Appendix A

Acronyms, Abbreviations, and Glossary of Terms

Appendix A: Acryonyms, Abbreviations, and Glossary of Terms

1. Acronyms & Abbreviations

BO	Biological Opinion
BPA	Bonneville Power Administration
C & S	Commercial, Ceremonial, and Subsistence Fisheries
CCMP	Comprehensive Conservation and Management Plan
CDFG	California Department of Fish and Game
COE	U.S. Army Corps of Engineers
Corps	U.S. Army Corps of Engineers
CRCIP	Columbia River Channel Improvement Project
CRFM	Columbia River Fish Mitigation
CTWG	Caspian Tern Working Group
DEIS	Draft Environmental Impact Statement
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESI	East Sand Island
ESU	Evolutionary Significant Units
FCRPS BO	Federal Columbia River Power System Biological Opinion
FCRPS	Federal Columbia River Power System
FMP	Federal Fishery Management Plans
FOUR H'S	Hydropower, habitat loss, hatcheries, and harvest
LCREP	Lower Columbia River Estuary Project
MBTA	Migratory Bird Treaty Act
MSA	Magnuson – Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Marine Fisheries Service
NWR	National Wildlife Refuge
O & M Program	Corps Columbia River Channel Operation and Maintenance Program

1. Acronyms & Abbreviations (Continued)

ODFW	Oregon Department of Fish and Wildlife
PFMC	Pacific Fishery Management Council
PSC	Pacific Salmon Commission
RM	River Mile
RM 146	River Mile 146 (Bonneville Dam)
Service	U.S. Fish and Wildlife Service
T & C	Terms and Conditions
UKL	Upper Kalamath Lake
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDFW	Washington Department of Fish and Wildlife
WRDA	Water Resource Development Act

2. Glossary of Terms

Additive mortality. A mortality factor that causes an immediate reduction in total survival.

Anadromous. Describes fish that migrate from the sea to fresh water to spawn (breed).

Arid. Lacking moisture, insufficient rainfall to support trees or woody plants.

Bioenergetics Modeling. Used to estimate consumption levels of piscivorous waterbirds. They calculate the amount of prey consumed in either biomass or numbers, based on diet composition, energy content of prey, energy requirements of individual consumers, and the number of individual consumers present (adults and juveniles).

Char. A fish of the genus *Salvelinus*, related to the trout.

Compensatory Mortality. A mortality factor that does not result in a change in total survival, until it reaches a threshold level. Animals dying of a compensatory mortality factor would have died anyway of some other cause.

Cyprinid. A soft-finned mainly freshwater fish typically having toothless jaws and cycloid scales.

Delta. Area where a river divides before entering a larger body of water.

Demersal. Fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Dredge material. Any excavated material from waterways.

Ephemeral. Lasting a very short time; short-lived; transitory.

Estuary. The wide part of a river where it nears the sea; fresh and salt water mix.

Exclusive Economic Zone. Consists of those areas adjoining the territorial sea of the U.S. and extends up to 200 nautical miles from the U.S. coastline. Within its Exclusive Economic Zone, the U.S. has sovereign rights over all living and nonliving resources. (This also includes the territorial sea of the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, and U.S. overseas territories and possessions).

Fledglings. Young birds that have recently acquired their flight feathers.

Foraging habitat. The area where an animal searches for food and provisions.

Fry. The young of any fish.

Generation time. The average amount of time between the appearances of two successive generations (parent and offspring).

Habitat. The type of environment in which an organism or group normally lives or occurs.

Hazing. Disturbance to Caspian terns early in the nesting season through the use of repeated walks through of the nesting area by people or dogs.

2. Glossary of Terms (Continued)

Herbaceous. Relating to or characteristic of an herb as distinguished from a woody plant. Green and leaflike in appearance or texture.

Mudflats. Flat un-vegetated wetlands subject to periodic flooding and minor wave action.

Outmigrant. Juvenile salmonids (smolts) that are migrating out of their native rivers or streams on their way to ocean waters.

Pelagic. Of or pertaining to the ocean; applied especially to animals that live at the surface of the ocean, away from the coast.

Pile dike. Dike with pilings.

Piscivorous. Fish-eating.

Pit-tags. Passive Integrated Transponder or PIT tag. Very small (12 mm by 2.1 mm) glass tube containing an antenna and an integrated circuit chip inserted into the juvenile fish's body cavity that remains inactive until activated at a PIT-tag monitoring facility.

Rodeo-herbicide. A herbicide (chemical) used to control a variety of emergent (any of various plants [such as a cattail] rooted in shallow water and having most of the vegetative growth above the water) aquatic weeds.

Salmonid. Of, belonging to, or characteristic of the family Salmonidae, which includes the salmon, trout, and whitefish. Includes steelhead.

Salt ponds. Persistent hypersaline ponds that are intermittently flooded with sea water. Artificial salt ponds are surrounded by levees or dikes (manmade embankments) were created for salt harvest and have completely replaced natural salt ponds in San Francisco Bay.

Scarify. Make superficial incisions in.

Shoal. An area of shallow water; submerged sandbank visible at low water.

Smolts. A young salmon two or three years old, when it has acquired its silvery color.

Spawning escapement. Number of adult fish returning to spawning grounds.

Subtidal zone. Zone includes from ten meters depth to the low tide line.

Subyearling. A juvenile fish less than 1 year old.

Thermocline. A layer of water in an ocean or certain lakes, where the temperature gradient is greater than that of the warmer layer above and the colder layer below.

Trolling. To fish for by running a baited line behind a slowly moving boat.

Upwelling. An oceanographic phenomenon that occurs when strong, usually seasonal, winds push water away from the coast, bringing cold, nutrient-rich deep waters up to the surface.

Yearling. A fish that is one year old or has not completed its second year.

Appendix B

References

Appendix B: References

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68 FR 16826. Notice of Intent to prepare an Environmental Impact Statement for Caspian tern management in the Columbia River estuary and notification of six public scoping meetings, April 7, 2003.

69 FR 33102. Endangered and Threatened Species: Proposed Listing Determinations for 27 ESUs of West Coast Salmonids. June 14, 2004.

69 FR 44053. Notice of Availablility of the Draft Environmental Impact Statement for Caspian tern management to reduce predation of juvenile salmonids in the Columbia River estuary, July 23, 2004.

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Roby, Dan: U.S. Geological Survey
Sanguinetti, Pam: U.S. Fish and Wildlife Service
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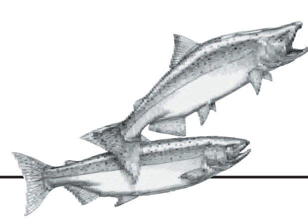

Appendix C

NOAA Fisheries Report: Caspian Tern Predation on Juvenile Salmonid Outmigrants in the Columbia River Estuary

Appendix C.

Caspian Tern Predation on Juvenile Salmonid Outmigrants in the Columbia River Estuary

Northwest Fisheries Science Center
NMFS/NOAA
Seattle, Washington

June 1, 2004

Amended for FEIS, January 7, 2005

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EXECUTIVE SUMMARY

- Relatively new human-constructed islands in the Columbia River estuary have provided breeding habitat for Caspian terns, where they have been able to successfully exploit juvenile salmonids as a food resource.
- The effect of Caspian tern predation: varies between years, varies among salmonid species, is greatest on steelhead, and is lowest on wild yearling chinook.
- Caspian tern predation on juvenile salmonids reduces salmon population growth rate and thus recovery, however, removing all tern predation will not-- by itself--lead to full recovery of any listed salmon and steelhead stock.
- The effect of Caspian tern predation on recovery may be comparable to fish passage improvements at Columbia River dams and harvest reductions for some Evolutionarily Significant Units.
- Relocating Caspian terns to habitat closer to the mouth of the Columbia River significantly reduced predation impact on juvenile salmon.
- Additional PIT tag data needs to be collected and evaluated to validate initial predation rates at East Sand Island.

BACKGROUND

The ecosystems inhabited by anadromous salmonids are extensive and complex. In the case of upper Columbia River and Snake River salmon and steelhead, their range extends inland as far as 1500 km and rise to elevations of 2500 m above mean sea level. Their oceanic range extends through the North Pacific Ocean to the Bering Sea and the Sea of Japan. Climate conditions and human activities have had adverse affects on water flows, river conditions, spawning and rearing habitat, ocean productivity, and eventually, salmonid survival and productivity. Wild and naturally reproducing stocks of steelhead have declined dramatically in the interior Columbia River Basin (McClure *et al.* 2003). Wild and naturally reproducing spring- and summer-run chinook stocks also have declined dramatically throughout the Pacific Northwest. As a result, nearly every population of naturally producing anadromous salmonids in the Columbia River Basin is now listed (or is a candidate for listing) under the Endangered Species Act (ESA).

Salmonids experience high mortality rates as juveniles in freshwater, the estuary and early ocean, leading researchers to suggest that reducing mortality during the juvenile stage has the potential to increase population growth rates (Kareiva *et al.* 2000). Although significant mortality of juvenile salmonids occurs in the ocean, our ability to influence ocean survival is limited. Therefore, improvements in freshwater survival and production are imperative and can directly affect the number of returning adult salmonids (Raymond 1988, Beamesderfer *et al.* 1996).

Many of the measures taken to restore anadromous salmonid production in the Columbia River Basin have focused on improving the survival of juvenile migrants through the mainstem dams. Various life-cycle models indicate that mortality of juveniles during migration in freshwater constrains anadromous salmonid production in the Columbia River Basin, thereby reducing the benefits of enhancement measures upstream (Beamesderfer *et al.* 1996, Kareiva *et al.* 2000). Increasing populations of piscivorous birds (primarily Caspian terns) nesting on islands in the Columbia River estuary annually consume large numbers of migrating juvenile salmonids (Roby *et al.* 1998) and thus constitute one of the factors that currently limit salmonid stock recovery (Roby *et al.* 1998; Independent Multidisciplinary Science Team 1998; Johnson *et al.* 1999). Therefore, reducing Caspian tern predation in the estuary, is one potential mechanism to reduce mortality, thereby increasing population growth rates of Endangered Species Act (ESA) listed salmonid Evolutionarily Significant Units (ESUs)[1] in the Columbia River Basin.

Anthropogenic changes in the Columbia River Basin appear to have facilitated increases in populations of colonial waterbirds. The largest recorded colony of Caspian terns in the world now occupies East Sand Island—a natural island that has been augmented by depositing upon it dredge material from maintaining a navigation channel in the Columbia River estuary (Roby *et al.* 1998). There, the terns feed on large numbers of migrating juvenile salmon and steelhead, and basin-wide losses to avian predators now constitute a substantial proportion of individual salmonid runs (Roby *et al.* 1998).

In the early 1990s, National Marine Fisheries Service (NOAA Fisheries) staff at the Point Adams Field Station noted substantial increases in the size of newly established Caspian tern nesting colonies on Rice Island in the Columbia River estuary. Several estuary islands on which piscivorous birds nest (Fig. 1) were created from or augmented by materials dredged to maintain the Columbia River Federal Navigation Channel. Before 1984, there were no recorded observations of terns nesting in the Columbia River estuary, when approximately 1000 pairs apparently moved from Willapa Bay to nest on newly deposited dredge material on East Sand Island. In 1986, those birds moved to Rice Island, an island created by the Army Corps of Engineers for the purpose of dredge disposal. The Caspian tern colonies in the estuary have since expanded to 9,000-10,000 pairs, the largest ever reported. In 1999, the colony was encouraged to relocate to East Sand Island. In 2001, the majority of the West Coast population nested on just four acres on East Sand Island; in 2002, the terns nested on six acres.

Because of the growing concern over the increasing impacts of avian predation on salmonid smolts, NOAA Fisheries required the Bonneville Power Administration (BPA) and U.S. Army Corps of Engineers (USACE) to study avian predation in the Columbia River estuary and, if necessary, develop potential measures for managing the predator populations. These requirements were part of the 1995 Formal Consultation on the Operation of the Federal Columbia River Power System and Juvenile Transport Program (NMFS 1995). Oregon State University (OSU) and the Columbia River Inter-Tribal Fish Commission (CRITFC) began the research in 1996. The losses of salmonid smolts to newly established and expanding numbers of avian predators is of concern as currently 12 ESUs of anadromous salmonids native to the Columbia River Basin are listed as threatened or endangered under the ESA (Fig. 2).

As avian predation on salmonids is a multi-jurisdictional issue, NOAA Fisheries, the U. S. Army Corps of Engineers, U.S. Fish and Wildlife Service, the Bonneville Power Administration, the

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[1] Under the Endangered Species Act, the National Marine Fisheries Service (NOAA Fisheries) lists species, subspecies and distinct population segments of vertebrates. NOAA Fisheries policy stipulates that a salmon population will be considered distinct if it represents an "evolutionary significant unit" (ESU) of the biological species (Waples 1991). For the purposes of conservation under the ESA, an Evolutionarily Significant Unit (ESU) is a distinct population segment that is substantially reproductively isolated from other conspecific population units and represents an important component in the evolutionary legacy of the species (Waples 1991).

Columbia River Inter-Tribal Fish Commission, and resource agencies of the states of Washington, Idaho and Oregon formed the Caspian Tern Working Group (CTWG) to develop a long-term management plan for reducing tern predation in the estuary. As part of this effort, NOAA Fisheries is evaluating the overall risk that tern predation presents to listed salmonid populations.

The intent of this document is to summarize what is known about Caspian tern predation impacts to salmonids in the Columbia River estuary. We have included a summary of Caspian tern populations in the Columbia River basin and estimates of predation rates gained from recovery of PIT tags and bioenergetics modeling. We have also included analyses of predation impacts on ESA-listed steelhead through the use of a life-cycle model that focuses on Caspian terns nesting on East Sand Island since their relocation from Rice Island. This information will be useful to resource managers to develop management options to reduce predation impacts.

CASPIAN TERNS (*Sterna caspia*)

Caspian terns are highly migratory and are nearly cosmopolitan in distribution (Harrison 1983; Harrison 1984). In North America, nesting has been reported on the west coast from Baja, California to the Bering Sea, in the interior from the Gulf Coast of Texas to Lake Athabasca, Saskatchewan, and on the east coast from the Florida panhandle to Labrador. Outside of North America, nesting has been reported in Australia, New Zealand, South Africa, Asia, and Europe.

Caspian Terns winter primarily on the Pacific coast from southern California south through west Mexico and Central America (Shuford and Craig 2002). Early estimates of the Pacific Northwest population were as many as 500 pairs nesting with gulls and cormorants as far north as Klamath Lakes in Oregon (Harrison 1984). Nesting colonies were first discovered in Washington near Moses Lake and Pasco in the 1930s, but coastal colonies were not recorded until the late 1950s, when one was found in Grays Harbor (Alcorn 1958, Penland 1976, 1981). Since the early 1960s, the population has shifted from small colonies in interior California and southern Oregon to large colonies nesting on human-created habitats along the coast (Gill and Mewaldt 1983). The current population in the Columbia River basin is part of a dramatic northward and coastward expansion in range and an overall increase in Caspian tern numbers in western North America.

The numbers of Caspian terns in western North America more than doubled between 1980 and 1999 (Cuthbert and Wires 1999). One reason for the increase is that human-created habitat provides high quality nest sites and is associated with population increases in many parts of North America (Cuthbert and Wires 1999). In the Columbia River estuary, Caspian terns have increased from a few scattered individuals before 1984 to nearly 10,000 pairs in 2002 (Fig. 3).

Caspian terns arrive in the Columbia River estuary in April and begin nesting at the end of the month (Roby *et al.* 1998). To avoid mammal and avian predators, terns construct their nests on islands (Harrison 1984) and show a preference for barren sand. They are piscivorous in nature (Harrison 1984), requiring about 220 grams (roughly one-third of their body weight) of fish per day during the nesting season. The timing of courtship, nesting and chick rearing corresponds with the outmigration of many of the salmonid stocks in the basin (Collis *et al.* 2002) (Fig. 4).

ESTIMATING PREDATION IMPACTS

One approach to evaluating the extent of Caspian tern predation and resultant salmonid mortality uses bioenergetics modeling. Since 1997, biologists with the Bonneville Power Administration-funded research project ("Avian Predation on Juvenile Salmonids in the Lower Columbia River," - a joint project of Oregon State University, the U. S. Geological Survey, the Columbia River Inter-Tribal Fish Commission, and Real Time Research Consultants) have used observed salmonid consumption at tern colonies in a bioenergetics model (Roby *et al.* 1998) to estimate the consumption of salmonids in the Columbia River estuary.

This analytical approach indicates that salmon and steelhead constituted a major portion of tern diets, particularly when the birds nested on Rice Island. Diet analyses indicated that juvenile salmonids constituted 77.1% of prey items in 1997 and 72.7% of prey items in 1998 of Caspian terns nesting on Rice Island (Collis *et al.* 2002). During the peak of smolt out-migration of steelhead, yearling chinook salmon, and coho salmon through the estuary, when Caspian terns are in their incubation period in May, the diet of Caspian terns was consistently over 90% juvenile salmonids (Collis *et al.* 2002). This concentration on smolts as a food source translates into substantial juvenile mortality during the outmigration period.

Smolt consumption and the number of smolts estimated to reach the estuary from 1999 to 2002 is given in Table 1. The smolt consumption data is estimated from bioenergetics modeling, while the latter is estimated from data on fish passing through the hydropower system or transported around the system and released below Bonneville Dam. Smolt estimates are comprised only of steelhead, yearling chinook and hatchery coho, and should not be thought of as absolute totals. Estimates for subyearling chinook are not included, as their expansions are based on few data and thus not reliable, and they outmigrate later in the season and are subject to less predation pressure from terns. Estimates for chum are also not included as their outmigration is earlier in the season and they are thus subject to less predation pressure from terns.

