THE PLIGHT OF THE GREATER YELOWSTONE GRIZZLY

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BACKGROUND

On May 24, 2012 Governor Matt H. Mead of Wyoming wrote a letter to the secretary of the interior, Ken Salazar, requesting that the secretary "expedite the analysis" of removing the grizzly bear from the endangered species list. [1] In this letter the governor enumerated his grievances with keeping the grizzly listed. He felt bears had become a nuisance. He complained of (1) four human deaths (2) damage to private and public property (3) that his state's investment in recovery over the past 28 years had exceed $35 million, and (4) that the average annual cost to Wyoming for grizzly management was approaching $2 million. [2] At the end of the letter he concluded that "the continued listing of a recovered population of grizzly bears is a threat to people especially recreationalists, hunters and property owners and it is costly to manage." [3] This request to expedite the delisting process was not well received by many people from Wyoming.

On March 23, 2016 two years after Governor Mead's letter, Jim Laybourn, a citizen of Wyoming concerned with what would happen if the grizzly was delisted responded to the Governor with his own letter. He told Mr. Mead that "a loss of roadside bears will cost the region tens of millions of dollars each year…" [4] Furthermore, that "the grizzly bear is the single most valuable living resource in the state of Wyoming". [5] In addition, he speculated that "ninety-nine percent of Yellowstone visitors polled recently expected to see a bear on their visit to Wyoming".[6] Where Citizen Laybourn got his figures is unclear—he cites a "recent scientific paper". [7] But his numbers are not important. Indeed, they are probably overstated, but his letter and his rather

[1] *See* Letter to Ken Salazar from Governor Matt Mead, May 24, 2012.
[2] *See* id.
[3] *See* id.
[4] Id.
[5] "Gov. Mead, Cowboy Up on the Grizz Issue, Jackson Hole Daily, March 23, 2016.
[6] Id.
[7] Id.

clumsy argument exemplify, or perhaps verbalize, the extent to which the grizzly's delisting has largely become a political battle.

I. Control of the GYE

Indeed, delisting the grizzly has become a federalism issue. Wyoming, Montana, Idaho, and the federal government are fighting for control of a piece of prime grizzly bear habitat called the Greater Yellowstone Ecosystem (the "GYE") which is an approximately 32,519 square mile pristine and contiguous chunk of land that spans the three states. [8] Currently, the federal government has significant control of the GYE pursuant to a controversial clause of the Endangered Species Act (the "ESA"). This clause, the "crit-hab" clause, protects endangered and threatened species' critical habitat from destruction and exploitation. In effect it often precludes states from leasing land to timber and energy companies.

Most of the GYE is designated critical grizzly habitat, and thus, the majority of the GYE including "virtually all of the Greater Yellowstone forests have placed some restrictions on oil and gas leases, and two forests have precluded leasing on critical grizzly bear lands [altogether]". [9] If the bear is delisted, however, some of these restrictions will be lifted and the government will lose the "dominant legal influence…[they have] on land use decisions" pursuant to the ESA.[10]

For example, the National Forests that surround Yellowstone National Park (the "Forests") have in their land use plans stipulations that would allow some oil and gas lease restrictions to be lifted if the grizzly were delisted. A paper written around 1990 that surveyed the Forest Plans observed what could have been the potential consequences of delisting: "Bridger-Teton officials

[8] https://en.wikipedia.org/wiki/Greater_Yellowstone_Ecosystem
[9] *Taking Account of the Ecosystem on the Public Domain*, 60 U. Colo L. Rev. 923, 959 (1989)
[10] Id.

have proposed leasing more than ninety-five percent of the southern portion of the forest, and they apparently will also open the northern portion of the forest leasing while dropping proposed "no leasing" restrictions on critical grizzly bear lands and on lands near Grand Teton National Park in the final forest plan."[11]

II. Litigation

Whether or not the bear will be delisted largely depends on the outcome of litigation that will follow the Fish and Wildlife Service's ("FWS") Proposed Delisting Rule (the "Rule") which has already been published in the federal registry. The question the court will consider in these imminent lawsuits is whether or not the survival of the GYE grizzly bear population faces a substantial threat currently or in the foreseeable future.

