A COST/BENEFIT ANALYSIS OF OILED WILDLIFE RESPONSE

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ABSTRACT

In discussions about the value of cleaning and rehabilitating oiled wildlife, much attention is focused on the costs to provide such care. Several references have made widely varying claims regarding these costs, yet none have provided a detailed accounting of costs associated with rehabilitation. Therefore, this paper focuses on three oil spill responses conducted in northern California (M/V Kure, M/V Stuyvesant, and S.S. Jacob Luckenbach) since 1997. We examine the costs associated with wildlife care using detailed accounting provided by the Oiled Wildlife Care Network. We include all variable costs (including labor and travel expenses for staff at the facility, facility expenses such as utilities and other indirect costs, and supplies) and compare these amounts to the numbers of birds collected live and dead, as well as the number treated and released. We discuss other fixed and variable costs that are not included, as well as characteristics of the spill responses that impacted rehabilitation costs. Finally, we discuss the results with regard to natural resource damage assessments, the costs of restoring birds in the wild, and non-economic criteria relevant to an evaluation of the value of oiled bird rehabilitation. We conclude that costs and benefits vary based on factors that include the temporal nature of the spill, the level of preparation, and the behavior of the responsible party.

INTRODUCTION

Marine oil spills have the potential to impact thousands of animals, as evidenced by the *Erika* spill off the coast of France (> 63,000 birds treated) and the *Treasure* spill in South African waters (> 20,000 birds treated), yet debate over the value of oiled wildlife response continues. Cost-effectiveness and benefits of rehabilitating oiled wildlife both to individual animals as well as to populations are two factors that have been questioned extensively (Estes, 1991; Anderson *et al.*, 1996).

Accounts of oiled wildlife rehabilitation costs per animal vary widely, from U.S. $15 (Smith, 1975) to U.S. $1,500 (Jessup, 1998) per bird and from U.S. $5,000 (Jessup, 1997) to U.S. $80,000 (Estes, 1998) per sea otter. Discrepancies in cost per animal figures are largely due to differences in the fixed costs included in these estimates—in particular, whether facility construction and initial equipment purchase costs are included, as these can considerably elevate the final figure. Nevertheless, Averett (1997) found that wildlife rehabilitation costs constitute only 0.01%–5.9% of the total response bill.

In California, as a consequence of the *Exxon Valdez* and *American Trader* oil spills in 1989-1990, the state legislature passed a series of laws (SB-2040, SB-775, AB-1549, and AB-748) designed to strengthen those federal regulations put in place by the Oil Pollution Act of 1990. These regulations developed a separate branch of California's Department of Fish and Game (the Office of Spill Prevention and Response) whose role is to oversee the State's spill response efforts and to develop the infrastructure necessary to allow for effective and efficient response. Additionally, funds generated through these legislative mandates helped to develop the State's Oiled Wildlife Care Network (OWCN), an integrative program providing for the construction of facilities and the development and administration of a cooperative network of wildlife caregivers whose mission is to provide the best achievable treatment for oil-affected wildlife. This has resulted in the construction of multiple rehabilitation facilities throughout the state, each dedicated to oiled wildlife response but also used for research and education during non-spill periods.

Another benefit arising from the creation of the OWCN is the development of detailed and extensive protocols for improving the efficiency and effectiveness of oiled wildlife rehabilitation. These protocols describe state-of-the-art care techniques, call-out procedures, animal data acquisition, evidence collection, and cost accounting. By using these protocols and playing an active role within the Incident Command System, more precise information on the costs of oiled wildlife rehabilitation, and the tangible and intangible benefits stemming from such activities, is now available to address some of the questions regarding animal care during oil spills. This paper examines rehabilitation costs and benefits associated with oiled bird care by analyzing data collected from three fuel oil spills that occurred off the northern California coast between 1997 and 2003.

METHODS

The three oil spills included in this analysis (*M/V Kure*, *M/V Stuyvesant*, and *S.S. Jacob Luckenbach*; Table 1) were selected for a number of reasons. First, all were large, full-scale responses where significant numbers of staff and volunteers were needed to provide appropriate care. Second, all spills impacted a similar species distribution, with the most frequent animal collected being the common murre (*Uria aalge*). Third, all three spills utilized pre-existing oiled wildlife response facilities. Fourth, all spills involved similar types of oil and occurred during winter months, thereby decreasing the variability in survival of animals between the different spill events. Finally, all of the spills occurred after standardized OWCN protocols for the care of oiled wildlife were put into place. With these facts in mind, one difference should be noted. The *Kure* and *Stuyvesant* spills were both acute releases focused in the Arcata/Humboldt region, but the *Luckenbach* spill was a chronic release from a sunken vessel. This resulted in impacted animals being collected from a search area over 200 miles long.