Table 1. Estimates of outmigrating steelhead, yearling chinook and hatchery coho smolts reaching the estuary[a] and of juvenile salmonids consumed by Caspian terns in the Columbia River estuary *1999-2002.*

Year	Number of smolts reaching estuary in millions	Number of smolts consumed in millions (95% C.I.)
1999	63.1	11.7 (9.4 - 14.0) [b]
2000	65.6	7.3 (6.1 - 8.6) [b]
2001	60.6	5.9 (4.8 - 7.0) [b]
2002	55.5	6.5 (5.5 – 7.6) [c]

[a] Data from NOAA Fisheries Fish Ecology Division, Sustainable Fisheries Division and Fish Passage Center. Includes estimated numbers of hatchery coho salmon only, no estimates are available for wild coho. Since no values for coho survival through the power system are available, estimates of survival of hatchery coho through the system were developed through the use of SIMPAS (NMFS 2000a) values for yearling chinook.
[b] Collis *et al.* 2001a [c] Collis *et al.* 2002

Another approach uses detections of passive integrated transponders (PIT) tags on Caspian tern colonies to estimate salmonid predation rates overall as well as by ESU (Collis *et al.* 2001b, Ryan *et al.* 2001). In 1997 and 1998, 1 - 2 million ESA-listed salmonid smolts entered the Columbia River estuary, representing 1 - 2 % of all salmonid smolts migrating to the estuary. However, in 1999, seven additional ESUs of anadromous salmonids in the Columbia River Basin were listed, and roughly 6 million ESA-listed salmonid smolts entered the estuary along with over 80 million unlisted smolts, which were primarily of hatchery origin. The majority of juvenile salmonids in the estuary are of hatchery origin and the majority being consumed by Caspian terns are hatchery fish (Independent Multidisciplinary Science Team 1998). Overall, Caspian terns consumed approximately *10%* to *19%* of the estimated outmigrating population of juvenile salmonids originating from the Columbia River basin.

Since 1987, researchers in the Columbia River basin have placed over five million PIT tags in juvenile salmonids for a variety of studies (Ryan *et al.* 2001). Identifying PIT tags on bird colonies can provide a minimum estimate of proportion of the stocks that were consumed by terns in these colonies. In recent years, approximately one million juvenile salmonids have been PIT-tagged annually (Collis *et al.* 2001b), the vast majority of which are steelhead and chinook from the Snake River basin. Using PIT tag detection equipment, over 115,000 PIT tags were detected on Rice Island in 1998 and 1999 (Ryan *et al.* 2001). Collis *et al.* (2001b) indicate that the majority of these PIT tags detected were from steelhead and chinook, coho and sockeye salmon. Of the PIT tags placed in steelhead smolts in 1997 that were detected at Bonneville dam, 2.8% of wild smolts and 5.4% of hatchery-raised smolts were subsequently detected on the Rice Island tern colony (Collis *et al.* 2001b). For steelhead PIT-tagged in 1998 and detected at Bonneville Dam, 11.7% of wild smolts and 13.4% of hatchery-raised smolts were subsequently detected on the Rice Island tern colony (Collis *et al.* 2001b). For yearling chinook salmon PIT-tagged in 1998 and detected at Bonneville Dam, 0.5% of wild smolts and 1.6% of hatchery-raised smolts were subsequently detected on the Rice Island tern colony (Collis *et al.* 2001b). PIT tag data also determined that steelhead experienced higher predation rates (0.6% to 8.1% on East Sand Island and 1.3% to 9.4% on Rice Island) than chinook salmon (0.2% to 2.0% on East Sand Island and 0.6% to 1.6% on Rice Island).

There are some important uncertainties from estimating predation rates for Caspian terns. Predation impacts derived from PIT tags, while more direct than those derived from bioenergetics models, represent minimum estimates of the proportion of stocks consumed--an unknown number of tags are regurgitated/defecated off-colony or removed by wind and water erosion, tags may be damaged and undetectable, and not all tags are detected (Ryan *et al.* 2001, Collis *et al.* 2001b, Collis *et al.* 2002). Also, predation rates vary annually and by the methodology used to make the estimate, making it difficult to derive a single predation rate. Although there is good correspondence of predation rates between methodological estimates, utilizing the upper and lower bounds of the predation rates to bracket potential recovery improvements represent the most reliable approach that currently should be used to assess potential impacts of smolt predation by Caspian terns. Finally, it is clear that predation rates are not uniform for all salmon species, thus evaluation of the impact of Caspian tern predation should be species or ESU-specific, to the extent possible.

RELOCATION EFFORTS

Efforts to relocate the terns to East Sand Island began in 1999, and these efforts have apparently succeeded in reducing consumption of smolts without affecting tern productivity. The Caspian Tern Working Group relocated the Caspian tern colony from Rice Island to East Sand Island--a site lower in the estuary with abundant alternate prey sources--in an attempt to decrease losses of juvenile salmonids. Over the last few years, consumption of salmonids in the estuary has been lower than previously, while consumption of alternative prey species has increased. Relocating the colony to East Sand Island, which is lower in the estuary and closer to periodically abundant Pacific herring [Clupeidae] and anchovies [Engraulidae] has contributed to the reduction. In 2000, salmonid consumption for both islands combined was estimated at 7.3 million smolts, which is 4.4 million less than in 1999--the last time a substantial number of terns nested on Rice Island (Collis *et al.* 2001a, USFWS 2001). In 2001, salmonid consumption was estimated at 5.9 million smolts, which is 5.9 million less than in 1999 (Collis *et al.* 2001a).

Caspian tern diets also shifted following relocation from Rice Island. Observed diets, which consisted of almost exclusively salmonids at Rice Island (77% in 1999 and 90% in 2000), shifted to 46%, 47% and 33% salmonids at East Sand Island in 1999, 2000 and 2001 respectively (Collis *et al.* 2001a, Roby *et al.* 2003). These data represent substantial declines in juvenile salmonid mortalities from Caspian tern predation. These observational data were substantiated by PIT tag detections on the two islands in 1999 and 2002. Significantly fewer PIT tags detected per nest on East Sand Island in 1999 and 2000 than were detected on Rice Island in 1999 and 2000 (Table 2).

Table 2. Ratio of PIT tags detected per Caspian tern nesting pair on East Sand Island and Rice Island in 1999 and 2000.

	1999	**2000**
Rice Island	0.59	1.25
East Sand Island	0.32	0.35

In addition to reductions in Caspian tern predation on juvenile salmonids, relocation efforts have not significantly impaired Caspian tern reproductive performance. Nesting success has been substantially higher for Caspian terns nesting on East Sand Island as compared to Rice Island (Roby *et al.* 2003), and productivity at East Sand Island in 2001 was the highest recorded for terns nesting in the estuary (Collis *et al.* 2001a). It appears that relocating terns to East Sand Island accomplished the goal of reducing consumption of juvenile salmon without adversely affecting tern population growth rates.

PREDATION IMPACT OF CASPIAN TERNS ON EAST SAND ISLAND

Data and Analyses

In this report, we focus on predation on steelhead by Caspian terns nesting on East Sand Island from 1999-2002. We focus on steelhead because they are the most heavily affected of the outmigrating juvenile salmonids (Ryan *et al.* 2003, Roby *et al.* 2003); estimates of the potential benefit of reducing Caspian tern predation are thus the greatest for steelhead and would encompass potential benefits afforded to other salmonid species. We focus on the Caspian tern colonies on East Sand Island in the lower estuary of the Columbia River, because the colony represents the majority of the West Coast Caspian tern population, and we focus on 1999-2002 because this represents the time period, after relocation from Rice Island, during which this colony has persisted in the Columbia River estuary. In general, both analytical techniques (PIT tag detections; bioenergetics modeling) found a positive relationship between the number of Caspian terns on East Sand Island and the predation rate on juvenile salmonids*, i.e.* the proportion of available juvenile salmonids consumed (Fig. 5).

Bioenergetics modeling, which has been used to estimate the effect of Caspian tern predators on juvenile salmonids on Rice Island (Roby *et al.* 2003), was used to calculate predation rates (%) (estimated # of steelhead consumed/estimated # of steelhead available in the estuary x 100) using updated and refined estimates of the number of outmigrating steelhead that run the river or are transported to below Bonneville Dam (Table 3; Fig. 6).

Table 3. Estimates of nesting population, the number of steelhead consumed, the number of steelhead available, and predation rates of Caspian terns nesting on East Sand Island using bioenergetics modeling (D. Lyons and D. Marsh, unpublished data).

Year	# tern pairs	# of steelhead consumed	# of steelhead available	Predation Rate % (95% C.I.)
1999	547	72,844	13,501,917	0.5 (0.3 - 0.8)
2000	8513	842,433	13,359,935	6.3 (4.4 - 8.3)
2001	8982	571,441	13,560,423	4.2 (3.2 - 5.2)
2002	9933	741,772	12,124,528	6.1 (4.8 - 7.4)

Although the relationship between tern abundance and predation rate is not known with certainty, possibilities include linear, exponential, asymptotic, and logistic. A simple linear response of the predation rate on all steelhead to the number of Caspian terns nesting on East Sand Island during the breeding seasons of 1999-2002 appears to describe the relationship.[2] Further support for a linear relationship between estimates of predation rate and the number of terns nesting on East Sand Island comes from per capita consumption rates (# of smolts consumed/adult tern), which have been relatively constant throughout the range of colony sizes

[2] Analyses of influence statistics on linear regressions of PIT tag recoveries on Caspian Tern numbers demonstrated that the 1999 data point exacted little leverage on the regression analyses (P. Wilson, USFWS, unpublished data). He concluded that regressions including the 1999 data resulted in reasonable representations of the data, provided they were modeled through the origin.

on East Sand Island from 1999-2003. The per capita consumption rate in 1999 (mean = 437.5 salmonids) was virtually the same as that in 2000 (mean = 431.1 salmonids), despite a ten-fold difference in Caspian Tern numbers (1094 in 1999 vs 17,026 in 2000) (D. Roby and D. Lyons, unpublished data). A relatively constant per capita consumption rates for salmonids has also been seen on Rice Island over a range of tern population numbers from 1997-2000. The per capita consumption rate on Rice Island in 1999 (mean = 784.1 salmonids) was virtually the same as in 2000 (mean = 739.7 salmonids) despite a ten-fold difference in colony size (8328 nesting pairs in 1999 vs. 588 nesting pairs in 2000) D. Roby and D. Lyons, unpublished data). This suggests that the Caspian Tern predation rate is not affected by *predator density*, at least over the range of values experienced from 1999-2003. While non-linear relationships described the data just as well as the linear one, per capita consumption rates associated with an exponential relationship (increasing with an increase in terns), logistic relationship (parabolic over the range of tern numbers), or asymptotic relationship (decreasing with an increase in tern numbers) were not observed.

As both analytical techniques produced similar results, we focus on the PIT tag detection analytical technique--which has also been used to estimate the effect of Caspian tern predators on juvenile salmonid outmigrants (Ryan *et al.* 2003)--to calculate estimates of predation rates on steelhead. Moreover, as the PIT tag detection approach makes possible ESU-specific predation rate estimates, subsequent analyses presented use PIT tag predation rates. Estimates of predation rates (%) from this approach (# PIT tags detected on East Sand Island/# PIT tags detected at Bonneville Dam x 100) also showed a linear response to the number of Caspian terns nesting on East Sand Island during the breeding seasons of 1999-2002 (Figure 7).

We then used these estimates of predation rate (derived from the number of terns) to derive the likely impact on the overall population trajectory for steelhead in the Columbia River. We first calculated the median population growth rate lambda (λ) using the methods in Holmes (2001) and McClure *et al.* (2003). These methods have been: developed for data sets with high sampling error and age-structure cycles (Holmes 2001), extensively tested using simulations for threatened/endangered populations as well as for low-risk stocks (Holmes 2004), and have been cross-validated with time series data (Holmes and Fagan 2002). We chose this parameter for two reasons. First, population growth rate is an essential parameter in viability assessments and a primary predictor of extinction risk. Second, calculating population growth rate in this manner (annualized), provides a standard metric for comparison between species (or ESUs) with different generation times.

We next calculated the deterministic change in population growth rates given standard reductions in mortality. Because the vast majority of steelhead in the interior Columbia are semelparous, the percent increase in λ attributable to an increase in survival at a particular life history stage can be approximated as:

$$\Delta\lambda = = \left[\left(\frac{S_{new}}{S_{old}}\right)^{1/G} - 1\right] \times 100$$

where S_{old} is the initial survival rate before recovery action, S_{new} is the survival rate following the recovery action, and G is the average generation time (McClure *et al*. 2003). This calculation assumes that the change in survival due to tern predation is independent of density and of changes in survival elsewhere in the salmonid life history. We did not use a formal Leslie matrix analysis to estimate changes in population growth rates because data to parameterize a detailed model for steelhead were not available.

We estimated the impact of Caspian tern predation on the population growth rate (λ) of all steelhead in the Columbia River basin to compare predation rate estimates from bioenergetics modeling and PIT tag detection approaches. Because of the similarity in the results between the two approaches, we present both for comparative purposes (Table 4).

Table 4. Estimated predation rate (PR) and percent increase in the population growth rate (λ) of all steelhead in the Columbia River basin if populations of Caspian Terns breeding on East Sand Island are reduced to that number, assuming a linear relationship between predation rates and Caspian Tern breeding population size (see Figs. *6 and 7)*. Calculations used the predation rate estimated for 20,000 terns from linear regressions of (a) ***recovery of PIT-tags*** and (b) ***bioenergetics modeling***, and the generation time for the Snake River basin*.

(a)

Number of tern pairs	PR	Increase in λ (%)
10000	8.7	0.0
9375	8.1	0.1
8750	7.6	0.2
8125	7.0	0.4
7500	6.5	0.5
6875	6.0	0.6
6250	5.4	0.7
5625	4.9	0.9
5000	4.3	1.0
4375	3.8	1.1
3750	3.2	1.2
3125	2.7	1.3
2500	2.2	1.4
1875	1.6	1.6
1250	1.1	1.7
625	0.5	1.8
0	0.0	1.9
	4.79*	

(b)

Number of tern pairs	PR	Increase in λ (%)
10000	6.1	0.0
9375	5.7	0.1
8750	5.3	0.2
8125	4.9	0.3
7500	4.6	0.3
6875	4.2	0.4
6250	3.8	0.5
5625	3.4	0.6
5000	3.0	0.7
4375	2.6	0.7
3750	2.3	0.8
3125	1.9	0.9
2500	1.5	1.0
1875	1.1	1.1
1250	0.8	1.2
625	0.4	1.2
0	0.0	1.3
	4.79*	

The predation rate for 10,000 Caspian tern pairs on all steelhead was estimated using the regression equations generated using both approaches. Reductions in predation rate corresponding to lowered tern population sizes were used to model the potential increase in λ, assuming all steelhead mortality attributable to terns is not compensated for by mortality due to other sources. The maximum *percent* increase in λ corresponding to complete elimination of mortality due to tern predation was 1.9% using the PIT-tag estimate of predation rate and 1.3%

using the bioenergetics modeling estimate of predation rate; the proportional increase in λ corresponding to a 50% reduction of mortality due to tern predation was 0.97% using the PIT-tag estimate of predation rate and 0.67% using the bioenergetics modeling estimate of predation rate.

To investigate how variation in generation times in Columbia River basin steelhead influenced model output, we also estimated the potential increase in λ using the recovery of PIT tags for all steelhead using the range of generation times (4.27 – 4.85) that have been estimated for steelhead ESUs in the Columbia River basin. This resulted in maximum increases in λ (corresponding to a minimum breeding population size of 0 tern pairs) that ranged from a low of 1.88% to a high of 2.44%.

As the PIT tag detection approach enables ESU-specific estimates of predation rate (and hence proportion increase in λ), we used the life-cycle model to estimate impact of Caspian tern predation on the population growth rate (λ) of steelhead ESUs using predation rates estimated from PIT tag detections (Table 5). Predation rates for 10,000 Caspian tern pairs on four of the five ESA-listed steelhead ESUs were estimated using linear regression (Figs. 8-11). Reductions in predation rate corresponding to lowered tern population sizes were used to model the potential increase in λ, again assuming all steelhead mortality attributable to terns is additive, *i.e.* not compensated for by mortality due to other sources. The maximum proportional increase in λ corresponding to complete elimination of mortality due to tern predation ranged from 1.6% to 4.9% under the most optimistic assumptions (hatchery fish do not reproduce) and 0.7% to 1.0% under the most pessimistic assumptions (hatchery fish reproduce at the same rate as wild-born fish).

Although this analysis was restricted to assessing the potential effects of reducing Caspian tern predation, McClure *et al*. (2003) estimated the effects of other potential conservation actions, including changes to the hydropower system and reductions in harvest. Because these estimates were calculated using similar methods, they are comparable to our results, and we present them here to provide context.

Table 5. Estimated predation rates (PR), % increase in λ predicted from predation rates at those levels, and population growth rate λ) of four of the five listed steelhead ESUs in the Columbia River basin given a range of pairs of Caspian Terns breeding on East Sand Island. Calculations used the predation rate estimated from the linear regression of ESU-specific PIT-tag recoveries (see Figs. 7-10). Generation times* and lambda values (1980-2000) for each ESU are taken from McClure *et al.* (2003), where λ has been estimated under different assumptions about hatchery fish reproduction (λ = hatchery fish on the spawning grounds do not reproduce and λ_h = hatchery fish reproduce at the same rate as wild-born fish).

