

Appendix A

Habitat Preferences for Common Fish Species in the Keeyask Study Area

Table A-1: Habitat Requirements for Common Fish Species in the Keeyask Study Area by Life Stage

Species	Spawning	Rearing (fry/juvenile)	Adult	Overwintering
ACIPENSERDAE (sturgeon family)				
Lake sturgeon (<i>Acipenser fulvescens</i>) LKST	Likely occurs in late spring, May to June; in swift flowing water or rapids, base of falls; water depth 0.6 – 4.9 m; rocky substrate.	Shallow bottom areas of lakes and rivers; feed on bottom for clams, snails, insect larvae, some fish and plant material; mud and mud/gravel substrate.	Shallow bottom areas of lakes and rivers; typically mud or gravel/mud substrate; deep back eddies >2.5 m depth; outside river bend 0.5 m depth; feed on bottom for clams, snails, insect larvae, some fish and plant material.	Deep wintering areas of large rivers and lakes.
SALMONIDAE (trout family)				
Brook trout (<i>Salvelinus fontinalis</i>) BKTR	Gravelly headwater streams with low amounts of fine sediments in the substrate; often associated with groundwater seepage; water >9 cm deep; water velocities 0.08- 0.1 m/s; occurs September to November.	Shallow pools and side channels; cover consisting of boulders and interstitial spaces, overhanging vegetation, logs; water velocity <0.5 m/s.	Cool, well oxygenated streams with gravel/cobble substrate; pool habitat; undercut banks; areas with cover from overhanging and instream vegetation and rocks; water depth <0.7 m and velocities 0.08-0.26 m/s.	Lakes; large water courses; deep pools >1.2 m in depth.
Cisco (<i>Coregonus artedii</i>) LKCS	Late October to December at 5-2°C in lakes; various substrates, often gravel or small cobble;	Larval cisco require light to feed; consume algae, copepods, cladocerans.	Pelagic; in schools; feed on plankton, crustaceans, and insects.	Lakes with plenty of oxygen.
Lake whitefish (<i>Coregonus clupeaformis</i>) LKWH	Occurs September to January; firm substrate (i.e., rocks or compact sand); at depths of 2–4 m in lakes; broadcast spawn over rock, gravel, or sand in shallow riffle areas of large rivers.	Rear in large groups; along steep shorelines; migrate to deeper water by early summer.	Restricted to cool well-oxygenated regions of lakes; in Alberta they occasionally occur in rivers.	Deep pools and lakes; minimum DO levels of >3 mg/L.
OSMERIDAE (smelt family)				
Rainbow smelt (<i>Osmerus mordax</i>) RNSM	Early spring; lake shores or rivers; gravel.		Schooling; pelagic; midwater of lakes and larger rivers; anadromous; carnivore/insectivore.	
ESOCIDAE (pike family)				
Northern pike (<i>Esox lucius</i>) NRPK	Occurs in early spring, during or shortly after the ice clears; shallow marshes connected to rivers and lakes or flooded vegetation in shallow bays and rivers; water velocity <0.1 m/s; water depth 0.1- 0.7 m.	Prefer dense submergent and emergent vegetation (>30% cover) in the calm bays of sloughs, marshes and lakes and in the back eddies or mouths of (low gradient) tributary streams; water depth <4 m.	Prefer shallow, weedy, clear waters primarily in lakes and marshes; common in streams with slow to moderate current with ample aquatic vegetation and fine substrate; diet consists of fish, crustacean, minnows, insects and young muskrats and ducks.	Typically deep water; dissolved oxygen >3-4 mg/L.
GADIDAE (cod family)				
Burbot (<i>Lota lota</i>) BURB	Boulders, cobble, or gravel with small amount of silt, sand and detritus; shallow bays or on shoals of lakes and rivers; no current; clear water; <2m deep; mid-winter under ice.	Juveniles occur along rocky shores and weedy areas of tributary streams; cover is important.	Cold parts of lakes and in large and small streams; in cold rivers prefer moderate-high turbidity, velocities <0.46 m/s, water depths <0.76 m, and rubble/cobble substrates; diet consists of fish and aquatic insect larvae as well as whitefish eggs; adults are night feeders and voracious predators.	Deep water of lakes and large rivers; sensitive to DO levels with acute lethal DO limit <2 mg/L.
CATOSTOMIDAE (sucker family)				
Longnose sucker (<i>Catostomus catostomus</i>) LNSC	Shallows of streams or areas of lakes; gravel substrate; water depth 0.15-0.28 m; water velocity 0.3-0.45 m/s; mid-April to mid-May.	Fry remain within gravel for 1-2 weeks then disperse to bottoms of deeper, cooler lakes and clear rivers; often in association with vegetation and sandy substrates.	Slow water areas of rivers such as back eddies and river mouths; adult fish feed primarily on bottom invertebrates.	Slow water areas of river such as back eddies and river mouths that contain adequate oxygen.
White sucker (<i>Catostomus commersoni</i>) WHSC	Spring spawning, between May and June; prefer inlet or outlet streams of lakes but will use lake margins as well; usually in flowing water over gravel substrate, near pools.	YOY prefer shallow water near shore during the day to feed on plankton then move to deeper water at night. Juveniles also prefer shallow	Commonly associated with warm, shallow water in lakes and tributary streams; feed on benthic organisms and detritus.	Slow water areas of river such as back eddies and river mouths that contain adequate oxygen.

