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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF OREGON

OREGON NATURAL DESERT ASS'N **CENTER FOR BIOLOGICAL DIVERSITY** and **WESTERN WATERSHEDS PROJECT** Plaintiffs, **v.** **ABIGAIL KIMBELL,** et al., Defendants **v.** **HARLEY & SHERIE ALLEN,** et al., Defendants-Intervenors.	Case No. 07-1871-HA [Related Case No. 08-151-HA] **SECOND DECLARATION OF ROBERT L. BESCHTA, Ph.D.**

I, ROBERT L. BESCHTA, Ph.D., state and declare as follows:

1. My name is Robert L. Beschta. I am the same Robert L. Beschta who submitted a previous declaration in this case. My qualifications are described in my previous declaration.

2. In my previous declaration, I listed and described the material that I had reviewed at that time. Since then, I have reviewed the third declaration of Christopher L. Christie (Feb. 23, 2009), which included monitoring reports on Long Creek, Slide Creek, Upper Middle Fork, and Hamilton Allotments, the third declaration of Jonathan J. Rhodes (Mar. 16, 2009), and the third declaration of Pat Larson (Feb. 10, 2009), which also contains Larson's 2008 monitoring reports for Murderers Creek and Middle Fork of John Day Allotments.

3. On October 1-3 of 2008, I inspected portions of the Long Creek and Upper Middle Fork allotments at which time I measured (a) the widths and depths of channels and (b) the heights of several woody species inside and outside of exclosures.

Scope of Review

4. I submit this declaration to clarify issues related to the conditions of streams and riparian systems in the Murderers Creek, Lower Middle Fork, and other allotments of the Malheur National Forest.

5. My review of additional material and the measurements summarized herein do not alter conclusions presented in my previous declaration where I indicated that long-term cattle grazing on allotments of the Malheur National Forest has had serious deleterious effects to riparian plant communities, streambanks, channel stability, water quality, and fish habitat.

Discussion Points

A. Pat Larson's declaration (February 10, 2009) and 2008 monitoring reports generally contend that the relatively rapid disappearance of cattle hoofprints along streambanks is proof that impacts to soils and streambanks are ephemeral and thus not a major concern.

6. Hoofprints, that are made by cattle on a soil surface in the summer or early fall, should visually become less distinct over time due to factors such as wind, rain, freeze-thaw, biological modification, or other processes. However, that does not mean that such hoofprints are inconsequential to how these soils function or that the effect of the "hoofprint" similarly disappears quickly. The occurrence of a hoofprint indicates soil compaction has occurred and soil compaction is a relatively long-lasting phenomenon. The hydrologic importance of a compacted soil is that infiltration rates can be greatly reduced thus causing increased surface runoff during rainfall or snowmelt events. For example, studies in eastern Oregon have indicated that infiltration rates in grazed riparian meadows may average less than 10% of those in ungrazed meadows (Kauffman et al. 2004). Greater surface runoff from compacted and disturbed riparian soils, in turn, can result in increased surface erosion and the delivery of sediment laden water into streams (Branson et al. 1981). Heavily compacted soils close to stream channels are particularly prone to routing fine sediments directly into a stream because of short travel distances for both runoff and sediment. Because sediments from the erosion of floodplains or streambanks are generally of a relatively fine texture (i.e., sand-sized or smaller), their particles can be particularly damaging to fisheries (e.g., decreased egg survival) (Bjornn and Reiser 1991). The scientific literature is represented by numerous studies that have

identified a wide-range of watershed and channel impacts that often result from livestock grazing (e.g., see review article by Belsky et al. 1999).

