

**SELECTED LIFE HISTORY ATTRIBUTES
OF SOME NORTH AMERICAN ENDEMIC
AND INTRODUCED SPECIES OF FISHES**

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EPA 600-3-86-020

NTIS PB86175726/AS

MARCH, 1986

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The purpose of assembling certain selected life history attributes of fish species is to allow the utilization of such data in characterizing relationships among and within those same species. Much of what we have to learn about species and their relationships to their environments is encompassed by expressions of their adaptation to differing environments and to environmental changes. These expressions include life history attributes among others.

Such data as longevity of individuals within populations of a species, maximum size attained by individuals within a population and the maximum number of eggs produced by individual females within populations have proven useful in conjecturing about survival strategies and, indeed, testing hypotheses about those survival strategies. The data presented in Table 1 of this paper were collected for the express purpose of testing a hypothesis about the tolerance of species to toxicants. The usefulness of this data to others cannot be gauged until they are made available in the open literature and others will have had the opportunity to utilize them for their unique purposes.

This data set is not exhaustive. Several important sources of life history data, notably United States Government publications, publications of state academies of science and state conservation agencies were not examined. However some 450 populations among 177 species are repre-

sented.

It is clear that of the life history studies done most were on species of either commercial or recreational importance and if this compilation of data is a fair representation of all such life history data available on North American fishes then we have hardly scratched the surface and the data certainly do not cover all ecological niches. The data do, however, cover a broad spectrum of longevities, sizes and fecundities.

The data presented in Table 1 are reported directly from life history studies in the published literature or indirectly from published compilations of life history studies (care was taken not to duplicate data where this effort had access to both). The life history attributes presented are in years for longevity, grams for maximum weight attained and number of eggs per female for maximum fecundity. The data were reported directly from life tables, age-growth tables and reproduction data tables or they were calculated from relationships presented in the studies such as length-weight relationships and by expanding eggs per unit weight of female by maximum weight attained by females.

Acknowledgements

This work was conducted under a cooperative agreement between Utah State University and the United States Environmental Protection Agency (EPA # CR811646-01-0). Thanks is extended to the staff of the Environmental Research Laboratory-Duluth who were free with their services and their much appreciated advice.

Table 1. Longevity in years, maximum weight attained in grams and maximum fecundity of fish as reported in the literature.

FAMILY	Species	Age	Wt.	Fec.	Reference
ACIPENSERIDAE					
	<i>Acipenser brevirostrum</i>	26	4125		Taubert 1980
	<i>Acipenser fulvescens</i>	65	37194		Royer et al 1968
	<i>Acipenser transmontanus</i>	71	45772		Semakula and Larkin 1968
AMMODYTIDAE					
	<i>Ammodytes dubius</i>	8			Winters 1981
ANGUILLIDAE					
	<i>Anguilla anguilla</i>	7	840		Rossi and Villani 1980
	<i>Anguilla rostrata</i>	20	800	20000000	Carlander 1969
	<i>Anguilla rostrata</i>	18	1614		Hurley 1972
	<i>Anguilla rostrata</i>			2561000	Wenner and Musick 1974
APHREDODERIDAE					
	<i>Hypostomus plecostomus</i>	3	7		Shepherd and Huish 1978
ATHERINIDAE					
	<i>Menidia extensa</i>	2	2	150	Davis and Louder 1969
BRAMIDAE					
	<i>Brama japonica</i>		2354		Manzer 1972
CALLIONYMIDAE					
	<i>Callionymus belcheri</i>	3		1710	Johnson 1972
CARANGIDAE					
	<i>Trachurus symmetricus</i>	10			Kaiser 1973
CARCHARHINIDAE					
	<i>Carcharhinus falciformis</i>			6	Bane 1966

Table 1. (contd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
CATOSTOMIDAE					
	<i>Carpioles carpio</i>			35000	Behmer 1969
	<i>Carpioles carpio</i>	20	3062	154038	Carlander 1969
	<i>Carpioles carpio</i>		4536		Schrenkeisen 1963
	<i>Catostomus ardens</i>			38525	Andreasen and Barnes 1975
	<i>Catostomus catostomus</i>	11		35000	Bailey 1969
	<i>Catostomus catostomus</i>	8			Brown and Graham 1953
	<i>Catostomus catostomus</i>		3175		Eddy and Underhill 1974
	<i>Catostomus catostomus</i>	19	3311	60307	Harris 1962
	<i>Catostomus catostomus</i>	8			Kathrein 1950
	<i>Catostomus columbianus</i>	9		21040	Dauble 1980
	<i>Catostomus commersoni</i>	17	2585		Beamish 1973
	<i>Catostomus commersoni</i>	12			Beamish and Harvey 1969
	<i>Catostomus commersoni</i>	12	3147	140000	Carlander 1969
	<i>Catostomus commersoni</i>	8			Kathrein 1950
	<i>Catostomus commersoni</i>	5			Lewis and Elder 1952
	<i>Catostomus commersoni</i>		3200	50000	McPhail and Lindsey 1970
	<i>Catostomus discobolus</i>			21227	Andreasen and Barnes 1975
	<i>Catostomus microps</i>	4		12590	Moyle and Marciochi 1975
	<i>Erimyzon oblongus</i>	7	750	32970	Wagner and Cooper 1963
	<i>Ictiobus bubalus</i>	14	12928		Carlander 1969
	<i>Ictiobus bubalus</i>		3175		Eddy and Underhill 1974
	<i>Ictiobus bubalus</i>	12	18144		Harlan and Speaker 1956
	<i>Ictiobus bubalus</i>	8	621		Purkett 1957

Table 1. (cntd.)

