High Plains Shooting Center: Response to the Shasta County Planning Department's Request of May 11, 2017 for Additional Information.

Introduction:

In January of 2016 WRM prepared a Biological Review for the High Plains Shooting Center Project Area located in Township 31 North, Range 3 West, Section 36. On May 11, 2017, Mr. Patrick Jones, project developer, received a letter from the County Planning Department requesting a "revision of the biological resource assessment survey to include botanical surveys for special status plant species on the property, particularly those species located within the grassland habitat on-site impacted by the proposed project" (County letter to Mr. Patrick Jones, May 11, 2017). The letter also requested a "discussion of the impacts of noise and lighting on wildlife on and off-site, and where appropriate, provide mitigation measures for reducing potential significant impacts. This addendum addresses those topics.

Vegetation Surveys:

The original Biological Review prepared by WRM contained a section on the vegetative associations found on the project area and a listing of the plant species found within each association. The species list was a compilation of those plants identified on-site by a botanist with the Western Resource Conservation District (2013) and WRM surveys (2016) for the Millville Plains area. As requested in the May 11th letter, WRM conducted an additional botanical survey at the site on May 26, 2017 of the grassland portions of the property. This was done in the western half of the project area by walking those areas between the vernal swales. At the time of the survey the grass component had dried and showed signs of livestock grazing. Within the vernal swale areas there was a limited amount of green vegetation remaining. Table 1 lists the species identified on the May 26th survey.

Table 1

Vegetative Species Identified on the High Plains Sports Center Project Area, May 26, 2017

The annual grassland species:

Erodium botrys	Long billed filaree
Lomatium caruifolium	Lomatium
Erodium cicutarium	Red stem filaree
Plagiobothrys tenellus	Popcorn flower
Lupinus bicolor	Miniature Lupine

trifolium hirtum	Rose clover
Taeniatherum caput-medusae	Medusa head
Bromus hordeaceus	Ripgut brome
Poa annua	Annual blue grass
Leontodon saxatiilis	Rough hawkbit
Poaceae spp.	
Vulpia myuros	Rattail fescue
Bromus madritensis	Foxtail chess
Lolium multiflorum	Italian ryegrass
Bromus hordeaceus	Soft chess
Brachypodium distachyon	Purple false brome
Aira caryophyllea	European hair grass
Geranium molle	Dove's foot geranium
Trifolium dubium	Shamrock
Trifolium depauperatum	Balloon clover
Medicago polymorpha	Calif. Bur clover
Lupinus nanus	Valley sky lupine
Cerastium glomeratum	Mouse-ear chickweed
Lepidium nitidum	Shining pepper grass
Centaurea solstilialis	Yellow star thistle
Avena barbata	Wild oat
Bromus tectorum	Cheat grass
Anthroxanthum gristatum	Vernal grass
Cerastium glomeratum	Mouse-ear chickweed
Raphanus sativa	Wild radish
Chamomilla suaveolens	Pineapple weed
Taraxacum officinale	Dandelion

Within this grassland area are vernal swale and pool complexes with their own unique hydrophytic vegetation. Species identified within these areas included:

Hordeum marinum	
Deschampsia danthonoides	Annual hairgrass
Eryngium castrense	Coyote thistle
Eleocharis macrostachya	Spike rush
Lasthenia fremontii	Fremont's goldfields
Navarretia leucocephaie	White head navarretia
Pogogyne zizyphoroides),	Sacramento mesamint
Lasthenia californica	Gold fields

Blue oak – gray pine woodlands: The only woodlands on the property is a narrow belt along the eastern property line which composes the habitat on either side of Bear Creek. The overstory species here include blue oak (*Quercus douglasii*), interior live oak (*Quercus wislizenii*) and gray pine (*Pinus sabiniana*). Mid-story species consist of California buckeye (*Aesculus californica*), redbud (Cercis *occidentalis*) and thick stands of wedgeleaf ceanothus (*Ceanothus cuneatus*). Understory vegetation is comprised of poison oak (*Rhus diversiloba*) with annual grasses and forbs.

