PEER
PUBLIC EMPLOYEES FOR ENVIRONMENTAL RESPONSIBILITY

November 17, 2021

Secretary Deb Haaland
Department of the Interior
1849 C Street, N.W.
Washington DC 20240
Via registered mail and email: naomie_germain@ios.doi.gov

RE: Ban Lead Ammunition and Fishing Tackle in National Parks

Dear Interior Secretary Haaland,

Encouraged by your strong record as an environmental leader, we are approaching you on a long-standing issue of concern to scientists, wildlife advocates, and conservationists. **PEER, the American Bird Conservancy and the Union of Concerned Scientists are submitting this rulemaking petition to the Department of the Interior to ban lead ammunition and fishing tackle in National Parks.**

The significant harms of lead ammunition to wildlife and to humans are well documented by the scientific community and recognized by federal and state wildlife and land management agencies. In 2009, there was a brief national park-wide strategy when the Park Service launched the "Get the Lead Out" campaign with a plan to ban lead in parks. While that plan was abandoned, some progress was made at National Parks with new internal policies and practices under the Obama Administration. Some parks ended the use of lead ammunition in culls and other reduction efforts. Other parks stepped up by no longer selling lead-based fishing tackle within their parks. Other parks banned the use of lead tackle while fishing or banned the use of lead ammunition when culling in some of the park units. Furthermore, in 2019, the state of California issued a phase out of lead ammunition in state parks. Most recently, in September 2022, the Fish and Wildlife Service announced a phase out of lead ammunition and fishing tackle in 18 National Wildlife Refuges.

It is time for the Park Service to revisit the issue.

This petition seeks to add additional language to the regulations that would phase out the use of lead-based ammunition and lead-based fishing tackle in National Parks. We request that the National Park Service issue a new Director's Order and policy statement which would direct park superintendents and our park partners to:

- Strive to reduce lead contamination in the environment;
- Eliminate the sale of lead ammunition and fishing tackle by park concessionaires; and
- Enforce the ban on the use of lead-based ammunition and fishing tackle.

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While most parks by law do not permit hunting, some 76 of the total 423 national parks allow recreational, subsistence, or tribal hunting. However, those parks that permit hunting cover more than 60% of land within the entire national park system. In addition, more than 85% of parks with fish (213 in all) are open for fishing.

The ecological stakes are profound and enormous. Altogether, more than 130 park wildlife species (that we know of) are exposed to or killed by ingesting lead or prey contaminated with lead:

- Lead is a leading threat to birdlife, from bald eagles to loons to condors;
- Lead fragments are found throughout the entire wildlife food chain; and
- Lead fishing tackle left in waters leads to elevated levels of lead in fish and amphibians.

The American public and the world expect our American parks to be the model in the conservation and preservation of our nation's national natural heritage. We urge you to adopt the rulemaking in this petition to further the mission of Interior's national interest in protecting and managing the nation's natural resources.

Sincerely,
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cc: Director Chuck Sams, National Park Service

Before the Department of the Interior
National Park Service
Washington, DC

In Re: Eliminating Lead Ammunition and Fishing Tackle in the National Park System

Petition for Rulemaking Governing Lead Ammunition and Fishing Tackle in the National Park System

To the Secretary of the Interior and the Director, National Park Service:

PETITION FOR RULEMAKING

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Summary

This petition submitted by Public Employees for Environmental Responsibility (PEER), the American Bird Conservancy (ABC) and the Union of Concerned Scientists (UCS) seeks the adoption of U.S. National Park Service (NPS) policies to eliminate the use of lead-based ammunition and fishing tackle in NPS units where hunting and fishing activities are authorized.

History

In 2009, the NPS launched "Get the Lead Out!" initiative which called for a halt in lead ammunition and fishing tackle by 2011 in NPS units where hunting and fishing are authorized. The NPS already began to phase out lead ammunition from its own operations, such as through wildlife culls and the dispatch of sick or injured wildlife.

Yet, on March 18, 2009, the NPS issued a "Clarification" that the ban meant that "[n]othing has changed for the public." It further noted that "[i]n the future, [the NPS] will look at the potential for transitioning to non-lead ammunition and non-lead fishing tackle for recreational use." At that time, the NPS provided no written explanation for the reasons for the action. However, the clarification was made due to political and public pressure from the hunting and gun and ammunition manufacturing communities.

Documents uncovered by PEER indicated that "being attractive to outside funders" such as the National Rifle Association, the U.S. Sportsman's Alliance, and others led to Jarvis' decision. Specifically, a document written by a NPS employee states that despite the NPS's responsibility to ensure viability through the agency's actions, the efforts to ban lead ammunition and tackle "were suddenly reversed for political reasons."

In reaction to these revelations, on January 28, 2011, the NPS tasked the Associate Director for Natural Resource Stewardship and Science to work with the Concessions Management Program on replacement of leaded ammunition and tackle with non-lead alternatives sold within park units through voluntary or contract measures. However, as part of this policy reformulation, Director Jarvis abandoned a goal of significant reduction in lead ammunition and tackle use system wide.

NPS internal planning documents, dated January 9, 2014, indicated that the agency recognized the continuing significant adverse impacts to park resources from use of lead ammunition and tackle. Another internal document dated February 2016 conceded that "a significant body of science exists on the negative impacts of lead on wildlife and humans" yet, "the use of non-lead ammunition . . . is still occurring in a park-by-park basis."

Hunting and Fishing inside the National Park System

According to the Department of Interior, there are 75 areas that are managed by the National Park System that permit hunting. A total of 51,097,000 acres managed by the National Park Service are open to hunting at various times during the year, representing approximately 60% of the total acreage of the National Park Service system.

In addition, Congress has re-designated national monuments as "national parks and preserves" outside of Alaska. Great Sand Dunes (2000), Craters of the Moon (2002) and Oregon Caves (2014) are examples. But in these cases, Congress added to the existing national monuments lands transferred from the national forest system or Bureau of Land Management, on which hunting was already occurring. In so doing, Congress designated much of the land transferred from the national forest or BLM to the national monument as "national preserves" so pre-existing hunting could continue.

As a result, some 76 of the total 423 NPS units allow some form of recreational, subsistence, or tribal hunting. However, the park units that do allow hunting, the largest of which are in Alaska, cover more than 60% of the land within the national park system. At the same time, more than 85% of park units with fish (213 in all) are open to fishing.