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		waters then, with age, move to deeper waters.		
PERCOPSIDAE (trout-perch family)				
Trout perch (<i>Percopsis omiscomaycus</i>) TRPR	Early spring; shallow streams and lake shores; substrate rocky or gravel and sand;	Deep lakes, rivers and shallow streams; tolerates turbid water.	Deep lakes, rivers and shallow streams; tolerates turbid water; diet consists of insect larvae, amphipods and minnows.	
COTTIDAE (sculpin family)				
Slimy sculpin (<i>Cottus cognatus</i>) SLSC	April to May; spawn under rocks.		Rivers, lakes (shallow or deep), streams and tidal pools; tolerates muddy, clear and slaine water; rocks important as juveniles are active over the substrate while adults hold under the rocks and emerge at night to feed.	
PERCIDAE (perch family)				
Iowa darter (<i>Etheostoma exile</i>) IWDR	Spring and early summer; sand/organic substrates.	Feed on small crustaceans (copepods, cladocerans)	Lakes and clear slow streams; shallow water; associated with aquatic vegetation and shelter; feed on insects.	Lakes and clear slow streams.
Johnny darter (<i>Etheostoma nigrum</i>) JHDR	Spring and early summer; under rocks.	Consume copepods, cladocerans, and midge larvae.	Moderate to no current; sand, sand/gravel, or sand/silt bottom; weedy areas; feed on insects larvae.	
Sauger (<i>Sander canadensis</i>) SAUG	Occurs in the spring, May to June; may use shoals of gravel to rubble; turbid rivers; 0.6 – 3.9 m depth.	Presumably similar to adult stage.	Found in slow flowing rivers; tolerant of turbid waters; backwater areas and mouths of tributary streams; feed on bottom dwelling fishes and insects.	
Walleye (<i>Sander vitreus</i>) WALL	Inlet streams or tributaries; rocky shoals in lakes; boulder to coarse gravel substrate; water velocities 0.73-1.5 m/s; mid-April to late May.	Turbid or dark water; slow velocity for juveniles using banks and logs for cover; gravel-cobble substrate; avoiding submerged vegetation.	Tolerant of a great range of environmental conditions; most abundant in large, shallow, and turbid lakes; frequent large streams, provided they are deep and turbid enough with ample hiding cover; diet consists of fish and aquatic invertebrates.	Deep pools; minimum DO levels of >6 mg/L
Yellow perch (<i>Perca flavescens</i>) YLPR	Typically occurs near rooted vegetation, submerged brush, fallen trees and rocks, but at times occurs over sand and gravel substrates.	Shallow water, near shores; at the end of the first year, diet shifts from plankton and chironomid larvae to larger benthic invertebrates.	Very adaptable and able to utilize a wide variety of warm to cooler habitats; large lakes to ponds, or quiet rivers; abundant in shallow open water of lakes with moderate levels of vegetation growth; clear water; substrates of fines and gravel.	Fish concentrate offshore during the winter; acute lethal DO Limit <1 mg/L
SCIAENIDAE (drum or croaker family)				
Freshwater drum (<i>Aplodinotus grunniens</i>) FRDR	Spring-summer.	Shallow water of lakes, rivers, streams; eat zooplankton and chironomids.	Shallow water of lakes, rivers, streams; sandy, silty bottoms; often turbid water; bottom feeder.	
HIODONTIDAE (mooneye family)				
Goldeye (<i>Hiodon alosoides</i>) GOLD	Occurs in the spring, May to June; turbid rivers; pool or backwater areas; some evidence suggests the eggs are suspended in the water column and drift downstream.	Presumably similar to adult stage.	Found in quiet waters of lakes, large rivers, ponds and marshes; tolerate turbid water; feed on a variety of sources, including insects, invertebrates, small fishes and vertebrates.	Deep areas of lakes and rivers.
Mooneye (<i>Hiodon tergisus</i>) MOON	Spring spawners; likely April to June.	Presumably similar to adult stage.	Found where there is an abundance of food supply: aquatic and terrestrial invertebrates, and small fishes.	