The project area is located within the Palo Cedro quadrangle. A search of the California Natural Diversity Data base for that quadrangle listed several sensitive plant species that may be found within the quadrangle. These are listed on Table 2.

Table 2
Vegetative Species Listed in the CNDDB for the Palo Cedro Quadrangle

Balsamorthiza macrolepis	Big-scale balsamroot
Cryptantha crinite	Silky cryptantha
Paronychia ahartii	Ahart's paronychia
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush
Limnanthes floccose ssp. Floccose	woolly meadowfoam
Gratiola heterosepala	Boggs Lake hedge-hyssop
Agrostis hendersonii	Henderson's bent grass
Orcuttia tenuis	Slender Orcutt grass

None of the listed species above (listed in the CNDDB) was found on-site by the two WRM surveys and the WRCS survey.

Impacts of Lighting:

The project design calls for a singular motion sensitive light to be mounted at the club house only. There will be no other lighting on the project area (K. Butler, pers. com.). Due to the nature of the project's human functions, there will be no nighttime activities at the site. Therefore, the only time a light would be on is in the case of the motion sensitive light being activated. Consequently, the time duration of lighting will be minimal and therefore may be considered to have a less than significant impact to wildlife both on and adjacent to the project area. No mitigation should be required.

Impacts of Noise:

An acoustical study for the project was done by the RCH Group and is on file with the Shasta County Planning Department. This study focused on noise impacts to residential homes within the general vicinity of the project area and not on the impacts of noise on wildlife. Impacts to wildlife from noise is a complex issue involving, among other things, species behavior, types of noise, duration of sound, distance from source, frequency, time of day and weather conditions. Animals rely on meaningful sounds for communication, navigation, avoiding danger and finding food against a background of noise. Noise may be defined as "any human sound that alters the behavior of animals or interferes with their functioning". The level of disturbance may be qualified as damage (harming health, reproduction, survivorship, habitat use, distribution, abundance or genetic distribution) or disturbance (causing a detectable change in behavior). A complete analysis of the site-specific impacts of noise is beyond the scope of this addendum. However, in order to address the noise issue, cited below are several authors that have addressed the issue of human induced noise and the impacts of such on wildlife.

From: The National Academies of Science and Engineering:
"Researchers have known for decades that acute intense sound events, such as those generated by aircraft overflight, gunshot, or chainsaws, can trigger immediate behavioral responses, such as hiding or fleeing (reviewed by Ortega [2012]). Additionally, early road ecology studies suggested that traffic noise reduces the density of vertebrates, especially birds, near roads (e.g., van der Zande et al., 1980; Reijnen et al., 1995; Kuitunen et al., 1998). However, these early studies were viewed with skepticism because confounding factors also associated with roads (e.g., mortalities from collisions with vehicles, changes in predator densities, and land cover changes) could also explain observed changes. Recent work has bolstered these early studies; research that isolates noise as a single environmental stimulus or introduces noise experimentally demonstrates that noise alone can explain declines in bird abundance and species richness "(Bayne et al., 2008; Francis et al., 2009).

From: Effects of military noise on wildlife: a literature review:
"The costs in reduction of habitat are obvious for species that avoid noisy areas entirely or that decline in abundance with noise exposure, but there also may be costs for those individuals that remain in noisy areas. For example, the number of males in courtship displays (leks) of greater sage-grouse (*Centrocercus urophasianus*) declines in response to experimental playback of natural gas compressor noise or energy-sector truck traffic" (Blickley et al., 2012a).

