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**Appendix A**

**Description of the Pmax technique used to calculate exploitation rates from catch and spawner abundance data.**

Estimates of spawner abundance (Fisheries and Oceans Canada 2011) are collected by DFO personnel through stream walk or aerial surveys of select rivers within each management area. As not all rivers in an area are surveyed every year, these estimates of spawner abundance, or escapement (i.e., those fish that escape the fishery), must be expanded to represent the total number of salmon returning to all rivers within an area in order to calculate exploitation rates. In British Columbia, fisheries managers often use an averaging scale technique referred to as the Pmax technique (Holtby et al. 2000, Godbout et al. 2004) to expand estimates of spawner abundance so that they are in the same units as catch data (i.e., per the entire area), and exploitation rates can be calculated. We have employed this method in our calculation of exploitation rates for Areas 7-10.

The total escapement estimate is an adjusted sum of the escapement to index streams within the area for which catch is reported. Index streams are streams with data for at least 20 years between 1950 and 2010. The **observed sum** in a given year is the sum of escapement estimates to each of *n* index streams:

This observed sum, *Etobs* is then expanded by the sum of the annual escapement contributions (proportions) to each index stream. This escapement contribution is calculated as the mean escapement to that stream over the decade divided by the sum of the mean escapements to all streams in that decade. If that stream had zero fish in a year, the escapement contribution was set to zero *even if* the decadal escapement contribution was non-zero. This adjustment is made to account for zeros or missing data for index streams, which may be important contributors to total escapement for the area. The **adjusted sum** is then the observed sum divided by this annual escapement contribution.

To account for the escapement to non-index streams, the adjusted sum is divided by the index streams’ contribution to give the **total observed sum**. This contribution is calculated as the sum of mean escapement to index streams in the each decade, divided by the sum of the mean escapement to *all streams* in that decade. This contribution is generally upwards of 90%.

Finally, the total observed sum is multiplied by 150% to give the **total adjusted sum**. This adjustment assumes that the total escapement to an area is 1.5 times what is observed in streams that are actually enumerated. The exploitation rate is then the total catch (gill net, seine and trawl) in a year divided by total catch plus total adjusted sum of escapement to the area.

**Literature cited**

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Holtby, L. B., K. Simpson, R. W. Tanasichuk, and J. R. Irvine. 2000. Forecast for southern British Columbia coho salmon in 2000. Canadian Stock Assessment Secreteriat Research Document 2000/127, Fisheries and Oceans Canada.

**Appendix B**

**Supplemental figures showing details of louse abundance and salinity for spatially intensive surveys in the Broughton Archipelago, B.C., in 2009.**

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Figure B. Mean abundance (± 95% bootstrapped CI) of sea lice on juvenile pink salmon migrating along the Tribune Channel route during five surveys (a) through (e) during April through June in 2009. Distance is relative to Shewell Island, at the confluence of Knight Inlet and Tribune Channel (SI Fig. 1). Vertical dotted lines mark locations of salmon farms that contained adult salmon during the migration season. Migration direction is from left to right in each panel.



Figure B2. Surface salinity in the Broughton Archipelago during the spatially intensive surveys of louse abundance on wild juvenile salmon was similar between 2004 (top) and 2009 (bottom; paired t-test, *t* = 0.0474, *df* = 14, *p*-value = 0.9628). We stratified salinity into 10 km distance bins (x-axis), where km 0 is Shewell Island, at the confluence of Knight Inlet and Tribune Channel, and by month (Apr, May, Jun; shaded bars) to control for different freshwater input and oceanographic currents along the migration route. Dashed lines indicate a salinity of 27 ppt.

Appendix C

Supplemental tables describing the pink salmon spawning rivers included in the analysis (Table C1) and results from the analysis of parasiticide treatments on farm salmon (Tables C2-C3).