Petition for Rulemaking: Non-Lead Based Ammunition and Fishing Tackle

PEER, the American Bird Conservancy (ABC) and the Union of Concerned Scientists (UCS), pursuant to the Administrative Procedure Act (16 U.S.C. § 553 (e)) and Department of the Interior regulations (43 C.F.R. Part 14), hereby petitions the NPS to govern through rulemaking its contribution to global and local lead pollution by eliminating the sale and use of lead-based ammunition and fishing tackle in Park Units where hunting and fishing are authorized.

The Administrative Procedure Act directs that "[E]ach agency (of the Federal Government) shall give an interested person the right to petition for the issuance…of a rule." 5 U.S.C. § 553.

Standing to File. PEER is an IRS 501(c)(3) non-profit organization incorporated under the laws of the District of Columbia. PEER serves the professional needs of the local, state, and federal employees – the scientists, hydrologists, biologists, and rangers – charged with the protection of America's environmental resources, including the resources within the national park system. As such, PEER is "an interested person" under the Administrative Procedure Act.

Argument in Support of Petition

I. LEAD-BASED AMMUNITION HARMS PARK WILDLIFE AND ENVIRONMENT

According to the NPS and a plethora of peer-reviewed scientific documents, lead is an environmental contaminant that presents significant negative impacts on wildlife and the environment. In a document obtained under the Freedom of Information Act (FOIA), one NPS employee recognized the "significant body of science [that] exists on the negative impacts of lead on wildlife and humans" and how "[t]he NPS, as a leader in land management, has fallen behind on this issue."

Lead is a toxic, non-essential, metal that provides no beneficial effects on living organisms. It is a metabolic poison that affects a wide range of physiological and biochemical systems (Pain et al. 2019). Despite this, lead is continuously used in various manufactured products, adding to

toxic lead exposure to humans and wildlife. While lead naturally occurs in the Earth's crust, its widespread mining, manufacturing, and use has resulted in extensive contamination throughout the environment. Animals do not have well-developed metabolic or detoxification mechanisms to biochemically protect themselves from any adverse effects of exposure.

Lead can remain in the environment for decades and can get into the food chain by being taken up by plants and soil microfauna (LAG 2015). Yet, wildlife is most exposed to lead through direct ingestion of lead-based ammunition and fragments (Sanderson and Bellrose 1986). While lead is toxic at low levels it can be lethal at high levels.

Specifically, lead poisoning of wildlife from lead-based ammunition has been recognized for over one hundred years (Calvert 1876). Lead fragments or pellets ingested may be regurgitated (in the pellets of raptors, for example), retained for varying periods, or completely dissolved with the resulting lead salts absorbed into the bloodstream. Ingestion of lead particles usually results in some absorption, and in cases where sufficient lead is absorbed, poisoning ensures. Lead absorbed from ammunition can cause damage in various organs, and result in behavioral changes, significant illness, and even death (Reiser and Temple 1981; Kramer and Redig 1997; Fisher et al. 2006). In addition to these direct effects, indirect effects of lead poisoning can occur, such as increased susceptibility to infectious diseases, parasite infestations, and increased susceptibility to death from other causes (Pain et al. 2019). Lead from ammunition is the major contributor to elevated lead concentrations in wild birds (Pain et al. 2019).

Birds are particularly susceptible. Birds can suffer from both acute and chronic lead poisoning (Bellrose 1959; Redig 1985; Sanderson and Bellrose 1986; Scheuhammer and Norris 1996). Birds with acute lead poisoning can appear normal but experience massive tissue destruction to internal organs and death within a few days (Sanderson and Bellrose 1986). Birds, including bald and golden eagles, with chronic lead poisoning may develop appetite loss, anemia, anorexia, reproductive or neurological impairment, immune suppression, weakness, and susceptibility to predation, collisions, and starvation (Grandy et al. 1968; Kimball and Munir 1971; Finley and Deiter 1978; Hohman et al. 1995). A 2022 study sponsored by the U.S. Geological Survey found that nearly half of North American eagle populations are experiencing debilitating lead exposure, mostly due to ammunition used by hunters. The study evaluated the lead exposure of 1,210 bald and golden eagles from 38 states, including 620 live eagles and found chronic lead poisoning in 46 percent of bald eagles and 47 percent of golden eagles. The researchers concluded that this level of impact is already having visible effects and could affect future populations (Slabe. Et al. 2022).

A 2007 Fish and Wildlife Service review of the California Condor revealed –

- Lead poisoning is the leading cause of death of condors released in Northern Arizona and, as a result, has complicated reintroduction efforts;

- Condors are increasingly encountering lead bullet fragments and pellets in the remains of rifle-killed deer, coyotes, and hares; and

- Ingested lead pellets and bullet fragments have been recovered from the digestive tracts

of a large percentage of the wild condors that tested positive for lead exposure., and continues to be the number one threat to condor populations

California moved to ban the use of lead ammunition in 2013 after discovering the harmful effects of lead on local wildlife such as the California Condor and has reduced the amount of lead available to condors and other wildlife.

However, it's not just birds that are impacted, anything that scavenges on lead tainted carcasses is exposed. Recent studies reveal the impacts to mammals as well. (https://experiment.com/projects/effects-of-lead-exposure-in-scandinavian-brown-bears.

Elevated levels of lead have been found in several species of small mammals near shooting ranges, such as shrews, mice, voles, and squirrels, hares, opossums, and raccoons (Erickson and Lindsey 1983; Ma 1989; Stansley and Roscoe 1996; Lewis et al. 2001). Both scavenging mammals and humans are exposed to lead through ingestion of animals shot with lead bullets (Hunt 2009). Data by Rogers (2010) showed that grizzly bears in the greater Yellowstone ecosystem sampled during hunting season had higher mean blood lead levels than grizzly bears captured before hunting season had started.

Elevated levels of lead have also been found in tissues of amphibians and reptiles near shooting ranges and heavily hunted areas (Stansley and Roscoe 1996; Stansley et al. 1997; Hammerton et al. 2003; Pattee and Pain 2003). Lead poisoning impacts egg and tadpole development and growth rates; and it may even be fatal (Sparling et al. 2006).