	Snake River				Upper Columbia River				Middle Columbia River				Lower Columbia River			
# Pairs	**PR**	**% Δ λ**	**λ**	**λ_h**	**PR**	**% Δ λ**	**λ**	**λ_h**	**PR**	**% Δ λ**	**λ**	**λ_h**	**PR**	**% Δ λ**	**λ**	**λ_h**
10000	8.7	0.0	1.02	0.96	16.4	0.0	1.00	0.63	8.7	0.0	0.97	0.95	6.9	0.0	0.92	0.81
9375	8.2	0.1	1.02	0.96	15.3	0.3	1.00	0.63	8.2	0.1	0.97	0.95	6.5	0.1	0.92	0.81
8750	7.6	0.2	1.02	0.96	14.3	0.6	1.01	0.63	7.6	0.2	0.97	0.95	6.1	0.2	0.92	0.81
8125	7.1	0.4	1.02	0.96	13.3	1.0	1.01	0.64	7.1	0.4	0.97	0.95	5.6	0.3	0.92	0.81
7500	6.5	0.5	1.02	0.96	12.3	1.3	1.01	0.64	6.5	0.5	0.98	0.96	5.2	0.4	0.92	0.81
6875	6.0	0.6	1.03	0.97	11.2	1.6	1.02	0.64	6.0	0.6	0.98	0.96	4.8	0.5	0.92	0.81
6250	5.4	0.7	1.03	0.97	10.2	1.9	1.02	0.64	5.4	0.7	0.98	0.96	4.3	0.6	0.93	0.82
5625	4.9	0.9	1.03	0.97	9.2	2.2	1.02	0.64	4.9	0.8	0.98	0.96	3.9	0.7	0.93	0.82
5000	4.4	1.0	1.03	0.97	8.2	2.5	1.02	0.65	4.4	1.0	0.98	0.96	3.5	0.8	0.93	0.82
4375	3.8	1.1	1.03	0.97	7.2	2.8	1.03	0.65	3.8	1.1	0.98	0.96	3.0	0.9	0.93	0.82
3750	3.3	1.2	1.03	0.97	6.1	3.1	1.03	0.65	3.3	1.2	0.98	0.96	2.6	1.0	0.93	0.82
3125	2.7	1.3	1.03	0.97	5.1	3.4	1.03	0.65	2.7	1.3	0.98	0.96	2.2	1.1	0.93	0.82
2500	2.2	1.5	1.04	0.97	4.1	3.7	1.04	0.65	2.2	1.4	0.98	0.96	1.7	1.2	0.93	0.82
1875	1.6	1.6	1.04	0.98	3.1	4.0	1.04	0.66	1.6	1.6	0.98	0.96	1.3	1.3	0.93	0.82
1250	1.1	1.7	1.04	0.98	2.0	4.3	1.04	0.66	1.1	1.7	0.99	0.97	0.9	1.4	0.93	0.82
625	0.6	1.8	1.04	0.98	1.0	4.6	1.05	0.66	0.5	1.8	0.99	0.97	0.4	1.5	0.93	0.82
0	0.0	1.9	1.04	0.98	0.0	4.9	1.05	0.66	0.0	1.9	0.99	0.97	0.0	1.6	0.93	0.82
	4.79*				4.27*				4.85*				4.63*			

For comparison, we include the results of similar modeling exercises conducted to estimate increases in population growth rates anticipated from changes to hydropower or harvest operations (Table 6). The estimates for hydropower improvement come from changes to improve passage for both adults and juveniles called for in NOAA Fisheries' FY 2000 Biological Opinion on operation of the Federal Columbia River Hydropower System (FCRPS) (NMFS 2000b, McClure *et al.* 2003). The estimates for harvest elimination come from McClure *et al.* (2003) and have been largely realized already. Thus, the potential increase in λ that may be realized from eliminating Caspian tern predation (1.6 - 4.9%) is equivalent to that of hydropower improvements but well below that of elimination of harvest reductions, all else being equal.

Table 6. Potential increases (%) in population growth rate of Columbia River basin steelhead ESUs corresponding to passage improvements in the Federal Columbia River Hydropower System and elimination of harvest.

	Snake River	Upper Columbia River	Middle Columbia River	Lower Columbia River
Caspian Tern predation (eliminated)	1.9	4.9	1.9	1.6
Caspian Tern predation (halved)	1.0	2.5	1.0	0.8
Hydropower improvements	1-2	2.0-4.0	2.0-3.0	0.0-1.0
Harvest elimination	4.0-7.0	8.0	4.0	6.0-8.0

ADDITIONAL AVIAN PREDATION IMPACTS

Other avian predators of juvenile salmonids in the Columbia River estuary include Double-crested Cormorants *(Phalacrocorax auriti*s), California Gulls (*Larus californicu*s), Ring-billed Gulls (*L. delawarensi*s), and members of the Glaucous-winged/Western Gull hybrid complex (*L. glaucescens/L. occidentali*s) (Roby *et al.* 1998, Collis *et al.* 2001a). Calculations of predation rates based upon the PIT tag detection approach for cormorants nesting on East Sand Island are provided for purposes of comparison and to place Caspian tern predation in context with other avian predation in the Columbia River basin (Table 7).

Table 7. Comparison of estimated predation rates (%) for Double-crested cormorants and Caspian terns breeding on East Sand Island on all steelhead in the Columbia River basin. Predation rates were calculated as the percent of PIT tags detected at Bonneville Dam that were later detected on cormorant colonies on East Sand Island. *Note: Detection efficiency for PIT tags on the East Sand Island comorant colony is probably much lower than on the East Sand Island tern colony, thus, the estimated predation rates by cormorants are biased lower for terns*

	1999	**2000**	**2001**	**2002**
Caspian terns	0.8	6.7	7.7	9.2
Double-crested cormorants	0.6	2.5	1.2	0.7

Analyses of PIT tag detections on East Sand Island cormorant colonies made it possible to compare these sources of mortality by ESU; these methods found not insubstantial predation rate estimates from double-crested cormorants as compared to Caspian terns (Table 8).

Table 8. Estimated predation rates (%) for Caspian terns and Double-crested cormorants breeding on East Sand Island on four of the five ESA-listed steelhead ESUs in the Columbia River basin. Predation rates were calculated as the percent of PIT tags detected at Bonneville Dam that were later detected on cormorant colonies on East Sand Island.

	Caspian terns				**Double-crested cormorants**			
	1999	**2000**	**2001**	**2002**	**1999**	**2000**	**2001**	**2002**
Snake River	0.7	5.8	7.2	10.6	0.6	2.7	1.3	0.7
Upper Columbia River	0.6	10.9	25.2	9.3	0.6	2.0	0.8	0.9
Middle Columbia River	0.4	6.8	10.0	7.2	0.4	1.9	0.8	0.3
Lower Columbia River	0.4	6.1	6.7	6.3	0.3	0.8	1.1	0.2

AVIAN PREDATION UPRIVER OF THE COLUMBIA RIVER ESTUARY

Substantial numbers of salmonid smolts are also lost to avian predators--terns, cormorants, and gulls--upriver of East Sand Island. In particular, a significant number of Caspian terns nest on Crescent Island in the mid-Columbia River. The proportion of their diet represented by salmonid smolts is greater than for terns nesting on East Sand Island (Collis *et al.* 2001a), and comparisons of the potential impact of this predation remains an important consideration in any analysis of avian predation impacts in the Columbia River basin (Table 9).

Table 9. Estimated predation rates (%) for Caspian terns and all birds breeding on Crescent Island on all steelhead ESUs in the Columbia River basin. Predation rates were calculated as the percent of PIT tags detected at Lower Monumental Dam that were later detected on *Caspian tern* colonies on Crescent Island (B. Ryan, unpubl. data).

	1999	**2000**	**2001**	**2002**
Caspian terns	4.1	1.7	13.2	7.2
Other birds	0.4	2.0	7.9	2.9

CONCLUSIONS

Many evaluations of salmonid predation by Caspian terns in the Columbia River estuary have indicated that substantial numbers of juvenile salmonids are being consumed (Roby *et al.* 1998, Collis *et al.* 2001a, 2001b, Ryan *et al.* 2001, Ryan *et al.* 2003, Roby *et al.* 2003). The two approaches that have been used to evaluate the extent of that impact yield similar results and appear to provide reasonable estimates of predation rates. The PIT tag recovery approach has also revealed species-specific vulnerability to Caspian tern predation--steelhead are substantially more susceptible to tern predation than yearling chinook. Efforts to reduce predation by moving the colony from Rice Island (more central to the Columbia River estuary) to East Sand Island (located towards the mouth of the Columbia River) have successfully decreased overall predation as fewer salmon are consumed per nest on East Sand Island. The decrease in consumption has been substantial. However, PIT tag data on predation rates needs to be further collected at East Sand to confirm initial observations and to document that the relocation efforts have been successful in reducing impacts for all ESUs (particularly for steelhead).

Several factors must be considered when interpreting the results of these calculations. Perhaps the most important factor is that this type of calculation assumes that there is no compensatory mortality later in the life cycle, and that the benefits from any reduction in tern predation are fully realized. In their assessment of predation impact by Rice Island terns on salmonids in 1997-1998, Roby et al (2003) hypothesized that tern predation was 50% additive. Given these limitations and uncertainties, the estimates of percent change in population growth rates should be viewed as maximum potential improvements. Realized improvements in population growth would likely be lower from any management action that reduces Caspian tern predation impacts on salmonid ESUs. These results may not be as easy to achieve as they are to calculate. It is also important to recognize that other factors such as ocean conditions may also influence population growth rate to a greater degree than the potential gains that may be realized from reducing predation by one species of avian predator on one island located in the lower estuary of the Columbia River basin.

Not all listed salmonid populations have declined because of the same factors or combination of factors, and not all populations could be expected to respond positively to any particular management measure or combination of measures. In the case of the avian predator populations discussed here, artificial islands (such as Rice Island) have promoted the development of unprecedented large colonies of piscivorous birds with subsequent increases in losses of juvenile salmonids from predation.

Finally, additional factors may influence the gains in population growth rate that may be realized from reducing predation rates on outmigrating juvenile salmonids. These include, but are not limited to: hydropower operations, harvest rates, habitat conditions, the influence of hatchery fish and exotic species, ocean conditions, and climate change.

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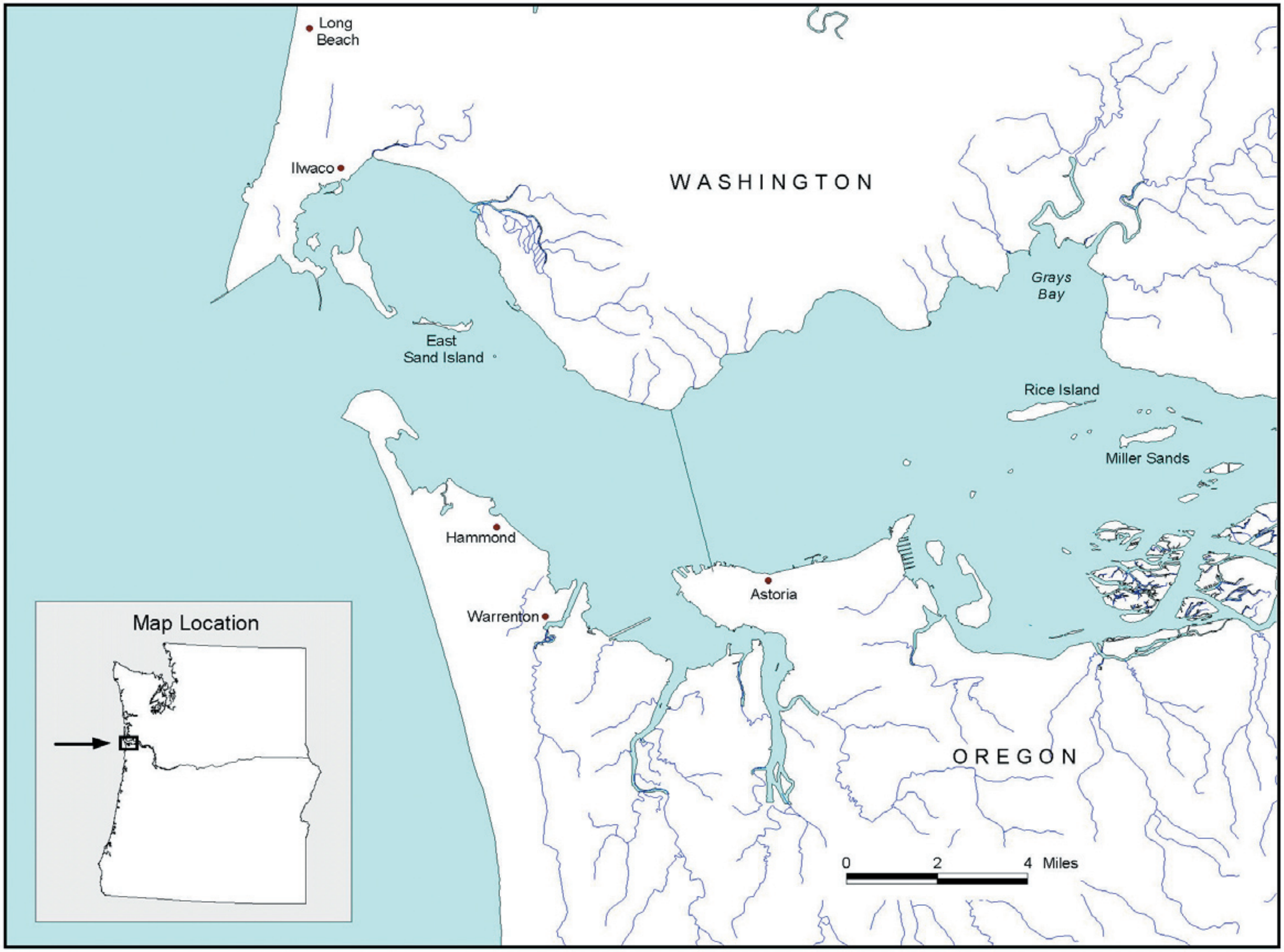


Figure 1. Map of the Columbia River estuary showing the relative locations of East Sand and Rice Islands, sites of Caspian tern nesting colonies.

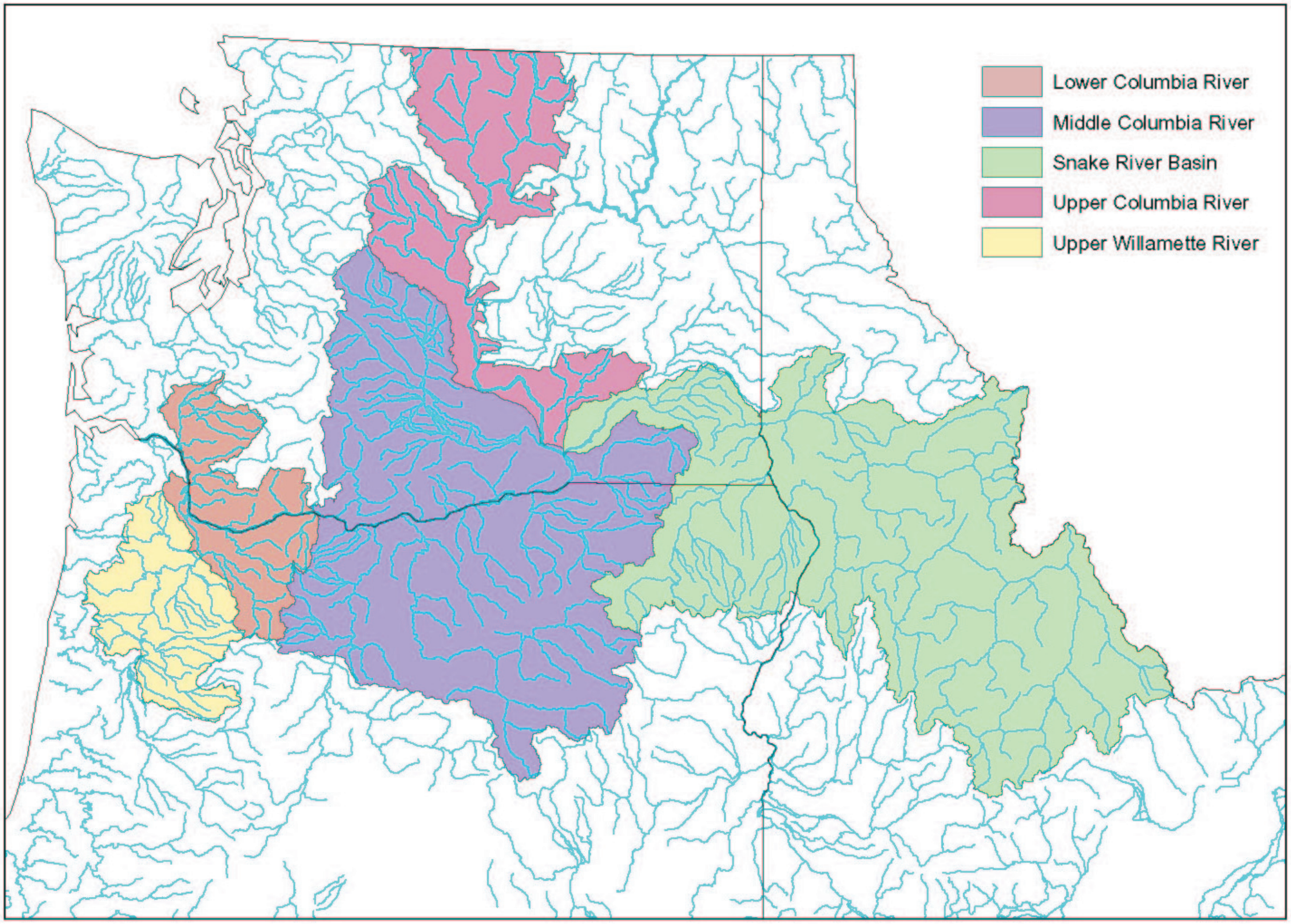


Figure 2. Map of Columbia River Basin showing the locations of the ESA-listed Lower Columbia River, Upper Willamette River, Middle Columbia River, Upper Columbia River and Snake River steelhead ESUs.

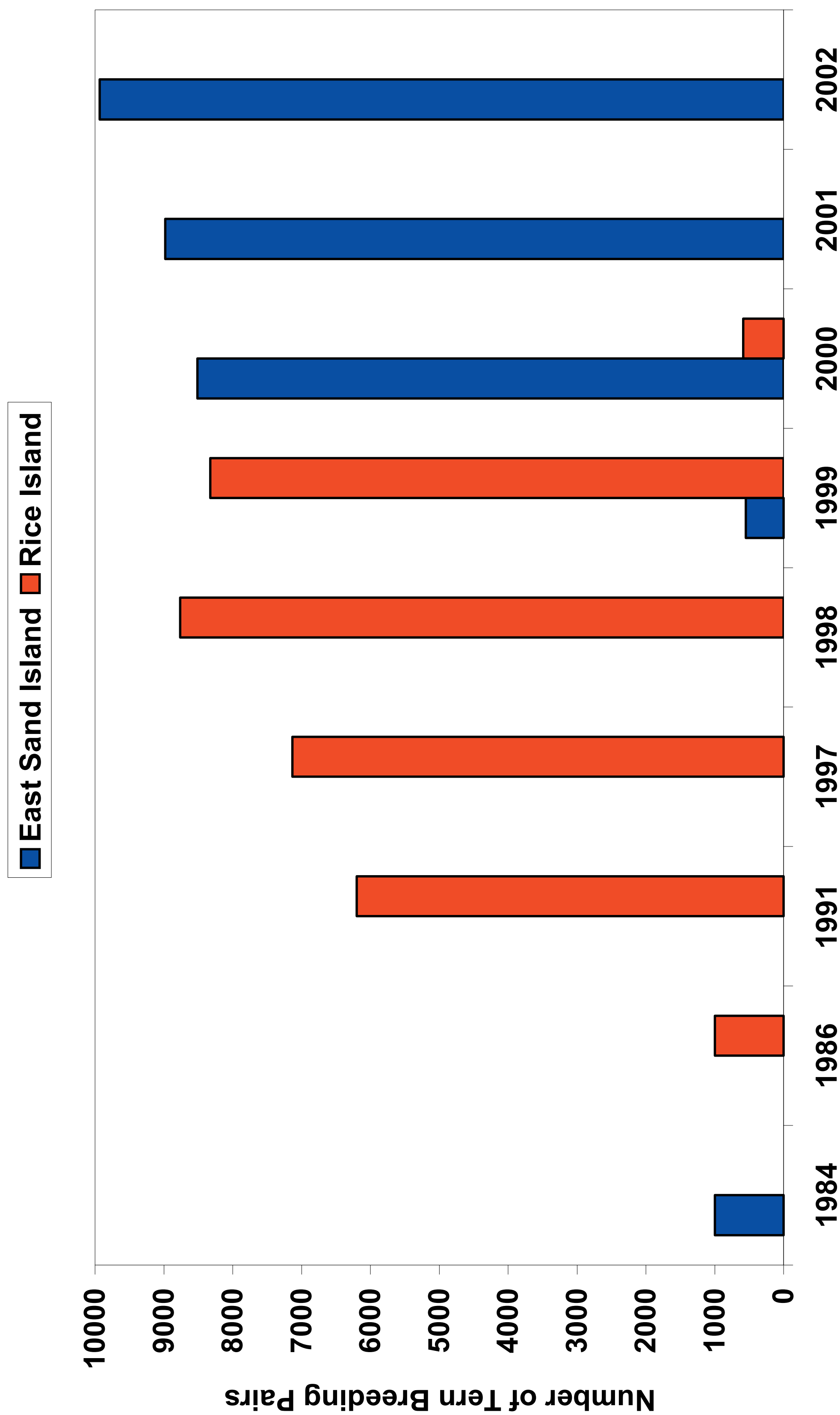


Figure 3. Numbers of Caspian terns nesting on islands in the Columbia River estuary since 1984.

