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Wildlife Services in California: Economic Assessments of Select Benefits and Costs



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ABSTRACT

The United States Department of Agriculture (USDA), Wildlife Services (WS) Program has been in existence for over 120 years (USDA, 1994). The WS Program enters into cooperative agreements with federal land management agencies, state and county governments, livestock associations, Native American tribes, universities, and individual farmers/ranchers to manage wildlife-caused damage and disease. The 1931 Animal Damage Control Act directed the Department to control wildlife for the benefit of protecting agricultural resources, forestry products, and public health and safety. Over the years, the Program has been reorganized numerous times, with several name changes and a long interim period under the Department of Interior (USDA, 1994). More recently, the 1988 Rural Development Agriculture, and Related Agencies Appropriated Act expanded functions to include the control of nuisance animals and birds, plus wildlife sources of disease (Clay, 1996).

In 2003, the Vertebrate Pest Control Research Advisory Committee (VPCRAC) funded a comprehensive economic assessment of WS operations in California (CA). That year, the WS-CA Program had cooperative agreements / MOUs with 40 of the State's 58 counties (69% participation), with El Dorado, Siskiyou, Sonoma, Sierra, Plumas and Placer Counties involving special arrangements. This Report consists of 38 County assessments, including one joint assessment for Sierra and Plumas Counties. Economic impacts of WS operations to reduce wildlife damage or threats to agriculture, public health and safety, property and natural resources were quantified. The assessment involved multiple economic techniques and was specific to the wildlife-damage management activities performed in each county.

A seven-step approach was used to conduct the WS-CA State aggregate and specific county assessments. First, data from the WS-CA Management Information System (MIS) data base were used to identify the types of WS-CA Program activities. Second, WS district supervisors were asked to rank the top three protection activities within these resource categories for the counties in their districts. Third, demographic and agricultural data were compiled to create county-specific profiles to be used in calculations. Fourth, actual frequencies of within-county MIS activities were retrieved for the period 1999-2003. Fifth, the cooperative shares paid by respective counties participating with WS-CA were obtained for fiscal year 2004; these values were set as the cost for each county to participate in the WS-CA Program. Sixth, "monetized" values of costs and savings were derived using the following sources: Marin County's Ranch Improvement/Non-lethal Control and Indemnity Plan, WS MIS, IMPLAN® (Minnesota IMPLAN® Group, Inc., Stillwater, MN) records/software, commercial provider prices and National Agricultural Statistics Service (NASS). For agriculture, specifically livestock protection, costs of Marin County's Ranch Improvement/Non-lethal Control and Indemnity Plan were extrapolated and expanded to county livestock numbers (NASS, 2004) using actual reported predation rates for Marin County (e.g., 1.5%, 3.2%); whereas, IMPLAN® analysis was used to estimate the potential job loss and other economic impacts to each county's economy due to the projected loss of livestock due to wildlife predation. For health and human safety, natural resource, and property protection, actual frequencies of wildlife-caused damage (1999-2003) were determined using MIS records. Mean replacement costs for health and human safety, natural resource, or property protection were used to project the cost to a county for a replacement of WS-CA operations. The damage to these three categories was taken directly from WS specialists' entries into the MIS records (i.e. these estimates provided an index of damage and repair costs) and scenarios involving increasing damage in the absence of WS were projected. Seventh, certain indirect and intangible benefits of WS-CA were described, but no financial costs were assigned to these services.

In 2004, the cumulative cooperative share costs paid by the 39 counties included in the report equaled \$1,968,327.87. The mean share paid by these counties was \$51,798.10, with minimum and maximum shares of \$5,446.30 and \$128,633.40.

Annual estimated replacement costs for WS-CA operations for Year 1 and Year 2 of the analysis (i.e., approximately equivalent to fiscal years 2003 and 2004, respectively) totaled \$6,605,234 and \$8,602,590 for the combined counties, respectively. These costs involved cumulative replacement totals for projected agriculture, health and human safety, natural resource, and property operations. Mean replacement costs for WS operations in the cooperating counties in Year 1 and Year 2 equaled \$173,821.95 and \$226,373.13, respectively. Given that the counties paid an average \$51,798.10 share to WS-CA in 2003, the counties would have incurred averaged net increased expenses of \$122,023.85 and \$174,575.03 for similar services offered by commercial wildlife damage management companies.

The economic impact analyses for planning (IMPLAN®) results included three levels of potential economic loss in the livestock sector (i.e., Levels 1, 2 and 3). These vary based upon different the levels of predation for sheep and cattle, that would hypothetically occur in the absence of WS. Also, damage to health and human safety, natural resources and property reported by wildlife damage specialists would likely increase in the absence of WS. We provided three levels of increase (i.e. 25%, 50 %, and 100%) to capture likely wildlife damage costs should WS be discontinued. When combined, results yielded cumulative totals of \$5,758,612, \$8,041,762 and \$10,625,890 in prevented damage benefits of WS-CA to the counties. Mean county projected benefits in prevented damage were \$151,542, \$211,625 and \$279,628, respectively. Additionally, IMPLAN® projected that a total of 256 (Level 1), 355 (Level 2), and 456 (Level 3) jobs would be lost in the 39 counties if WS cooperative agreements were dropped.

In conclusion, although some services provided by WS-CA can be “replaced” by other programs, these may not provide the same level of wildlife damage mitigation. To compute the total benefits of WS-CA, replacement cost and increased damage estimates must be combined. The total benefits of WS in California as a complete program ranged from \$12,363,852 to \$19,228,476. The costs of the WS-CA operations can be determined by adding the cooperative shares of all counties, which total 1,968,327.87. The net benefits to the WS-CA State aggregate, due to county funding for WS-CA, ranged from \$10,395,524 to \$17,260,148 in our analysis.



PREFACE

This report was prepared by staff of the Economics Research Project, Product Development Program (PDP), National Wildlife Research Center (NWRC), Wildlife Services (WS), Animal and Plant Health Inspection Service (APHIS), U. S. Department of Agriculture (USDA) for the California Vertebrate Pest Control Research and Advisory Council (VPCRAC). Staff of USDA, APHIS, WS California collaborated. The report was created in accordance with Cooperative Agreement 03-7403-0483 (RA) between the California Department of Food and Agriculture (CDFA) and USDA/APHIS/WS.

We present an economic assessment of the WS Program in California. Experimental bias is always a concern of economic analyses, especially when the analyses are conducted by researchers within the same agency. Therefore, every effort was made to develop valuations based upon empirical data. Actual frequencies of agricultural, public health and safety, natural resource and property protection activities performed by WS-CA were obtained from the WS Management Information System (MIS); these were used to quantify wildlife damage activities and to determine benefits. Alternative program costs were obtained from available published or commercial sources to establish “replacement” costs that would be needed to supplant the activities provided by WS-CA. We used “conservative” estimates of savings whenever possible--mean or minimum values were substituted for alternative wildlife damage management services. Of course, many savings from wildlife-caused damage mitigation involve intangibles (e.g., reduced anxiety of risks or threats posed to the safety of children and pets by predators, the loss of premium breeding stock, benefits received from compliance with the National Environmental Policy Act, specialized pesticide application, training of personnel, etc.). For these, we described potential intangibles characteristic of specific county wildlife issues, rather than attempting to place actual monetary value on these potential benefits.

It should be noted that this report provides a more comprehensive methodology for the analysis of damages created in the agricultural protection category and by doing so underestimates the damages created in other protection categories. For example, for those counties that are heavily urbanized and face fewer agricultural issues, net benefit results may be understated due to a lack of methodology to analyze and monetize issues related to urban wildlife damage. While this may be seen as a shortcoming of the report, it also supports our contention that estimates of the benefits of WS-CA contained in this report are conservative.

The original proposal for this project cited 3 objectives:

- To describe WS Program benefits and costs in California, plus identify unique demographic situations in the State.
- To compare benefits and costs of livestock protection afforded by WS Program activities versus a predation-compensation program recently begun in Marin County.
- To perform scenario-type analyses and to project potential future impacts and costs of selected livestock protection and public health and safety activities from reduced funding of the WS Program in the State.

The current Final Report satisfies these objectives. The economic assessment of benefits and costs associated with WS operations in California are provided in the county and statewide analyses. Unique demographic situations are described in the county reports. The Marin County Agriculture Commissioner and Staff kindly provided predation and payment data for that County’s Ranch Improvement/Non-lethal Control and Indemnity Plan which was

implemented in lieu of paying a WS cooperative share; this allowed extrapolation of these outlays and comparisons to the counties' cooperative payments for WS-CA participation. Additionally, empirical costs of commercial wildlife damage services were used to compute likely replacement values for the WS cooperative share in those counties utilizing WS for health and human safety and natural resource protection--a forecasted-replacement scenario. Scenarios assumed varied levels of increased predation or wildlife damage in the absence of WS-CA.

In conclusion, we contend that this report provides County Agriculture Commissioners, and other officials, faced with entering into WS-CA agreements improved information and knowledge regarding monetary factors and likely returns on investments from these agreements. At the very least, the Report provides quantification for many WS operations and improved decision-making tools for Agriculture Commissioners attempting to provide wildlife damage protection for county residents.

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BACKGROUND AND PURPOSE

The economic value of the United States Department of Agriculture's Wildlife Services (WS) Program has historically been poorly quantified. The nature of many of the services provided (protection of non-market commodities) makes valuation difficult and sometimes impossible.

It is reasonable to expect that the economic value of WS differs both between states and between counties within states. For example, many western states still rely heavily upon WS for livestock protection activities; whereas, eastern states have begun to focus on technical assistance to small farm operators, bird damage to grain crops, fish-eating birds at aquaculture facilities and other activities (USDA, 2005).

Economic assessment offers procedures for quantifying the potential return on investment from wildlife damage management activities and the WS Program. The challenge entails making realistic assumptions about expected damages and assigning realistic monetary valuations ("monetizing") to the cost outlays and to the acquired savings from these wildlife management actions.

This report provides estimates of the potential savings likely to be associated with the WS Program in California (WS-CA). A detailed assessment for 39 of 40 counties (i.e., no Placer County analysis) in which WS-CA conducts operations is provided, as well as an aggregate summary of these county analyses that conveys statewide results.

Origins of Wildlife Services

The history of the WS Program encompasses the past 120 years (Clay, 1996; Di Silvesto, 1985; USDA, 1994). Initially, its precursor, the Branch of Economic Ornithology, is reported to have surveyed farmers about the impact of bird damage to crops in 1885 (Di Silvesto, 1985; USDA, 1994). The Program has mostly been administered by the USDA, but during 1938-1987, it was part of the Department of Interior's Fish and Wildlife Service.

Descriptions of numerous name changes, reorganizations, directives and contentious issues that have characterized this history can be found in the Agency's Environmental Impact Statement (USDA, 1994).

Official legislative authorization for WS occurred in 1931 with passage of the Animal Damage Control Act. This Act mandated the Agency to control wildlife for the benefit of protecting agricultural resources, forestry products, and public health and safety (Clay, 1996; USDA, 1994). More recently, the 1988 Rural Development Agriculture, and Related Agencies Appropriated Act expanded this function to include the control of nuisance animals and birds, plus wildlife sources of disease (Clay, 1996).