7. Also of major importance with regard to cattle hoofprints is the shearing of streambanks. The hoof pressure exerted by cattle can physically displace soil along streambanks and is an extremely effective mechanism for causing the collapse of overhanging banks (a normal and stable feature of streambanks in good condition). Bank shearing and collapse can lead to streambank erosion that results in channel widening and elevated instream sediment loads. Thus, the widespread occurrence of bank shearing and active streambank erosion evident in the much of the monitoring data and photographs for Murderers Creek and other allotments on the Malheur National Forest (e.g., Declarations of Christopher L. Christie and Jonathan J. Rhodes) is strong evidence of cattle impacts to channels, water quality, and fish habitat. Their measurements of streambank instability and alteration are consistent with my observations indicating that streambank impacts from cattle (e.g., compaction, bank shearing, collapse of overhanging banks, accelerated streambank erosion during periods of high flow, dished-out channel cross-sections) are a common feature of allotments on the Malheur National Forest.

8. For stream systems where riparian plant communities have not been heavily impacted by cattle, well-vegetated floodplains and streambanks coexist with relatively narrow, deep, and typically sinuous streams that provide high quality fish habitat. During October 1-3, 2008, I undertook stream channel measurements along several reaches in the Long Creek and Upper Middle Fork Allotments to index the general character of these streams. This consisted of measuring the wetted width (distance across water surface at a cross-section) and thalweg depth (depth of the deepest part of a cross-section) and

expressing these measurements as a dimensionless ratio of width:depth. For a given reach, these measurements are repeated at equally spaced intervals along the channel. Results of those measurements are summarized in the following table:

Summary of stream width/depth measurements[a/]

Allotment, Unit	**Width/ depth**	Std. Dev.	n
Long Creek, Hiyu Unit, (flood meadows)			
Reach 1 (near upstream end of unit)	**7**	5	40
Reach 2 (~0.5 miles downstream of Reach 1)	**13**	8	40
Spring-fed tributary to Reach 2	**46**	27	32
Long Creek, Lick Creek Unit	**27**	9	40
Upper Middle Fork Allotment, Lower Vinegar Unit	**15**	6	40

[a/] Width/depth represents the ratio of wetted width (ft) to thalweg depth (ft); Std. Dev. = standard deviation of width:depth measurements, and n = number of cross-sections measured. All measurements were spaced 9 ft apart along a channel, thus an "n" of 40 represents 360 ft and an "n" of 32 represents 288 ft of channel that was sampled.

9. A width:depth ratio of ≤10 normally depicts a stream channel that can provide high quality fisheries habitat. An increase in width:depth typically indicates increasingly unstable and eroding banks, a dished-out channel cross-section, loss of fish cover from overhanging banks and streamside vegetation, shallower water depths, a loss of pool habitat, and warmer water temperatures in the summer. As can be seen in the previous table, only Reach 1 in the Hiyu Unit of the Long Creek Allotment has as width:depth ratio of <10. However, channel streambanks along this section had been heavily trampled by cattle and the channel was beginning to attain a dished-out appearance. What appears to have prevented the stream from attaining a >10 width:depth ratio is that

old logs are imbedded in the channel banks along many portions of this reach and they have physically prevented the stream from widening at those locations. Nevertheless, under continued grazing and as the logs decay, increased width:depth ratios are likely to develop over time if grazing impacts continue. All the other reaches had width/depth ratios of >10, often much greater, and are consistent with the types of long-term impacts to channel morphology expected from historical and contemporary grazing practices.

B. Pat Larson's 2008 monitoring reports indicate that each year, whether riparian plant communities are grazed or ungrazed, the vegetation achieves a fully productive state.

10. Photographs of ungrazed pastures in the Murderers Creek and Lower Middle Fork Allotments (e.g., attachments to the declarations of Pat Larson and Christopher Christie) indicate that significant growth of herbaceous vegetation can occur in the course of one growing season. The amount of vegetative regrowth, in the absence of livestock grazing, is often quite impressive. However, continued non-use (i.e., non-grazing) is needed for these plant communities to continue their recovery so that they can begin to stabilize eroding streambanks and reform highly altered channels. The degradation of these riparian/aquatic systems from grazing has occurred over many years thus it should be of no surprise that recovery will also require a number of years of protection from current grazing practices. In particular, recovery of stream morphology features such as overhanging banks (banks that are provide important protection for fish from predators) will require considerable rest from the impacts of cattle since they form over time via the interaction of well vegetated banks and the annual occurrence of high flows.