In *Greater Yellowstone Coalition, Inc. v. Servheen*, a suit following the FWS' last delisting attempt, the Ninth Circuit set binding precedent in favor of keeping the bear listed when it held that "the Service [Fish and Wildlife Service] had failed to rationally support its conclusions that…declines in whitebark pine did not threaten the grizzly." 665 F.3d 1015, 1023 (2011). The court reasoned that the FWS admitted in their delisting rule "that it simply does not yet know what impact whitebark pine declines may have on the Yellowstone grizzly [because] the specific amount of decline in whitebark pine distribution and the rate of this decline are difficult to predict with certainty [and] [t]he specific response of grizzly bears to declines in whitebark cone production is even more uncertain". *Id.* at 1028.

Notably, however, the court suggested that in the future it would allow delisting if sufficient evidence showed that the grizzly population was stable during the whitebark pine die-off. *Id.*

[11] Id. at 982, Bridger-Teton is one of the seven Forests surrounding Yellowstone, all have similar plans.

Indeed, the court stated: "the Yellowstone grizzly has been the focus of a laudable, decades long cooperative research effort—one that we hope continues. It may be that scientists will compile data demonstrating grizzly population stability in the face of whitebark pine declines. Such information, however, simply is not in the record before us." *Id.* at 1029. Five years have passed since this opinion, and scientists have compiled reams of data. The data shows the grizzly population is unstable in the face of the whitebark pine decline yet the FWS is still trying to delist the bear.

DISCUSSION

I. Population Growth and Vital Rates

Since the whitebark pine decline the GYE grizzly's annual population growth rate has slowed significantly but still remained positive. Accordingly, the FWS contends that the grizzly population is not threatened by the declining whitebark pine population. [12] Since the die-off, however, the GYE grizzly population's vital rates have declined sharply. Yet the FWS associates these vital rate declines with the population reaching its carrying capacity rather than the whitebark pine die-off because the grizzly has alternative food available in the GYE; but the FWS overlooks the fact that the whitebark pine die-off and the vital rate declines occurred simultaneously.

A. Growth Rate

Indeed, the GYE grizzly's average annual population growth rate during the whitebark pine's most critical ten-year period, 2002 to 2011, increased at an estimated rate of .3 to 2.2 percent.[13] Accordingly, the decline is negatively correlated with the GYE grizzly population, and thus, the

[12] *See Removing the Greater Yellowstone Ecosystem Population of Grizzly Bears From the Federal List of Endangered and Threatened Wildlife*, hereinafter referred to as (the "Proposed Rule") 13213.
[13] Id.

FWS contends that the decline does not pose a significant threat to the long term survival of the GYE grizzly.[14] Indeed, the FWS states in their proposed delisting rule [15] (the "Rule"): "[T]he best available information indicates the GYE grizzly bear population's trend…has been increasing. We consider estimates of population trend (*i.e.,* "lambda") to be the ultimate metric to assess cumulative impacts to the population. It reflects all of the various stressors on the population and provides a scientific basis to correct a negative trend…but if these [various stressors] *are not causing the population to decline*, we cannot consider them substantial." [16] In other words, the FWS' position is that the whitebark pine decline is not a substantial threat to the long term survival of the GYE grizzly bear population because the annual population growth rate has continued to increase in the face of the die-off.[17]

But positive growth rates do not guarantee the non-existence of a substantial threat, and positive rates do not mean a population is healthy. [18] Growth rates can be misleading, indeed, the GYE grizzly growth rate has dramatically slowed since the whitebark pine started dying off. [19] During the 10 year period before the whitebark pine decline 1983-2001, the estimated annual rate of population growth was between 4.1% (using a conservative assumption that unresolved fates of independent females represented mortality) and 7.6% (censoring data of independent females with unresolved fates; Schwartz et al. 2006d).[20] Whereas during a ten year period during the whitebark pine decline, 2002-2011, annual population growth rates were between 0.3% (unresolved fates

[14] Id. at 13219
[15] Id.
[16] Id.
[17] Id.
[18] *See Greater Yellowstone Coalition, Inc. v. Servheen,* 665 F.3d 1015 (9th Cir. 2011)
[19] *See Responses of Yellowstone Grizzly Bears to Changes in Food Resources: A Synthesis*, December 2013 (the "Food Report"), 5
[20] Id. at 5

assumed to represent mortality) and 2.2% (unresolved fates censored).[21] Critically, if the GYE grizzly's annual growth rate trend continues, the population will either stabilize or start to decline. Accordingly, positive growth rates do not indicate that a population will keep growing, nor do they indicate that a population is not facing any threat. Thus, growth rates are not very useful in predicting population trends.

