Attachment 6

April 8, 2022, Memorandum from Ascent Environmental

Memo

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Date: April 8, 2022

To: Jason Dooley and Brian Bordona (Napa County)

From: Sam Ruderman, Hannah Kornfeld, Brenda Hom, and Honey Walters (Ascent Environmental)

Subject: Revised Walt Ranch Greenhouse Gas Mitigation: Response to Comment Memorandum

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The Center for Biological Diversity (CBD) submitted a comment letter in response to the proposed revision to Mitigation Measure 6-1 (MM 6-1) of the Walt Ranch Vineyards Agricultural Erosion Control Plan (project) Environmental Impact Report (EIR). CBD's comment letter focuses on potential negative impacts to forest carbon sequestration potential resulting from "edge effects." CBD references several papers that point to reductions in carbon storage due to forest fragmentation and degradation or disturbance. However, edge effects are complex and significantly influenced by local factors. Additionally, the project's conservation easements will not result in conserved parcels to be disturbed or degraded, and it is likely that adjacent forest parcels will also remain intact, as there are no proposals to develop other areas of Walt Ranch.

CBD's letter states that "Protecting the integrity of remaining intact forest ecosystems and biodiversity is critical for effective carbon sequestration and storage (Watson et al. 2018)." While this article recognized the importance of intact forests, the authors also acknowledged that there are a variety of important solutions for protecting ecosystems and forest carbon sequestration: "Our call for an increased emphasis on intact forests does not imply that other forms of forest are unimportant. Given the scale of the environmental challenges facing humanity, there is also an undoubted need to cease deforestation and degradation at forest frontiers[11], and to promote large-scale reforestation[12]. We believe that coherent environmental policy should give due weight to intact forests, clearance frontiers and restoration opportunities, because all three have crucial and complementary roles to play" (Watson et al. 2018).

The CBD comment letter notes that "large intact forest areas have been shown to sequester more carbon than smaller, fragmented forest patches, and carbon density near forest edges has been found to be 'very low' compared to the interior core areas of forest (Ma et al. 2017)." The letter also states, "Degraded forests and forest edges have been found to have about 10 to 80% less carbon stored in above-ground biomass and soils compared to interior areas of intact forests (Ma et al. 2017; Wekesa et al. 2016; de Paula et al. 2011)." However, this phenomenon has been shown to vary considerably depending on climate and other factors; several studies point to differences in edge effects and fragmentation impacts on forest carbon dynamics based on geographies and biomes.
Edge effects create distinct growing conditions that vary across biomes, resulting in impacts to carbon cycles that differ in direction and magnitude, and changes in microclimates at the forest edge can create both favorable and adverse conditions for plant growth (Smith et al. 2018). For example, tropical forests have been shown to have 25 percent less biomass within 500 meters of an edge compared to the forest interior (Chaplin-Kramer et al. 2015). In

contrast, forest edge effects have been shown to substantially enhance aboveground forest growth and carbon storage in temperate broadleaf forests; in Massachusetts researchers found that biomass densities were 64% higher near the forest edge than the forest interior (Reinmann and Hutyra 2017). Another study concluded that "biomass density in a temperate coniferous forest was 31% higher near the edge relative to the interior" (Bowering, LeMay, and Marshall 2006). In some ways this is not surprising; foresters routinely alter the microenvironment to accelerate tree growth through efforts such as thinning stands (Meadows and Goelz 2002), which results in increased light and reduced competition, conditions that can be similar to those experienced at or near forest edges (Smith et al. 2018, Reinmann and Hutrya 2017).

The Ma et al. (2017) study cited by CBD was conducted in the Guangdong Province in southern China, a region that experiences a "typical sub-tropical monsoon climate" and is home to "sub-tropical forest." Ma et al. describe previous studies that have evaluated the impact of forest fragmentation on carbon storage: "intact tropical forests likely act as C [carbon] sinks, whereas fragmented forests may be vulnerable to C losses." Ma et al. reference a study by Pütz: "Using remote sensing, Pütz[10] estimated long-term C loss due to fragmentation in Neotropical forests. Pütz concluded that tropical forest fragmentation increased C loss and should be accounted for when attempting to understand the role of vegetation in the global C budget. In central and south America, major losses occur in the immediate aftermath of fragmentation, resulting from the death of large, old-growth trees, especially close to fragment edges that are exposed to wind and fire[14]." This research is not representative of oak woodlands that are found in the project area.

Similarly, CBD references de Paula et al. (2011), who studied carbon dynamics and impacts in three tropical forest habitats of a highly fragmented Atlantic forest landscape in northeast Brazil, a distinct biogeographic unit of the Atlantic Forest region. The study area consisted of 100 forest fragments, "all of [which are] completely surrounded by a monoculture of sugarcane" and are dominated by vegetation species that are native/endemic to tropical regions on other continents. Lastly, Wekesa et al. (2016) evaluated impacts to forest carbon storage potential in forests in Kenya. Due to the complex nature of edge effects and significant variations in carbon cycle dynamics associated with climate and other factors, the conclusions made by CBD cannot necessarily be applied to ecosystems in Napa County. Napa County has a Mediterranean climate, rather than a sub-tropical or tropical climate. Wekesa et al. make note of the importance of local conditions: "Moreover, development and implementation of effective mitigation strategies to reduce carbon emissions will require the use of local biomass models since they are accurate." In the first sentence of the Introduction the authors highlight distinctions between different climates and ecosystems: "Although forests can mitigate climate change through carbon sequestration and storage (Marland & Schlamadinger, 1997; Chhatre & Agrawal, 2009; Galik & Jackson, 2009), the contrary is increasingly manifested, particularly in tropical forests."

The concept that fragmentation causes detrimental effects on carbon sequestration has been based on previous studies in tropical systems. Recent research suggests that, "in contrast to tropical systems, temperate forest edges exhibit increased forest growth and biomass with no change in total mortality relative to the forest interior" (Morreale et al. 2021). In the northeastern United States, oak forests have been found to show a particularly positive relationship between biomass and proximity to forest edge relative to interior, compared to other species (Morreale et al. 2021). Researchers studying temperate forests in Europe (including sub-Mediterranean forests in central Italy) recently published similar results, finding that temperate forest edges exhibit a 95% increase in aboveground carbon stock within 5 meters of an edge (Meeussen et al. 2021). The results of these studies indicate that edges are associated with increased growth in temperate forests.

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