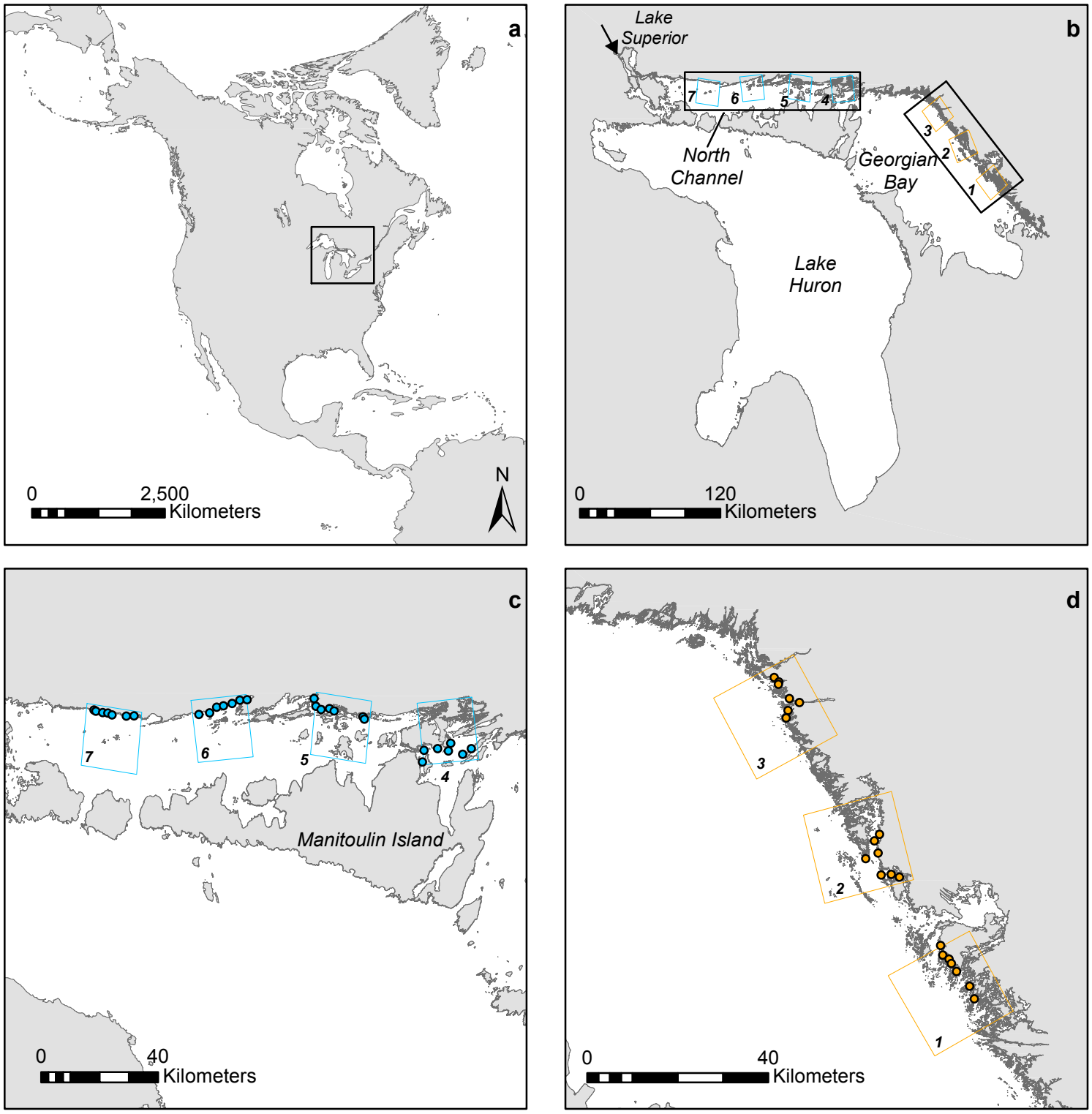
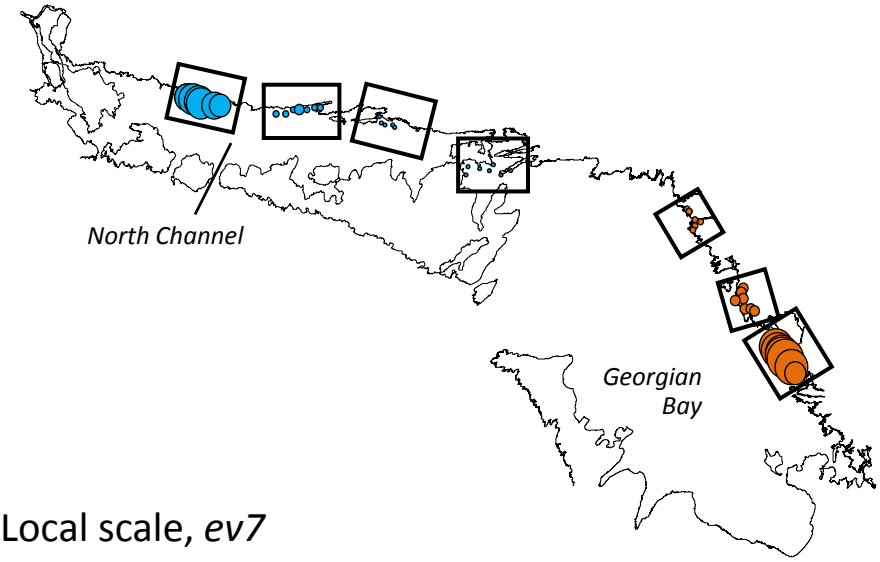
Appendix S1. Map of a) North America with a box outlining the Great Lakes, b) Lake Huron study area with boxes outlining numbered sampling frames, c) inset of Georgian Bay sites within frames (1-3), and d) North Channel sites within frames (4-7). Frames delineate clusters of sampling sites and spatial extent of cormorant sampling. The arrow in b) indicates where inflow from Lake Superior enters the North Channel.

