

# **Fish Abundance**

**Klawock Lake Sockeye Salmon Stakeholder Meeting  
November 14–15, 2017**



**Steve Heint**

**Alaska Department of Fish and Game**

# Adult Fish Abundance

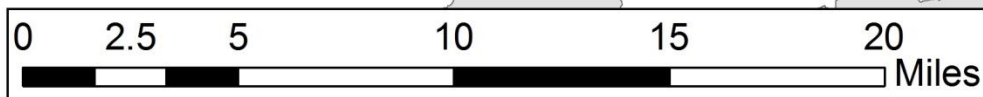
**Commercial  
Harvest**

**Subsistence  
Harvest**

**Klawock**

**Spawning  
Population**

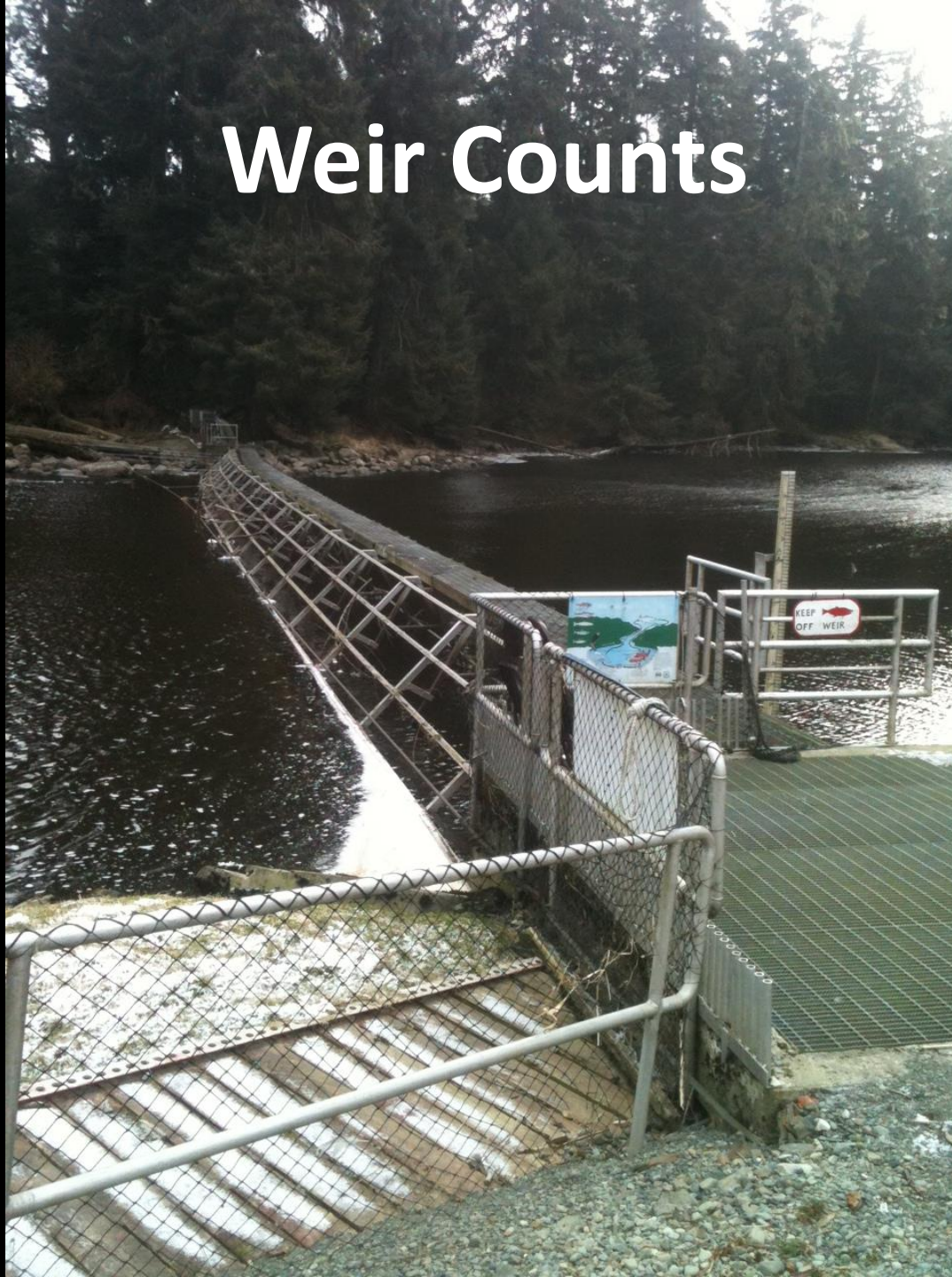
**Craig**



# Escapement

- Escapement = spawning population = number of fish that enter the lake to spawn.
- Escapement is the most important information about adult abundance.
  - Track trends over a long period.
  - Assess production from number of spawning fish.
  - Assess enhancement or rehabilitation activity.
  - Assess habitat restoration activity.
- Escapement estimates can be obtained in different ways.

# Weir Counts



# Weir Counts

- **Advantage:**

- Provides a count of fish rather than an estimate.
- Provides information about run timing.

- **Disadvantage:**

- Provides a minimum count.
- Must be well maintained.
- Can impede natural movement of fish.





