The UNIVERSITY of VERMONT

James M. Jeffords Center's

Vermont Legislative Research Service

Firing Ranges: Lead, Water, and the Environment of the Green Mountain State

Firing ranges provide an outlet to conduct outdoor recreation, hunting practice, and competitive target shooting. At the same time, firing ranges create a set of concerns for communities in which they reside, including but not limited to firearm safety, environmental concern of lead contamination in freshwater source(s) and soil from expired bullet cartridges, and, noise pollution affecting neighboring residents and communities. This report is a follow up to a previous Jeffords Center Vermont Legislative Research Service (JC VLRS) report on firing ranges (that can be found here).

Firing Ranges in Vermont

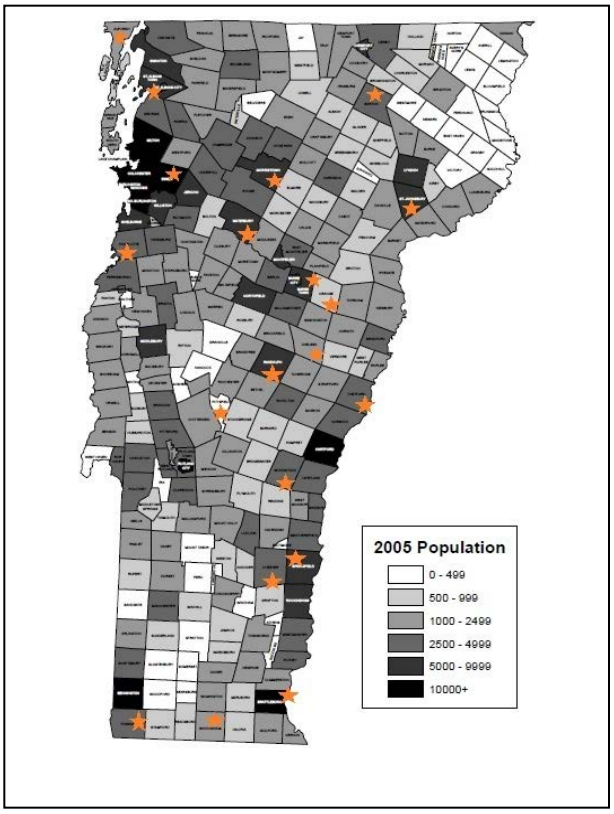
In the state of Vermont, there are a total of twenty-five firing ranges, nineteen outdoor facilities and six indoor shooting centers.[1] As illustrated in the map below (on which the locations of firing ranges are denoted by stars), eighty percent of the twenty outdoor facilities in Vermont lie within or adjacent to towns with populations over 5,000; the remaining twenty percent of outdoor ranges lie within or adjacent to towns with populations over 10,000.[2]

An article in *Seven Days* in 2011 suggested that firing ranges were scarce in Vermont relative to other states.[3] That claim turns out to be false when one examines the number of firing ranges per gun owner (while also controlling for population density). Vermont actually has more firing ranges than other states per gun owner, even after controlling for population density. Among states with low population density,[4] Vermont has the third *most* firing ranges available for its population of gun owners. (See Appendix A the data and analysis results on which these assertions are based.)

[1] Vermont Fish and Game Department, "VT Shooting Ranges Directory," accessed March 19, 2012, http://www.vtfishandwildlife.com/library/Vendors_and_sources/Shooting_Ranges_in_Vermont.pdf.
[2] Vermont Department of Health, "2005 Vermont Population Estimates: Figure 2," accessed April 1, 2012, http://healthvermont.gov/research/2005pop/2005pop.aspx.
[3] Ken Picard, "Home for the Range?: So many guns in Vermont, so few safe places to shoot them," Seven Days, 22 September 2010, accessed 5 April 2011, http://www.7dvt.com/2010vermont-shooting-ranges.
[4] Vermont falls into the category of states with population density between 0-100, making it one of twenty-six states within this designated population density.