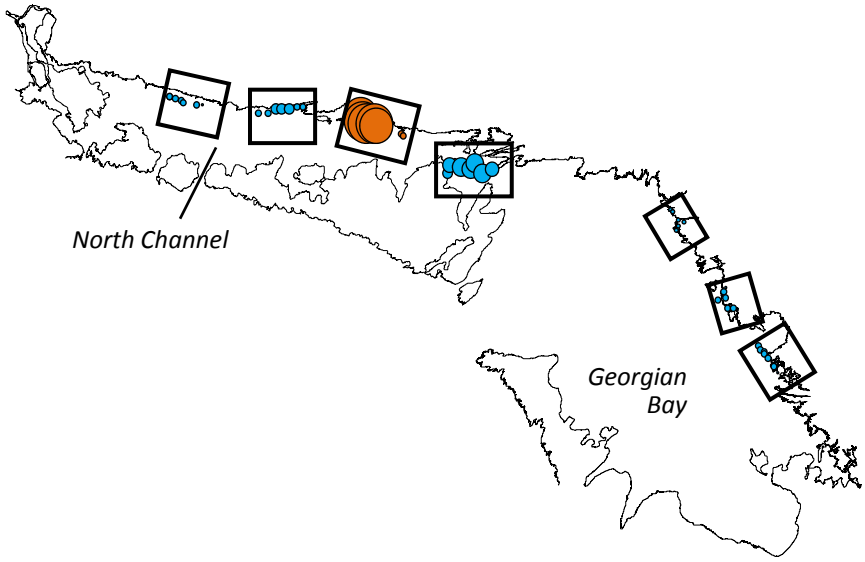


Appendix S2: Examples of eigenvector maps of sampling sites at two spatial scales: (a) regional (*ev3*) and (b) local (*ev7*). The size of the circle is proportional to the value of a site in comparison to other sites, while the colour of the circle represents the direction of the value (orange=negative, blue=positive). In (a), there is strong positive autocorrelation at broad spatial scales, separating sites in Georgian Bay from sites in the North Channel. In (b), positive spatial autocorrelation exists, but at a smaller scale than that observed in (a) (ie., between frames).

(a) Regional scale, *ev3*



(b) Local scale, *ev7*



Appendix S3

Table S3: Functional traits of fish species. Parental care based on classification of Winemiller (1989). Juvenile survivorship was estimated following Olden et al. (2006), where juvenile survivorship = ln [(egg diameter + 1)*(parental care + 1)]. Life history categories: opp = opportunistic, equil = equilibrium, per = periodic.