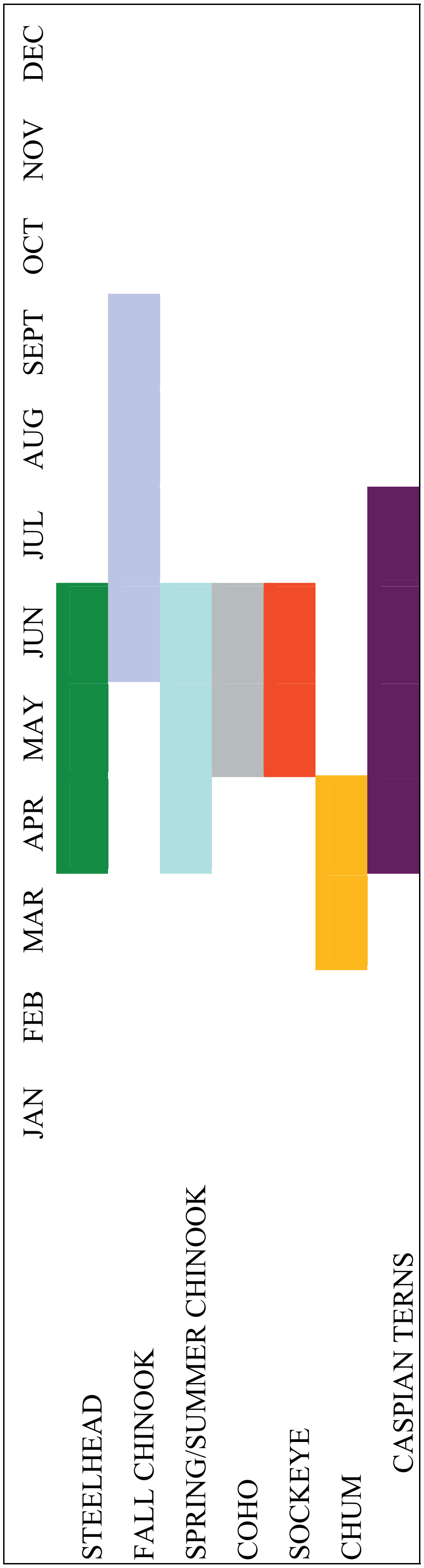


Figure 4. Arrival times of juvenile salmonids and nesting period of Caspian terns in the Columbia River estuary.

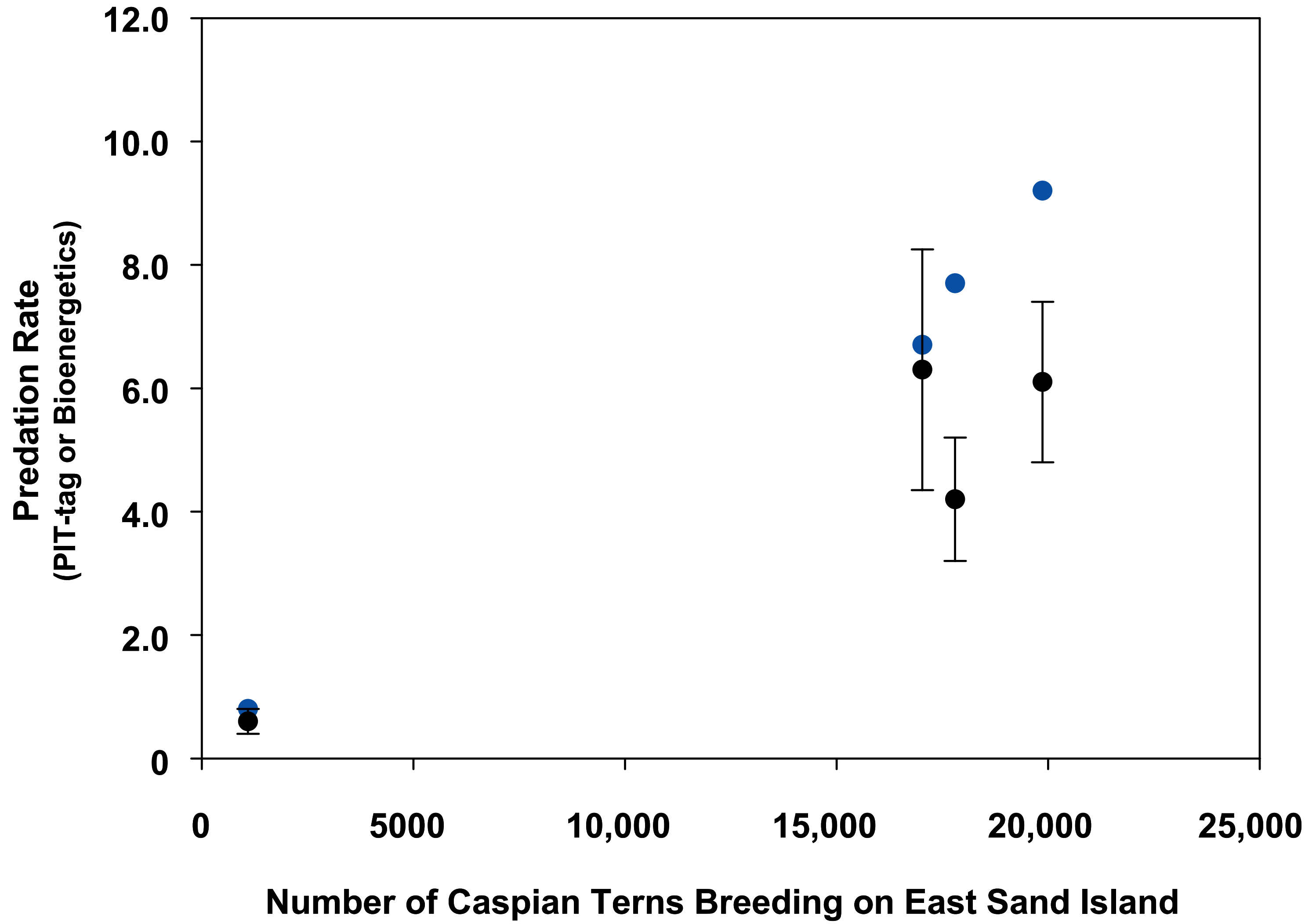


Figure 5. Estimated predation rates on ***all Columbia River basin steelhead*** in the Columbia River estuary by Caspian Terns (1999-2002) using bioenergetics modeling (black symbols) and recovery of PIT tags (blue symbols). Error bars on bioenergetics estimates represent 95% confidence limits.

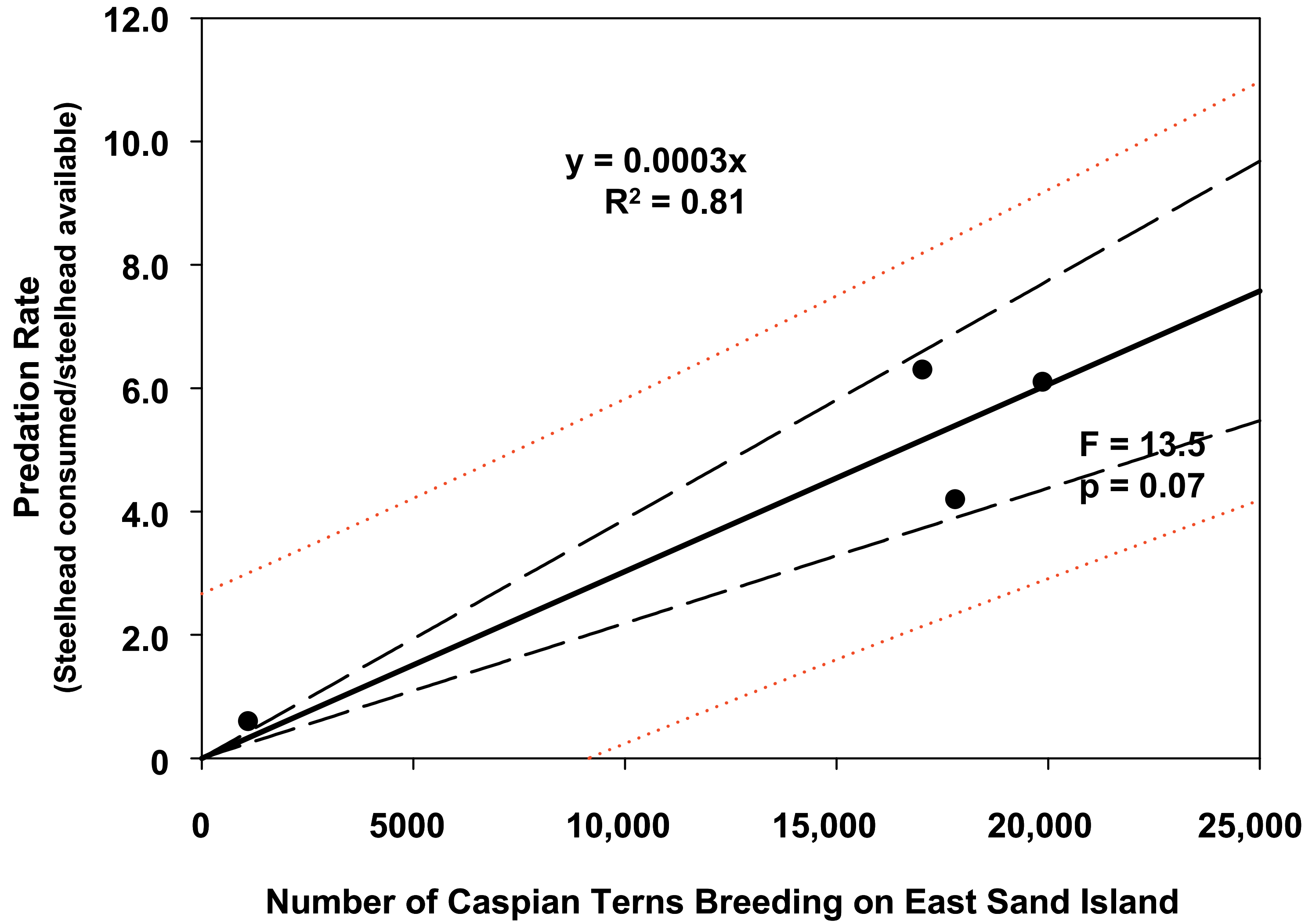


Figure 6. Linear regression of predation rates on ***all Columbia River basin steelhead*** in the Columbia River estuary by Caspian Terns breeding on East Sand Island (1999-2002) estimated using ***bioenergetics modeling***. Dashed black lines represent 95% confidence limits; dotted red lines represent 95% prediction limits.

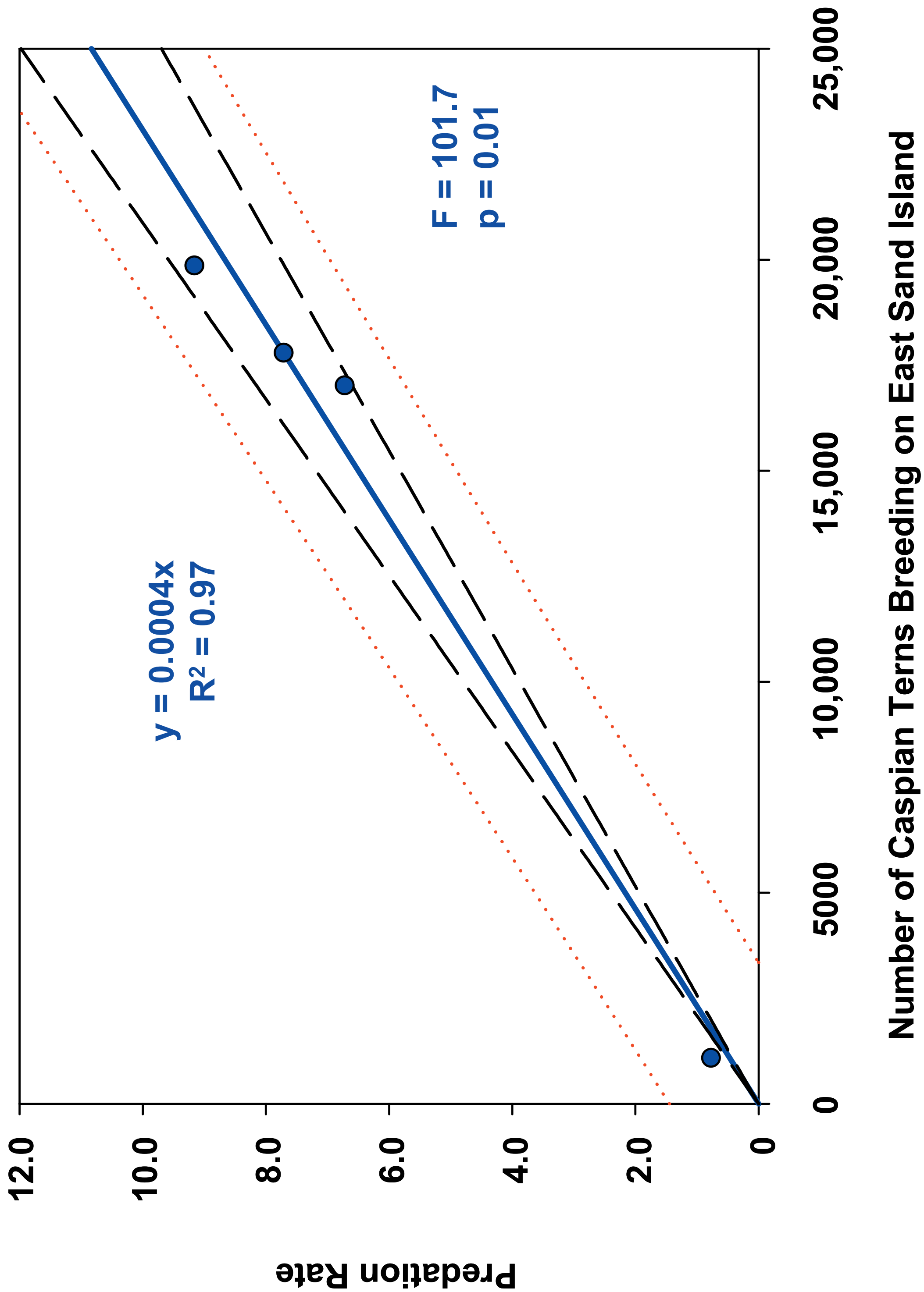


Figure 7. Linear regression of predation rates on ***all Columbia River basin steelhead*** in the Columbia River estuary by Caspian Terns breeding on East Sand Island (1999-2002) estimated using ***recovery of PIT tags***. Dashed black lines represent 95% confidence limits; dotted red lines represent 95% prediction limits.

