

## Standardized Regulatory Impact Assessment

Re: Prohibition on the Use of Lead Projectiles and Ammunition  
Using Lead Projectiles for the Take of Wildlife with Firearms

### A. Statement of Need for Proposed Regulation

#### 1. Implementation of AB711: Fish and Game Code Section 3004.5

The proposed regulations phase in the requirements of Fish and Game Code Section 3004.5, which prohibits the use of any lead ammunition when taking any wildlife with a firearm after July 1, 2019. The implementation schedule is structured to balance the statutory requirements with the complexities of the firearms and ammunition sectors' supply response as consumer demand shifts to various nonlead ammunition types with the new regulatory requirements. Public input and the Department of Fish and Wildlife's (Department) understanding of the current and anticipated future availability of the required types of ammunition greatly influenced the phase in timing: The transition is planned over a four year period to give ammunition manufacturers sufficient incentive and time to invest in developing new product lines and increased production to meet the increasing demand for nonlead ammunition in California from July 1, 2015 and beyond.

#### Proposed Phase Approach

**Phase 1:** Effective July 1, 2015, it shall be unlawful to use, or possess with any firearm capable of firing, any projectile that is not certified as nonlead when taking:

- Nelson bighorn sheep; or
- All wildlife in any Department wildlife area or ecological reserve.

**Phase 2:** Effective July 1, 2016, it shall be unlawful to use, or possess with any shotgun capable of firing, any projectile that is not certified as nonlead when taking:

- Upland game birds except for dove, quail, snipe, and any game bird taken under the authority of a Licensed Game Bird Club;
- Small game mammals;
- Furbearing mammals;
- Nongame mammals;
- Nongame birds; or
- Any wildlife for depredation purposes.
- It will still be legal to take the above animals with a rifle using traditional lead rimfire and centerfire ammunition.

**Phase 3:** Effective July 1, 2019, it shall be unlawful to use, or possess with any firearm capable of firing, any projectile that is not certified as non-lead when taking:

- Any wildlife for any purpose in the State of California.

## **2. Existing State Regulations**

The proposed regulations add to existing state regulations adopted in 2007 and 2008 for the California condor range that prohibit the use of lead projectiles to hunt deer, bear, wild pig, elk, and pronghorn antelope and in 2008, prohibit the use of lead projectiles in the same area for hunting coyotes, ground squirrels, and other nongame wildlife. Effective July 1, 2008, all big game and nongame hunters within the condor range area were required to use nonlead ammunition.<sup>1</sup>

## **3. Outreach**

The Department conducted an extensive, pre-notice public outreach effort between January and October of 2014. At the January 15, 2014, meeting of the Fish and Game Commission's (Commission) Wildlife Resources Committee (WRC) in Van Nuys, the Department introduced a "starting point" proposal that outlined a potential four-year phase-in for nonlead ammunition. The starting point proposal was based on the Department's understanding of the current availability of nonlead ammunition and became the focal point for a series of public meetings throughout the state from Susanville to San Diego. In addition to public workshops, the Department also sought public input at international sporting goods shows and at meetings of the National Wild Turkey Federation in Vacaville, Ducks Unlimited in Corning, and the Director's Hunting Advisory Committee in Sacramento.

The Department presented an update of its outreach efforts as well as planned future efforts at the Commission's WRC meeting in Sacramento on July 28, 2014. At this meeting, the Commission received testimony by Dr. Vernon G. Thomas of the University of Guelph in Canada on behalf of Audubon California, Defenders of Wildlife and the Humane Society of the United States on his survey of the current availability of nonlead ammunition in California.

The Department presented a public review draft of the proposed regulatory text at the Commission's WRC meeting in Sacramento on September 17, 2014. At this meeting, the Commission received testimony by Mr. Scott Scherbinski of Pinnacles National Park and Mr. Ben Smith of the Institute for Wildlife Studies on reducing the impact of lead ammunition in California. Testimony was also received from Mr. Rob Southwick of Southwick Associates on behalf of the National Shooting Sports Foundation on the potential effects of the ban on lead ammunition on hunting participation in California and associated economic measures.

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<sup>1</sup> Methods Authorized for Taking Big Game, Section 353, Title 14, California Code of Regulations (CCR); Modifications to Methods of Take for Nongame Birds and Mammals, Section 475, Title 14, CCR.

In addition to public workshops and meetings, the Department also contacted representatives of the ammunition manufacturing and distribution sectors for their input on the proposed phasing. A meeting with ammunition retailers was held at the Yolo Basin Wildlife Area on September 3, 2014. Letters requesting input from major ammunition manufacturers were sent on August 26, 2014, to Barnes Bullets, Inc., Federal Premium Ammunition, Hornady Manufacturing, Kent Cartridge, Magtech Ammunition Company, Inc., Nosler, Remington Arms Company, LLC, Weatherby, Inc., and Winchester Ammunition.

## **B. Source of Potential Economic and Fiscal Impact**

The proposed regulations will phase in the requirement to use nonlead ammunition for all hunting in the state. During the four-year implementation period, compliance may involve increased (explicit and transactions) costs for hunters. Hunters may choose to respond to increased costs by reducing their level of hunting activity. Any reduction in hunt days would reduce direct trip and equipment spending and the subsequent rippling of that spending throughout the local and state economy, potentially impacting total economic output, jobs, and tax revenues.

### **1. Impact Assessment Methodology**

After establishing the baseline conditions the Department utilized the following analytical methods to estimate and evaluate the potential economic and fiscal impacts.

#### **a. Elasticity of Demand**

The exercise of predicting hunter reaction to an increase in “costs” can be characterized as an exercise in gauging the “price elasticity of demand” for hunting. We reviewed published literature on the price elasticity of demand and the determinants of the demand for hunting. The published findings derived from large data sets of hunting activity over time provide a frame of reference for evaluating estimates of hunter reaction to the proposed regulatory change.<sup>2</sup>

#### **b. Stated Preference and Revealed Preference**

Surveys that probe for a subject’s anticipated response to future scenarios identify “stated preferences.” The historical record of actual decisions and behavior in reaction to a change represent “revealed preference.” We took into account the findings of surveys that asked hunters how they anticipated their hunting activity would change if faced with a range of potential cost increases for nonlead ammunition.<sup>3</sup> Generally,

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<sup>2</sup> Poudyal, et al., 2008; U.S. Forest Service, 2007; Sun, et al., 2005; Saskatchewan Environment, 2005; Handbook of Environmental Economics, Volume 2, Ed. Karl-Göran Mäler,, et al., 2005.

<sup>3</sup> Southwick Associates, *Effects of the Ban on Traditional Ammunition for Hunting in California on Hunting Participation and Associated Economic Measures*, prepared for National Shooting Sports Foundation (NSSF) Sept. 2014.

surveys that solicit potential responses to hypotheticals or, in other words, solicit an individual's stated preference have some limitations. The responses may be illustrative of underlying sentiments but may not match actual responses when the consequence of an individual's choice has real costs. These survey results inform our current analysis, but recognizing the limitations of stated preference, whenever possible we sought to use revealed preference as guide to anticipate future reactions to this regulation change.<sup>4</sup>

The Department has an indication of revealed preference in the historical record of comparable past nonlead ammunition programs. We examined the level of hunting activity in the condor range before and after nonlead ammunition regulations were put into effect in 2008. We also looked into the hunter and ammunition manufacturer response to federal regulations that banned lead ammunition for the take of waterfowl across the country in 1991. Additionally, we reviewed the experience of other states' nonlead programs. The outcome of these comparable programs is presented in further detail in the conclusion section following the projected economic and fiscal impact section.

### **c. Multiplier Analysis**

All costs and benefits due to the proposed regulatory change are calculated on an annual basis over each one year period as the successive phases are implemented and through the twelve months after the proposed regulation is fully implemented in 2019. The baseline of hunting activity in the state is specified. The projected changes in levels of hunting activity and direct expenditures are then utilized to estimate the total economic and fiscal impacts with multipliers derived with IMPLAN social accounting matrices.<sup>5</sup>

1. The broad economic impacts assessed are: changes in direct expenditure by hunters, along with the subsequent indirect, induced, and employment effects of any change in direct expenditure as multiplied through the affected sectors that serve hunting activities.
2. The economic impacts to ammunition manufacturers and hunting supply retailers (doing business in California) that were specifically assessed are: the direct, indirect and induced effects of any changes in revenues to the ammunition manufacturers and hunting supply retail sectors.
3. The fiscal impacts assessed are: revenue to the state from hunting license sales;

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<sup>4</sup> "It would appear from historical data, that the surveyed reactions to fee increases may be exaggerated. While the survey data is still valuable, it should not be used as an unqualified projection of the market elasticity." *Economic Evaluation of Hunting in Saskatchewan*, 2006.

<sup>5</sup> Minnesota IMPLAN Group, Inc., *State and National Economic Effects of Fishing, Hunting and Wildlife-Related Recreation on U.S. Forest Service-Managed Lands*, American Sportfishing Association, 2007.

federally allocated Pittman-Robertson Funds; Department expenditures for education and enforcement; as well as sales tax revenue impacts and fiscal impacts to local and federal governments.

## 2. Major Regulation Determination

The proposed regulations could exceed \$50 million in total economic and fiscal impacts in the 12 months following full implementation from July 2019 to July 2020. However, given Department analysis of historical license sales in response to similar regulations in the condor range, we anticipate a less than five percent reduction in hunting activity. The phase in schedule is specifically structured to avoid major disruption to the hunting community and associated businesses.

Because of existing uncertainty over the future availability and cost of nonlead ammunition, we evaluated a range of potential reductions in hunting effort, including the Department's projection of up to five percent, a mid-range of 10 percent, and a drop of 13 percent based on the report by Southwick Associates.<sup>6</sup> Table 1 shows the projected changes in hunter direct expenditure, hunt days, total economic output, total economic and fiscal impact and the price elasticity of demand value associated with the anticipated change in hunting activity. If hunting is reduced by 10 percent with no change in the initial compliance costs then the regulations would exceed the threshold for a major regulation.

Table 1. Major Regulation Threshold (\$2013)

Twelve Month Period after Full Implementation					
% Reduction in Hunting <sup>1</sup>	Projected Change in Hunter Direct Expenditure	Projected Change in Hunt Days	Total Economic Output	Economic and Fiscal Impacts: Major Regulation Total	<i>PED &lt; 1 Inelastic</i> <i>PED &gt; 1 Elastic</i>
5%	\$ (13,539,407)	(173,582)	\$ (27,363,142)	\$ (29,381,073)	(0.68)
10%	\$ (27,078,815)	(347,164)	\$ (54,726,284)	\$ (58,762,146)	(1.35)
13%	\$ (35,202,459)	(451,314)	\$ (71,144,170)	\$ (76,390,790)	(1.78)

<sup>1</sup> A range of potential percentage reductions in hunting activity are evaluated to assess a range of possible hunter responses to the proposed regulation.

