

Appendix F1: 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 Brayton Point facility. Life history data were primarily obtained from the Brayton Point Permit Renewal Application reviewed by the Brayton Point Technical Advisory Committee (PG&E National Energy Group, Appendix F, 1999c). If not available in the Permit Renewal Application, the data were compiled from a variety of other sources, with a focus on obtaining data on local stocks whenever possible. The fishing mortality rates recommended for stock rebuilding were used, when available. These rates were obtained from the Northeast Fishery Science Center (NOAA, 2001c).

Table F1-1: Alewife Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^a (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------|
| Eggs | 0.544 | 0 | 0 | 0.000022 ^c |
| Larvae | 5.5 | 0 | 0 | 0.00022 ^c |
| Juvenile 1 | 2.57 | 0 | 0 | 0.00478 ^a |
| Age 1+ | 1.04 | 0 | 0 | 0.0443 ^a |
| Age 2+ | 1.04 | 0 | 0 | 0.139 ^a |
| Age 3+ | 1.04 | 0 | 0 | 0.264 ^a |
| Age 4+ | 1.04 | 0 | 0 | 0.386 ^a |
| Age 5+ | 1.04 | 0 | 0 | 0.489 ^a |
| Age 6+ | 1.04 | 0 | 0 | 0.568 ^a |
| Age 7+ | 1.04 | 0 | 0 | 0.626 ^a |
| Age 8+ | 1.04 | 0 | 0 | 0.667 ^a |
| Age 9+ | 1.04 | 0 | 0 | 0.696 ^a |

^a PG&E National Energy Group, 2001.

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

^c Assumed based on data in PG&E National Energy Group (2001).

Table F1-2: Atlantic Menhaden Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^a (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------|
| Eggs | 1.2 | 0 | 0 | 0.000022 ^c |
| Larvae | 4.47 | 0 | 0 | 0.00022 ^c |
| Juvenile 1 | 6.19 | 0 | 0 | 0.000684 ^a |
| Age 1+ | 0.54 | 0 | 0 | 0.0251 ^a |
| Age 2+ | 0.45 | 1.12 | 0.5 | 0.235 ^a |
| Age 3+ | 0.45 | 1.12 | 1 | 0.402 ^a |
| Age 4+ | 0.45 | 1.12 | 1 | 0.586 ^a |
| Age 5+ | 0.45 | 1.12 | 1 | 0.863 ^a |
| Age 6+ | 0.45 | 1.12 | 1 | 1.08 ^a |
| Age 7+ | 0.45 | 1.12 | 1 | 1.27 ^a |
| Age 8+ | 0.45 | 1.12 | 1 | 1.43 ^a |

^a PG&E National Energy Group, 2001.^b Commercial species. Fraction vulnerable assumed.^c Assumed based on data in PG&E National Energy Group (2001).**Table F1-3: American Sand Lance Species Parameters**

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------|
| Eggs | 1.41 | 0 | 0 | 0.000022 ^c |
| Larvae | 2.97 | 0 | 0 | 0.00022 ^c |
| Juvenile 1 | 2.9 | 0 | 0 | 0.00119 ^a |
| Age 1+ | 1.89 | 0 | 0 | 0.00384 ^a |
| Age 2+ | 0.364 | 0 | 0 | 0.0073 ^a |
| Age 3+ | 0.364 | 0 | 0 | 0.0113 ^a |
| Age 4+ | 0.364 | 0 | 0 | 0.0153 ^a |
| Age 5+ | 0.364 | 0 | 0 | 0.0191 ^a |
| Age 6+ | 0.364 | 0 | 0 | 0.0225 ^a |
| Age 7+ | 0.72 | 0 | 0 | 0.0255 ^a |
| Age 8+ | 0.72 | 0 | 0 | 0.028 ^a |
| Age 9+ | 0.72 | 0 | 0 | 0.0301 ^a |
| Age 10+ | 0.72 | 0 | 0 | 0.0319 ^a |
| Age 11+ | 0.72 | 0 | 0 | 0.0333 ^a |

^a PG&E National Energy Group, 2001.^b Not a commercial or recreational species, thus no fishing mortality.^c Assumed based on data in PG&E National Energy Group (2001).