B. Vital Rates

Vital rates are more indicative of long term population trends, and the GYE grizzly's vital rates have declined sharply since the whitebark pine die-off. [22] Indeed, cub survival rate estimates declined from .640 during 1983-2001 to .553 during 2002-2011 and, amongst yearlings the survival rates dropped from .817 during 1983-2011 to .539 during 2002-2011.[23] Furthermore, reproductive transition experienced a similar decrease between the period 1983-2001, before the die-off, and 2002-2011, after the die-off.[24] There was also a decrease of independent females in the GYE. [25]

The foregoing vital rate declines correspond perfectly with the whitebark pine die-off, yet the Interagency Grizzly Bear Committee (the "IGBC"), contends that "a decline in cub survival and the probability of reproductive transition during 2001-2012 are associated with an index of grizzly bear density rather than availability of whitebark pine…[26] In other words, they believe that the vital rate declines "[indicate] the population is near its carrying capacity" [27]. Thus, they attribute the vital rate declines with the population being too dense, and not the whitebark pine die-off.

[21] Id.
[22] Id.
[23] Id.
[24] Id. at 34, documented by the IGBC.
[25] Id.
[26] Id. at 33
[27] Id. at 35

Indeed, their position is that "the whitebark pine decline has had no profound negative effects on grizzly bears at the individual or population level…" [28]

C. Alternative Food Sources

The FWS explains that the whitebark pine die-off does not explain the slowing growth rate or the vital rate declines because their studies indicate that "bears obtained sufficient alternative foods through diet shifts..." [29] Thus, they contend that the whitebark pine die-off cannot be associated with the grizzly's slowing growth rate and the vital rate declines.[30]

Perhaps the FWS is correct that the GYE grizzly has found alternative food. Indeed, these bears are opportunistic eaters. Since 1944, the GYE grizzly has been documented eating 234 different types of foods, including seventy-five taxa that were "well represented" within several different studies.[31] The grizzly is known to prey on elk calves in early spring, occasionally older elk throughout the year, and opportunistically scavenge carcasses throughout the fall and winter, and even usurp kills of other predators, including cougars and gray wolves. [32]

Nevertheless, the vital rate declines and the whitebark pine die-off occurred simultaneously, this timing cannot be overlooked. The pine beetle infestation began in the GYE in the year 2000[33] and, the vital rates declines began exactly the same year.[34] The GYE grizzly population has been monitored for nearly a century. In that long history the FWS has never suggested that the grizzly

[28] Id. at 35
[29] Id.
[30] Id.
[31] Id. at 4
[32] Id. at 4
[33] Id. at 10
[34] Id. ("based on change-point analyses of trend in number of Fcoy [females with cubs of the year] the change in trajectory likely started around 2000 or 2001".)

population was near its carrying capacity until delisting the grizzly was contingent upon a lack of a substantial threat.

D. Vital Rates Will Change Slowly

Furthermore, the declining vital rates have not been fully realized because grizzly's have extraordinarily slow reproductive rates. Indeed, grizzlies have some of the slowest reproductive rates among terrestrial mammals. [35] Their slow rates are attributable to an average time between litters of 2.78 years, their late age of reproduction at approximately 6 years, small litter sizes of 1-4 cubs, and average age of reproduction of approximately 6 years. [36] The FWS states in the proposal: "it may take a female grizzly bear 10 or more years to replace herself in a population".[37]

Accordingly, any external influence affecting the population will take a long time to manifest in the vital rates. For example, the IGBC used a daily survival rate model in determining the cub survival rate of the GYE grizzly cub population which declined significantly after the year 2001.[38] This model estimated the number of cubs alive on day *d* and then again how many cubs were alive later on *d+t.* The number, or rate created by the model represented the proportion of those cubs still alive on *d+t*. If new cubs are produced every three years, then the population since the whitebark pine-die off has only experienced five reproductive periods, maybe even less than that since the trees did not die as soon as the infestation began and since bears did not immediately begin starving as soon as the die-off began. Accordingly, any change in vital rates may be just beginning to be realized and we may have only seen a glimpse of the effects of the whitebark pine

[35] *The Rule* at 13177
[36] Id.
[37] Id.
[38] *The Food Report* at 30

die-off on the GYE grizzly's vital rates. Indeed, the recent decline could be just the tip of the iceberg.