California has played a key role in the history of WS. The first predatory animal control program was undertaken on December 1, 1915, in Modoc County (Di Silvesto, 1985). The Bureau of Biological Survey, which evolved into Wildlife Services, supervised that program in cooperation with the U.S. Public Health Service and California Board of Health. In 1921, in response to producers of sheep, poultry, and hogs, the California Legislature made the first biennial appropriation of \$50,000 to the Department of Agriculture for a cooperative predatory animal control program. In 1948, The Lea Act authorized the purchase or rent of nearly 20,000 acres of California wetlands to aid in the management and control of migratory waterfowl (U. S. GAO, 2001). Moreover, in 2000, WS funds for California consisted of \$1.4

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million federal funds and \$1.2 million in State funds—making California the second-ranked, state-supported program after Texas that year (GAO, 2001).

In 2003, fiscal issues greatly impacted California’s budget. The State invoked budget cuts estimated at about \$26 billion, resulting in a \$0.98 million reduction of state contributions to support WS-CA activities (C. Coolahan, personal communication, 2003). This abrupt 35% loss in funds caused many counties to examine their cooperative payments for WS operations. While most farmers and ranchers have long offered testimony to the savings incurred from WS activities, particularly predator damage control, analyses to substantiate these claims are lacking. An economic assessment to delineate potential monetary savings attributed to WS-CA is overdue.

Organizational Elements

A. Overview of Organization

Organizationally, the national WS Program is located within the Animal and Plant Health Inspection Service (APHIS), an agency of the USDA. WS is funded annually by the agriculture appropriations bill, but also receives some state, county and private funds in certain states and situations. It is subdivided into an Eastern and Western Region. As expected, California is part of the Western Region, with administrative offices in Ft. Collins, CO. The State Office is located in Sacramento, CA.

Within California, WS is now conducted pursuant to Federal authorities mentioned previously and a Memorandum of Understanding with the State Department of Food and Agriculture (CDFA). WS-CA also has cooperative agreements and Memoranda of Understandings (MOUs) with several other State and Federal agencies including the California Department of Fish and Game, California Department of Health Services, California State Parks, and the U.S. Fish and Wildlife Service.

Funding for WS-CA comes from a variety of different sources with the majority coming from the 40 (69%) of 58 counties that choose to participate in the program and cost share with WS. The mission is to provide federal leadership in the management of damage caused by wildlife.

Both The Animal Damage Control Act (1931) and The Rural Development, Agriculture, and Related Agencies Appropriated Act (1988) limit the scope of the WS management activities (GAO, 2001; USDA, 1994; Clay, 1996). Management of wildlife involved in damage to agricultural resources and threats to the public must be conducted in accordance with guidelines set forth by state wildlife agencies.

Technical assistance and direct assistance are dual approaches offered by the WS-CA Program to prevent or reduce wildlife-caused damage (GAO, 2001). Technical assistance consists of providing advice or information regarding wildlife and wildlife-caused damage to residents of the State. In some cases, citizens attempt to exclude or trap animals themselves, thereby avoiding the need for direct intervention by WS specialists. Direct assistance refers to cases where citizens (i.e., mostly farmers and ranchers) request the actual removal or exclusion of wildlife (i.e., either preventive or corrective) by WS specialists. Both technical assistance and direct assistance can entail a diverse array of management tools or techniques (e.g., repellents, fencing, shooting, live trapping with euthanasia); the types of assistance and methods employed to deter wildlife damage are specific to situations, locations and species.

B. Districts

The WS-CA Program is divided into five districts: North, Sacramento, Central, San Luis, and South (Fig. 1). Of the 40 counties that participate in the Program, 14, 9, 10, 5 and 2 counties are represented in each district, respectively.

North: The North District consists of 16 northern CA counties including: Butte, Del Norte, Glenn, Humboldt, Lassen, Mendocino, Modoc, Nevada, Plumas, Shasta, Sierra, Siskiyou, Sutter, Tehema, Trinity, and Yuba. Two of these counties, Del Norte and Tehema, are not active participants in the program but citizens in these counties can seek and receive technical advice from the Program. The North District is administered by a District Supervisor headquartered at McArthur, CA, and an Assistant District Supervisor with a duty station at Blue Lake, in Humboldt County.

Sacramento: The Sacramento District consists of 10 counties including: Colusa, El Dorado, Lake, Marin, Napa, Placer, Sacramento, Solano, Sonoma, and Yolo. Only Marin County does not actively participate in the Program. As with other non-cooperating counties, residents of this County can seek and receive technical advice from the Program. The Sacramento District is administered by a District Supervisor with headquarters in Lincoln, CA.

Central: The Central District consists of 16 counties including: Alameda, Alpine, Amador, Calaveras, Contra Costa, Fresno, Kings, Inyo, Madera, Mariposa, Mono, Merced, San Joaquin, Stanislaus, Tuolumne, and Tulare. The Counties of Alpine, Fresno, Kings, Mono, Tulare, and Inyo are currently not active participants in the Program. The Central District is administered by a District Supervisor with headquarters in Modesto, CA, and an Assistant District Supervisor stationed in Mariposa, CA.

San Luis: The San Luis District consists of 10 counties, including: Kern, Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Clara, Santa Cruz, San Francisco, San Mateo, and San Bernadino. Santa Clara, Santa Cruz, San Francisco, San Mateo, and San Bernadino are not actively participating in the WS-CA Program. The San Luis District is administered by a District Supervisor and Assistant District Supervisor both stationed in Taft, CA.

South: The South District includes two cooperating, San Diego and Imperial, and four non-cooperating counties; Los Angeles, Orange, Ventura and Riverside. The South District is administered by a District Supervisor and Assistant District Supervisor both headquartered in El Cajon, CA.

Participation by some counties involves special arrangements. For example, El Dorado, Siskiyou, and Sonoma have arranged that WS-CA put a Federal employee(s) in the county to match their county employee(s), with WS-CA district supervisors then essentially supervising the County's employee(s). Agreements between WS-CA and the counties can also vary. For example, San Benito County's program is no longer funded by the county, but instead by private entities. Also, in Placer County the Farm Bureau has agreed to pay the employee's salary, rather than the Agriculture Commissioner's Office. No report for Placer County was provided in the report, as no direct supervisory authority of wildlife damage employees by WS-CA occurred in this County. The point is that agreements must be established for WS-CA participation, but the nature of these agreements may vary at the discretion of the WS-CA State Director and County representatives.

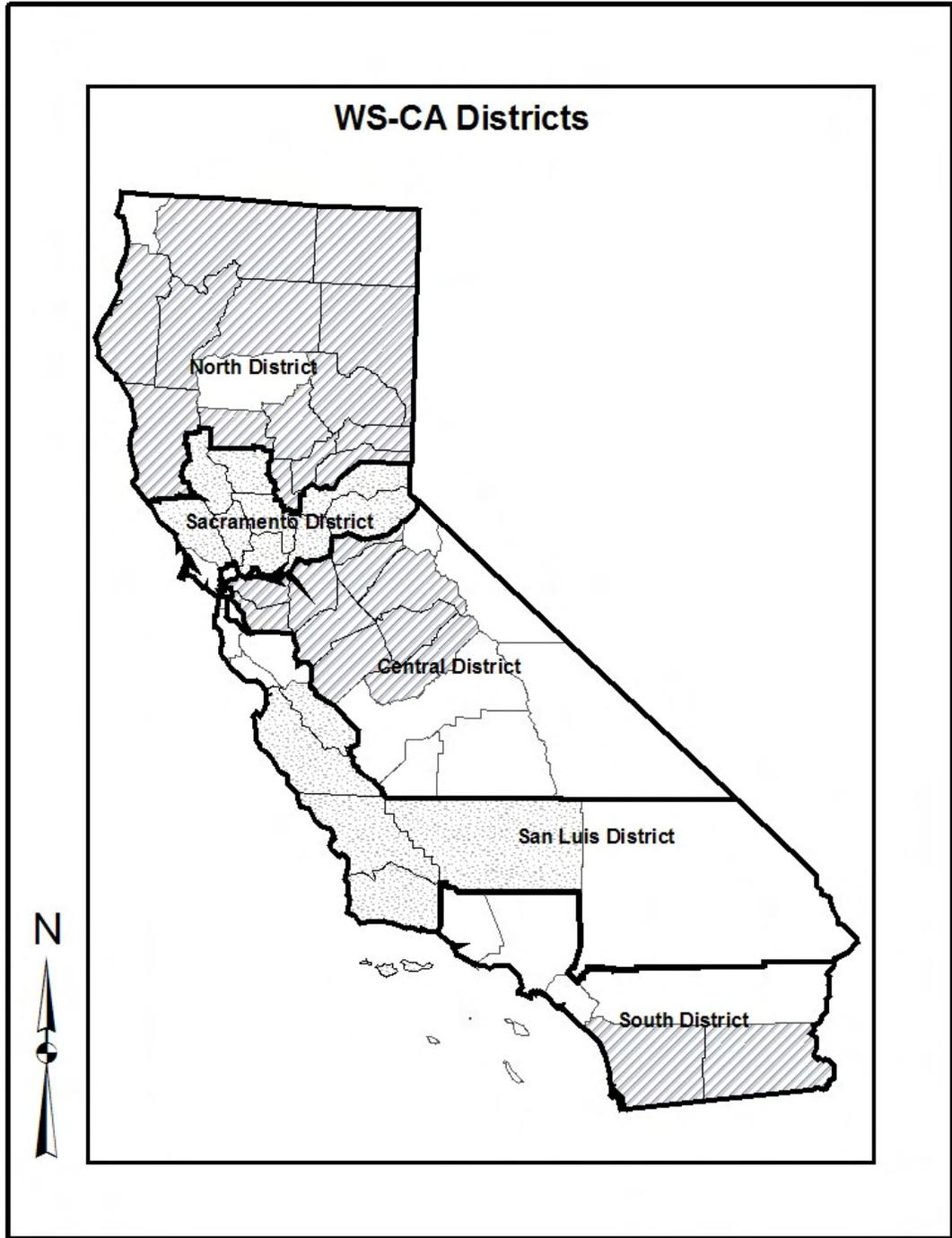


Fig. 1. Map of California's 58 counties showing the five WS-Ca Districts; cooperating counties (n=40) are shown by hatching or matting.

C. The Process of Cooperative Shares with WS-CA

The California WS Program is a cooperatively funded program with a large percentage of its funding coming from the 40 counties that participate in the Program. In Fiscal Year (FY) 2004 (July 1, 2003 through June 30, 2004), funding from these counties represented approximately 36 percent of total funding for WS-CA. Prior to the State reducing funds in FY-02 and FY-03, costs were shared between the State, the Counties and WS at approximately 1/3 State, 1/3 County and 1/3 Federal portions. As a result of the State's budget reduction and the lack of any substantive increases in WS funding, cooperating counties were asked to pick up a larger percentage of the costs for the Program. WS-CA's long term goal is to split costs about 50:50, but this goal may prove difficult to achieve. In FY-04, each cooperating county typically paid 57 percent of the average cost of a WS specialist.