Table F1-4: Atlantic Silverside Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^a (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------|
| Eggs | 1.41 | 0 | 0 | 0.000022 ^c |
| Larvae | 5.81 | 0 | 0 | 0.00022 ^c |
| Juvenile 1 | 2.63 | 0 | 0 | 0.0049 ^a |
| Age 1+ | 3 | 0 | 0 | 0.0205 ^a |
| Age 2+ | 6.91 | 0 | 0 | 0.0349 ^a |

^a PG&E National Energy Group, 2001.^b Not a commercial or recreational species, thus no fishing mortality.^c Assumed based on data in PG&E National Energy Group (2001).**Table F1-5: Bay Anchovy Species Parameters**

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^a (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------|
| Eggs | 1.1 | 0 | 0 | 0.000022 ^c |
| Larvae | 7.19 | 0 | 0 | 0.00022 ^c |
| Juvenile 1 | 2.09 | 0 | 0 | 0.00104 ^a |
| Age 1+ | 2.3 | 0 | 0 | 0.0037 ^a |
| Age 2+ | 2.3 | 0 | 0 | 0.00765 ^a |
| Age 3+ | 2.3 | 0 | 0 | 0.0126 ^a |

^a PG&E National Energy Group, 2001.^b Not a commercial or recreational species, thus no fishing mortality.^c Assumed based on data in PG&E National Energy Group (2001).**Table F1-6: Butterfish Species Parameters**

| Stage Name | Natural Mortality (per stage) | Fishing Mortality ^d (per stage) | Fraction Vulnerable to Fishery ^e | Weight (lb) ^f |
|------------|----------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------------|
| Eggs | 2.3 ^a | 0 | 0 | 0.00000002 ^g |
| Larvae | 7.56 ^b | 0 | 0 | 0.000002 ^g |
| Age 1+ | 0.8 ^c | 1.6 | 0.5 | 0.0272 ^h |
| Age 2+ | 0.8 ^c | 1.6 | 1 | 0.0986 ^h |
| Age 3+ | 0.8 ^c | 1.6 | 1 | 0.944 ^h |

^a Calculated from survival for Atlantic silverside (Stone & Webster Engineering Corporation, 1977) using the using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^b Calculated from extrapolated survival using the using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^c NOAA, 2001b.^d NOAA, 2001b. $F_{0.1}$ for Gulf of Maine - Middle Atlantic.^e Commercial species. Fraction vulnerable assumed.^f Weight calculated from length using the formula: $(4.0 \times 10^{-6}) \times \text{Length(mm)}^{3.26} = \text{weight(g)}$ (Froese and Pauly, 2001).^g Length from Able and Fahay (1998).^h Length from Scott and Scott (1988). Eastern United States.

Table F1-7: Hogchoker Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|----------------------|
| Eggs | 1.04 | 0 | 0 | 0.00022 ^c |
| Larvae | 5.2 | 0 | 0 | 0.0011 ^c |
| Juvenile 1 | 2.31 | 0 | 0 | 0.00207 ^a |
| Age 1+ | 2.56 | 0 | 0 | 0.0113 ^a |
| Age 2+ | 0.705 | 0 | 0 | 0.0313 ^a |
| Age 3+ | 0.705 | 0 | 0 | 0.061 ^a |
| Age 4+ | 0.705 | 0 | 0 | 0.0976 ^a |
| Age 5+ | 0.705 | 0 | 0 | 0.138 ^a |
| Age 6+ | 0.705 | 0 | 0 | 0.178 ^a |

^a PG&E National Energy Group, 2001.^b Not a commercial or recreational species, thus no fishing mortality.^c Assumed based on data in PG&E National Energy Group (2001).**Table F1-8: Rainbow Smelt Species Parameters**

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^c | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|----------------------|
| Eggs | 4.44 | 0 | 0 | 0.00022 ^d |
| Larvae | 3.12 | 0 | 0 | 0.0011 ^d |
| Juvenile 1 | 1.39 | 0 | 0 | 0.00395 ^a |
| Age 1+ | 1 | 0.04 | 0.5 | 0.0182 ^a |
| Age 2+ | 1 | 0.04 | 1 | 0.046 ^a |
| Age 3+ | 1 | 0.04 | 1 | 0.085 ^a |
| Age 4+ | 1 | 0.04 | 1 | 0.131 ^a |
| Age 5+ | 1 | 0.04 | 1 | 0.18 ^a |
| Age 6+ | 1 | 0.04 | 1 | 0.228 ^a |

^a PG&E National Energy Group, 2001.^b Stone & Webster Engineering Corporation, 1977.^c Commercial species. Fraction vulnerable assumed.^d Assumed based on data in PG&E National Energy Group (2001).