Environmental and Health Impact of Lead

According to the EPA, an estimated 9,000 non-military outdoor ranges exist in the United States, collectively resulting in the firing of millions of pounds of lead annually.[5] Firing ranges can damage the environment and contaminate the soil, and possibly the groundwater, with lead from the birdshot, bullets, and bullet fragments, as well as produce airborne lead dust.[6] The impact of lead in firing ranges is long lasting. When bullets are left in shooting ranges, lead oxidizes when exposed to air and dissolves when exposed to acidic water or soil. Lead bullets, bullet particles, or dissolved lead can be moved by storm water runoff.[7] Dissolved lead can then migrate through soils to groundwater, contaminating soil in the area.[8]



For more information on the health effects of lead, refer to pages 3-4 in the earlier JC VLRS report titled 'The Effects of Firing Ranges in Vermont: How Lead and Noise Impact Communities'.

Legislation and Policies Regarding Firing Range Waste Management

Under the Resource Conservation and Recovery Act (RCRA) when ammunition is discharged from a weapon it is not considered solid waste as it is being used for its intended purpose; however, once spent shots or bullets are collected, or upon the closure of a range, this material becomes solid waste, and because of the lead content, hazardous waste.[9] Title 42 of the Code of Laws of the United States of America (US Code) defines hazardous waste as, a solid waste, or combination of solid wastes, which because of its quantity or characteristics may (A) cause an increase in morality or an increase serious irreversible and incapacitating illness; or (B) pose a substantial present or potential hazard to human health when improperly stored, treated,

[5] U.S. EPA, "Lead & Lead Poisoning."
[6] U.S. EPA, "Public Safety Management," access March 24, 2012, http://www.epa.gov/tribalcompliance/pubsafety/pspublicdrill.html.
[7] U.S. EPA, "Best Management Practices for Lead in Outdoor Shooting Ranges," 2005, page I-2, accessed April 2, 2012, www.epa.gov/region2/waste/leadshot/epa_bmp.pdf.
[8] U.S. EPA, "Best Management Practices for Lead in Outdoor Shooting Ranges."
[9] National Park Service, "National Park Service EnviroFacts", Hazardous Waste Management and Pollution and Prevention Team, accessed February 27, 2012, http://www.wbdg.org/pdfs/05_nps_rangewastemgt.pdf.

transported or disposed of.[10] "Hazardous waste management" is defined by Title 42 as the systemic collection, proper storage, and consequent procedures in disposing of hazardous waste.[11] Firing range handling and storage waste management practices are outlined in the National Park Service "EnviroFacts" publication, which can be found here. Waste must be collected in accordance with the Occupational Safety and Health Administration (OSHA) requirements. Furthermore, employees collecting lead must be trained in lead abatement hazards and procedures.[12] Waste should be stored and segregated in a manner to facilitate covered, labeled receptacles for both reclamation and recycling. Spent projectiles must be classified as scrap metal and reclaimed; otherwise the spent rounds are considered hazardous waste under the RCRA. Metal cartridges should be collected and recycled via their respective manufacturer. Used gun cleaning materials should be recycled or reclaimed; while gun cleaning towels or rags should be cleaned by an industrial laundry service. Any lead dust or lead material must be disposed of as hazardous waste at the nearest RCRA permitted facility.[13]

For more information on the firing range regulations, refer to pages 4-5 in the earlier VLRS report titled 'The Effects of Firing Ranges in Vermont: How Lead and Noise Impact Communities'.

Green Bullets and Non-Lead Ammunition

Lead bullets left in soil can harm wildlife, contaminate drinking water, and lead to various health effects including reproductive problems, nerve damage and development problems in children.[14]

There are non-lead ammunition alternatives, also known as 'green bullets' or 'green ammunition.'[15] The New York State Department of Environmental Conservation defines green ammunition to be bullets that are lead-free and include non-toxic primers.[16]

Certain states are taking measures to encourage the use of green bullets in place of lead ammunition. Arizona and California each have their own green ammunition initiatives.[17] In