More than 130 species of animals (including songbirds, game birds, raptors, waterfowl, mammals and reptiles) have been shown to be exposed to or killed by ingesting lead shot, bullets, bullet fragments, or prey contaminated with lead ammunition (Environment Canada 1995; Tranel and Kimmel 2009). So long as lead-based ammunition remains available for purchase and use, numerous species of wildlife will continue to be poisoned by lead, posing an unreasonable risk to both wildlife and the environment.

II. LEAD BASED TACKLE BURDENS NATIONAL PARK RESOURCES

Lead fishing tackle is another source of lead contamination and poisoning in National Parks. This is due in part to the fact that lead tackle is explicitly “designed to be used in aquatic environments where they can be irretrievably lost.” (Grade et al. 2019). Sport anglers attach lead weights to fishing lines to sink the hook, bait, or lure into the water. Some anglers use lead-weighted hooks, called jigs. A sinker or jig can accidentally detach from a line and fall into the water, or the hook or line may become tangled, and the line may break or be cut. Lead tackle, similar to lead ammunition, has likely inhibited the recovery of threatened species.

Like lead-based ammunition, birds are particularly susceptible, and it is estimated that around 75 North American bird species may be at risk of lead tackle ingestion due to foraging behavior (Grade et al. 2019). Waterbirds are generally poisoned from ingesting lead fishing sinkers or jigs lost by fishermen on the bottom of water bodies. They may also ingest lead objects while collecting gizzard stones or by preying on live bait or escaped fish with attached fishing gear.

Some birds may be more susceptible to poisoning from ingested lead fishing tackle, as opposed to lead ammunition. This can be attributed to their habitation in urban areas, but this can also be attributed due to preferences for foraging in aquatic habitats (Grade et al. 2019). For example, ducks and swans who forage for food in the mud at the bottom of lakes. Most of these birds also swallow small stones and grit that aid in grinding up their food. Some of the grit may contain lead from fishing tackle. Once ingested, lead objects retained within the ventriculus of birds will be abraded and will be partially dissolved by acid in the digestive tract, and then absorbed into the blood with potentially toxic effects (Pokras et al. 2009).

A 2017 Research Article of the Common Loon revealed –

- Lead fishing tackle is the leading cause of mortality in adult common loons;
- Around 99% of the sinkers, jigs, swim baits, internal weights, or other types of tackle weights removed from loons tested positive for lead; and
- The number of loons dying from lead tackle peaked during July and August, suggesting ingestion of tackle was from current fishing activity (Grade et al. 2017).

Reptiles have also been found to be affected by lead based fishing tackle. A snapping turtle that ingested a lead fishing sinker resulted in elevated blood lead levels. There have also been reports of turtles suffering from lead toxicosis after ingesting lead fishing weights (Scheuhammer et al. 2003).

To date, more than 30 species of birds have been found to have ingested lead fishing tackle, along with three mammals and two reptiles (Grade et al. 2019). The continued ability to purchase and use lead-based fishing tackle endangers wildlife and presents an unreasonable risk of injury to human health and the environment.

III. LEAD CONTAMINATION HARMS HUMAN HEALTH

The toxic effects of lead on humans have been known since Roman times (Nriagu 1983; Needleman 1999; Hernberg 2000; Tong et al. 2000; Nriagu 2009). Lead is an extraordinarily toxic element, and when ingested it attacks organs and many different body systems, including the blood-forming, nervous, urinary, and reproductive systems (USDHHS 1999).

The effects of lead poisoning in humans can include: damage to the brain and central nervous system; kidney disease; high blood pressure; anemia; and damage to the reproductive system, including decreased sex drive, abnormal menstrual periods, impotence, premature ejaculation, sterility, reduction in number of sperm cells, damage to sperm cells resulting in birth defects, miscarriage, and stillbirth, painful gastrointestinal irritation, diarrhea, loss of appetite, weakness and dehydration, nerve disorders, memory and concentration problems, muscle and joint pain (USDHHS 1999). In large enough doses, lead can cause brain damage leading to seizures, coma, and death (USDHHS 1999).

Chronic overexposure to low levels of lead can cause health impairments to develop over time, and irreversible damage can occur without obvious symptoms (USDHHS 1999). Lead exposure can adversely affect the nervous system (resulting in impaired cognition, reduced motor coordination, and palsy), renal system, and cardiovascular system (IPCS 1989; Needleman et al. 1990; Goyer 1996; Needleman 2004; Khan 2005).

Lead is especially dangerous to fetuses and young children and poisoning is even more pronounced because the lead is absorbed faster and disrupts development, causing slow growth, development defects, and damage to the brain and nervous system. Some studies link elevated bone or blood lead levels with aggression and delinquent behavior and attention deficit hyperactivity disorder (Nevin 2000; Needleman et al. 2002; Needleman 2004; Braun et al. 2006). Lead accumulates in humans mainly in bones, with lead in blood and other tissues reflecting more recent exposure. Human exposure to lead in the United States has decreased as lead plumbing, paint, solder, toys, and gasoline have been phased out and replaced. Public health agencies have regulated lead in industrial activities and consumer products and have, to varying degrees, begun to address and remediate lead exposure from shooting ranges. However, these agencies have focused little attention on hunting or fishing activities that may be an important source of lead exposure in certain communities, occupations, or activities.

Hunters who use lead bullets are at risk of lead poisoning in several ways. One exposure mechanism is inhalation of airborne lead created by friction from lead slugs against the gun barrel (KDHE 2004), whereby inhaled lead enters the bloodstream and is distributed throughout the body. Hunters who handle lead bullets are also at risk of ingesting lead residue (KDHE 2004). The most serious exposure is from accidental ingestion of lead shot pellets or lead bullet fragments in the meat (Carey 1977; Tsuji et al. 1997, 1999; Scheuhammer et al. 1998; Johansen et al. 2001, 2004, 2005; Bjerregaard et al. 2004; Mateo et al. 2007).

Health effects in human beings following ingestion of whole lead shot pellets have been reported in many cases, and ingestion of meat tissues containing minute flakes or fragments of metallic lead from the passage of lead shot or lead bullet fragments through the tissues is also possible (Scheuhammer and Norris 1995; Khan 2005). Published literature on lead concentrations and lead isotope patterns from subsistence hunters in the circumpolar North indicates that elevated human lead exposure is correlated with use of lead ammunition (Verbrugge et al. 2009).

