

September 14, 2015

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**Re: Petition to List on an Emergency Basis the Alexander Archipelago Wolf (*Canis Lupus Ligoni*) as Threatened or Endangered Under the Endangered Species Act**

Dear Mrs. Jewell, Mr. Ashe, and Mr. Haskett:

We write to request that the Service, pursuant to Section 4(b)(7) of the Endangered Species Act,<sup>1</sup> emergency list the Alexander Archipelago Wolf (*Canis lupus ligoni*) as a threatened or endangered species and to designate critical habitat. We submitted a petition to list the AA wolf on August 10, 2011, which we incorporate by reference.<sup>2</sup> The Service has yet to decide whether to list the species.<sup>3</sup> Now, new population estimates from the Alaska Department of Fish and Game (ADFG), released this June, show that the AA wolf is in danger of extinction in a significant portion of its range, on Prince of Wales Island and its satellite islands (Game

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<sup>1</sup> Section 4(b)(7) gives the Service authority to emergency list a species when the regular listing process will be inadequate to protect the species from extinction. 16 U.S.C. § 1533(b)(7); *see also* 50 C.F.R. 424.20.

<sup>2</sup> See Center for Biological Diversity and Greenpeace, Petitioners, PETITION TO LIST THE ALEXANDER ARCHIPELAGO WOLF (*CANIS LUPUS LIGONI*) AS THREATENED OR ENDANGERED UNDER THE ENDANGERED SPECIES ACT (Aug. 10, 2011).

<sup>3</sup> The Service published a 90 day finding that listing may be warranted on March 31, 2014, and requested comments. 79 Fed. Reg. 17993 (Mar. 31, 2014). Pursuant to a Consent Decree between Petitioners and the Service, by December 31, 2015, the Service must make determine whether listing the AA wolf is warranted.

Management Unit 2, “GMU-2”),<sup>4</sup> and that the population of wolves on GMU-2 may be as low as or lower than 50 individuals. Despite dangerously low population estimates, ADF&G and the Federal Subsistence Board (FSB) have opened the wolf hunting and trapping season with a 9-wolf quota. In order to avoid catastrophic consequences to this species, the Service must emergency list the AA wolf in light of new ADF&G population estimates and the harvest quota for this season.

Emergency listing is appropriate when high-magnitude, immediate threats to a significant proportion of the total population are so great that waiting to go through the regular listing process would risk the continued existence of the species.<sup>5</sup> Emergency listing criteria are very similar, if not the same, as the criteria used to assign Listing Priority Numbers (LPNs) to candidate species.<sup>6</sup> Furthermore, candidate species assigned LPNs of 1, 2, or 3, are regularly considered for emergency listing.<sup>7</sup> Therefore, we also discuss LPN criteria when applicable to the AA wolf.

Regular listing under the Endangered Species Act is inadequate to provide protection to the AA wolf because the magnitude and immediacy of the threats to the wolf are great. The AA wolf population on POW has declined significantly in recent years due to both legal and illegal killing (poaching) of wolves, and the ratio of females has fallen at an alarming rate. The AA wolf will suffer irreparable harm from the recently authorized hunting and trapping season and by irreversible loss of habitat as a result of logging in low-elevation, old-growth forest authorized by the U.S. Forest Service. The existing regulatory framework implemented by ADF&G and the U.S. Forest Service has proven to be inadequate to protect the wolf, resulting in the current crisis facing the species. The AA wolf’s physical and genetic isolation on GMU-2 makes it especially vulnerable to the combined effects of hunting, trapping and degradation of habitat.

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<sup>4</sup> GMU-2 in itself constitutes a significant portion of the AA wolf’s range, meaning that the threat to the GMU-2 population warrants listing the entire species. *See*: Petition to List the AA Wolf at 22-23 (Aug. 10, 2011). In addition, the population of AA wolf on GMU-2 is a distinct population segment, and warrants listing in itself. *Id.* at 23-24. *See* Petition to List the AA Wolf at 27-30 (Aug. 10, 2011).

<sup>5</sup> FWS, Listing Handbook, at 109 (4th ed. 1994); *see also* 16 U.S.C. § 1533(b)(7).