11. It should also be noted that one year's growth of riparian plants (due to rest from grazing) may have little benefit to woody species if grazing again occurs the following year. Recruitment of woody browse species (i.e., their establishment and growth above the browse level of cattle) is typically a major problem on most allotments. The widespread lack of such recruitment for palatable woody species due to historical (over a period of many decades) and contemporary grazing indicates these species are eventually destined to be functionally extirpated (if they haven't already been so) from riparian areas within many grazing allotments on the Malheur National Forest. To illustrate the magnitude of browsing that is occurring, I measured heights of willow and cottonwood outside and inside of small exclosures within the Hiyu unit of the Long Creek allotment, Malheur National Forest on October 1 & 2 of 2009. Results indicated the dramatic effects current grazing is having on the growth and recruitment of woody plants. Outside of exclosures, both species were limited to an average height of $\leq$1.4 ft, while inside the exclosures young willow and cottonwood were able to attain average heights of 6.0 ft and 5.3 ft, respectively, with only four years of grazing protection (see earlier declaration of Robert L. Beschta).

12. The plant heights I measured outside and inside exclosures on the Hiyu unit of the Long Creek allotment illustrate how annual grazing continues to suppress the height growth and recruitment of woody species on this and other allotments of the Malheur National Forest. Even so, the severity of these impacts are apparently unrecognized by the Malheur National Forest. For example, in their 2008 End of Year Grazing Report for the Blue Mountain Ranger District, it was indicated that 6 grazing units had "light hedging" and an additional 83 grazing units (including the Hiyu unit) had

"light to moderate hedging". Yet field measurements of plant heights on the Hiyu unit of the Long Creek Allotment indicate that current browsing levels are anything but "light to moderate" since woody species have consistently been unable to grow taller than 1-2 ft in height unless protected by an exclosure fence. The current level of grazing on this allotment, and by extension to other allotments that are similarly rated as "light to moderate hedging" by the Forest Service, is heavily impacting woody plant communities and preventing their recovery. Without improved woody plant communities along streambanks, and not just a few plants protected by exclosures, impacts to water quality, stream channels, and fish habitat will continue unabated.

C. Pat Larson's declaration and monitoring reports further indicate that 1) livestock are not causing fine silt or clay particles to enter the stream in amounts that can be harmful to fish and 2) there were 0% fines in streams that were monitored in 2007 and 2008.

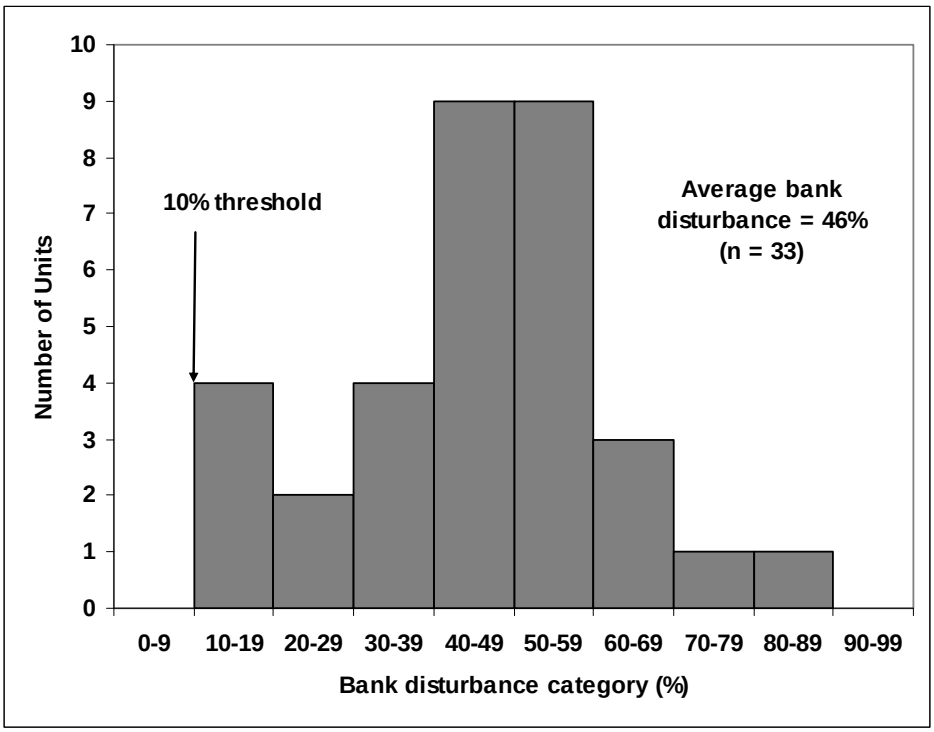
13. Field observations over many years along streams in eastern Oregon, and specifically those on the Malheur National Forest Allotments, indicate that increased sediment production is a common feature of grazed riparian areas. Potential contributors of increased instream sedimentation include accelerated surface erosion from riparian (and upland) sites where vegetation has been degraded and soils compacted as well as from streambanks where vegetation has been degraded and soils have been physically altered (shearing/collapse). While the act of bank shearing/collapse usually occurs in summer or fall when cattle are grazing a particular allotment and streamflows are relatively low, increased instream sediment production from these banks normally occurs during subsequent periods of high runoff (i.e., rainfall during late-summer or early fall,