FAMILY		Species	Age	Wt.	Fec.	Reference
<i>Ictalurus</i>						
<i>Ictalurus bubalus</i>				15876		Schrenkeisen 1962
<i>Ictalurus cyprinellus</i>	20	24494	750000	Carlander 1969		
<i>Ictalurus cyprinellus</i>		36288			Eddy and Underhill 1974	
<i>Ictalurus cyprinellus</i>	20	11600	750322	Johnson 1963		
<i>Ictalurus cyprinellus</i>		22680			Schrenkeisen 1963	
<i>Moxostoma</i>						
<i>Moxostoma anisurum</i>	9	1665			Meyer 1962	
<i>Moxostoma atripinne</i>	4	60	1755	Timmons and Ramsey 1983		
<i>Moxostoma duquesnei</i>	10	390	4150	Bowman 1970		
<i>Moxostoma erythrurum</i>	7	5000	35000	Carlander 1969		
<i>Moxostoma erythrurum</i>	4				Lewis and Elder 1952	
<i>Moxostoma erythrurum</i>	7	1360			Meyer 1962	
<i>Moxostoma macrolepidotum</i>	12	2554	29732	Carlander 1969		
<i>Moxostoma macrolepidotum</i>	8	3077			Meyer 1962	
CENTRARCHIDAE						
<i>Ambloplites rupestris</i>	10	394			Beckman 1946	
<i>Ambloplites rupestris</i>			500	Gross and Nowell 1980		
<i>Ambloplites rupestris</i>	12				Ryan and Harvey 1977	
<i>Ambloplites rupestris</i>		907			Schrenkeisen 1963	
<i>Ambloplites rupestris</i>			12000	Eddy and Underhill 1974		
<i>Lepomis cyanellus</i>	6				Lewis and Elder 1952	
<i>Lepomis cyanellus</i>	5				Purkett 1957	
<i>Lepomis cyanellus</i>		113			Schrenkeisen 1963	
<i>Lepomis gibbosus</i>	8	179			Beckman 1946	
<i>Lepomis gibbosus</i>		680			Schrenkeisen 1963	
<i>Lepomis macrochirus</i>	10	226			Beckman 1946	

Table 1. (cntd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Lepomis macrochirus</i>		2154	67000	Eddy and Underhill 1974
	<i>Lepomis macrochirus</i>		680		Schrenkeisen 1963
	<i>Lepomis megalotis</i>		283		Trautman 1957
	<i>Lepomis megalotis</i>	5			Lewis and Elder 1952
	<i>Lepomis microlophus</i>	5			Gerking 1952
	<i>Lepomis microlophus</i>		312		Trautman 1957
	<i>Micropterus dolomieu</i>	9	1103		Beckman 1946
	<i>Micropterus dolomieu</i>		4990		Eddy and Underhill 1974
	<i>Micropterus dolomieu</i>	12	1984		Fraser 1955
	<i>Micropterus dolomieu</i>		2721	17465	Harlan and Speaker 1956
	<i>Micropterus dolomieu</i>	11	2223		Henderson and Foster 1956
	<i>Micropterus dolomieu</i>		4082		Schrenkeisen 1963
	<i>Micropterus punctulatus</i>	6	439		Olmsted and Kilambi 1978
	<i>Micropterus salmoides</i>	9	1319		Beckman 1946
	<i>Micropterus salmoides</i>	8			Cole 1966
	<i>Micropterus salmoides</i>		3629	40000	Eddy and Underhill 1974
	<i>Micropterus salmoides</i>			8036	Kelley 1962
	<i>Micropterus salmoides</i>	13			Mraz and Threinen 1955
	<i>Micropterus salmoides</i>	7			Smagula and Adelman 1983
	<i>Pomoxis annularis</i>		1814		Eddy and Underhill 1974
	<i>Pomoxis annularis</i>	8	575	147800	Mathur et al 1979
	<i>Pomoxis nigromaculatus</i>	8			Beckman 1946
	<i>Pomoxis nigromaculatus</i>		2268	140000	Eddy and Underhill 1974
	<i>Pomoxis nigromaculatus</i>	6			Huish 1953