**Disappearance Creek  
chum salmon weir**



NOTICE: 2 Walking our

# Video Counts





# Mark-Recapture



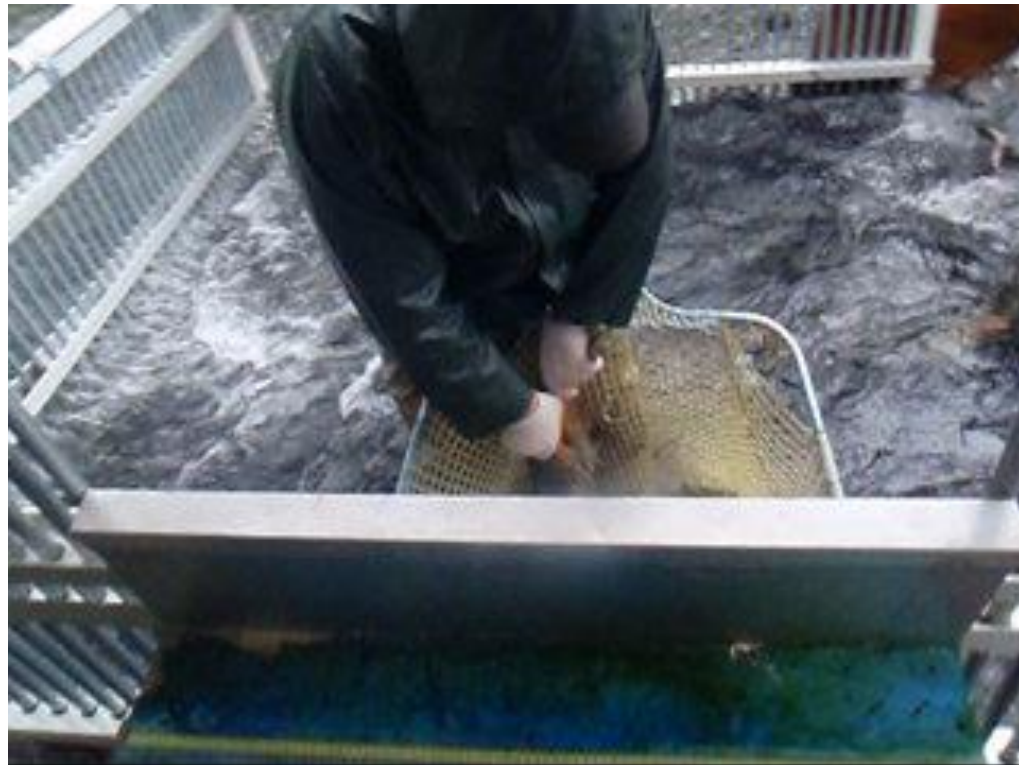
# Mark-Recapture

- **Advantage:**

- Provides a more complete estimate of the population.
- Can be used to verify weir counts.

- **Disadvantage:**

- Needs to be conducted correctly and carefully – or will produce biased (inflated) estimates.
- Requires more handling of fish.