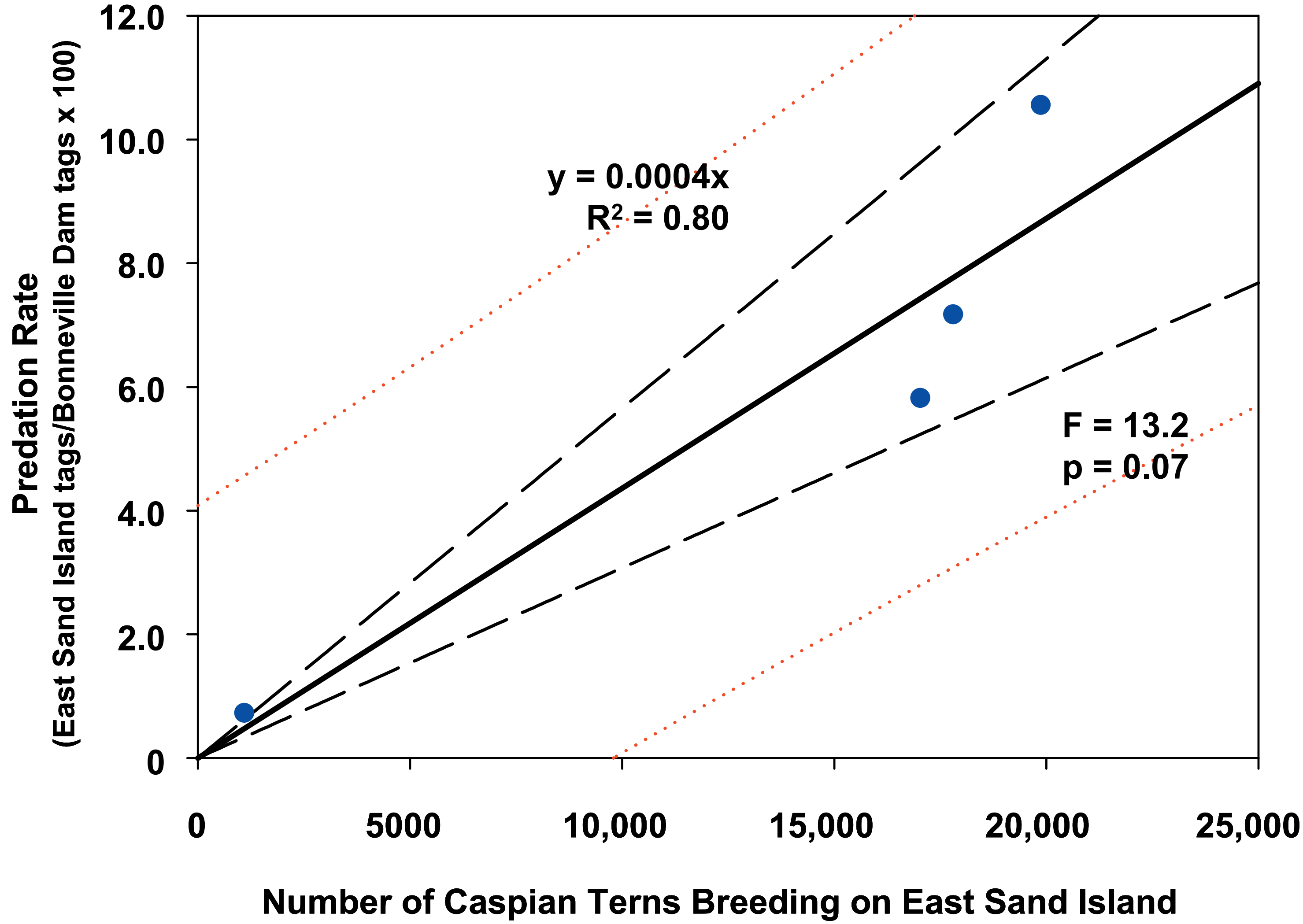


Figure 8. Linear regression of predation rates on the ***Snake River steelhead ESU*** in the Columbia River estuary by Caspian Terns breeding on East Sand Island (1999-2002) estimated using ***recovery of PIT tags***. Dashed black lines represent 95% confidence limits; dotted red lines represent 95% prediction limits.

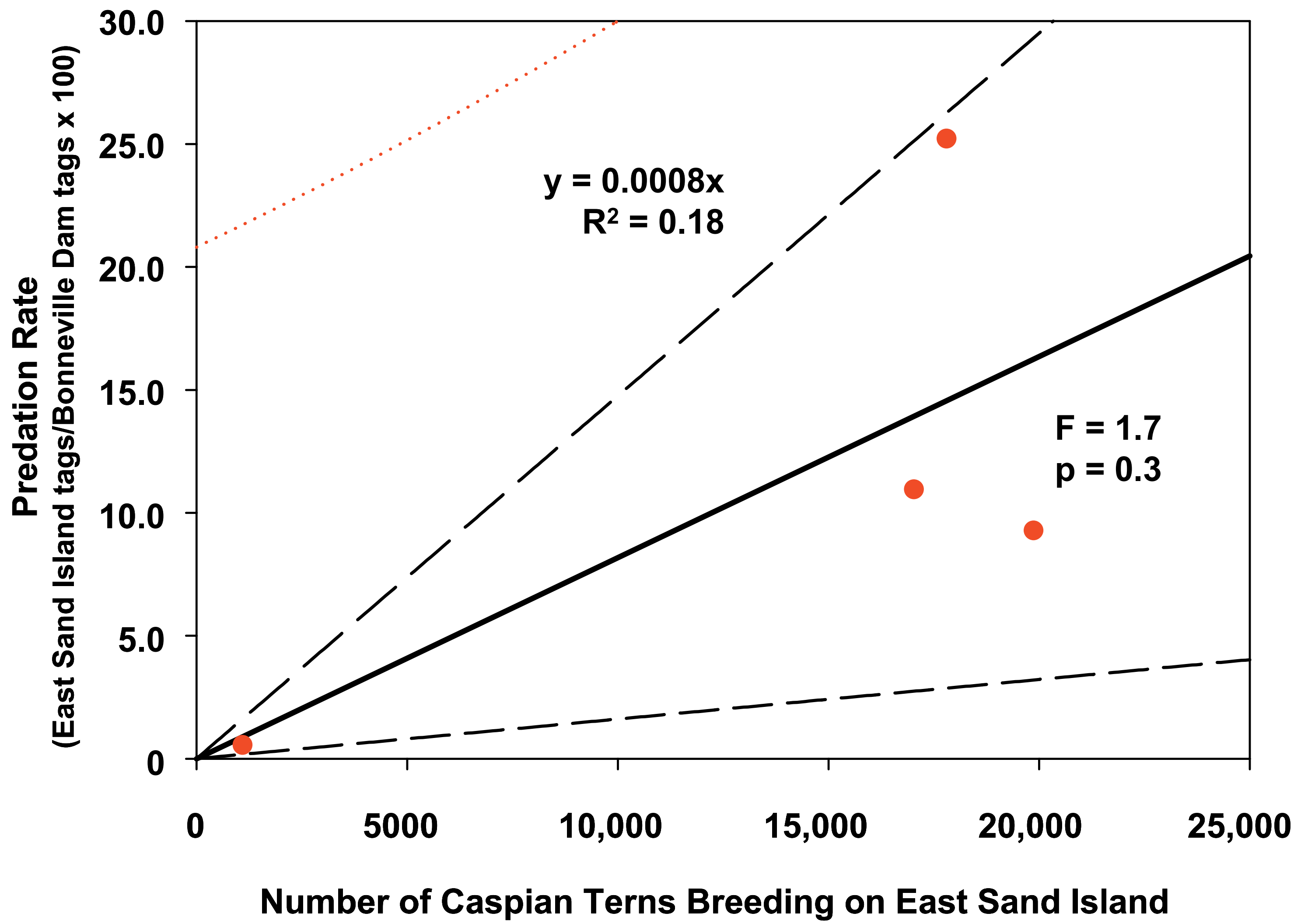


Figure 9. Linear regression of predation rates on the ***Upper Columbia River steelhead ESU*** in the Columbia River estuary by Caspian Terns breeding on East Sand Island (1999-2002) estimated using ***recovery of PIT tags***. Dashed black lines represent 95% confidence limits; dotted red lines represent 95% prediction limits.

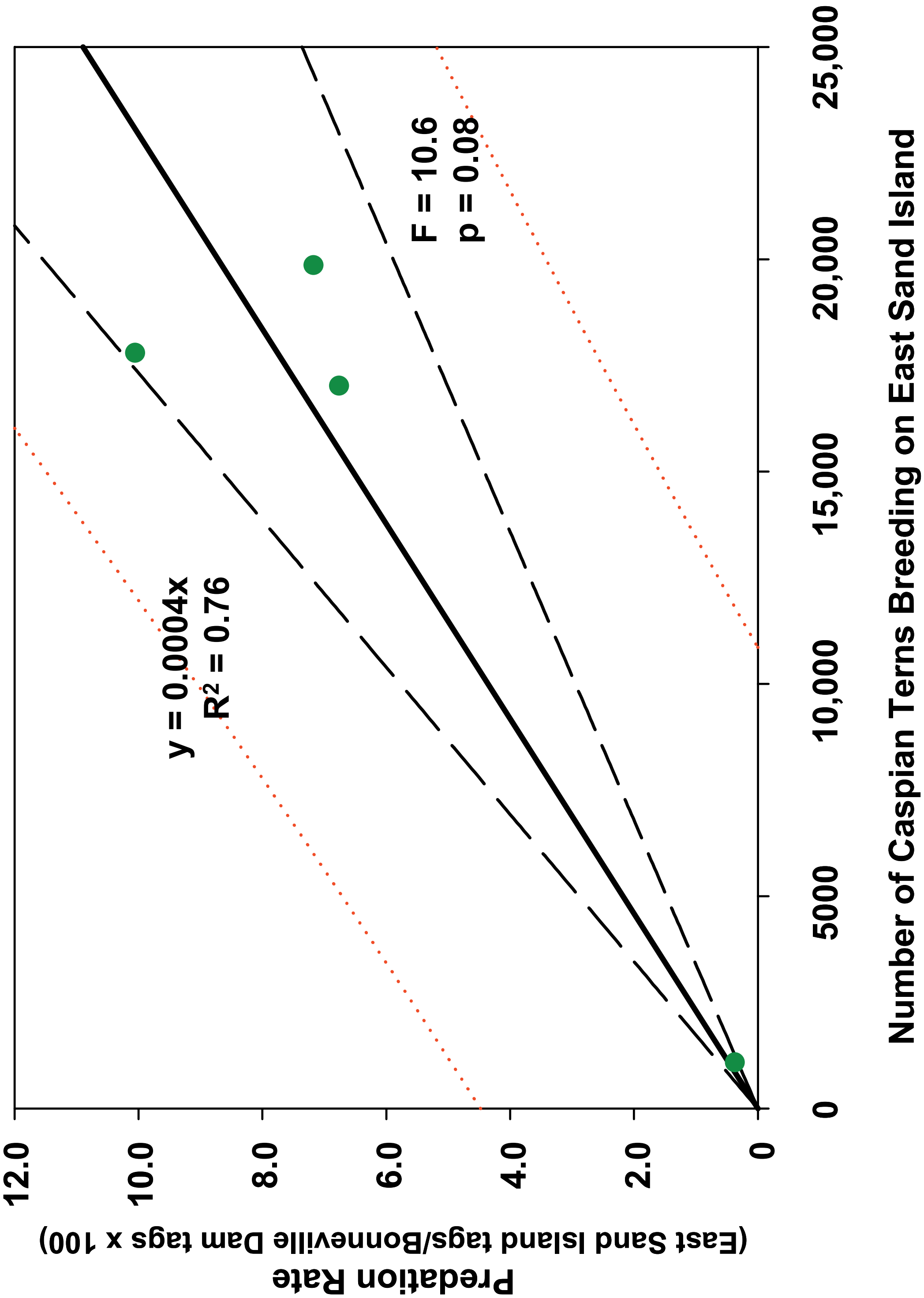


Figure 10. Linear regression of predation rates on the *Middle Columbia River steelhead ESU* in the Columbia River estuary by Caspian Terns breeding on East Sand Island (1999-2002) estimated using *recovery of PIT tags*. Dashed black lines represent 95% confidence limits; dotted red lines represent 95% prediction limits.

Appendix D

Applicable Laws and Executive Orders

Appendix D. Applicable Laws and Executive Orders

Law, Regulation, or Guideline	Description
Migratory Bird Treaty Act of 1918 (MBTA), as amended, (16 U.S.C. 703-711)	The Service has the primary statutory authority to manage migratory bird populations in the United States. The MBTA implements treaties with Great Britain (for Canada in 1916 as amended in 1999), the United Mexican States (1936 as amended in 1972 and 1999), Japan (1972 as amended in 1974), and the former Soviet Union (1978) and imposed certain obligations on the U.S. for the conservation of migratory birds, including the responsibilities to: conserve and manage migratory birds internationally; sustain healthy migratory bird populations for consumptive and non-consumptive uses; and restore depleted populations of migratory birds. Conventions are also held with Mexico, Japan, and Russia.
Endangered Species Act of 1973 (ESA), as amended (7 U.S.C. 136; 16 U.S.C. 460 et seq.)	It is Federal policy, under the ESA, that all Federal agencies seek to conserve threatened and endangered species and utilize their authorities in furtherance of the purposes of the Act (Sec. 2(c)).
National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347)	NEPA is our national charter for protection of the environment; it requires Federal agencies to evaluate the potential environmental impacts when planning a major Federal action and ensures that environmental information is available to public officials and citizens before decisions are made and before actions are taken. It mandates a process for thoroughly considering what an action may do to the human environment and how any adverse impacts can be mitigated (http://npi.org/nepa/process.html).
Sustainable Fisheries Act (Public Law 104-297) (re-named from the Magnuson-Stevens Act) (MSA)	Amended the habitat provisions of the MSA. It calls for direct action to stop or reverse the continued loss of fish habitats. The Act requires Federal agencies to protect, conserve, and enhance "essential fish habitat" (EFH) for federally managed fish species; "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."
Public Law 106-53, Section 582c	Requires the U.S. Army Corps of Engineers to "carry out methods to reduce nesting populations of avian predators on dredge spoil islands in the Columbia River under the jurisdiction of the Secretary" in conjunction with the Departments of Interior and Commerce.

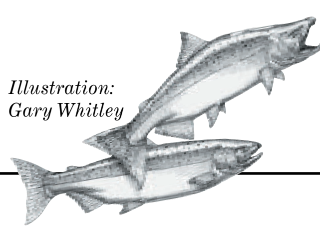
Appendix D. Applicable Laws and Executive Orders Continued

Law, Regulation, or Guideline	Description
Fishery Conservation and Management Act (FCMA) of 1976 (16 U.S.C. 1801-83)	Law 99-659, Section 104, amended Section 302 of the 1976 act requires all Federal agencies to respond within 45 days to comments and recommendations made by the Regional Fishery Management Council relative to the impacts a Federal activity have on fishery resources under the Council's jurisdiction.
Fish and Wildlife Coordination Act (FWCA) of 1958	Requires equal consideration and coordination of wildlife conservation with other water resource development programs.
Fish and Wildlife Conservation Act (16 USC 661-667e), as amended	Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under ESA.
Fish and Wildlife Act of 1956 (16 USC 742a-743j)	Provides Secretary of Interior with authority to protect and manage fish and wildlife resources.
Executive Order 13186 (EO), Responsibilities of Federal Agencies to Protect Migratory Birds	Directs any Federal agency whose actions have a measurable negative impact on migratory bird populations to develop a Memorandum of Understanding (MOU) with the Service to promote conservation of migratory birds. The MOUs would establish protocols to guide future agency regulatory actions and policy decisions; renewal of permits, contracts or other agreements; and the creation of or revisions to land management plans.
Federal Water Pollution Control Act of 1948, as amended ("Clean Water Act")	The Clean Water Act (CWA) contains a number of provisions to restore and maintain the quality of the nation's water resources. Provides for protection of water quality.
Coastal Zone Management Act (CZMA) of 1972, as amended (16 U.S.C. 1451-1464)	Protects environmental quality of coastal areas.
Estuary Protection Act (16 U.S.C. 1221-1226)	The purpose of the Estuary Protection Act is to establish a program to protect, conserve and restore estuaries. The act does not affect an agency's authority for existing programs within an estuary.
Executive Order 11593 (EO), Protection and Enhancement of the Cultural Environment	States that if the Service proposes any development activities that may affect archeological or historical sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.

Appendix D. Applicable Laws and Executive Orders Continued

Law, Regulation, or Guideline	Description
Executive Order 12898 (EO), Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, 11 February 1994	The overall purpose of the order is to avoid disproportionately high imposition of any adverse environmental or economic impacts on minority or low-income populations. All NEPA environmental analyses must include an evaluation of effects on minority and low income communities.
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications.
Section 10, Rivers and Harbors Act of 1899 (30 Stat 1151: 33 USC 401 Section 10)	Provides for the protection of waters associated with work in or affecting Navigable Waters of the United States. Requires U.S. Army Corps of Engineers review for structures or work.

Illustration:
Gary Whitley



Appendix E

Distribution List

Appendix E: Distribution List

INDIVIDUALS

Ainley, David
Alderson, George
Alderson,Francis
Alexander,John
Alonso, E.
Ammeraal, John
Babb, Evelyn
Basset, William
Bayer, Range
Blais Napier, Judy
Blanchard, Steve
Boeholt, Dan
Boerner, Stephen
Bradford, Debby
Brookman, Gerald
Brown, Lena
Burkhalter, Mark
Colter, Carolee
Conroy, Edward
Corriere, Caryn
Daigneault, Steve
Davidson, Judy
Davis, Shannon
DeNiro, Liz
Dilley, Scott
Dilley, Lisa
Durr, Greg & Becky
Emde, Richard
Fatta, Louis
Fields, Gary
Fisher, Bruce
Fisk, Bill
Folnagy, Atilla
Grant, Catherine
Groves, Desiree
Hardin, Yvone
Hamilton, Dave
Harr, Peter
Harr, Sharon
Hart, Sue
Hearn, Jim
Hendricks, Brenda
Hill, Brandon
Hollingsworth, Allan
Honican, Albert
Huhtala, Peter
Humphreys, John
Ishiyama, D.
Jacus, Anna
Julius, Theressa
Knutson, Peter
Kocsis, Amy
Krajewski, Dan
Laier, Charles
Lamb, Alexandra J.
Lancefield, Tom
Landua, Katrina
Larsen, Adolph
Leohardt, Dea
Leohardt, Jim
Long, Meredith
Malek, Robert
Marett, Robert
Marett, Susan
Marinkovich, Fred
Marshall, David B.
Martinson, Kahler
Mayo, John
McNew, Sandra
McGuire, Matthew
Miller, Bonnie
Miyawaki, Leland
Moon, Melanie
Morse, Melissa
Muller, Gretchen
Murray, Shannon
Napier, Dan
Norman, Donald
O'Brien, Kim
Ordonez, David
Padilla, Gabriel
Parameswaran, G.
Powers, Denise
Richards, Loretta
Russo, Susan
Ruud, Mary Catherine
Sandall, Marilyn
Schafer, Kevin
Scherb, Ben
Shrewsbury, Gerald
Skinner, Carol
Skumanich, Marina
Slikas, Beth
Smith, Deborah
Smith, J.
Smith, Kerry
Sorsey, W. Renee
Swanson, Michael
Thomas-Blake, Debra
Van Dran, Chris
Watson, John A.
Weller, Charles
Williams, Daniel
Winstead, Robert
Wolf, Martin

