

Appendix H1: Life History Parameter Values Used to Evaluate I&E

The tables in this appendix present the life history parameter values used by EPA to calculate age 1 equivalents, fishery yields, and production foregone from I&E data for the J.R. Whiting facility.

Table H1-1: Alewife Species Parameters

Stage Name	Natural Mortality (per stage) ^a	Fishing Mortality (per stage) ^b	Fraction Vulnerable to Fishery ^b	Weight (lb)
Eggs	0.554	0	0	0.000022 ^c
Yolksac larvae	1.81	0	0	0.0060 ^d
Post-yolksac larvae	1.72	0	0	0.0121 ^d
Juvenile 1	3.11	0	0	0.0181 ^d
Juvenile 2	3.11	0	0	0.0242 ^d
Age 1+	0.3	0	0	0.0303 ^a
Age 2+	0.3	0	0	0.125 ^a
Age 3+	0.3	0	0	0.254 ^a
Age 4+	0.9	0	0	0.379 ^a
Age 5+	1.5	0	0	0.485 ^a
Age 6+	1.5	0	0	0.565 ^a
Age 7+	1.5	0	0	0.625 ^a
Age 8+	1.5	0	0	0.666 ^a

^a Based on Delaware Estuary alewife from PSEG, 1999c.

^b Not a commercial or recreational species, thus no fishing mortality.

^c Assumed.

^d Assumed based on Delaware Estuary alewife from PSEG, 1999c.

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P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.alewife.csv

Table H1-2: Bluntnose Minnow Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^d	Weight (lb) ^e
Eggs	2.3 ^a	0	0	0.000000985 ^f
Larvae	2.06 ^b	0	0	0.000375 ^g
Age 0	2.06 ^b	0	0	0.00208 ^g
Age 1+	1 ^c	0	0	0.00585 ^g
Age 2+	1 ^c	0	0	0.0121 ^g
Age 3+	1 ^c	0	0	0.0143 ^f

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^b Calculated from estimated survival (Froese and Pauly, 2001) using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^c Froese and Pauly, 2001.

^d Not a commercial or recreational species, thus no fishing mortality.

^e Weight calculated from length using the formula: $(4.466 \times 10^{-4}) * \text{Length(mm)}^{2.34} = \text{weight(g)}$ (Froese and Pauly, 2001).

^f Length assumed based on Carlander, 1969.

^g Length from Carlander, 1969.

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Table H1-3: Bullhead Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^d	Weight (lb) ^f
Eggs	2.3 ^a	0	0	0.000000559 ^g
Larvae	4.61 ^b	0	0	0.000186 ^h
Age 0	1.39 ^b	0	0	0.00132 ⁱ
Age 1+	0.223 ^c	0.223 ^e	0.5	0.0362 ⁱ
Age 2+	0.223 ^c	0.223 ^e	1	0.0797 ⁱ
Age 3+	0.223 ^c	0.223 ^e	1	0.137 ⁱ
Age 4+	0.223 ^c	0.223 ^e	1	0.233 ⁱ
Age 5+	0.223 ^c	0.223 ^e	1	0.402 ⁱ
Age 6+	0.223 ^c	0.223 ^e	1	0.679 ^b

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^b Calculated from estimated survival for channel catfish (Geo-Marine Inc., 1978) using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^c Calculated from survival for brown bullhead (Carlander, 1969) assuming that half of mortality was natural and half was fishing, using the equation: (natural mortality) = -LN((survival)^{1/2}).

^d Commercial species; vulnerable to fishing at age 1.

^e Calculated based on survival for brown bullhead (Carlander, 1969) assuming that half of mortality was natural and half was fishing, using the equation: (fishing mortality) = -LN((survival)^{1/2}).

^f Weight calculated from length using the formula: $(8.80 \times 10^{-6}) * \text{Length(mm)}^{3.06} = \text{weight(g)}$ (Froese and Pauly, 2001).

^g Length from Wang, 1986a.

^h Length assumed based on Carlander, 1969.

ⁱ Length from Carlander, 1969.