Table F1-9: Scup Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^a | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|----------------------|
| Eggs | 1.43 | 0 | 0 | 0.00022 ^c |
| Larvae | 4.55 | 0 | 0 | 0.0011 ^c |
| Juvenile 1 | 3.36 | 0 | 0 | 0.028 ^a |
| Age 1+ | 0.383 | 0 | 0 | 0.132 ^a |
| Age 2+ | 0.383 | 0 | 0 | 0.322 ^a |
| Age 3+ | 0.383 | 0.14 | 0.5 | 0.572 ^a |
| Age 4+ | 0.383 | 0.14 | 1 | 0.845 ^a |
| Age 5+ | 0.383 | 0.14 | 1 | 1.12 ^a |
| Age 6+ | 0.383 | 0.14 | 1 | 1.37 ^a |
| Age 7+ | 0.383 | 0.14 | 1 | 1.59 ^a |
| Age 8+ | 0.383 | 0.14 | 1 | 1.78 ^a |
| Age 9+ | 0.383 | 0.14 | 1 | 1.94 ^a |
| Age 10+ | 0.383 | 0.14 | 1 | 2.07 ^a |
| Age 11+ | 0.383 | 0.14 | 1 | 2.23 ^a |

^a PG&E National Energy Group, 2001.^b NOAA, 2001c. $F_{0.1}$ for Southern New England - Middle Atlantic.^c Assumed based on data in PG&E National Energy Group (2001).**Table F1-10: Seaboard Goby Species Parameters**

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^a (per stage) | Fraction Vulnerable to Fishery ^a | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------|
| Eggs | 0.288 | 0 | 0 | 0.000022 ^b |
| Larvae | 4.09 | 0 | 0 | 0.00022 ^b |
| Juvenile 1 | 2.3 | 0 | 0 | 0.000485 ^a |
| Age 1+ | 2.55 | 0 | 1 | 0.00205 ^a |

^a PG&E National Energy Group, 2001.^b Assumed based on data in PG&E National Energy Group (2001).

Table F1-11: Silver Hake Species Parameters

| Stage Name | Natural Mortality (per stage) | Fishing Mortality ^d (per stage) | Fraction Vulnerable to Fishery ^e | Weight (lb) ^f |
|------------|-------------------------------|--------------------------------------------|---------------------------------------------|--------------------------|
| Eggs | 1.22 ^a | 0 | 0 | 0.00000006 ^g |
| Larvae | 10.5 ^b | 0 | 0 | 0.00203 ^h |
| Age 1+ | 0.36 ^c | 0 | 0 | 0.164 ^g |
| Age 2+ | 0.36 ^c | 0 | 0 | 0.478 ^g |
| Age 3+ | 0.36 ^c | 0.39 | 0.5 | 0.804 ^g |
| Age 4+ | 0.36 ^c | 0.39 | 1 | 1.48 ^h |
| Age 5+ | 0.36 ^c | 0.39 | 1 | 2.15 ^h |
| Age 6+ | 0.36 ^c | 0.39 | 1 | 3 ^h |
| Age 7+ | 0.36 ^c | 0.39 | 1 | 4.06 ^h |
| Age 8+ | 0.36 ^c | 0.39 | 1 | 5.35 ^h |
| Age 9+ | 0.36 ^c | 0.39 | 1 | 6.89 ^h |
| Age 10+ | 0.36 ^c | 0.39 | 1 | 8.72 ^h |
| Age 11+ | 0.36 ^c | 0.39 | 1 | 10.4 ^h |
| Age 12+ | 0.36 ^c | 0.39 | 1 | 11.3 ^g |