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Table 1: Overall Summaries of the Three Spills Evaluated in this Paper

	M/V Kure	*M/V Stuyvesant*	*SS Luckenbach*
Estimated Release	4,500 gallons	2,100 gallons	Unknown
Duration of Animal Care	59 days	27 days	439 days
Birds Collected Alive	484	690	1094
Birds Released	195	281	370
Volunteer Hours	8,200	9,600	8,200

For the purpose of this analysis, all variable costs associated with wildlife care were included. Specifically, these included staff labor and travel costs, consumable supplies, utilities, facility use fees (imposed to offset repair/maintenance costs to the facilities), and overhead charges (which varied between 7% and 20% and were dependent on the collaborating organization). Fixed costs associated with facility construction (as pre-existing facilities were used during all spills), beach search efforts, wildlife collection and transportation, dead bird documentation, or other costs that may have been incurred without a wildlife rehabilitation effort were not included. Costs for collecting oiled wildlife were excluded in the analysis because these animals must be removed from the environment following a spill regardless of whether rehabilitation takes place. Just like oiled debris on the shoreline, they represent a form of environmental contamination that must be eliminated; furthermore, oiled animals can be consumed by predators or scavengers, thereby increasing the level of wildlife impact beyond those directly affected by the spilled product. Similarly, costs incurred by beach search and capture efforts, as well as documentation of carcasses, were not included because these activities would take place even if it was decided not to care for live oiled animals.

RESULTS AND DISCUSSION

Costs

Overall wildlife response costs for these three spills ranged from approximately $338,000 to more than one million dollars (Table 2). Personnel costs (salary, benefits and travel expenses) accounted for approximately one-half of the overall costs for each spill. Facility/supply costs accounted for close to 40%, and indirect costs approached 8-10%. On a per-bird basis, costs per captured bird ranged from approximately $650 to $1,100, and costs per released bird ranged from approximately $1,600 to $3,100. Not surprisingly, per-animal costs were found to be higher for the chronic spill (*Luckenbach*) than the two acute releases. This is primarily due to many of the personnel costs being equivalent whether a small or moderate number of animals are in care at any given time.

An important factor to note is the large number of volunteer labor hours recorded during these spills (see Table 1). General costs for management of this workforce (such as meals, training, and coordination) were included in the overall spill costs, but actual costs per unit time were not included. Using the most conservative approach available, if these volunteers had been paid the current minimum wage ($6.75 per hour in California) overall personnel costs would have increased between $55,000 and $60,000 (or 5–16%) per event, and overall per-bird costs would have increased by more than $80 per captured bird and $150 per released bird. Alternatively, if volunteers had been employed by the OWCN as general assistants under the currently approved cost structure, per-bird costs would have increased an additional 25%–80%. Therefore, actively soliciting volunteers during (and before) a spill event and mounting a concerted effort to retain a volunteer corps can significantly decrease costs associated with a spill response.

As described above, construction costs were not included in these estimates, as previously constructed facilities were used to provide rehabilitative care. If these expenses were included in the overall cost estimates (and facility use fees subtracted from the totals), per-bird costs would have at least doubled (ranging from $1,400 to $2,400 per bird captured and $3,400 to over $7,000 per bird released). While it can be argued that these costs would be amortized over several spill events, it should be noted that these construction costs are very conservative estimates, as costs associated with building a rehabilitation facility during the response phase of a spill could easily be double that seen during non-spill times.

Table 2: Cost Estimates for the Three Spills Evaluated in this Paper

	M/V Kure	*M/V Stuyvesant*	*SS Luckenbach*
Personnel Costs	$179,756.88	$230,214.30	$512,917.21
Travel Costs	$15,365.78	$7,506.83	$26,871.48
Facility Use Fees	$54,975.00	$45,200.00	$315,500.00
Supply Costs	$63,718.12	$128,121.49	$126,710.78
Utilities	$1,029.49	$418.89	$106,914.84
Indirect	$23,428.72	$38,848.40	$73,655.26
Total Costs	$338,273.99	$450,309.91	$1,162,569.57

Benefits: Restoration Costs

Interest is sometimes focused on the costs of rehabilitation in comparison to the costs of restoration, with the claim that funds are more efficiently directed toward population conservation efforts (Estes 1998, Jones 2001). In most oil spill settings in the United States, rehabilitation and restoration are not pitted against each other, as responsible parties are obligated to do both (see Jessup and Mazet 1999).