The mechanisms of exposure include ingestion of lead dust, ammunition fragments, and shot pellets in harvested meat, and inhalation of lead dust during ammunition reloading. Epidemiological studies and risk assessment modeling indicate that regular consumption of game meat harvested with lead ammunition and contaminated with lead residues may cause relatively substantial increases in blood lead compared to background levels, particularly in children (Kosnett 2009).

A Canadian study of blood lead levels in hunters (Nieboer 2001) showed that lead pellets from wild game harvested with lead shot is a major source of exposure to lead in Native American communities in Canada. Blood lead levels were demonstrated to be higher in Native hunting communities than in a nearby reference group. Blood lead levels were also higher in men than

women, consistent with greater participation of males in hunting and greater consumption of bagged wild fowl. Blood lead levels were shown to increase in male hunters during the hunting season, and one of the measured lead isotope ratios also changed in a manner consistent with exposure to lead derived from leaded ammunition. Of 132 subsistence hunters radiographed, 15% showed ingested lead pellets, with 8% located in the lumen of the digestive tract and 7% in the appendix (Tsuji and Nieboer 1997).

Fifteen studies in Canada, Greenland, and Russia have linked lead shot found in game animals to higher levels of lead in people who eat those game animals (Carey 1977; Tsuji et al. 1997, 1999; Scheuhammer et al. 1998; Johansen et al. 2001, 2004, 2005; Bjerregaard et al. 2004; Mateo et al. 2007; Tranel and Kimmel 2009). Studies showing significantly higher lead exposure in people from hunting communities have major implications for the public health hazards of lead in ammunition (Dewailley et al. 2001; Levesque et al. 2003).

In Alaska, ammunition-related lead exposures include ingestion in shot game, use of certain indoor firing ranges and melting and casting lead to make bullets. Titus et al. (2009) quantified the population of Alaska at potential risk of lead exposure from eating game shot with lead ammunition. In rural Alaska, where reliance on ungulated meat is high, about 100 kg of moose and caribou meat is consumed per person annually, and small game, marine mammals, and waterfowl harvested with firearms also contribute to 44 the local diet. Sixty percent of households in rural Alaska harvest game animals and 86% consume wild game.

A study of lead concentrations in tissues of waterfowl killed by shotgun (Frank 1986) showed high amounts of lead (>100 mg/kg) and confirmed the presence of lead fragments by X-ray. Particles of lead ranged from irregular fragments 1–2 mm in length to very fine dust, resulting from the disruption of lead shot pellets upon collision with bone (Frank 1986).

Researchers have also detected lead fragments visible by radiograph in carcasses of squirrels shot with bullets (Harmata and Restani 1995; Knopper et al. 2006). The flesh of any species of game animal killed with lead shot or lead bullets can become contaminated with high concentrations of lead through this mechanism. Studies have demonstrated that lead bullets can shatter into hundreds of fragments when fired from a high-powered rifle (Hunt et al. 2009b; Cornicelli and Grund 2009).

Bedrosian and Craighead (2009) showed extensive fragmentation of lead bullets in an elk carcass shot with a .30-06 rifle. In an X-ray of the results, lead fragments appear as white shards spread throughout a large area in the elk's body. Hunt et al. (2009b) found that lead fragments in shot game spread far beyond the internal organs and can move into the meat that humans eat. X-rays of meat from butchered game animals showed bullet fragments in steaks packaged for human consumption.

While most big-game hunters discard "blood-shot" meat that's been pierced by bullet fragments, the California research shows that fragments can be packaged even by experienced butchers. A study by the Minnesota Department of Natural Resources found that when lead bullets explode inside an animal, imperceptible dust sized particles of lead can infect meat up to a foot and a half away from the bullet wound (Cornicelli and Grund 2009). Cornicelli and Grund (2009)

conducted a radiograph study of bullet fragmentation patterns in carcasses to determine the potential risk of lead contamination of deer meat in the Minnesota venison donation program. The study assessed lead levels in deer and domestic sheep shot using different types of bullets and firearms commonly used for hunting in Minnesota, including: a centerfire rifle with lead bullets designed to rapidly expand upon impact used for hunting mid-sized game such as deer, lead bullets designed to retain a high percentage of their weight, and non-lead copper bullets; a shotgun using a 1-ounce Foster lead slug, commonly used throughout the Minnesota shotgun-only zone; and an inline muzzleloader with two common bullets types used during Minnesota's hunting seasons. Cornicelli and Grund (2009) showed that using bullets with no exposed lead (a copper case surrounds the lead core) or bullets made of copper significantly reduce (or eliminate) lead exposure. Non-exposed lead core bullets averaged nine copper fragments in the animal with an average maximum distance from the wound channel of seven inches.

By design, copper bullets leave no lead and the few copper fragments that were seen on x-ray were less than an inch from the exit wound. Both bullet designs fragmented very little and left no lead. Ballistic tip lead bullets (rapid expansion) had the highest fragmentation rate, with an average of 141 lead fragments per carcass and an average maximum distance of 11 inches from the wound channel. In one carcass, a lead fragment was found 14 inches from the exit wound. Soft point lead bullets (rapid 45 expansion) left an average of 86 lead fragments at an average maximum distance of 11 inches from the wound channel. Bonded lead-core bullets (controlled expansion, exposed lead core) left an average of 82 lead fragments with an average maximum distance of nine inches from the wound.

Lead shotgun slugs left an average of 28 lead fragments at an average maximum distance of five inches from the wound channel. Muzzleloader bullets (245-grain and 300-grain respectively) left an average of three and 34 lead fragments, respectively, at an average maximum distance of one and six inches, respectively. Lead fragments were found so far from exit wounds that routine trimming likely would not remove all the fragments. Only about 30 percent of fragments were within two inches of the exit wound, and the vast majority were dispersed further from the carcass. In some cases, low levels of lead were detected as far away as 18 inches from the bullet exit hole. Rinsing of a carcass produced mixed results, tending to reduce lead around the wound channel but also transporting lead away from the wound. Lead ammunition shot into the hindquarters of a deer, where heavy bones are found, resulted in extensive fragmentation so pronounced that a hunter would likely not want to utilize this meat as there would be no way to remove all the fragments.