Table C1. Summary of pink salmon populations included in the growth rate analysis.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Return years analyzed** | |
|  | **Area** | **River** | **Population** | **b** | **1/b** | **first** | **last** |
| 1 | 12 | AHNUHATI RIVER | Even | 5.39E-06 | 185529 | 1962 | 2010 |
| 2 | 12 | AHNUHATI RIVER | Odd | 6.22E-05 | 16077 | 1963 | 2009 |
| 3 | 12 | AHTA RIVER | Even | 7.31E-05 | 13680 | 1962 | 2010 |
| 4 | 12 | AHTA RIVER | Odd | 5.53E-05 | 18083 | 1963 | 2009 |
| 5 | 8 | AIRPORT SIDE CHANNEL | Odd | 8.92E-04 | 1121 | 2007 | 2007 |
| 6 | 9 | ALLARD CREEK | Even | 6.29E-03 | 159 | 1982 | 1994 |
| 7 | 9 | ALLARD CREEK | Odd | 7.00E-04 | 1429 | 1979 | 1991 |
| 8 | 9 | AMBACK CREEK | Even | 3.19E-04 | 3135 | 1968 | 2006 |
| 9 | 9 | AMBACK CREEK | Odd | 2.35E-04 | 4255 | 1965 | 2007 |
| 10 | 9 | ASHLULM CREEK | Even | 9.95E-04 | 1005 | 1972 | 2002 |
| 11 | 9 | ASHLULM CREEK | Odd | 1.02E-03 | 980 | 1977 | 2009 |
| 12 | 8 | ASSEEK RIVER | Even | 8.97E-05 | 11148 | 1962 | 2006 |
| 13 | 8 | ASSEEK RIVER | Odd | 1.18E-04 | 8475 | 1963 | 1993 |
| 14 | 8 | ATNARKO SPAWNING CHANNEL | Even | 7.30E-05 | 13699 | 1988 | 2004 |
| 15 | 8 | ATNARKO SPAWNING CHANNEL | Odd | 1.72E-04 | 5814 | 1989 | 2007 |
| 16 | 9 | BEAVER CREEK | Even | 2.73E-03 | 366 | 1974 | 2002 |
| 17 | 9 | BEAVER CREEK | Odd | 6.13E-03 | 163 | 1981 | 2003 |
| 18 | 8 | BELLA COOLA RIVER | Even | 5.33E-07 | 1876173 | 1962 | 2010 |
| 19 | 8 | BELLA COOLA RIVER | Odd | 7.75E-07 | 1290323 | 1963 | 2009 |
| 20 | 10 | BOSWELL CREEK | Odd | 8.20E-02 | 12 | 1983 | 1983 |
| 21 | 7 | BULLOCK CHANNEL CREEKS | Even | 5.77E-04 | 1733 | 1962 | 2002 |
| 22 | 7 | BULLOCK CHANNEL CREEKS | Odd | 7.89E-04 | 1267 | 1963 | 2003 |
| 23 | 8 | CAMP CREEK | Even | 2.57E-03 | 389 | 1962 | 2000 |
| 24 | 8 | CAMP CREEK | Odd | 5.83E-03 | 172 | 1963 | 1987 |
| 25 | 8 | CASCADE RIVER | Even | 9.80E-05 | 10204 | 1962 | 2006 |
| 26 | 8 | CASCADE RIVER | Odd | 2.40E-04 | 4167 | 1963 | 2009 |
| 27 | 9 | CHUCKWALLA RIVER | Even | 6.07E-06 | 164745 | 1962 | 2010 |
| 28 | 9 | CHUCKWALLA RIVER | Odd | 2.98E-06 | 335570 | 1963 | 2009 |
| 29 | 7 | CLATSE CREEK | Even | 2.33E-05 | 42918 | 1962 | 2010 |
| 30 | 7 | CLATSE CREEK | Odd | 4.40E-05 | 22727 | 1963 | 2009 |
| 31 | 8 | CLAYTON FALLS CREEK | Odd | 1.28E-03 | 781 | 2007 | 2007 |
| 32 | 9 | CLYAK RIVER | Even | 1.94E-05 | 51546 | 1962 | 2006 |
| 33 | 9 | CLYAK RIVER | Odd | 7.16E-04 | 1397 | 1963 | 1995 |
| 34 | 8 | COLD CREEK | Even | 1.87E-03 | 535 | 1990 | 1992 |
| 35 | 7 | COOPER INLET CREEKS | Even | 5.26E-05 | 19011 | 1962 | 2000 |
| 36 | 7 | COOPER INLET CREEKS | Odd | 9.78E-05 | 10225 | 1963 | 2001 |
| 37 | 8 | CRAB HARBOUR CREEK | Even | 4.28E-03 | 234 | 1978 | 2002 |
| 38 | 8 | CRAB HARBOUR CREEK | Odd | 1.02E-02 | 98 | 1983 | 1995 |
| 39 | 9 | DALLERY CREEK | Even | 1.80E-04 | 5556 | 1974 | 2002 |
| 40 | 9 | DALLERY CREEK | Odd | 6.19E-04 | 1616 | 1967 | 2009 |
| 41 | 8 | DE COSMOS LAGOON CREEK | Even | 1.00E-02 | 100 | 1992 | 1996 |
| 42 | 8 | DE COSMOS LAGOON CREEK | Odd | 2.07E-02 | 48 | 1985 | 1995 |