In the 2011 opinion, the Ninth Circuit noted that the "the Service's ultimate (and understandable) conclusion is that it simply does not yet know what impact the whitebark pine declines may have on the Yellowstone grizzly. *GYC Inc. v. Servheen*, 665 F.3d 1015, 1028. The Court noted that "It is not enough for the Service to simply invoke "scientific uncertainty" to justify its action…the Service must rationally explain why the uncertainty regarding the impact of whitebark pine loss on the grizzly counsels in favor of delisting now, rather than, for example, more study." *Id.*

Because the vital rate data is realizing the whitebark pine effects slowly, perhaps the court will find again that the FWS has not rationally explained why it would be favorable to delist the grizzly now rather than later, when the vital rate data is fully realized. *Id*. Given, the grizzly's slow reproductive rates, and how the whitebark pine has been slowly dying off. The burden should at the very least, lie with the FWS to explain how their conclusions are not premature. *Id.*

II. The Density Theory

As stated in the foregoing, the FWS attributes the GYE grizzly's vital rate declines to the population reaching its carrying capacity. The FWS does not, however, provide an explanation of any causal link between density and the GYE grizzly's vital rate declines. Accordingly, their theory is inadequate. Furthermore, in future litigation the court will require the FWS to make a rational connection between these two factors, and currently, that connection is missing.

A. Density-Dependent and Density-Independent Effects

The FWS theory is premised on certain effects in a population that indicate whether or not a population is being influenced by density or some external, density-independent factor. They explain that certain indicators reveal how populations are affected.[39] Some suggest density is affecting the population whereas, others suggest external independent factors are affecting the population, they explain, "when a population is at or near carrying capacity, mechanisms that regulate or control population size fall into two broad categories; density-dependent effects and density-independent effects." [40] They describe density-dependent effects as intrinsic factors that are "usually expressed through individual behaviors, physiology, or genetic potential...".[41] Whereas density independent effects are extrinsic factors such as "drought or fire that kill individuals regardless of how many individuals are in a population…" [42]

Teasing apart how a population is being effected is a difficult task, but according to the FWS things that indicate populations are being influenced by density-dependent factors in grizzly populations are: (1) decreased yearling and cub survival…(2) decreases in home range size, (3) increases in generation time, (4) increase in age of first reproduction, and (5) decreased reproduction". [43] And examples of density-independent indicators are : "(1) larger home range sizes (because bears are roaming more widely in search of foods),…(2) decreased cub and yearling survival due to starvation, (3) increases in age of first reproduction due to limited food resources, and (4) decreased reproduction due to limited food resources." [44]

[39] *The Rule* at 13180
[40] Id.
[41] Id.
[42] Id.
[43] Id.
[44] Id.

Notably, three of their four density-independent examples, are identical to the density-dependent examples, and thus cannot be used to distinguish whether the population is being influenced by density or, something else like whitebark pine seed availability. They add "due to starvation", and "due to limited food resources" to the density-independent indicators to distinguish them from the density-dependent indicators.[45] But critically, starvation and limited food resources would affect vital rates, they do not indicate between density and independent factors how vital rates are being effected. This may seem like semantics, but it is critical. If the indicators that are being used to distinguish whether a population is effected by density, or something else like whitebark pine availability, are identical, then how could one possibly determine from the indicators which factor, density, or whitebark pine seed availability, is affecting the population.

B. Home Range Size

The one indicator that presumably should yield an opposite result depending on which category of factors, density-dependent or density-independent, is affecting the population is home range size.[46] Presumably, home range size should increase if a density-independent factor such as a food resource is depleted, and inversely, decrease as density increases "presumably as a reaction to intra-specific social pressures." [47] Critically, an IGBC study, found that the home range size of female GYE grizzlies has decreased from the period 1989-1999 to the period 2007-2012.[48] Accordingly, this finding is the basis for the FWS' density theory. It is important to understand that home range size does not explain how density is affecting vital rates. It merely and only,

[45] Id.
[46] Id.
[47] *The Food Report* at 26
[48] Id. at 27

indicates that the population may be getting more dense.[49] Thus it is critically an indication, not an explanation, of what is affecting the population.