"The most obvious of these declines in success include examples in which male birds occupying noisy territories have lower pairing success than individuals in areas that are less noisy (Habib et al., 2007; Gross et al., 2010). In other cases, birds breeding in noisy areas lay fewer eggs (Halfwerk et al., 2011) or fledge fewer young (Kight et al., 2012). It is unclear whether the lower breeding success is due to the influence of noise on these pairs or if the lower success is due to less fit birds being marginalized to the noisy habitat. If the latter, and if there remain better territories for the more fit pairs, then it likely will not lead to population-level effects."

"In noisy conditions, birds increase visual vigilance in response to impaired acoustic surveillance capabilities, but decrease time spent actively foraging. Frid and Dill (2002) argue that disturbance generally causes animals to reduce time allocated to other critical activities, such as foraging, which may pose increasing fitness costs as disturbance increases. Noise can also directly impair foraging by masking the acoustic cues used by predators to locate prey, such as in gleaning bats (e.g., Schaub et al., 2008; Siemers and Schaub, 2011). Additional evidence from a comparative study examining responses of 183 bird species suggests that birds with animal-based diets are more sensitive to human-made noise than birds with plant-based diets, perhaps due to an underappreciated use of hearing alongside vision when hunting (Francis, 2015). Regardless of the precise mechanisms responsible for predator sensitivities to noise, decreases in predator abundance, or decreases in predator efficiency, can have broader ecological consequences. For example, declines in common nest predators in areas exposed to energy-sector noise results in higher nesting success among several songbird species that persist in noisy areas (Francis et al., 2009). Similarly, noise-induced declines in the abundance of species that perform key ecological functions, such as the seed-dispersing activities of Woodhouse's scrub-jay (*Aphelocoma woodhouseii*), can trigger the reorganization of foundational species" (Francis et al., 2012b).

"Behavioral effects that might decrease chances of surviving and reproducing include retreat from favorable habitat near noise sources and reduction of time spent feeding with resulting energy depletion. Serious effects such as decreased reproductive success have been documented in some studies and documented to be lacking in other studies on other species. Decreased responsiveness after repeated noises is frequently observed and usually attributed to habituation. Vehicle noise can interfere with animal communication essential for reproduction. On the other hand, people afoot may cause stronger behavioral reactions than people in vehicles" (Larkin, R.P. 197_).

The above citations suffice to explore the complexity of the effects of noise associated with the project on wildlife utilization of general area. From the research cited above we may generally characterize the impact of noise on wildlife by factors of duration and distance.

Duration: Human disturbance noise (construction, vehicles, shooting, vocalization, etc.) associated with the projects operation will be confined to daylight hours, the hours of area use. During this time, it may be expected that wildlife, where possible, will seek to avoid the project area and escape to areas less impacted by the site's activities. Those unable to do so (terrestrial small mammals, reptiles, etc.) may be expected to seek cover either sub-terraranan or beneath existing vegetation. During nighttime hours, use of the area may be expected to be near pre-project levels as noise and other human activity will be essentially absent with noise conditions similar to pre-project levels.

Distance: The effects of project noise on wildlife will be directly dependent on the noise frequency and volume, species in question, and the distance from the source to the receiver. Wildlife within the immediate area of the shooting ranges will be more highly impacted than those at varying distances away. The further away from the source of the noise the less evident the impact. It may be expected that those species which can, will move away from the site as noise activities increase during daylight operations to that distance where the noise level is not perceived as a threat. That distance will be dependent on the species and noise frequency.

Mitigation: According to the acoustical study done by the RCH Group, the natural topography of the area will reduce acoustical impacts for the law enforcement range, although some noise reduction mitigation will be needed to reduce off-site noise from the pistol and rifle ranges and the clay sports shooting area (RCH Group. 2017). RCH recommended that "mitigation will need to be added between the rifle range and the receptors to the south. To be most effective, the barriers should probably be located immediately behind the shooters, so the noise is attenuated at the shooter location. Noise barriers work best when they are in close proximity to the noise source or the noise receiver." If these barriers are placed where recommended, we may assume that noise impacts to wildlife will be reduced to less than significant.

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