| 43 | 8 | DEAN RIVER | Even | 2.06E-05 | 48544 | 1962 | 2010 |
| 44 | 8 | DEAN RIVER | Odd | 4.61E-05 | 21692 | 1967 | 2009 |
| 45 | 8 | DEEP BAY CREEK | Even | 2.43E-03 | 412 | 1962 | 1996 |
| 46 | 8 | DEEP BAY CREEK | Odd | 7.71E-03 | 130 | 1963 | 1993 |
| 47 | 7 | DEER PASS LAGOON CREEKS | Even | 1.66E-02 | 60 | 1980 | 1982 |
| 48 | 7 | DEER PASS LAGOON CREEKS | Odd | 1.36E-03 | 735 | 1977 | 1981 |
| 49 | 10 | DOCEE RIVER | Even | 2.64E-04 | 3788 | 2010 | 2010 |
| 50 | 9 | DRANEY CREEK | Even | 7.22E-04 | 1385 | 1980 | 2002 |
| 51 | 9 | DRANEY CREEK | Odd | 7.40E-05 | 13514 | 1981 | 2001 |
| 52 | 8 | ELCHO CREEK | Even | 4.93E-05 | 20284 | 1962 | 2010 |
| 53 | 8 | ELCHO CREEK | Odd | 2.86E-04 | 3497 | 1963 | 2009 |
| 54 | 8 | EVANS INLET #3 CREEK | Even | 1.22E-03 | 820 | 1962 | 1998 |
| 55 | 8 | EVANS INLET #3 CREEK | Odd | 1.89E-02 | 53 | 1963 | 1995 |
| 56 | 8 | FISH CREEK | Odd | 2.83E-03 | 353 | 2007 | 2007 |
| 57 | 8 | FOUR LAKES CREEK | Even | -2.10E-02 | -48 | 1986 | 2002 |
| 58 | 8 | FOUR LAKES CREEK | Odd | 8.64E-05 | 11574 | 1991 | 2001 |
| 59 | 8 | FRENCHMAN CREEK | Even | 7.30E-05 | 13699 | 1962 | 2010 |
| 60 | 8 | FRENCHMAN CREEK | Odd | 1.72E-02 | 58 | 1963 | 2009 |
| 61 | 8 | GARBAGE DUMP CREEK | Odd | 1.11E-03 | 901 | 2007 | 2007 |
| 62 | 9 | GENESEE CREEK | Even | 1.13E-03 | 885 | 1976 | 2002 |
| 63 | 9 | GENESEE CREEK | Odd | 2.68E-06 | 373134 | 1975 | 2009 |
| 64 | 12 | GLENDALE CREEK | Even | 2.15E-06 | 465116 | 1962 | 2010 |
| 65 | 12 | GLENDALE CREEK | Odd | 1.48E-03 | 676 | 1963 | 2009 |
| 66 | 7 | GOAT BUSHU CREEK | Even | 2.61E-03 | 383 | 1964 | 1994 |
| 67 | 7 | GOAT BUSHU CREEK | Odd | 1.87E-03 | 535 | 1971 | 2009 |
| 68 | 8 | GREEN RIVER | Even | 1.28E-03 | 781 | 1984 | 2002 |
| 69 | 8 | GREEN RIVER | Odd | 1.48E-04 | 6757 | 1975 | 1981 |
| 70 | 8 | HOOK NOSE CREEK | Even | 1.24E-04 | 8065 | 1962 | 2008 |
| 71 | 8 | HOOK NOSE CREEK | Odd | 1.22E-04 | 8197 | 1963 | 2001 |
| 72 | 8 | JENNY BAY CREEKS | Even | 1.45E-04 | 6897 | 1962 | 2006 |
| 73 | 8 | JENNY BAY CREEKS | Odd | 2.97E-03 | 337 | 1963 | 2005 |
| 74 | 8 | JENNY BAY EAST CREEK | Odd | 5.13E-04 | 1949 | 2009 | 2009 |
| 75 | 8 | JENNY BAY SOUTH CREEK | Odd | 3.77E-04 | 2653 | 2009 | 2009 |
| 76 | 8 | JENNY BAY WEST CREEK | Odd | 2.49E-05 | 40161 | 2009 | 2009 |
| 77 | 9 | JOHNSTON CREEK | Even | 2.97E-05 | 33670 | 1962 | 2004 |
| 78 | 9 | JOHNSTON CREEK | Odd | 1.20E-04 | 8333 | 1963 | 2005 |
| 79 | 7 | KADJUSDIS RIVER | Even | 2.28E-04 | 4386 | 1962 | 2000 |
| 80 | 7 | KADJUSDIS RIVER | Odd | 2.31E-06 | 432900 | 1963 | 1991 |
| 81 | 12 | KAKWEIKEN RIVER | Even | 2.02E-06 | 495050 | 1962 | 2010 |
| 82 | 12 | KAKWEIKEN RIVER | Odd | 1.36E-05 | 73529 | 1963 | 2009 |
| 83 | 9 | KILBELLA RIVER | Even | 6.50E-06 | 153846 | 1962 | 2010 |
| 84 | 9 | KILBELLA RIVER | Odd | 1.16E-06 | 862069 | 1963 | 2009 |
| 85 | 8 | KIMSQUIT RIVER | Even | 4.83E-04 | 2070 | 1962 | 1996 |
| 86 | 8 | KIMSQUIT RIVER | Odd | 8.36E-06 | 119617 | 1963 | 1993 |
| 87 | 12 | KINGCOME RIVER | Even | 1.04E-04 | 9615 | 1962 | 2010 |
| 88 | 12 | KINGCOME RIVER | Odd | 3.27E-04 | 3058 | 1963 | 2009 |