D. Special Agreements

In addition to the wildlife damage management assistance provided in cooperating counties, WS-CA is involved in protecting public safety at civilian and military airports; protecting public safety throughout California from attacks by mountain lions, black bears and coyotes; protecting a number of different State and Federally listed threatened and endangered species from predation at specific sites (e.g. Camp Pendleton Marine Corps Base); cooperating in wildlife research projects with the State Department of Fish and Game and the University of California; and monitoring a number of different zoonotic diseases. These activities are funded by special agreements between private, State or other Federal agencies and organizations--county funds do not provide for these activities. The benefits that accrue through these types of agreements are significant. There has been no effort made to monetize the benefits and costs associated with these types of activities. In this way, all estimates of benefits to specific counties and the WS-CA State aggregate are underestimates and likewise not all of the costs have been included.

Ex Post Economic Assessment and Uncertainty

Two general types of data are recognized by economists—*ex ante* and *ex post*. *Ex ante* refers to the collection/analysis of future data to test specific *a priori* hypotheses; these data can be designed to quantify specific variables. *Ex post* refers to prior-recorded data; these data afford quantification of variables based upon traditional cost accounting variables that institutions or governments record in the process of routine business transactions, but lack any design to capture specific attributes of economic savings or costs. Except for the survey of district supervisors, the current assessment involved *ex post* data exclusively.

The mathematical basis for economic assessments covers a variety of methods ranging from simple descriptive accounting procedures (e.g., fixed-cost expenditures for agreements, mean unit cost per damage action, predation rate times numbers of livestock times market value per sheep) to sophisticated econometric procedures (e.g., regression analysis, time-series analysis, causal-forecasting models; see Studenmund, 2001; Kennedy, 2001).

With regard to the economic assessment of WS-CA, uncertainty underlies the estimation of the benefits and costs associated with reducing, preventing or mitigating wildlife-caused damage to commodities and resources via payment of WS cooperative shares. Uncertainty is

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a parameter of dispersion (variance) associated with the direct and indirect costs of wildlife-caused damage and the savings gained from WS-CA operations (see Zerbe and Dively, 1994). This uncertainty results from unknown or unspecified biological (e.g., predation rates, risks to humans posed by large carnivores), economic (e.g., non-market commodity prices, non-market value of endangered species), technique (e.g., pyrotechnics to disperse birds, coyote removal to deter livestock predation), and skill factors (e.g., live-trap capture rate, WS specialist technical knowledge) associated with specific wildlife damage situations.

Economic procedures exist for reducing uncertainty. The use of empirical measurements and projections for a range of potential increases or decreases in damages or services reduce uncertainty by allowing officials, policy makers and citizens to view potential outcomes in advance. By using known frequencies of wildlife damage incidents or threats, the saving and cost projections become based on actual frequencies. Use of empirical numbers of wildlife damage complaints affords computations of realistic estimates of lost resources and labor costs involved in reducing subsequent damage. Except for descriptions of certain indirect and intangible benefits of the WS-CA Program, data and cost values for predator-caused livestock losses, human health and safety incidents, natural resource damages and property damages in this report were derived from county, agency or published records. Potential increased predation and damages were expanded to show what potential increased incidences of wildlife damage might cost in the absence of WS activities.

CALIFORNIA LAND REGIONS AND AGRICULTURE

California is not only the nation's, but one of the world's, greatest agricultural producers (USDA, 2004). With diverse habitats and autumn influxes of large populations of overwintering birds, the potential for wildlife damage to livestock and crops is great.

Physical landforms in the State are varied (USGS, 1970). The irrigated San Joaquin and Sacramento Valleys—key agricultural sites—comprise nearly one-fourth of the central land area. Southeastern California is desert (i.e., Mojave) or semi-desert country. The eastern and western portions of the State are mountainous (i.e., Sierra Nevada and several Pacific Coastal Ranges, respectively). Major drainages include the Eel, Kern, Merced, Pit and Sacramento Rivers.

The U. S. Soil and Conservation Service has delineated land resource regions within the United States (USGS, 1970). Three major land resource regions make up California: Western Range and Irrigated Region, California Subtropical Fruit, Truck, and Specialty Crop Region and Northwestern Forest, Forage, and Specialty Crop Region (Fig. 2). As shown, roughly half of the land (i.e., Western Range and Irrigated Region) is irrigated. Southern portions of the California Subtropical Fruit, Truck, and Specialty Crop Region and Western Range and Irrigated Region experience 210-300 day growing seasons (USGS, 1970).

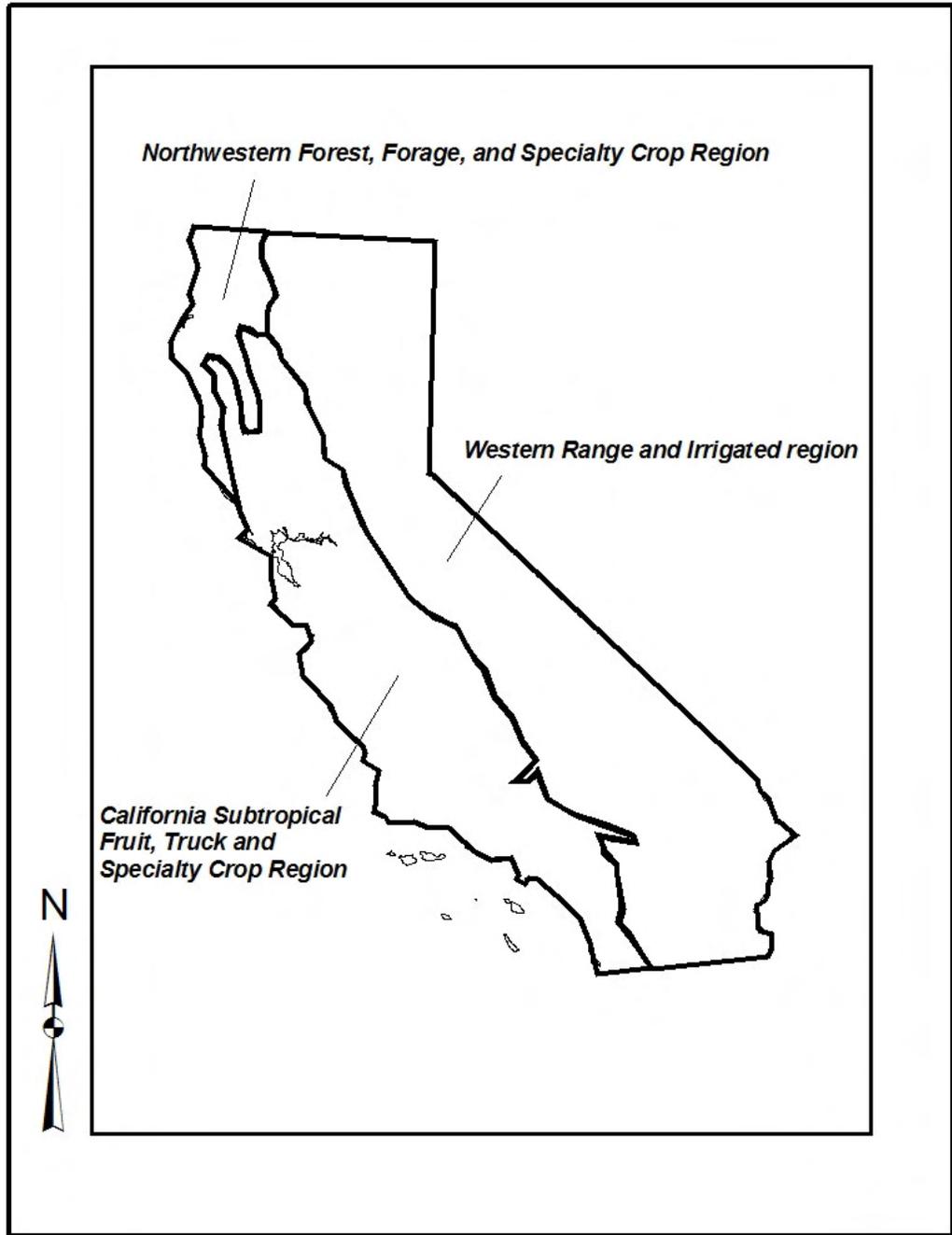


Fig. 2. Map showing the three general agricultural zones comprising California (USGS, 1970).

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The Western Range and Irrigated Region comprises the eastern part of the State—many of these counties (e.g., Imperial, Riverside, San Bernardino, Modoc, Lassen, Placer and El Dorado) are high producers of hay, alfalfa, potatoes, oranges, oats, peppers, etc. (CASS, 2004). The California Subtropical Fruit, Truck, and Specialty Crop Region makes up the western and southwestern part of the State; as expected, many of these counties (e.g., Fresno, Kings, Mendocino, Lake, San Joaquin, Sonoma, Napa, Monterey, San Luis Obispo, Santa Barbara, Tulare, Ventura, Orange and San Diego) are reported as major producers of artichokes, beans, cabbage, carrots, cherries, grapes, lettuce, peppers, spinach, squash, tomatoes, pecans, pistachios and walnuts (CASS, 2004). The Northwestern Forest, Forage, and Specialty Crop Region are in the northwestern portion of the State adjacent to the Oregon Border. This region including mainly portions of Del Norte and Humboldt Counties is associated with nursery, milk and cattle products (CASS, 2004).

APPROACH AND RATIONALE

Approach

The current study used mainly *ex post* data to describe the activities, costs and potential savings associated with WS-CA operations. Costs were the 2003 cooperative shares set for each county to fund WS-CA operations. Benefits were measured as the savings in livestock, commodities, resources, property and safety or health that could be derived from entering into WS-CA agreements.

The value of WS-CA was determined using multiple economic approaches, several predation rates or other wildlife damage loss figures to project replacement programs and potential damages based upon empirical sources. Most procedures (except IMPLAN®) involved calculations of WS-CA agriculture, health and human safety, natural resource, and property protection activities derived from MIS reports and extrapolated to reflect replacement values and potential damage savings for performed services. The benefits of WS-CA were determined using the “replacement value”—the cost of a replacement program required in lieu of WS, by estimating the monetary value of losses in certain sectors of the economy relative to the economy as a whole (i.e., multiplier effects of losses in the agricultural sector from livestock predation) throughout the County or State economy (IMPLAN®, Minnesota IMPLAN® Group, Inc., Stillwater, MN) and by projecting a range of costs that each county (or aggregated for the State) would likely experience in the absence of WS-CA due to damage that would likely increase if offending animals were not removed and technical or direct assistance were not provided.

Key elements of the assessment can be summarized as:

- The cooperative share paid by each county was the cost of WS-CA.
- Benefits were derived using “replacement values”, IMPLAN® analysis, “forecasts” of projected damages in the absence of WS operations, and descriptions of certain WS Program indirect and intangible benefits.
- Estimates of “replacement values” focused on each of four categories of protection ascribed to WS: agriculture, health and human safety, natural resources, and property.
- Empirical-based estimates of fiscal benefits and costs were obtained by using published or recorded sources of data (i.e., livestock predation rates, indemnity and property improvement payments, numbers/types of health and human safety incidents, natural resource and property protection activities, and commercial wildlife control fees).