NAME	ORGANIZATION
ACADEMIC INSTITUTIONS	
Colwell, Mark	Humboldt State University
Fischer, Karen	OSU-Columbia River Avian Predation Project
Larson, Keith	Oregon State University
Roby, Dan	Oregon State University
Schiller, Anja	Oregon State University
Shugart, Gary	Slater Museum of Natural History
Smith, Judy	Colordao State University Libraries
Wells, Adam	OSU-Columbia River Aviation Predation Program
NON GOVERNMENT ORGANIZATIONS	
(no contact name)	Admiralty Audubon Society
(no contact name)	American Rivers Society
(no contact name)	Audubon Society - Redwood Region
(no contact name)	California Sportfishing Coalition
(no contact name)	California Sportfishing Protection Alliance
(no contact name)	Cascade Chapter, Sierra Club
(no contact name)	Columbia River Keeper
(no contact name)	Dungeness River Audubon Society
(no contact name)	Fisherman's Marketing Association
(no contact name)	Friends of Summer Lake
(no contact name)	Golden Gate Audubon
(no contact name)	Humboldt Fish Action Council
(no contact name)	Marin Conservation League
(no contact name)	Napa Solano Audubon
(no contact name)	National Audubon
(no contact name)	National Audubon Society
(no contact name)	North Cascades Audubon Society
(no contact name)	Northwest Sportfishing Industry & Association
(no contact name)	NW Steelhead/Salmon Council of Trout Unlimited
(no contact name)	Olympic Pennisula Audubon
(no contact name)	Oregon Chapter, Sierra Club
(no contact name)	San Francisco Bay Chapter, Sierra Club
(no contact name)	Santa Clara Audubon
(no contact name)	Sea and Sage Audubon
(no contact name)	Sequoia Audubon
(no contact name)	The Nature Conservancy
(no contact name)	Trout Unlimited
(no contact name)	Washington Trout
(no contact name)	Washington Wetlands Network (WNET)
(no contact name)	Westport Charter Fisherman's Association
Allen, Brian	Columbia Basin Fish & Wildlife Authority
Ambroge, Christina	EPIC
Bakke, Bill	Native Fish Society
Barber, Harry	Lower Columbia Fish Enhancement Group
Beaty, Roy	Fish Commission
Berggren, Steve	Resource Coalition and Commercial
Burns, Keith	Gray Harbor Poggie Club

NAME	ORGANIZATION
NON GOVERNMENT ORGANIZATIONS (CONTINUED)	
Carey, Chris	Regional Wildlife Diversity - High Desert
Castellanos, Candy	Audubon Centers Associate
Cedergreen, Mark	Westport Charterboat Association
Clark, Tom	Lower Columbia Basin Audubon
Cochlin, Clyde	E. Washington Steelhead Foundation
Cohen, Ellie	PRBO Conservation Science
Croonquist, David	Puget Sound Anglers
Curl, Jr, Herbert	Seattle Audubon Society
Eaton, Bob	Salmon for All
Englemeyer, Paul	National Audubon Society
Eversen, John	Steelhead Trout Club of Washington
Fee, Sharnelle	Wildlife Rehab Center of the North Coast
Feinstein, Arthur	Golden Gate Audubon/CCCR
Fricke, Doug	Chehalis Basin Fisheries Task Force
Grunbaum, Arthur (R.D)	Friends of Grays Harbor
Hanson, Janet	San Francisco Bay Bird Observatory
Harrison, Craig	Pacific Seabird Group
Heiken, Doug	Oregon Natural Resources Council
Hoppler, Wes	Steelhead Trout Club of Washington
Jacobsen, Jim	USACE-Seattle
Johnston, Ken	Klamath Basin Audubon Society
Jones, Tod	CEDC Fisheries
Kennedy, Caroline	Defenders of Wildlife
Ketcham, Paul	Audubon Society of Portland
Kress, Stephen	Seabird Restoration Program
LeGue, Chandra	Oregon Natural Resources Council
LePage, Al	National Coast Trail Associations
LeValley, Ron	Mad River Biologists
McRoberts, James	Federation of Fly Fishers
Mills, Kyra	PRBO Conservation Science
Morgan, Alex	Seattle Audubon
Mueller, Dana	Eastern Washington Steelhead Foundation
Nelson, Ray	Lahontan Audubon Society
Packard, Heath	Audubon Washington and Black Hills Audubon
Parlato, Gale	Central Oregon Audubon Society
Perciasepe, Bob	National Audubon Society
Puddicombe, Steve	Willapa Hills Audubon
Redisch, Meryl	Audubon Society of Portland
Rolfe, Allison	San Diego Audubon Society
Schoyen, Kris	Washington State Audubon
Schwickerath, Dean	Grays Harbor Audubon Society
Schwickerath, Dianne	Grays Harbor Audubon Society
Senatore, Mike	Defenders of Wildlife
Shaffner, Owen	SW WA County Farm Bureau
Sikes, Ron	Admirality Audubon Chapter
Sowles, Maeve	Lane County Audubon Society
Soverel, Peter	Wild Salmon Center
Spain, Glen	Pacific Coast Federation of Fishermen's Assoc.
St. Louis, Marty	Summer Lake Wildlife Refuge

NAME	ORGANIZATION

NON GOVERNMENT ORGANIZATIONS (CONTINUED)

Strake, Gretchen	Vancouver Audubon Society
Strong, Cheryl	San Francisco Bay Bird Observatory
Turner, Terry	Washington Council of Trout Unlimited
Twitchell, Marlyn	National Audubon Society
Van Ess, Matt	Columbia River Estuary Study Taskforce
Wahl, Leslie	Yakima Valley Audubon Society
Whitworth, Joe	Oregon Trout
Wilkinson, Russell	Summer Lake Wildlife Refuge
Winegrad, Gerald	American Bird Conservation

BUSINESS

(no contact name)	Columbia River Fisherman's Protective Union
(no contact name)	Port of Chinook
(no contact name)	Port of Ilwaco
Blanchard, Cecil	SafeHarbor Technology Corporation
Brewer, Rone	Landau Associates Inc.
Collis, Ken	Real Time Research
Cook, Bill	Port of Astoria
Meier, Robert	Rayonier Technical Services
Mitby, Eric	Nelson Crab, Inc
Rauzon, Mark	Marine Endeavors
Sharp, Brian	Ecological Perspectives
Smith, Richard	Smith and Lowney, P.L.L.C

MEDIA

Crampton, Bill	Columbia Basin Bulletin
Loney, Terry	The Daily World

CITY AGENCIES & GROUPS

(no contact name)	City of Arcata
(no contact name)	City of Eureka
Andrews, Ryan	City of Westport
Kavanaugh-Lynch, Maragret	City of Alameda Planning and Building
McNerney, John T.	City of Davis, Public Works

COUNTY AGENCIES & GROUPS

(no contact name)	Clatsop County Courthouse
(no contact name)	Klamath County Commissioner's Office
(no contact name)	Lake County Commissioner's Office
(no contact name)	Lane County Commissioner's Office
(no contact name)	Pacific County Commissioners Courthouse

NAME	ORGANIZATION
COUNTY AGENCIES & GROUPS (CONTINUED)	
Beerbower, Bob	Grays Harbor County Board of Commisioners
Bobzien, Steve	East Bay Regional Park District
Carter, Albert	Grays Harbor Board of Commissioners
Cervelli, Ann	Contra Costa County Board of Supervisors
Chapman, Michael	Clallam County Commisioner
Conlon, Thomas	Humboldt County Planning Department
Doherty, Mike	Clallam County Comissioner
Hishida, Crystal	Alameda County Board of Supervisors
Huntingford, Glen	Jefferson County Commissioner
Leong, Eugene	Association of Bay Governments
Maltbie, John	San Mateo County Board of Supervisors
McGoldrick, Jake	San Francisco Board of Supervisors District 1
Morrisette, Dennis	Grays Harbor County Board of Commisioners
Palmer, Andy	Jefferson County Marine Resource Company
Perez-Sorensen, Phyllis	Santa Clara County Board of Supervisors
Pock, Darrel	Grant County PUD
Schmitt, Joe	Clallam County Marine Resource Company
Tharinger, Stephen	Clallam County Commissioner
STATE AGENCIES & GROUPS	
(no contact name)	Washington Environmental Council
Ball, Lindsay	Oregon Department of Fish and Wildlife
Beach, Rocky	Washington Department of Fish and Wildlife
Bean, Dave	Washington Department of Natural Resources
Brittle, Dave	Washington Department of Fish and Wildlife
Bruce, Charles	Oregon Department of Fish and Wildlife
Burkett, Esther	California Department of Fish and Game
Caswell, James	State of Idaho Office of Species Conservation
Crawforth, Terry	Nevada Department of Wildlife
Dobler, Fred	Washington Department of Fish & Wildlife
Frey, Vicki	California Department of Fish and Game
Hampton, Steve	Office of Spill Prevention and Response CDFG
Huffaker, Steve	Idaho Department of Fish and Game
Koenings, Jeff	Washington Dept. of Fish and Wildlife
Morey, Sandra	California Department of Fish and Game
Neel, Larry	Nevada Department of Wildlife
Nichols, Mary	CA Resources Agency
Pustis, Nancy	Oregon Division of State Lands
Rea, Maria	CA Resource Agency - Salmon & Watershed
Sallabanks, Rex	Idaho Fish and Game Department
Smith, Jack	Washington Department of Fish and Wildlife
Stone, Richard	Washington Department of Fish and Wildlife
Warren, Ron	Washington Department of Fish and Wildlife
Wood, Dan	Farm Bureau
Zora, Craig	Washington Department of Natural Resources

TRIBAL GOVERNMENTS & STAFFS

NAME	ORGANIZATION
	Northwest Indian Fisheries Commision
Allen, W. Ron	Jamestown S'Klallam Tribal Council
Anderson, Jim	Northwest Indian Fisheries Commission
Brunoe, Garland	Conf. Tribes of the Warm Springs Reservation
Burke, Gary	Confederated Tribes of the Umatilla Indian Resv.
Capoeman-Baller, Pearl	Quinault Indian Nation-Business Committee
Charles, Ronald	Port Gamble S'Klallam Tribe
Crombie, Howard	Conf. Tribes of Coos, Lower Umpqua & Siuslaw
Hapner, Nina	Table Bluff Reservation Wiyot Tribe
James, Gordon	Skokomish Tribal Council
Jim, Russell	Conf. Tribes & Bands of the Yakama Indian Nation
Johnson, Anthony	NPTEC, Nez Perce Tribe
Kennedy, Cheryle	Confederated Tribes of the Grande Ronde
McCullough, Dale	Columbia River Inter-Tribal Fish Commission
Meninick, Jerry	Conf. Tribes & Bands of the Yakama Indian Nation
Nelson, Charlene	Shoalwater Bay Tribal Council
Pigsley, Delores	Confederated Tribes of Siletz Indians
Sullivan, Dennis	Lower Elwha Klallam Tribe

FEDERAL AGENCIES & OFFICES

NAME	ORGANIZATION
(no contact name)	Klamath Basin NWRC
(no contact name)	Sacramento/San Joaquin Estuary FRO
(no contact name)	San Diego NWR
(no contact name)	Upper Columbia River Basin Fisheries Office
(no contact name)	Cultural Resource Team, Sherwood, Oregon
(no contact name)	San Pablo Bay NWR
(no contact name)	California/Nevada Operations Office
(no contact name)	Oregon Coast NWRC
(no contact name)	Sonny Bono Salton Sea NWRC
(no contact name)	Modoc NWRC
(no contact name)	United States Fish and Wildlife Service
(no contact name)	Malhuer NWRC
(no contact name)	Mid Columbia NWRC
(no contact name)	Southeast Idaho NWRC
(no contact name)	Minidoka NWRC
(no contact name)	Stillwater National Wildlife Refuge Complex
(no contact name)	Oregon State Office
(no contact name)	Columbia Basin Ecoregion
Adelsbach, Terry	Sacramento Fish and Wildlife Office
Berg, Ken	Western Washington Fish and Wildlife Office
Bohan, Carolyn	National Wildlife Refuge System
Cameron, Forrest	National Wildlife Refuge System
Concannon, Julie	U.S. Fish and Wildlife Service, Regional One
Diggs, Daniel	U.S. Fish and Wildlife Service, Region One
Dunmire, Scott	USCOE, Walla Walla District Office
Gibbons, Jason	USDA-APHIS Wildlife Services
Kolar, Margaret	San Francisco Bay NWRC
Marker, Doug	Northwest Power Planning Council

NAME	ORGANIZATION
FEDERAL AGENCIES & OFFICES (CONTINUED)	
Maslen, Bill	Bonneville Power Administration
McChesney, Gerry	San Francisco Bay National Wildlife Refuge
McQuillen, Harry	Sacramento Fish and Wildlife Office
Nelson, Eric	Humboldt Wildlife Refuge
Paulin, Dave	Klamath and Central Valley/San Francisco Bay
Roush, Linda	Arcata Resource Area, BLM
Ryan, Kevin	Washington Maritime NWRC
Schlafmann, Deb	Habitat Conservation and Partners
Selvaggio, Sharon	U.S. Fish and Wildlife Service
Shake, Bill	U.S. Fish and Wildlife Service, Regional One
Stenvall, Charlie	Willapa NWRC
Swan, Ron	U.S. Fish and Wildlife Service, Regional One
Reichgott, Christine	U.S. Environmental Protection Agency, Region 10
Takekawa, Jean	Nisqually NWR
Thompson, Steve	California/Nevada Operations Office
Wagne, Kim	USDA/APHIS/COS
Walsworth, Dan	Nevada/Southern California-CNO Sacramento
Waters, Linda	North Pacific Coast/Pacific Islands Ecoregion
Welch, Dorie W.	Bonneville Power Administration
Wesley, Dave	United States Fish and Wildlife Service
Wills, David	R1 Columbia River Fisheries Program Office
Wilson, Paul	Columbia River Fisheries Program Office
Woodruff, Roger	USDA Wildlife Services
STATE LEGISLATURE	
Blake, Brian	Member of Congress
Butler, Tom	Member of Congress
Canciamilla, Joesph	Member of Congress
Doumit, Mark	Member of Congress
Dukes, Joan	Member of Congress
Figueroa, Liz	Member of Congress
Guinn, Kenny	Governor of Nevada
Hatfield, Brian	Member of Congress
Kempthorne, Dick	Governor of Idaho
Kulongoski, Ted	Governor of Oregon
Locke, Gary	Governor of Washington
McPherson, Ruce	Member of Congress
Merkle, Jeff	Member of Congress
Perata, Don	Member of Congress
Schwarzenegger, Arnold	Governor of California
Sher, Byron	Member of Congress
Speier, Jackie	Member of Congress
Stark, Fortney “Pete”	Member of Congress
Tauscher, Ellen	Member of Congress
Vasconcellos, John	Member of Congress
Yee, Ph.D., Leland	Member of Congress

NAME	ORGANIZATION
US CONGRESS	
Baird, Brian	Member of Congress
Boxer, Barbara	Member of Congress
Cantwell, Maria	Member of Congress
Craig, Larry E.	Member of Congress
Crapo, Mike	Member of Congress
Dicks, Norm	Member of Congress
Eshoo, Anna	Member of Congress
Feinstein, Dianne	Member of Congress
Ferrioli, Ted	Member of Congress
Gibbons, James	Member of Congress
Honda, Michael	Member of Congress
Kitts, Derrick	Member of Congress
Lantos, Tom	Member of Congress
Lee, Barbara	Member of Congress
Lofgren, Zoe	Member of Congress
Miller, George	Member of Congress
Murray, Patty	Member of Congress
Pelosi, Nancy	Member of Congress
Reid, Harry	Member of Congress
Rusigh, John	Member of Congress
Simpson, Mike	Member of Congress
Smith, Gordon	Member of Congress
Walden, Greg	Member of Congress
Wu, David	Member of Congress
Wyden, Ron	Member of Congress

Appendix F

Caspian Tern Regional Population Nesting Site Locations and Colony Sizes

Appendix F: Caspian Tern Regional Population Nesting Site Locations and Colony Sizes

TABLE F.1 Current and Historic Caspian Tern Nesting Locations in the Pacific Coast Region

Site Location	Current [a]	Historic [b]
WASHINGTON		
Dungeness Spit NWR, Cllalam County	x	
Padilla Bay, Skagit County		x
Commencement Bay, Pierce County	x [c]	
Grays Harbor, Grays Harbor County		x
Willapa Bay, Pacific County		x
Miller Rocks, Klickitat County		x
Crescent Island, Walla Walla County	x	
Banks Lake, Grant County	x	
Potholes Reservoir, Grant County	x	
Sprague Lake, Adams County	x	
OREGON		
East Sand Island, Clatsop County	x	
Rice Island, Clatsop County	x [d]	
Miller Sands Spit, Clatsop County		x [d]
Threemile Canyon Island, Morrow County	x [e]	
Malheur Lake, Harney County	x	
Crump Lake, Lake County	x	
Summer Lake, Lake County	x	
CALIFORNIA		
Humboldt Bay, Humboldt County	x	
Knights Island, Solano County	x	
Brooks Island, Contra Costa County	x	
Agua Vista, San Francisco County	x	
Hayward Regional Shoreline, Alameda County	x	
Bair Island, San Mateo County	x	
Ravenswood, San Mateo County	x	
Proposed Alameda NWR, Alameda County	x [f]	
Baumberg Tract, Alameda County	x	
Ponds M4/M5, Alameda County		x
Ponds N1-N9, Alameda County		x
Alviso (Pond A7), Santa Clara County	x	
Elkhorn Slough, Monterey County	x	
Salinas River NWR, Monterey County	x	
Bolsa Chica Ecological Reserve, Orange County	x	
Pier 400, Terminal Island, Los Angeles County	x	
South San Diego Bay NWR, San Diego County	x	
Meiss Lake, Butte Valley WA, Siskiyou County	x	
Clear Lake NWR, Modoc County	x	
Goose Lake, Modoc County	x	
Big Sage Reservoir, Modoc County	x	
Honey Lake WA, Lassen County	x	
Mono Lake, Mono County	x	
Lemoore NAS sewer ponds, Kings County	x	
Westlake Farms North Evaporation Ponds, Kings County	x	
Westlake Farms South Evaporation Basin, Kings County	x	
Tulare lakebed, Kings County	x	
South Wilbur Flood Area, Kings County	x	
Tulare Lake Drainage District, North Evaporation Basin, Kings County	x	
Tulare Lake Drainage District, South Evaporation Basin, Kings and Kern County	x	
Lake Elsinore, Riverside County	x	
Salton Sea, Imperial County	x	

Appendix F: Caspian Tern Regional Population Nesting Site Locations and Colony Sizes Continued

TABLE F.1 Current and Historic Caspian Tern Nesting Locations in the Pacific Coast Region (continued)

Site Location	Current [a]	Historic [b]
MEXICO		
Cerro Prieto, Mexicali Valley	x	
Isla Montague	x	
Isla Concha	x	
Isla Vaso 8	x	
IDAHO		
Mormon Reservoir, Camas County	x	
Magic Reservoir, Blaine County		x
Minidoka NWR, Cassia County	x	
American Falls Reservoir, Bingham County	x	
Blackfoot Reservoir, Caribou County	x	
Bear Lake NWR, Franklin County		x
NEVADA		
Stillwater Point Reservoir, Churchill County		x
Lahontan Reservoir, Lyon County		x
Carson Sink, Churchill County	x	
Anaho Island NWR, Washoe County	x	
UTAH		
Great Salt Lake, Tooek County		x
Bear River Migratory Bird Refuge, Box Elder County		x
Farmington Bay Waterfowl Management Area, Davis County		x
Utah Lake, Utah County		x
MONTANA		
Canyon Lake Ferry Reservoir, Lewis and Clark Counties	x	
Fort Peck Reservoir, Charles M. Russell NWR, Valley County	x	
WYOMING		
Molly Island, Yellowstone National Park	x	
Pathfinder Reservoir, Natrona and Carbon Counties		x
Soda Lake Islands, Natrona County	x	
Gray Reef Reservoir, Natrona County		x
Bamforth Lake, Albany County		x
Caldwell Lake, Albany County		x

[a] Active nesting occurred at these sites in the last 5 years. Nesting may or may not have occurred in 2003.