Table 1. (cntd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
CLINIDAE					
	<i>Heterostictius rostratus</i>	7	380		Coyer 1982
CLUPEIDAE					
	<i>Alosa pseudoharengus</i>	9	437	102800	Carlander 1969
	<i>Alosa pseudoharengus</i>	5		100000	Eddy and Underhill 1974
	<i>Alosa pseudoharengus</i>	4	33	80000	Norden 1967
	<i>Alosa pseudoharengus</i>		400		Schrenkeisen 1963
	<i>Alosa sapidissima</i>	11	6804	616000	Carlander 1969
	<i>Alosa sapidissima</i>		1520		Davis 1980
	<i>Alosa sapidissima</i>	6			LaPointe 1957
	<i>Alosa sapidissima</i>		6350		Schrenkeisen 1963
	<i>Alosa sapidissima</i>				Walburg 1961
	<i>Clupea harengus</i>	11			Davey 1972
	<i>Clupea harengus harengus</i>	9			Cote et al 1980
	<i>Clupea harengus harengus</i>			92000	McKenzie 1964
	<i>Clupea harengus harengus</i>	23			Olsen 1961
	<i>Dorosoma petenense</i>	4			Johnson 1970
	<i>Dorosoma petenense</i>			4000	Johnson 1971
	<i>Dorosoma petenense</i>			14000	Kilambi et al 1969
	<i>Sardinops sagax</i>		52		Farris 1956
COTTIDAE					
	<i>Clinocottis analis</i>			1300	Hubbs 1966
	<i>Cottus aleuticus</i>		1	298	Ikusemiju 1975
	<i>Cottus asperimus</i>	5		245	Daniels and Moyle 1978
	<i>Cottus bairdi</i>	5			Zarbock 1951

Table 1. (cont'd.)

FAMILY	Species	Age	Wt.	Fec.	Preference
	<i>Cottus cognatus</i>	7		339	Craig and Wells 1976
	<i>Cottus cognatus</i>			653	Foltz 1976
	<i>Myoxocephalus scorpius</i>	15			Ennis 1970
	<i>Myoxocephalus scorpius</i>	11		60976	Ennis 1970
CYCLOPTERIDAE					
	<i>Liparis pulchellus</i>		92	9196	Johnson 1969
CYPRINIDAE					
	<i>Agosia chrysogaster</i>	3	10	417	Lewis 1978
	<i>Couesius plumbeus</i>	6		2104	Brown et al 1970
	<i>Couesius plumbeus</i>	5			McPhail and Lindsey 1970
	<i>Cyprinus carpio</i>	47	26990	2208000	Carlander 1969
	<i>Cyprinus carpio</i>	13	10217		Crivelli 1981
	<i>Cyprinus carpio</i>	11			Crivelli 1980
	<i>Cyprinus carpio</i>		22680	2000000	Eddy and Underhill 1974
	<i>Cyprinus carpio</i>	8			McConnell 1951
	<i>Cyprinus carpio</i>	8	442		Purkett 1957
	<i>Cyprinus carpio</i>			591000	Swee and McCrimmon 1966
	<i>Dicnda rubila</i>	2	8	888	'Glazier and Taylor 1980
	<i>Gila atraria</i>	8			Graham 1961
	<i>Gila atraria</i>	11			Neuhold 1955
	<i>Gila robusta elegans</i>	7	367		Vanicek and Kramer 1969
	<i>Gila robusta robusta</i>	7	368		Vanicek and Kramer 1969
	<i>Meda fulgida</i>	4		1749	Barber et al 1970
	<i>Notropis analostanus</i>			4268	Gale and Buynak 1978

Table 1. (Cntrd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Notropis atherinoides</i>	3	9	8733	Campbell & McCrimmon 1970
	<i>Notropis atherinoides</i>	2	11		Carlander 1969
	<i>Notropis atherinoides</i>	2	37		Fuchs 1967
	<i>Notropis atherinoides</i>	4			McPhail and Lindsey 1970
	<i>Notropis chihuahua</i>	2		892	Burr and Mayden 1981
	<i>Notropis hudsonius</i>	3	23	2600	Calander 1969
	<i>Notropis hudsonius</i>	3		1300	McCann 1969
	<i>Notropis hudsonius</i>	3			McPhail and Lindsey 1970
	<i>Notropis longirostris</i>	2		129	Heins and Clemmer 1976
	<i>Notropis longirostris</i>	2		323	Heins et al 1980
	<i>Notropis nubilus</i>	2	8	888	Glazier and Taylor 1980
	<i>Notropis petersoni</i>	3		328	Davis and Louder 1971
	<i>Notropis scepticus</i>	3	6	1164	Harrell and Cloutman 1978
	<i>Notropis stramineus</i>	3		1800	Carlander 1969
	<i>Notropis stramineus</i>	3		340	Summerfelt et al 1969
	<i>Notropis umbratilis</i>	2		887	Matthews and Heins 1984
	<i>Phoxinus erythrogaster</i>			12500	Phillips 1969
	<i>Phoxinus neogaeus</i>	6		2556	Stasiak 1978
	<i>Pimephales notatus</i>	3	9	5000	Carlander 1969
	<i>Pimephales notatus</i>			1000	Eddy and Underhill 1974
	<i>Pimephales notatus</i>			4195	Gale 1983
	<i>Pimephales promelas</i>	3	13	12124	Carlander 1969
	<i>Pimephales promelas</i>	3		6000	Eddy and Underhill 1974
	<i>Pimephales promelas</i>			10164	Gale and Buynak 1982