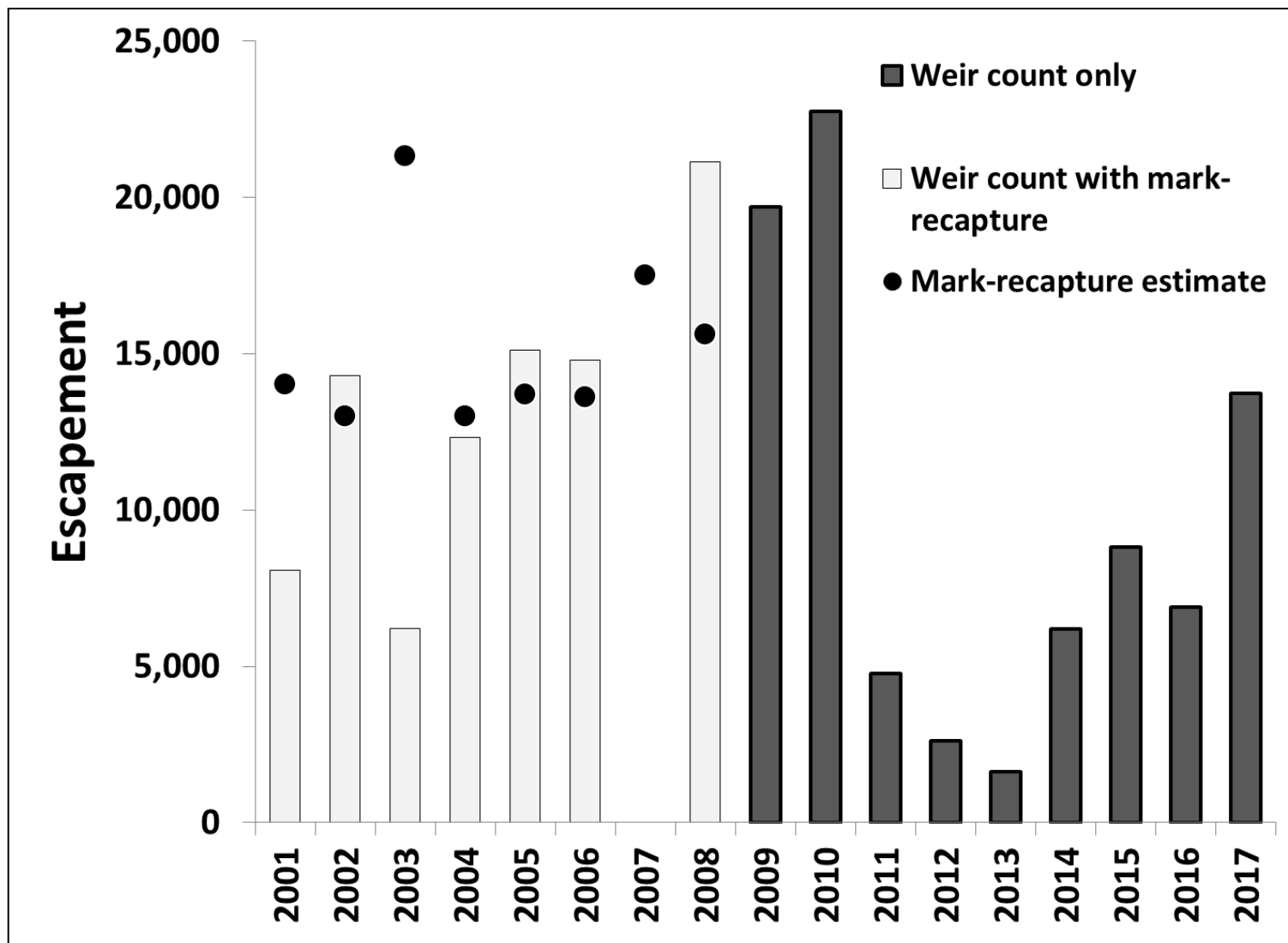
# Mark-Recapture



# Mark-Recapture



# Klawock Lake Sockeye Salmon Escapement 2001–2016



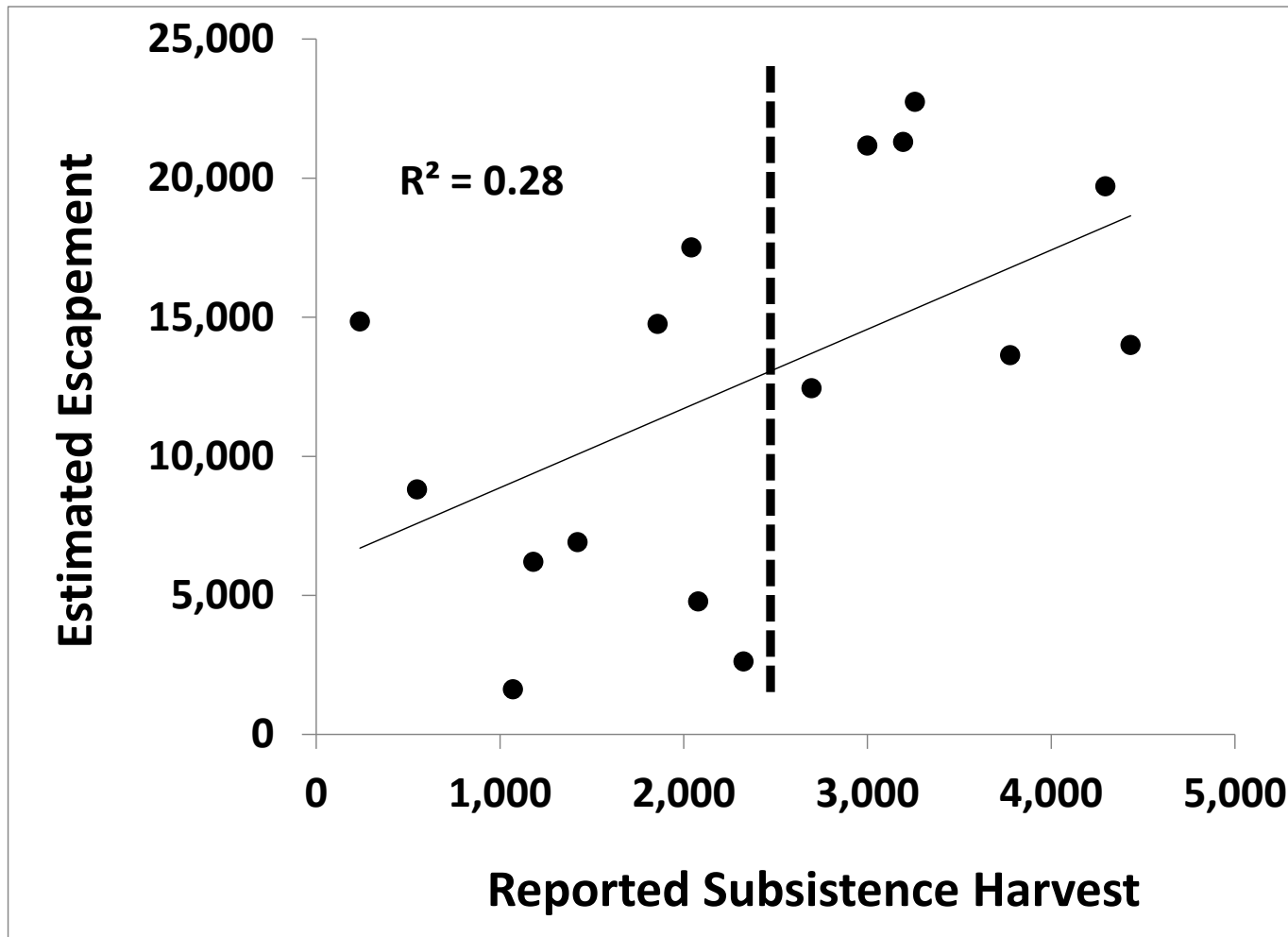
# Mark-Recapture Estimates

| Halfmile Creek |          |             |
|----------------|----------|-------------|
| Year           | Estimate | Range       |
| 2004           | 260      | 190–430     |
| 2005           | 170      | 80–340      |
| 2006           | 1,000    | 600–1,900   |
| 2007           | 1,400    | 1,000–2,300 |
| 2008           | 700      | 160–1,900   |

| Threemile Creek |          |              |
|-----------------|----------|--------------|
| Year            | Estimate | Range        |
| 2004            | 9,000    | 6,000–15,000 |
| 2005            | 10,000   | 7,000–19,000 |
| 2006            | 8,100    | 6,100–17,700 |
| 2007            | 8,000    | 5,400–14,900 |
| 2008            | 7,500    | 6,200–10,500 |

| Inlet Creek |          |              |
|-------------|----------|--------------|
| Year        | Estimate | Range        |
| 2004        | 1,700    | 500–4,800    |
| 2005        | NA       |              |
| 2006        | 1,600    | 800–3,700    |
| 2007        | 8,100    | 5,200–16,900 |
| 2008        | 7,400    | 5,700–12,100 |