If home range size is "a reaction to intra-specific social pressures", however, social pressures could limit range size even in the face of food scarcity.[50] For example, a very hungry GYE mother grizzly may choose to stay near her den and risk starvation in her home range rather than go out searching for food, and thus increase here home range size, but risk her cubs being eaten by a male bear. Home range size is not determinative because food scarcity and social pressure are working strongly against each other.

C. Body Condition

Determining how home range size was being affected was important to the FWS density theory. But the most critical factor that the FWS had to prove was that the GYE grizzly's body condition was stable in the face of the whitebark pine decline. A decline in body condition would indicate that the vital rate decline is being caused by limited food resources, and thus, a logical connection could be made between the whitebark pine die-off and the vital rate decline.[51] Accordingly, the IGBC performed a study that tested body condition, and determined that GYE grizzly's body condition was not declining. Notably, for this study the IGBC only sampled female grizzly's because worse female body condition would lead to decreased reproductive transition, and lower cub survival rates (theorizing that if the mother's fat levels are insufficient then she is less likely to be able to reproduce and if she does her cub, or cubs are less likely to survive).

[49] Id.
[50] Id.
[51] *See* Id.

The data included in this study was collected in September and October, the critical months before hibernation.[52] The results of the study showed "a decline in female body percent fat, primarily after 2006".[53] The IGBST, however, maybe unsatisfied with the result, determined that the sample size was too small and discounted the validity of the study and its findings.[54] Accordingly, they conducted another study which yielded a more favorable result, and provided the basis for their conclusion that "body condition is not different between poor and good years of whitebark pine production and, given the data obtained to date, has not declined during the period coinciding with the peak of whitebark pine decline." [55]

The IGBST, however, admitted that this second study included bears that were not captured specifically for monitoring change in body fat levels: "[r]esearch captures of grizzly bears in the Greater Yellowstone Ecosystem are not designed to specifically assess changes in body fat but to mark a geographically balanced set of individuals for long-term monitoring of population vital rates [so] the stochastic nature of the ages, day of year, and size of individuals captured during any given year and limited sample sizes can contribute to unbalanced datasets." [56] In other words, they were pulling bears of all different shapes and sizes for other reasons, and then looking at their body fat levels.

Second, this study was inadequate because it included female grizzly fat level data from the spring and summer, even though whitebark pine seeds are the GYE grizzly's fall food source. These data were used under the assumption that the "cumulative impacts [on female grizzly fall

[52] Id. at 18
[53] Id.
[54] Id.
[55] Id.
[56] Id.

fat levels] would carry over into the spring-summer".[57] But this carryover assumption, is flawed—female grizzlies could reach satisfactory fat levels (or levels from before the whitebark pine die-off) in the spring and summer months, and still have been fat deficient in the fall. The theory is simple—a female grizzly can wake up from a winter hibernation that she entered fat deficient and restore fat levels before she is sampled. Fat levels have a ceiling—overall body fat percentage will not necessarily carry over from season to season i.e. a fat deficient fall bear could eat a lot in the spring and become satisfactorily fat in the summer. This would not indicate, however, that she was not fat deficient in the fall.

Perhaps the court will find in future litigation that the FWS' ultimate conclusion from this study, that overall body condition has not declined is not rationally related to the best available science even with deference given to the FWS.[58] Indeed, in the 2011 opinion the court suggested that the FWS could not reasonably rely on uncertainty in the face of the whitebark pine die-off. 665 F.3d 1015 (9th Cir. 2011). The FWS cannot argue in good faith that pursuant to their second body condition study that they are certain that the overall body conditions' of GYE grizzlies have not declined. Accordingly, the court may find their conclusion from the available science irrational.[59]

D. Inadequacies of the Density Theory

Already mentioned in the foregoing, the FWS density theory relies on density-dependent indicators that are the same as the density-independent indicators. The FWS cannot discern what

[57] Id. at 19
[58] *See Greater Yellowstone Coalition, Inc. v. Servheen,* 665 F.3d 1015 (9th Cir. 2011)
[59] *Id.*

is effecting a population using the same indicators. [60] Furthermore, home range size is not determinative.

Where the density theory is really lacking, however, is that it lacks a causal link between density and the vital rate declines [61] The only link the IGBC provides is: "density may also influence vital rates through mechanisms such as infanticide by adult males" [62]. But infanticide could only be used to explain the cub survival rate declines, it could not explain the reproductive transition rate decline, nor could it explain the later reproductive generation.