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Table H1-4: Channel Catfish Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage)	Fraction Vulnerable to Fishery ^d	Weight (lb) ^f
Eggs	2.3 ^a	0 ^d	0	0.000000408 ^g
Larvae	4.61 ^b	0 ^d	0	0.0000191 ^g
Age 0	1.39 ^b	0 ^d	0	0.00987 ^h
Age 1+	0.41 ^c	0.41 ^e	0.5	0.0554 ^h
Age 2+	0.41 ^c	0.41 ^e	1	0.189 ^h
Age 3+	0.41 ^c	0.41 ^e	1	0.436 ^h
Age 4+	0.41 ^c	0.41 ^e	1	0.71 ^h
Age 5+	0.41 ^c	0.41 ^e	1	1.22 ^h
Age 6+	0.41 ^c	0.41 ^e	1	1.55 ^h
Age 7+	0.41 ^c	0.41 ^e	1	2.27 ^h
Age 8+	0.41 ^c	0.41 ^e	1	2.66 ^h
Age 9+	0.41 ^c	0.41 ^e	1	3.41 ^h
Age 10+	0.41 ^c	0.41 ^e	1	5.59 ^h
Age 11+	0.41 ^c	0.41 ^e	1	5.81 ⁱ
Age 12+	0.41 ^c	0.41 ^e	1	5.92 ^h

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^b Calculated based on survival from (Geo-Marine Inc., 1978) using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^c Calculated based on survival from (Miller, 1966) assuming that half of mortality was natural and half was fishing, using the equation: (natural mortality) = -LN((survival)^{1/2}).^d Recreational and commercial species; vulnerable to fishing at age 1. Based on hake (Saila et al., 1997).^e Calculated based on survival from (Miller, 1966) assuming that half of mortality was natural and half was fishing, using the equation: (fishing mortality) = -LN((survival)^{1/2}).^f Weight calculated from length using the formula: $(2.94 \times 10^{-6}) * \text{Length(mm)}^{3.13} = \text{weight(g)}$ (Froese and Pauly, 2001).^g Length from Wang, 1986a.^h Length from Carlander, 1969.ⁱ Length assumed based on Carlander, 1969.

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Table H1-5: Common Carp Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage)	Fraction Vulnerable to Fishery ^d	Weight (lb) ^e
Eggs	2.3 ^a	0 ^d	0	0.000000143 ^f
Larvae	4.61 ^b	0 ^d	0	0.0000118 ^f
Age 0	1.39 ^b	0 ^d	0	0.0225 ^g
Age 1+	0.13 ^c	0.13 ^c	0.5	0.79 ^g
Age 2+	0.13 ^c	0.13 ^c	1	1.21 ^g
Age 3+	0.13 ^c	0.13 ^c	1	1.81 ^g
Age 4+	0.13 ^c	0.13 ^c	1	5.13 ^g
Age 5+	0.13 ^c	0.13 ^c	1	5.52 ^h
Age 6+	0.13 ^c	0.13 ^c	1	5.82 ^h
Age 7+	0.13 ^c	0.13 ^c	1	6.76 ^g
Age 8+	0.13 ^c	0.13 ^c	1	8.17 ^g
Age 9+	0.13 ^c	0.13 ^c	1	8.55 ^h
Age 10+	0.13 ^c	0.13 ^c	1	8.94 ^h
Age 11+	0.13 ^c	0.13 ^c	1	9.76 ^h
Age 12+	0.13 ^c	0.13 ^c	1	10.2 ^h
Age 13+	0.13 ^c	0.13 ^c	1	10.6 ^h
Age 14+	0.13 ^c	0.13 ^c	1	11.1 ^h
Age 15+	0.13 ^c	0.13 ^c	1	11.5 ^h
Age 16+	0.13 ^c	0.13 ^c	1	12 ^h
Age 17+	0.13 ^c	0.13 ^c	1	12.5 ^h

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^b Calculated from survival (Geo-Marine Inc., 1978) using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^c Froese and Pauly, 2001, assuming half of mortality was natural and half was fishing.

^d Commercial species; vulnerable to fishing at age 1.

^e Weight calculated from length using the formula: $(1.1 \times 10^{-5}) * \text{Length(mm)}^{3.025} = \text{weight(g)}$ (Froese and Pauly, 2001).