[10] Cornell University Law School, " USC Title 42, Chapter 82, Sub-chapter 1, § 6903 – Definitions," Code of Laws of the United States of America, accessed March 21, 2012, http://www.law.cornell.edu/uscode/text/42/6903, 5A-B.
[11] Cornell University Law School, " USC Title 42, Chapter 82, Sub-chapter 1, § 6903 – Definitions," 7.
[12] National Park Service, "National Park Service EnviroFacts."
[13] National Park Service, "National Park Service EnviroFacts."
[14] Environmental Protection Agency, "Human Health and Lead" accessed April 11, 2013, http://www.epa.gov/superfund/health/contaminants/lead/health.htm
[15] John D. Sutter, CNN, "Should hunters switch to 'green' bullets?" last modified March 4, 2009, accessed February 27, 2012, http://articles.cnn.com/2009-03-04/tech/green.bullets_1_hunters-ammunition-barnes-bullets?_s=PM:TECH.
[16] Department of Environmental Conservation, "Conservation Officers, Rangers to Train with 'Green Ammo'," last modified February 2007, accessed February 27, 2012, http://www.dec.ny.gov/environmentdec/41168.html.
[17] Sutter, "Should hunters switch to 'green' bullets?"

2005, Arizona began a program that offers coupons for the purchase of green ammunition. A 2006 report showed the program to be successful in promoting the use of green ammunition.[18]

California has created a lead-free zone to protect the endangered Condor from indirect lead poisoning.[19] In October 2007, Governor Schwarzenneger of California approved Assembly Bill No. 821, known as the Ridley-Tree Condor Preservation Act.[20] This act resulted in the California Fish and Game Commission's modification to the Methods Authorized for Taking Big Game (Section 353, Title 14, CCR) in December of 2007. The Methods of Take for Nongame Birds and Mammals (Section 475, Title 14, CCR) were also later amended to include coyotes, ground squirrels, and other non-game wildlife. These modified regulations became effective July 1, 2008. The intent of these laws is to protect vulnerable wildlife, such as deer, bear, wild pig, elk and pronghorn antelope by prohibiting use of lead ammunition in area(s) designated California condor habitat to deter the ongoing threat of lead poisoning.[21] While it does not ban the use of lead bullets throughout the entire state, it does protect a portion of California's land, water, and wildlife from lead pollution. The bill also established certification standards for green bullets. In order to qualify as 'green,' bullets must be constructed with less than one percent lead. Thus far, California has certified twenty-eight different brands of green ammunition.[22]

The Arizona program provides hunters with two coupons, which they may redeem for non-lead (green) ammunition.[23] Since 2007 hunters have responded with an 80-90 percent participation rate.[24] 93 percent of hunters said that the green bullets (100 percent copper in composition) performed as well or better than lead bullets.[25] Since 2005 Arizona has been utilizing a program offering free non-lead ammunition to "big game" hunters in Units 12A, 12B, 13A, and 13B of the California Condor Range in an effort to combat lead toxicity in the environment.[26] Lead toxicity has been identified as leading cause of death to condors in Arizona.[27] Arizona Game and Fish Department stated that the program will exist as long as funding permits. The funding

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[18] Arizona Game and Fish Department, "Non-Lead Ammunition Program Hunter Survey," last modified February 2006, accessed February 27, 2012, http://www.azgfd.gov/w_c/documents/AmmoSurveyFINALReport2-23-06_000.pdf.

[19] California Department of Fish and Game, "Nonlead Certification Information for ammo manufacturers," accessed February 27, 2012, http://www.dfg.ca.gov/wildlife/hunting/condor/nonlead/index.html.

[20] California State Legislature, "Assembly Bill No. 821, Nava. Ridley-Tree Condor Preservation Act," last modified October 13, 2007, accessed April 11, 2012, http://www.dfg.ca.gov/wildlife/hunting/condor/docs/ab_821_bill_20071013_chaptered%5B1%5D.pdf.

[21] California Department of Fish and Game, "Attention Hunters: 'It's time to Get the Lead Out," accessed April 10, 2012, http://www.dfg.ca.gov/wildlife/hunting/condor/.