Having venison processed at a meat processor will likely result in an increased risk of lead exposure because venison from different hunters is typically mixed during the grinding process and the vast majority of hunting bullets are made from lead. Cornicelli and Grund (2009) found that 27% of the ground venison and 2% of the whole muscle cuts tested had detectable lead fragments. In a highly publicized recent case, packets of venison shot with lead ammunition and donated by hunters to feed the hungry tested positive for lead contamination. Cornatzer et al. (2009) studied 100 randomly selected ground venison packages donated to the Community Action Food Centers of North Dakota by hunters. The packages were studied by high resolution computerized tomography imaging and x-ray fluoroscopy for detection of metal fragments.

Analysis of randomly selected ground venison samples showed 59 packages out of 100 had one or more visible lead fragments. One sample had 120 ppm lead. Cornatzer et al. (2009) concluded there is a health risk from lead exposure to humans consuming ground venison. Food banks and shelters in North Dakota pulled the meat from their shelves after the report.

The Centers for Disease Control and Prevention and the North Dakota Department of Health ran a test to find out the health effects of lead-shot game. The agency compared blood-lead levels of people who regularly eat meat shot with lead bullets with the levels of those who don't eat much wild game. The results were inconclusive. Those who ate the lead-shot meat had slightly higher blood-lead levels than those who did not, but none of the 738 people in the study had levels above the government's threshold for danger. The health department recommended that children younger than 6 and pregnant women stop eating venison shot with lead bullets because those groups are at particular risk for lead poisoning, even at low levels.

Avery and Watson (2009a) conducted a survey of all wild game meat donation programs throughout the United States to determine the amount of venison and other game donated annually. Venison donation programs operate in all 50 states and in at least four Canadian provinces. For the 2007/2008 hunting season 75 programs reported providing an average of 34,943 pounds of hunted game meat annually, a total of 2.6 million pounds of meat or approximately 10 million meals.

Hunt et al. (2009) radiographed 30 eviscerated carcasses of white-tailed deer (Odocoileus virginianus) shot by hunters with standard lead core, copper-jacketed bullets under normal hunting conditions. All deer carcasses brought to processors contained fragments (15–409 fragments counted in radiographs), and despite a high rate of removal of fragments by processors to avoid contamination, 80% were unable to do so entirely.

Hunt et al. (2009) also demonstrated that people risk exposure to bioavailable lead when they eat venison from deer killed with standard lead-based rifle bullets and processed under normal commercial procedures. Ten million hunters, their families, and low-income beneficiaries of venison donations in the U.S. are at risk. The evidence includes a high proportion (80%) of examined deer showing at least one bullet fragment in one or more ground meat packages, a substantial frequency of contamination (32% of all ground meat packages), a majority (93%) of assayed fragments identified as lead, isotopic homogeneity of bullet lead with that found in the meat, and increased blood lead concentrations in swine fed fragment-containing venison, meaning the lead is bioavailable to humans as well. Hunt et al. (2009) concluded that in a majority of cases, one or more consumers of a hunter-killed, commercially processed deer will consume bullet lead.

Pain et al. (2010) found that eating the meat of animals hunted using lead ammunition can be more dangerous for health than was previously thought, especially for children and people who consume large quantities. Pain et al. (2010) analyzed the meat of six species of game birds (red partridge, pheasant, wood pigeon, grouse, woodcock and mallard) shot by hunters in the United Kingdom and found that lead levels in cooked game meat exceeded the maximum allowances set by the European Union, due to the presence of remains of ammunition even after lead pellets were removed. Depending on the species and type of recipe used, between 20% and 87.5% of the

samples analyzed exceeded 100 parts per billion of the fresh weight of meat.

Watson and Avery (2009) assessed the numbers and proportions of state populations that hunt and may be at risk of lead exposure from lead-based ammunition, from lead handling ammunition (e.g., hunters who load their own ammunition), inhalation of vapor upon firing, or ingestion of game meat contaminated with bullet fragments and shot.

In addition, elevated blood lead levels resulting in biochemical effects, disease and neurotoxicity have been documented for people who frequent or work at indoor and outdoor firing ranges (Fischbein et al. 1979; Novotny et al. 1987; Chisholm 1988; Valway et al. 1989; Peddicord and LaKind 2000; Gulson et al. 2002). Exposure may be due to handling lead materials during reloading as well as inhalation of lead dust. Sportsmen who reload rifle and pistol ammunition and cast their own lead bullets are at particular risk of exposure to lead.

Finally, melting lead to produce fishing tackle such as lead sinkers and jigs can result in lead poisoning through inhalation of lead dust and fumes (USEPA 2004).

IV. NATIONAL PARK SERVICE HAS AN OBLIGATION TO REMEDY THESE ADVERSE CONSEQUENCES

Congress established the National Park Service in 1916 to "promote and regulate the use of the federal areas known as national parks, monuments, and reservations . . . by such means and measures as conform to the fundamental purpose . . . to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." National Park Service Organic Act, ch. 408, § 1, 39 Stat. 535 (1916) (current version at 54 U.S.C. § 100101(a) (2018)) (emphasis added).

Regarding its duty to leave the wildlife in national park units "unimpaired" for the enjoyment of future generations, the Park Service defines "impairment" as an impact that "would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values." 2006 NPS Management Policies, § 1.4.5. 26.

Even where resources and values are not at risk of impairment, the NPS must fulfill the "fundamental purpose" of the National Park System, which is "to conserve park resources and values" and provide "for the enjoyment of park resources and values by the people of the United States." 2006 NPS Management Policies § 1.4.3. When a conflict arises between "conserving resources and values and providing for enjoyment of them, conservation is to be predominant." *Id.*

In addition to its Organic Act and policies, the NPS is subject to other statutes and Executive Orders requiring it to utilize its authorities to protect wildlife and the habitats upon which they depend. These mandates militate towards eliminating or preventing the addition of harmful substances to the environment:

1. The Endangered Species Act

Enacted in 1973, the Endangered Species Act ("ESA") is a broad statutory scheme designed to protect endangered and threatened species and conserve the habitats upon which they depend (16 U.S.C. § 1531(b)). Section 7(a)(1) states that all federal agencies "shall," in consultation with the U.S. Fish & Wildlife Service (FWS) or National Marine Fisheries Service, "utilize their authorities in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered species and threatened species."