^f Length from Wang, 1986a.

^g Length from Carlander, 1969.

^h Length assumed based on Carlander, 1969.

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P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.common.carp.csv

Table H1-6: Crappie Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^c	Fraction Vulnerable to Fishery ^c	Weight (lb) ^d
Eggs	1.8 ^a	0	0	0.000000179 ^e
Larvae	0.498 ^a	0	0	0.00000857 ^e
Age 0	2.93 ^a	0	0	0.012 ^f
Age 1+	0.292 ^b	0.292 ^b	0.5	0.128 ^f
Age 2+	0.292 ^b	0.292 ^b	1	0.193 ^f
Age 3+	0.292 ^b	0.292 ^b	1	0.427 ^f
Age 4+	0.292 ^b	0.292 ^b	1	0.651 ^f
Age 5+	0.292 ^b	0.292 ^b	1	0.888 ^f
Age 6+	0.292 ^b	0.292 ^b	1	0.925 ^f
Age 7+	0.292 ^b	0.292 ^b	1	0.972 ^g
Age 8+	0.292 ^b	0.292 ^b	1	1.08 ^f
Age 9+	0.292 ^b	0.292 ^b	1	1.26 ^f

^a Bartell and Campbell, 2000. Black crappie.^b Bartell and Campbell, 2000 assuming half of mortality was natural and half was fishing. Black crappie.^c Recreational species, vulnerable to fishing at age 1.^d Weight calculated from length using the formula: $(1.014 \times 10^{-5}) * \text{Length(mm)}^{3.066} = \text{weight(g)}$ (Froese and Pauly, 2001).^e Length from Wang, 1986a.^f Length from Carlander, 1977.^g Length assumed based on Carlander, 1977.

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Table H1-7: Emerald Shiner Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^d	Weight (lb) ^e
Eggs	2.3 ^a	0	0	0.000000252 ^f
Larvae	4.61 ^b	0	0	0.0016 ^f
Age 0	0.776 ^b	0	0	0.0135 ^g
Age 1+	0.371 ^b	0	0	0.026 ^g
Age 2+	4.61 ^b	0	0	0.0478 ^g
Age 3+	4.61 ^c	0	0	0.106 ^g

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^b Wapora, 1979.^c Assumed based on Wapora, 1979.^d Not a commercial or recreational species, thus no fishing mortality.^e Weight calculated from length using the formula: $(1.114 \times 10^{-4}) * \text{Length(mm)}^{2.922} = \text{weight(g)}$ (Fuchs, 1967).^f Length assumed based on Trautman, 1981.^g Length from Trautman, 1981.

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P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.emerald.shiner.csv

Table H1-8: Freshwater Drum Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^d	Weight (lb)
Eggs	2.27 ^a	0 ^d	0	0.0000011 ^e
Larvae	6.13 ^a	0 ^d	0	0.00000295 ^f
Age 0	1.15 ^b	1.15 ^b	0.5	0.0166 ^f
Age 1+	0.155 ^c	0.155 ^c	1	0.05 ^g
Age 2+	0.155 ^c	0.155 ^c	1	0.206 ^g
Age 3+	0.155 ^c	0.155 ^c	1	0.438 ^g
Age 4+	0.155 ^c	0.155 ^c	1	0.638 ^g
Age 5+	0.155 ^c	0.155 ^c	1	0.794 ^g
Age 6+	0.155 ^c	0.155 ^c	1	0.95 ^g
Age 7+	0.155 ^c	0.155 ^c	1	1.09 ^g
Age 8+	0.155 ^c	0.155 ^c	1	1.26 ^g
Age 9+	0.155 ^c	0.155 ^c	1	1.44 ^g
Age 10+	0.155 ^c	0.155 ^c	1	1.6 ^g
Age 11+	0.155 ^c	0.155 ^c	1	1.78 ^g
Age 12+	0.155 ^c	0.155 ^c	1	2 ^g

^a Bartell and Campbell, 2000.^b Bartell and Campbell, 2000 assuming half of mortality was natural and half was fishing.^c Froese and Pauly, 2001, assuming half of mortality was natural and half was fishing.^d Commercial species; vulnerable to fishing at age 0.^e Assumed based on Bartell and Campbell, 2000.^f Bartell and Campbell, 2000.^g Scott and Crossman, 1973.