Sources included: Marin County Ranch Improvement/Non-lethal Control and Indemnity Plan, IMPLAN® values and NASS values.

The approach involved a seven-step, empirical process that assigned monetary values to WS-CA activities within each of the agriculture, health and human safety, natural resources, and property categories. The last three steps dealt with economic procedures.

Step 1.—The first step was to identify the categories in which the WS Program provided wildlife damage prevention or mitigation. The WS Program historically has maintained MIS data on the activities of its field specialists. Data addressed four categories of wildlife damage management: agriculture, health and human safety, natural resources and property.

Step 2.—The WS district supervisors were surveyed to identify the three main types of wildlife-caused damage to agriculture, health and human safety, natural resources, and property in each county under their purview (e.g., coyote predation of lambs, coyote threat to homeowners, raccoon damage to buildings). Survey results were used to characterize the county-specific profiles of WS activities.

Step 3.—A demographic and agricultural background on each county was collected using the National Agricultural Statistics Service (NASS) and the U.S. Census Bureau (USCB). This information was then used to further hone each County's WS operation profile. Some of the agricultural values were later used for determination of benefits.

Step 4.—Actual frequencies of specific WS-CA activities were collected from the WS-CA MIS database for the period 1999 to 2003. WS specialists routinely complete MIS forms to record actions they take in the protection of each county's resources and to record damage and loss data. These two sources were utilized to provide county-specific information.

Step 5.—The cost of WS was determined as the cooperative share (US\$) paid by each county to have WS operate in that county, with the statewide cost a simple aggregation of these county shares. These costs were the FY-04 cooperative shares as provided by WS-CA.

Step 6.—Monetized benefits of WS-CA were derived using the following sources: Marin County Ranch Improvement/Non-lethal Control and Indemnity Plan, National Agricultural Statistics Service (NASS), WS Management Information System (MIS), and IMPLAN® (Minnesota IMPLAN® Group, Inc., Stillwater, MN) analysis records/software, and alternative commercial sources for wildlife damage control. For agriculture, specifically livestock protection, costs of Marin County Ranch Improvement/Non-lethal Control & Indemnity Plan were extrapolated and expanded to county livestock numbers (NASS, 2004) using reported predation rates (e.g., 1.5%, 3.2%); whereas, IMPLAN® was used to estimate the potential job loss and other economic impacts to each county's economy due to the projected loss of fixed numbers of livestock (i.e., sheep and cattle) due to wildlife predation. For health and human safety, natural resource and property protection, actual frequencies of wildlife-caused damage for the five-year period between 1999 and 2003 were gleaned from MIS records. Mean replacement costs for a health and human safety, natural resource or property incident averaged \$170, \$287.50, or \$395 depending on damaging specie (2005 US\$; i.e., average quoted price by 9 commercial nuisance wildlife control operators in the State); these values were used to project the cost to each county based upon alternatives to WS-CA operations. The value of wildlife-caused damage was taken directly from WS specialist

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entries into the MIS (i.e. estimates provide an index of damage and repair costs) and used to project damage increases in the absence of WS-CA operations.

Step 7.—Indirect and intangible benefits were described for the activities of WS-CA within the WS-CA State aggregate and each county. Examples included: compliance with the National Environmental Policy Act (NEPA), Certified Pesticide Operator’s credentials, Certified Wildlife Biologist credentials, provisions for handling explosives, and supportive capabilities to rapidly deal with unforeseen animal or human disease issues.

Objectives

- To describe WS Program benefits and costs in California, plus identify unique demographic situations in the State.
- To compare benefits and costs of livestock protection afforded by WS Program activities versus a predation-compensation program recently begun in Marin County.
- To perform scenario-type analyses and to project potential future impacts and costs of selected livestock protection and public health and safety activities from reduced funding of the WS Program in the State.

Data

A. WS District Supervisors’ Survey Responses

Initially, WS district supervisors were surveyed to identify the three main wildlife-caused damage problems related to agriculture, health and human safety, natural resources and property in each county (e.g., coyote predation of lambs, rabid skunk threats to homeowners, predator damage to valued mammal life) (Appendix A). Each of the five WS district supervisors provided respective rankings of the three most prevalent wildlife damage management activities performed in each county within the North, Sacramento, Central, San Luis and South Districts. Supervisors were asked to provide combinations of the damage and species linked within each of the four protection categories. These rankings were viewed to characterize the major resource by species problems within the State.

Results of these surveys revealed that sheep, goat and cattle predation by coyotes, bears and mountain lions, general health and safety threats associated with skunks, raccoons, opossums and coyotes, tree damage by beaver and residential building damage by skunks, raccoons and opossums were the single greatest agriculture, public health, natural resource and property issues in the cooperating counties. Based on these rankings, we decided to provide a section on livestock protection within each county report.

B. Marin County Ranch Improvement/Non-lethal Control and Indemnity Plan

This Plan was initiated in October 2000 by the Marin County Board of Supervisors (Appendix B). It was devised to provide funds for facilities improvement, non-lethal methods use and livestock-loss indemnity payments among rancher participants. Payments were contingent upon sufficient funds being available to cover all claims, if not, claims would be reduced proportionately based upon numbers of claims

The Plan entailed a two part approach to predator management: cost share funds for facilities improvements or non-lethal predator control methods use and indemnification payments for

predator-caused losses. Funds of \$37,500 and \$50,000 were set aside for the Plan in 2000/2001 and 2001/2002, respectively, with future funds pledged. Any unspent funds would be carried over in a trust fund for future years. The County recognized 29 commercial sheep ranchers with 7,500 head of sheep denoted in the original document.

Regarding cost-share funds, ranchers with more than 2,000 sheep would be eligible for up to \$2,000 in annual cost-share funds; ranchers with less than 2,000 but greater than 200 sheep would be eligible for up to \$500 in annual share funds. To participate, ranchers would contact the Agricultural Commissioner's Office to initiate a site review. The site review by a member of the Commissioner's staff and the Cooperative Extension's Rangeland and Livestock Advisor was used to determine the amount of non-lethal cost share funds to be granted to the rancher. A claim form, plus any receipts, for reimbursement of expenditures for facilities improvements would then be submitted by the rancher in cooperation with the Commissioner's staff member (Appendix C). Examples of reimbursable improvements were: predator deterrent fencing, lambing sheds, guard animals, etc. Recyclable materials were excluded from payments. Payments would be made using a priority scheme, with payments going to previously unfunded ranchers and then to those that had received funds.

Regarding indemnification payments, sheep/lamb losses require rancher notification to the Commissioner's Office of date, location, manner of loss, predator, numbers of animals killed, etc, with possible verification at the discretion of the Commissioner, County Livestock Advisor, or County Humane Society. The rancher must sign and promptly send in a claim form (Appendix C). Payment is at market price or dependent upon available funds.

Detailed data for both the cost share and indemnification payments were provided by the Marin County Commissioner's Office for two fiscal years (2000/2001 and 2001/2002). Summary statistics computed using these spreadsheets showed that 69 per cent of commercial ranchers in Marin County (20 of 29) participated in the Plan. Predation rates for the years provided increased from 1.5% in Year 1 to 3.2 % in Year 2, and market prices paid for depredated sheep were \$70/head and \$82/head, respectively.

C. Management Information System (MIS)

In 1980, a review by the U.S. Department of Interior, Office of Audit and Investigation led to the development of "A Conceptual Plan for the Animal Damage Control Management Information System" (USDA, 1998). Prior to this time, the WS Program relied on sporadic, personal records of wildlife damage management activities maintained by individual employees in field diaries.

MIS is a computer-database designed for entry and retrieval of wildlife-caused damage and wildlife control information. Traditionally, WS has used a four-category breakdown for describing its resource-protection activities: agriculture, health and human safety, natural resources, and property (GAO, 2001; USDA, 1994). In 2000, national WS expenditures for reducing wildlife-caused damage to agriculture, health and human safety, natural resources and property accounted for 55.3, 19.1, 13.3 and 12.3 percent of all operations, respectively (GAO, 2001). Annual records of these activities are kept as part of the WS MIS. Each WS specialist completes Scantron® forms that allow for categorization of diverse wildlife damage management information (e.g., agreement number, WS specialist name, county, land class and acreage, method used, number and specie of animal removed or harassed). Forms are logged for both "direct" control activities and "technical assistance" (i.e., consultation/advice or

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brochures). Data are logged by WS specialists, but entered into the MIS by trained MIS specialists.

D. IMPLAN® Data

IMPLAN® (Minnesota IMPLAN® Group, Inc., Stillwater, MN) stands for “impact analysis for planning.” This is a commercial program that incorporates county-specific data to model inputs and outputs of economic effects. It is an accepted methodology for estimating the secondary effects on local economies.

The IMPLAN® Data Files (see www.IMPLAN.com) are collections of annual state-specific demographic and economic data files assembled by IMPLAN® for its software users. Site licenses are required for the software package; these must be purchased by subscribers of the IMPLAN Professional® software system. Together, these data and software package allow the user to develop local level input-output models that can estimate the economic impact of diverse municipal, county and state economic events/activities. The IMPLAN® Data include information for a set of highly disaggregated industries; information consists of employment, income, value added, household and government consumption. Files are compiled from diverse sources (e.g., US Bureau of Economic Analysis, the US Bureau of Labor, and Census) IMPLAN® data is available for individual state, county and custom Zip Code level. State data packages include the U.S. file, the state file, and all county files in that state.

For current purposes, Needham and McCaffrey (Dallas, TX), an economic consultant firm and IMPLAN® subscriber, subcontracted to perform the current analyses. Current analyses dealt with the impacts of sheep and cattle predation only upon WS-CA participating county economies. Data reflected IMPLAN® 2001 county-level industry activity and the 2001 Bureau of Economic Analysis accounting of industrial linkages for California. These data were then updated to the year 2003 for input to the IMPLAN® Model using a method referred to as “ground proofing.” That is, county-specific data for 2001 were updated by adding or deleting firms from each county economy based on 2003 State economic data. Thus, data provided by the State of California was used in these analyses to estimate the economic interrelationships among major business sectors of WS—CA participating counties.

Industries in any county are broadly characterized as either export basic or non-basic (support) sectors. The **basic sectors** generally produce products for sale outside of the county and as a result import money into the county. The **non-basic** sectors support the basic sectors. The idea behind this classification is that any economy will grow when it exports goods and imports money. Recent years have seen an extension of the concept of basic sector to include such activities as health care, tourism, and financial services.

Industries also may be classified by the federal government’s standard industrial classification system. This older system of classification has recently been replaced by the North American Industrial Classification System (NAICS).

The economic loss from predation of sheep and cattle, as described in this study, along with associated reductions in purchases directly supporting those sheep and cattle, are referred to as **direct economic effects**.

Indirect economic effects are generated as livestock loss alters producer purchases of input supplies from other county industries. Money from livestock sales outside the county generates additional economic activity within the county as goods and services are purchased in the livestock production process. The increased or decreased demand for inputs stimulates

production from the livestock industry sector within the county. In turn, the livestock industry sector is forced to increase its demand for inputs into its own production process. These indirect economic effects result in additional jobs, increased income for the county and greater tax revenues for community infrastructure development.