# Reported subsistence harvest compared to estimated escapement, 2001–2016



# Regional Sockeye Abundance

Klukshu River

Chilkat Lake

Chilkoot Lake

Stikine  
River

McDonald Lake

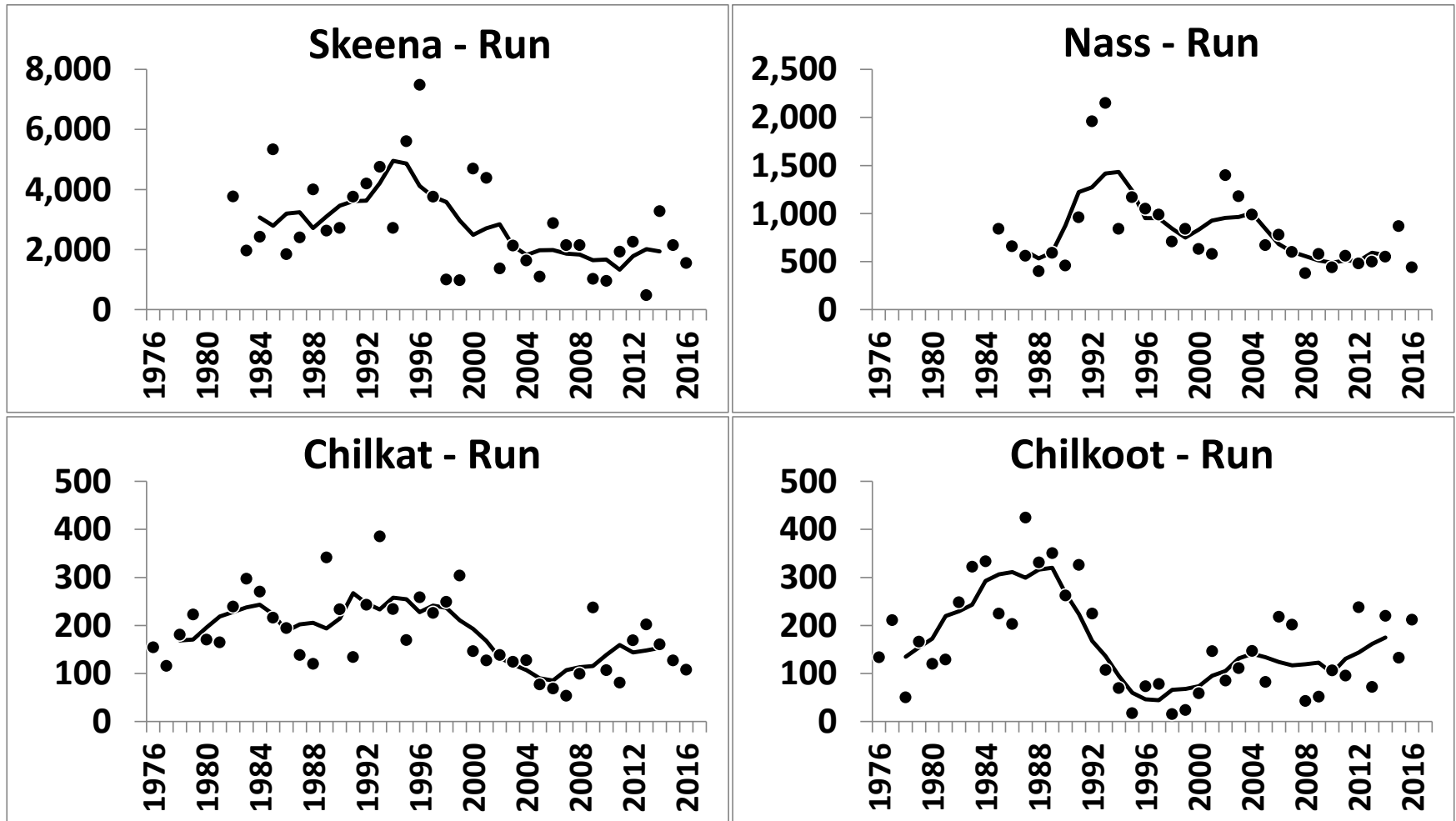
Nass  
River

Skeena  
River

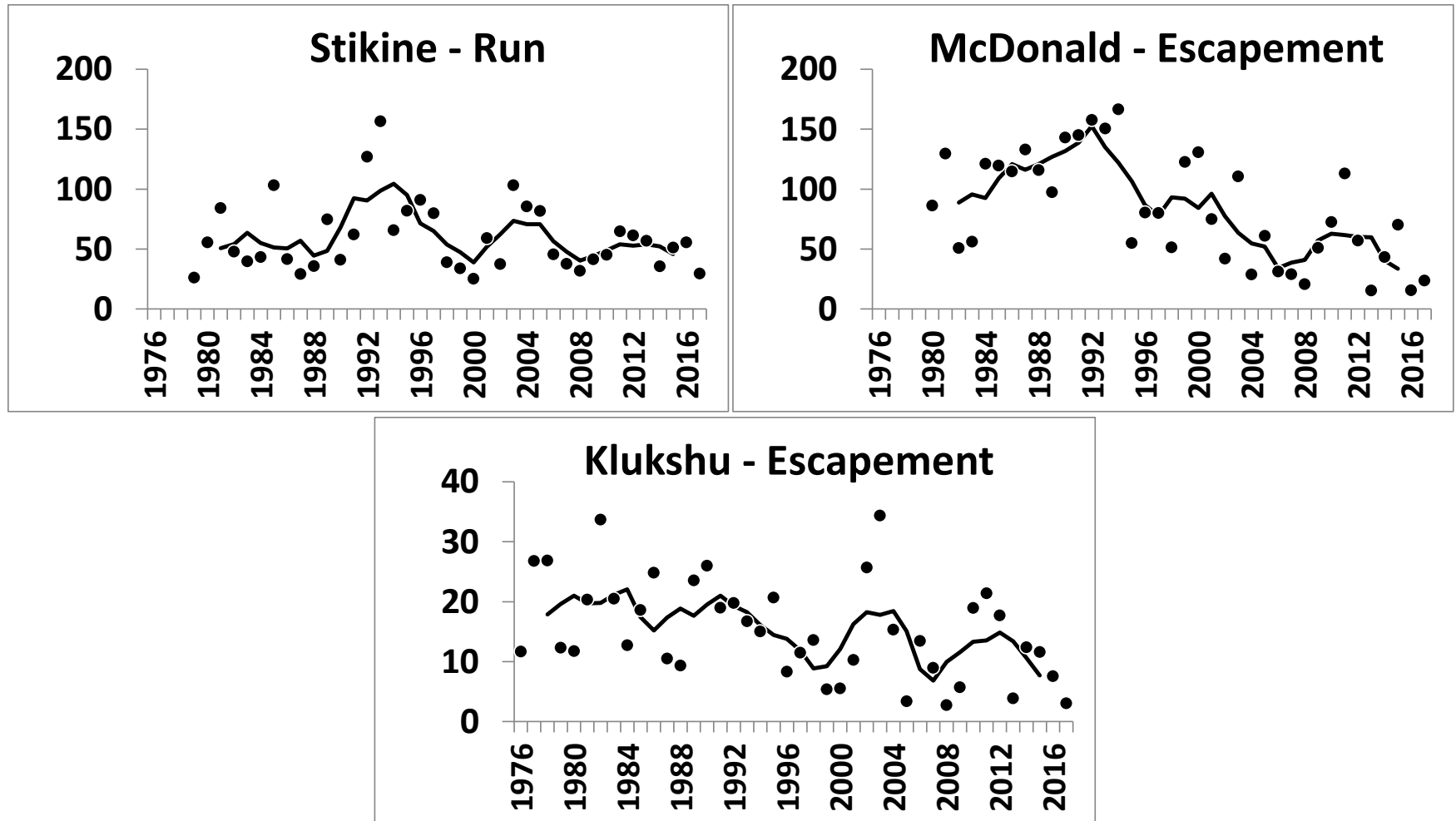


0 25 50 100 150 200 Miles

# Regional Sockeye Abundance

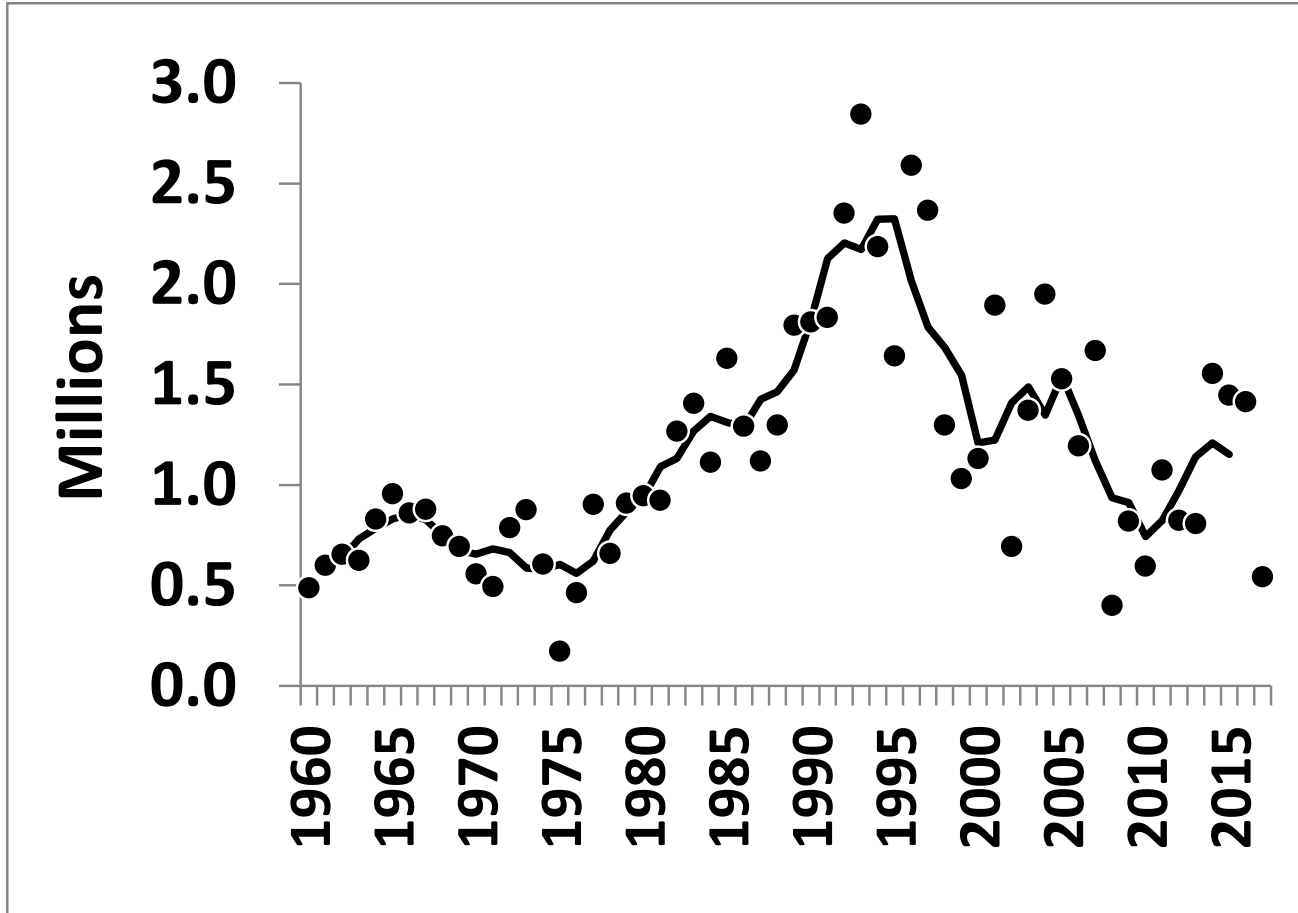