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GASTEROSTEIDAE (stickleback family)				
Brook stickleback (<i>Culea inconstans</i>) BRST	Builds nests in shallow water, on the stems of grass, reeds, or on substrate bottom; spring-early summer	Streams, shallow lakes, and bays; associated with vegetation; slow-moderate current.	Streams, shallow lakes, and bays; associated with vegetation; slow-moderate current.	High tolerance to low oxygen concentration.
CYPRINIDAE (minnow family)				
Fathead minnow (<i>Pimephales promelas</i>) FHMN	Occurs from June through to August; water depth < 1 m; underside of log, branch or rock.	Presumably similar to adult stage.	Found in turbid streams, ponds and lakes; quiet, shallow waters; tolerant of extreme pH and salinity levels, as well as low DO levels; feeds on algae, zooplankton, and insect larvae.	High tolerance to low oxygen concentration.
Finescale dace (<i>Phoxinus neogaeus</i>) FNDC	Presumably in the spring; mate under debris		Feed mainly on insects, other invertebrates and algae; occur in lakes and slow flowing streams with stained, boggy water.	
Lake chub (<i>Couesius plumbeus</i>) LKCH	Migrate from lakes to tributary streams; June to mid-August.	Fry typically found in submerged vegetation; slow flowing water; food preference variable but typically insects, zooplankton and algae	Lakes, rivers, and small streams; food preference variable but typically insects, zooplankton, and algae.	Intermediate sensitivity to DO levels with acute lethal DO limit 1-2 mg/L.
Longnose dace (<i>Rhinichthys cataractae</i>) LNDC	Riffle areas containing gravel substrate.	Shallow water near shore; velocity low to none.	Swift flowing streams; inshore waters of lakes; gravel to boulder substrate.	
Northern redbelly dace (<i>Phoxinus eos</i>) NRDC	July to August; over aquatic plants or in filamentous algae pockets.	Quiet water; nearshore in vegetation.	Quiet water; boggy lakes, creeks, and ponds; substrates of silt and detritus.	
Pearl dace (<i>Margariscus margarita</i>) PRDC	Gravel to silt; quiet or flowing water; 45-60 cm deep; April-May.		Cool, clear, slow-flowing water; bog habitat.	
Spottail shiner (<i>Notropis hudsonius</i>) SPSH	Late spring to early summer; over sandy shoals; gravel; occurs in large schools.	Presumably similar to adult stage.	Common in lakes, rivers and streams; schools found in open water of lakes; feed on plankton, aquatic insects, and bottom fauna.	

Source: Barton and Taylor (1996), Casselman and Lewis (1996), Evans *et al.* (2002), Joynt and Sullivan (2003), McPhail and Lindsey (1970), Nelson and Paetz (1992), Scott and Crossman (1973)