Table 1. (cont'd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Pimephales promelas</i>	2	14		Held and Peterka 1974
	<i>Ptychocheilus lucius</i>	11	1848		Vanicek and Kramer 1969
	<i>Rhinichthys cataractae</i>	5		870	Brazo et al 1978
	<i>Rhinichthys cataractae</i>	5		680	Carlander 1969
	<i>Rhinichthys cataractae</i>			1200	McPhail and Lindsey 1970
	<i>Rhinichthys cataractae</i>	5			Reed 1959
	<i>Semotilus atromaculatus</i>	7	340	4671	Carlander 1969
	<i>Semotilus atromaculatus</i>	3			Lewis and Elder 1952
CYPRINODONTIDAE					
	<i>Cyprinodon diabolis</i>		1	65	Minckley and Deacon 1973
	<i>Fundulus luciae</i>		1071	210	Kneib 1978
	<i>Fundulus majalis</i>	7		540	Carlander 1969
	<i>Fundulus majalis</i>	7	70		Clemmer and Schwartz 1964
	<i>Fundulus zebrinus</i>	2		40	Minckley and Klassen 1969
DASYATIDAE					
	<i>Dasyatis centroura</i>		272727		Bullis & Struhsaker 1961
	<i>Gymnura micrura</i>		31818	7	Daiber and Booth 1960
	<i>Gymnura micrura</i>	6			Daiber and Booth 1960
EMBIOTOCIDAE					
	<i>Cymatogaster aggregata</i>	5	53		Anderson and Bryan 1970
	<i>Hyperprospon argenteum</i>	6	207		Anderson and Bryan 1970
	<i>Phanerodon furcatus</i>	7	284		Anderson and Bryan 1970
	<i>Phanerodon furcatus</i>	7	365		Banerjee 1973
ESOCIDAF					
	<i>Esox americanus americanus</i>	7	211	4364	Crossman 1962

Table 1. (cont'd.)

FAMILY

Species	Age	Wt.	Fec.	Reference
<i>Esox americanus americanus</i>			3716	Crossman 1966
<i>Esox americanus vermiculatus</i>			15732	Crossman 1966
<i>Esox lucius</i>	10	5684	147501	Bregazzi and Kennedy 1980
<i>Esox lucius</i>	24	24040	272160	Carlander 1969
<i>Esox lucius</i>	3			Diana 1983
<i>Esox lucius</i>		22680	100000	Eddy and Underhill 1974
<i>Esox lucius</i>	10	9935	234470	Mann 1976
<i>Esox lucius</i>	25	22226		McPhail and Lindsey 1970
<i>Esox lucius</i>		18144		Schrenkeisen 1963
<i>Esox lucius</i>	8	3344		Wolfert and Miller 1978
<i>Esox masquinongy</i>	30	31640	265000	Carlander 1969
<i>Esox masquinongy</i>	9			Crossman 1956
<i>Esox masquinongy</i>	9			Harrison & Padley 1979
<i>Esox masquinongy</i>	9			Muir 1963
<i>Esox masquinongy</i>	6			Parsons 1959
<i>Esox masquinongy</i>		45260		Schrenkeisen 1963
<i>Esox masquinongy</i>	14	14983		Simard and Magnin 1968
<i>Esox masquinongy</i>	14			Spangler 1968
<i>Esox masquinongy</i>	15	31724	100000	Eddy and Underhill 1974
GADIDAE				
<i>Gadus macrocephalus</i>	7			Kennedy 1970
<i>Gadus macrocephalus</i>			3215000	Thomson 1962
<i>Gadus morhua</i>	16			Fleming 1960
<i>Gadus morhua</i>	22	27895		Patriquin 1967
<i>Lota lota</i>	12	2873	900000	Bailey 1972

Table 1. (Contd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Lota lota</i>	15			Beamish and Chilton 1977
	<i>Lota lota</i>			430764	Hart 1967
	<i>Lota lota</i>	14	4715		Hewson 1955
	<i>Lota lota</i>	8	2778	1362077	Lawler 1963
	<i>Lota lota</i>	16	34020	1000000	McPhail and Lindsey 1970
	<i>Melanogrammus aeglefinus</i>		900	375700	Hislop et al 1978
	<i>Melanogrammus aeglefinus</i>	15		2460000	Hodder 1963
	<i>Melanogrammus aeglefinus</i>	15			Kohler 1959
	<i>Merluccius productus</i>	17			Beamish 1979
	<i>Merluccius productus</i>	8			Swartzman et al 1983
	<i>Microgadus tomcod</i>			31640	Schaner and Sherman 1960
GASTEROSTEIDAE					
	<i>Gasterosteus aculeatus</i>	1	1		Allen and Wootton 1982
HICDONTIDAE					
	<i>Hiodon tergisus</i>	8	425	20000	Carlander 1969
	<i>Hiodon tergisus</i>	9	400		Glenn 1975
	<i>Hiodon tergisus</i>	7	363		Van Oosten 1961
ICTALURIDAE					
	<i>Ictalurus melas</i>	9	1474	6820	Carlander 1969
	<i>Ictalurus melas</i>			3500	Dennison and Bulkley 1972
	<i>Ictalurus platycephalus</i>	7	241	1742	Olmsted and Cloutman 1979
	<i>Ictalurus punctatus</i>	12	5112	4570	Appelget and Smith 1950
	<i>Ictalurus punctatus</i>	22	24948	70000	Carlander 1969
	<i>Ictalurus punctatus</i>		11340		Eddy and Underhill 1974
	<i>Ictalurus punctatus</i>	09	1232		Purkett 1957