| 89 | 8 | KISAMEET RIVER | Even | 3.05E-04 | 3279 | 1962 | 1982 |
| 90 | 8 | KISAMEET RIVER | Odd | 1.05E-05 | 95238 | 1963 | 1985 |
| 91 | 8 | KOEYE RIVER | Even | 1.38E-05 | 72464 | 1962 | 2004 |
| 92 | 8 | KOEYE RIVER | Odd | 5.14E-05 | 19455 | 1963 | 2009 |
| 93 | 7 | KUNSOOT RIVER | Even | 1.45E-04 | 6897 | 1962 | 2006 |
| 94 | 7 | KUNSOOT RIVER | Odd | 7.73E-05 | 12937 | 1963 | 2007 |
| 95 | 7 | KWAKUSDIS RIVER | Even | 1.03E-04 | 9709 | 1962 | 2006 |
| 96 | 7 | KWAKUSDIS RIVER | Odd | 8.95E-06 | 111732 | 1963 | 2009 |
| 97 | 8 | KWATNA RIVER | Even | 8.90E-06 | 112360 | 1962 | 2006 |
| 98 | 8 | KWATNA RIVER | Odd | 1.50E-03 | 667 | 1963 | 2009 |
| 99 | 7 | LEE CREEK | Even | 2.09E-04 | 4785 | 1962 | 2010 |
| 100 | 7 | LEE CREEK | Odd | 2.51E-04 | 3984 | 1963 | 2001 |
| 101 | 9 | LOCKHART GORDON CREEK | Even | 2.54E-04 | 3937 | 1964 | 2004 |
| 102 | 9 | LOCKHART GORDON CREEK | Odd | 2.49E-04 | 4016 | 1973 | 2001 |
| 103 | 12 | LULL CREEK | Even | 4.13E-04 | 2421 | 1962 | 2010 |
| 104 | 12 | LULL CREEK | Odd | 1.77E-04 | 5650 | 1967 | 2009 |
| 105 | 9 | MACNAIR CREEK | Even | 2.97E-04 | 3367 | 1964 | 2002 |
| 106 | 9 | MACNAIR CREEK | Odd | 1.31E-04 | 7634 | 1973 | 2005 |
| 107 | 8 | MARTIN RIVER | Even | 7.99E-04 | 1252 | 1962 | 2002 |
| 108 | 8 | MARTIN RIVER | Odd | 7.18E-04 | 1393 | 1963 | 2003 |
| 109 | 7 | MCLOUGHLIN CREEK | Even | 1.34E-03 | 746 | 1970 | 1990 |
| 110 | 7 | MCLOUGHLIN CREEK | Odd | 7.24E-05 | 13812 | 1973 | 1991 |
| 111 | 9 | MILTON RIVER | Even | 3.82E-04 | 2618 | 1962 | 2010 |
| 112 | 9 | MILTON RIVER | Odd | 7.19E-04 | 1391 | 1963 | 2005 |
| 113 | 8 | NAMU RIVER | Even | 1.70E-03 | 588 | 1962 | 1990 |
| 114 | 8 | NAMU RIVER | Odd | 1.34E-03 | 746 | 1963 | 1985 |
| 115 | 8 | NASCALL CREEK | Even | 1.79E-02 | 56 | 1990 | 1992 |
| 116 | 8 | NASCALL CREEK | Odd | 2.56E-05 | 39063 | 1993 | 1993 |
| 117 | 8 | NECLEETSCONNAY RIVER | Even | 3.17E-05 | 31546 | 1962 | 2004 |
| 118 | 8 | NECLEETSCONNAY RIVER | Odd | 1.89E-03 | 529 | 1963 | 2005 |
| 119 | 9 | NEECHANZ RIVER | Even | 1.97E-05 | 50761 | 1976 | 1978 |
| 120 | 7 | NEEKAS CREEK | Even | 4.12E-05 | 24272 | 1962 | 2010 |
| 121 | 7 | NEEKAS CREEK | Odd | 4.25E-05 | 23529 | 1963 | 2009 |
| 122 | 10 | NEKITE RIVER | Even | 3.96E-05 | 25253 | 1962 | 2008 |
| 123 | 10 | NEKITE RIVER | Odd | -7.80E-03 | -128 | 1963 | 2009 |
| 124 | 10 | NEKITE SPAWNING CHANNEL | Even | 9.33E-04 | 1072 | 1990 | 2002 |
| 125 | 10 | NEKITE SPAWNING CHANNEL | Odd | 5.81E-03 | 172 | 1989 | 2007 |
| 126 | 9 | NEWICHY CREEK | Even | 2.21E-04 | 4525 | 2002 | 2002 |
| 127 | 9 | NICKNAQUEET RIVER | Even | 3.35E-04 | 2985 | 1962 | 2002 |
| 128 | 9 | NICKNAQUEET RIVER | Odd | 4.32E-05 | 23148 | 1963 | 2009 |
| 129 | 9 | NIEL CREEK | Even | 1.70E-03 | 588 | 1986 | 1996 |
| 130 | 9 | NIEL CREEK | Odd | 3.89E-04 | 2571 | 1987 | 1987 |
| 131 | 8 | NIEUMIAMUS CREEK | Even | 6.17E-04 | 1621 | 1980 | 2000 |
| 132 | 8 | NIEUMIAMUS CREEK | Odd | 4.11E-04 | 2433 | 1979 | 1999 |
| 133 | 8 | NOEICK RIVER | Even | 4.12E-04 | 2427 | 1962 | 1984 |
| 134 | 8 | NOEICK RIVER | Odd | 3.84E-03 | 260 | 1963 | 1985 |