Natural resource damages (NRD) are a civil claim requiring compensation for injuries to natural resources. Because recovered funds may only be spent on wildlife and habitat restoration projects, the cost of these projects is commonly used as the basis for calculating damages (Jones and Pease, 1997). Past NRD settlements provide an index of the restoration cost per injured bird, but the cost per killed bird varies widely among species depending upon population recovery time (as interim losses inform the level of injury) and restoration costs. For example, the mallard (*Anas platyrhynchos*), a bird with rapid reproduction that readily adapts to a wide variety of habitats, can be restored relatively cheaply through the creation of brood ponds in wetlands. Other species, like the marbled murrelet (*Brachyramphus marmoratus*)—a rare and declining species because it requires a specific habitat that is in conflict with human uses—may be restored through the protection of old growth forests, a practice which can be extremely expensive.

In the *Apex Houston* case, $4.9 million was allocated to provide restoration for 7,488 common murres estimated killed (Page et al. 1990), while $500,000 was allocated for compensation of less than 10 marbled murrelets. These figures amount to restoration costs of $654/killed common murre and more than $50,000/killed marbled murrelet. In the *Command* oil spill case, the implied restoration costs were $853/killed common murre and at least $95,600/killed marbled murrelet (Command Oil Spill Trustee Council, 2004).

This range of restoration costs illustrates that, in some cases rehabilitating oiled birds, especially if they are rare or endangered, may satisfy an economic efficiency criterion. Note that this evaluation must take into account post-release survival of rehabilitated birds, as the primary concern relative to restoration costs is the cost per *surviving* rehabilitated bird. Post-release survival rates vary greatly across species (for example, see Sharp 1996, Underhill et al. 1999, and Golightly et al. 2002).

A related concern is the NRD credit that responsible parties may receive in return for bearing rehabilitation costs. In general, NRD assessment practice errs on the side of species conservation and grants little credit for rehabilitated animals, assuming that most of the rehabilitated birds do not re-enter the breeding population (Fry et al., 1986; Collins et al., 1994; Anderson et al. 1996; Harris and Wanless, 1997). This practice may change as more research sheds new light on the issue.

Because total bird mortality is estimated to be many times greater than the number of birds collected, in most cases the post-release status of rehabilitated birds has a minor impact on the NRD assessment. For example, imagine an oil spill where 800 birds are collected, half dead and half alive. Of the 400 collected alive, 200 are successfully cleaned and released. At the same time, the trustees and responsible party agree that for every bird collected four more were missed due to scavenging, at-sea loss, or lack of search effort. Thus, a total of 4,000 birds were impacted, with 200 of those (or 5%) spared through rehabilitation. This illustration, using proportions that are not atypical, demonstrates that the post-release status of rehabilitated birds is a minor issue in most NRD cases.

Benefits: Brand Equity

For large national or multi-national businesses, a discussion of the costs and benefits of responding to oiled wildlife must also address the potential impact of the company's action or inaction on brand equity. Barwise (2003) describes brand equity as referring to customers' and others' beliefs and expectations about products and services sold under a specific trademark or about the company that provides them. For the purpose of this discussion we will focus on the latter, as an oil spill clearly impacts public perception of the responsible party. Viewed in this light, brand equity largely becomes a reflection of the company's reputation, a commodity that has distinct value. For example, when market value for a successful business exceeds the value of its tangible assets, brand equity is often the single most important intangible asset accounting for this difference. This was clearly demonstrated when Philip Morris purchased Kraft for $12.9 billion, four times its book value (The Economist, 1991). Clifton (2003) more demonstrably states that the brand is the most important and sustainable asset of any organization. Marketing metrics, such as customer loyalty, offer one way for managers to understand this important asset.