Table 1. (Contd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Ictalurus punctatus</i>	8			Sneed 1950
	<i>Pylodictis olivaris</i>	19	43090	11300	Carlander 1969
	<i>Pylodictis olivaris</i>		45360		Eddy and Underhill 1974
	<i>Pylodictis olivaris</i>	8	5251		Mayhew 1969
	<i>Pylodictis olivaris</i>	8	7296	9200	Minckley and Deacon 1959
	<i>Pylodictis olivaris</i>	9			Purkett 1957
ISTICOPHORIDAE					
	<i>Tetrapturus albidus</i>		60781		De Sylva and Davis 1963
LABRIDAE					
	<i>Tautoga onites</i>	27	2184		Cooper 1967
LEPISOSTEIDAE					
	<i>Lepisosteus osseus</i>	22	18371	77156	Eddy and Underhill 1974
	<i>Lepisosteus osseus</i>	15	2658		Klassen and Morgan 1974
LUTJANIDAE					
	<i>Lutjanus campechanus</i>	16			Nelson and Manooch 1982
	<i>Ocyurus chrysurus</i>	14	13698		Johnson 1983
	<i>Rhomboplites aurorubens</i>	10	2869		Grimes 1978
MALACANTHIDAE					
	<i>Caulolatilus microps</i>	15			Ross and Huntsman 1982
MYCTOPHIDAE					
	<i>Stenobrachius leucopsarus</i>	8			Smoker and Pearcy 1970
OSMERIDAE					
	<i>Mallotus villosus</i>	4			Baily et al 1977
	<i>Mallotus villosus</i>	5			Baily et al 1977
	<i>Mallotus villosus</i>			63300	Winters 1971

Table 1. (Cntd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Osmerus mordax</i>	6	131	31388	Bailey 1964
	<i>Osmerus mordax</i>	5		20570	Baldwin 1948
	<i>Osmerus mordax</i>	5	50		Burbridge 1969
	<i>Osmerus mordax</i>	7	142	69600	Carlander 1969
	<i>Osmerus mordax</i>	5			Rupp 1959
	<i>Osmerus mordax</i>		454		Schrenkeisen 1963
PERCICHTHYIDAE					
	<i>Morone americana</i>	5			Busch et al 1977
	<i>Morone americana</i>	7			Marcy and Richards 1974
	<i>Morone chrysops</i>		800	473000	Newton and Kilambi 1973
	<i>Morone chrysops</i>	8	430		Priegel 1971
	<i>Morone mississippiensis</i>	6	455		Priegel 1975
	<i>Morone saxatalis</i>	17			Chapoton and Sykes 1961
	<i>Morone saxatilis</i>		56700		Schrenkeisen 1963
	<i>Roccus americana</i>	10		247681	Sheri and Power 1968
PERCIDAE					
	<i>Etheostoma blennius</i>		68	134	Rurr 1979
	<i>Etheostoma camurum</i>			100	Mount 1959
	<i>Etheostoma nigrum nigrum</i>			164	Speare 1965
	<i>Etheostoma olmstedi</i>	3	3	275	Tsai 1972
	<i>Etheostoma spectabile</i>			200	Fubbs 1958
	<i>Etheostoma vitreum</i>			223	Winn and Picciolo 1960
	<i>Perca flavescens</i>	10	331		Beckman 1946
	<i>Perca flavescens</i>	7	1641	100000	Brazo et al 1975
	<i>Perca flavescens</i>	11	680	48000	Carlander 1949

Table 1. (Cont'd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Perca flavescens</i>		453	48000	Eddy and Underhill 1974
	<i>Perca flavescens</i>	15	412		Fortin and Magnin 1972
	<i>Perca flavescens</i>	5			Joeris 1956
	<i>Perca flavescens</i>	8	1814	41000	McPhail and Lindsey 1970
	<i>Perca flavescens</i>		1814		Schrenkeisen 1963
	<i>Percina caprodes</i>			1700	Hubbs 1958
	<i>Percina peltata</i>			125	New 1966
	<i>Stizostedion canadense</i>	10	765	46000	Carlander 1949
	<i>Stizostedion canadense</i>	20	4536	50000	Eddy and Underhill 1974
	<i>Stizostedion vitreum vitreum</i>	6			Carlander et al 1960
	<i>Stizostedion vitreum vitreum</i>	12			Carlander et al 1961
	<i>Stizostedion vitreum vitreum</i>		6804		Eddy and Underhill 1974
	<i>Stizostedion vitreum vitreum</i>			119180	Forney 1976
	<i>Stizostedion vitreum vitreum</i>	6			Kelso and Ward 1972
	<i>Stizostedion vitreum vitreum</i>	16	11340	600000	McPhail and Lindsey 1970
	<i>Stizostedion vitreum vitreum</i>				Olson 1957
	<i>Stizostedion vitreum vitreum</i>		11340		Schrenkeisen 1963
	<i>Stizostedion vitreum vitreum</i>	10			Smith and Pycha 1961
	<i>Stizostedion vitreum vitreum</i>	11			Smith et al 1951
	<i>Stizostedion vitreum vitreum</i>	7			Serns and Kempinger 1981
	<i>Stizostedion vitreum vitreum</i>	11	6309	614000	Wolfert 1969
PERCOPSIDAE					
	<i>Percopsis omiscomaycus</i>	8	31	1329	House and Wells 1973
PETROMYZONTIDAE					
	<i>Lampetra appendix</i>	5		2883	Seagle and Nagel 1982