The ESA defines "conserve" as "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary." (§ 1532(3)). ESA Section 7 "further directs federal agencies "to take steps within their power to carry out the purposes of" the Act.

As related above, the use of lead ammunition has had clearly demonstrated negative impacts on ESA-listed species, such as the California Condor. Significantly, when the FWS enacted the requirement to use nontoxic shot for waterfowl hunting, it noted that based on the mandates of

the ESA, "the Secretary [of Interior] must consider where it is necessary to require nontoxic shot in order to reduce exposure of [ESA-listed species] to lead in their waterfowl prey." (FWS, Supplemental Environmental Impact Statement: Proposed Use of Steel Shot for Hunting Waterfowl in the United States at III-44 (U.S. Department of the Interior, 1986).

This, requiring the use of nontoxic ammunition on all national park lands is not only well within the agency's power, but would be a means by which the NPS could comply with its mandate under the ESA to support the conservation and recovery of listed birds and other species who suffer from the debilitating and often lethal effects of lead poisoning.

2. The Migratory Bird Treaty Act

In 1916, recognizing that migratory birds were of "great value" but "in danger of extermination through lack of adequate protection," the United States and Great Britain entered into the Convention for the Protection of Migratory Birds traveling between the United States and Canada (39 Stat. 1702 (1916). Following the adoption of similar treaties with other nations, in 1918 the U.S. enacted The Migratory Bird Treaty Act (MBTA), to implement these treaties and to establish both an international and domestic framework for protecting migratory birds.

Since lead ammunition presents an unquestionable danger to the conservation of migratory birds, it is clearly within the authority of NPS to require the use of nontoxic ammunition on park lands in order to mitigate harm to the protected birds caused by the release of lead-based ammunition into the environment.

3. The Bald and Golden Eagle Protection Act

As its name suggests, the Bald and Golden Eagle Protection Act (BGEPA) seeks to protect eagle populations from hunters and other societal threats. Section 325 of the BGEPA, in pertinent part, prohibits the taking – defined as the pursuing, shooting, shooting at, poisoning, wounding, killing, trapping, capturing, collecting, molesting or disturbing – as well as the possession, purchase, barter, sale, or the offer to perform such acts, of any bald eagle or any golden eagle.

As aforementioned, lead ammunition poisoning has caused the premature and preventable death of bald and golden eagles throughout the United States and remains a significant threat to both species. The implementation of a requirement to use nontoxic ammunition on NPS and FWS lands would further the purpose of the BGEPA to protect and conserve eagle populations.

4. The Fish and Wildlife Conservation Act and Fish and Wildlife Coordination Act

The Fish and Wildlife Conservation Act "encourage[s] all Federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and to promote conservation of nongame…wildlife and their habitats." (16 U.S.C. § 2901(b)(2)).

5. Executive Orders

Over the years, several Presidential Executive Orders (E.O.s) have required federal agencies to implement more environmentally sound policies and procedures to eliminate threats to the environment, thereby protecting wildlife and the habitats on which they depend, as well as public health and welfare. These include:

- E.O. 13514 that instructs federal agencies to implement policies that "focus[] on making improvements in their environmental, energy, and economic performance[s]," and directs that "Federal agencies shall . . . and prevent pollution" and "promote pollution prevention and eliminate waste by minimizing the generation of waste and pollutants through source reduction."

- Executive Order 13423 mandates that agencies conduct their environmental . . . activities under the law in support of their respective missions in an environmentally, . . . integrated, continuously improving, efficient, and sustainable manner."

- E.O. 13423 directs Federal agencies to "reduce [ ] the quantity of toxic and hazardous chemicals and materials acquired, used or disposed of by the agency."

NPS would further the purposes of all these presidential orders by eliminating the sale and use of toxic ammunition and fishing tackle.

V. LEAD AMMUNITION AND TACKLE BANS WORKED WELL

Many States and parks in the U.S. have already taken steps to limit or eliminate lead ammunition and tackle. Similarly, many countries have either adopted limits or total bans on lead ammunition and tackle, including Denmark, The Netherlands, England, and others. Following the implementation of mandatory bans, lower lead poisoning rates for wildlife are observed, particularly in areas with high human activity (Grade et al. 2019).

A. MANY STATES AND OTHER COUNTRIES HAVE ADOPTED SUCH BANS

In fact, lead ammunition for duck and goose hunting has been banned nationwide in the U.S. since 1991. 50 C.F.R. § 20.21(j). Before the introduction of this ban, it was "estimated that 2-3% of the mortality in the fall waterfowl population in North America could be attributed to lead poisoning." (Kelly et al. 2011). While an estimated 10-15% of post-fledgling mortality in bald and golden eagles "was attributed to lead poisoning from ingestion of lead shotgun pellets in waterfowl wounded or killed by lead ammunition." *Id.*

California's requirement of non-lead ammunition took full effect on July 1, 2019. This requires the use of non-lead ammunition when hunting on public land, private land, and licensed game bird clubs and applies to rifles, shotguns, pistols, and muzzle loaders in any gauge or caliber. Alaska, in addition to federal regulations, requires non-toxic shot in NPS Units 18 and 26 when taking game under the provision of a hunting or trapping license with a shotgun. At least 26 other states have restricted the use of lead-based ammunition and tackle.

Many other countries have also banned or restricted the use of lead-based ammunition and tackle. Denmark, The Netherlands, Sweden and Germany each have a total ban of lead gunshot. While many other countries, like the United Kingdom and Canada, have limitations on lead-based ammunition and tackle. Specifically, the United Kingdom banned the sale and use of lead fishing weights in 1987 while the use of lead ammunition in England has been restricted since 1999 with similar existing regulations applicable in Wales, Scotland, and Northern Ireland. These regulations prohibit the use of lead ammunition on all foreshores or in specified wetland areas for the shooting of ducks, geese, coot, and moorhen. Yet recent plans are considering banning the use of lead ammunition across all environments in England, Scotland, and Wales. At least 23 other European Union countries currently limit lead-based ammunition or tackle, and several are also considering imposing additional restrictions.

B. THESE BANS HAVE ACCOMPLISHED THEIR INTENDED PURPOSES

Bans on lead-based ammunition and fishing tackle have shown decreased lead exposure to wildlife, humans, and the environment.