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P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.freshwater.drum.csv

Table H1-9: Gizzard Shad Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^d	Weight (lb)
Eggs	2.3 ^a	0	0	0.0000022 ^e
Larvae	6.33 ^b	0	0	0.00000663 ^b
Age 0	0.511 ^b	0	0	0.0107 ^b
Age 1+	1.45 ^c	1.45 ^c	0.5	0.141 ^b
Age 2+	1.27 ^c	1.27 ^c	1	0.477 ^b
Age 3+	0.966 ^c	0.966 ^c	1	0.64 ^b
Age 4+	0.873 ^c	0.873 ^c	1	0.885 ^b
Age 5+	0.303 ^c	0.303 ^c	1	1.17 ^b
Age 6+	0.303 ^c	0.303 ^c	1	1.54 ^b

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^b Wapora, 1979.

^c Wapora, 1979, assuming half of mortality was natural and half was fishing.

^d Commercial species; vulnerable to fishing at age 1.

^e Assumed based on Wapora, 1979.

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P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.gizzard.shad.csv

Table H1-10: Logperch Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^d	Weight (lb) ^e
Eggs	2.3 ^a	0	0	0.0000000309 ^f
Larvae	1.9 ^b	0	0	0.000276 ^g
Age 0	1.9 ^b	0	0	0.00345 ^f
Age 1+	0.7 ^c	0	0	0.0128 ^f
Age 2+	0.7 ^c	0	0	0.0274 ^f
Age 3+	0.7 ^c	0	0	0.0443 ^f

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^b Calculated from estimated survival based on (Froese and Pauly, 2001) using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^c Froese and Pauly, 2001.

^d Not a commercial or recreational species, thus no fishing mortality.

^e Weight calculated from length using the formula: $(5.240 \times 10^{-7}) * \text{Length(mm)}^{3.641} = \text{weight(g)}$ (Carlander, 1997).

^f Length from Carlander, 1997.

^g Length assumed based on Carlander, 1997.

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Table H1-11: Rainbow Smelt Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^c	Fraction Vulnerable to Fishery ^c	Weight (lb) ^d
Eggs	3.32 ^a	0	0	0.0000000115 ^e
Larvae	2.65 ^a	0	0	0.00000233 ^e
Age 1+	0.72 ^b	0	0	0.0195 ^f
Age 2+	0.72 ^b	0	0	0.041 ^g
Age 3+	0.72 ^b	0	0	0.177 ^g
Age 4+	0.72 ^b	0	0	0.338 ^f
Age 5+	0.72 ^b	0	0	0.537 ^f
Age 6+	0.72 ^b	0	0	0.597 ^f

^a Calculated from survival from (Stone and Webster Engineering Corporation, 1977) using the equation:
(natural mortality) = -LN(survival) - (fishing mortality).

^b Froese and Pauly, 2001.

^c Not a commercial or recreational species, thus no fishing mortality.

^d Weight calculated from length using the formula: $(5.23 \times 10^{-6}) * \text{Length(mm)}^{3.114} = \text{weight(g)}$ (Froese and Pauly, 2001).

^e Length from Able and Fahay, 1998.

^f Length assumed based on Able and Fahay, 1998 and Scott and Scott, 1988.

^g Length from Scott and Scott, 1988.

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Table H1-12: Sucker Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^c	Fraction Vulnerable to Fishery ^c	Weight (lb) ^d
Eggs	2.05 ^a	0	0	0.0000000135 ^e
Larvae	2.56 ^a	0	0	0.00000198 ^e
Age 0+	2.3 ^a	0	0	0.000145 ^f
Age 1+	0.274 ^b	0.274 ^b	0.5	0.0447 ^f
Age 2+	0.274 ^b	0.274 ^b	1	0.249 ^f
Age 3+	0.274 ^b	0.274 ^b	1	0.305 ^f
Age 4+	0.274 ^b	0.274 ^b	1	0.609 ^f
Age 5+	0.274 ^b	0.274 ^b	1	0.823 ^f
Age 6+	0.274 ^b	0.274 ^b	1	0.929 ^f

^a Bartell and Campbell, 2000.