## C. Baseline Hunting Activity

### 1. Licensed Hunters

We used Department records from the Automated License Data System (ALDS) and the License and Revenue Branch (LRB) of hunting license sales as opposed to USFWS

<sup>6</sup> Southwick Associates, 2014.

2011 survey results to determine the baseline number of hunters potentially affected by the proposed regulations. The number of licensed resident and non-resident hunters in 2013, the most recent year with full data, was 287,052.

The Department's count of hunters is the number of hunting licenses sold by type totaled to reflect the actual number of individual resident and non-resident hunters each year. The ALDS, which was fully implemented in 2011, provides the most accurate recording of all LRB transactions. The totals vary from those reported in the *2011 National Survey on Fishing, Hunting and Wildlife-Associated Recreation* published by the United States Fish and Wildlife Service (USFWS) due to differing data collection methodologies. The USFWS survey methods provided an estimate of 394,000 hunters in 2011, whereas the Department count is 282,266 licensed hunters in 2011.

The USFWS surveys a random sample of the population on angling, hunting and wildlife-associated recreation that is then extrapolated out to estimate the numbers found in each state. Insufficient observations hamper the reliable reporting of findings in several instances for California. The USFW survey is of all wildlife-associated recreation, with hunters being a small minority of the survey's expanded population. Capturing the number of hunters via surveys is challenging for California. Although California is the most populous state, on a per capita basis certified license holders comprise less than one percent of the total state population.

**2. Long-Term Trends in Hunting Participation**

The number of hunters across- the country has been declining. In 1970, there were over 40 million licensed hunters in the nation and a peak of 763,500 in California. Now there are 12.6 million hunters across the country and 287,052 in the state. The number of California hunters has been relatively stable over the past decade from 2004 to 2013 as shown in Department LRB records.

Table 2. Resident and Non-Resident Hunting Licenses 2004 – 2013

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
299,293	298,212	301,668	297,612	293,231	289,609	287,229	282,266	284,218	287,052

Source: LRB, 2014.

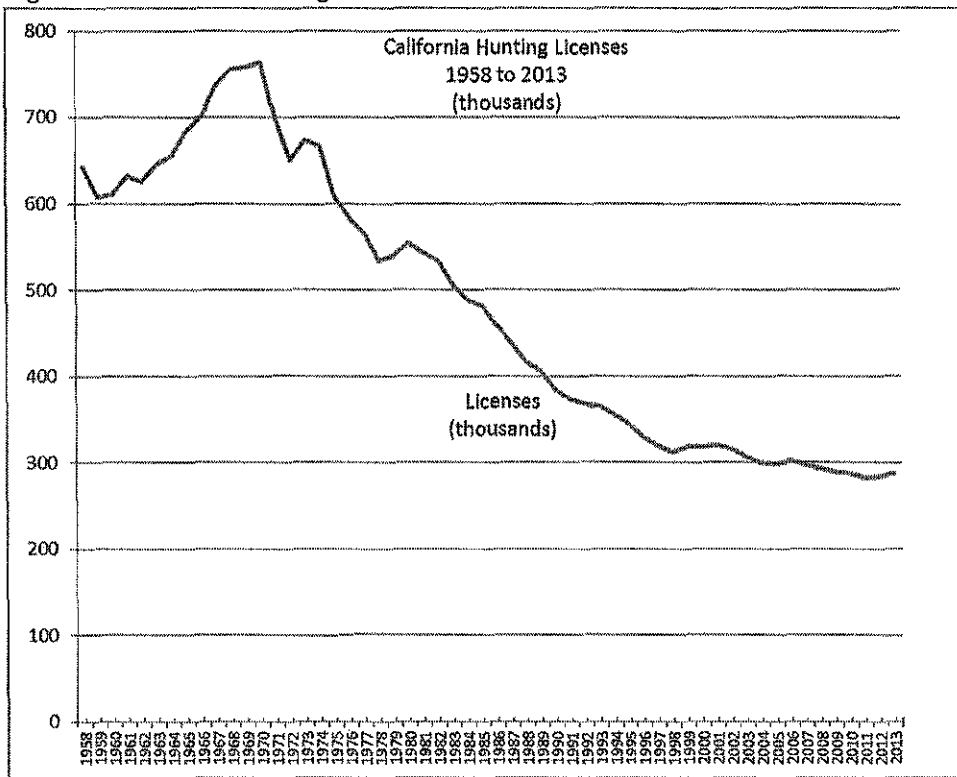
This steady decline over the decades has been attributed to a number of causes including habitat loss and resulting declines in both game species and places to hunt, demographic changes, competing recreation options, movement out of rural areas, changes in disposable income, and other societal changes.<sup>7</sup> Surveys of hunters over time have shown that the majority of hunters have higher than average income, are

<sup>7</sup> William C. Gartner, et al., *Trends in Outdoor Recreation, Leisure, and Tourism*, 2004.

white (94%), male (89%), and over 45 years old (55%).<sup>8</sup> Broader demographic developments in the state have tended to shrink that population base as a share of the total.

Figure 1 displays the number of resident and non-resident hunting licenses issued. Non-resident licenses comprise about 3 percent of the total throughout this time period. During the 1970s to 1980s there were substantial declines in hunting, but by 2003 the number of hunters over the last ten years has been relatively stable. More women are joining the sport and youth recruitment has kept pace. However the aging of the core participants may exert an influence on the total numbers.

Figure 1. California Hunting Licenses



Sources: USFWS License Sales by State, 1958-1969; CDFW LRB, 1970 – 2013.

### 3. Demand for Hunting

We reviewed academic research on the determinants of the demand for hunting that examined the price elasticity of demand, income elasticity of demand, and how socio-demographic characteristics of the population relate to hunting demand. Hunting demand is found to be quite price inelastic; that is to say that the level of hunting does not respond much to changes in the price of things that comprise a small share of the

<sup>8</sup> USFWS, Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR), 2011, Revised 2014.

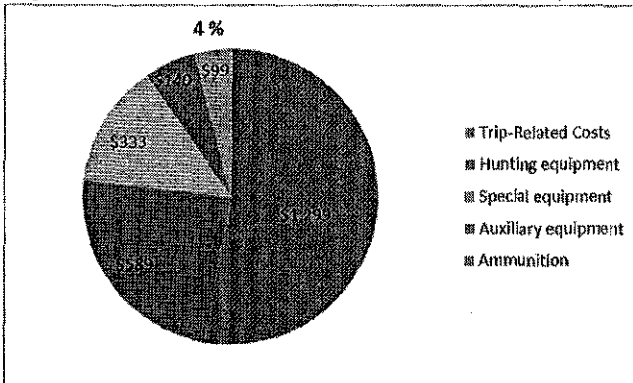
total cost of hunting activities. A small increase in a recurring cost (e.g. licenses, ammunition, fuel costs, etc.) appears to be put in context of each hunter's previous investment in hunting equipment and total annual trip expenses. The research supports the conclusion that hunting is an activity that is bound by tradition and that it is a unique activity with no like substitutes.<sup>9</sup>

Socio-demographic factors, such as, age, gender, race, as well as urban or rural residency, have been found to have pronounced effects on hunting demand. Despite annual population growth rates of about 1.3% to 2.9% in the state, broader demographic trends have tended to diminish the pool of traditional hunters.<sup>10</sup>

#### 4. Baseline Hunter Expenditures

As hunter numbers have been trending downward, expenditures per hunter have been trending upward. Between 2006 and 2011, hunter trip-related, inflation-adjusted spending has increased by 40 percent and equipment spending has increased by 17 percent. Across the country, hunter spending on ammunition is typically about four percent of total equipment and trip expenditures as illustrated in Figure 2.<sup>11</sup>

Figure 2. Annual Hunter Expenditures. (\$2013)



Source: USFWS *Fishing, Hunting and Wildlife-Associated Recreation, 2011, Table 17.*

#### 5. Baseline Hunt Days

California's 287,052 hunters pursue a variety of game mammals and birds on hunting trips often comprised of multiple days. The number of hunt days and changes in the number of hunt days by species or area in response to the proposed regulations is the key metric for the economic assessment.

<sup>9</sup> Poudyal, et al., 2008; U.S. Forest Service, 2007; Sun, et al., 2005; Saskatchewan Environment, 2005; Handbook of Environmental Economics, Volume 2, Ed. Karl-Göran Mäler, et al., 2005.

<sup>10</sup> William C. Gartner, et al., 2004.

<sup>11</sup> USFWS, *Fishing, Hunting, and Wildlife-Associated Recreation, tables 17, 2011.*



The proposed regulations will not affect the hunt days of more than 70,500 hunters that pursue waterfowl since waterfowl hunting is currently subject to federal restrictions on the use of lead shot.<sup>12</sup> The proposed regulatory action will also not affect the hunting activity of roughly 47,700 deer hunters that hunt within the condor range and are currently subject to state prohibitions on the use of lead projectiles. However, as the proposed regulations are phased in, these same hunters may be affected should they choose to hunt in the newly regulated areas or for the species that are designated for non-lead method of take each year of the implementation schedule.

Table 3. Baseline Lead and Nonlead Hunt Days and Expenditure Shares (\$2013)

Hunters, Hunt Days, and Expenditures 2013			
	Lead & Nonlead	Nonlead	Nonlead
California	All Hunters	Condor Range <sup>1</sup>	Waterfowl
Hunters by Game Type	287,052	47,730	70,509
Hunting Days per Year	4,879,884	429,570	909,566
Annual Expenditures <sup>2</sup>	\$ 380,630,952	\$ 60,139,800	\$ 35,473,078
% of All Hunters	100%	17%	25%
% of All Expenditures	100%	16%	9%
1 Deer only, other nonlead game hunts not included			
2 Hunt days by game and annual expenditure from USFWS, FHWAR, 2011.			
Sources: CDFW LRB, ALDS 2014; USFWS, FHWAR 2011.			

## D. Economic Impact of the Proposed Regulation

### 1. Affected Hunters by Phase

The regulations are proposed to be implemented in stages in an effort to minimize the disruption of hunting activities and the resulting economic contribution to the state economy. The proposed phasing provides manufacturers additional time to increase the production of nonlead ammunition to meet the demand of California hunters. Accordingly, each phase affects a limited number of hunters and meters the demand for nonlead ammunition over the four-year transition period. The Department's Wildlife Branch (WLB) hunter survey results, Biogeographic Data Branch spatial analysis, and LRB data on license sales by species groups were used to estimate the numbers of affected hunters and hunting days by phase.