[22] California Department of Fish and Game, "Non-lead Certification."

[23] Phil T. Seng, "Non-Lead Ammunition Program Hunter Survey," DJ Case and Associates, last modified February 2006, accessed April 23, 2012, http://www.azgfd.gov/w_c/documents/AmmoSurveyFINALReport2-23-06_000.pdf, p. 2.

[24] Arizona Game and Fish Department, "Condors and Lead."

[25] Arizona Game and Fish Department, "Condors and Lead."

[26] Arizona Game and Fish Department, "Condors and Lead," accessed April 23, 2012, http://www.azgfd.gov/w_c/california_condor_lead.shtml.

[27] Arizona Game and Fish Department, "Condors and Lead."

comes the Heritage Fund (state lottery revenue) and the Wildlife Conservation Fund (state gaming revenue).[28]

Use of Green Bullets by U.S. Army

Since June of 2011 the United States Army has switched their use of ammunition to a "greener" bullet.[29] The army has concluded that the new "greener" M855A1 Enhanced Performance Round (EPR) is as effective, and more consistent than the current M855 round, which the army has used for years. This new round has an added bonus; it is completely comprised of copper, and contains no lead.[30] Lieutenant Colonel Jeffrey K. Woods, the product manager of the program, stated, "On M855's [the old round] best day, with that great performance that you will see, you're going to see that type of performance out the EPR [the new round] – but you will see it every time."[31] This new round is a completely new design from the previous M885; however, it does not affect the weaponry, which the army currently uses. The new M885A1 "green round" is compatible with both the M16 and M4 rifles; those most commonly used by the United States Army.[32] The new round has addressed the previous issues and concerns of the United States Army ammunition.

Firing Range Grants and Programs: National and State

A number of grant programs do exist to provide financial assistance to firing ranges for improvements. The grants are discussed in this section.

Federal Aid in Wildlife Restoration Act of 1937 – Pittman-Robertson Wildlife Restoration Act

The Federal Aid in Wildlife Restoration Act of 1937, also known as the Pittman-Robertson Wildlife Restoration Act, created a cyclical funding system for US firing ranges. Funds come from an 11 percent excise tax on sporting arms and ammunition, a 10 percent tax on pistols and revolvers, as well as an 11 percent excise tax on bows, arrows, and their parts and accessories. The funds are then apportioned to States to fund grants which pay for up to seventy five percent of the cost of approved projects. In sum, the funds that are collected from the shooting and hunting community are returned to the community via firing range improvement grants.[33]

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[28] Arizona Game and Fish Department, "Condors and Lead."
[29] United States Army, "Green Bullets, as Effective as M855 Round – Consistently," last modified May 6, 2011, accessed April 11, 2012, http://www.army.mil/article/56157/.
[30] United States Army, "Green Bullets, as Effective as M855 Round – Consistently."
[31] United States Army, "Green Bullets, as Effective as M855 Round – Consistently."
[32] United States Army, "Green Bullets, as Effective as M855 Round – Consistently."
[33] US Fish and Wildlife Service, "Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service: Federal Aid in Wildlife Restoration Act," accessed April 4, 2012, http://www.fws.gov/laws/lawsdigest/FAWILD.HTML.

National Rifle Association (NRA)

The NRA has a matching grant to city, county, state or federal agencies providing funds to build or improve firing ranges, community relations, and environmental efforts as long as it can match the NRA's funding.[34] The funding from the NRA Public Range Fund Grant Program covers labor, equipment, materials, construction, et cetera and is granted on a 50-50 basis with half of the funding provided by the NRA and half provided from the grantee. Funding is maxed out at $25,000.[35]

The Colorado Division of Wildlife's (CDOW) Shooting Range Grant Program (SRGP)