Table 1. (Cont'd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
PHOLIDAE					
	<i>Pholis gunnellus</i>	5	15	404	Sawyer 1967
PLEURONECTIDAE					
	<i>Glyptocephalus cynoglossus</i>	24			Bowering 1976
	<i>Glyptocephalus cynoglossus</i>	26	2100	950000	Bowering 1978
	<i>Hippoglossoides platessoides</i>			1449695	Pitt 1964
	<i>Hippoglossoides platessoides</i>	28			Pitt 1967
	<i>Hippoglossoides platessoides</i>				Powles 1965
	<i>Limanda ferruginea</i>	12			Pitt 1974
	<i>Limanda ferruginea</i>			4570000	Pitt 1971
	<i>Microstomus pacificus</i>	24			Demory 1972
	<i>Pseudopleuronectes americanus</i>	13	1163	1531953	Kennedy and Steele 1971
	<i>Pseudopleuronectes americanus</i>			3329000	Topp 1968
	<i>Reinhardtius hippoglossoides</i>	23		215000	Lear 1970
	<i>Reinhardtius hippoglossoides</i>	14			Lear and Pitt 1975
POLYCDONTIDAE					
	<i>Polyodon spathula</i>	15			Pasch et al 1980
RACHYCENTRIDAE					
	<i>Rachycentron canadum</i>	10	3597		Richards 1967
RAJIDAE					
	<i>Raja erinacea</i>	8	748		Waring 1984
SALMONIDAE					
	<i>Coregonus alpenae</i>	9	642		Jobes 1964
	<i>Coregonus clupeaformis</i>		1774	49114	Bidgood 1974
	<i>Coregonus clupeaformis</i>	7			Christie 1963

Table 1. (Contd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Coregonus clupeaformis</i>		9072		Eddy and Underhill 1974
	<i>Coregonus clupeaformis</i>	14	764		Edsall 1960
	<i>Coregonus clupeaformis</i>	12			Fenderson 1964
	<i>Coregonus clupeaformis</i>	14	2200	33400	Healey 1978
	<i>Coregonus clupeaformis</i>	14	1480		Healey 1980
	<i>Coregonus clupeaformis</i>			69000	Healey 1984
	<i>Coregonus clupeaformis</i>	13		69000	Healey and Nicol 1975
	<i>Coregonus clupeaformis</i>				Henderson et al 1983
	<i>Coregonus clupeaformis</i>	16	2612		Kennedy 1963
	<i>Coregonus clupeaformis</i>	28			McPhail and Lindsey 1970
	<i>Coregonus clupeaformis</i>	18			Mills and Beamish 1980
	<i>Coregonus clupeaformis</i>	17		35900	Morin et al 1982
	<i>Coregonus clupeaformis</i>	9	2959		Peterka and Smith 1970
	<i>Coregonus clupeaformis</i>	19	2721	67200	Qadri 1968
	<i>Coregonus clupeaformis</i>		10433		Schrenkeisen 1963
	<i>Coregonus clupeaformis</i>	16	3064		Van Oosten and Hile 1947
	<i>Coregonus hoyi</i>			18768	Emery and Brown 1978
	<i>Coregonus hoyi</i>	10			Lindsey and Woods 1970
	<i>Coregonus nasus</i>	18	16000		Muth 1969
	<i>Coregonus pidschian</i>	14	805		Alt 1979
	<i>Oncorhynchus gorbuscha</i>		4546		Eddy and Underhill 1974
	<i>Oncorhynchus gorbuscha</i>	3	6350	2000	McPhail and Lindsey 1970
	<i>Oncorhynchus gorbuscha</i>	4	680	1060	Kwain 1982
	<i>Oncorhynchus gorbuscha</i>		2268		Schrenkeisen 1963