The direct and indirect effects resulting from the livestock sector provide for a third kind of effect on the county economy as wage earners, business owners or managers spend their earned income and business profits within the county economy. These requirements (demands) placed on the county economy by personal consumption by residents of the county induces additional activity in other sectors of the county economy as residents purchase goods and services for daily living. This is referred to as the **induced effect**.

The total economic impact of the LIVESTOCK SECTOR on the state is a summation of the direct, indirect and induced effects. The indirect and induced effects are often referred to as the **secondary economic effects**. Any increase or decrease in the LIVESTOCK SECTOR output or sales may be expected to cause increases or decreases in secondary economic impacts throughout the remaining county economy.

The magnitude of the secondary effects of the LIVESTOCK SECTOR within the county depends in large part upon:

whether the LIVESTOCK SECTOR inputs are purchased from within or outside the county
whether the LIVESTOCK SECTOR employees, owners, and managers spend their wages and profits locally.

Clearly, not all the money received from the sale of the LIVESTOCK SECTOR services, and not all income from the LIVESTOCK SECTOR is spent in the county. At each successive cycle of economic activity, some money is lost from the county. Those losses are referred to as “**leakages**” from the county.

Leakages occur for a number of reasons including:

federal and state taxes that must be paid elsewhere.
the need for specialized equipment and other goods and services that are not available within the county.
consumer preferences for shopping at locations outside the county.

E. National Agriculture Statistical Service and Census Bureau Demographic Data

Demographic data were collected for each county and the State as a whole. These data were used in the County and WS-CA State aggregate reports to characterize economies and to provide a basis for certain analyses. For example, data for the price of lambs and cattle used to derive replacement costs for the livestock predation values were based on 2003 average annual prices (NASS, 2004¹).



Monetizing Savings and Costs

The term “monetizing” refers to the assignment of monetary values to the diverse benefits that are involved in WS-CA operations. Procedures were used to quantify WS-CA activities and to assign realistic “replacement values” for these activities in each of the four resource protection categories: agriculture, health and human safety, natural resources, and property.

A. Agriculture

Agricultural protection is the largest component of WS operations in a majority of the 40 cooperating counties in California. This entails diverse activities to protect livestock from mammalian predators and raptors, as well as to protect grain, vegetable and fruit crops, aquaculture and feed at dairy or cattle feedlots from birds. The survey of WS district supervisors revealed that at least one of the most important concerns for all of the counties involved livestock protection. As a result, our focus for agriculture was on the value of livestock protection by WS. For the purpose of this report, livestock includes sheep and cattle only, unless otherwise specified.

Within this report, the sections providing economic evaluations of agriculture protection are divided into three main components. The first component details the results of the livestock protection replacement program - Marin County Ranch Improvement/Non-lethal Control and Indemnity Plan data extrapolation. The second component estimates the economic impact of an increase in predation on beef cattle and sheep due to the hypothetical absence of WS activities (i.e., IMPLAN® results). The third component provides a discussion of intangible benefits that could be attributed to WS-CA related to agriculture.

1. Replacement Projections of Marin County Data - Livestock Protection

For livestock protection, the empirical participation rate of ranchers, annual predation rates, annual cost share of facilities improvement payments and indemnity payments associated with The Marin County Ranch Improvement/Non-lethal Control and Indemnity Plan were extrapolated to each county paying cooperative shares for WS-CA. This served as one possible replacement value for WS-CA livestock protection activities. Sixty-nine percent of ranchers participated in the Marin Plan, and these were all sheep producers. Actual sheep predation rates of 1.5 percent and 3.2 percent were reported by this county in 2000/2001 and 2001/2002, respectively; no cattle protection by the county occurred in this plan. National predation rates for sheep were 4 percent, these rates were included for comparison (NASS, 2004²). Rates of beef cattle predation were set at a more conservative 1.0 and 1.5 percent and combined with hypothetical indemnity payments that would be required for counties currently provided cattle protection by WS-CA. In computing county projections, the actual numbers of sheep and cattle for 2002 were gleaned from California Agriculture and NASS data sources (NASS, 2004).

2. IMPLAN® Model for Absence of WS-CA - Livestock Protection

IMPLAN® was used to estimate the effects of increased predation losses in the absence of WS-CA. By purchasing the most up-to-date available data files of California economic and demographic variables, an analysis was performed to predict how the loss of sheep to predation would “ripple” through the county economies and impact local employment.

Relevant scientific literature suggests that in the absence of predation management, predation rates would likely increase for both sheep and cattle (Bodenchuk et al., 2002). Current analyses were conducted by analysts with Needham and McCaffrey (Dallas, TX). These analyses used an increase in predation of sheep and cattle due to the absence of WS-CA as the input variable; household (i.e., less rancher spending due to decreased household income from fewer livestock profits) and job losses associated with this decreased profit were the output effects. For these IMPLAN® analyses, hypothesized increased predation rates for sheep were set as 2% (level 1), 2.5% (level 2), and 3% (level 3); increased predation rates for cattle were set as 1% (level 1), 1.5% (level 2), and 2% (level 3), except as noted for Imperial County.

3. Description of Intangible Benefits of WS-CA Agriculture

Text was used to describe diverse legislative, regulatory, training, record keeping and “other” benefits that accrue from the use of WS-CA for wildlife damage management activities rather than alternative sources. These descriptions are not exclusive. Indirect and intangible benefits of WS-CA involve a multitude of economic and personal contributions to wildlife damage mitigation and control for the residents of California.

B. Health and Human Safety/ Natural Resources/ Property

Regarding health and human safety, diverse protective activities comprised this category of activities. For example, threats to people from injuries and illness posed by dangerous and diseased animals (e.g., coyotes, rabid skunks, plague-carrying rodents) and nuisances caused by various birds/mammals (e.g., bats, rodents, raccoons, skunks) were included here.

Natural resource protection typically involves efforts to deter predation or damage to a number of valued resources such as timber, wildlife, water sources, etc. In addition, natural resource protection activities can involve other special cases of wildlife-caused damage or risks (e.g., rodent damage at archeological sites and rodent damage to historical trees or impoundments). These activities are usually addressed by WS—CA engaging in specific agreements between private organizations and State or other Federal Agencies.

Wildlife-caused damage to property refers to ways that animals and birds can harm or destroy property. WS activities are aimed at preventing or reducing this damage. Examples include: goose destruction of lawns, feral pig uprooting of trees, beaver-caused flooding of roadways, vole girdling of fruit trees, deer browsing of ornamental flowers/trees, and bird damage of vegetable sprouts.

1. Damage by Species Incident Totals (1999 to 2003)

“Replacement” services were used to quantify the potential savings afforded by WS-CA for health and human safety, property, and natural resources protection activities. Four steps comprised these projections: (a) retrieval of major damage by species incident totals (1999 to 2003), (b) determination of replacement costs for wildlife damage activities, (c) projections of three levels (25, 50, and 100 percent) of increased frequency of damage incidents (i.e., assuming WS-CA would not be available to respond to incidents), and (d) descriptions of intangible benefits related to WS protection of health and human safety, natural resources, and property.

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2. Determination of Replacement Costs for Health and Human Safety/ Natural Resources / Property Activities

Two techniques were involved in estimation of the benefits associated with these three protection categories. These economic methods were the “best fit” for the type of service provided in these areas. First, to estimate typical “replacement costs” commercial charges for wildlife damage management activities, personal phone inquiries were made of nine California pest control companies using Internet search engine and business listing queries. Because of varied nature of wildlife incidents, company representatives were surveyed regarding coyote, beaver and “general” specie complaints. A range of prices (i.e., \$150 to \$200 for general wildlife, \$250 to \$325 for beaver, and \$260 to \$625 for coyote) for complaint resolutions were quoted by commercial representatives-a mean price of \$170 for general wildlife, \$287.50 for beaver, and \$395 for coyote, respectively. Quotes generally reflected a single trap set up and removal of one animal for each wildlife complaint. Interestingly, no commercial provider of wildlife damage management services would quote prices or indicate a willingness to attempt removals of bear or mountain lions. Therefore incidents involving large predators other than coyotes were included within the coyote specie group, as the cost for their removal was likely higher.

To compute estimates of replacement costs, the mean annual number of incidents obtained from the WS-MIS over the five-year period (1999-2003) was multiplied by the corresponding specie quote to determine this value. This leads to a conservative estimate, as a WS-MIS reported incident routinely entails multiple trap set ups and animal removals.

3. Projections of 25, 50 and 100 Percent Increases in Damage

WS specialists routinely provide estimates of the monetary damage associated with a wildlife incident as part of the MIS record. These estimates were retrieved, summed and averaged for the health and human safety, natural resource, and property categories of damage incurred annually between 1999 and 2003.

A projection technique was used to estimate increases in damage to health and human safety natural resource, and property. These were based on the assumption that wildlife-caused damage incidents would likely increase in the absence of WS operations. Estimates of wildlife damage reported in MIS were increased on three levels: 25, 50 and 100 percent, to project damage increases, and averaged to find an annual estimation of increased wildlife damage. This range provided a baseline for potential magnitudes of hypothetically increased damage.

4. Descriptions of WS-CA Intangible Benefits for Health and Human Safety/Natural Resources/Property

Again, as for Agriculture, text was offered which describes diverse legislative, regulatory, training, record keeping and “other” benefits that accrue from the use of WS-CA for wildlife damage management activities rather than alternative approaches.

STATE AND COUNTY ASSESSMENTS

A. California State Aggregate Assessment

The State assessment of costs and savings is simply an aggregation of the county economic analyses. Although it could be argued that additional benefits may accrue to the State other than simply the aggregate of county savings, this approach was more conservative.

B. Specific County Assessments

County economic assessments were performed for data from the 39 of the 40 counties cooperating with WS-CA. A joint report was prepared for Plumas and Sierra Counties; whereas, no report was provided for Placer County. Siskiyou, Sonoma, Placer, and El Dorado Counties were “special” cases. Each of these Counties provided funding for an employee(s) to perform wildlife damage management activities; this was viewed as sufficient for WS-CA to match this commitment with a WS specialist. Placer County is unique; this County also has its own wildlife damage management employees, but they were not supervised by WS-CA District personnel at the time this report was compiled and these employees did not enter data into the WS-CA MIS.

Specific County assessments are presented as 38 addenda to this Report. Within each assessment, pagination is restarted by letter identifier for each county (i.e. A-1, A-2). Tables are also numbered sequentially within the assessments, and an appendix to each provides details of the Needham-McCaffery IMPLAN® analysis for the respective county.

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Wildlife Services in California: Economic Assessments of Select Benefits and Costs

California State Aggregate

INTRODUCTION

This document is a summary of 39 (i.e., Sierra and Plumas Counties analyzed jointly and Placer County omitted) county reports. It offers a comprehensive assessment of WS-CA.

To quantify selected benefits and costs of the WS-CA Program we had to determine the benefits and the costs of WS as a complete program. The benefits were derived from multiple information sources such as replacement programs, National Agricultural Statistics Service (NASS) reports, IMPLAN® and damages to resources documented in the WS Management Information System (MIS). The savings attributed to the Program were then examined in relation to the costs.