^b Bartell and Campbell, 2000 assuming half of mortality is natural and half is fishing.

^c Commercial species; vulnerable to fishing at age 1.

^d Weight calculated from length based on river carpsucker using the formula: $(6.13 \times 10^{-6}) * \text{Length(mm)}^{3.099} = \text{weight(g)}$ (Froese and Pauly, 2001).

^e Length assumed based on Carlander, 1969.

^f Length from Carlander, 1969.

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Table H1-13: Sunfish Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^c	Fraction Vulnerable to Fishery ^c	Weight (lb) ^e
Eggs	1.71 ^a	0	0	0.00000000736 ^f
Larvae	0.687 ^a	0	0	0.000000994 ^f
Age 0+	0.687 ^a	0	0	0.000878 ^g
Age 1+	1.61 ^a	0	0	0.00666 ^g
Age 2+	1.61 ^a	0	0	0.0271 ^g
Age 3+	1.5 ^b	1.5 ^d	0.5	0.0593 ^g
Age 4+	1.5 ^b	1.5 ^d	1	0.0754 ^g
Age 5+	1.5 ^b	1.5 ^d	1	0.142 ^g
Age 6+	1.5 ^b	1.5 ^d	1	0.18 ^g
Age 7+	1.5 ^b	1.5 ^d	1	0.214 ^g
Age 8+	1.5 ^b	1.5 ^d	1	0.232 ^g

^a Calculated from survival for pumpkinseed from (Carlander, 1977) using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^b Calculated from survival for pumpkinseed from (Carlander, 1977) using the equation: (natural mortality) = -LN((survival)^{1/2}).

^c Recreational species; vulnerable to fishing at age 3.

^d Calculated from survival for pumpkinseed from (Carlander, 1977) using the equation: (fishing mortality) = -LN((survival)^{1/2}).

^e Weight calculated from length based on pumpkinseed using the formula: $(6.13 \times 10^{-6}) * \text{Length(mm)}^{3.262} = \text{weight(g)}$ (Froese and Pauly, 2001).

^f Length for Pumpkinseed from Wang, 1986a.

^g Length for Pumpkinseed from Carlander, 1977.

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Table H1-14: Walleye Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^c	Fraction Vulnerable to Fishery ^c	Weight (lb) ^e
Eggs	1.05 ^a	0	0	0.00000000506 ^f
Larvae	3.55 ^b	0	0	0.0000768 ^g
Age 0+	1.93 ^b	0	0	0.03 ^g
Age 1+	0.0474 ^b	0.6 ^d	0.5	0.328 ^g
Age 2+	0.0474 ^b	0.6 ^d	1	0.907 ^g
Age 3+	0.0474 ^b	0.6 ^d	1	1.77 ^g
Age 4+	0.0474 ^b	0.6 ^d	1	2.35 ^g
Age 5+	0.0474 ^b	0.6 ^d	1	3.37 ^g
Age 6+	0.0474 ^b	0.6 ^d	1	3.97 ^g
Age 7+	0.0474 ^b	0.6 ^d	1	4.66 ^f
Age 8+	0.0474 ^b	0.6 ^d	1	5.58 ^g

^a Calculated from survival from (Carlander, 1997) using the equation: (natural mortality) = -LN(survival) -(fishing mortality).

^b Bartell and Campbell, 2000.

^c Recreational species; vulnerable to fishing at age 1.

^d McDermot and Rose, 2000.

^e Weight calculated from length using the formula: $(2.296 \times 10^{-6}) * \text{Length(mm)}^{3.23} = \text{weight(g)}$ (Froese and Pauly, 2001).

^f Length assumed based on Carlander, 1997.

^g Length from Carlander, 1997.