#### Phase 1

Beginning July 1, 2015, the proposed regulations require hunters to use nonlead ammunition on Department wildlife areas and ecological reserves. With the exception

<sup>12</sup> United States Fish and Wildlife Service, 1991, Nontoxic shot regulations for hunting waterfowl and coots in the U.S. <http://www.fws.gov/migratorybirds/currentbirdissues/nontoxic.htm>.

of a few wildlife areas and ecological reserves that have full-time employees that monitor human uses, the Department does not track the numbers of hunters using Department lands that are specified in Phase 1. However, the lands where the Department has full-time employees are the ones most frequented by hunters and other visitors. In order to obtain an estimate of the number of hunters and hunting days that would be affected in Phase 1, the Department utilized existing geocoded data to calculate the proportion of the total range of each hunted species that falls within Department wildlife areas and ecological reserves. These percentages were then applied to the numbers of hunters reported for each species statewide in the 2010/2011 Game Take Survey Report, the most recent report available. This method resulted in a total estimate of 4,028 hunters using Department lands that are not managed by full time employees (see Table 1 in the Appendix). Based on hunting records from Department lands with full time employees and the experience of Department wildlife biologists, this number is thought to underestimate the number of hunters and hunting days that would be affected in Phase 1. To make sure the impacts of Phase 1 are not under-reported, for this analysis we doubled the estimate to 8,070 hunters. This figure includes the 14 Nelson bighorn sheep hunters that would also be affected in Phase 1. The number of affected hunt days was then estimated by applying the average number of annual hunt days per hunter as reported by USFWS survey data.<sup>13</sup>

## **Phase 2**

The numbers of hunters and hunting days affected in Phase 2 include those who hunt upland game birds (excluding dove, quail and snipe); fur-bearing mammals; non-game mammals<sup>14</sup>; non-game birds; or any wildlife for depredation purposes. Phase 2 requires nonlead ammunition when taking these species with a shotgun, but would still allow take with traditional lead rifle ammunition. The additional numbers of affected hunters were estimated by working with Department license and validation sales and game take survey results. This subset of hunters was then added to the number of affected hunters in the Phase 1 totals.

## **Phase 3**

Phase 3, effective July 1, 2019 will constitute full implementation of the proposed regulations. While many hunters have already been in compliance with the portions of the regulations that were implemented in Phase 1 and Phase 2, these hunters will continue to be affected by the nonlead requirement in 2019 and beyond. By July 2019, the regulations will affect all hunters and hunting days in the state of California. In 2019,

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<sup>13</sup> USFWS, 2011. Revised 2014.

<sup>14</sup> Nongame mammals are defined in Fish and Game Code Section 4150 as all mammals occurring naturally in California which are not game mammals, fully protected mammals, or fur-bearing mammals.

the cumulative total number of affected hunters is estimated to be 282,987 as adjusted by the 2003 - 2013 trend line in license sales.

Table 4. Estimated Numbers of Affected Hunters By Phase

Phase	Time Period	Areas and Species	Estimated Number of Hunters Affected
1	July 1, 2015 – June 30, 2016	All Wildlife on CDFW Wildlife Areas and Ecological Reserves; Nelson Bighorn Sheep.	8,070
2	July 1, 2016 – June 30, 2019	Upland game birds (excluding dove, quail, & snipe); fur-bearing mammal; non-game mammal; non-game birds, or any wildlife for depredation purposes.	186,073
3	July 1, 2019 – onward <sup>1</sup>	All Wildlife in California.	282,987

<sup>1</sup> The total number of affected hunters in 2019 includes those in previous phases 1 and 2. The full implementation figure also takes into account population growth and the ten-year trend line in license sales. While not all hunters will be affected (e.g. those who only hunt waterfowl), this approach yields the most comprehensive estimate of potential economic effects.

## 2. Compliance Costs for Affected Parties: Hunters

The proposed regulation in prohibiting traditional lead projectiles for hunting may:

- increase the cost of ammunition (steel, copper, tungsten, and other non-lead alloys)
- require new gun purchases (in a few exceptional instances), and
- change performance which may involve recalibration costs.

### a. Ammunition Costs

Traditional ammunition prices have been increasing at unprecedented rates; for some calibers, prices have increased by two or three times since 2008. The retail cost of nonlead ammunition varies widely, depending on the caliber and design of the cartridge or projectile. Currently, nonlead ammunition can range from 30 percent more to as much as twice the price of the lead counterpart, presumably due to smaller production runs and higher component prices. In comparing market prices it depends on whether the comparison is between two premium versions in lead and nonlead, where the nonlead version may be 30 percent higher than the lead price. In contrast, comparing a lower grade lead bullet to a premium grade nonlead bullet, the price may be 50 percent to twice the price of the lead version.<sup>15</sup> In some instances the nonlead version is the

<sup>15</sup> <http://www.Huntingwithnonlead.org>, Smith, Petterson and Brown, 2014

same or less than the premium version of the lead bullet.<sup>16</sup> A 2014 Southwick Associates study using current data augmented with surveys of manufacturers predicted that supply shortfalls could push centerfire nonlead ammunition prices up to nearly three times the price of the lead counterpart (by 284%).<sup>17</sup> Accordingly, we used a range of proposed nonlead ammunition price increases in our estimates of economic impacts, but chose to work principally with the estimated nonlead ammunition cost increase of nearly twice as much or, “on average, up to 190 percent more than the equivalent traditional ammunition.”<sup>18</sup> (see Appendix, Table 2 for retail cost comparisons for lead-core and nonlead centerfire rifle ammunition for commonly used calibers, October 2014).

### **b. Firearm Incompatibility Costs**

During public outreach many hunters expressed concern that their firearms would not accommodate nonlead ammunition. In most cases this was related to antique or vintage shotguns that cannot handle the pressures of nonlead shotshells. However, it is possible that hunters using rifles firing unusual calibers may also have to retire those weapons if nonlead ammunition is not available. In those instances, modification of their current shotgun or a new firearm may be necessary. Expenditures on a new firearm would constitute a hunting equipment expenditure that is amortized over the life of the firearm in the annual expenditure calculations maintained by USFWS. We included a generous estimate (10 percent) for the instances in which such an outlay might be necessary. The additional cost of around \$1,300 for a firearm is amortized over twenty years and included in our compliance costs calculations.

### **c. Recalibration Costs**

We also heard during public outreach that nonlead ammunition performs differently and will require hunters to spend some time recalibrating, sighting and shooting to learn the different ballistic properties of the alternative ammunition. A USFWS analysis of national survey data found that 52 percent of hunters target shoot in preparation for hunting and 22 percent of hunters prepare for hunting with practice at a shooting range.<sup>19</sup> Slightly more, or 29 percent, of hunters in the Pacific region used ranges to practice, perhaps due to greater access to ranges than wild lands. That said, the data shows that most hunters practice before the hunt on unsupervised outdoor ranges on public land in the state where shooting is free. Yet many use outdoor target shooting ranges where fees run from \$10 to \$20 for a few hours of range time. We have included

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<sup>16</sup> Vernon C. Thomas, *Availability and Use of Nonlead Rifle Cartridges and Nontoxic Shot for Hunting in California, with Reference to Regulations used in Various Jurisdictions & Survey of California Ammunition Retailers to Assess Availability of Nonlead Ammunition*, prepared for the sponsors of AB 711, July 2014.

<sup>17</sup> Southwick Associates, 2014.

<sup>18</sup> *Economic Impact of Traditional Ammunition Ban*, National Shooting Sports Foundation, 2010.

<sup>19</sup> *Target Shooting by Hunters and Their Use of Shooting Ranges: 1975, 1991, and 2011*, USFWS, June 2014.

the need for an increase in expenditure for range fees and spent bullets in the transition to nonlead ammunition.

### 3. Component Costs Impact on Annual Expenditures

A prevailing concern is that these incremental cost increases will change the level of hunting activity: numbers of hunters and/or the number of hunt days, reducing hunting expenditures to a range of businesses during a hunt trip and to ammunition manufacturers and retailers. We analyzed potential compliance costs in the context of the total average annual expenditure per hunter as reported in USFWS survey data. As component costs increase, sometimes nearly doubling in the case of ammunition or in the unusual case where a firearm cannot accommodate non-lead alternative ammunition, the increase in spending may appear to be quite substantial. However, if the increased costs to comply with the proposed regulations are seen in the context of a typical year's expenditure of \$2,557 adjusted for 2013 dollars, the percentage increase in component costs constitutes only a seven percent increase.<sup>20</sup> Table 5 provides an estimate of potential component cost increases by category.

Table 5. Component Costs Increase (\$2013)

	Baseline Annual Costs	New Cost of Compliance	Increase in Cost
Ammunition	\$ 99	\$ 188	\$ 89
Recalibration Costs	\$ 40	\$ 70	\$ 30
Firearms Costs	\$ 223	\$ 288	\$ 65
Total	\$ 362	\$ 546	\$ 184

Sources: USFWS Tables 17, 20, 21 and for CA 2011, revised Feb 2014, Tables 20-22

Current hunter spending on ammunition is about four percent of total equipment and trip expenditures.<sup>21</sup> The projected increases in compliance costs as the new regulations are phased in are estimated to result in an average annual increase of \$184 to cover nonlead ammunition and additional firearm and recalibration costs. These costs would now comprise seven percent of the total annual expenditure of \$2,557.

### 4. Price Elasticity of Demand for Ammunition and for Hunting

The proposed regulations are expected to effectively increase the cost of hunting as per unit ammunition prices increase; practice and recalibration costs increase; and equipment replacement and maintenance costs increase. As the costs to pursue hunting increase, the key question is how hunters will respond. This question is essentially an exercise in determining the price elasticity of demand (PED) for hunting. Any entity, whether a private company or a public agency, when proposing a price

<sup>20</sup> USFWS, 2011, revised 2014.

<sup>21</sup> USFWS, 2011, revised 2014, Tables 20, 21.

increase needs to consider whether the price increase will result in a reduction in the quantity demanded and to what degree. If demand drops substantially in response to a price increase, the good is “price elastic.” If a good has an array of substitutes and is not a necessity, the price elasticity of demand may be more elastic. Goods that are critically necessary may be perfectly inelastic. Goods that have very few substitutes are usually price inelastic. Hunting has been found to be highly price inelastic in studies using American and Canadian data.<sup>22</sup> That is to say that hunting demand changes less than the percentage change in the costs of hunting.

Hunting Research findings:

- Inelastic PED
- Short-run more inelastic (0.21); than the Long-run (0.60)<sup>23</sup>
- Big Game (0.23) to (0.62)
- Small Game (0.36) to (1.06)<sup>24</sup>

These results suggest that hunting is a:

- Tradition-bound behavior

The price elasticity of demand is a measure of the responsiveness of the quantity demanded of a good to changes in the price of that good. The elasticity of demand for something is:

$$\text{Elasticity} = \frac{\frac{\text{Difference in Quantity}}{\text{Quantity}}}{\frac{\text{Difference in Price}}{\text{Price}}} = \frac{\text{Percent Change in Quantity}}{\text{Percent Change in Price}}$$

If PED > 1 Demand is Elastic and if PED < 1 Demand is Inelastic

The strong price inelasticity of hunting is also supported by surveys that ask hunters why they chose in the past to not hunt or to reduce their amount of hunting. Competing time commitments from work and family and declining health are the most common explanations, while increased costs to hunt rank near the bottom.<sup>25</sup>

## 5. Supply of non-lead ammunition

The change in the price of ammunition and the potential new firearm and recalibration costs are *explicit costs* changes. Comments received during outreach often referred to the limited availability of all ammunition and nonlead ammunition particularly. Reported supply bottlenecks can be viewed as increasing the *transactions costs* for acquiring non-lead ammunition. Transactions costs are the search costs, wait periods for back orders and so on, that make simply purchasing the nonlead ammunition in a chosen caliber more difficult than for traditional lead ammunition.