Costs were the cooperative share that each county paid for WS operations in 2003. This value represents what was paid at the county level for a WS specialist and was supplemented by Federal funds. The percentage paid by each county (approximately 57%) was larger in 2003 than in previous years as a result of a major cut in State funding. In 2003, the combined cooperative share from the counties was \$1,968,327.87 (C. Coolahan, personal communication, 2003).

The WS-CA Program provides a wide array of services. To quantify all of these services would be difficult. Thus, a survey of California WS district supervisors was undertaken to identify the main wildlife damage concerns in each cooperating county. The four general categories used by WS to record wildlife damage management and loss data in the MIS are: Agriculture, Health and Human Safety, Natural Resources, and Property. The top three specific wildlife damage issues in each category were identified by respective supervisors using identical survey forms for all counties. Results showed that the protection of agriculture, particularly sheep, cattle, and goats from predation, was a main agricultural activity of WS personnel operating in the counties. This survey information was used to tailor the analyses. That is, the benefits and costs of WS-CA activities relevant to cooperating counties served as the basis for deriving economic impacts of Program replacement costs, total wildlife damage, etc. within the specific counties.

The data sources used for this report included NASS, IMPLAN®, Marin County Ranch Improvement/Non-lethal and Indemnity Plan, United States Census Bureau (USCB), WS MIS and a survey of Wildlife Services district supervisors.

State Demographic Statistics

According to the 2000 U.S. Census, California had a total population of 33,871,648; the total land area is 155,959 square miles, which translates to a population density of 217.2 persons per square mile (USCB, 2000). In 2000, the population living in urban communities was 31,989,663 and the population living in rural communities was 2,039,665; this means that 6% of the human population lived in rural areas. In 2000, per capita income was \$22,711, with 26.6% of the population (25+) reportedly having a bachelor's degree or higher (USCB, 2000).

State Agriculture Statistics

The total number of farms reported for California for 2000 was 79,631. Of 27,589,027 total acres of farmland, 8,466,321 acres were cropland in 2000. In the State, there were approximately 5,234,177 total head of cattle, of which 735,045 were beef cows, and 731,558 head of sheep, of which 304,183 were ewes one year and older in 2002 (NASS, 2004). Given that these data are the most accurate and recent data available, those parts of this report that require multi-year analysis utilized the same 2002 data.

DETERMINATION OF BENEFITS

To identify and understand the categories in which WS-CA provided services (i.e., Agriculture, Health and Human Safety, Natural Resources and Property), the survey of WS district supervisors was analyzed, and supplemental data were collected from the California WS MIS database for the period 1999 to 2003. WS specialists routinely complete MIS forms to record actions that they take in the protection of each county's resources and to record loss data. These data were jointly examined to provide County-specific information.

As mentioned earlier in the report, the benefits of WS-CA were determined using several different economic methods. First, the benefits of WS were determined using the "replacement value," the cost of a replacement program required in lieu of WS operations. Second, benefits were determined by estimating the economic value of losses in certain sectors of the economy relative to the economy as a whole. In other words, this value would represent the multiplier effects of losses in the agricultural sector throughout each County's economy; this analysis was accomplished by using an economic impact analysis for planning (IMPLAN®). Third, the value of WS-CA was also determined by projecting a range of costs that each County would likely experience in the absence of WS activities (i.e., damage that would likely increase if offending animals were not removed and technical assistance were not provided). Finally, indirect and intangible benefits were described because monetary quantification of such benefits was unrealistic within the scope of this study.

Agriculture

Agricultural protection was the largest component of WS operations in a majority of the 40 cooperating counties in California. The survey of WS district supervisors revealed that the most important concern for the majority of the counties was livestock protection. As a result, our focus for agriculture was on the value of livestock protection provided by WS-CA. For the purpose of this report, livestock includes sheep and cattle only, unless otherwise specified.

This section is divided into three main components. The first component details the results of the livestock protection replacement program (ie. Marin County Ranch Improvement/Non-

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lethal Control and Indemnity Plan) discussed in the main report. The second component estimates the economic impact of an increase in predation on beef cattle and sheep due to the hypothetical absence of WS activities. The third component provides a discussion of indirect and intangible benefits that we were unable to quantify but are still important to consider in the economic analysis.

A. Replacement Program

The main report provides a detailed description of the livestock protection replacement program used for comparison in this section. This livestock protection program is an actual method used in one California County to replace WS livestock protection operations. The trends in the levels of predation, indemnification, participation, production and reimbursements over two years of this alternative program's operation are described in the main report, and are utilized to calculate the impacts in California here. Marin County's Ranch Improvement/Non-lethal Control and Indemnity Plan involved two parts: (a) monetary reimbursement for protection improvements to facilities (e.g., fencing, guard dogs, scare devices, etc.) and (b) indemnification: compensation for livestock depredated by predators (market price per head lost). Predation rates of 1.5% (Year 1) and 3.2% (Year 2) were based on the number of lambs lost to predators in each year and a hypothetical lamb crop of 1.5 lambs/1 ewe. Indemnification costs were based on these levels of predation and were calculated by multiplying the number of lambs lost to predation by the market price given in the livestock protection replacement program (Year 1: \$70/head; Year 2: \$82/head).

Results of the analysis for Year 1 in the participating counties indicated that it would cost \$1,269,241 in year one to replace WS-CA sheep protection for the WS-CA State aggregate. In year two of the replacement program, the cooperating counties would spend \$1,831,664 collectively (Table 1). The national average predation rate of 4% for sheep provided was also calculated, \$1,847,245 in year one, and \$2,206,477 in year two (NASS, 2004²); this was incorporated into the analysis to provide estimates of indemnity at a rate more commonly experienced by livestock producers elsewhere in the nation (Jones, 2004; Bodenchuk et al. 2002).

Beef cattle protection is also a major service of WS-CA operations. Scenarios for a beef cattle replacement program were identical to those for sheep, except that the amount of indemnity was based on a market value for cattle of \$425 per head, and more conservative predation rates (1.0 and 1.5%) were used to determine indemnity. During the first and second years the counties would collectively spend \$4,609,354 and \$6,044,287, respectively, for an alternative cattle replacement program.

The total costs for the livestock protection replacement program in the 38 County reports (ie. Sierra/Plumas combined) annually was determined at two different levels of predation for sheep and beef cattle. The level of predation increased in the absence of WS-CA in the County and this study reflects those same predation changes. In Year 1, at a 1.5% level of predation on sheep and a 1.0% level of predation on cattle, the cooperative counties would expend a total of \$5,878,595 for this livestock protection replacement program. In Year 2, at a 3.2% level of predation for sheep and a 1.5% level of predation for cattle, costs would rise to \$7,875,951. In 2003, cooperating counties paid WS-CA \$1,968,327.87 for all services, including a livestock protection program. Thus, it could be argued that the net savings to the State aggregate relative to an alternative livestock protection replacement program would be **\$3,910,267 to \$5,907,623.**

Table 1. Livestock Protection Replacement Program for WS Operations in California

| | Year 1 | Year 2 |
|-------------------|--------------------|--------------------|
| Sheep Protection | \$1,269,241 | \$1,831,664 |
| Cattle Protection | \$4,609,354 | \$6,044,287 |
| Total | \$5,878,595 | \$7,875,951 |

B. Increased Damages – Impact Analysis for Planning (IMPLAN®)

The IMPLAN® modeling system estimates the impacts of economic change in a specific sector to other parts of the economy. For the purposes of this analysis, the source of economic change is an increase in predation on sheep and cattle due to the absence of WS. Relevant scientific literature suggests that in the absence of predation management, predation rates would likely increase for both sheep and cattle (Bodenchuk et al., 2002). Lending further support to this argument, the livestock protection replacement program previously described yielded predation rates that conservatively increased 1.7% from year one to year two. Thus, for the IMPLAN analysis, hypothesized increased predation rates for sheep were set as 2% (level 1), 2.5% (level 2), and 3% (level 3); increased predation rates for cattle were set as 1% (level 1), 1.5% (level 2), and 2% (level 3).

This IMPLAN® analysis projected the economic impact of increased predation on the agricultural sector of the economy if WS-CA were to cease operations; note the loss in output and employment as predation increases. For example, a level 2 increase in predation for sheep (2.5%) and cattle (1.5%) results in a loss of output of \$7,554,085 to the California economy and a loss of 355 jobs in the State. These results suggest that an increase in predation on sheep and cattle in the absence of WS activities could result in the total loss of \$5,514,270 to \$9,648,542 of output value and 256 to 456 jobs in the State annually (Table 2).

Table 2: IMPLAN Results for California

| | Level 1 | | Level 2 | | Level 3 | |
|--------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
| | Loss of Output | Loss of Employment | Loss of Output | Loss of Employment | Loss of Output | Loss of Employment |
| Total | \$ 5,514,270 | 256 | \$ 7,554,085 | 355 | \$ 9,648,542 | 456 |

C. Indirect and Intangible Benefits

Indirect benefits are usually an unintentional effect of the primary purpose of the WS-CA Program, and in some cases are viewed as multiplier effects from direct benefits. For the WS predation management operations, the value of these benefits depends on the quantity and variety of livestock affected by predators. In many cases, the indirect benefit of livestock protection may result in a decrease in predation of other prey species. These may include domestic goats, fowl and exotics or threatened/endangered and game species. Their numbers (and value) may equal or exceed the direct benefit in livestock losses avoided. Additional indirect benefits can accrue to the communities that depend on the livestock industry as a primary source of revenue (these were captured by the IMPLAN® analysis).

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Intangible benefits exist as a result of the WS-CA Program, but are difficult to quantify monetarily. These benefits incorporate factors such as increased cooperation from landowners in others areas of service to the County and State as a result of the implementation of a predation management program (e.g., endangered species management actions and land management conservation practices). Additional intangible benefits include possible reductions in the use of less humane or illegal methods to control predators. The WS specialists are required to conduct all wildlife damage management activities in compliance with applicable Federal and State laws; they must record all activities for management purposes. Additionally, these individuals receive numerous hours of training in the proper use of pesticides, tranquilizers, and euthanasia--training that undoubtedly protects California's environment and offers humane capture and removal of offending animals. The recognition of the importance of intangible benefits in a predation management program is vital to providing an accurate description of the WS-CA Program's contributions.

Health and Human Safety, Natural Resources, and Property

Protection of resources by WS in California also includes health and human safety, natural resources, and property. The economic methods used to calculate benefits for these areas of protection are the same, and so their analysis has been combined into one section for simplicity.

This section is divided into three main elements, each addressing the remaining categories protected by WS. The first element uses the replacement of WS operations by an outside entity to determine the value of WS. The second element estimates the economic impact of an increase in damage when WS personnel are not present to remove the responsible animals. The third element provides a discussion of indirect and intangible benefits related to WS protection of health and human safety, natural resources, and property.

WS protects a wide range of resources in these three areas through its operations in California. Regarding health and human safety, the examination of WS MIS records revealed that the most important concern in the cooperative counties was the different threats that wildlife pose to health and human safety in general. According to collected WS MIS data, damage to riparian areas was the top natural resource issue. As far as property damage, the most important concern was damage to residential buildings.

