selected species from both the standard gangs and small mesh gangs. These “target” species differ slightly from waterbody-to-waterbody as indicated in Table 1. Northern Pike and Walleye are target species in all CAMP waterbodies. Lake Whitefish are a target species in all waterbodies except the on-system waterbodies in the Winnipeg River Region. Sauger was added as a target species for all waterbodies in 2017, due to their apparent increase in abundance in several regions in Manitoba. White Sucker was added as a target species in all waterbodies in 2010.

The individual metrics for all target species include:

- Fork length  $\pm$  1 mm;
- Weight  $\pm$  10 g ( $\pm$  1 g if species <200 g); and

- External condition, including the occurrence of deformities, erosion, lesions, and tumours (DELTs).

Additional metrics collected for Northern Pike, Walleye, Sauger, and Lake Whitefish include:

- Sex and maturity are determined and photographs of representative categories are collected; and
- Ageing structures are collected and placed in an envelope marked with the waterbody, date, site, species, and sample number. Ageing structures collected are:
  - Walleye – otolith;
  - Sauger – otolith;
  - Lake Whitefish – otolith; and
  - Northern Pike – cleithra.

All other species of fish are sampled as follows:

- Fish from each mesh in the standard gangs are separated by species, counted, and bulk weighed to the nearest 10 g; and
- Fish from the small mesh gangs are not separated by mesh, but are separated by species, counted, and bulk weighed to the nearest 10 g (1 g if species is < 200 g).

Although Lake Sturgeon are not a target species, they are of specific management interest in all locations and are released alive after the following information is collected:

- Total length and fork length  $\pm$  1 mm;
- Weight to the nearest 25 g for fish > 25,000 g or to nearest 10 g for fish  $\leq$  25,000 g; and
- Occurrence of DELTs.

**Table 1. Target fish species and number of gill net sites sampled under the CAMP fish community monitoring program.**

Waterbody	Type of Site	Target Species <sup>a</sup>	Gill Net Sites <sup>b</sup>	
			# GN Sets	# SN Sets
<b>Winnipeg River Region</b>				
Pointe du Bois Forebay	Annual / On-system	WALL, SAUG, NRPK, and WHSC	12	4
Lac du Bonnet	Annual / On-system	WALL, SAUG, NRPK, and WHSC	10	3
Pine Falls Forebay	Rotational / On-system	WALL, SAUG, NRPK, and WHSC	9	3
Manigotagan Lake	Annual / Off-system	WALL, SAUG, NRPK LKWH, and WHSC	6	3
Eaglenest Lake	Rotational / Off-system	WALL, SAUG, NRPK, and WHSC	12	4
<b>Lake Winnipeg Region</b>				
Lake Winnipeg - Sturgeon Bay	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	10	3
Lake Winnipegosis	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
<b>Saskatchewan River Region</b>				
Cedar Lake - southeast	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Lake Winnipeg - Grand Rapids	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Saskatchewan River	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Cedar Lake - west	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	3
South Moose Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	3
Cormorant Lake	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	16	4
<b>Upper Nelson River Region</b>				
Lake Winnipeg - Mossy Bay	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Cross Lake – west basin	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Playgreen Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Little Playgreen Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	10	3

Waterbody	Type of Site	Target Species <sup>a</sup>	Gill Net Sites <sup>b</sup>	
			# GN Sets	# SN Sets
Sipiwesk Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Upper Nelson River upstream of the Kelsey GS	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Setting Lake	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	16	4
Walker Lake	Rotational / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
<b>Lower Nelson River Region</b>				
Split Lake	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Lower Nelson River d/s of the Limestone GS	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Burntwood River d/s First Rapids	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Stephens Lake - South	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Stephens Lake - North	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Limestone Forebay	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Assean Lake	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Hayes River	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
<b>Upper Churchill River Region</b>				
Southern Indian Lake - Area 4	Annual /On-system	WALL, SAUG, LKWH, NRPK, and WHSC	24	8
Opachuanau Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Southern Indian Lake - Area 1	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Southern Indian Lake - Area 6	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Rat Lake	Rotational/On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Mynarski Lake	Rotational/On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Notigi Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3

Waterbody	Type of Site	Target Species <sup>a</sup>	Gill Net Sites <sup>b</sup>	
			# GN Sets	# SN Sets
Granville Lake	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
<b>Lower Churchill River Region</b>				
Northern Indian Lake	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	12	4
Churchill River at the Little Churchill River	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Partridge Breast	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Fidler Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Billard Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Lower Churchill River at the Churchill Weir	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Gauer Lake	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
<b>Churchill River Diversion Region</b>				
Threepoint Lake	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Wuskwatim Lake	Annual / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	11	4
Footprint Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Apussigamasi Lake	Rotational / On-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3
Leftrook Lake	Annual / Off-system	WALL, SAUG, LKWH, NRPK, and WHSC	9	3

<sup>a</sup> WALL = Walleye; SAUG = Sauger; LKWH = Lake Whitefish; NRPK = Northern Pike; WHSC = White Sucker

<sup>b</sup> GN = Standard Gang Index Gill Nets; SN = Small mesh index gill nets