<sup>22</sup> *Demand for Wildlife Hunting in British Columbia*, Sun, et al., Canadian Journal of Agricultural Economics, 53, 2005, 25-46; *Economic Evaluation of Hunting in Saskatchewan*, 2006; Poudyal, et al., 2008; U.S. Forest Service, 2007; Handbook of Environmental Economics, Volume 2, Ed. Karl-Göran Mäler, et al., 2005.

<sup>23</sup> *Ibid*, Sun, et al., Canadian Journal of Agricultural Economics, 53, 2005, 25-46.

<sup>24</sup> *Economic Evaluation of Hunting in Saskatchewan*, 2006.

<sup>25</sup> *Wildlife and the American Mind, Public Opinions on and Attitudes toward Fish and Wildlife Management*, Duda, Bissell, and Young, Responsive Management, 1998.

## Supply constraints

An array of factors that could influence the price and availability of nonlead ammunition for hunting include: the price of component materials; ammunition sector investment and innovation; U.S. military demand; Bureau of Alcohol Tobacco and Firearms determinations on non-lead ammunition; legislation (such as Senate Bill 53, 2014) that would limit internet purchases of ammunition; and any number of factors outside the Commission's sphere of influence.

The Department has considered these factors and how they may contribute to limiting the supply of nonlead ammunition needed to comply with these regulations. The perceived relative availability of ammunition in various calibers has been a principle rationale for the proposed timing of the phase in. The intent is to phase in the new nonlead requirements in the least disruptive manner, while still providing enough stimulus to market demand for manufacturers to respond. As demand grows in California, the total market demand combined with other states that have nonlead ammunition programs is anticipated to incentivize larger scale production lines and, in the long run, lower consumer costs. Table 6 shows hunting days by state as an indicator of the future relative market demand for nonlead hunting ammunition by state.

Table 6. Relative Market Demand by States with Non-Lead Ammunition Programs

Hunting Days Percentages by State		
USA Total	281,884,177	100%
California	6,730,616	2.39%
Arizona	2,634,280	0.93%
Utah	2,720,463	0.97%
Minnesota	5,589,294	1.98%
Total:		6.27%

Sources: USFWS, 2011, rev. 2014, and Southwick Associates, 2014.

## E. Expected Change in Level Of Hunting Activity By Phase

The proposed regulations are to be phased in over the span of four years to be the least disruptive to the hunting community and other affected parties.<sup>26</sup> To gauge the potential impact of each successive phase, a range of potential hunting reduction rates: five percent (projected by the Department), ten percent (mid-range estimate), and 13 percent (projected by Southwick Associates, 2014) were assessed.

Based on observations of hunter response to the nonlead restrictions in the condor range, the Department anticipates that less than five percent of hunters or a drop in overall hunt days of less than five percent will occur. This is consistent with published

<sup>26</sup> Governor Edmund G. Brown Jr., Signing message for AB 711, October 11, 2013. [http://gov.ca.gov/docs/AB\\_711\\_2013\\_Signing\\_Message.pdf](http://gov.ca.gov/docs/AB_711_2013_Signing_Message.pdf)

research on the price elasticity of demand for hunting and other factors, such as the impact of tradition and previous investment in equipment that are found to influence the demand for hunting. The rate of reduction in hunting activity may vary by phase as the numbers of affected hunters and types of game varies; however for simplicity we have used the same potential reduction rate for each phase.

### 1. Impact Estimates

The following tables show the potential economic impacts if hunting were to decline by five percent, 10 percent, and 13 percent. The price elasticity of demand (PED) associated with the projected percentage change in hunting demand is indicated for each table.

Table 7. Estimated Total Annual Economic Impact of Lead Ammunition Ban by Phase:  
5% Reduction in Hunting Activity; PED = (0.68)

Phase	Change in Direct Expenditure	Total Multiplier Effect	Salaries & Wages	Jobs
1	\$ (535,041)	\$ (1,081,318)	\$ (269,126)	(9)
2	\$ (12,336,640)	\$ (24,932,349)	\$ (6,205,330)	(210)
3	\$ (13,539,407)	\$ (27,363,142)	\$ (6,810,322)	(230)

Table 8: Estimated Total Annual Economic Impact of Lead Ammunition Ban by Phase:  
10% Reduction in Hunting Activity; PED = (1.37)

Phase	Change in Direct Expenditure	Total Multiplier Effect	Salaries & Wages	Jobs
1	\$ (1,070,082)	\$ (2,162,636)	\$ (538,251)	(18)
2	\$ (24,673,280)	\$ (49,864,698)	\$ (12,410,660)	(419)
3	\$ (27,078,815)	\$ (54,726,284)	\$ (13,620,644)	(460)

Table 9: Estimated Total Annual Economic Impact of Lead Ammunition Ban by Phase:  
13% Reduction in Hunting Activity; PED = (1.78)

Phase	Change in Direct Expenditure	Total Multiplier Effect	Salaries & Wages	Jobs
1	\$ (1,391,107)	\$ (2,811,426)	\$ (699,727)	(24)
2	\$ (32,075,264)	\$ (64,824,108)	\$ (16,133,858)	(545)
3	\$ (35,202,459)	\$ (71,144,170)	\$ (17,706,837)	(598)



We also estimated the total economic impact with a nonlead ammunition price increase of 284 to 294 percent due to the increased demand driving prices up in a supply constrained market.<sup>27</sup> The estimated outcome under such conditions resulted in a projected seven percent reduction in hunting and total negative economic impact in the final implementation phase of (\$38,308,399).

## **F. CONCLUSION**

After evaluating the available information from a wide array of sources, the Department assessment supports a potential decline in hunting activity of less than five percent. The total economic and fiscal impacts are anticipated to be less than the impacts induced by a five percent reduction in hunting as fully presented in Tables 5 and 6 in the Appendix. This rate of decline in hunting, less than five percent with a price elasticity of demand less than (0.68), is not only consistent with published research on the demand for hunting, but also accords with the state's experience following the condor range lead ammunition prohibitions established in 2008.

It should be noted however, that the ban on lead ammunition in the condor range affects only about a quarter (25.8%) of California's deer hunters and a much smaller percentage of the state's total hunters. Current supplies of nonlead ammunition appear adequate to meet this volume of demand. In the event that manufacturers are unable to meet the increasing demand for nonlead ammunition as the regulations are phased in statewide, imbalances in supply and demand may make it more difficult for California hunters to obtain suitable ammunition. Under these conditions a larger percentage of hunters may reduce their hunting activity or decide not to participate altogether. If hunting participation decreases by nine percent or more, the resulting impact on total economic output will exceed the \$50 million threshold for major regulations.

### **a. Condor Range Experience 2008 to present**

Legislative analysis of the 2007 Condor bill included speculation by those opposing the bill that hunting activity could decline by as much as 25 percent based on stated preferences from surveys.<sup>28</sup> However, Department tag sales and harvest report data have shown virtually no drop in tag sales. The four-year average number of tags sold for the condor range areas prior to 2007 was 47,233. The four-year average following the implementation of the condor range lead ammunition prohibition was 46,167, constituting a drop of 2.26 percent or 1,066 fewer tags sold to hunters. It should be

<sup>27</sup> Southwick Associates, 2014.

<sup>28</sup> Assembly Committee Analysis of AB 821, 2007. "The National Shooting Sports Foundation notes that recent surveys of hunters show that as many as 25% of hunters would either quit hunting big game or hunt less in California if a ban were adopted. A decrease in hunting could result in a loss of revenue to DFG from hunting license and tag sales, taxes on ammunition sales, and other economic contributions associated with hunting."

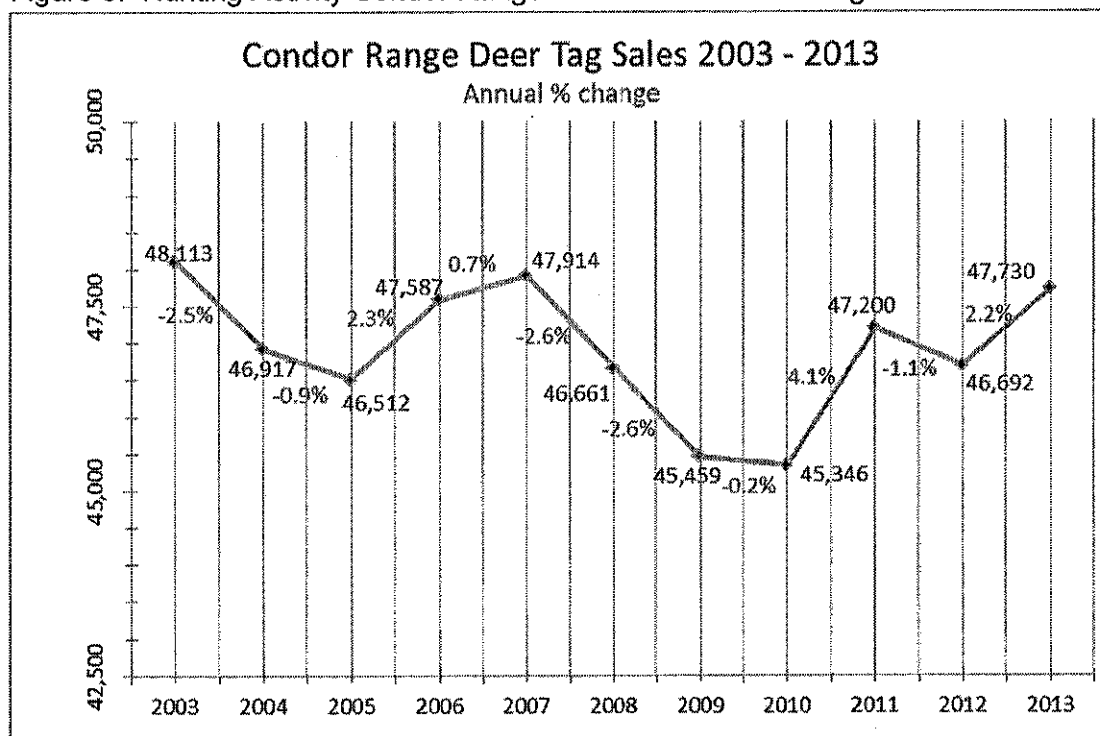
noted that variations in tag sales are influenced by a number of factors including annual tag quotas; weather; and in this time period especially, consumer sentiment given the unprecedented 2008 - 2009 financial collapse. If the same price increase anticipated for lead ammunition today were applied to the hunting demand response at that time, the price elasticity of demand would be highly inelastic at (0.32).