Since the implementation of the U.S. ban on lead-based ammunition for waterfowl, it has been estimated that the mortality of mallards in the Mississippi Flyway was reduced by 64% and saved 1.4 million ducks nationwide during the fall migration of 1997 (Kelly et al. 2011). There was also a 44% decline in blood lead levels of American black ducks. While this ban did not decrease the number of lead poisoned scavenger birds, such as eagles, due to the ingestion of fragmented lead bullets in discarded gut piles from left by hunters, it shows that regulating the use of lead ammunition can reduce lead exposure to wildlife (Kelly et al. 2011).

Similarly, when California first banned lead ammunition for the take of big game in July 2008, blood lead concentrations significantly declined in both golden eagles and turkey vultures (Kelly et al. 2011). For golden eagles, the prevalence of elevated lead exposure decreased from 58%, where non-migrant birds had significantly lower blood lead concentrations compared to eagles of unknown residency status. For turkey vultures, the prevalence of elevated blood lead exposure decreased 61% (Kelly et al. 2011).

After the United Kingdom restricted the use of lead tackle, there was a rapid decline in lead mortality among the mute swan population and in fact the population started to increase (Grade et al. 2017). Specifically, lead poisoning of swans fell by 70% in the Thames Valley following the ban (Grade et al. 2019). While swans continue to ingest lead from ammunition sources, coordinated action on banning lead ammunition would further reduce wildlife mortality from lead ingestion.

Each ban decreased the amount of lead in the environment while subsequently protecting the wildlife that inhabit it. Furthermore, these bans protect the people that hunt and fish by reducing their exposure to lead. These bans have not resulted in any demonstrated decline in hunting or fishing.

C. HUNTERS AND ANGLERS HAVE READY ACCESS TO ALTERNATIVES

There are numerous alternatives to lead-based ammunition and tackle made of non-toxic materials such as iron, copper, tungsten, tin, bismuth, brass, and steel.

1. Ammunition

Currently available ammunition alternatives are either made completely of non-lead materials, such as copper, or designed such that a lead interior is protected from exposure upon impact.

A concern among hunters and fishers is the performance of non-toxic ammunition. However, lead-free ammunition was found to have "closely resembled" traditional ammunition" in terms of energy conversion, deflection angle, cavity shape, and reproducibility, showing that similar terminal ballistic behavior can be achieved." (Gremse et al. 2014). In fact, non-lead bullets generally have equivalent, if not superior, performance when compared to their lead counterparts. This is because copper bullets retain almost all their original weight and do not fragment. This weight retention means more weight and kinetic energy driving the bullet through the animal on impact. This allows for a lower bullet weight while still penetrating as good, or even exceeding, lead core bullets. Additionally, copper bullets were originally designed for the "premium" market not because of concerns over lead poisoning but rather for their enhanced ballistic capabilities.

Stroud and Hunt (2009) reviewed basic bullet materials available to bullet manufacturers, which include lead alloys, lead with external copper wash, lead core with copper jacket, pure copper, and bismuth. Lead and bismuth are highly frangible, whereas pure copper bullets tend to remain intact after impact. Bullet fragmentation increases the degree of lead contamination in tissue ingested by scavengers feeding on hunter-killed animal remains. Modern bullet design, velocity, composition, and bone impact are significant factors in the character and distribution of lead particles in carcasses, gut piles, and wound tissue left in the field by hunters.

Although the terms "lead-free," "non-lead" and "nontoxic" are used interchangeably, as a result of the manufacturing process, trace levels of lead can exist in any metal projectile used for bullets, including copper, resulting in ammunition that is not 100% lead-free, but that is functionally nontoxic to wildlife and humans. The Fish and Wildlife Service definition of "nontoxic" shot to be used in waterfowl hunting specifies in 50 C.F.R. § 20.21(j) several alloys containing not more than 1% lead.

The California Department of Fish and Game has established a maximum amount of lead content in projectiles considered to be nontoxic at 1% by weight, given scientific consensus that this threshold for lead content will preclude risk to condors, which are typically more sensitive to lead than other taxa, from lead fragmentation. Toxicological modeling of this amount of lead impurity in bullet fragments indicates that even if condors consume major fragments of bullets, the dissolution of lead is unlikely to raise the blood lead levels above 1 µg/dL, a low-level equivalent to the blood lead levels of condors being raised in Los Angeles or San Diego Zoos on a lead-free diet (Fry et al. 2009).

In addition, these non-lead alternatives appear to have a high level of acceptance. In one survey, 90% of hunters and ranchers surveyed approved of the use of copper bullets (Ritter 2006).

According to post-hunt survey results in Arizona, 88% of successful hunters who used non-lead ammunition said it performed as well as or better than lead bullets. In addition, 72% of all hunters said they would recommend the all-copper bullets to other hunters (Seng 2006). In general, experts appear to endorse the use of non-lead bullets (AGFD; Rees).

2. Fishing Tackle

Non-toxic fishing tackle alternatives are also widely available with comparable performance. Inexpensive and ecologically sound alternatives to lead fishing weights made from non-poisonous materials such as tin, bismuth, steel, and recycled glass are available. At least 10 substitutes for lead fishing tackle are on the market: tungsten (plastic composites and putty), stainless steel, carbon steel, tin, tin/bismuth, brass, ceramics, glass, pewter, and zinc (Scheuhammer and Norris 1995; Scheuhammer et al. 2003b; MOEA 2006).

Most fishing tackle stores in the U.S. already carry alternatives to lead fishing tackle and sinkers (Scheuhammer and Norris 1995, 1996; Simpson 2001; Scheuhammer et al. 2003b; Michael 2006). Some states and non-profit organizations offer small-scale programs that exchange angler-owned lead tackle for non-lead substitutes. Fishing jigs and weights containing lead are required to carry a warning label in California (Proposition 65 warning) because lead has been identified by California as causing cancer. As a result, retailers and purchasers of fishing gear in nearly all states can currently identify gear containing lead, and can routinely avoid using lead-containing products, if they so choose.