^a Saila et al., 1997. Red hake.^b Calculated from extrapolated survival using the using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^c Froese and Pauly, 2001.^d NOAA, 2001c. $F_{0.1}$ for southern stock.^e Commercial species. Fraction vulnerable assumed.^f Weight calculated from length using the formula: $(3.79 \times 10^{-6}) * \text{Length(mm)}^{3.17} = \text{weight(g)}$ (Froese and Pauly, 2001).^g Length from Scott and Scott (1988).^h Length assumed based on Scott and Scott (1988).**Table F1-12: Striped Killifish Species Parameters**

| Stage Name | Natural Mortality (per stage) | Fishing Mortality ^c (per stage) | Fraction Vulnerable to Fishery ^c | Weight (lb) ^d |
|------------|-------------------------------|--------------------------------------------|---------------------------------------------|--------------------------|
| Eggs | 2.3 ^a | 0 | 0 | 0.0000009 ^e |
| Larvae | 2.14 ^b | 0 | 0 | 0.00002 ^e |
| Age 1+ | 0.777 ^b | 0 | 0 | 0.0121 ^f |
| Age 2+ | 0.777 ^b | 0 | 0 | 0.0327 ^f |
| Age 3+ | 0.777 ^b | 0 | 0 | 0.0551 ^f |
| Age 4+ | 0.777 ^b | 0 | 0 | 0.0778 ^f |
| Age 5+ | 0.777 ^b | 0 | 0 | 0.0967 ^f |
| Age 6+ | 0.777 ^b | 0 | 0 | 0.113 ^f |
| Age 7+ | 0.777 ^b | 0 | 0 | 0.158 ^f |

^a Calculated from survival for Atlantic silverside (Stone & Webster Engineering Corporation, 1977) using the using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^b Calculated from survival for mummichog (Meredith and Lotrich, 1979) using the using the equation: (natural mortality) = -LN(survival) - (fishing mortality).^c Not a commercial or recreational species, thus no fishing mortality.^d Weight calculated from length using the formula: $(2.6 \times 10^{-5}) * \text{Length(mm)}^{2.96} = \text{weight(g)}$ (Carlander, 1969).^e Length from Able and Fahay (1998).^f Length from Carlander (1969).

Table F1-13: Tautog Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^c | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|---------------------|
| Eggs | 1.4 | 0 | 0 | 0.0022 ^d |
| Larvae | 5.86 | 0 | 0 | 0.022 ^d |
| Juvenile 1 | 5.02 | 0 | 0 | 0.0637 ^a |
| Age 1+ | 0.175 | 0 | 0 | 0.217 ^a |
| Age 2+ | 0.175 | 0 | 0 | 0.44 ^a |
| Age 3+ | 0.175 | 0 | 0 | 0.734 ^a |
| Age 4+ | 0.175 | 0 | 0 | 1.08 ^a |
| Age 5+ | 0.175 | 0 | 0 | 1.48 ^a |
| Age 6+ | 0.175 | 0 | 0 | 1.89 ^a |
| Age 7+ | 0.175 | 0 | 0 | 2.32 ^a |
| Age 8+ | 0.175 | 0 | 0 | 2.76 ^a |
| Age 9+ | 0.175 | 0.15 | 0.5 | 3.18 ^a |
| Age 10+ | 0.175 | 0.15 | 1 | 3.6 ^a |
| Age 11+ | 0.175 | 0.15 | 1 | 4 ^a |
| Age 12+ | 0.175 | 0.15 | 1 | 4.38 ^a |
| Age 13+ | 0.175 | 0.15 | 1 | 4.73 ^a |
| Age 14+ | 0.175 | 0.15 | 1 | 5.07 ^a |
| Age 15+ | 0.175 | 0.15 | 1 | 5.38 ^a |
| Age 16+ | 0.175 | 0.15 | 1 | 5.67 ^a |
| Age 17+ | 0.175 | 0.15 | 1 | 5.94 ^a |
| Age 18+ | 0.175 | 0.15 | 1 | 6.19 ^a |
| Age 19+ | 0.175 | 0.15 | 1 | 6.42 ^a |
| Age 20+ | 0.175 | 0.15 | 1 | 6.63 ^a |
| Age 21+ | 0.175 | 0.15 | 1 | 6.82 ^a |
| Age 22+ | 0.175 | 0.15 | 1 | 6.99 ^a |
| Age 23+ | 0.175 | 0.15 | 1 | 7.15 ^a |
| Age 24+ | 0.175 | 0.15 | 1 | 10 ^a |

