

wake zones for PWC). Prohibiting PWC fueling on the lake would further reduce the potential for accidental spills and associated impacts on water quality.

The environmental analysis determined that cumulative impacts in 2002 from PWC and motorboat use would range from negligible to moderate under this proposal. Impacts from benzene in 2002 would be moderate in area 1 and minor in area 2. Focused water quality monitoring would be needed immediately following a high-use day to confirm these impact estimates. By 2012 all threshold volumes would be substantially reduced as a result of improved emission controls and park instituted flat wake zones and PWC user education program. All cumulative impacts based on ecotoxicological and human health benchmarks would be negligible. (For an explanation of terms such as "negligible" and "adverse," see page 66 of the Environmental Assessment.) Therefore, this proposal would not result in an impairment of water resources.

Air Quality

PWC emit various compounds that pollute the air. In the two-stroke engines commonly used in PWC, the lubricating oil is used once and is expelled as part of the exhaust; and the combustion process results in emissions of air pollutants such as volatile organic compounds (VOC), nitrogen oxides (NO_x), particulate matter (PM), and carbon monoxide (CO). PWC also emit fuel components such as benzene that are known to cause adverse health effects. Even though PWC engine exhaust is usually routed below the waterline, a portion of the exhaust gases go into the air. These air pollutants may adversely impact park visitor and employee health, as well as sensitive park resources.

For example, in the presence of sunlight VOC and NO_x emissions combine to form ozone. Ozone causes respiratory problems in humans, including cough, airway irritation, and chest pain during inhalation. Ozone is also toxic to sensitive species of vegetation. It causes visible foliar injury, decreases plant growth, and increases plant susceptibility to insects and disease. Carbon monoxide can affect humans as well. It interferes with the oxygen carrying capacity of blood, resulting in lack of oxygen to tissues. NO_x and PM emissions associated with PWC use can also degrade visibility. NO_x can also contribute to acid deposition effects on plants, water, and soil. However, because emission estimates show that NO_x from PWC are

minimal (less than 5 tons per year), acid deposition effects attributable to PWC use are expected to be minimal.

Continuing PWC use at Lake Meredith would result in minor adverse impacts from CO and negligible impacts from VOC, PM₁₀, and NO_x, in 2002 and 2012, although emissions would be reduced slightly compared to the current circumstances.

Cumulative emission levels in 2002 and 2012 would be moderate for CO and negligible for PM₁₀ and NO_x. Emission levels for VOC would be minor in 2002, decreasing to negligible in 2012 as a result of improved engine technology. Overall, PWC emissions of HC and VOC are estimated to be 25% to 38% of the cumulative boating emissions in 2002 and would be reduced to below 20% by 2012 with technology improvements. Therefore, this proposal would not result in an impairment of air quality.

Under this proposal there would be a negligible impact on visibility from PWC in both 2002 and 2012 and a minor adverse impact from ozone exposure in 2002 and 2012.

On a cumulative basis there would be negligible impact levels on visibility from all motorized watercraft in both 2002 and 2012, although PM_{2.5} emissions would be reduced slightly. The impact level on ozone exposure in 2002 and 2012 is expected to remain moderate. Ozone monitoring data indicate that Lake Meredith is influenced by the transport of ozone and its precursor pollutants from south and east Texas. This proposal would not impair air quality related values.

Soundscapes

Noise impacts from PWC use are caused by a number of factors. Noise from human sources, including PWC, can intrude on natural soundscapes, masking the natural sounds that are an intrinsic part of the environment. This can be especially true in quiet places, such as in secluded lakes, coves, river corridors, and backwater areas. Also, PWC use in areas where there are nonmotorized users (such as canoeists, sailors, people fishing or picnicking, and kayakers) can disrupt the "passive" experience of park resources and values.

The biggest difference between noise from PWC and that from motorboats is that the former repeatedly leave the water, which magnifies noise in two ways. Without the muffling effect of water, the engine noise is typically 15 dBA louder and the smacking of the craft against the water surface results in a loud "whoop" or series of them. With the rapid maneuvering and frequent speed changes, the impeller has no constant "throughput" and no

consistent load on the engine.

Consequently, the engine speed rises and falls, resulting in a variable pitch. This constantly changing noise is often perceived as more disturbing than the constant noise from motorboats.

PWC users tend to operate close to shore, to operate in confined areas, and to travel in groups, making noise more noticeable to other recreationists. Motorboats traveling back and forth in one area at open throttle or spinning around in small inlets also generate complaints about noise levels; however, most motorboats tend to operate away from shore and to navigate in a straight line, thus being less noticeable to other recreationists.

The environmental analysis determined that impacts from noise from PWC use would have temporary, minor, adverse impacts at most locations at Lake Meredith Recreation Area over the short and long term. However, there would be beneficial impacts on the back coves where flat wake restrictions would be in effect under this proposed rule. Impact levels would be related to the number of PWC operators, as well as the sensitivity of other visitors. Over the long term PWC noise levels would be reduced with the introduction of newer engine technologies.

Cumulative noise impacts from PWC and motorboat use, as well as other visitor activities, would be temporary, minor, and adverse over the short and long term, with these sounds heard occasionally throughout the day. Under this proposed rule there will be a beneficial impact on the back coves since these areas would be designated as flat wake zones. For the most part, natural sounds would still predominate at most locations within the recreation area. The highest concentration of sound impacts would occur near the boat launches and marinas. Therefore, this proposal would not impair soundscapes.

Wildlife and Wildlife Habitat

This proposed rule intends to protect birds and waterfowl from the effects of PWC-generated noise, especially during nesting seasons, protect fish and wildlife species and their habitat from PWC disturbances, and protect fish and wildlife from the adverse effects of bioaccumulation of contaminants from PWC emissions.

Under this proposal there would be a reduction in overall impacts caused by PWC use because of flat wake zones and water quality would be improved due to PWC fueling restrictions on the lake. Impacts on wildlife and wildlife habitat would be short term, negligible, and