Family	Scientific name	Common name	ID	Length at maturity (mm)	Mean clutch size	Egg diameter (mm)	Parental care	Juvenile survivorship	Life history classification	Trophic classification	Thermal guild
Amiidae	*Amia calva*	bowfin	1	610	33383	2.5	3	2.62	equil	piscivore	warm
Atherinidae	*Labidesthes sicculus*	brook silverside	2	74	429	1.4	1	1.55	opp	insectivore	cool
Catostomidae	*Catostomus commersonii*	white sucker	3	253	76250	2.8	1	2.03	per	omnivore	cool
Catostomidae	*Moxostoma macrolepidotum*	shorthead redhorse	4	195	25772	3.3	1	2.15	equil	insectivore	warm
Centrarchidae	*Ambloplites rupestris*	rock bass	5	54	6500	2.1	3	2.52	equil	piscivore	cool
Centrarchidae	*Lepomis gibbosus*	pumpkinseed	6	59	14886	3.6	3	2.91	equil	omnivore	warm
Centrarchidae	*Lepomis macrochirus*	bluegill	7	93	41732	1.2	3	2.17	per	insectivore	warm
Centrarchidae	*Micropterus dolomieu*	smallmouth bass	8	264	14858	2.3	4	2.80	equil	piscivore	warm
Centrarchidae	*Micropterus salmoides*	largemouth bass	9	272	55657	1.7	4	2.60	per	piscivore	warm
Centrarchidae	*Pomoxis annularis*	white crappie	10	146	163793	0.9	3	2.03	per	piscivore	cool
Clupeidae	*Alosa pseudoharengus*	alewife	11	138	16777	0.9	1	1.34	equil	insectivore	cold
Cottidae	*Cottus* spp.	sculpin	12	63	721	2.8	4	2.93	opp	insectivore	cold
Cyprinidae	*Couesius plumbeus*	lake chub	13	108	5970	1.5	1	1.60	equil	omnivore	cold
Cyprinidae	*Cyprinus carpio*	carp	14	353	1122000	1.5	1	1.61	per	omnivore	warm
Cyprinidae	*Luxilus cornutus*	common shiner	15	74	2170	1.3	3	2.20	opp	omnivore	cool
Cyprinidae	*Notemigonus crysoleucas*	golden shiner	16	64	3675	1.0	1	1.39	opp	omnivore	cool
Cyprinidae	*Notropis atherinoides*	emerald shiner	17	42	4801	0.9	1	1.31	opp	insectivore	cool
Cyprinidae	*Notropis heterodon*	blackchin shiner	18	37	1238	0.9	1	1.36	opp	insectivore	cool

Table S3 cont'd

Family	Scientific name	Common name	ID	Length at maturity (mm)	Mean clutch size	Egg diameter (mm)	Parental care	Juvenile survivorship	Life history classification	Trophic classification	Thermal guild
Cyprinidae	*Notropis heterolepis*	blacknose shiner	19	24	1135	0.8	1	1.28	opp	insectivore	cool
Cyprinidae	*Notropis hudsonius*	spottail shiner	20	55	4907	1.0	1	1.36	opp	insectivore	cold
Cyprinidae	*Notropis volucellus*	mimic shiner	21	35	514	0.9	1	1.34	opp	omnivore	warm
Cyprinidae	*Pimephales notatus*	bluntnose minnow	22	50	2654	1.1	3	2.11	opp	omnivore	warm
Cyprinidae	*Rhinichthys cataractae*	longnose dace	23	74	1787	1.6	1	1.65	opp	insectivore	cool
Cyprinidae	*Rhinichthys obtusus*	western blacknose dace	24	49	867	1.5	1	1.61	opp	omnivore	cool
Cyprinodontidae	*Fundulus diaphanus*	banded killifish	25	53	229	2.1	1	1.81	opp	insectivore	cool
Esocidae	*Esox lucius*	northern pike	26	534	301446	2.8	1	2.03	per	piscivore	cool
Esocidae	*Esox masquinongy*	muskellunge	27	650	135658	2.1	0	1.12	per	piscivore	warm
Gadidae	*Lota lota*	burbot	28	370	744861	1.1	1	1.44	per	piscivore	cold
Gasterosteidae	*Culaea inconstans*	brook stickleback	29	50	271	1.2	3	2.17	opp	insectivore	cool
Gasterosteidae	*Pungitius pungitius*	ninespine stickleback	30	35	104	1.3	4	2.42	opp	insectivore	cold
Ictaluridae	*Ameiurus nebulosus*	brown bullhead	31	161	7650	3.0	4	3.00	equil	omnivore	warm
Lepisostediae	*Lepisosteus osseus*	longnose gar	32	500	40714	3.0	1	2.08	equil	piscivore	warm
Percidae	*Etheostoma caeruleum*	rainbow darter	33	37	815	1.2	1	1.50	opp	insectivore	cool
Percidae	*Etheostoma nigrum*	johnny darter	34	37	684	1.5	3	2.30	opp	insectivore	cool
Percidae	*Perca flavescens*	yellow perch	35	175	80179	2.7	1	2.00	per	piscivore	cool
Percidae	*Sander vitreus*	walleye	36	328	318500	1.9	1	1.76	per	piscivore	cool
Percopsidae	*Percopsis omiscomaycus*	trout-perch	37	78	976	1.7	1	1.69	opp	insectivore	cold
Salmonidae	*Oncorhynchus gorbuscha*	pink salmon	38	411	1800	5.7	2	2.99	equil	piscivore	cold
Umbridae	*Umbra limi*	central mudminnow	39	110	1238	1.4	3	2.26	opp	omnivore	cool