Table 10. Hunting Activity: Condor Range Post-2008 Lead Prohibition.

	2005-2007	2008-2011	% Change
Condor Range Deer Tags	47,233	46,167	-2.26%
Price Elasticity of Demand : 7% increase in expenditure			(0.32)

Sources: LRB and WLB.

Figure 3. Hunting Activity Condor Range Pre- and Post-2008 Regulation



Sources: LRB and WLB.

Table 11. Deer Tag Sales in Condor Range by Zone: 2003 - 2013

Deer Tag Sale Statistics - pre & post lead prohibition

Zone/Hunt	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Tags Sold	Tags Sold	Tags Sold	Tags Sold	Tags Sold	Tags Sold	Tags Sold	Tags Sold	Tags Sold	Tags Sold	Tags Sold
A (110)	21,296	21,008	20,056	19,896	19,896	18,843	18,194	17,580	18,577	18,207	18,917
G8**	60	20	20	20	20	20	20	20	20	20	20
G9**	30	30	30	30	30	30	30	30	-	-	-
G11***	500	500	500	500	500	500	500	500	500	500	501
G21	25	25	25	25	25	25	25	25	25	25	25
J10	40	60	60	40	85	85	85	85	85	85	85
MA 1	150	150	150	150	150	150	150	150	150	150	150
MA 3	150	150	150	150	150	150	150	150	150	150	150
total A	21,751	21,443	20,491	20,811	20,856	19,893	19,154	18,540	18,507	19,137	19,848
D7 general	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	8,999	9,001
D8 general	7,031	6,983	7,149	7,260	7,310	7,389	7,421	7,296	7,425	7,140	7,551
G6	50	50	50	50	50	60	50	50	50	50	50
total D8	7,081	7,033	7,199	7,310	7,360	7,439	7,471	7,346	7,475	7,190	7,601
D9 general	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
D10 general	700	588	623	517	584	548	425	550	622	625	604
D11 general	4,161	3,107	3,925	4,749	4,610	4,517	4,006	4,209	4,713	4,696	4,856
J13	40	40	40	40	40	40	40	40	40	40	40
total D11	4,201	3,147	3,965	4,789	4,650	4,557	4,046	4,249	4,753	4,736	4,896
D13 general	3,230	3,556	3,084	3,010	3,314	3,164	3,213	3,511	3,693	3,859	3,630
M7	150	150	150	150	150	150	150	150	150	150	150
total D13	3,380	3,706	3,234	3,160	3,464	3,314	3,363	3,661	3,843	4,005	3,780
Condor Range Total	48,113	48,917	48,512	47,587	47,914	46,661	45,459	45,346	47,200	46,892	47,730
Percentage Change		-2.6%	-0.9%	2.3%	0.7%	-2.6%	-2.6%	-0.2%	4.1%	-1.1%	2.2%

\*Tags Sold = 60% of total A zone tag sales; \*\*1/2 public, 1/2 military; \*\*\*all military

Sources: LRB and WLB.

**b. Licensed Hunters Historical Record**

Additionally, projections of a 10 percent or 13 percent drop in hunting participation are without precedent in Department records. At no time in history, even with the dramatic drops in hunting participation in the 1970s through the 1980s, did the state experience an annual drop higher than nine percent. The year with the highest drop was 8.8% from 1973-1974. Moreover annual changes in the numbers of hunters since 2000 have not exceeded three percent up or down. The average annual percentage change from 2000 to 2013 is less than one percent (-0.71%).

Table 12. Hunting Licenses and Annual Percentage Change from 2000 to 2013.

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
317,517	320,823	316,249	306,747	299,293	298,212	301,668	297,612	293,231	289,609	287,229	282,266	284,218	287,052
-0.03%	1.0%	-1.4%	-3.0%	-2.4%	-0.4%	1.2%	-1.3%	-1.5%	-1.2%	-0.8%	-1.7%	0.7%	1.0%

Source: LRB, 2014.

**c. Federally Mandated Waterfowl Lead Prohibition**

In 1991 the use of lead ammunition to hunt waterfowl was banned across the entire country. Many states phased the prohibition in stages as was the case for California. License sales statistics show that waterfowl hunters continued to hunt at similar levels throughout the phase in period of the federal ban on lead shot from 1985 to 1991 in the

state of California. Initially some hunters reported dissatisfaction with the performance of nonlead alternatives, particularly steel shot. Over the course of a few years, ammunition manufacturers responded and developed a wide variety of nonlead shot alloys such as: tungsten-bronze-iron, tungsten-iron, and tungsten-tin-bismuth. Steel shot shotgun shell loads have undergone significant improvements as well. Overall it is reported that the required compliance across the country triggered industry to respond with new products that improved performance and brought costs down as materials costs permit.<sup>29</sup>

#### **d. Other States**

Arizona and Utah have nonlead programs that include some cost offsetting by the state and third parties. Compliance rates have been high with no reduction in numbers of hunters. Arizona Game and Fish implemented a voluntary nonlead program in 2005 to reduce the amount of lead in their condor range. The state has been offering hunters free non-lead ammunition if they hunt in condor territory. Over 2011 to 2013, Arizona surveyed hunters and found that 88 percent were in compliance voluntarily. The survey also found that the majority were satisfied with the performance of nonlead ammunition. In 2011, Utah launched a voluntary non-lead ammunition program similar to Arizona's. The program expanded substantially in 2013. Big game hunters that hunt in condor territory receive coupons for free non-lead ammunition. Utah has been aided by a third party, The Peregrine Fund, which has donated prizes to encourage increased use of nonlead ammunition to help restore condor populations. Minnesota has a program advocating the use of nonlead ammunition for the preservation of raptors and moreover, for the health of those who consume wild game. Several states (34 or more) have nonlead programs for specific species, and/or by specific areas. These states' more limited programs have not been shown to deter hunting in the specific regulated areas within each state.

#### **G. Alternatives to the Proposed Project**

As enacted, Fish and Game Code section 3004.5 requires full implementation of the ban on the use of nonlead ammunition for the take of wildlife by July 1, 2019. The law also requires that the Commission implement, in advance of July 1, 2019, any of the statute's requirements that can be implemented practicably, thus the range of alternatives to the proposed project is limited. With that in mind, three alternative approaches to the phasing in of nonlead ammunition were developed based on evidence and input received during 16 pre-notice public outreach meetings. These alternatives to the proposed regulations are considered below:

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<sup>29</sup> *Non-Toxic Shot Buyer's Guide*, Frank Ross, Cabela's.com.

### Alternative 1. Early Implementation

Alternative 1 consists of full implementation of section 3004.5 on July 1, 2015. This early implementation of the requirement to use nonlead ammunition would result in the highest risk of economic impacts to hunting activities, but would also immediately reduce lead introduced to the environment through hunting activities. Ingestion of lead fragments or pellets in carcasses and gut piles by scavenging wildlife should be reduced or eliminated with associated reductions in blood lead levels and potential lead poisoning in predatory and scavenging birds.<sup>30</sup> While this alternative may provide near term benefits to wildlife as compared to the other alternatives, it may not be practicable based on the current availability of nonlead rifle and shotgun ammunition. Ammunition in general is in short supply both in California and nationwide, leading to shortages and backorders for even traditional ammunition. Based on the limited capacity of manufacturers to increase production, it is likely not practicable to meet the demand for nonlead ammunition in California as early as 2015. We estimated the economic impacts resulting from a 13 percent reduction in hunting as predicted by a recent Southwick Associates analysis.<sup>31</sup> This alternative would be most disruptive to hunting activity in the state and the sectors of the economy that depend on hunting due to the higher likelihood of supply shortfalls to meet a sudden increase in demand.

Table 13. Alternative 1: Potential Economic Impacts (\$2013)

Effective date	Projected Percent Change	Change in Direct Expenditure	Total Multiplier Effect	Salaries & Wages	Jobs
July 1, 2015	5%	\$ (13,539,407)	\$ (27,363,142)	\$ (6,810,322)	(230)
July 1, 2015	10%	\$ (27,078,815)	\$ (54,726,284)	\$ (13,620,644)	(478)
July 1, 2015	13%	\$ (35,202,459)	\$ (71,144,170)	\$ (17,706,837)	(598)

See the Appendix, Table 3 for more detail on data sources.

### Alternative 2. Modified Implementation Phasing

This alternative would accomplish the transition to nonlead ammunition in two phases as opposed to the three outlined in the proposed regulations. Alternative 2 would advance the implementation process by combining phases 1 and 2 of the proposed project with an effective date of July 1, 2015. Full implementation would remain at July 1, 2019. Under Alternative 2, hunters on Department lands, bighorn sheep hunters, and hunters using a shotgun to take specified upland game birds, small game mammals, furbearing mammals, nongame mammals, nongame birds, and any wildlife for depredation purposes, would be required to use nonlead ammunition after July 1, 2015.

<sup>30</sup> Kelly et al., Impact of the California lead ammunition ban on reducing lead exposure in golden eagles and turkey vultures, Conservation Biology, 2011.

<sup>31</sup> Southwick Associates, 2014.

Because nontoxic shot has been required for waterfowl hunting nationwide since 1991, nonlead shot shells in waterfowl sizes are thought to be widely available.<sup>32</sup> For this reason, it is potentially practicable to phase in take of wildlife with a shotgun using waterfowl-sized shot in 2015. Because of extremely limited supplies of nonlead .22 and .17 rimfire ammunition, and the resulting economic impact, small game and nongame species could still be taken with traditional lead ammunition until July 1, 2019. While precise estimates cannot be made, this alternative is anticipated to disrupt hunting activity to a greater extent (reducing hunting activity by nearly 10%) than the proposed regulations due to the higher likelihood of ammunition supply deficiencies. The total impacts under this alternative could approach \$50 million in a twelve month period after Phase 1 and exceed \$50 million during the year after full implementation in 2019.

Table 14. Alternative 2: Potential Economic Impacts (\$2013)

Effective date	Projected Percent Change	Change in Direct Expenditure	Total Multiplier Effect	Salaries & Wages	Jobs
July 1, 2015	5%	\$ (12,336,640)	\$ (24,932,349)	\$ (6,205,330)	(210)
July 1, 2019		\$ (13,539,407)	\$ (27,363,142)	\$ (6,810,322)	(230)
July 1, 2015	10%	\$ (24,673,280)	\$ (49,864,698)	\$ (12,410,660)	(419)
July 1, 2019		\$ (27,078,815)	\$ (54,726,284)	\$ (13,620,644)	(478)
July 1, 2015	13%	\$ (32,075,264)	\$ (64,824,108)	\$ (16,133,858)	(545)
July 1, 2019		\$ (35,202,459)	\$ (71,144,170)	\$ (17,706,837)	(598)

See the Appendix, Table 3 for more detail on data sources.