A. Replacement Program

To estimate the cost of replacing the service of capturing and removing animals that pose a health and human safety threat or cause damage to natural resources and property, a range of costs was averaged for providers across California. Pricing for service is based upon a single trap setup and removal of one animal. Conversely, a single damage incident reported by WS personnel may constitute multiple trap locations and the capture of multiple animals. To calculate replacement costs, the number of incidents obtained from the WS-MIS over the five-year period (1999-2003) was multiplied by \$170.00 in most cases, by \$287.50 for beaver, and by \$395.00 for coyote incidents, then divided by the number of years to determine mean cost per year. Incidents involving large predators other than coyotes such as mountain lions and bears were calculated using the mean cost for coyote removal, as the replacement cost for their removal was likely higher. These calculations lead to a very conservative estimate of what WS provides: a cost for the minimum replacement service likely to be performed.

During the study years, an average of 1,561 incidents per year of health and human safety protection were provided by WS-CA. To replace WS-CA actions, and thereby protect health and human safety with a similar program, the minimum amount cooperating counties would likely spend annually would be \$297,223. Similarly, the cost of a replacement program to protect natural resources from wildlife was calculated for the 48 incidents WS-CA dealt with. The minimum amount California would spend is \$13,634 annually to replace WS actions in this area. The cost of a replacement program to protect property was \$414,512 for 1,837 annual incidents.

Table 3. Replacement Program for Wildlife Services Operations in California

| | Incident # | Avg/Incident | Annual Cost |
|--------------------------|-------------------|---------------------|--------------------|
| HHS Protection | 1561 | \$190 | \$297,223 |
| Nat. Resource Protection | 47 | \$290 | \$13,634 |
| Property Protection | 1837 | \$226 | \$414,512 |

B. Increased Damages

A second method used to determine the benefit of WS-CA was to estimate the increase in damage to health and human safety, natural resources, and property that residents might experience if WS ceased operations in California. The damages caused by wildlife that were incurred by the public were recorded by WS specialists using the MIS reporting system. It is important to note that the WS MIS data base only captures a small portion of the total wildlife damage that occurs in each county during a given year. Certainly, many homeowners, ranchers, and farmers simply tolerate or deal with damage on their own and don't report the damage to WS-CA.

Because it is impossible to determine the exact proportional increase in damage if WS were to cease operations, we have projected a range of possible levels. That is, increases of 25, 50 and 100 percent were used to estimate projected damage. The annual range of increased damage to health and human safety was \$42,798 to \$171,190 (Table 4).

Table 4. Prevented Damage Benefit of Wildlife Services Operations in California

| | Level 1 | Level 2 | Level 3 |
|--------------------------|----------------|----------------|----------------|
| HHS Protection | \$42,798 | \$85,597 | \$171,190 |
| Nat. Resource Protection | \$15,260 | \$30,519 | \$61,037 |
| Property Protection | \$180,233 | \$360,462 | \$720,922 |

Projected costs for an increase in wildlife damage to natural resources and property in California were also calculated in Table 4. The benefit of having natural resource protection was calculated in the same categories mentioned above (Levels 1, 2 and 3) equaling \$15,260, \$30,519 and \$61,037 each year in prevented costs to the public. To quantify the possible increase in damage to property, the same range is provided. The benefit of WS-CA in this area may be \$180,233, \$360,462 or \$720,922 each year in prevented damage.

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C. Indirect and Intangible Benefits

The cooperative counties receive a number of indirect and intangible benefits related to health and human safety, natural resource, and property protection as a result of paying cooperative funds for WS activities. Indirect benefits refer to diverse auxiliary benefits from professional and regulatory amenities that federal agencies provide in support of agriculture. Examples include the requirement for WS to comply with National Environmental Policy Act (NEPA) regulations in the conduct of wildlife management practices, the training and certification of WS specialists in firearm safety and chemical use and disposal, the participation and support of professionals at the National Wildlife Research Center to provide research and technical support on diverse pesticide registration and use issues, the use of capture methods that adhere to “best management practice” (BMP) guidelines for the removal of animals that come into contact with people, the safe disposal of captured animals using methods that meet current sanitation regulations, and an accurate accounting of program activities via the MIS.

California has traditionally experienced a large number of rabies cases, 3,312 animal rabies cases were reported in The California Department of Health Services “Reported Animal Rabies by State and Species California, 1993-2002” (CDHS, 2004). Although it would be incorrect to imply that WS is responsible for the control and testing of these potentially rabid animals (CDHS and the California Department of Fish and Game personnel handle these duties), it must be noted that WS does provide technical assistance to residents where threat of rabies is a concern and will remove potential vectors such as skunks and gray foxes. The high level of training provided by WS to its staff goes a long way to ensure that these complaints are dealt with safely and quickly, with the proper referral to other State agencies, if warranted.

SUMMARY

The current economic analysis of WS activities in California demonstrated that multiple returns on invested cooperative dollars were provided to the cooperating counties. Wildlife damage protection was afforded mainly for agriculture, but protection of health and human safety, natural resources, and property were also key areas. For the cooperating counties to employ replacement programs for agriculture, health and human safety, natural resource, and property protection activities provided by WS-CA, it would cost between \$6,603,964 and \$8,601,320 (Table 5). Given that the counties paid a total of \$1,968,327.87, net annual increased expenses of \$4,635,636 to \$6,632,992 would be incurred by the counties to attain similar benefits afforded by WS-CA.

Table 5. Total Replacement Program Benefits of Wildlife Services Operations in California

| | Year 1 | Year 2 |
|----------------------------------|--------------------|--------------------|
| Livestock Protection | \$5,878,595 | \$7,875,951 |
| HHS Protection* | \$297,223 | \$297,223 |
| Nat. Resource Protection* | \$13,634 | \$13,634 |
| Property Protection* | \$414,512 | \$414,512 |
| Total Replacement Program | \$6,603,964 | \$8,601,320 |

*Replacement cost calculated for only one year.

Assuming that damage from wildlife would increase 25 to 100 percent in the absence of WS activities within California it was projected that the cooperating counties would incur between \$5,758,612 and \$10,625,890 in additional expenses (Table 6). Under the current circumstances cooperating counties experience a minimum net savings of \$3,790,284 (\$5,758,612 - \$1,968,327.87) or a maximum of \$8,657,562 (\$10,625,890 - \$1,968,327.87).

Table 6. Total Prevented Damage Benefits of Wildlife Services Operations in California

| | Level 1 | Level 2 | Level 3 |
|-------------------------------|--------------------|--------------------|---------------------|
| Livestock Protection | \$5,520,321 | \$7,565,184 | \$9,672,741 |
| HHS Protection | \$42,798 | \$85,597 | \$171,190 |
| Nat. Resource Protection | \$15,260 | \$30,519 | \$61,037 |
| Property Protection | \$180,233 | \$360,462 | \$720,922 |
| Total Prevented Damage | \$5,758,612 | \$8,041,762 | \$10,625,890 |

The WS program achieves certain economies of scale that individual replacement programs do not. This is a result of efficiency gains inherent in WS operations due to the fact that WS can use a broad spectrum of available resources and technology to mitigate wildlife damage problems. We contend that because alternative programs would not have these efficiency gains (e.g., the livestock replacement program) then higher rates of predation and resulting damages would be greater.

For example, in Year 1 it would be possible to have replacement programs in place with an associated total cost of \$6,603,964 and also to have increases in damages and loss to the economy of \$8,041,762 (level 2), for a grand total of \$14,645,726 (Table 7). This grand total, minus the sum of cooperative share that the cooperative counties pay (\$1,968,327.87) could be viewed as a net benefit of \$12,677,398 as a result of contributing cooperative funds to WS. The net value of WS operations in California has been calculated in this report as ranging from **\$10,394,248 to \$17,256,882**.

Table 7. Total and Net Benefits of Wildlife Services Operations in California

| | Year 1 | | |
|---------------|---------------------|---------------------|---------------------|
| | Level 1 | Level 2 | Level 3 |
| Total Benefit | \$12,362,576 | \$14,645,726 | \$17,227,854 |
| - Share Cost | \$1,968,328 | \$1,968,328 | \$1,968,328 |
| Net | \$10,394,248 | \$12,677,398 | \$15,259,526 |

| | Year 2 | | |
|---------------|---------------------|---------------------|---------------------|
| | Level 1 | Level 2 | Level 3 |
| Total Benefit | \$14,359,932 | \$16,643,082 | \$19,225,210 |
| - Share Cost | \$1,968,328 | \$1,968,328 | \$1,968,328 |
| Net | \$12,391,604 | \$14,674,754 | \$17,256,882 |

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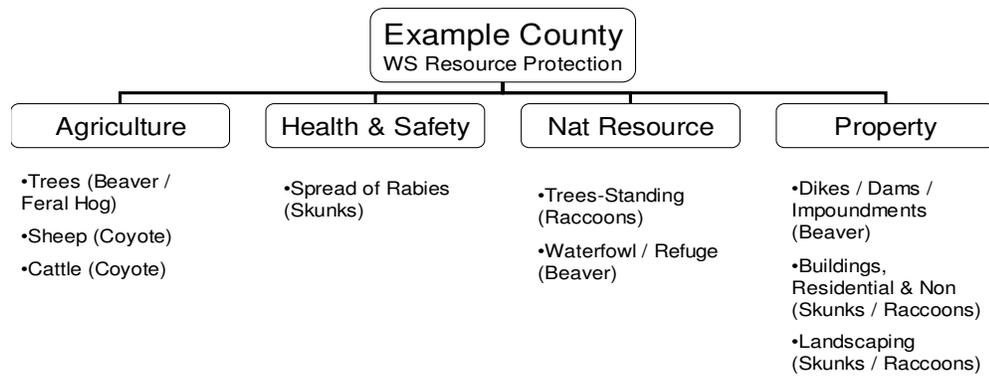
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Appendix I.

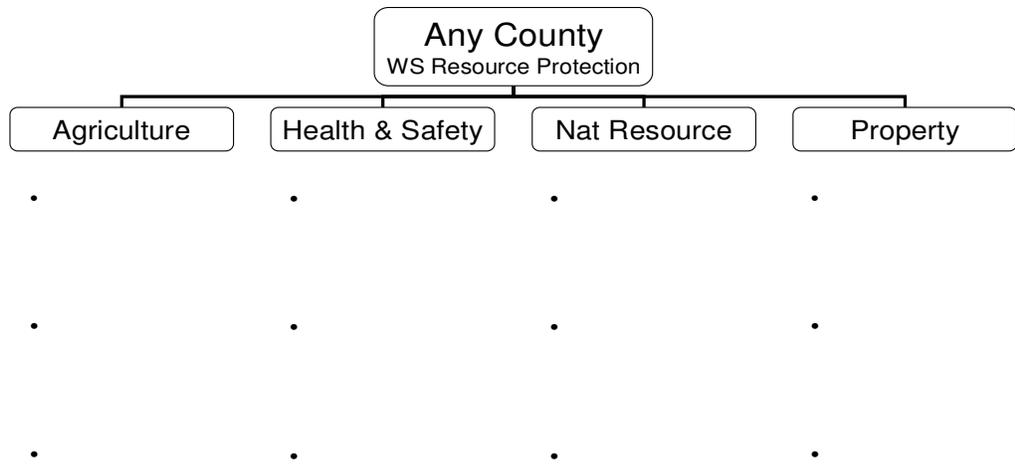
WS Resource Protection California District Supervisor Survey

Please fill in blank bullets (when applicable) and return via fax to:

Stephanie Shwiff, Ph.D.
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Thank you for you Participation,
Craig Coolahan and Stephanie Shwiff



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Appendix II.