# Regional Sockeye Abundance



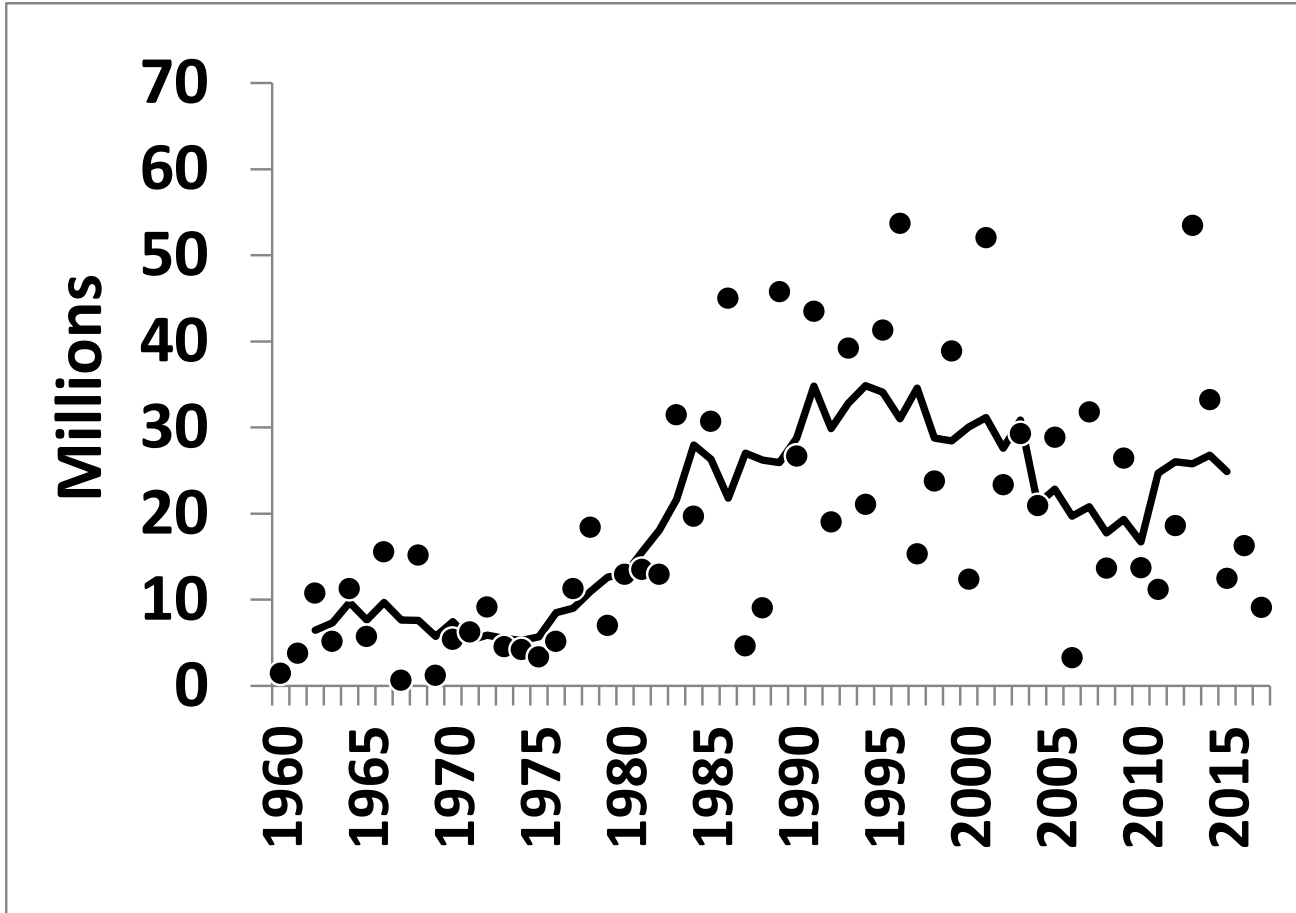
# Sockeye Salmon

## Southern Southeast - Harvest



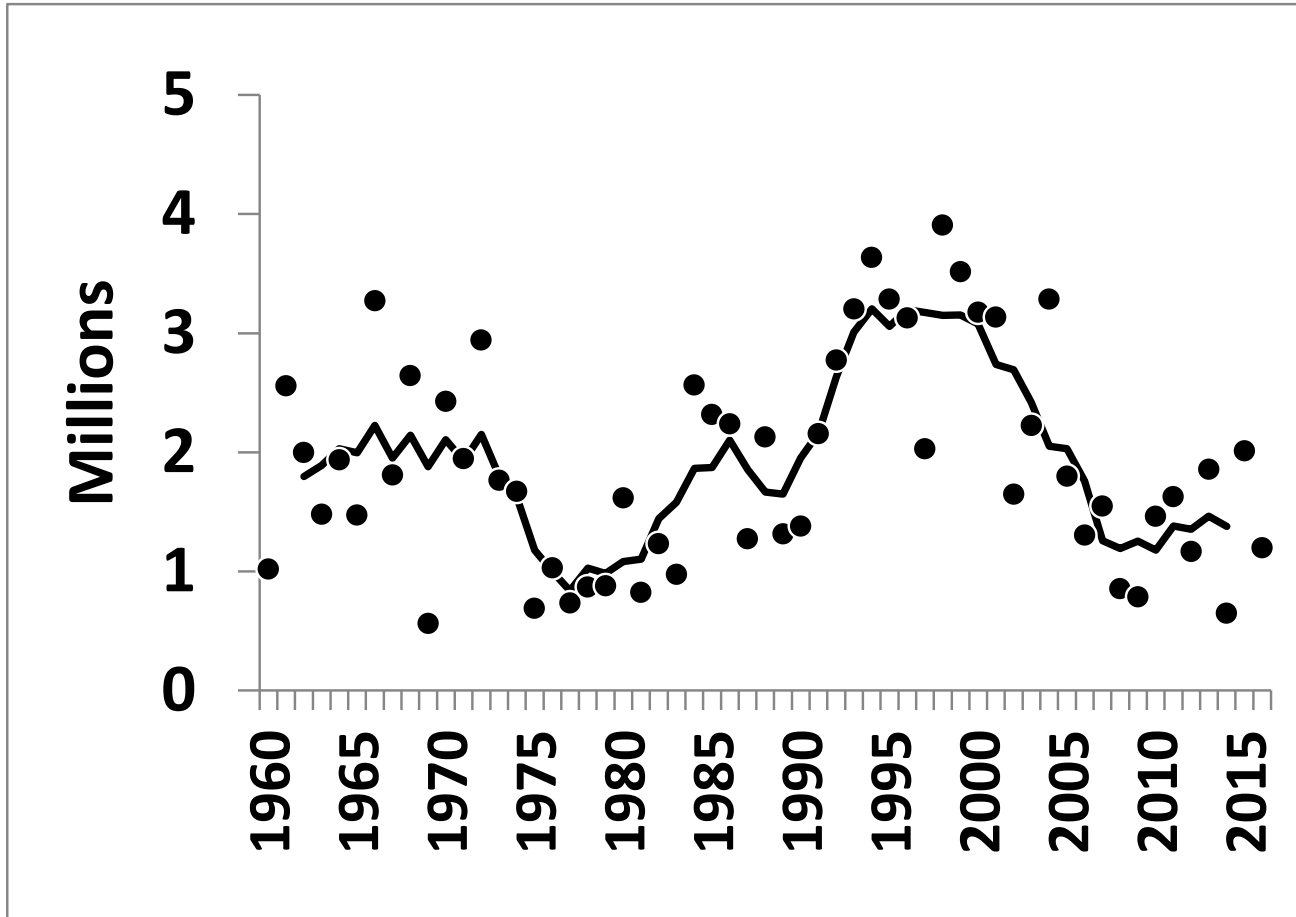
# Pink Salmon

## Southern Southeast - Harvest



# Wild Chum Salmon

## Southeast Alaska - Harvest



# Escapement Summary

- Need to maintain a good record of escapement to the lake to track trends in abundance over a long period of time.
- Maintain operation of weir.
  - Or determine different method of estimating escapement.
- Potential to look more closely at in-lake distribution of spawning fish.

# Escapement Summary

- Need to maintain a good record of escapement to the lake to track trends in abundance over a long period of time.