The Colorado Division of Wildlife offers a grant through its Shooting Range Grant Program. It may be used to create new shooting ranges and shooting areas, or to enhance existing ones. The program offers a total of $500,000 worth of grants. The minimum award is $5,000. Applicants are required to develop an Environmental Stewardship Plan that follows the US EPA Region 2's "Best Management Practices for Lead at Outdoor Shooting Ranges," which outlines methods for responsible handling of lead ammunition. Several improvement projects are eligible for funding, including noise reduction berms, which are built alongside shooting lanes and absorb noise.[36]

Vermont

Vermont's Fish and Wildlife Department provides a shooting range improvement grant aimed at improving and supporting the operation of ranges, promoting safe shooting practices, helping hunters gain firearm proficiency and providing environmentally responsible ranges.[37] The U.S. Fish and Wildlife Restoration Program provide these funds. Funding is disbursed on a 75%-25% basis with 25% of funding coming from a non-federal match from the grantee.

Montana

The purpose of the Montana Fish, Wildlife, and Parks Shooting Range Development and Enhancement Program is to create a sustainable and continuing mechanism for the improvement and accessibility of ranges throughout the state. For the 2012 grant period the state has allocated $314,000; however, individual grant applications may not exceed $94,000. If the applicant is a private club or organization they must meet the guidelines of a non-profit

[34] National Rifle Association, "NRA Public Range Fund Grant Program," accessed March 26, 2012, http://www.nrahq.org/shootingrange/public_range_grants.asp.
[35] National Rifle Association, "NRA Public Range Fund Grant Program."
[36] Colorado Division of Wildlife, "2011 – 2012 Shooting Range Grant Program," accessed April 2, 2012, http://wildlife.state.co.us/SiteCollectionDocuments/DOW/Education/pdf/RangeGrants/2011-2012ShootingRangeGrantProgramApplication.pdf.
[37] Vermont Fish and Wildlife, "Shooting Range Improvement Grant," accessed March 26, 2012, http://www.vtfishandwildlife.com/Shooting_Range_Grants_page.cfm.

organization pursuant to Title 35, Chapter 2, of the Montana Code of Laws.[38] Applicants must provide a matching $1 for every $1 of aid granted; essentially the grant will pay for half of the desired project.[39] While this grant is for general range improvement, priority is given to those where, "range safety is part of the proposed project, or reduce impact to the human environment."[40] Other priority criteria include disability accessibility improvement, as well as improvements based on the needs of the community.[41]

Nevada

Nevada provides a shooting range grant for up to $80,000 for range construction or improvement. The funding comes entirely from an excise tax on guns and ammunition. To be eligible, recipients of the grant must provide public shooting or educational shooting or hunting programs. The grant provides 75% of the projects cost with a 25% match from the grantee.[42]

Oregon

The Oregon Department of Fish and Wildlife offers a grant to firing ranges for construction, development, and improvement. Eligible ranges are non-profit and are open to the public. The grant covers 50% of project's cost with the other half coming from the recipient.[43] The goal of the grant is to, "encourage significant improvements, prioritize safety and environmental concerns, and increase hours and accessibility and implement 'good neighbor' improvements."[44]

Arizona

Arizona's Game and Fish department offers a Shooting range development grant of up to $50,000. Both Sportsman's clubs and government agencies are eligible as long as they are not privately owned or for-profit. The grant provides 50% of the project costs, with the other 50% provided by the Grantee. Accepting this grant requires the range to hold "Arizona Game and

[38] State of Montana, "Montana Code Title 35: Corporations, Partnerships, and Associations, Chapter 2: Non-Profit Organizations," last modified 2011, accessed April 2, 2012, http://data.opi.mt.gov/bills/mca_toc/35_2_2.htm.
[39] Montana Fish and Wildlife Department, "Shooting Range Development and Enhancement Program: Guidelines for Grant Requests," accessed March 29, 2012, http://fwp.mt.gov/fwpDoc.html?id=54633, 1.
[40] Montana Fish and Wildlife, "Shooting Range Development and Enhancement Program: Guidelines for Grant Requests," 4.
[41] Montana Fish and Wildlife, "Shooting Range Development and Enhancement Program: Guidelines for Grant Requests," 4.
[42] Nevada Department of Wildlife, "Funds Available for Public Shooting Ranges," accessed April 3, 2102, http://www.ndow.org/about/news/pr/2010/feb_10/021710_shooting_range.shtm.
[43] Oregon Department of Fish and Wildlife, "Hunter Education – Shooting Range Development Grant Program," accessed April 3, 2012, http://www.dfw.state.or.us/education/hunter/range_development.asp.
[44] Oregon Department of Fish and Wildlife, "Shooting Range Development Grant Application," accessed April 3, 2012, http://www.dfw.state.or.us/education/hunter/range_development.asp.