^a PG&E National Energy Group, 2001.^b Atlantic States Marine Fisheries Commission, 2000h. F_{target} .^c Commercial and recreational species. Fraction vulnerable assumed.^d Assumed based on data in PG&E National Energy Group (2001).

Table F1-14: Threespine Stickleback Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^a (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|----------------------|
| Eggs | 0.288 | 0 | 0 | 0.00022 ^c |
| Larvae | 2.12 | 0 | 0 | 0.0011 ^c |
| Juvenile 1 | 1.7 | 0 | 0 | 0.00377 ^a |
| Age 1+ | 1.42 | 0 | 0 | 0.00917 ^a |
| Age 2+ | 1.42 | 0 | 0 | 0.0112 ^a |
| Age 3+ | 1.42 | 0 | 0 | 0.0116 ^a |

^a PG&E National Energy Group, 2001.^b Not a commercial or recreational species, thus no fishing mortality.^c Assumed based on data in PG&E National Energy Group (2001).**Table F1-15: Weakfish Species Parameters**

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^a | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|-----------------------|
| Eggs | 1.04 | 0 | 0 | 0.000022 ^c |
| Larvae | 7.67 | 0 | 0 | 0.065 ^c |
| Juvenile 1 | 2.44 | 0 | 0 | 0.13 ^c |
| Juvenile 2 | 1.48 | 0 | 0 | 0.195 ^a |
| Age 1+ | 0.349 | 0.5 | 0.1 | 0.26 ^a |
| Age 2+ | 0.25 | 0.5 | 0.5 | 0.68 ^a |
| Age 3+ | 0.25 | 0.5 | 1 | 1.12 ^a |
| Age 4+ | 0.25 | 0.5 | 1 | 1.79 ^a |
| Age 5+ | 0.25 | 0.5 | 1 | 2.91 ^a |
| Age 6+ | 0.25 | 0.5 | 1 | 6.21 ^a |
| Age 7+ | 0.25 | 0.5 | 1 | 7.14 ^a |
| Age 8+ | 0.25 | 0.5 | 1 | 9.16 ^a |
| Age 9+ | 0.25 | 0.5 | 1 | 10.8 ^a |
| Age 10+ | 0.25 | 0.5 | 1 | 12.5 ^a |
| Age 11+ | 0.25 | 0.5 | 1 | 12.5 ^a |
| Age 12+ | 0.25 | 0.5 | 1 | 12.5 ^a |
| Age 13+ | 0.25 | 0.5 | 1 | 12.5 ^a |
| Age 14+ | 0.25 | 0.5 | 1 | 12.5 ^a |
| Age 15+ | 0.25 | 0.5 | 1 | 12.5 ^a |

^a PSEG, 1999c.^b Atlantic States Marine Fisheries Commission, 2000d. Management goal.^c Assumed based on data in PSEG (1999c).

Table F1-16: White Perch Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^a (per stage) | Fraction Vulnerable to Fishery ^b | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|----------------------|
| Eggs | 1.42 | 0 | 0 | 0.00022 ^c |
| Larvae | 4.59 | 0 | 0 | 0.0011 ^c |
| Age 1+ | 0.693 | 0 | 0 | 0.0516 ^a |
| Age 2+ | 0.693 | 0 | 0 | 0.156 ^a |
| Age 3+ | 0.543 | 0.15 | 0.5 | 0.248 ^a |
| Age 4+ | 0.543 | 0.15 | 1 | 0.331 ^a |
| Age 5+ | 1.46 | 0.15 | 1 | 0.423 ^a |
| Age 6+ | 1.46 | 0.15 | 1 | 0.523 ^a |
| Age 7+ | 1.46 | 0.15 | 1 | 0.613 ^a |
| Age 8+ | 1.46 | 0.15 | 1 | 0.658 ^a |
| Age 9+ | 1.46 | 0.15 | 1 | 0.794 ^a |