Tungsten, one of the more widely used alternatives to lead fishing tackle, is sold as a tungsten-plastic composite and as tungsten putty, a specialty item marketed to fly fisher people. Tungsten putty can be molded into varying shapes and sizes and affixed to fishing line, allowing anglers to vary the sink rate of their fly presentation. Tungsten is comparable to 52 lead in density and can be manufactured to be denser than lead, thus allowing for smaller tackle. Tungsten tackle can also have noise-making attributes that may attract fish in some situations. Tungsten is more expensive than lead, and tungsten tackle requires plastic sleeves to cover sharp edges, and additional expense.

Stainless steel tackle is advertised as having fish-attracting qualities due to the noise it makes bumping along the bottom. Stainless steel tackle is larger than lead tackle of equivalent weights. Carbon steel tackle is available on the internet. Some carbon steel tackle is made from recovered waste steel mixed with resins, within a cotton sleeve. Anglers can add or subtract steel balls on a three-way swivel to adjust the sink rate to hold bait on the bottom.

Bismuth/tin compounds are popular among anglers who manufacture their own jigs, partly due to better paint quality on jig heads using this material. Fishing tackle made of glass tends to be larger and more expensive than lead. Certain types of glass can be made to "glow" after exposure to light, a quality purported to improve fish biting frequency. Glass sinkers are available primarily through the internet.

In 1994 the EPA determined that the economic impact of switching to nontoxic fishing sinkers will be nominal (EPA 1994). Similarly, when the National Wildlife Refuge System implemented

"Lead-Free Fishing Areas," they acknowledged that non-toxics sometimes cost more than lead weights but stated that as sinkers only comprise 3% of yearly equipment costs, the increase did not create a burden for anglers (Federal Regulation 50 CFR 32 and 36, proposed rule).

The use of steel and tin tackle quickly gained popularity in 1995 when the company Bulletweights introduced Ultra Steel fishing sinkers. Additionally, tungsten tackle has quickly become the most popular non-toxic lead alterative for anglers around the world. Tungsten compares favorably to lead when it comes to relative weight and density. In fact, most tungsten weights are smaller and more compact than lead gear of a similar weight.

3. Relative Cost

Cost is a concern for many who oppose banning lead-based ammunition and tackle. While non-lead ammunition costs more than average ammunition, it costs around the same as higher-quality cartridges (Thomas 2013). Similarly, non-toxic fishing tackle is generally cost competitive with lead-based tackle. While some materials, like tungsten, may cost more, tungsten tackle can also have noise-making attributes that may attract fish in some situations. Additionally, as ammunition and tackle companies continue to adapt, costs are decreasing.

While mandating the use of non-lead ammunition and tackle may impose some additional costs on some in the hunting and fishing community, any incremental cost is a small fraction of the total that is spent on the person's respective sport. It should be noted that monies spent on ammunition or fishing weights represent only a tiny fraction of what hunters and anglers annually spend on pursuing their sports.

Furthermore, any restriction on the sale of lead products would guarantee a market for non-lead alternatives. As demand continues to increase and subsequent production costs fall, nontoxic ammunition and tackle will likely become less expensive. On a larger scale, the costs to purchase non-lead ammunition and tackle would likely more than offset the societal costs involved in cleaning up and managing lead waste from lead ammunition.

VI. SYSTEM-WIDE APPROACH AND ENFORCEMENT ARE NEEDED

The National Park System is a decentralized collection of park units. The operation of each park unit is usually solely the task of that park's administration rather than part of a centralized system where park operations are consolidated into larger subunits. In order to ensure the health of both humans and the environment, a nationwide ban on lead-based ammunition and fishing tackle is required. Voluntary bans of lead ammunition and tackle create a patchwork system that is ineffectual.

While many states have restricted the use of lead-based ammunition and tackle, the failure to ban all sizes and types does little to adequately address lead contamination as lead ammunition and tackle are still readily available.

Notably, the demise of the NPS "Get the Lead Out" campaign did not encourage or direct parks to enact bans. It merely allowed parks to voluntarily implement non-lead ammunition and tackle

alternatives. Nor did it set any system-wide quotas or goals.

It should be recognized that national parks have a conservation mission. NPS leadership should encourage conservation throughout the system in as many ways as possible. As tax-supported institutions, national parks should also explore ways to reduce their direct and indirect impacts on the environment, especially in areas, such as lead contamination, which are peripheral to the park mission.

Conclusion

The scientific literature on the sources, quantities, and pathways of exposure of lead in the environment from hunting, shooting sports, and fishing is comprehensive and conclusive, as is information on the toxic effects and health risk of lead ammunition and fishing tackle on wildlife and humans. The banning of lead ammunition for hunting waterfowl has greatly reduced the massive former mortalities and correspondingly reduced lead consumption by predators and scavengers of waterfowl, such as bald eagles, as well as humans. However, other uses of lead ammunition have continued unabated, causing unnecessary widespread incidental mortality of many wildlife mammal species.

The limited experience that the NPS has had with lead ammunition and tackle bans was overwhelmingly positive and significantly reduced lead contamination in parks. These results were achieved with little encouragement or leadership from NPS Headquarters. Much more could be accomplished with a system-wide approach to lower overall lead contamination in the environment and a required management focus on aiding the protection and conservation of wildlife.

Neither politics nor cost should be a guiding principle for the health and safety of our national parks. Instead, national parks should set examples for their visitors of promoting science, conservation, and preventing environmental degradation. For those reasons, adopting the rulemaking urged by this petition furthers the mission of the national park system.

Appendix - Proposed Rules

1. Subsection (b)(5) to be added to 36 C.F.R. § 2.2 (Wildlife Protection), to read:

> (3)…
> (4)…
> (5) Where hunting or trapping or both are authorized, such activities will not include the use of lead-based ammunition. This prohibition will occur within one year of the adoption of this paragraph.

2. Subsection (d)(9) to be added to 36 C.F.R. § 2.3 (Fishing), to read:

> (7)…
> (8)…
> (9) Fishing with the use of lead-based tackle.

3. A new Director's Order 77-10 is adopted, to read:

Director's Order 77-10

It is the policy of the National Park Service that all park superintendents and our park partners strive to reduce lead contamination in the environment and, where possible, eliminate the sale of lead ammunition and fishing tackle. Each superintendent will require concession operators to halt the sale of lead-based ammunition and fishing tackle.

In addition, each superintendent will enforce the ban on the use of lead-based ammunition and fishing tackle contained prescribed in 36 C.F.R. § 2.2 (b)(5) within all park lands.

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