<sup>6</sup> The criteria for assigning LPNs are: (1) magnitude of threat, (2) immediacy of threat, and (3) whether the species represents a distinct or isolated gene pool. *See* 48 Fed. Reg. 43098, at 43103 (Sept. 21, 1983). To differentiate between the highest priority candidate species, the Service considers whether there are fewer than fifty individuals remaining or four or fewer populations. 79 Fed. Reg. 72450, at 72456 (Dec. 5, 2014). By comparison, in decisions to emergency list a species, the Service has considered factors such as: immediacy of the threat, past and ongoing habitat loss, size of the remaining population, whether the regular listing timeframe will be too slow, and pre-existing regulatory protections. Fish and Wildlife Service Emergency Lists Miami Blue Butterfly as Endangered, *available at* <http://www.fws.gov/southeast/news/2011/11-056.html> (“Imminent threats now pose significant risk to the survival of the Miami blue”) (“the normal listing timeframe is insufficient to prevent losses that may result in extinction”); Emergency Protection Given to San Bernardino Kangaroo Rat, *available at* <http://www.fws.gov/cno/news/1998/9809nr.htm> (emergency listing the rat because of past habitat loss and ongoing damage to remaining habitat caused by active mining operations); Emergency Listing for the Columbia Basin Pygmy Rabbit, *available at* <http://www.fws.gov/pacific/news/2001/136/q&as.htm> (emergency listing the rabbit as a DPS because of habitat loss and that there were likely fewer than 50 individuals remaining in the wild); 78 Fed. Reg. 70104, at 70122 (Nov. 22, 2013) (section discussing *sistrurus catenatus*) (declining to emergency list a subspecies of rattlesnake because it was already protected at the state level).

<sup>7</sup> *See* 79 Fed. Reg. 72450, at 72451 (Dec. 5, 2014) (the most recent annual Candidate Notice of Review).

### **A Low and Quickly Declining Population**

This June, the ADF&G released an updated population estimates for GMU-2 wolves for 2014, stating that the population fell 60% from 2013 to 2014.<sup>8</sup> The mid-range estimate is only 89 individuals in fall 2014, but there could have been as few as 50 remaining.<sup>9</sup> This most recent estimate results from data collected just before the 2014-15 hunting season, in which 29 individuals were taken legally. This suggests that at the end of the 2014-15 season, no more than 60 individuals remained on GMU-2, based on the mid-range estimate. Based on the low range estimate, no more than 21 wolves remained. This does not take into account illegal take and wolves that died of other causes. It is very possible that fewer than 50 AA wolves remained on POW at the end of the 2014-15 hunting season, and this fact alone warrants emergency listing. By comparison, in the mid-1990s GMU-2 supported about 300 individuals, believed to be one-third of the total AA wolf population.<sup>10</sup>

It is also unlikely that the number of wolves was bolstered by substantial reproduction. Although recruitment is unknown, ADF&G/Forest Service field research in spring 2015 found only one active wolf den with only one pup, in the extensive study area in north-central Prince of Wales Island, although at least a dozen den sites are known to ADF&G and Forest Service researchers.<sup>11</sup> This compounds other dismal reproduction observations from field work in recent years and leads to the conclusion that there is likely very little recruitment on GMU-2.

Not only has the population declined dramatically, but the ratio of females has also fallen drastically. In fall 2014, the estimated ratio of females on GMU-2 was 0.25, down from 0.5 the year prior.<sup>12</sup> Based on the mid-range estimates, there were 22 females remaining in 2014.<sup>13</sup> The situation could be even more dire: based on the low range population estimate and low range female ratio estimate, there were as few as 7 females remaining. On the other hand, the high end estimate are still only 32 females.<sup>14</sup> All of this information points to an emergency situation for AA wolves.

### **Unsustainable Hunting and Trapping**

Despite dramatically low population estimates, ADF&G and FSB have announced that they will allow hunting and trapping of AA wolves on GMU-2 this season, with a quota of 9 wolves. The subsistence hunting season began September 1. The threat of hunting is immediate and in itself warrants emergency listing. The Service, under regular listing procedures, need not issue a decision whether to list the AA wolf until December 31, 2015<sup>15</sup>—too late to affect the hunting

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<sup>8</sup> (1) See: ADF&G 2015a (GMU 2 Wolf Population Estimate Update, Fall 2014. Memorandum of June 16, 1015).

(2) See also: Greenpeace 2015, critiquing the memorandum.

<sup>9</sup> ADF&G 2015a at 2.

<sup>10</sup> See: FWS, Alexander Archipelago Wolf, available at [http://www.fws.gov/alaska/fisheries/endangered/species/aa\\_wolf.htm](http://www.fws.gov/alaska/fisheries/endangered/species/aa_wolf.htm).