Table 1. (Cntd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Oncorhynchus keta</i>	22			La Lanne and Safsten 1969
	<i>Oncorhynchus keta</i>		14061	4000	McPhail and Lindsey 1970
	<i>Oncorhynchus keta</i>		9072		Schrenkeisen 1963
	<i>Oncorhynchus kisutch</i>		14969		Eddy and Underhill 1974
	<i>Oncorhynchus kisutch</i>	5	6350	2000	McPhail and Lindsey 1970
	<i>Oncorhynchus kisutch</i>		13608		Schrenkeisen 1963
	<i>Oncorhynchus kisutch</i>		2250	3500	Stauffer 1976
	<i>Oncorhynchus nerka</i>		7031	4000	McPhail and Lindsey 1970
	<i>Oncorhynchus nerka</i>		2206		Parker 1963
	<i>Oncorhynchus nerka</i>	6	2223		Ricker 1962
	<i>Oncorhynchus nerka</i>		5443		Schrenkeisen 1963
	<i>Oncorhynchus tshawytscha</i>	4			Berg 1978
	<i>Oncorhynchus tshawytscha</i>		56700		Eddy and Underhill 1974
	<i>Oncorhynchus tshawytscha</i>		57154	8000	McPhail and Lindsey 1970
	<i>Oncorhynchus tshawytscha</i>		45360		Schrenkeisen 1963
	<i>Oncorhynchus tshawytscha</i>			3753	Wales and Coots 1954
	<i>Prosopium artedi</i>	13		49000	Morin et al 1982
	<i>Prosopium coulteri</i>		20	290	Bird and Roberson 1979
	<i>Prosopium coulteri</i>	7	22	338	Eschmeyer and Bailey 1954
	<i>Prosopium coulteri</i>	9			McCart 1965
	<i>Prosopium cylindraceum</i>	14	2041	20000	McPhail and Lindsey 1970
	<i>Prosopium cylindraceum</i>	14	7138		Jessop and Power 1973
	<i>Prosopium cylindraceum</i>	12	876		Mackay and Power 1968
	<i>Prosopium cylindraceum</i>	12			Morin et al 1982
	<i>Prosopium cylindraceum</i>	7			Mraz 1964

Table 1. (Crtc.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Prosopium williamsoni</i>	18	2268	3570	McPhail and Lindsey 1970
	<i>Prosopium williamsoni</i>	10			Pettit and Wallace 1975
	<i>Salmo clarki</i>	10			Armstrong 1971
	<i>Salmo clarki</i>	6			Fjorunn 1961
	<i>Salmo clarki</i>	3			Fleener 1951
	<i>Salmo clarki</i>	6	2233	2140	Irving 1954
	<i>Salmo clarki</i>		2721		Schrenkeisen 1963
	<i>Salmo clarki</i>	10			Sumner 1962
	<i>Salmo gairdneri</i>		1276	3459	Allen and Sanger 1960
	<i>Salmo gairdneri</i>			5900	Bulkley 1967
	<i>Salmo gairdneri</i>		22680	3000	Eddy and Underhill 1974
	<i>Salmo gairdneri</i>	7			Kathrein 1950
	<i>Salmo gairdneri</i>	6	23587	7600	McPhail and Lindsey 1970
	<i>Salmo gairdneri</i>	4	568	2505	Scott 1962
	<i>Salmo gairdneri</i>	3	464		Whoriskey et al 1981
	<i>Salmo salar</i>			207548	Baum and Meister 1971
	<i>Salmo salar</i>	11			Chadwick 1982
	<i>Salmo salar</i>		27216		Eddy and Underhill 1974
	<i>Salmo salar</i>			63400	Jarams 1979
	<i>Salmo salar</i>	8			Kazakov 1981
	<i>Salmo salar</i>	10	6910	8024	Lee and Power 1976
	<i>Salmo salar</i>		4000		Scarneccchia 1983
	<i>Salmo salar</i>		45360		Schrenkeisen 1963
	<i>Salmo salar</i>	10	3900		Warner 1962
	<i>Salmo trutta</i>	7	1800		Campbell 1977

Table 1. (Cntrd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Salmo trutta</i>	24	8200		Campbell 1970
	<i>Salmo trutta</i>			20865	Carlander 1969
	<i>Salmo trutta</i>	10	870		Craig 1982
	<i>Salmo trutta</i>		13608		Eddy and Underhill 1974
	<i>Salmo trutta</i>	7	17917	9000	Holcik and Mihalik 1968
	<i>Salmo trutta</i>			59400	Jarams 1979
	<i>Salmo trutta</i>	9			Kathrein 1950
	<i>Salmo trutta</i>				McFadden and Cooper 1962
	<i>Salmo trutta</i>	8			Sigler 1951
	<i>Salmo trutta</i>	4	713		Treasurer 1976
	<i>Salmo trutta</i>	13	9698		Went 1979
	<i>Salvelinus alpinus</i>	16	4045		Andrews and Lear 1956
	<i>Salvelinus alpinus</i>		510		Jensen 1981
	<i>Salvelinus alpinus</i>	10		1119	Jonsson and Hindar 1982
	<i>Salvelinus alpinus</i>	8		199	McCart and Craig 1973
	<i>Salvelinus alpinus</i>	24	11800	7200	McPhail and Lindsey 1970
	<i>Salvelinus alpinus</i>	19	3500	7000	Moore 1975
	<i>Salvelinus alpinus</i>	20	1000		Moore and Moore 1974
	<i>Salvelinus alpinus</i>		1850	4038	Thompson 1959
	<i>Salvelinus fontinalis</i>		6577	4800	Eddy adn Underhill 1974
	<i>Salvelinus fontinalis</i>	5			Flick and Webster 1975
	<i>Salvelinus fontinalis</i>				Latta 1963
	<i>Salvelinus fontinalis</i>	4		2086	McFadden et al 1967
	<i>Salvelinus fontinalis</i>	7	6600	5000	McPhail and Lindsey 1970

