**Appendix C.** Additional Tables and Figures

Table S1. Chronology of additional data and publications used to update the Alexander Archipelago wolf population model.

|  |  |
| --- | --- |
| Data Type | Data Source |
| Wolf reproduction  | Person and Russell 2009 |
| Wolf survival  | Person and Russell 2008 |
| Effect of roads on wolf mortality | Person and Russell 2008 |
| Black bear Predation on fawns | Gilbert 2015 |
| Black bear predation on adult | Gilbert 2015, Person 2009 |
| Climate effects on winter severityWolf Diet | Littell and McAfee 2017Szepanski et al. 1999 |

Table S2. Description of scenarios evaluated using the wolf population model.

|  |  |  |
| --- | --- | --- |
| Scenario | Parameter  | Condition |
| No New Action | Vegetation | Natural succession |
|  | Roads | No change |
|  | Wolf harvest | 20% harvest cap |
|  | Frequency of severe winter | Predicted average |
| Scenario A | Vegetation | Natural succession |
|  | Roads | Planned decommission |
|  | Wolf harvest | No legal harvest |
|  | Frequency of severe winter | Predicted low |
| Scenario B | Vegetation | Young growth transition |
|  | Roads | Planned decommission |
|  | Wolf harvest | 20% harvest cap |
|  | Frequency of severe winter | Predicted average |
| Scenario C | Vegetation | Continued harvest of old growth |
|  | Roads | No change |
|  | Wolf harvest | 20% harvest cap |
|  | Frequency of severe winter | Predicted average |
| Scenario D | Vegetation | Increased harvest of old growth |
|  | Roads | No change |
|  | Wolf harvest | 30% harvest cap |
|  | Frequency of severe winter | Predicted high |
| Scenario E | Vegetation | Maximum harvest of old growth |
|  | Roads | Road construction |
|  | Wolf harvest | 30% harvest cap |
|  | Frequency of severe winter | Predicted high |

Table S3. Generalized land cover and forest conditions under baseline and future management scenarios in Game Management Unit 2 of southeastern Alaska, 1995 - 2045.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Baseline |  | Future Scenarios in 2045 |
| General Land Cover | 1995(hectares) | 2015 (hectares) |  | No New Action (hectares) | Scenario B (hectares) | Scenario C(hectares) | Scenario D(hectares) | Scenario E(hectares) |
| Old-growth forest | 424,656 | 397,040 |  | 397,040 | 374,588 | 366,971 | 354,742 | 346,639 |
| Logged forest (all) | 134,621 | 165,664 |  | 165,664 | 188,116 | 195,733 | 207,961 | 216,065 |
| Early succession (<25 yr) | 98,230 | 50,821 |  | 0 | 25,468 | 21,502 | 20,328 | 14,050 |
| Late succession (>25 yr) | 36,391 | 114,842 |  | 165,664 | 162,647 | 174,231 | 187,633 | 202,015 |
| Other | 410,720 | 410,720 |  | 410,720 | 410,720 | 410,720 | 410,720 | 410,720 |
| Total | 973,423 | 973,423 |  | 973,423 | 973,423 | 973,423 | 973,423 | 973,423 |