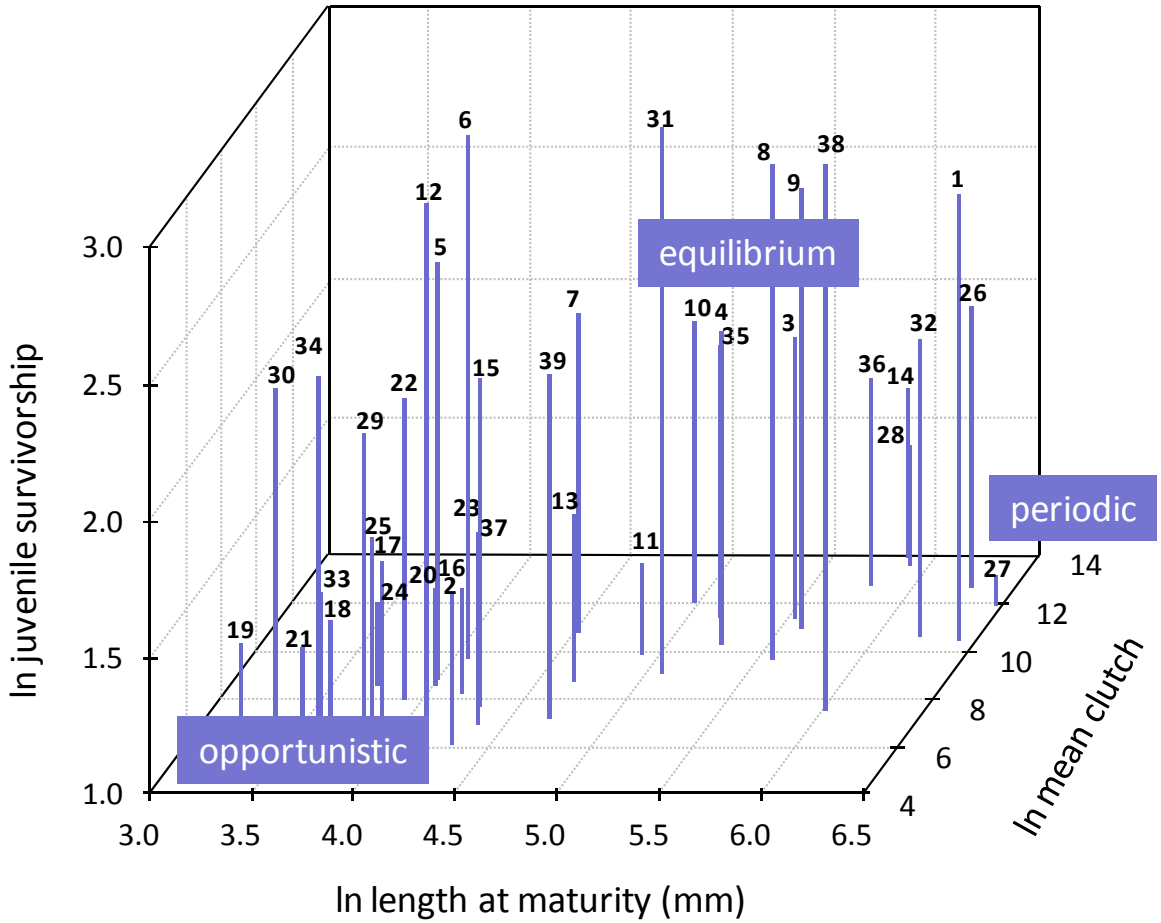


Figure S3: Life history continuum of fish species in Lake Huron coastal fish communities, contrasting ln length at maturity (mm), ln mean clutch size, and ln juvenile survivorship (ln [(egg diameter + 1)*(parental care + 1)]). Species codes in Table S3. Life history endpoints were defined as follows: opportunistic (minimum clutch size, minimum juvenile survivorship, and minimum maturation size), periodic (maximum clutch size, minimum juvenile survivorship, and maximum maturation size), and equilibrium (mean clutch size, maximum juvenile survivorship, and maximum maturation size).

References

Olden JD, Poff NL, Bestgen KR (2006) Life-history strategies predict fish invasions and extirpations in the Colorado River Basin. Ecol Monogr 76:25-40

Winemiller KO (1989) Patterns of variation in life history among South American fishes in seasonal environments. Oecologia 81:225-241