Table 1. (Ctd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
	<i>Salvelinus fontinalis</i>	7	536	1203	Saunders and Power 1970
	<i>Salvelinus fontinalis</i>		4082		Schrenkeisen 1963
	<i>Salvelinus fontinalis</i>			4765	Vladkov 1956
	<i>Salvelinus fontinalis</i>	4			Warner 1970
	<i>Salvelinus malma</i>			3086	Blackett 1973
	<i>Salvelinus malma</i>		14400	8000	McPhail and Lindsey 1970
	<i>Salvelinus malma</i>	11			Reed 1967
	<i>Salvelinus malma</i>		9072		Schrenkeisen 1963
	<i>Salvelinus namaycush</i>	17			Bulkley 1960
	<i>Salvelinus namaycush</i>	9			DeRoche and Bond 1955
	<i>Salvelinus namaycush</i>		28577	6000	Eddy and Underhill 1974
	<i>Salvelinus namaycush</i>			8426	Eschmeyer 1954
	<i>Salvelinus namaycush</i>		8400	4090	Healey 1978
	<i>Salvelinus namaycush</i>	27	14968	16900	Kennedy 1954
	<i>Salvelinus namaycush</i>	10			Lawrie 1963
	<i>Salvelinus namaycush</i>	25			MacLean et al 1981
	<i>Salvelinus namaycush</i>	25	46400	17000	McPhail and Lindsey 1970
	<i>Salvelinus namaycush</i>	11	2052	2052	Rahrer 1965
	<i>Salvelinus namaycush</i>	12	8326		Rahrer 1967
	<i>Salvelinus namaycush</i>	16			Sakagawa and Pycha 1971
	<i>Salvelinus namaycush</i>		45360		Schrenkeisen 1963
	<i>Salvelinus namaycush</i>	8			Webster et al 1960
	<i>Stenodus leucichthys</i>	20	27000		Alt 1973
	<i>Thymallus arcticus</i>			12946	Carlander 1969
	<i>Thymallus arcticus</i>	16	886		Craig and Poulin 1975

Table 1. (Contd.)

FAMILY	Species	Age	Wt.	Tec.	Reference
	<i>Thymallus arcticus</i>	12	2500	10000	McPhail and Lindsey 1970
SCIÆNIDÆ					
	<i>Aplodinotus grunniens</i>	9			Butler and Smith 1949
	<i>Aplodinotus grunniens</i>		22680		Eddy and Underhill 1974
	<i>Aplodinotus grunniens</i>	10	997		Priegel 1969
	<i>Aplodinotus grunniens</i>	9	1828		Purkett 1957
	<i>Aplodinotus grunniens</i>		27216		Schrenkeisen 1963
	<i>Aplodinotus grunniens</i>	9	670	49300	Swedberg and Walburg 1970
	<i>Aplodinotus grunniens</i>		11570		Witt 1960
	<i>Cynoscion nebulosus</i>	8			Iversen and Tabb 1962
	<i>Cynoscion nebulosus</i>			16688	Sundararaj et al 1961
	<i>Pogonias cromis</i>	10	17000		Richards 1973
SCOMBRIDÆ					
	<i>Thunnus alalunga</i>	8	14411		Partlo 1955
SCORPAENIDÆ					
	<i>Sebastes alutus</i>	21			Gunderson 1974
	<i>Sebastes alutus</i>	24	388		Westerheim 1973
	<i>Sebastes alutus</i>		1515		Westerheim et al 1974
	<i>Sebastes emphaeus</i>	4	59	59543	Moulton 1975
	<i>Sebastes flavidus</i>	20			Kimura et al 1979
SERRANIDÆ					
	<i>Mycteroperca microlepis</i>	13	2161		Marooch et al 1978
SOLEIDÆ					
	<i>Trinectes maculatus</i>	6			Koski 1978

Table 1. (Cont'd.)

FAMILY	Species	Age	Wt.	Fec.	Reference
SQUALIDAE					
	<i>Squalus acanthias</i>	70		7	Jones and Green 1977
	<i>Squalus acanthias</i>	30			Jones and Green 1977
	<i>Squalus acanthias</i>			13	Ketchen 1972
	<i>Squalus acanthias</i>	95			8 Ketchen 1975
STICHAEIDAE					
	<i>Stichaeus punctatus</i>	6	17	2475	Farwell et al 1976
TRIGLIDAE					
	<i>Prionotus evolans</i>	3	995		McEachran and Davis 1970
UMBRIDAE					
	<i>Dallia pectoralis</i>	3	37		Blackett 1962

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