^a PG&E National Energy Group, 2001.^b Commercial and recreational species. Fraction vulnerable assumed.^c Assumed based on data in PG&E National Energy Group (2001).**Table F1-17: Windowpane Species Parameters**

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^c | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|----------------------|
| Eggs | 1.41 | 0 | 0 | 0.0011 ^d |
| Larvae | 6.99 | 0 | 0 | 0.00165 ^d |
| Juvenile 1 | 2.98 | 0 | 0 | 0.00223 ^a |
| Age 1+ | 0.42 | 0 | 0 | 0.0325 ^a |
| Age 2+ | 0.42 | 1.6 | 0.25 | 0.122 ^a |
| Age 3+ | 0.42 | 1.6 | 0.61 | 0.265 ^a |
| Age 4+ | 0.42 | 1.6 | 1 | 0.433 ^a |
| Age 5+ | 0.42 | 1.6 | 1 | 0.603 ^a |
| Age 6+ | 0.42 | 1.6 | 1 | 0.761 ^a |
| Age 7+ | 0.42 | 1.6 | 1 | 0.899 ^a |
| Age 8+ | 0.42 | 1.6 | 1 | 1.01 ^a |
| Age 9+ | 0.42 | 1.6 | 1 | 1.11 ^a |
| Age 10+ | 0.42 | 1.6 | 1 | 1.19 ^a |

^a PG&E National Energy Group, 2001.^b NOAA, 2001c. F_{target} for Southern New England - Middle Atlantic.^c USGen New England, 2001.^d Assumed based on data in PG&E National Energy Group (2001).

Table F1-18: Winter Flounder Species Parameters

| Stage Name | Natural Mortality ^a (per stage) | Fishing Mortality ^b (per stage) | Fraction Vulnerable to Fishery ^c | Weight (lb) |
|------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|----------------------|
| Eggs | 0.288 | 0 | 0 | 0.0022 ^d |
| Larvae 1 | 2.05 | 0 | 0 | 0.00441 ^d |
| Larvae 2 | 3.42 | 0 | 0 | 0.011 ^d |
| Larvae 3 | 3.52 | 0 | 0 | 0.0176 ^d |
| Larvae 4 | 0.177 | 0 | 0 | 0.022 ^d |
| Juvenile 1 | 2.38 | 0 | 0 | 0.033 ^a |
| Age 1+ | 1.1 | 0.24 | 0.01 | 0.208 ^a |
| Age 2+ | 0.924 | 0.24 | 0.29 | 0.562 ^a |
| Age 3+ | 0.2 | 0.24 | 0.8 | 0.997 ^a |
| Age 4+ | 0.2 | 0.24 | 0.92 | 1.42 ^a |
| Age 5+ | 0.2 | 0.24 | 0.83 | 1.78 ^a |
| Age 6+ | 0.2 | 0.24 | 0.89 | 2.07 ^a |
| Age 7+ | 0.2 | 0.24 | 0.89 | 2.29 ^a |
| Age 8+ | 0.2 | 0.24 | 0.89 | 2.45 ^a |
| Age 9+ | 0.2 | 0.24 | 0.89 | 2.57 ^a |
| Age 10+ | 0.2 | 0.24 | 0.89 | 2.65 ^a |
| Age 11+ | 0.2 | 0.24 | 0.89 | 2.71 ^a |
| Age 12+ | 0.2 | 0.24 | 0.89 | 2.75 ^a |
| Age 13+ | 0.2 | 0.24 | 0.89 | 2.78 ^a |
| Age 14+ | 0.2 | 0.24 | 0.89 | 2.8 ^a |
| Age 15+ | 0.2 | 0.24 | 0.89 | 2.82 ^a |
| Age 16+ | 0.2 | 0.24 | 0.89 | 2.83 ^a |

^a PG&E National Energy Group, 2001.^b NOAA, 2001c. F_{target} for Southern New England - Middle Atlantic.^c Colarusso, 2000.^d Assumed based on data in PG&E National Energy Group (2001).