<sup>11</sup> Person, D. K. 2010. Estimating wolf populations in Southeast Alaska using noninvasive DNA sampling. ADF&G federal aid annual progress report, submitted Aug. 24, 2010.

<sup>12</sup> ADF&G 2015a at 2.

<sup>13</sup> *Id.*

<sup>14</sup> *Id.*

<sup>15</sup> *Id.* at 2; cf. ADF&G Hunting Regulations 2014-15 Season at 45.

season, or the federal trapping season that begins November 15. Adhering to the regular listing process risks extinction of the AA wolf on Prince of Wales and associated islands because the population may not be able to withstand any additional harvest.

Since around 2008 ADF&G and the FSB have been concerned about the observed continual decline of the GMU-2 wolf population. Facts that became public at the close of the 2013-2014 season exposed mismanagement that had been on-going since at least November 2010, when ADF&G asked the Board of Game for a regulatory change.<sup>16</sup> In the next few paragraphs we first give background on the management of seasons from 2009 to 2014, and then discuss the March 2014 closure and subsequent events up to the present. Bear in mind that over these years the FSB has implemented the same GMU-2 wolf management controls (quotas, etc.) as the state.

For the 2009-2010 GMU-2 wolf season, the quota was 90 wolves.<sup>17</sup> For the November 2010 Board of Game meeting, in its submitted Proposal 18 (changing the unlimited bag limit to 10 wolves and requiring skins to be sealed within 14 days of take), ADF&G stated its intent to set a GMU-2 wolf quota of 45 wolves for the 2010-2011 season, based on a 30% harvest cap.<sup>18</sup> (Proposal 18). The causes of action were “concerns with the long-term sustainability of our Unit 2 wolf population,” “significant declines in the harvest, from a high of 131 to 18 wolves last year,” and “a substantial reduction in wolf sign, including scats, tracks and” denning activity.<sup>19</sup> In its testimony to the board, ADF&G asked the board to amend the proposal (in the “spirit of cooperation” with the trappers) to leave the bag limit unlimited and said it had decided to set the quota at 60 wolves instead of the 45 stated in the proposal.<sup>20</sup> The board amended and passed the proposal as recommended<sup>21</sup> in ADF&G’s testimony. ADF&G and the FSB then both used this 60-wolf quota for the 2010-2011 through 2013-2014 seasons. That the 60 wolf quota was derived from the 30% harvest cap means that the estimated population had effectively been changed to 200 wolves, instead of ADF&G’s estimate of 150-175 as considered in Proposal 18 (i.e. “half of the 300-350 that was estimated [in the mid-1990s] when the department had reliable data”).

The 2013-2014 season was closed early when the reported take reached 53 wolves, nearing the quota of 60.<sup>22</sup> (The final reported take was 57.)<sup>23</sup> ADF&G’s press release for the closure disclosed that the quota was determined from a 30% regulatory cap on “reported” harvests, of an estimated population of 200 wolves.<sup>24</sup> Thus, it was clear that the illegal take of wolves *had not*

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<sup>16</sup> ADF&G 2010a at 2 (ADF&G’s Proposal 18 for the Board of Game’s November meeting). “At this time, the department does not have a reliable population estimate for wolves in Unit 2. But it is probable that wolf numbers are half of the 300-350 that was estimated when the department had reliable data (mid-1990s).”

<sup>17</sup> ADF&G 2010b at 1 (testimony of Stephen Bethune for ADF&G on Proposal 18). Board of Game, Nov. 2010.

<sup>18</sup> ADF&G 2010a (ADF&G’s Proposal 18). “Per 5 AAC 92.008 (1) we have set a harvest cap of 30% of the estimated wolf population. Our estimate of 150 wolves would then allow for a harvest cap of 45. The department intends to set this as its updated cap.”

<sup>19</sup> ADF&G 2010b at 1 (Bethune’s testimony).

<sup>20</sup> Id.

<sup>21</sup> Id. at 4.

<sup>22</sup> ADF&G 2014a at 2 (emergency closure order of March 13 2014).

<sup>23</sup> ADF&G 2015a (ADF&G’s population est. for fall 2014).

<sup>24</sup> Of ADF&G’s 2010 estimates, the 57 was a 27% mortality of the 200, and 38% of the low range estimate of 150.