### Alternative 3. Delayed Implementation (No Project)

The third alternative, which is also the “No Project” alternative that will occur if the Commission takes no action, consists of no implementation occurring until July 1, 2019. Implementation on July 1, 2019 would minimize the near term impacts on recreation as compared to the proposed regulations. This alternative would give ammunition manufacturers the maximum amount of time to increase production of nonlead ammunition in anticipation of the increased demand by California hunters after July 1, 2019. While this alternative would likely be less disruptive to hunting-based recreation in the short run, it provides less incentive to manufacturers to begin increasing production of nonlead ammunition. Moreover, it does not meet the requirements of the statute to implement all or portions of the law in advance of July 1, 2019 if it is practicable to do so. Given that the statutory requirements are not met, this alternative cannot be recommended.

<sup>32</sup> Vernon G. Thomas, July 2014.

## H. Economic Impact on other Affected Parties: Businesses

### 1. Affected Hunting Trip-Related Businesses

Businesses that serve hunters on hunt trips could expect marginal changes in the volume of visitors to hunting areas. Hunters spend at a variety of establishments while traveling to hunting areas and in the rural communities near the hunting areas. These establishments include Campgrounds (35%); Lodging (23%); Restaurants (23%); Retail markets (13%); and Gas stations (6%).

### 2. Ammunition Manufacturers

Being the most populous state, California has been a large market for ammunition manufacturers. The fastest growing segment, the target shooting market (52%) will not be impacted by the proposed regulations; neither will the ammunition sectors' growing exports. The share of consumer sales to hunters nationally constitutes approximately 40 percent. Industry annual reports say that the historic levels of firearms and ammunition sales are expected to continue after a mild tempering in the rate of growth after 2013.<sup>33</sup> Steady growth in the target shooting market is expected to mitigate any shifts in hunting equipment sales. Lead ammunition supplies are expected to continue to be in strong demand by target shooters, personal protection consumers, and hunters outside California. With the phase in of the proposed regulations, hunters may be expected to purchase more nonlead ammunition at higher per unit costs, which should yield higher per unit margins until manufacturer competition and higher production runs reduce costs.<sup>34</sup>

Table 15. Firearms and Ammunition Manufacturer Annual Sales and Growth Rates

Year End Dec 31, 2013	Net Revenue		Growth		(Millions\$)
	2013	Rate %	2012	Rate %	
Firearms	\$ 740	26%	\$ 551	23%	\$ 426
Ammunition	\$ 437	24%	\$ 332	5%	\$ 314
All Other	\$ 92	46%	\$ 49	28%	\$ 35
Totals	\$ 1,268	27%	\$ 932	17%	\$ 775

Sources: Freedom Group Annual Reports, 2012, 2013 and 2014(Q2).

### 3. Hunting Equipment Retailers

Despite slow growth in the overall U.S. economy, the hunting equipment retailing market has grown by 22% between 2006 and 2010.<sup>35</sup> The possibility of higher margins on nonlead ammunition along with the inducement for new firearms sales are

<sup>33</sup> Freedom Group Annual Report 2014.

<sup>34</sup> *Hunting and Sporting Goods Retailing Report*, Mintel Associates, 2012.

<sup>35</sup> Mintel Group.

anticipated to increase revenues in this sector. Many large hunting equipment retailers have close ties to large manufacturer groups that enable favorable product mix and stocking strategies. Approximately 45 percent of the Freedom Group commercial net sales in 2013 were directly to major retail and sporting goods chains, such as Cabela's, Gander Mountain, Academy Sports + Outdoors, Wal-Mart, Bass Pro Shops and Dick's Sporting Goods. Many large equipment retailers also have a strong internet sales presence that greatly expands their consumer base beyond California. Efficient inventory relationships with large manufacturers, along with a large non-hunting consumer base should mitigate any reductions (due to a potential five percent reduction in hunting) in revenue to large equipment retailers. Smaller hunting goods retailers that serve largely local markets may have more difficulty in maintaining a favorable product mix, including new nonlead ammunitions.

### I. Fiscal Impact

The fiscal impact of the proposed regulations during each year through the phase in period was assessed. Although any decline in hunting activity is anticipated to be less than five percent, we present the resulting fiscal impacts with a projected five percent decline in hunting activity.

Table 16. Summary Projected Fiscal Impacts by Phase (\$2013)

Phase	Time Period	Projected Change In Total Hunt Days by Phase	Baseline CDFW License & Tag Sales Revenue <sup>2</sup>	CDFW License & Tag Sales Revenue Impact <sup>3</sup>	Pittman-Robertson Excise Tax Revenues Impact <sup>4</sup>	CDFW Expenditure Impact <sup>5</sup>	CDFW Total Revenue Impact	Projected Sales & Motor Fuel Tax Revenue to State <sup>6</sup>	State Income Tax
1	July 1, 2015 - June 30, 2016	(6,860)	\$ 840,724	\$ (42,036)	\$ (1,324)	\$ (45,000)	\$ (88,360)	\$ (36,383)	\$ (12,840.98)
2	July 1, 2016 - June 30, 2019	(158,162)	\$ 19,384,882	\$ (969,244)	\$ (30,533)	\$ -	\$ (999,777)	\$ (838,892)	\$ (296,079.36)
3	July 1, 2019 - June 30, 2020 One Year Full Implementation	(173,582)	\$ 21,274,822	\$ (1,063,741)	\$ (33,510)	\$ -	\$ (1,097,251)	\$ (920,680)	\$ (324,945.78)

See the Appendix, Table 4 for more detail on data sources.

#### 1. Pittman-Robertson Excise Tax Revenue

The Pittman-Robertson (PR) allocation method takes land mass, population, and numbers of hunting licenses compared to that of the entire country into consideration. California with the largest population and third largest land mass receives the maximum (five percent of the total) allowable under those criteria. These factors along with the tremendous growth in the PR country-wide total fund suggest that the California allocation level will not be significantly impacted by consequences of the proposed regulations. Any change in the amount allocated to the state would more likely be a result of changes in the collection of PR excise tax funds from firearms and ammunition equipment sales across the country.



Table 17. Top Five Pittman-Robertson Fund States 2014 with Allocation Criteria

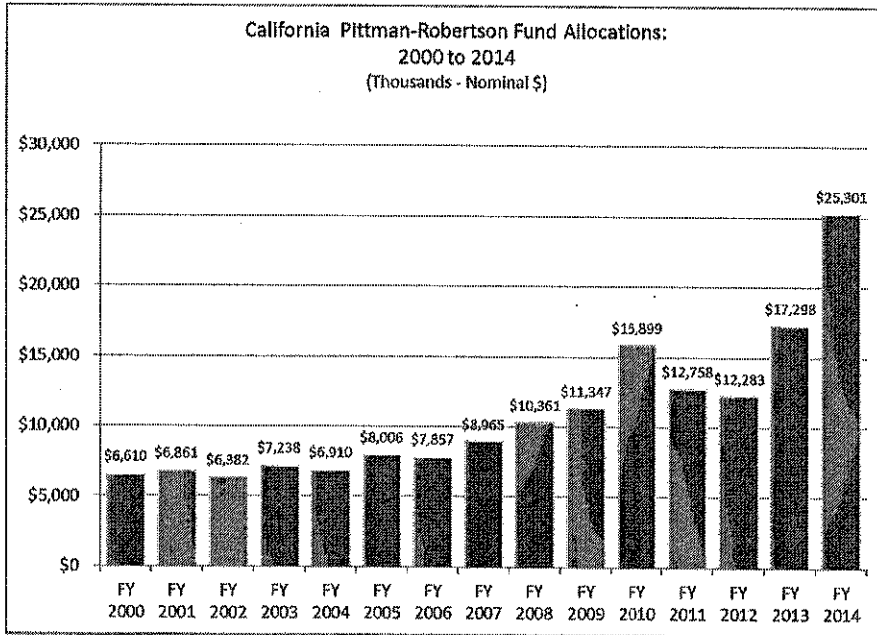
	2013 Hunting Licenses	2014 PR Fund Allocation	Hunter /Pop	Hunters /USAHunters	State Pop /USAPop	State Land /USALand	Rank
TX	1,036,946	\$ 35,275,009	4.26%	7.09%	8.02%	7.40%	1
AK	101,547	\$ 32,511,089	14.80%	0.69%	0.23%	16.17%	2
PA	968,735	\$ 27,975,344	7.78%	6.62%	4.10%	1.27%	3
CA	281,472	\$ 25,301,091	0.77%	1.92%	12.11%	4.41%	4
MI	786,880	\$ 25,028,297	7.61%	5.20%	3.30%	1.61%	5

Source: USFWS, Pittman-Robertson Allocation to states, 2014.

It is notable that in 2008 the year that the condor range nonlead regulations went into effect, license sales dipped by 2.6 percent, but the allocation of Pittman-Robertson Funds increased by 16 percent, or by \$1.4 million. The following year the state's allocation increased another 10 percent, or by \$1 million.

The USFWS has projected a downturn in the total allocation of funding largely driven by the moderation in firearms and ammunition sales starting in 2014 across the country. The overall sum total of funds collected across the country, from which each state receives an apportionment, is likely to impart a larger influence than any change in total hunting license sales on Pittman-Robertson funding for the state of California.

Figure 4. Pittman-Robertson California Allocation: 2000 to 2014



Source: USFWS, Pittman-Robertson Allocation to states, 2014.

## 2. Department License Sales Revenue

The impact on Department Licenses and Tag Sales revenue is estimated with a projected five percent decline in total hunting activity in Table 18 below.

Table 18. Projected CDFW License Sales Revenue Impact by Phase (\$2013)

Phase	Time Period	Projected Change in Total Hunt Days by Phase	Baseline CDFW License & Tag Sales Revenue <sup>2</sup>	CDFW License & Tag Sales Revenue Impact <sup>3</sup>
1	July 1, 2015 - June 30, 2016	(6,860)	\$ 840,724	\$ (42,036)
2	July 1, 2016 - June 30, 2019	(158,162)	\$ 19,384,882	\$ (969,244)
3	July 1, 2019 - June 30, 2020 One Year Full Implementation	(173,582)	\$ 21,274,822	\$ (1,063,741)

<sup>2</sup> & <sup>3</sup>: See the Appendix, Table 4 for more detail on data sources.

### 3. Department Expenditure

The Department is projected to spend roughly \$45,000 in regulation development and outreach in the year preceding the promulgation of the proposed regulations in July 1, 2015. Thereafter few additional expenditures are foreseen for the Department.

### 4. State Sales Tax Revenue

The impact on State Sales Tax revenue is estimated with a projected five percent decline in total hunting activity.

Table 19. Project State Sales Tax Revenue by Phase (\$2013)

Phase	Time Period	Projected Sales & Motor Fuel Tax Revenue to State
1	July 1, 2015 - June 30, 2016	\$ (36,383)
2	July 1, 2016 - June 30, 2019	\$ (838,892)
3	July 1, 2019 - June 30, 2020 One Year Full Implementation	\$ (920,680)

See the Appendix, Table 4 for more detail on data sources.