| 135 | 8 | NOOHALK CREEK | Odd | 8.26E-05 | 12107 | 2007 | 2007 |
| 136 | 8 | NOOSESECK RIVER | Even | 9.96E-05 | 10040 | 1962 | 2004 |
| 137 | 8 | NOOSESECK RIVER | Odd | 9.19E-05 | 10881 | 1963 | 2003 |
| 138 | 8 | NOOTUM RIVER | Even | 8.15E-04 | 1227 | 1962 | 1998 |
| 139 | 8 | NOOTUM RIVER | Odd | 1.04E-03 | 962 | 1963 | 2001 |
| 140 | 9 | OATSOALIS CREEK | Even | 2.95E-04 | 3390 | 1978 | 1986 |
| 141 | 7 | PINE RIVER | Even | 4.65E-04 | 2151 | 1962 | 1992 |
| 142 | 7 | PINE RIVER | Odd | 1.86E-04 | 5376 | 1963 | 1989 |
| 143 | 7 | QUARTCHA CREEK | Even | 1.25E-04 | 8000 | 1962 | 2010 |
| 144 | 7 | QUARTCHA CREEK | Odd | 2.44E-04 | 4098 | 1963 | 2009 |
| 145 | 8 | QUATLENA RIVER | Even | 7.62E-04 | 1312 | 1962 | 2006 |
| 146 | 8 | QUATLENA RIVER | Odd | 1.40E-04 | 7143 | 1963 | 2009 |
| 147 | 7 | ROSCOE CREEK | Even | 5.92E-05 | 16892 | 1962 | 2000 |
| 148 | 7 | ROSCOE CREEK | Odd | 3.85E-04 | 2597 | 1963 | 2009 |
| 149 | 8 | SAGAR CREEK | Even | 5.69E-04 | 1757 | 1962 | 1998 |
| 150 | 8 | SAGAR CREEK | Odd | 1.29E-04 | 7752 | 1963 | 2001 |
| 151 | 8 | SALLOOMT RIVER | Odd | 2.22E-04 | 4505 | 2007 | 2009 |
| 152 | 9 | SANDELL RIVER | Even | 1.26E-01 | 8 | 1966 | 1990 |
| 153 | 8 | SKIMLETS CREEK | Odd | 2.93E-04 | 3413 | 2005 | 2005 |
| 154 | 8 | SKOWQUILTZ RIVER | Even | 2.03E-04 | 4926 | 1962 | 2006 |
| 155 | 8 | SKOWQUILTZ RIVER | Odd | 9.84E-04 | 1016 | 1963 | 2005 |
| 156 | 8 | SNOOTLI CREEK | Odd | 1.07E-03 | 935 | 2007 | 2009 |
| 157 | 8 | STEELHEAD CREEK | Even | -8.49E-02 | -12 | 1990 | 1990 |
| 158 | 8 | STEELHEAD CREEK | Odd | 8.31E-04 | 1203 | 1993 | 1993 |
| 159 | 8 | TALEOMEY RIVER | Even | 3.48E-04 | 2874 | 1962 | 1992 |
| 160 | 8 | TALEOMEY RIVER | Odd | 6.19E-04 | 1616 | 1963 | 1989 |
| 161 | 7 | TANKEEAH RIVER | Even | 1.97E-04 | 5076 | 1962 | 2008 |
| 162 | 7 | TANKEEAH RIVER | Odd | 1.01E-03 | 990 | 1963 | 2009 |
| 163 | 8 | TASTSQUAN CREEK | Odd | 2.66E-04 | 3759 | 2007 | 2009 |
| 164 | 8 | THORSEN CREEK | Odd | 1.29E-04 | 7752 | 2007 | 2009 |
| 165 | 12 | VINER SOUND CREEK | Even | 2.57E-03 | 389 | 1962 | 2010 |
| 166 | 12 | VINER SOUND CREEK | Odd | 5.15E-06 | 194175 | 1963 | 2009 |
| 167 | 12 | WAKEMAN RIVER | Even | 4.73E-06 | 211416 | 1962 | 2010 |
| 168 | 12 | WAKEMAN RIVER | Odd | 8.55E-04 | 1170 | 1963 | 2009 |
| 169 | 7 | WALKER LAKE CREEK | Even | 1.28E-03 | 781 | 1962 | 1992 |
| 170 | 7 | WALKER LAKE CREEK | Odd | 2.23E-03 | 448 | 1971 | 1995 |
| 171 | 10 | WALKUM CREEK | Even | 6.20E-03 | 161 | 1978 | 1992 |
| 172 | 10 | WALKUM CREEK | Odd | 4.20E-04 | 2381 | 1975 | 1995 |
| 173 | 9 | WANNOCK RIVER | Even | 1.48E-03 | 676 | 1972 | 1984 |
| 174 | 9 | WANNOCK RIVER | Odd | 1.50E-03 | 667 | 1973 | 1983 |
| 175 | 9 | WASHWASH RIVER | Even | 1.38E-02 | 72 | 1984 | 2002 |
| 176 | 9 | WASHWASH RIVER | Odd | 2.18E-04 | 4587 | 1985 | 1989 |
| 177 | 8 | WORAN CREEK | Even | 2.40E-04 | 4167 | 1962 | 2004 |
| 178 | 8 | WORAN CREEK | Odd | 3.66E-05 | 27322 | 1963 | 2005 |
| 179 | 9 | YOUNG RIVER | Even | 8.52E-04 | 1174 | 1986 | 1996 |
| 180 | 9 | YOUNG RIVER | Odd | -8.36E-04 | -1196 | 1987 | 1995 |