*been considered at all* in the Board of Game’s regulation or ADF&G’s season management calculation, which ADF&G also admitted to us after some stonewalling.<sup>25</sup> ADF&G, however, did know that the illegal take of wolves in GMU-2 is substantial.<sup>26</sup> Consequently, we submitted Proposal 13 for the Board of Game’s January 2015 meeting, for the GMU-2 wolf regulation to be changed so that each mortality cause (reported take, wounding loss, illegal take, and natural mortality) would be explicitly accounted for it setting a sustainable quota. ADF&G submitted Proposal 14 to reduce the “reported” harvest cap from 30% to 20%, but not explicitly accounting for other mortality causes. ADF&G’s testimony to the board nonetheless characterized its proposal as “transparent” and “conservative,” and it was adopted by the board (with Proposal 14 voted down).<sup>27</sup>

In November 2014, for the 2014-2015 season, ADF&G and the FSB implemented the 20% cap on reported harvest (ahead of its approval by the Board of Game the following January), setting a quota of 25 wolves based on both that and a new estimate of the GMU-2 population for the previous fall that was determined with a DNA mark/recapture method.<sup>28</sup> The new estimate (actually for fall 2013) was 212, with a 95% confidence interval of 130 to 378, and the low end . ADF&G used the low end that range to determine the season’s harvest quota of 25 wolves.<sup>29</sup> An emergency closure of the 2014-2015 season was announced on February 18, 2015 when the reported harvest had reached 22 wolves, with the closure to be effective 4 days later (and with the regulatory 14 day grace period after that for hunters and trappers to report their harvest).<sup>30</sup> The final tally of reported skins was 29 wolves, 16% more than the quota. Again, as with the 2014 emergency closure, illegal take was not accounted for. Moreover, in June 2015 ADF&G produced a new, retroactive population estimate for fall 2014. It is 89, with a range of 50–159 instead of the higher estimate that had been used to conduct the 2014-2015 season (212 with a range of 130-378).<sup>31</sup> Based on the new low end of range estimate (50) – the same basis that ADF&G used to set the quota – the 2014-2015 season’s mortality just from reported take was 58%, or if based on the mid-range estimate (89) – a metric that was not used for setting the quota – it was a still substantial 33%. These losses do not include illegal take or natural mortality.

This year’s quota is likewise unsustainable. ADF&G established its 9-wolf quota by applying the current 20 percent harvest cap to the mid-range estimate of the GMU-2 wolf population before the 2014-15 season (89 wolves),<sup>32</sup> and then halving that number.<sup>33</sup> This is an unscientific and non-conservative approach.

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<sup>25</sup> Pers. comm., D. Larsen, 3/20/14. The need to account for illegal take “hadn’t resonated” with the department.

<sup>26</sup> (1) Person & Russell 2008. The principal investigator was an ADF&G research biologist. (2) Person & Larson 2013 (ADF&G’s federal aid progress report update to USFS on AA wolf field work in GMU-2, with field observations and reporting on the fates of radio-collared wolves [80% over-winter mortality]; March 31, 2013).

<sup>27</sup> The board removed by amendment part of the proposal that would have requested voluntary reporting of wounded wolves, with such number to be deducted from a hunter’s bag limit (of 5). Note that for trappers there has never been a bag limit.

<sup>28</sup> ADF&G 2014b (ADF&G’s GMU-2 wolf quota announcement, Nov. 17, 2015).

<sup>29</sup> ADF&G 2014b, 2015a.

<sup>30</sup> ADF&G 2015b.

<sup>31</sup> ADF&G 2015a.

<sup>32</sup> ADF&G 2015c. (ADF&G’s Emergency Order closing the 2013-2014 season early, March 13, 2104).



First, with a population as low as it is on GMU-2, the quota should have been based on the low end of the population estimate (which was 50), as it did the year before. For example, had ADF&G based its 2014-15 quota on the mid-range population estimate of 212 rather than the low-end estimate of 130, 42 wolves could have been killed legally, instead of the actually intended 25. So, taking into account additional illegal kills, the entire wolf population on GMU-2 could have been wiped out that year had ADF&G based its quota on the mid-range estimate. Given how few wolves there now are on GMU-2 and the uncertainties inherent in obtaining an accurate population estimate, basing the quota on the mid-range population estimate is dangerous.