Fish Department hunter education activities, Hunter recruitment activities, and activities that support the Archery in the Schools Program and Scholastic Clay Target Program."[45]

Texas

Texas' Park and Wildlife department provides a target range grant, which provides up to 75% of the funding for a single project. The project covers construction needs. Grant proposals are subject to review by a National Rifle Association range technical team advisor.[46]

Firing Range Field Investigation

Throughout March and April of 2012, the JC VLRS research team that wrote this report traveled to four different Vermont firing ranges to observe the practices of each range. Prior to embarking on the trips, students were instructed to use all due caution and respect postings in the areas. Students researched the firing ranges on-line first to find out information about the ranges and whether visiting the ranges was possible. They found no information on those sites that would suggest visiting the ranges was prohibited; indeed, on the North Country Sportsman's Club's site they read "Visitors are always welcome. No experience is necessary."[47] Upon visiting each range, the team attempted to speak with range workers. In two cases, range workers were on the premises and the team was able to speak with them. At the others, the team was unable to locate any workers. The team was mainly interested in retrieving information regarding location (i.e. proximity to residential areas and/or bodies of water) as well as cleanup practices.

Waterbury-Stowe Fish and Game Club

The research team visited the Waterbury – Stowe Fish and Game Club (outdoor firing range) on Thursday March 15th. The range was off the direct roadway and located in a valley-like location, preventing noise from traveling outside of the property. No range officials were present and/or working and records of who visits the range relied on a self-identified member sign-in notebook. The researchers noted the location of two large freshwater ponds directly on the grounds of the range. According to satellite mapping of the area, the ponds do not connect to any nearby water sources. Individuals using the range were lined up with no designated shooting area or booths and were practicing five-stand shooting, which is the practice of shooting a clay disk launched into the air. At this range, the shooting area was located directly over the pond, creating circumstances for discharged ammunition to dissolve in the water. The team witnessed three individuals using the range, with no visible signs of collecting or disposing of spent ammunition rounds.

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[45] Arizona Game and Fish Department, "Shooting Range Development Grants," accessed April 3, 2012, http://www.azgfd.gov/outdoor_recreation/shootingrange_development.shtml.
[46] Texas Parks & Wildlife Department, "Target Range Grant Funding," accessed April 3, 2012, http://www.tpwd.state.tx.us/business/feedback/meetings/2009/0827/agenda/item_13/.
[47] http://www.shootncsc.com/About.html, accessed April 30, 2012.

Barre Fish and Game Club

The Barre Fish and Game Club is an outdoor firing range located a few miles outside of Montpelier in a remote hillside area. The area nearby is somewhat residential, but not heavily populated. Houses are spread out and none are located directly beside the range. There were no visible bodies of water near the range either. When the researchers arrived at the range on Monday, March 21, there were two shooters present at the range. The researchers asked if either of the shooters worked at the range and they replied that no employees were present at the time.

Bull's Eye Sporting Center

The research team traveled to the Bull's Eye Shooting Center in Orange, Vermont on March 28th, 2012. After arriving at the range, the team stepped out to survey the range and discovered several areas containing uncollected, spent casings. The team noted barriers, used to block spent lead from entering the environment, surrounding the pistol range section of the shooting center. This was the only range section which used barriers to block spent lead. The team explored the rest of the firing range which covered several acres, containing different shooting areas and obstacles. The shooting areas the team observed in the woods did not have barriers to block spent lead shot. The team spotted numerous sporting-clay "throwers," which hurled clays directly over water. The nearby wooded area contained creeks and streams, which ultimately ended in a pond housing local trout. The owner of the range stated that the pond was regularly used for recreational fishing. Broken clays were located directly in water, which led the team to conclude that spent lead shot was also capable of dissolving in the water.