ADMINISTRATION AND ALLOCATION OF COUNTY COST-SHARE FUNDS FOR NON-LETHAL PREDATOR CONTROL PROGRAM

Overview

On October 31, 2000, the Board of Supervisors approved and adopted a five-year action plan to develop, implement, and continuously evaluate a sustainable livestock protection program with non-lethal components, and to assess whether such practices exclusively applied might be economically feasible. This action was taken as the initial step in phasing out County support of a wildlife services contract with the United States Department of Agriculture (USDA). At the time of approval, county cost share funds supporting these activities were to be administered through the North Bay Woolgrowers Association. On September 12, 2001 the board approved modification of this plan to allow the agricultural commissioner to administer the funds, as well as include an element of indemnification against predation losses.

For FY2000/01 \$37,500 in funds was approved by the Board to be made available to ranchers to encourage the implementation and application of non-lethal livestock protection practices. In FY2001/2002 \$50,000 was additionally allocated, making \$87,500 available for both non-lethal cost share and indemnification. At this time the commissioner is proposing to allocate \$37,500 toward non-lethal cost share, and \$50,000 for purposes of indemnification. The following outlines a proposal for the administration and allocation of the \$87,500 in funds currently available.

Cost Share Funds

Improvements made as of October 31, 2000 will be eligible for reimbursement by the \$37,500 in cost share funds authorized by the Board on that date. Currently, county non-lethal predator cost share funds are placed into expenditure account 361-2267. These funds are clearly identified in a separate line, and tracked so they are effectively separated from the FY2001/02 funds allocated for implementation of the final year of the USDA Wildlife Services contract.

There are currently 29 commercial sheep ranchers in Marin constituting 7,500 head. It is proposed that ranches with greater than 200 head be eligible to receive up to \$2,000 in annual cost share funds, and ranches with fewer than 200 head would be eligible to receive up to \$500. Operations with less than 25 head are not considered commercial and would therefore not be eligible for reimbursement under this program. If all eligible ranchers were to participate and receive the maximum allowed under the current structure, all but \$2,000 would be expended. Those funds remaining in the account will be available for other types of ranching operations who wish to submit a claim for implementing non-lethal predator management improvements.

To initiate a claim, ranchers will contact the Agricultural Commissioner's office to set up an on site ranch review. This review will be set at the ranch location, and be made cooperatively by the Agricultural Commissioner's staff and Cooperative Extension's Rangeland and Livestock Advisor. The livestock advisor has the expertise to reasonably assess the value of any improvements or activity specified in the claim, and will also serve as a third party verification of the non-lethal activity for which reimbursement is requested.

A claim submittal form developed for the allocation of the non-lethal cost-share funds will be used to document the non-lethal predator program elements and associated costs. This claim form will be completed cooperatively by ranchers and the Agricultural Commissioner's staff. The completed form will provide site-specific information concerning needed, or existing property improvements, and estimated costs of improvements made since October 31, 2000.

The claim submittal form outlines what activities are reimbursable under this program, the four main categories being; protection/guard animals, fencing, scare devices, and shepherding/husbandry practices to minimize loss from predation. Projects that would be eligible for cost-share reimbursement are any material or property improvements that deter predation, such as fencing, barriers, lambing sheds, and other suitable animal husbandry activities. Reimbursement claims cannot be submitted for recycled materials salvaged from the bone yard.

Once the claim has been reviewed and the site information verified, the claimant, the County Inspector and/or the Livestock Advisor will sign the claim along with any notes and comments. The claim form, as well as any receipts will be submitted to the Agricultural Commissioner for review. Future cost sharing funds will be allocated in advance of program expenditures and will entail cooperative development of a plan with the rancher, and either the Agricultural Commissioner, Cooperative Extension, or USDA. This plan would consider individual ranch predator issues, outline appropriate non-lethal project elements, and estimate associated costs. Upon review and approval by the Commissioner, cost share funds would be authorized and allocated based on the plan. To attest to the veracity of the improvements claimed for reimbursement, a declaration has been added to the claim form beneath the claimant signature line. In this first year of the program the County may accept the claimants signature on this line as sufficient. However, future claims will require receipts as proof of material purchases before claims will be paid.

Once reviewed and approved, a payment voucher (PVQ) will be submitted to the Treasures office for a warrant to be paid in the name of the respective rancher. At this time, payments will be made out of Special Projects line 361-2267. A trust fund should eventually be established as it would provide a higher level of accountability, and perhaps, greater financial stability with regard to continued program funding. Additionally, should there be outside resources made available to the program (industry, endowments, private contributions, etc.), such a fund would provide an avenue for account for those funds and make them available for Marin ranchers.

The Agricultural Commissioners Office will maintain an accounting of disbursed cost share funds, and after initial claims review and fund disbursement, funds remaining in the account will be reviewed to determine the unclaimed amount. Those Remaining funds would then be made available to ranchers through a second claim submittal process. First priority would be given to ranchers who have not already filed claims, second priority to those who have. The order of payment on competing second priority claims would be determined by the posted date of the second claim and the amount the eligible ranch has already drawn on the account.

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Indemnification

It is proposed that the \$50,000 allocated for FY2001/2002 be designated for purposes of indemnification. Indemnification claims are for commercial livestock operations, and does not apply to show animals or special breeding stock.

Average annual losses are estimated at \$40,000, with \$160,000 estimated as the worst case loss for Marin's sheep industry. It is recommended that any indemnification and cost share funds remaining at the end of the year be placed into a trust fund, as outlined earlier, and made available for future indemnification against predation losses. The goal is to accrue and maintain a balance of \$160,000 in this fund to insure against a worst case circumstance. There would be a periodic review and adjustment of this account to insure the maximum available funds are adequate to cover worst case losses.

To be eligible for indemnification, a ranch must have in place an effective non-lethal program to manage livestock predation. As with cost share funds, ranchers will contact the Agricultural Commissioner's office to set up an on site ranch review to verify and document that the ranch has in place the elements of an effective non-lethal program. This site review must be made before the ranch is eligible for indemnification funds. This review will be made cooperatively by the Agricultural Commissioner's staff and Cooperative Extension's Rangeland and Livestock Advisor. This information will be documented using the same ranch review form as is used to access eligibility for cost share funds. Once the ranch is determined to be eligible for indemnification, losses covered are those suffered after the date when the commissioner's staff determined the ranch met the criteria for indemnification – predation related losses are not retroactive to the date that the county authorized the indemnification aspects of the program.

To be reimbursed for predator related losses, ranchers are to immediately notify the Agricultural Commissioner of predation loss, and provide logistical information such as location, manner, predator, total numbers of animals killed, etc. If necessary the Agricultural Commissioner, the County Livestock Advisor, USDA, or the Humane Society would verify the kill. Losses would also be documented on the Marin County Monthly Predator Survey Report Card, signed by the rancher, and the form immediately submitted to the County Livestock Advisor. Loss forms not submitted immediately following a kill, or kills belatedly reported, may not be honored as being valid.

Indemnification payments will be made in June after the lambing season and after all claim forms have been submitted for that fiscal year. At that time, individual ranch losses will be tallied, the ranch will be notified of the reported losses based on the number of losses reported by the ranch, as well as the preliminary level of reimbursement expected. The rancher will review and verify the number of reported losses on record for their operation, and then sign and return an affidavit attesting to the accuracy of the losses claimed for that year.

If sufficient funds are available to cover all claims at that year's market value, claims will be reimbursed the market value. If market value total claimed loss exceeds the available funds, payments will be prorated based on a percentage determined by dividing the available indemnification funds by the dollar value of all the claims filed. If, at the end of the year, there were funds remaining in the account, these would be placed into a trust fund, and be made available for future claims against losses.

Appendix III.



MARIN COUNTY DEPARTMENT OF AGRICULTURE • WEIGHTS AND MEASURES
STACY K. CARLSEN
 COMMISSIONER/DIRECTOR
FRED W. CROWDER
 DEPUTY COMMISSIONER/DIRECTOR

Reimbursement Claim for Non-lethal Control

The Marin County Board of Supervisors recently approved and adopted a five-year action plan to develop, implement, and evaluate a sustainable/wildlife protection program. The plan provides funding for the use and implementation of non-lethal methods.

The following is a list of recognized non-lethal methods that could qualify a rancher for the non-lethal reimbursement money and potentially for indemnification due to predator loss. There are four main categories: Protection animals, Fencing, Scare Devices, and Husbandry and Shepherding. Please fill out the following information:

Date: _____
Name: _____
Mailing address: _____
Location address: _____
Telephone: _____
Number of livestock (adults head count) _____ **Acres:** _____

Reimbursement Tier for cost share funds:

25 to 199 adult head = up to \$500.00
 200 adult head and up = up to \$2,000.00

I. Protection Animals

Animals used to protect livestock: guard dogs, llamas, donkeys, etc.

| Type of Animal | Name | Id or Markings | Animal Cost | Yearly upkeep (Vet, food, etc.) |
|----------------|------|----------------|-------------|---------------------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Date(s) of implementation: _____
 Total costs: _____
 Remarks: _____



II. Fencing

NEW FENCING – electric, woven wire, barb wire, cross fencing, other.

Type of new fencing: _____

Cost of materials: _____

Receipts submitted yes no: _____

Number of linear fence feet: _____

Labor/number of hours to install _____

Remarks: _____

EXISTING FENCES/PATCH FENCING

Type of fencing: _____

Cost of materials: _____

Number of feet improved: _____

Labor/number of hours to install: _____

Date(s) of implementation: _____

Total costs: _____

Remarks: _____

III Scare Tactics

Horns, lights, radios, bells, noisemakers, behavioral disrupters, etc.

| Name/type of scare tactic | Where it's used | Upkeep cost(s) |
|---------------------------|-----------------|----------------|
| | | |
| | | |
| | | |
| | | |

Date(s) of implementation: _____

Total costs: _____

Remarks: _____

IV Husbandry and Shepherding

Rotating pastures, night pastures (bring animals to a protected area), barn/protective-housing improvements, shed lambing, shed herding/herders.

Describe type of husbandry/shepherding: _____

Number of labor hours on a weekly, monthly, and year: _____

Date(s) of implementation: _____

Total costs: _____

Remarks: _____

I declare under penalty of perjury under the laws of the State of California that the above statements are true and correct of my own knowledge, or, if based upon information and belief, I believe them to be true.

Applicant signature _____ **Date** _____

V. Summary

To be filled out by Marin County Department of Agriculture/U.C. Cooperative Extension.

Estimate total spent on non-lethal methods (from October 31, 2000 to present): _____

Total cost share funds eligible through non-lethal program: _____

Rancher meets the criteria for indemnification: ___Yes ___No

Comments: _____

Inspector signature: _____ Date: _____

Rangeland Advisor signature: _____ Date: _____

Notes/Comments _____