The FWS only offers that one explanation. [63] In fact, in the Proposed Rule, and even within the Food Report where the FWS gets the bulk of its ecological information, the FWS and the IGBC offer no explanation, of how increased density in the GYE has decreased cub survival, or how increased density has increased generation time, or how increased density has increased age of first reproduction.[64] Instead, they clumsily make the argument that cub survival is going down, age of first reproduction is going up, reproductive transition is going down, and home range size is going down, and that indicates, per their density-dependent theory, that the GYE grizzly population has reached its carrying capacity, which explains why vital rates are going down.

The FWS could get around this fallacy by either providing a causal link in addition to infanticide, or they could even remain silent i.e. contend that density causes vital rate declines there is no need for explanation. Indeed, there are many ways that density could affect vital rates, and not explaining the specific mechanisms would not destroy the FWS' argument. In the Proposed

[60] *See The Rule*
[61] *See* Id.
[62] Id. at 29
[63] *The Rule* at 13180
[64] *See The Rule; see The Food Report.*

Rule, however, the FWS methodically eliminates any possible explanation of how density could have affected the vital rate declines.

E. Genetic Health

Genetic health, something esoteric, for example, could have been used as an explanation. In other words, genetics which some led to worse reproductive transition, later reproductive generation, and lower cub survival rates. But, the FWS explicitly and expressly says in Proposed Rule that "the GYE grizzly bear population demonstrate[s] that the current levels of genetic diversity are capable of supporting healthy reproductive and survival rates. As evidenced by normal litter size, no evidence of disease, high survivorship, an equal sex ratio, normal body size and physical characteristics, and a stable to increasing population.[65] Furthermore, they state "we know that there is no immediate need for new genetic material". [66] Perhaps the FWS is quick to dispel this theory because the delisting proposal allows hunters to take a significant amount of the already small population. [67]

Perhaps the FWS dispels the genetic health theory because they intend to remove existing genetic safeguards. Specifically, the FWS decided to "remove[] the deadline of 2020 for translocation from the draft 2016 Conservation Strategy…[reasoning that] translocation of bears between these ecosystems [the NCDE and the GYE] will be a last resort and will only be implemented if there are demonstrated effects of lower heterozygosity among GYE grizzly bears or other genetic measures that indicate a decrease in genetic diversity" [68] Finally, once more in the proposed rule they state "[g]enetic concerns are not currently a threat to the GYE grizzly bear

[65] *The Rule* at 13211
[66] Id.
[67] *See* The Rule
[68] Id. at 13211

population." [69] Thus, by their discussion of genetics we can conclude that the FWS believes the vital rate decline is not attributable to genetic health, and therefore, that density is not affecting genetics.

F. Disease

Furthermore, disease is exacerbated by density. But again in the Proposed Rule, the FWS states "although grizzly bears have been documented with a variety of bacteria and other pathogens, parasites, and disease fatalities are uncommon and do not appear to have population-level impacts on grizzly bears" [70] and furthermore, "we conclude that this source of mortality [disease] does not constitute a threat to the GYE grizzly bear DPS now, or in the future." [71]

Thus, the FWS does not provide a link, and furthermore, it methodically eliminates alternative links, but repeatedly accuses density for the decline in the vital rates. In the proposed rule the FWS contends "the results…support the interpretation that slowing population growth during the last decade was associated more with increasing grizzly density than the decline in whitebark pine…[which] further supports the recovered status of the GYE grizzly bear population." [72] The IGBC in the food report says "the change in population trajectory was more associated with grizzly bear density, primarily through reduced cub survival and reproductive transition, rather than whitebark pine decline." [73] The 2016 Conservation Strategy that details what regulation will be implemented after delisting states the GYE grizzly "population is showing density-dependent population regulation as the population occupies almost all suitable habitat in the DMA

[69] Id.
[70] Id. at 13205
[71] Id.
[72] Id.
[73] *Food Report* at 35

[Demographic Monitoring Area] [74] Indeed, in the hundreds of pages documenting the GYE grizzly population the only connection or link the FWS offers between vital rates and density is in the Food Report, when they say that cub survival declines may be attributable to infanticide.