[b] Nesting activity has not occurred for the last 5 consecutive years.

[c] Colony last nested in 2002 but site is no longer available because of environmental clean-up.

[d] Terns could potentially nest at these locations, but active management actions are being implemented to prevent terns from nesting.

[e] Mink predation occurred at this site in 2001 and most likely will inhibit any future nesting activity .

[f] Nesting habitat was lost to heavy vegetation in 1999; restoration needs to occur before terns are able to nest again.

Appendix F: Caspian Tern Regional Population Nesting Site Locations and Colony Sizes Continued

TABLE F.2 Caspian Tern Pacific Coast Regional Population, 1997 to 2003 and Average Colony Size[a]

Site Location	Number of Nesting Pairs 1997	1998	1999	2000	2001	2002	2003	Average[b] Colony Size
WASHINGTON								
Dungeness NWR							186[c]	-
Padilla Bay	0	0	-	-	-	-	0	104[d]
Commencement Bay	-	-	423	620[e]	388	215[e]	0	412
Grays Harbor	0	0	0	0	0	0	0	1675[f]
Willapa Bay	0	0	0	0	0	0	0	820[g]
Miller Rocks	-	-	-	-	15	0	0	-
Crescent Island [i]	614[c]	357[c]	552[c]	548	657	578	509	545
Banks Lake	-	-	-	10	23	-	21	18
Potholes Reservoir	259	-	-	150	~250	~250	205	223
Sprague Lake	-	-	~50	20	20	-	-	30
OREGON								
East Sand Island	0	0	547	8,513	8,896	9,933[h]	8,325[h]	7,248
Rice Island	7,151	8,691	8,328	588	0	0	0	6,190
Miller Sands Spit	0	17	0	0	0	0	0	-
Threemile Canyon Island	354[c]	210[c]	238[c]	260	2	0	0	266[i]
Malheur Lake	65	25	30	192[c]	51[c]	0	0	73
Crump Lake	-	-	-	155[c]	-	0	71	113
Summer Lake	-	-	38	16	0	~5	5	16
CALIFORNIA								
Humboldt Bay	-	-	-	-	~17[c]	~6[c]	60[c]	28
Knights Island	400	~200	-	121[c]	43[c]	153	203	187
Brooks Island	~500	582	Active	806[c]	512[c]	825	859	681
Agua Vista	-	-	-	-	-	86[c]	43[c]	65
Hayward Regional Shoreline	1	1	1	1	1	1	0	1
Ravenswood	0	4	0	1	1	1	0	1
Alameda	285	267	1	0	0	0	0	184
Baumberg Tract	0	33	26	79	116	80	35	62
Alviso (Pond A7)	104	30	122	118	155	73	50	93
Elkhorn Slough	0	0	~30	~80	~65	~50	~50	~55
Salinas River NWR	-	-	-	-	2	93[c]	167	87
Bolsa Chica[j]	175	40	58	51	92	192	5	613
Pier 400, Terminal Island	25	146	250	336	160	151	170	177
South San Diego Bay NWR	320	198	261	380	350	379	311	314
Meiss Lake, Butte Valley WA	25[c]	16	27	19	0	0	0	22
Clear Lake NWR	180[c]	68[c]	118	242[c]	201	0	29	120
Goose Lake	143[c]	-	310[c]	4	~240	133	282	185
Big Sage Reservoir	62[c]	-	0	48	0	0	0	55
Honey Lake WA	152	-	87	82	92	46	13	79
Mono Lake	0	0	0	8	6	11	8	8
Lemoore NAS sewer ponds	-	20[c]	0	-	-	0	-	-
Westlake Farms, South Evaporation Basin	0	3	0	0	0	0	-	-
Tulare lakebed	0	20[c]	0	0	0	0	-	-
South Wilbur Flood Area	0	70	27	0	0	0	-	49
Tulare Lake Drainage District, North Evaporation Basin	0	0	0	0	1	0	-	-
Tulare Lake Drainage District, South Evaporation Basin	0	40	0	0	0	0	-	-
Lake Elsinore	-	-	14	-	-	0	-	-
Salton Sea	1,200	800	211	207	327	29	88	409

Appendix F: Caspian Tern Regional Population Nesting Site Locations and Colony Sizes Continued

TABLE F.2 Caspian Tern Pacific Coast Regional Population, 1997 to 2003 and Average Colony Size[a]

	Number of Nesting Pairs							
Site Location	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**Average[b] Colony Size**
MEXICO								
Cerro Prieto	30	-	-	0	0	4	37	-
Isla Montague	-	-	-	-	-	83	-	-
Isla Concha	-	-	-	-	-	21	23	22
Isla Vaso 8	-	-	-	-	-	32	90	61
IDAHO								
Mormon Reservoir	-	-	-	-	~2	25	0	14
Minidoka NWR	-	-	-	1	0	4	0	1
American Falls Reservoir	-	-	-	-	-	5	0	-
Blackfoot Reservoir	-	-	-	-	0	50	40	45
NEVADA								
Carson Sink	0	-	685	0	0	0	0	-
Anaho Island NWR, Pyramid Lake	1	5	0	0	0	0	5	4
MONTANA								
Canyon Lake Ferry Reservoir	5	0	2	7	35	43	11	15
Fort Peck Reservoir, Charles M. Russell NWR	?	?	?	?	~25	~25	-	25
WYOMING								
Molly Island, Yellowstone Lake	4	5	4	0	3	5	-	4
Soda Lake islands	0	0	0	7	12	19	-	13
PACIFIC REGION TOTALS[k]	**12,115**	**11,848**	**12,440**	**13,669**	**12,760**	**13,606**	**11,906**	**-**

[a] Data from Shuford and Craig 2002 with additional data for 2002 and 2003 from USFWS and D. Shuford. To enable estimation of the total numbers of breeding pairs in the entire region, we adjusted some raw counts or estimates. When a range was given for numbers of nests or pairs we report the mid-point (e.g., 800-850 pairs reported as 825 pairs) and for breeding adults we use the mid-point as the basis for estimating numbers of pairs. Counts or estimates of breeding adults were multiplied by 0.62 to approximately estimate numbers of breeding pairs based on the average ratio of nests to adults at sites on the California coast (0.625, Carter et al. 1992, p. I-45) and the California interior (0.61, D. Shuford unpubl. data). Dashes (–) indicate that no survey was conducted or no data available, zeroes (0) that a survey was conducted but no evidence of nesting observed, and question marks (?) that nesting strongly suspected but no solid data available.

[b] Average colony size was based on years with nest counts only.

[c] Counts of adults were converted to an estimate of breeding pairs by multiplying raw adults by the 0.62 correction factor described above.

[d] Average colony size for Padilla Bay was calculated based on data collected in 1991 and 1995 (M. Davison pers. comm)

[e] Counts of adults were converted to an estimate of breeding pairs by multiplying raw adults by the 0.62 correction factor described above. Terns at Commencement Bay in 2002 were nesting on the rooftop of a Port of Tacoma building (# 407); the count of adults on which the estimate of pairs was made was taken late in the nesting season (9 July).

[f] Average colony size calculated from data in Shuford and Craig (2002). Range = 9 - 3950 breeding pairs

[g] Average colony size calculated from data in Shuford and Craig (2002). Range = 175 - 1500 breeding pairs

[h] Data from Collis et al. 2003a and 2003b

[i] Average colony size does not include 2001 nest count because the colony was affected by a predator that year.

[j] All counts from Bolsa Chica are of total nest attempts (on the basis of marked nests), which likely overestimates nesting pairs because of pairs that renest after initial failures.

[k] Totals are likely underestimates because of a lack of surveys at some sites in particular years or during the whole time period (e.g., most sites in Mexico).

Appendix G

Potential Caspian Tern Nesting Sites in the Pacific Coast Region: Selection Process and Proposed Management Actions

Appendix G: Potential Caspian Tern Nesting Sites in the Pacific Coast Region: Selection Process and Proposed Management Actions

The process used to identify the seven sites in this FEIS consisted of an initial review (feasibility assessment) of Caspian tern nesting habitat that was conducted by the Service in 2002 (see Seto et al. 2003 for full report). A total of 77 individual historic, current, and potential nesting sites (sites with appropriate habitat) in Washington, Oregon, California, Idaho, and Nevada were evaluated in this study (including site visits) to determine their management potential for Caspian terns (Seto et al. 2003). Sites in or near the Columbia River, such as Crescent Island, were eliminated from consideration because specific activities to enhance Caspian tern colonies in these locations would not contribute to the goal of reducing impacts to ESA-listed Columbia River salmonids. During the feasibility assessment, a site was determined to have management potential for Caspian terns if the following conditions were met (Seto et al. 2003, Table G.1, Tables G.1 - G.4 are located at the end of Chapter G):

1. Suitable nesting habitat is present or habitat enhancement requirements are minimal,
2. Site is available or could be managed for nesting terns every year,
3. Site can support a substantial number of breeding terns (350 to 2,000 nesting pairs),
4. Prey is available in most or all years,
5. Potential predators (mammalian and avian) are absent or controllable, and
6. Levels of natural or human disturbance are absent, minimal, or controllable.

Sites determined to have management potential for Caspian terns were also ranked to identify those sites which had the best potential to serve as alternate nesting habitat for terns displaced from East Sand Island (Tables G.2 and G.3). Based on this initial review, further investigation of sites, public scoping, and comments received by the states of Washington, Oregon, and California, the list of potential nesting sites for displaced Caspian terns was refined for analysis in this FEIS. A few sites not discussed in the feasibility assessment (e.g. Dungeness National Wildlife Refuge (NWR), Yolo Bypass Wildlife Area, and City of Davis Wetlands) were identified during scoping.

Although these sites were identified as having potential for Caspian tern management, some sites were eliminated from further consideration in this EIS (See Table G.4 for a summary of nesting sites that were not selected and the reason for elimination). These included socio-political and biological concerns expressed by Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), California Fish and Game (CDFG), and the Service's California/Nevada Operations office. For example, several sites in coastal Washington (e.g., Grays Harbor and Padilla Bay) were identified in the feasibility assessment (Seto et al. 2003, Table G.1) as having high management potential for development of tern nesting habitat, but have been eliminated from further consideration because WDFW does not support or would not facilitate the managed relocation of Caspian terns within Washington. Since Caspian terns established a colony at Dungeness NWR in 2003 on their own accord, this site remained in our analysis.

ODFW will not support managed relocation of Caspian terns to non-historic nesting sites in Oregon due to concerns for introducing predation to sensitive fish stocks that had not historically been subjected to tern predation. Since terns have not been documented to nest on the Oregon Coast, sites on the coast that were identified in the feasibility assessment were eliminated from further consideration because ESA-listed salmonids are present (Seto et al. 2003, Table G.1). Crump and Summer lakes, although initially identified as having no management potential in the feasibility assessment, are included in the EIS at the request of ODFW. These sites are historic or current nesting sites and further consideration identified viable management options for terns. Although Fern Ridge Lake is not a historic tern nesting site in Oregon, we included Fern Ridge Lake in our analysis because the local prey base in the lake does not include fish species of concern. Although, the Willamette and McKenzie rivers are about 15 miles from Fern Ridge Lake and support ESA-listed salmonids, we do not expect these stocks to serve as the primary food resource for the terns. Thus, although this is not a historic tern nesting site, relocation of terns to this site may not result in high levels of predation on other salmonid stocks.

Similarly, CDFG will support Caspian tern management in California only at historic colonies. Therefore, although the scoping process of this EIS identified development of tern nesting habitat at the Yolo Bypass Wildlife Area and City of Davis Wetlands in the Sacramento Valley, these sites were removed from further analysis because they are not historical Caspian tern nesting sites. Additionally, although Humboldt Bay is a historic tern nesting site, Teal Island in the Humboldt Bay National Wildlife Refuge (NWR) was eliminated from further consideration in this EIS because of concerns expressed by CDFG and the Service's California/Nevada Operations office about the potential impact of tern predation on ESA-listed salmonids and partnership efforts associated with salmon recovery. Although management actions associated with this EIS are not proposed for these sites, displaced Caspian terns may select to nest on these sites or any other sites in the region by their own accord. Final criteria used to identify potential nesting sites listed in Table 2.1 included:

1. Relative stability and abundance of suitable prey (i.e., prey are heavily dependent on annual water levels at interior sites vs. sites with more stable water/prey resources),
2. Availability of or capability to improve/develop Caspian tern nesting habitat in the near future (2005 to 2008),
3. Ability to attract nesting terns from East Sand Island (using distance from East Sand Island as an indicator), and,
4. Minimal conflict with ESA-listed species.

Potential Caspian Tern Nesting Sites and Possible Management Actions

Management actions that would be required at each potential site if selected for implementation are described below and summarized in Table 2.1.

Dungeness NWR. Since the completion of the feasibility assessment report, a new site, Dungeness NWR (Figure G.1), in northwestern Washington, became available for consideration because terns established a new nesting colony there in 2003. The current Caspian tern nesting site at Dungeness NWR could accommodate an increased number of nesting terns and thus, does not require any habitat enhancement. However, protecting this newly established Caspian tern colony to decrease possible human disturbance and predator access would provide a secure nesting site less susceptible to factors that would otherwise lead to site failure or abandonment. This includes adding educational signs to notify visiting public of the existing closed area, enforcing closures, and monitoring predator activity. If predators, primarily mammalian, become a problem, a predator management program (e.g., fences or other non-lethal measures) may be considered to ensure successful tern nesting. However, the control or elimination of predators may not be feasible because this site is connected to the mainland, unlike an island site which has limited predator access.

Estimated costs: $ 65,000.00 (first year costs, including monitoring)

Crump Lake. Management actions proposed at Crump Lake (Figure G.2), in south-central Oregon, are extensive. Since the current nesting island (Crump Island) lies below full lake water levels and is subject to erosion, we propose to build up the island to an elevation that would remain above high water levels. This island is approximately 1.25 miles offshore and is situated in waters 2 to 10 feet in depth. Crump Island was formerly a natural island located approximately mid-lake and north of the peninsula that nearly bisects the lake. Previous human disturbance led to erosion of the island to lakebed level, eliminating use by colonial nesting waterbirds. An effort in the 1990s led by ODFW was partially successful in restoring the island. Unfortunately, the island height did not exceed high water levels and thus, is inundated or nearly so during higher water periods.

Crump Island is too far offshore for construction of a causeway to haul materials into place. Potentially the island could be reconstructed during a future drought but there is no certainty when such a situation would occur or if it will last long enough for the lakebed to support heavy equipment and dump trucks. A "mudcat" hydraulic dredge would be used to place material from the lakebed to form the island. To hold material pumped to the location, we propose to construct a revetted rock berm or artificial retaining wall to form the island perimeter prior to emplacement an interlocking, plastic sheet pile wall to hold the dredged material in place. For construction purposes, an estimated 19,400 cy of material are required to form an island that rises uniformly two feet above full pool level. Two feet of freeboard would be maintained on the perimeter berm or retaining wall to address wave erosion concerns. A settling pond to lessen siltation and