Customer loyalty derives from multiple factors, but begins with a well-developed sense of trust in the company or commodity. In fact, Blackett (2003) wrote that the real power of a brand is that it represents a promise to the consumer which has been kept. Following an oil spill, the consumer expects the responsible party to do everything possible to address the impact of its spill on the environment affected—this includes the recovery and care of wildlife. It is through this lens that the responsible party's actions will be judged and the public's trust validated. If consumers find the responsible party wanting, they will feel a sense of betrayal and, if possible, move their purchasing power elsewhere. This can have significant impact on multi-national companies where a 5% decrease in sales could result in a loss of brand value exceeding $1 billion (Lindemann, 2003). In a petroleum market populated by multiple choices for a relatively similar product, a company's brand—along with all it represents—is an important differentiating factor.

In this light, consideration should be given to how the responsible party might bolster public confidence following a spill that affects wildlife. Consider the relative cost and perceived value of the following scenarios. In example A, the responsible party aggressively pursues a state-of-the-art oiled wildlife response and a public relations person is tasked with managing images and information for dissemination to third party media outlets. In example B, the responsible party does not aggressively support oiled wildlife recovery and rehabilitation and receives negative media attention for its lack of effort. The resulting decline in sales prompts a post-response advertising campaign that includes public service initiatives to benefit local environmental stewards. The cost of managing public relations during a spill would pale in comparison to mounting an advertising campaign after the fact. Additionally, the credibility of the information's source must also be factored. A positive message delivered by a third party news outlet will be viewed as unbiased and valued more highly by the consuming public. In contrast, an advertising campaign sponsored by the responsible party will be viewed as self-serving and less reaffirming of the trust the consumer originally placed in the company.

The value of this trust cannot be underestimated when decisions are made regarding an oiled wildlife response. Given the low percentage of overall response costs attributed to caring for oiled wildlife (Averett, 1997), responsible parties must carefully weigh potential loss of brand equity when deciding whether the benefit of conducting an oiled wildlife response outweighs the cost.

Indirect Benefits

The actual act of cleaning oiled birds during a spill response undoubtedly provides benefits to the public in addition to the direct impact of saving birds. Bird cleaning is a prominent public act and is often the focus of considerable media attention. It provides

an opportunity for the responsible party to make amends, and it is the only part of the spill response that utilizes public volunteers. As such, it provides a group cathartic experience, where people can "do something" about an oil spill. During each of the three spill responses examined here over 8,000 volunteer hours aided the bird rehabilitation efforts. This outpouring of public support not only reduces costs, but also suggests considerable intrinsic or altruistic values involved in providing aid to stricken wildlife (see Estes 1998 and Jessup and Mazet 1999). Although difficult to measure, such values have been described by economists for decades. Kopp (1992) argued that people can derive value from an ethical or altruistic concern for non-human species. These values are evidenced by the fact that people commit resources (e.g. time and money) on the basis of these values (Freeman 1993). Public demand for and involvement in wildlife rehabilitation are examples of such altruism. Members of the public that do not volunteer during an oil spill may still vicariously receive value simply from knowing that others are making the effort (Randall and Stoll 1983).

CONCLUSIONS

In order to more thoroughly analyze the costs and benefits of an oiled wildlife response, we have presented the most carefully documented accounting of these activities to date. We noted that costs vary based on several factors, including but not limited to: the temporal nature of the spill (i.e., acute vs. chronic), the availability of pre-existing rehabilitation facilities, the number and availability of volunteers, and the behavior of the responsible party. When threatened and endangered species are affected, costs of natural resource damages are higher and rehabilitation of these animals translates to a potential net financial benefit for the responsible party. Similarly, refining existing rehabilitation techniques by responding to non-endangered oiled animals not only benefits the animals directly, but also provides essential information that can be used to improve the rehabilitation success for threatened and endangered species.

An oiled wildlife response satisfies the public's expectation that the responsible party take responsibility for its actions and benefits the responsible party in the form of improved brand equity, but just as important, the response benefits the general public by providing an outlet for them to "do something". The large number of volunteer hours documented in this paper reflects the high intrinsic value people place on wildlife and its care. Though this value may be difficult to quantify, it should not be ignored.

BIOGRAPHY

Dr. J. Gregory Massey received his DVM from the North Carolina State University in 1989. In 1996 he became a diplomate of the American Board of Veterinary Practitioners certified in avian practice. From 1993–2003 he worked as Hawaii's Endangered Species Veterinarian. In 2003, he joined the U.C. Davis Wildlife Health Center as the Response Veterinarian for the Oiled Wildlife Care Network.

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