G. Litigation

Perhaps because density is so inclusive, in other words, because it could exacerbate so many different problems, e.g. food resource depletion, disease rate increases, and genetic dysfunctions, the FWS thinks that establishing that a population is getting more dense is dispositive, and thus, density could inherently explain the vital rate declines. Or perhaps, the density theory was a clever political move. Notably, the density theory, that suggests the population has reached its carrying capacity i.e. is too dense significantly changes our perceptions of what should be done with that population. A population that is too dense makes us believe that that species should be managed, and further, it perhaps justifies thinning a species with removal and even sport hunting.

Currently, however, the FWS only rational connection between density and the vital rate declines is infanticide. *Id*. Pursuant to the 2011 opinion, the court will require that the FWS rationally articulate a connection between density and the vital rate declines, or at least require them not to eliminate all possible alternatives. 665 F.3d 1015, 1024. Accordingly, a link or an alternative explanation will be necessary.

III. Human Caused Mortality

Human mortality has increased dramatically since the whitebark pine decline. Critically, in 2011 the Ninth Circuit found human mortality was a substantial threat to the GYE grizzly

[74] *2016 Conservation Strategy* at 50

population. It noted that "the [FWS] points out that grizzlies "are notoriously resourceful omnivores that will make behavioral adaptations regarding food acquisition [and] while this uncontroversial assertion is adequately supported by science, it fails to address the heart of the threat that the whitebark pine loss poses to the bears: increased proximity to humans when bears do adapt to seed shortages by seeking substitute foods." Id. at 1026. Thus, the court astutely pointed out that "that the bears are likely to seek alternate foods in the face of whitebark pine decline is a part of the problem, not an answer to it." Id.

A. Mortality Risk Increasing

The FWS admits that "whitebark pine seeds are known to have an influence on grizzly bear mortality risk".[75] And furthermore, that "during years of low whitebark pine seed availability, we know grizzly bear-human conflicts may increase as bears use lower elevation, less secure habitat within their home ranges…[a]pproximately six more independent females and six more independent males die across the ecosystem in poor whitebark pine years…these mortalities are primarily due to defense of life encounters and wildlife management agency removals of conflict bears." [76] Yet, the FWS contends that since the mortality numbers are relatively low, they do not pose a substantial threat to the grizzly.

But perhaps the FWS is significantly underestimating these figures. Indeed, 2015 "set the record as the deadliest for Greater Yellowstone Ecosystem grizzlies in modern history" [77] at least 59 bears died, and 55 of those 59 deaths were related to human causes. [78] In fact, the death rate of

[75] *The Rule* at 13212
[76] *Id.*
[77] *2015 Grizzly Death Toll Tops all Previous Years,* Jackson Hole Daily, December 23, 2016.
[78] Id.

female independent bears surpassed the 7.6% sustainable mortality threshold set by the IGBST.[79] Indeed, "it's estimated that 19 of the 247 sow grizzlies older than 2 years have died this year [2015]." [80] furthermore, "the number of "under investigation" bear deaths, is nearly three times the previous annual record", presumably, those "under investigation, are almost always killed in hunting accidents. [81] To put these numbers in perspective, on the date this article was written, December 23, 2015, there were an estimated 717 grizzlies total in the GYE. [82] Those 55 human caused deaths represent 7.7% of the entire GYE population. Furthermore, the IGBC notably recorded "there were 112 hunter-killed grizzly bears during the period [2004-2014]". [83] Again, the total population is around 717.

Critically, another study conducted by the IGBC in 2002 recorded "an average of 3.7 grizzlies killed by hunters each year between 1992 and 2000. In the past 11 years [2005-20015] the figure averaged 10.2 bears a year, meaning there has been a three-fold rise in bears dying from hunter gunfire". But the Food Report, which the delisting proposal relies on, undermines these numbers contending that the "whitebark pine decline may be a potential contributor to the increase in human caused fall mortality", [84] but "the population has also continued to geographically expand its range, increasing 38% from 2004-2010…attributing the observed increase in fall human-caused mortalities solely to whitebark pine decline does not seem warranted." [85]

Perhaps, the FWS is correct, that the whitebark pine is not the sole cause of the increase in fall human-caused mortalities, but there has undeniably been a trend of increasing human mortality

[79] Id.
[80] Id.
[81] Id.
[82] Id.
[83] *What Happens When Hunters and Grizzlies Collide*, Jackson Hole Daily, October 7, 2016.
[84] *The Food Report* at 24
[85] *The Food Report* at 24

since the whitebark pine die-off began. And these mortality numbers cannot be overlooked, again, in 2015 nearly 7.6% of the total population, 55 of 717 bears, were killed by humans.