snowmelt runoff the following spring). Given the highly altered condition of many streambanks on the Malheur National Forest, it is incomprehensible to me how one could sample multiple streambeds and attain "0%" fine sediments in all instances. Even watersheds undisturbed by large herbivores would normally have some level of fine sediments ("fine sediment" normally comprises particles in the clay, silt, and fine sand fractions) in their substrates.

D. Overview comments

14. The degradation of riparian plant communities, streams, and fish habitat that is currently underway along streams and riparian systems of the Murderers Creek, Lower Middle Fork, and other allotments of the Malheur National Forest has been occurring for many decades. For example, inspection of Murderers Creek and Deer Creek Ranges on the Malheur National Forest nearly ¾ of a century ago by range examiner E.P Cliff (report of March 2, 1936) found "most of the range in deplorable condition." A wide range of shrub species "growing along the creek bottoms and lower slopes were seriously browsed" to the point that many "had been hedged back until they were dying at the tops". With regard to direct stream impacts, Cliff concluded that "Channel erosion is taking place in all of the main streams and in many of the smaller tributaries." The descriptions and the photographs provided in the Cliff report similarly describe conditions today on many allotments of the Malheur National Forest. Unfortunately, long-term impacts to riparian vegetation, stream morphology, and water quality have been allowed to persist over many decades via the grazing programs that have been implemented on Malheur National Forest allotments.

15. Results of bank disturbance measurements on grazing allotments/units of the Malheur National Forest in 2007 and 2008 (from the Christie Declaration of March 2008, pp. 10 & 12, and the second Christie Declaration of February, 2009, page 14) are summarized in the following figure:



This summary graph illustrates that bank disturbances across various allotments/units are typically well in excess of the 10% standard and thus the long-term removal of grazing is paramount to initiating recovery in these units. Since the 10% standard is exceeded, on average, by a factor of 4.6 (i.e., 46% ÷ 10%), it seems reasonable that at least 4 & ½ half years of non-use are needed if streambanks and fish habitat are to begin recovery. And, after that time, only a grazing strategy that keeps bank disturbances to less than 10% should be considered.

16. In conclusion, cattle grazing on allotments of the Malheur National Forest has caused significant degradation of riparian areas, stream channels, and water quality

(temperature and sediment). As a result, these historical practices have not only significantly and adversely affected the food-webs and instream habitat features necessary to support fish, but they continue to prevent recovery.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

DATED this 9th day of April 2009.

S/ Robert L. Beschta

Robert L. Beschta, Ph.D.

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