*b*  is the density dependent parameter from the hierarchical Ricker model. It was constant over time, but varied among populations, and is inversely related to the carrying capacity.

Table C2. Results of a linear regression predicting the total number of treatments with SLICE™ in the Knight Inlet – Tribune Channel – Fife Sound corridor and the entire Broughton Archipelago\* over time.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Area** | **Predictor** | **Estimate** | **SEa** | ***t*-value** | ***p*-vaue** | ***F*1,7** | **R2** |
| KTF | (Intercept) | -429.19 | 710.486 | -0.604 | 0.565 | 0.374 | 0.051 |
| Year | 0.22 | 0.354 | 0.611 | 0.560 |
| BA | (Intercept) | -1291.47 | 1451.791 | -0.890 | 0.403 | 0.806 | 0.103 |
| Year | 0.65 | 0.724 | 0.898 | 0.399 |

\*Data are given in Table 2. aStandard error in the parameter estimate.

Table C3. Logistic regression predicting the proportion of total treatments occurring in winter (October – March)\* over time.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Area** | **Predictor** | **Estimate** | **SEa** | **exp()b** | ***t*-value** | ***p-*vaue** | **Deviance** |
| KTF | (Intercept) | -362.86 | 200.584 |  | -1.809 | 0.070 | 4.692855 |
| Year | 0.18 | 0.100 | 1.198 | 1.807 | 0.071 |
| BA | (Intercept) | -232.25 | 129.558 |  | -1.793 | 0.073 | 2.67196 |
| Year | 0.12 | 0.065 | 1.123 | 1.790 | 0.073 |