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Table H1-15: White Bass Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^e	Weight (lb)
Eggs	2.3 ^a	0	0	0.0000000266 ^f
Larvae	4.61 ^b	0	0	0.00000174 ^g
Age 0+	1.39 ^b	0	0	0.174 ^h
Age 1+	0.42 ^c	0	0	0.467 ^h
Age 2+	0.42 ^c	0.7	0.5	0.644 ^h
Age 3+	0.42 ^c	0.7	1	1.02 ^h
Age 4+	0.42 ^c	0.7	1	1.16 ^h
Age 5+	0.42 ^c	0.7	1	1.26 ^h
Age 6+	0.42 ^c	0.7	1	1.66 ^h
Age 7+	0.42 ^c	0.7	1	1.68 ⁱ

^a Calculated from assumed survival using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^b Calculated from survival from (Geo-Marine Inc., 1978) using the equation: (natural mortality) = -LN(survival) - (fishing mortality).

^c Froese and Pauly, 2001.

^d McDermot and Rose, 2000.

^e Assumed based on fishing mortality.

^f Weight calculated from assumed length of 1mm using the formula: $(1.206 \times 10^{-5}) * \text{Length(mm)}^{3.132} = \text{weight(g)}$ (Van Oosten, 1942).

^g Weight calculated from length of 3.8mm (Carlander, 1997) using the formula: $(1.206 \times 10^{-5}) * \text{Length(mm)}^{3.132} = \text{weight(g)}$ (Van Oosten, 1942).

^h Carlander, 1997.

ⁱ Assumed based on Carlander, 1997.

Wed Jan 09 14:12:00 MST 2002 Results: Life history Plant: jr.whiting.78.79 Pathname:

P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.white.bass.csv

Table H1-16: White Perch Species Parameters

Stage Name	Natural Mortality (per stage) ^a	Fishing Mortality (per stage) ^a	Fraction Vulnerable to Fishery ^a	Weight (lb)
Eggs	2.75	0	0	0.000022 ^b
Yolksac larvae	2.1	0	0	0.00946 ^c
Post-yolksac larvae	3.27	0	0	0.0189 ^c
Juvenile 1	0.947	0	0	0.0283 ^c
Juvenile 2	0.759	0	0	0.0378 ^c
Age 1+	0.693	0	0	0.0472 ^a
Age 2+	0.693	0	0	0.0567 ^a
Age 3+	0.693	0.15	0.0008	0.103 ^a
Age 4+	0.689	0.15	0.0266	0.15 ^a
Age 5+	1.58	0.15	0.212	0.214 ^a
Age 6+	1.54	0.15	0.48	0.265 ^a
Age 7+	1.48	0.15	0.838	0.356 ^a
Age 8+	1.46	0.15	1	0.387 ^a
Age 9+	1.46	0.15	1	0.516 ^a
Age 10+	1.46	0.15	1	0.619 ^a

^a Based on Delaware Estuary white perch from PSEG, 1999c.^b Assumed based on PSEG, 1999c.

Wed Jan 09 14:12:05 MST 2002 Results: Life history Plant: jr.whiting.78.79 Pathname:

P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.white.perch.csv

Table H1-17: Yellow Perch Species Parameters

Stage Name	Natural Mortality (per stage)	Fishing Mortality (per stage) ^d	Fraction Vulnerable to Fishery ^e	Weight (lbs)
Eggs	2.75 ^a	0	0	0.0000022 ^f
Larvae	3.56 ^b	0	0	0.00000384 ^b
Age 0+	2.53 ^b	0	0	0.0232 ^b
Age 1+	0.361 ^b	0	0	0.0245 ^b
Age 2+	0.248 ^b	0	0	0.0435 ^b
Age 3+	0.504 ^b	0.7	0.5	0.0987 ^b
Age 4+	0.504 ^b	0.7	1	0.132 ^b
Age 5+	0.504 ^b	0.7	1	0.166 ^b
Age 6+	0.504 ^c	0.7	1	0.214 ^b

^a Based on Delaware Estuary yellow perch from PSEG, 1999c.^b Wapora, 1979.^c Assumed based on Wapora, 1979.^d McDermot and Rose, 2000.^e Recreational species; vulnerable to fishing at age 3.^f Assumed based on Wapora, 1979.

Wed Jan 09 14:12:10 MST 2002 Results: Life history Plant: jr.whiting.78.79 Pathname:

P:/Intake/Great_Lakes/GL_Science/scodes/jr.whiting/tables.output.78.79/lifehistory.yellow.perch.csv