## 5. State Income Tax

The impact on State Income Tax revenue is estimated with a five percent decline in total hunting activity.

Table 20. Project State Income Tax by Phase (\$2013)

Phase	Time Period	State Income Tax
1	July 1, 2015 - June 30, 2016	\$ (12,841)
2	July 1, 2016 - June 30, 2019	\$ (296,079)
3	July 1, 2019 - June 30, 2020 One Year Full Implementation	\$ (324,946)

See the Appendix, Table 4 for more detail on data sources.

## J. Effects of the regulation on the creation or elimination of jobs within the State

The Department does not anticipate any significant impacts on the creation or elimination of jobs, because the phase in structure should minimize any disruptions in hunting activity, and the resulting economic activity, over four years. The multiplier for jobs in the hunting, ammunition manufacturing, and outdoor sports retail sectors is 17 jobs per million dollars in direct expenditure. If full implementation precipitates a five percent reduction in hunting activity, approximately 230 jobs could be eliminated across the state. The impact on job creation and elimination is estimated with a projected five percent decline in total hunting activity in Table 21.

Table 21. Projected Impact on Jobs (\$2013)

Phase	Change in Direct Expenditure	Total Multiplier Effect	Salaries & Wages	Jobs
1	\$ (535,041)	\$ (1,081,318)	\$ (269,126)	(9)
2	\$ (12,336,640)	\$ (24,932,349)	\$ (6,205,330)	(210)
3	\$ (13,539,407)	\$ (27,363,142)	\$ (6,810,322)	(230)

See the Appendix, Table 3 for more detail on data sources.

## K. Effects of the regulation on the creation of new businesses or the elimination of existing businesses within the State

The Department does not anticipate significant impacts on the creation of new business or the elimination of existing businesses in California. However, some new business activity may be spurred to serve hunters' needs for nonlead ammunition, hand-loaded bullets, and practice time on shooting ranges.

## **L. Effects of the regulation on the expansion of businesses currently doing business within the State**

The Department anticipates the potential for some expansion of businesses currently doing business in California that manufacture or sell nonlead ammunition. Hunting guides and/or shooting ranges that may aid in the acquisition and transition to the use of nonlead ammunition may also have the potential to expand.

## **M. Benefits of the Regulations**

### **1. Benefits of the regulation to the health and welfare of California residents**

The Department anticipates benefits to the health and welfare of California residents from better protection of the State's natural resources and through the better management of toxic lead substances that may be deleterious to those who consume wild game. Lead shot can fragment into tiny pieces and spread out several inches from the entry point into tissue even if the main shot pieces exit the animal.<sup>36</sup> Consequently, the amount of lead in processed game meat, particularly ground venison, has been shown, in some instances, to exceed levels thought to be suitable for human consumption. A number of studies have reported elevated lead levels in humans that rely on lead-shot meat for subsistence.<sup>37</sup> More recently, there is evidence that lead levels in people who eat game harvested with lead ammunition can be elevated as well.<sup>38</sup> Children can be particularly sensitive to lead poisoning and even very low levels of lead can cause permanent cognitive damage.<sup>39</sup>

### **2. Benefits of the regulation to worker safety**

The Department does not anticipate any benefits to worker safety because this regulatory action will not impact working conditions or worker safety.

### **3. Benefits of the regulation to the State's environment:**

The Department anticipates benefits to the environment through the better management of toxic lead substances that can be deleterious to wildlife, including threatened and/or endangered species. Scavenging and predatory birds are highly susceptible to lead poisoning when they consume lead shot or fragmented lead bullets in hunter-killed carcasses or discarded gut piles. Some ground feeding species such as mourning doves, wild turkeys, and pheasants may consume lead pellets inadvertently as they forage for seeds.

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<sup>36</sup> Tsuji et al. 2009, Hunt et al. 2009, Pain et al. 2010.

<sup>37</sup> Johansen et al. 2004, Johansen et al. 2006, Tsuji et al. 2008.

<sup>38</sup> Iqbal, S., et al., Hunting with lead: association between blood lead levels and wild game consumption, National Institutes of Health, 2009.

<sup>39</sup> Lanphear et al., Low-Level Environmental Lead Exposure and Children's Intellectual Function: An International Pooled Analysis, Environmental Health Perspectives, 113(7): 894-899, Jul 2005.

#### **4. Investment and Incentives**

It is difficult to measure the change in investment that this regulation could induce however generally new requirements may induce compliance investment. In this case, environmental externalities, such as lead bullet fragments, have not been recognized as costs internal to the firm such that firms have under-invested in environmentally sound technology. Since the environmental consequences of lead ammunition, have precipitated public and legislative action, now new government regulations may act as critical triggers to prompt investment. As larger shares of the ammunition manufacturing sector are compelled to invest to development new products that comply with new standards, the spread of new technologies may eventually bring costs down and externalities as well.

#### **5. Incentives for Innovation in Products, Materials, or Processes**

Innovation typically involves research and development expenditures and prototype development at less than cost-effective scales of production. Moreover, firms that invest in innovation often have difficulty retaining all of the benefits of their expenditures because their new technologies may be copied by competing firms. In this instance the proposed regulations will spur incentives to innovate in a larger variety of nonlead ammunition types than are currently available. Over time competition among manufacturers is expected to promote innovation in ballistics performance and to reduce production costs that may be passed onto consumers.

#### **N. Personal Income**

The direct and indirect impacts of projected decreases in direct expenditure by hunters is not expected to register any difference to the state's aggregate level of personal income, which was \$1,856,614 million in 2013 (Bureau of Economic Analysis data series as posted by the California Department of Finance).

#### **O. Gross State Product**

Gross State Product (\$ 2.2 trillion in 2013, California Department of Finance) is not expected to register much overall change as a result of the implementation of the proposed regulations. Hunters constitute less than one percent of the state's population. The businesses supported by hunting activity are also supported by growing customer bases in target shooting, fishing, camping and wildlife watching. Industry studies have reported significant growth in firearms, ammunition, hunting and outdoor sporting goods market sectors of over 22 percent annually since 2009.<sup>40</sup>

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<sup>40</sup> *Hunting and Fishing Equipment U.S. Market Report 2006-2010*, Mintel Group, 2012; Freedom Group Annual Reports 2010 through to 2014.

## References

American Sportfishing Association, State and National Economic Effects of Fishing, Hunting and Wildlife-Related Recreation on U.S. Forest Service-Managed Lands, for U.S. Department of Forestry and U.S. Department of Agriculture, 2007.

Caldwell, K.L. and M.J. Brown, Hunting with lead: Association between blood lead levels and wild game consumption. *Environmental Research* 109: 952–959, 2009.

California Department of Fish and Wildlife, Report of the 2010/11 Game Take Hunter Survey, Wildlife Branch, 2012.

Derek Murray Consulting Associates, Economic Evaluation of Hunting in Saskatchewan, for Saskatchewan Environment, 2006.

Duda, Bissell, and Young, Wildlife and the American Mind, Public Opinions on and Attitudes toward Fish and Wildlife Management, Responsive Management, 1998.

Freedom Group Annual Reports 2010 through to 2014.

Gartner, William C., et al., Trends in Outdoor Recreation, Leisure, and Tourism, 2004.

Hunt, W.G., R.T. Watson, J.L. Oaks, C.N. Parish, K.K. Burnham, et al. Lead Bullet Fragments in Venison from Rifle-Killed Deer: Potential for Human Dietary Exposure, 2009.

Iqbal, S., W. Blumenthal, C. Kennedy, F. Yip, S. Pickard, W.D. Flanders, K. Loring, K. Kruger, Hunting with lead: association between blood lead levels and wild game consumption, National Institutes of Health, *Environmental Research*, Nov;109(8):952-9. 2009.

Johansen, P., G. Asmund, and F. Riget, High human exposure to lead through consumption of birds hunted with lead shot. *Environ Pollut* 127: 125–129, 2004.

Johansen, P., H.S. Pedersen, G. Asmund, and F. Riget, Lead shot from hunting as a source of lead in human blood. *Environ Pollut* 142: 93–97, 2006.

John Dunham and Associates, Economic Impact of Traditional Ammunition Ban, for National Shooting Sports Federation, 2010.

Kelly et al., Impact of the California lead ammunition ban on reducing lead exposure in golden eagles and turkey vultures, 2011.

Mäler, Karl-Göran, et al., Handbook of Environmental Economics, Volume 2, 2005.

Minnesota IMPLAN Group, Inc., 2014.

Mintel Associates, Hunting and Fishing Equipment U.S. Market Report 2006-2010, 2012.

Pain, D.J., R.L. Cromie, J. Newth, M.J. Brown, E. Crutcher, et al., Potential Hazard to Human Health from Exposure to Fragments of Lead Bullets and Shot in the Tissues of Game Animals, 2010.

Poudyal, Neelam, Seong Hoon Cho and J.M. Bowker, Demand for resident hunting in the Southeastern United States, Human Dimensions of Wildlife, 13:158-174, 2008.

Ross, Frank, Non-Toxic Shot Buyer's Guide, <http://www.cabelas.com/product/Non-Toxic-Shot-Buyers-Guide/532009.uts>

Smith, Petterson and Brown, <http://www.Huntingwithnonlead.org>, 2014.

Southwick Associates, Effects of the Ban on Traditional Ammunition for Hunting in California on Hunting Participation and Associated Economic Measures, Prepared for National Shooting Sports Foundation (NSSF) Sept. 2014.

State of California, Department of Finance, Report P-1 (County): State and County Total Population Projections, 2010-2060. Sacramento, California, January 2013.

State of California, Department of Finance, Report P-1 (Race): State and County Population Projections by Race/Ethnicity, 2010-2060. Sacramento, California, January 2013.

State of California, Department of Finance, Economic Research Unit Forecasts:  
National Economic Forecast — Annual & Quarterly  
California Economic Forecast — Annual & Quarterly  
Consumer Price Index (CPI) Forecast — Annual & Monthly

Sun, et al., Demand for Wildlife Hunting in British Columbia, Canadian Journal of Agricultural Economics, 53, 2005, 25-46. 2005.

Thomas, Vernon C., Availability and Use of Nonlead Rifle Cartridges and Nontoxic Shot for Hunting in California, with Reference to Regulations used in Various Jurisdictions & Survey of California Ammunition Retailers to Assess Availability of Nonlead Ammunition, prepared for the sponsors of AB 711, July 2014.

Tsuji, L.J.S., B.C. Wainman, I.D. Martin, C. Sutherland, J-P. Weber, et al., Lead shot contribution to blood lead of First Nations people: the use of lead isotopes to identify the source of exposure. *Sci Total Environ*, 2008.

Tsuji, L.J.S. B.C. Wainman, R.K. Jayasinghe, E.P. VanSpronsen, and E.N. Liberda, Determining Tissue-Lead Levels in Large Game Mammals Harvested with Lead Bullets: Human Health Concerns. *Bulletin of Environ Contam Toxicology* 82:435–439, 2009.