Second, the 2015-16 quota calculation does not take into account all available information, and should have included the legal and illegal takes from fall 2014 until now. It is based on the population estimate for *before* the 2014-15 season, and did not account for the 29 wolves reported taken in that season. Studies have shown that as many as half the wolves taken on GMU-2 are taken illegally,<sup>34</sup> meaning that the reported take of 29 likely represents only a fraction of the number of wolves killed. The quota also does not represent natural mortality. At the very least, ADF&G should have subtracted the number of known takes from its population estimate. ADF&G would also want to add wolves back in to account for recruitment, but as discussed (e.g., see page 3, only one active den found this spring, with only one pup) there is little evidence of wolf reproduction on GMU-2 at this time.<sup>35</sup> Moreover, researchers estimated that females make up only 25 percent of the population,<sup>36</sup> reducing reproduction potential.

ADF&G's method for quota calculation is not based on science and is not conservative. Using a rule of thumb such as the present 20 percent harvest cap may make sense for an abundant population, but doing so invites disaster for a small population or when unknowns and uncertainties can have a profound effect, as is the case here.<sup>37</sup> When wolf numbers get as low as they are on GMU-2, it becomes dangerous to remove any additional wolves. Moreover, ADF&G's arbitrary halving of the 20-percent figure is unscientific. ADF&G seems to believe that halving the 20-percent figure somehow makes up for the failures to account for: known (since fall 2014) and illegal kills, natural mortality; low or no reproduction; low female percentages; and the failure to use the low-end population estimate. With a declining population

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<sup>33</sup> (1) Pers. comm., ADF&G R. Scott; (2) Ketchikan Daily News 2015 (SE wolf harvest limit set. By Scott Bowlen. Aug. 22, 2015).

<sup>34</sup> Person, D. K., and A. L. Russell. 2008. Correlates of mortality in an exploited wolf population. *Journal of Wildlife Management* 72:1540-1549; statement by Person in KRBD's Aug. 22 story)

<sup>35</sup> This is consistent with Person & Russell (2009), which found that litter sizes of GMU-2 wolves are small, that is probably a worsening problem, and that fragmentation of packs worsens the problem. The study explored the contents of active dens.

<sup>36</sup> ADF&G, 2015a. Memorandum, "GMU 2 Wolf Population Estimate Update, Fall 2014." To Ryan Scott, ADF&G Region 1 Supervisor, Wildlife Conservation Division. June 16, 2015.

<sup>37</sup> (1) Artelle K.A., Anderson S.C., Cooper A.B., Paquet P.C., Reynolds J.D., Darimont C.T. (2013). Confronting uncertainty in wildlife management: performance of grizzly bear management. *PloS one*. 8:11:e78041; (2) Artelle K.A., Reynolds J.D., Paquet P.C., Darimont C.T. (2014). When Science-Based Management Isn't. *Science*. 343:. 1311-1311.

on the brink of extirpation, managing agencies must manage conservatively and base decisions on the best available science and scientific methods, not random factors pulled out of thin air.<sup>38</sup>

Even if the Prince of Wales wolf population could sustain a harvest of 9 wolves, there is no way to ensure that only 9 wolves will be killed. Such a low quota cannot be safely managed, even with a short season. There is no limit on the number of trappers and hunters who can participate, and no limit on the number of traps. Moreover, under the FSB's regulations, hunters and trappers have 14 days to report harvests, and the quota could be easily and unknowingly exceeded.

Overarching the above management failings from 2010 to the present is the fact that a population objective for GMU-2 wolves has never been adopted. There has been vague policy that a viable or sustainable population must be ensured, but a desired number and a minimum safe number for the population has never been established. Consequently, management direction has been rudderless. For example, under the current regulation for a 20% harvest cap, it is permissible to reduce the population to the point of collapse. It would allow 1 wolf to be legally taken if the population were 5, and without even taking into account genetics for such a small population or the potential for illegal take. The current regulatory approach may be satisfactory for management of an abundant population, but it is incapable of guiding management of a population whose continued existence is in question, as in GMU-2. A scientifically robust population goal that is on the safe side and is enshrined in the regulations is necessary if this population is to survive much less rebound, and it needs to drive management when the population is below or declining toward that level.

Moreover, a revised regulatory approach is needed that takes into account that human-caused mortality is not necessarily compensatory, and can be additive or super-additive.<sup>39</sup> The potential for super-additive mortality, in which take by humans "increases total mortality beyond the effect of direct killing itself, through social disruption or the loss of dependent offspring,"<sup>40</sup> may well be at play in GMU-2<sup>41</sup> but has never been incorporated into management of the seasons there. Importantly, the effects of super-additive mortality on a population may not become fully manifested in one year,<sup>42</sup> which greatly complicates management beyond the direction given in the existing regulations.