\*Data are given in Table 2. aStandard error in the parameter estimate. bIn logistic regression, exp() is often referred to as the odds ratio.

**Supplement 1**

**Details of the analysis of pink salmon population data, including spawner and catch data and R code for compiling spawner-recruit pairs and fitting the Ricker model.**

**File list**

nuSEDS\_PINK.csv

Catch\_PINK.csv

1\_DataCompilation.R

2\_PopulationAnalysis.R

**Description**

The following files are made available with the intention of ensuring our manipulation of data and analysis of pink salmon populations is entirely transparent. We assume that the reader is familiar with the program R, which can be downloaded from the web at cran.r-project.org. Any errors in transcribing and manipulating the data are the sole responsibility of the authors. Additional data and code for the analysis of farm treatments and lice on wild salmon are available upon email request to Stephanie Peacock (stephanie.peacock@ualberta.ca).

nuSEDS\_PINK.csv contains spawner data for pink salmon populations in British Columbia, Canada from 1950-2010, provided by Fisheries and Oceans Canada (contact: Bruce Baxter <bruce.baxter@dfo-mpo.gc.ca>). These data include the following columns:

Area: Fisheries management area, the spatial scale at which catch data are reported.

River: The river at which spawners were enumerated, the finest scale at which spawner data are available.

Yr: The year spawners were enumerated.

Escapement: The estimated number of spawners in that river in that year, from the nuSEDS database.

Catch\_PINK.csv contains catch data for pink salmon by management area, provided by different area managers at Fisheries and Oceans Canada (contacts: Pieter VanWill <pieter.vanwill@dfo-mpo.gc.ca> and David Peacock <david.peacock@dfo-mpo.gc.ca>). These data include the following columns:

Area: Fisheries management area, the spatial scale at which catch data are reported.

Odd\_Even: Integer indicated whether the catch was of an odd-year population (=1) or even year (=2).

Year: The year of the catch.

Catch: The number of pieces of pink salmon caught in all fisheries for the given year and area.

1\_DataCompilation.R is R code that calls the previous two data files and calculates the number of recruits per spawner.

2\_PopulationAnalysis.R is R code that fits the linearized Ricker model to the spawner recruit data, and tests for an effect of sea lice on wild salmon.