U.S. Environmental Protection Agency, Best management practices for lead at outdoor shooting ranges, EPA-902-B-01-001, 2001.

U.S. Fish and Wildlife Service (USFWS), Fishing, Hunting, and Wildlife-Associated Recreation, 2011, Revised 2014.

U.S. Fish and Wildlife Service (USFWS), Fishing, Hunting, and Wildlife-Associated Recreation for California, 2011, Revised 2014.

U.S. Fish and Wildlife Service (USFWS), Pittman-Robertson Fund Allocation Reports, 2000 to 2014.

U.S. Fish and Wildlife Service (USFWS), Target Shooting by Hunters and Their Use of Shooting Ranges: 1975, 1991, and 2011, USFWS, June 2014.



## Appendix

Table 1 Numbers of Hunters using Wildlife Areas and Ecological Reserves 2010.

COMMON NAME	TOTAL ACREAGE SPECIES RANGE	ACREAGE OF SPECIES RANGE WITHIN WILDLIFE AREAS	% OF RANGE ON WILDLIFE AREAS	ECOLOGICAL RESERVE	% OF RANGE ON COMBINE LANDS (WA AND ER)	2010 GAME TAKE SURVEY HUNTER NUMBERS	ESTIMATED NUMBER OF HUNTERS USING DFW LANDS
Band-tailed Pigeon	53,553,237	316,222	0.590%	66,663	0.715%	3,914	28
Black Bear	39,113,760	96,333	0.246%	52,171	0.380%	24,844	94
Black and White-tailed Jackrabbit	97,562,333	693,390	0.711%	125,074	0.839%	8,546	72
Brush Rabbit	43,594,547	288,561	0.662%	76,307	0.837%	9,904	83
All Quail	98,837,024	688,013	0.696%	125,237	0.823%	69,248	570
Chukar	27,238,914	219,519	0.806%	67,392	1.053%	9,984	105
Mourning Dove	92,777,161	694,429	0.748%	125,237	0.883%	86,900	768
Blacktail and Mule Deer	69,946,156	464,183	0.664%	84,516	0.784%	142,421	1,117
Pheasant	20,777,064	216,264	1.041%	27,007	1.171%	27,689	324
Sooty and Ruffed Grouse	25,499,874	54,361	0.213%	1,304	0.218%	5,378	12
Sage Grouse	3,422,120	50,327	1.471%	1,276	1.508%	85	1
Snipe	72,058,390	466,712	0.648%	93,815	0.778%	1,384	11
Turkey	23,691,870	164,681	0.695%	26,332	0.806%	52,235	421
Western Gray Squirrel	45,843,462	337,555	0.736%	50,494	0.846%	11,342	96
Wild Pig	19,777,167	114,609	0.580%	55,760	0.861%	37,806	326
<b>Totals:</b>						491,680	4,028

Sources: Report of the 2010/11 Game Take Hunter Survey; Department Biogeographic data.

Table 2

Retail cost comparison of lead-core and nonlead centerfire rifle ammunition for commonly used calibers

Cartridge	Bullet		Bullet Mass (grains)	Retail Price Per box of 20
	Composition	Product Name		
.223 Remington	Nonlead	Barnes VOR-TX	55	26.99
		Nosler Custom Ballistic Tip	35	22.99
	Lead-core	Federal Premium	55	27.99
		Winchester Silvertip	55	27.99
		Remington Hypersonic Power Lokt	62	25.99
	.243 Winchester	Nonlead	Federal Premium VITAL SHOK Trophy Copper	85
Hornady GMX			85	35.99
Lead-core		Federal Premium	95	29.99
		Winchester Ballistic Silvertip	55	34.99
		Remington Hypersonic	100	25.99
.270 Winchester		Nonlead	Federal Premium VITAL SHOK Trophy Copper	130
	Barnes VOR-TX		130	42.99
	Hornady GMX		130	41.99
	Lead-core	Federal Premium	130	31.99
		Winchester Ballistic Silvertip	130	32.99
		Remington Core Lokt	130	22.49
7 mm Remington	Nonlead	Barnes VOR-TX	150	45.99
		Hornady GMX	139	46.99
		Federal Premium VITALSHOK Trophy Copper	150	43.99
	Lead-core	Federal Premium	140	32.99
		Winchester Ballistic Silvertip	140 & 150	38.99
		Remington Core Lokt	150 & 175	30.99
.30-06	Nonlead	Federal Premium VITAL SHOK Trophy Copper	165 & 180	37.99
		Barnes VOR-TX	150	42.99
		Hornady GMX	165	41.99
	Lead-core	Federal Premium	180	37.99
		Federal Premium	150 & 165	31.99
		Winchester Ballistic Silvertip	150, 168 & 180	33.99
.300 Winchester	Nonlead	Federal Premium VITAL SHOK Trophy Copper	165 & 180	46.99
		Barnes VOR-TX	165 & 180	48.99
		Hornady GMX	165	46.99
	Lead-core	Federal Premium	165	41.99
		Winchester Ballistic Silvertip	150	41.99
		Remington Core Lokt	150 & 180	30.99
.308 Winchester	Nonlead	Federal Premium VITAL SHOK Trophy Copper	165	37.99
		Barnes VOR-TX	150	41.99
		Nosler E-Tip	150	34.99
	Lead-core	Federal Premium	165	31.99
		Winchester Ballistic Silvertip	150	32.99
	.375 H & H	Nonlead	Hornady GMX	250
Lead-core		Federal Premium	300	79.99
		Nosler Custom Trophy Fusion Safari Rifle	260 300	69.99 67.99
<a href="http://www.cabelas.com">http://www.cabelas.com</a>		Accessed 10/7/2014		
<a href="http://www.sportsmanswarehouse.com">http://www.sportsmanswarehouse.com</a>		Accessed 10/7/2014		
<a href="http://www.midwayusa.com">http://www.midwayusa.com</a>		Accessed 10/7/2014		
<a href="http://www.brownells.com">http://www.brownells.com</a>		Accessed 10/7/2014		

Table 3 Projected Economic Impact of Lead Ammunition Ban by Phase (\$2013)

Phase	Time Period	Hunters affected <sup>1</sup>	Hunter Compliance Costs			Compliance Costs % of Total Annual Expenditure <sup>2</sup>	Baseline Historical Hunt Days <sup>3</sup>	Projected Total Change in Hunt Days by Phase <sup>4</sup>	(\$2013) Baseline Average Expenditure per Hunt Day <sup>5</sup>	Projected Change in Total Hunter Expenditure by Phase <sup>6</sup>
			% Change in Ammunition Costs	% Change in Recalibration Costs	% Change in Firearm & Maintenance Costs					
1	July 1, 2015 - June 30, 2016	8,070	90%	75%	29%	7%	137,190	(6,860)	\$ 78	\$(535,041)
2	July 1, 2016 - June 30, 2019	186,073	90%	75%	29%	7%	3,163,241	(158,162)	\$ 78	\$(12,336,640)
3	July 1, 2019 - June 30, 2020 One Year Full Implementation	282,987	90%	75%	29%	7%	3,471,643	(173,582)	\$ 78	\$(13,539,407)

<sup>1</sup> Hunters affected by phase were estimated using: CDFW Lands data, game density and habitat maps, CDFW Report of the 2010/ 2011 Game Take Hunter Survey, and license and tag sales data. 2019 hunter totals were adjusted by the ten year trend line.

<sup>2</sup> Compliance costs were estimated using: USFWS National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, 2011, rev 2014, Tables 17-22; ammunition manufacturers and retailers outreach and public outreach; and multiple market surveys of retail ammunition prices.

<sup>3</sup> Baseline historical hunt days: CDFW License and tag sales; USFWS annual hunt days by type of game, Tables 6, 7 and USFWS CA Survey Report Tables 2 ,3, 13; CDFW Game Take Hunter Survey.

<sup>4</sup> Change in total hunt days is derived by reducing the baseline historical hunt days by the projected five percent decrease in hunting activity.

<sup>5</sup> Hunter expenditure information: annual and per day and by item: USFWS CA & National Survey FHWAR, 2011, rev 2014, CA Tables 17 - 21, & CA Report Tables 18, 20, 21.

<sup>6</sup> Multipliers used throughout for hunting activity in California sources: Minnesota IMPLAN Group; and U.S. Forest Service and U.S. Dept. of Agriculture, State and National Effects of Fishing, Hunting and Wildlife-Related Recreation, 2007.

Table 4. Projected Annual Fiscal Impact of Lead Ammunition Ban by Phase (\$2013)

Phase	Time Period	Projected Change in Total Hunt Days by Phase <sup>1</sup>	Baseline CDFW License & Tag Sales Revenue <sup>2</sup>	CDFW License & Tag Sales Revenue Impact <sup>3</sup>	Pittman-Robertson Excise Tax Revenues Impact <sup>4</sup>	CDFW Expenditure Impact <sup>5</sup>	CDFW Total Revenue Impact	Projected Sales & Motor Fuel Tax Revenue to State <sup>6</sup>	State Income Tax
1	July 1, 2015 - June 30, 2016	(6,860)	\$ 840,724	\$ (42,036)	\$ (1,324)	\$ (45,000)	\$ (88,360)	\$ (36,383)	\$ (12,840.98)
2	July 1, 2016 - June 30, 2019	(158,162)	\$ 19,384,882	\$ (969,244)	\$ (30,533)	\$ -	\$ (999,777)	\$ (838,892)	\$ (296,079.36)
3	July 1, 2019 - June 30, 2020 One Year Full Implementation	(173,582)	\$ 21,274,822	\$ (1,063,741)	\$ (33,510)	\$ -	\$ (1,097,251)	\$ (920,680)	\$ (324,945.78)

1 Change in total hunt days is derived by reducing the baseline hunt days by the projected five percent decrease in hunting activity.

2 Baseline CDFW License and Tag Sales: License and Revenue Branch, 2014

3 Baseline Revenue with a projected five percent reduction in hunting activity.

4 Pittman-Robertson funding levels and allocation formula: USFWS <https://www.animallaw.info/statute/us-funding-state-pittman-roberson-act-chapter-5b-wildlife-restoration>

5 California Department of Fish and Wildlife Legislative analysis of AB 711 2014.

6 Tax revenue multipliers used throughout for hunting activity in California. Source: Minnesota IMPLAN Group; and U.S. Forest Service and U.S. Dept. of Agriculture, State and National Effects of Fishing, Hunting and Wildlife-Related Recreation, 2007.

Table 5

California State-Wide Hunting Activity Multipliers						
Direct Expenditure	Total Multiplier Effect	Salaries & Wages	Jobs/\$Million	Sales and Motor Fuel Taxes	State Income Tax	Federal Income Tax
1.000	2.021	0.503	17.000	0.068	0.024	0.090

Source: Minnesota IMPLAN Group, used by U.S. Department of Forestry, U.S. Department of Agriculture, U.S. Fish and Wildlife Service, Association of Fish and Wildlife Agencies, and National Shooting Sports Foundation.