After returning back to the parking lot, the team ran into David Brooks, owner and operator of the Bull's Eye Shooting Center, who opened the range twenty-one years ago and has since run it as a family-operated business. The team spoke with David for over an hour about the general operation of his range. Upon talking with David, the team learned that the different obstacles previously observed in the woods were in fact different 'real-life hunting scenarios' created and procured by David. According to David, the Bull's Eye Shooting Center is the only firing range in Vermont that is open for 'full public use.' David explained that firearm and archery equipment is openly available for rental. The firing range is used for several different activities, including general shooting training and practice for children as well as adults, police training, community service, and private events. The facilities include recycling units for copper bullets and aluminum arrows. When asked about green bullets, Dave said he did not supply the shooters bullets and couldn't confirm what kind of ammunition they used. The Bull's Eye Shooting Center had no method of recycling their discharged lead, but did have large trash bags full of spent shells. Dave also stated that he regularly teaches classes on gun safety and hunter education, and allows people to come in season and shoot freely, only charging six dollars for the day.

Hours of operation are regulated due to the noise pollution that occurs from shooting. The range is permitted to operate on Wednesday from 2:00 PM to 5:00 PM, Thursday and Friday from 10:00 AM to 6:30 PM, and Saturday from 10:00 AM to 5:00 PM. Regulations require that the center be closed from November 15 to April 15. To reduce noise pollution, patrons may only use smaller caliber bullets, including .22-caliber pistols and shotgun ammunition.

North Country Sportsman's Club

On April 4, 2012 the team traveled to the North Country Sportsman's Club in Williston, VT. Upon arrival, the team was approached by range treasurer Tim Riddle due to the team's lack of ear and eye protection. The team explained the purpose of their visit and asked Mr. Riddle if the facility recycled its expired lead shot. He replied that, due to the geography, it was difficult and costly to collect. Lead collection would require sifting through the top eight inches of soil with heavy machinery. It might also require slash and burn removal of trees. Complaints from neighbors living alongside the range are another issue at the range. In the past, the neighbors tried to prosecute the range for noise violations, but failed due to the grandfather clause in Act 176. Recently, the neighbors altered their focus to the issue of water pollution. The neighbors had their well water tested for lead content, and the tests returned negative. Three independent groups have tested water in close proximity to the range. Only one test found detectable levels of lead content. Lastly, the researchers asked Mr. Riddle about use of green ammunition at the range. He expressed that green bullets were not compatible with antique guns, which are used by a number of club members. Mr. Riddle also mentioned that they are more expensive than regular lead bullets.

Summary of Findings from Visits to Firing Ranges

Two out of four observed firing ranges had water on-site and were openly vulnerable to lead pollution from bullets oxidizing in the water; satellite images suggest that these waterways terminate on the firing range property so contamination of other waterways is unlikely.

This report was completed on January 9, 2013 under the supervision of Professor Anthony Gierzynski.

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Appendix A

Table A1: Firing Ranges Calculations* - Arranged by Lowest to Highest Gun Ranges per Gun Owner by State