B. Behavioral Connection

Furthermore, the IGBC found "conclusive evidence of a behavioral response by grizzly bears to [the] declining [whitebark pine]. In a study performed to determine how the GYE grizzlies were using whitebark habitat the IGBC discovered that since the beginning of the decline, bears were delaying their travel to whitebark habit by arriving at whitebark pine, or secure habitat, on August 31, whereas before the die-off they moved up on August 18, and perhaps even more importantly the study found " a distinct and rapid increase in bear-jams [cars stopped to watch bears indicating bears were near roads] during years of poor whitebark pine production…this pattern suggests that bears left the more open roadside habitats to begin investigating the availability of whitebark pine seeds at approximately the same time each year, but returned to alternative foods, such as those found in roadside habitats, more quickly when seed abundances was low." [86]

In other words, bears were observed returning at rapid rates from secure habitats to roadsides, or less secure habitats, when whitebark pine years were bad. Accordingly, the FWS has strong evidence that GYE grizzlies are now, after the whitebark pine decline, going to secure habitats later, and thus remaining in less secure habits longer; and they have strong evidence that GYE grizzlies are now, after the whitebark pine decline, completely abandoning secure whitebark pine habitat and returning to less secure area; and most importantly they are aware of the unprecedented

[86] B 17.

human caused death toll, yet they contend that the connection between the whitebark pine die-off and the increased human caused mortality rates are "negligible".[87]

C. Litigation

In 2011 the Ninth Circuit holding in favor of keeping the bear listed cited the human mortality risk due to the whitebark pine decline as a serious threat. 665 F.3d 1015, 1025. Indeed, the opinion noted that "based on the evidence of a relationship between reduced whitebark pine seed availability, increased grizzly mortality, and reduced grizzly reproduction, it is logical to conclude that an overall decline in the region's whitebark pine population would have a negative effect on its grizzly bear population." *Id*. Furthermore, the court rejected the FWS' contention that the declines were "not a threat" finding "that the heart of the threat that the whitebark pine loss poses to the bears [is an] increased proximity to humans when bears *do* adapt to seed shortages by seeking substitute foods. *Id.* at 1026. Thus, since the FWS noted a strong behavioral connection between the declining whitebark pine habitat, and since human caused mortality has sky-rocketed since the last delisting attempt, it is likely the court will find that human caused mortality is still a substantial threat.

CONCLUSION

Vital rates including cub survival and reproductive transition have experienced sharp declines since the whitebark pine began dying off. Vital rate declines in the face of the white bark pine die-off pose a substantial threat to the continued existence of the GYE grizzly. The FWS density theory used to explain vital rate declines is inadequate because it provides no causal link between density and vital rate declines, furthermore, its inadequate because the FWS eliminates alternative links

[87] B 24

between density and vital rate declines by explicitly denying that density has exacerbated genetic dysfunction, disease and food scarcity. Even if fall body condition has not declined, the FWS must provide an explanation for the declines in the face of the whitebark pine die-off. Failing to provide any link and methodically eliminating alternative links indicate that the FWS has not rationally come to the conclusion that the whitebark pine die-off is not a substantial threat to the continued existence of the GYE grizzly population.

TABLE OF AUTHORITIES

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4. *Taking Account of the Ecosystem on the Public Domain*, 60 U. Colo L. Rev. 923, 959 (1989)

5. *See Removing the Greater Yellowstone Ecosystem Population of Grizzly Bears From the Federal List of Endangered and Threatened Wildlife*, hereinafter referred to as (the "Proposed Rule") 13213.

6. *See Greater Yellowstone Coalition, Inc. v. Servheen*, 665 F.3d 1015 (9th Cir. 2011)

7. *See Responses of Yellowstone Grizzly Bears to Changes in Food Resources: A Synthesis*, December 2013 (the "Food Report"), 5

8. *2015 Grizzly Death Toll Tops all Previous Years*, Jackson Hole Daily, December 23, 2016.

9. *What Happens When Hunters and Grizzlies Collide*, Jackson Hole Daily, October 7, 2016