**QUESTIONS?**

# 2017

## Oct 1

|        | 30   | 31   | 32   | 34   | 35   | 36   | 37   | 38   |     | 00 | 01 | 02   | 03   | 04   | 05  | 06   |     | 08   | 09   | 10 | 11   | 12 | 13 | 14   | 15 | 16  | 17 |
|--------|------|------|------|------|------|------|------|------|-----|----|----|------|------|------|-----|------|-----|------|------|----|------|----|----|------|----|-----|----|
| PRIOR  |      | 1879 | 5517 | 3090 | 1438 | 8064 | 3871 | 4043 |     |    |    |      |      |      |     |      |     |      |      |    |      |    |    |      |    |     |    |
| 1-Jul  |      | 62   | 2229 | 276  | 19   | 1549 | 269  | 154  |     |    |    | 16   | 22   | 1    |     |      |     |      | 42   |    | 0    |    |    |      |    |     |    |
| 2-Jul  |      | 125  | 4    | 214  | 31   | 1663 | 278  | 0    |     |    |    | 44   | 0    | 0    | 1   |      |     |      | 2    |    | 0    |    |    | 0    |    | 4   |    |
| 3-Jul  |      | 182  | 188  | 203  | 474  | 1900 | 637  | 11   |     |    |    | 10   | 0    | 1    | 1   |      |     |      | 2    |    | 0    |    |    |      |    |     |    |
| 4-Jul  |      | 194  | 930  | 156  | 325  | 1874 | 931  | 691  |     |    |    | 63   | 4    | 3    | 1   |      |     |      | 2    |    | 0    |    |    | 9    |    | 7   |    |
| 5-Jul  |      | 420  | 660  | 81   | 178  | 81   | 2142 | 288  | 760 |    | 50 | 53   | 0    | 0    | 1   | 12   |     |      | 1    |    | 0    |    |    | 6    |    | 2   |    |
| 6-Jul  |      | 35   | 632  | 17   | 142  | 2374 | 206  | 293  |     |    |    | 1    | 126  | 0    | 1   | 178  |     |      | 37   |    | 0    |    |    | 0    |    | 9   |    |
| 7-Jul  |      | 1164 | 398  | 182  | 121  | 2843 | 211  | 316  |     |    |    | 15   | 24   | 6    | 2   | 22   |     |      | 15   |    | 0    |    |    | 12   |    | 7   |    |
| 8-Jul  |      | 51   | 697  | 191  | 399  | 1976 | 1506 | 322  |     |    |    | 38   | 0    | 7    | 1   | 1    |     |      | 14   |    | 9    |    |    | 14   |    | 9   |    |
| 9-Jul  |      | 727  | 1887 | 169  | 461  | 2471 | 1670 | 463  |     |    |    | 40   | 14   | 0    | 0   |      |     |      | 46   |    | 0    |    |    | 0    |    | 73  |    |
| 10-Jul |      | 368  | 1483 | 256  | 343  | 2672 | 1722 | 225  |     |    |    | 46   | 0    | 0    | 2   | 5    |     |      | 23   |    | 0    |    |    | 6    |    | 4   |    |
| 11-Jul |      | 328  | 280  | 647  | 110  | 869  | 1900 | 202  |     |    |    | 26   | 0    | 18   | 2   |      |     |      | 2    |    | 0    |    |    | 0    |    | 7   |    |
| 12-Jul |      | 843  | 1169 | 227  | 1408 | 1598 | 847  | 478  |     |    |    | 16   | 2    | 0    |     |      |     |      | 17   |    | 0    |    |    | 3    |    | 14  |    |
| 13-Jul | 2    | 809  | 2669 | 275  | 810  | 1511 | 704  | 156  |     |    |    | 2    | 8    | 0    | 12  | 4    |     |      | 17   |    | 0    |    |    | 0    |    | 9   |    |
| 14-Jul | 25   | 604  | 3713 | 320  | 404  | 806  | 738  | 419  |     |    |    | 25   | 137  | 0    | 0   | 10   | 4   |      | 23   |    | 112  |    |    | 0    |    | 0   |    |
| 15-Jul |      | 1484 | 669  | 353  | 802  | 1488 | 1068 | 538  |     |    |    | 93   | 61   | 0    | 32  | 14   | 13  |      | 4    |    | 93   |    |    | 4    |    | 16  |    |
| 16-Jul |      | 718  | 523  | 1533 | 6    | 422  | 1913 | 1228 | 205 |    |    | 18   | 6    | 15   | 6   | 5    |     |      | 10   |    | 135  |    |    | 17   |    | 4   |    |
| 17-Jul |      | 730  | 398  | 557  | 353  | 1293 | 342  | 107  |     |    |    | 36   | 20   | 361  | 13  | 10   | 7   |      | 17   |    | 93   |    |    | 4    |    | 3   |    |
| 18-Jul | 179  | 545  | 1780 | 646  | 108  | 1368 | 573  | 365  |     |    |    | 39   | 27   | 119  | 0   | 42   | 1   |      | 7    |    | 113  |    |    | 0    |    | 6   |    |
| 19-Jul | 69   | 196  | 802  | 375  | 13   | 1327 | 498  | 303  |     |    |    | 715  | 0    | 0    | 20  | 7    |     |      | 322  |    | 91   |    |    | 28   |    | 18  |    |
| 20-Jul | 57   | 718  | 1127 | 646  | 39   | 1006 | 1249 | 114  |     |    |    | 56   | 13   | 0    | 0   | 24   | 3   |      | 30   |    | 22   |    |    | 27   |    | 0   |    |
| 21-Jul | 733  | 963  | 963  | 273  | 55   | 518  | 57   | 268  |     |    |    | 16   | 0    | 0    | 5   | 3    |     |      | 10   |    | 135  |    |    | 52   |    | 31  |    |
| 22-Jul | 206  | 237  | 229  | 255  | 730  | 561  | 436  | 268  |     |    |    | 11   | 7    | 7    | 52  | 14   | 17  |      | 2    |    | 69   |    |    | 32   |    | 2   |    |
| 23-Jul | 385  | 392  | 479  | 276  | 62   | 1173 | 716  | 104  |     |    |    | 31   | 108  | 0    | 14  | 8    | 184 |      | 13   |    | 84   |    |    | 1955 |    | 18  |    |
| 24-Jul | 1270 | 199  | 237  | 302  | 76   | 1278 | 687  | 169  |     |    |    | 154  | 285  | 2    | 37  | 16   | 2   |      | 15   |    | 1981 |    |    | 313  |    | 0   |    |
| 25-Jul | 1315 | 1411 | 1002 | 557  | 55   | 1072 | 268  | 103  |     |    |    | 13   | 38   | 9    | 1   | 36   | 837 |      | 31   |    | 433  |    |    | 2    |    | 0   |    |
| 26-Jul | 91   | 467  | 294  | 386  | 110  | 107  | 287  | 166  |     |    |    | 37   | 23   | 12   | 32  | 338  | 53  |      | 30   |    | 134  |    |    | 16   |    | 0   |    |
| 27-Jul | 24   | 1060 | 1304 | 290  | 351  | 1145 | 574  | 46   |     |    |    | 1    | 24   | 0    | 30  | 330  | 79  |      | 128  |    | 30   |    |    | 0    |    | 9   |    |
| 28-Jul | 234  | 1262 | 997  | 350  | 602  | 1426 | 463  | 23   |     |    |    | 2    | 0    | 54   | 37  | 20   | 329 | 13   | 23   |    | 36   |    |    | 0    |    | 10  |    |
| 29-Jul | 76   | 404  | 896  | 241  | 329  | 1365 | 248  | 37   |     |    |    | 0    | 137  | 34   | 33  | 153  | 0   |      | 25   |    | 49   |    |    | 6    |    | 153 |    |
| 30-Jul | 89   | 615  | 847  | 157  | 159  | 1247 | 1022 | 89   |     |    |    | 5    | 119  | 7    | 26  | 13   | 165 | 1    | 28   |    | 63   |    |    | 28   |    | 34  |    |
| 31-Jul | 243  | 843  | 1030 | 286  | 150  | 520  | 802  | 64   |     |    |    | 5    | 51   | 0    | 15  | 6    | 788 | 7    | 16   |    | 94   |    |    | 111  |    | 21  |    |
| 1-Aug  | 45   | 709  | 1269 | 421  | 416  | 1068 | 298  | 9    |     |    |    | 8    | 13   | 1    | 26  | 13   | 26  |      | 36   |    | 111  |    |    | 42   |    | 0   |    |
| 2-Aug  | 122  | 348  | 827  | 310  | 104  | 361  | 315  | 97   |     |    |    | 40   | 1129 | 63   | 38  | 1586 | 68  | 13   | 217  |    | 112  |    |    | 252  |    | 46  |    |