The approvals given by ADF&G and the FSB of a 2015-16 hunting and trapping season, even with a seemingly low quota of 9 wolves, shows that current regulations are inadequate to protect the AA wolf, and in fact threaten the AA wolf's continued existence. This warrants emergency listing.

### **Old Growth Logging**

Moreover, the GMU-2 AA wolf's primary low-elevation, old-growth habitat is threatened by old-growth logging associated with the Big Thorne timber sale. The timber sale was authorized in June 2013 and logging began in April 2015 at the rate of 144,000 board feet of timber per

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<sup>38</sup> *See id.*

<sup>39</sup> Creel & Rotella (2010).

<sup>40</sup> *Id.*

<sup>41</sup> See, e.g.: (1) Person & Rusell (2009); Person (2010); and Person & Larson (2013).

<sup>42</sup> Creel & Rotella (2010).

day.<sup>43</sup> The Big Thorne project authorizes the cutting of 149 MMBF of timber from over 6,000 acres of old-growth forest on POW.<sup>44</sup> The project will have significant short and long term impacts. Short term impacts, already taking place, include loss of low-elevation old-growth forest habitat and a reduced deer population. The project also authorizes the construction of about 80 miles of road on Prince of Wales Island, bringing total road density on lands below 1,200 feet elevation to 1.6 miles per square mile or more in every Wildlife Analysis Area of the project.<sup>45</sup> This conflicts with the best available science, which documents that wolf harvest increases markedly when road densities are greater than 0.7mi/mi<sup>2</sup>.<sup>46</sup>

With its current carrying capacity for Sitka black-tailed deer already reduced by decades of logging to only 14.5 deer per square mile,<sup>47</sup> the North Central Prince of Wales Biogeographic Province is already well below the Tongass Forest Plan's standard and guideline of providing habitat to support 18 deer per square mile. This puts wolves at great risk in times of severe winters, and further habitat loss from logging in the Big Thorne project makes this risky situation worse. The impact to deer and wolf populations will be long-term, and will worsen from much of the past logging as well as from Big Thorne as second growth stands reach the stem-exclusion stage between now and 2040.<sup>48</sup>

## Conclusion

Threats to the AA wolf are amplified because the wolf represents a distinct and isolated gene pool and few individuals remain.<sup>49</sup> The AA wolf subspecies is isolated and genetically distinct from other North American wolves because of tidewater barriers and tall coastal mountains that limit migration to the rest of the continent.<sup>50</sup> The GMU-2 population is further isolated and may be genetically distinct from other AA wolf populations.<sup>51</sup>

The AA wolf faces high-magnitude, immediate threats to its continued existence, and in the absence of immediate action the wolf may well go extinct on GMU-2 while it waits for the regular listing process to run its course. Action must be taken immediately to prevent continued and significant population decline. Based on these imminent threats to the AA wolf, we request that the Service emergency list the AA wolf and proceed expeditiously with the rulemaking process during the following 240-day period as set forth in Section 4 of the ESA.<sup>52</sup>

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<sup>43</sup> Declaration of Kirk Dahlstrom, secretary of Viking Lumber, in the Big Thorne lawsuit. March 12, 2015.

<sup>44</sup> Big Thorne ROD at 4 (June 2013).

<sup>45</sup> Big Thorne ROD at 38 (June 2013). (See statistics for open & closed roads on federal & non-federal lands.) Also, the project affects four wildlife analysis areas (WAAs). WAAs are analysis areas designated by ADF&G throughout southeastern Alaska that generally encompass several watersheds and usually approximate the size of a wolf pack home range. They are used for determining road density and estimating carrying capacity for deer.

<sup>46</sup> Person et al. 1996; Person & Russell 2008.

<sup>47</sup> Big Thorne FEIS at 3-181 (Alt. 1 in table WLD-26).

<sup>48</sup> Big Thorne ROD at 27.

<sup>49</sup> Petition to List the AA Wolf at 11-12 (Aug 10, 2011); ADFG GMU2 Wolf Population Estimate, Fall 2014 at 2 (June 16, 2015).

<sup>50</sup> Petition to List the AA Wolf at 7 (Aug. 10, 2011).

<sup>51</sup> Petition to List the AA Wolf at 11 (Aug 10, 2011).

<sup>52</sup> 16 U.S.C. § 1533(b)(7).



Sincerely, *(verifiable signatures up on request)*

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