State	Population from 2000 Census[48]	Percent of Gun Owners[49]	Gun Owners per State	Gun Ranges per State[50]	Firing ranges per Gun Owner by State	Pop. Density by State[51]
RI	1,048,319	12.38%	129806	21	6181	1014
NH	1,235,786	30.00%	370733	58	6392	138
MN	4,919,479	40.35%	1985072	296	6706	61.8
MT	902,195	59.80%	539531	74	7291	6.2
VT	608,827	42.41%	258186	32	8068	66.1
WY	493,782	62.31%	307688	36	8547	5.1
SD	754,844	58.32%	440200	50	8804	10
ND	642,200	56.30%	361549	37	9772	9.3
AK	626,932	55.75%	349527	35	9986	1.1
WI	5,363,675	42.31%	2269617	222	10224	99
NY	18,976,457	18.22%	3456874	327	10571	402.7
NE	1,711,263	44.70%	765003	72	10625	22.3
CT	3,405,565	17.74%	604213	54	11189	703.3
NJ	8,414,350	11.22%	944367	75	12592	1144.2
NM	1,819,046	38.48%	699905	53	13206	15
PA	12,281,054	34.53%	4240680	319	13294	274.5
DE	783,600	25.87%	202752	15	13517	402.1
NV	1,998,257	32.53%	650132	48	13544	18.2
WA	5,894,121	32.70%	1927512	139	13867	88.7
ME	1,274,923	39.36%	501842	34	14760	41.3
OR	3,421,399	38.28%	1309741	81	16170	35.6
WV	1,808,344	56.43%	1020503	60	17008	75.2
UT	2,233,169	44.36%	990555	57	17378	27.2
OH	11,353,140	32.91%	3735906	201	18587	277.8
KY	4,041,769	46.16%	1865847	97	19236	102.4
MA	6,349,097	11.07%	702838	35	20081	814
TX	20,851,820	36.43%	7595951	362	20983	79.8
AZ	5,130,632	31.39%	1610455	75	21473	45.2

[48] 2000 U.S. Census, "Resident Population of the 50 States, the District of Columbia, and Puerto Rico."
[49] Centers for Disease Control and Prevention (CDC), "Behavioral Risk Factor Surveillance System Survey Data from 2004."
[50] National Sports Shooting Foundation, "Find Shooting Ranges In…"
[51] 2000 U.S. Census, "Table 17. Area Measurements: 2000; and Population and Housing Unit Density: 1980 to 2000."

FL	15,982,378	24.55%	3924036	181	21680	298
AR	2,673,400	56.99%	1523693	69	22083	51.4
GA	8,186,453	38.97%	3190497	143	22311	142.3
NC	8,049,313	38.34%	3086358	138	22365	165.6
SC	4,012,012	42.19%	1692845	75	22571	133.5
MO	5,595,211	43.01%	2406287	103	23362	81.4
VA	7,078,515	36.62%	2591953	104	24923	179.2
TN	5,689,283	44.48%	2530644	97	26089	138
CA	33,871,648	18.74%	6347372	242	26229	217.4
OK	3,450,654	44.58%	1538465	58	26525	50.3
CO	4,301,261	33.42%	1437400	54	26619	41.5
ID	1,293,953	53.41%	691103	23	30048	15.7
MD	5,296,486	20.70%	1096311	35	31323	545.6
MS	2,844,658	53.13%	1511429	42	35986	60.6
KS	2,688,418	42.12%	1132255	28	40438	32.9
IO	2,926,324	45.13%	1320526	27	48908	52.4
LA	4,468,976	44.09%	1970525	32	61579	103.4
AL	4,447,100	50.48%	2244791	35	64137	87.8
IN	6,080,485	37.35%	2271343	25	90854	169.7
IL	12,419,293	19.84%	2464233	24	102676	223.7
MI	9,938,444	39.68%	3943706	35	112677	175.8
Total	**275,829,404**	**31.22%**	**86090989**	**4465**	**19281**	

*Excluding Hawaii and District of Columbia because not enough survey data was collected for either state in the 2004 BRFSS survey.

Table A2: Multiple Regression Analysis, regressing the number of firing ranges on the number of gun owners while controlling for how rural the state was (as measured by population density) and a dichotomous variable for the state of Vermont

Model	B (slope coefficient)
Constant	11.87
Gun Owners Per State	.0000431
Population Density by State	0.013
VT	8.15
Adjusted R-Squared	0.54

As this analysis includes the entire population of states, tests of statistical significance are irrelevant. The coefficient for Vermont estimates that, while controlling for the number of gun owners and the population density, Vermont has 8 more firing ranges that similarly situated states (similar on gun owners and population density).