| 3-Aug  | 27   | 242  | 656  | 321  | 101  | 558  | 235  | 235  |     |    |    | 916  | 1203 | 848  | 24  | 309  | 145 | 8    |      |    | 197  |    |    | 35   |    | 36  |    |
| 4-Aug  | 141  | 529  | 1132 | 306  | 126  | 286  | 85   |      |     |    |    | 96   | 217  | 232  | 87  | 37   | 152 | 11   | 48   |    | 202  |    |    | 203  |    | 32  |    |
| 5-Aug  | 223  | 577  | 607  | 116  | 379  | 397  | 941  | 117  |     |    |    | 9    | 84   | 41   | 44  | 19   | 118 | 14   | 286  |    | 232  |    |    | 64   |    | 172 |    |
| 6-Aug  | 35   | 179  | 589  | 104  | 602  | 1300 | 402  | 192  |     |    |    | 236  | 389  | 1    | 164 | 18   | 240 | 11   | 70   |    | 368  |    |    | 105  |    | 85  |    |
| 7-Aug  | 18   | 354  | 727  | 151  | 107  | 1037 | 233  | 117  |     |    |    | 72   | 261  | 16   | 43  | 270  | 11  | 10   | 42   |    | 99   |    |    | 4066 |    | 64  |    |
| 8-Aug  | 148  | 51   | 937  | 152  | 914  | 658  | 135  | 188  |     |    |    | 16   | 126  | 1071 | 386 | 123  | 77  | 131  | 748  |    | 198  |    |    | 954  |    | 50  |    |
| 9-Aug  | 36   | 67   | 700  | 100  | 592  | 1240 | 132  | 296  |     |    |    | 125  | 59   | 1037 | 137 | 360  | 110 | 37   | 154  |    | 97   |    |    | 153  |    | 52  |    |
| 10-Aug | 64   | 189  | 426  | 33   | 726  | 1078 | 222  | 102  |     |    |    | 93   | 61   | 3    | 160 | 829  | 121 | 6    | 290  |    | 584  |    |    | 45   |    | 18  |    |
| 11-Aug | 28   | 87   | 116  | 10   | 302  | 851  | 113  | 113  |     |    |    | 226  | 126  | 3    | 220 | 283  | 248 | 8    | 272  |    | 1116 |    |    | 0    |    | 212 |    |
| 12-Aug | 81   | 277  | 151  | 10   | 106  | 176  | 105  | 10   |     |    |    | 45   | 12   | 1    | 187 | 40   | 25  | 25   | 412  |    | 142  |    |    | 152  |    | 26  |    |
| 13-Aug | 196  | 173  | 87   | 14   | 217  | 833  | 18   | 84   |     |    |    | 32   | 190  | 796  | 33  | 161  | 257 | 43   | 5338 |    | 83   |    |    | 40   |    | 24  |    |
| 14-Aug | 42   | 507  | 212  | 11   | 288  | 337  | 97   | 92   |     |    |    | 117  | 151  | 44   | 146 | 276  | 632 | 48   | 974  |    | 196  |    |    | 77   |    | 352 |    |
| 15-Aug |      | 493  | 87   | 11   | 220  | 367  | 126  | 79   |     |    |    | 101  | 165  | 1    | 320 | 630  | 489 | 259  | 41   |    | 61   |    |    | 217  |    | 334 |    |
| 16-Aug | 21   | 373  | 212  | 25   | 142  | 383  | 141  | 112  |     |    |    | 1161 | 198  | 2    | 426 | 468  | 748 | 114  | 12   |    | 75   |    |    | 374  |    | 986 |    |
| 17-Aug | 32   | 271  | 426  | 19   | 170  | 42   | 83   | 126  |     |    |    | 3526 | 143  | 3    | 256 | 438  | 599 | 97   | 25   |    | 1662 |    |    | 197  |    | 84  |    |
| 18-Aug | 43   | 599  | 293  | 20   | 157  | 107  | 72   | 104  |     |    |    | 66   | 154  | 152  | 162 | 462  | 482 | 10   | 18   |    | 466  |    |    | 124  |    | 480 |    |
| 19-Aug | 22   | 531  | 349  | 61   | 371  | 262  | 206  | 118  |     |    |    | 7    | 230  | 10   | 153 | 640  | 718 | 395  | 874  |    | 342  |    |    | 1234 |    | 5   |    |
| 20-Aug | 53   | 651  | 379  | 57   | 157  | 148  | 450  | 61   |     |    |    | 39   | 114  | 47   | 60  | 484  | 123 | 167  | 327  |    | 200  |    |    | 628  |    | 502 |    |
| 21-Aug | 38   | 883  | 283  | 23   | 124  | 130  | 501  | 46   |     |    |    | 526  | 376  | 65   | 137 | 356  | 61  | 357  | 103  |    | 95   |    |    | 75   |    | 35  |    |
| 22-Aug | 56   | 637  | 398  | 22   | 375  | 82   | 210  | 61   |     |    |    | 13   | 183  | 1048 | 56  | 136  | 248 | 1012 | 145  |    | 72   |    |    | 61   |    | 0   |    |
| 23-Aug | 34   | 922  | 416  | 20   | 98   | 293  | 93   | 46   |     |    |    | 49   | 48   | 1096 | 225 | 266  | 436 | 339  | 138  |    | 264  |    |    | 95   |    | 25  |    |
| 24-Aug | 18   | 1236 | 222  | 16   | 281  | 60   | 240  | 71   |     |    |    | 4    | 35   | 17   | 27  | 152  | 111 | 461  | 3552 |    | 248  |    |    | 1187 |    | 1   |    |
| 25-Aug | 22   | 604  | 437  | 15   | 186  | 56   | 274  | 76   |     |    |    | 3    | 99   | 4    | 7   | 159  | 196 | 506  | 156  |    | 289  |    |    | 394  |    | 1   |    |
| 26-Aug | 13   | 343  | 130  | 28   | 161  | 40   | 158  | 53   |     |    |    | 2    | 71   | 46   | 14  | 352  | 413 | 671  | 16   |    | 421  |    |    | 211  |    | 2   |    |
| 27-Aug | 20   | 342  | 1232 | 10   | 204  | 70   | 135  | 40   |     |    |    | 2    | 171  | 3    | 17  | 236  | 113 | 1980 | 26   |    | 93   |    |    | 33   |    | 21  |    |
| 28-Aug | 11   | 249  | 1300 | 6    | 100  | 30   | 55   | 53   |     |    |    | 4    | 35   | 8    | 28  | 246  | 163 | 582  | 27   |    | 1710 |    |    | 687  |    | 33  |    |
| 29-Aug | 28   | 110  | 851  | 7    | 57   | 12   | 39   | 103  |     |    |    | 13   | 7    | 85   | 19  | 150  | 36  | 66   | 111  |    | 89   |    |    | 18   |    | 44  |    |
| 30-Aug | 17   | 103  | 2197 | 3    | 86   | 65   | 29   | 6    |     |    |    | 16   | 5    | 14   | 73  | 102  | 337 | 311  | 43   |    | 47   |    |    | 281  |    | 28  |    |
| 31-Aug | 10   | 84   | 744  | 45   | 88   | 43   | 21   | 21   |     |    |    | 11   | 10   | 334  | 132 | 109  | 189 | 125  | 35   |    | 15   |    |    | 804  |    | 81  |    |
| 1-Sep  | 22   | 41   | 186  | 62   | 56   | 6    | 47   | 28   |     |    |    | 15   | 43   | 27   | 183 | 135  | 92  | 1149 | 127  |    | 120  |    |    | 812  |    | 84  |    |
| 2-Sep  | 52   | 29   | 108  | 27   | 32   | 19   | 12   | 23   |     |    |    | 14   | 5    | 68   | 41  | 56   | 257 | 88   | 86   |    | 106  |    |    | 254  |    | 57  |    |
| 3-Sep  | 14   | 18   | 64   | 14   | 68   | 18   | 24   | 31   |     |    |    | 8    | 7    | 353  | 17  | 103  | 178 | 70   | 31   |    | 69   |    |    | 141  |    | 292 |    |
| 4-Sep  | 14   |      | 99   | 9    | 52   | 20   | 9    | 31   |     |    |    | 315  | 3    | 32   | 198 | 52   | 17  | 58   | 41   |    | 166  |    |    | 141  |    | 38  |    |
| 5-Sep  |      |      |      | 21   | 46   | 29   | 13   | 58   |     |    |    | 35   | 2    | 92   | 42  | 92   | 118 | 105  | 276  |    | 428  |    |    | 80   |    | 5   |    |
| 6-Sep  |      | 35   | 61   | 41   | 16   | 24   |      |      |     |    |    | 33   | 281  | 74   | 126 | 288  | 153 | 118  | 130  |    | 106  |    |    | 17   |    | 1   |    |
| 7-Sep  |      | 31   | 35   | 24   | 14   |      |      |      |     |    |    |      |      |      |     |      |     |      |      |    |      |    |    |      |    |     |    |