Table S4. Sensitivity of wolf and deer spring abundance, hunting, and browsing impacts to changes in forest vegetation, road length, frequency of severe winters, wolf harvest regulation, and wolf diet composition. Abundance is shown as a median, as well as % change by 2045, hunting is shown as % change by 2045, and browsing is show as proportion of wolf ranges with severe browsing impacts by 2045, all with 95 % confidence intervals.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Perturbation description | Wolf abundance | % change wolf  | % change deer  | % change hunt | % browsed |
| Vegetation | Stable K (restoration) | 136 (50, 190) | 64 (-40, 129) | -3 (-18, 6) | -21 (-39, -7) | 10 (0, 23) |
|  | No timber harvest | 130 (49, 184) | 65 (-38, 133) | -10 (-23, -2) | -29 (-45, -17) | 10 (0, 23) |
|  | Transition to second growth\* | 129 (44, 183) | 62 (-45, 130) | -10 (-23, -2) | -30 (-45, -19) | 10 (0, 23) |
|  | Continued old growth harvest | 130 (42, 182) | 60 (-41, 128) | -12 (-25, -4) | -31 (-46, -19) | 10 (0, 23) |
|  | Increased old growth harvest | 130 (48, 182) | 60 (-41, 125) | -15 (-29, -7) | -35 (-50, -24) | 10 (0, 23) |
|  | Maximum old growth harvest | 126 (50, 180) | 57 (-38, 124) | -17 (-29, -9) | -37 (-50, -16) | 10 (0, 23) |
| Roads | Maximum decommission | 133 (50, 187) | 66 (-38, 133) | 1 (-11, 6) | -39 (-49, -36) | 13 (0, 26) |
|  | Increased decommission | 130 (43, 185) | 63 (-46, 131) | - 2 (-16, -4) | -34 (-46, -29) | 13 (0, 26) |
|  | Planned decommission\* | 129 (44, 183) | 62 (-45, 130) | -10 (-23, -2) | -29 (-44, -17) | 10 (0, 23) |
|  | No change | 133 (51, 184) | 62 (-38, 124) | -11 (-25, -3) | -29 (-46, -17) | 10 (0, 23) |
|  | Road construction | 134 (48, 180) | 65 (-41, 122) | -20 (-36, -10) | -23 (-44, -7) | 6 (0, 19) |
| Winter |  Low frequency | 131 (42, 182) | 64 (-48, 128) | -10 (-23, -2) | -28 (-44, -17) | 10 (0, 23) |
| severity | Average frequency\* | 130 (47, 182) | 64 (-41, 130) | -10 (-24, -2) | -29 (-44, -16) | 10 (0, 23) |
|  | High frequency | 132 (48, 181) | 59 (-42, 118) | -11 (-27, -3) | -49 (-49, -18) | 10 (0, 23) |
| Wolf  | No wolf harvest occurs | 287 (227, 362) | 280 (211, 365) | -52 (-63, -40) | -80 (-87, -66) | 0 (0, 0) |
| harvest | Total harvest closure | 309 (259, 356) | 264 (208, 321) | -38 (-54, -25) | -63 (-80, -45) | 0 (0, 0) |
|  | 20% cap on reported harvest\* | 129 (44, 183) | 62 (45, 130) | -10 (-23, -2) | -29 (-44, -17) | 10 (0, 23) |
|  | 30% cap on reported harvest | 59 (11, 107) | -26 (-86, 34) | -3 (-16, 0) | -20 (-34, -14) | 16 (3, 29) |
|  | 0% cap (no limit) | 61 (7, 107) | -26 (-92, 33) | -3 (-14, 0) | -20 (-33, -15) | 16 (3, 29) |
|  | Wolves extinct | 0 | -100 | 0 (-10, 2) | -18 (-29, -14) | 29 (10, 32) |
| Wolf diet | 9.5 deer/year | 136 (46, 205) | 68 (43, 153) | -6 (-18, -1) | -24 (-38, -16) | 16 (3, 26) |
|  | 15 deer/year\* | 129 (44, 183) | 52 (-45, 104) | -16 (-32, -4) | -36 (-54, -19) | 10 (0, 23) |
|  | 20.5 deer/year | 123 (54, 166) | 50 (-34, 102) | -16 (-31, -4) | -35 (-53, -20) | 6 (0, 19) |
|  | 26 deer/year | 105 (44, 142) | 30 (-46, 75) | -22 (-39, -6) | -44 (-63, -22) | 3 (0, 16) |
| Deer  | Regular hunting\* | 129 (44, 183) | 63 (-42, 122) | -11 (-25, -2) | NA | 71 (39, 90) |
| harvest | No hunting | 143 (47, 180) | 83 (-42, 159) | 13 (6, 17) | NA | 10 (0, 23) |

\* Equivalent to Scenario B



Figure S1. Sensitivity of wolf and deer abundance to a) vegetation change, b) road decommissioning, c) winter severity frequency, d) wolf diet composition, e) wolf harvest conditions, and f) deer hunting. Abundance is shown as percent change from 2014-2045 for wolves (grey) and deer (brown) with 95 % confidence interval bars.



Figure S2. Sensitivity of ecosystem services (hunting opportunity, pink) and disservices (deer browsing impacts to conifers, green) to a) vegetation change, b) road decommissioning, c) winter severity frequency, d) wolf diet composition, e) wolf harvest conditions, and f) deer hunting. Hunting opportunity is shown as percent change from 2015-2045, and browsing impacts represent percentage of wolf pack ranges experiencing severe browsing in 2045, both with 95 % confidence interval bars.



**Figure S3.** Population estimates produced by the Alaska Department of Fish and Game of fall wolf population size for Prince of Wales and outlying islands (GMU 2). The Fall 2020 estimate has not yet been made available to the public as of publication.