FIGURE G.1 Dungeness National Wildlife Refuge (NWR), Washington

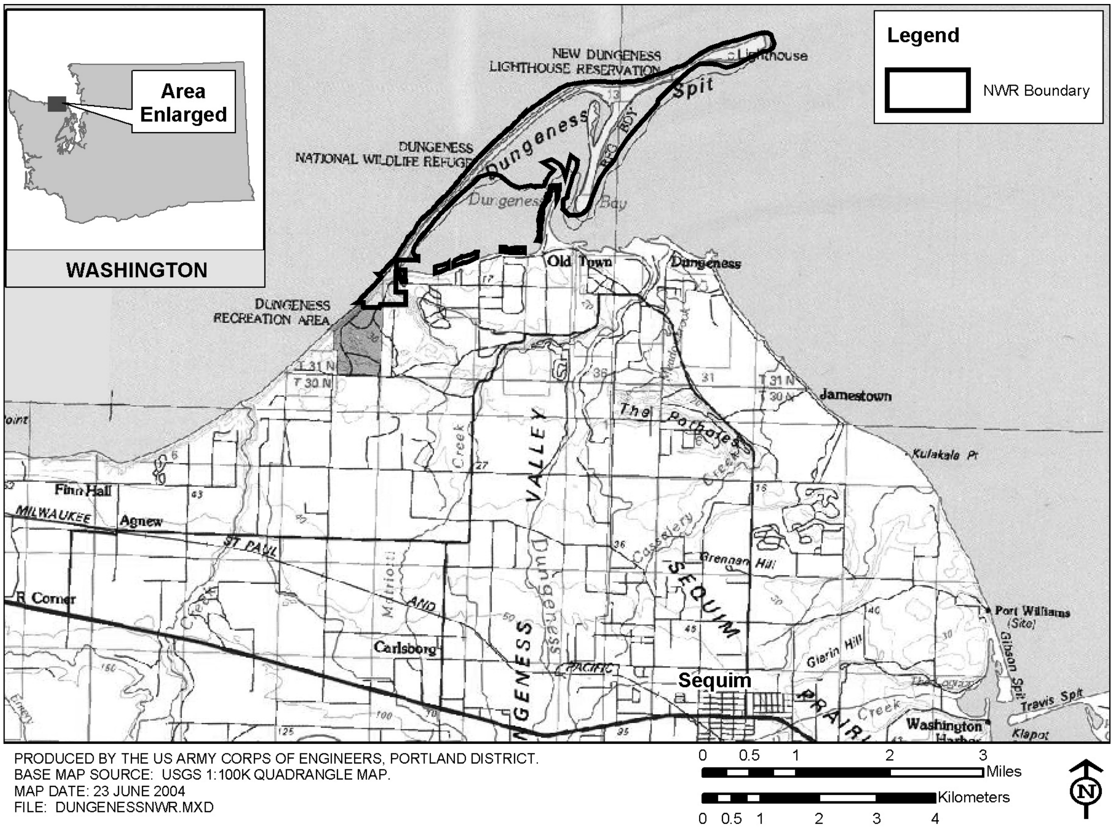
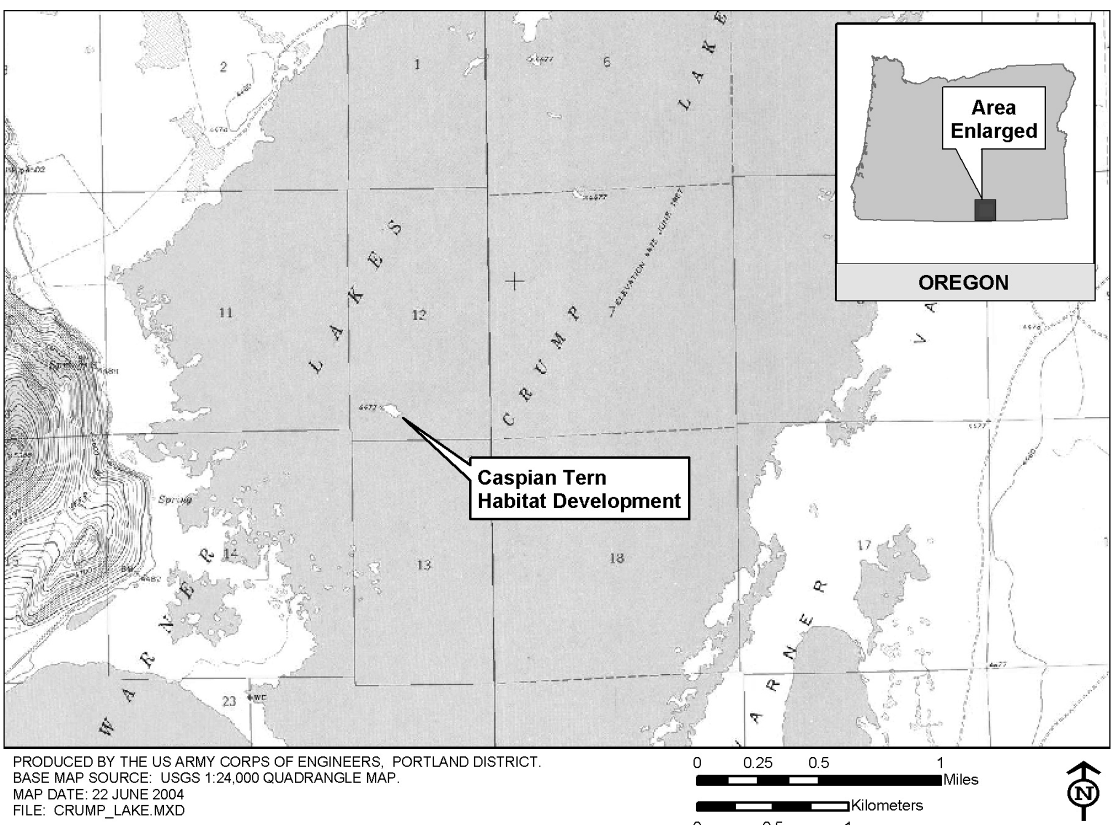


FIGURE G.2 Crump Lake, Oregon



sedimentation is also proposed. Dredged material would be pumped to the point furthest from the settling pond location and then moved closer as material accumulates.

These activities would occur during the month of June when water levels would be at their highest. To stabilize the surface of the constructed island (1 acre) and to reduce the risk of dense vegetation encroachment, the island would be capped with gravel and fines. This material would need to be placed on site via helicopter. Social attraction techniques using decoys and vocalization recordings would be used to attract terns to nest at the new island site.

Estimated costs: $ 1,192,413.00 (first year costs, including construction and monitoring)

Summer Lake. The historic Caspian tern nesting island in Summer Lake (Figure G.3), also in south-central Oregon, is connected to the mainland during low water years, resulting in increased vulnerability to predators. Since it would be difficult to ensure that this island remains isolated during low water level years, we propose to build new islands in wetland impoundments north of Summer Lake within the ODFW Wildlife Management Area. Proposed management actions for the Summer Lake Wildlife Management Area would occur at the East Link impoundment, and adjacent to the Windbreak and Gold Dike locations. ODFW personnel have better control of the water in these impoundments. Thus, they would serve as higher quality and more predictable habitat for Caspian terns. Three 0.5-acre islands would be constructed in the East Link Impoundment and off the Windbreak and Gold dikes. Construction for all islands would occur under dry or in water conditions. The East Link location is a diked, rectangular impoundment. Construction under dry conditions in this impoundment would entail either borrow of material from within the impoundment or importation of dry material previously excavated and sidecast from the East Link Canal to form the core of the island, which would be centered in the unit. Material for the island will come from either of two methods. If site conditions are suitable, excavators would be used to push material to the island from adjacent land. The second construction method would obtain the necessary borrow material from dry soil formerly sidecast from the maintenance excavation of the East Link canal. This material would need to be trucked into the site. Once the island is completed, a top dressing of relatively fine gravels (approximately pea-size or smaller) obtained from an ODFW quarry would be placed on the island. This material would provide a suitable nesting substrate for terns. A construction access road would be constructed for gravel trucks to reach the constructed island. Upon completion of the project, the road would be sidecast back into the borrow pits from which it was constructed. Construction in water would result in temporary increases in sedimentation and siltation at the East Link impoundment. Water movement through this shallow impoundment is either slow or nonexistent depending on inflow and control structure operations. Siltation and sedimentation is anticipated to occur within the impoundment and to be minor in magnitude. Frequency and duration are limited to the construction period, as armored shorelines would protect the islands from wave-induced erosion.

The remaining two 0.5 acre-islands would be constructed in a similar manner off the Windbreak and Gold dikes. Both of these dikes are located within a diked impoundment. As with Crump Lake, social attraction techniques would also be used to attract terns to all three islands that would be constructed at this site.

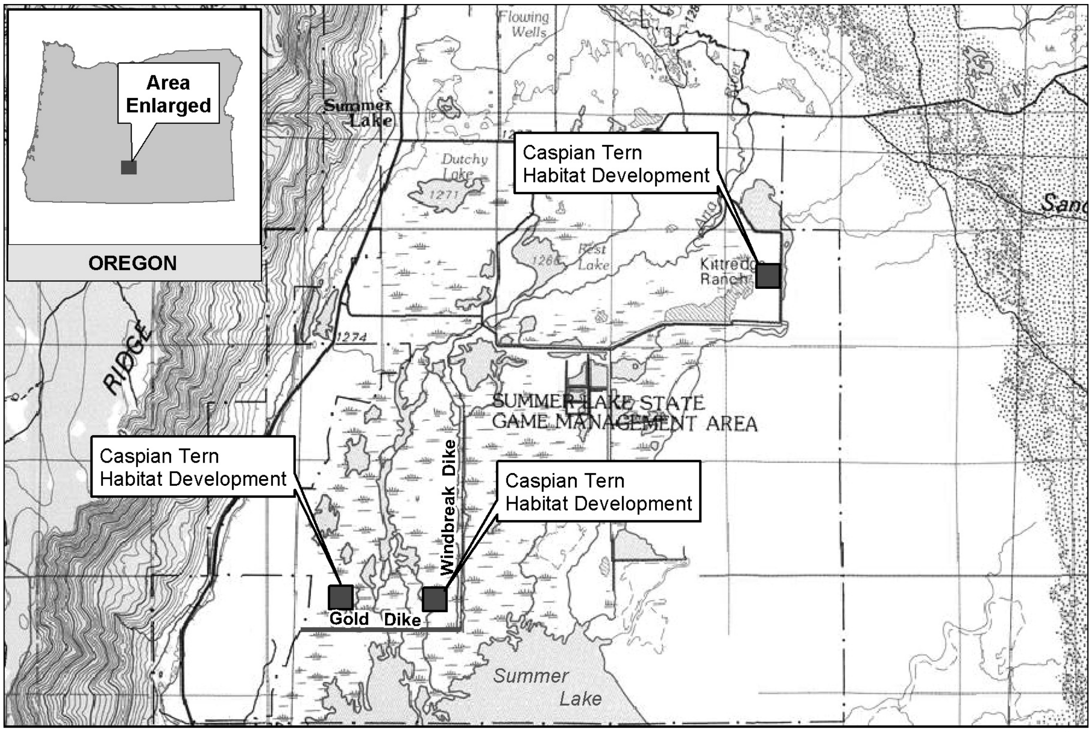
Estimated costs: $ 600,873.00 (first year costs, including construction and monitoring)

Fern Ridge Lake. Fern Ridge Lake (Figure G.4), in the southern Willamette Valley of Oregon, currently contains no appropriate nesting habitat for Caspian terns. The Corps has prepared a conceptual draft for the construction of a 1-acre island in the reservoir to serve as nesting habitat for terns (U.S. Army Corps of Engineers 1998). We propose to implement this project and attract terns to the site with social attraction techniques. A 1-acre island would be constructed off Royal Avenue within the full pool boundary. Former roads would provide access to the proposed construction location with a stable hard surface to import rock, equipment, and supplies. The primary borrow material for the island would come from the dry lakebed; rock and filter fabric would be used to prevent perimeter erosion of the island when Fern Ridge Lake is full. The proposed action is similar to a previous action constructed nearby, i.e., Fern Ridge Reservoir Sub-Impoundment, which was constructed in a comparable manner and season.

Fern Ridge Lake is on Oregon's Water Quality Limited Streams - 303 (d) List (http://www.epa.gov/r10earth/maplib/orlist.xls) for turbidity and Water Contact Recreation (Fecal Coliform) - Fall through Spring.

Estimated costs: $ 428,807.00 (first year costs, including construction and monitoring)

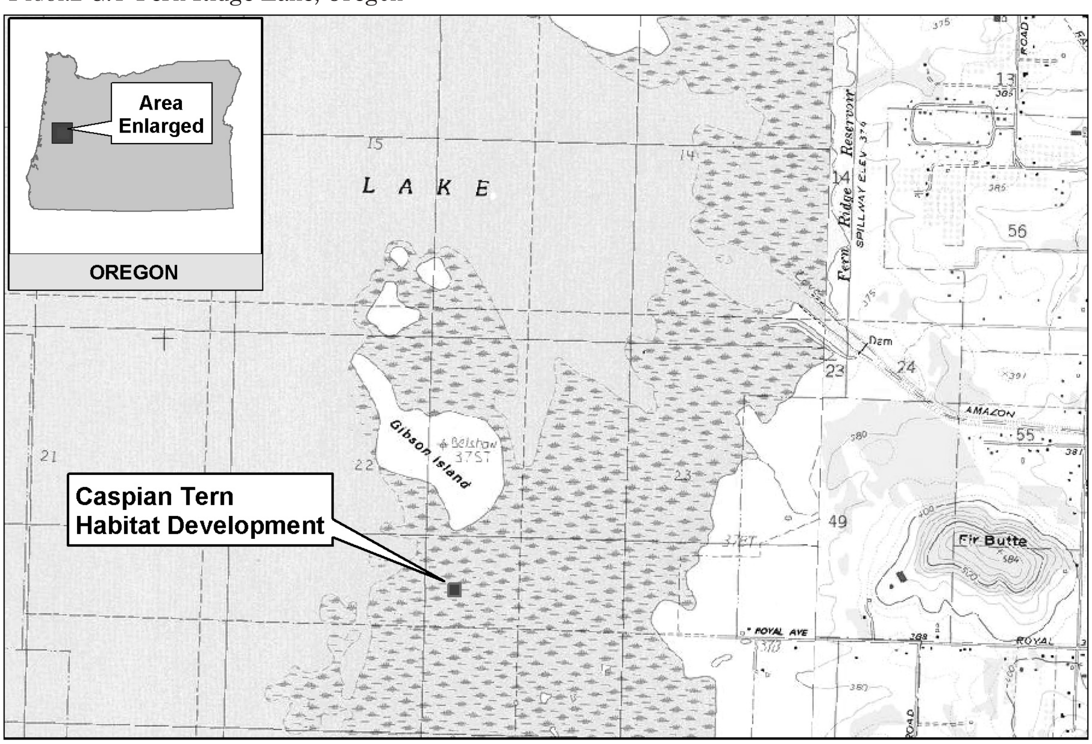
FIGURE G.3 Summer Lake, Oregon



PRODUCED BY THE US ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT.
BASE MAP SOURCE: USGS 1:100,000 QUADRANGLE MAP.
MAP DATE: 23 JUNE 2004
FILE: SUMMER_LAKE.MXD

0 0.5 1 2 Miles
0 0.5 1 2 3 Kilometers
N

FIGURE G.4 Fern Ridge Lake, Oregon



PRODUCED BY THE US ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT
BASE MAP SOURCE: USGS 1:24,000 QUADRANGLE MAP.
MAP DATE: 23 JUNE 2004
FILE: FERN_RIDGE_LAKE.MXD

0 0.25 0.5 1 Miles
0 0.25 0.5 1 Kilometers
N

San Francisco Bay. Brooks Island. In San Francisco Bay, California (Figure G.5), there are several sites that could be enhanced for Caspian terns. On Brooks Island (Figure G.6), we propose to assist the East Bay Regional Parks Department in removing vegetation adjacent to the current tern nesting area to create more open habitat for nesting terns. Open habitat at higher elevations would help eliminate the possibility of nest loss due to flooding at high tide. Increased enforcement of area closures would also protect the tern nesting colony. Rats have been documented on the island and may need to be controlled or eliminated to ensure long-term nesting success for the terns. Predator control (avian and mammalian), may also be necessary. In addition, we would explore various methods to prevent erosion of the spit at Brooks Island that is currently occurring. Estimated costs: $ 56,000.00 (first year costs, including habitat management and monitoring)

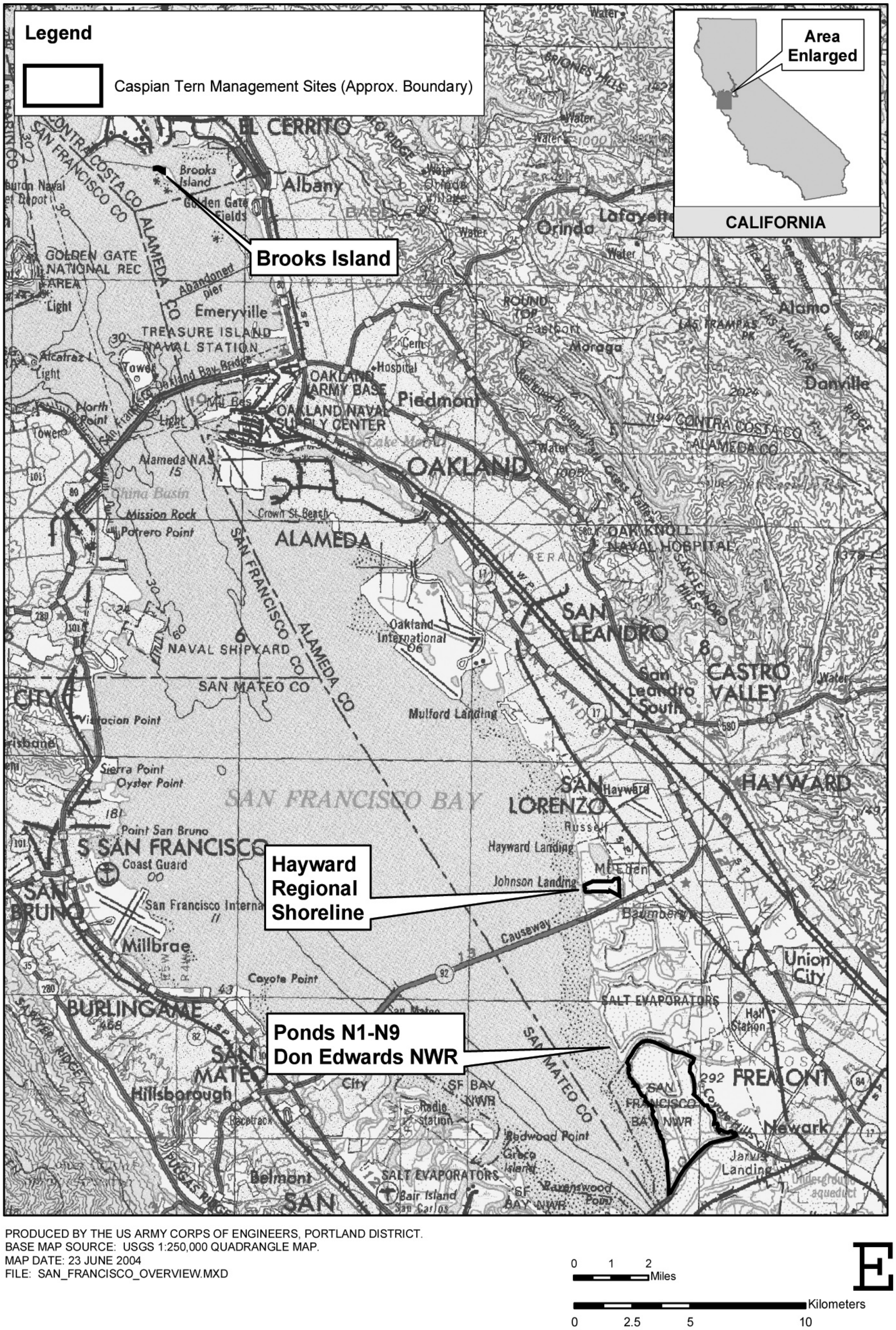
Ponds N1/N9. Ponds N1/N9 in the Don Edwards San Francisco Bay NWR (Figure G.7) are active salt ponds with numerous internal levees that are closed to visiting public. Although nesting terns have used nearby areas, no nesting activity has been documented at this site. Nesting habitat could be created for terns by enhancing nesting substrate and increasing predator control. Gravel or oyster shells would be deposited on the site via helicopter. Social attraction techniques would also be used.

Estimated costs: $ 174,000.00 (first year costs, including construction and monitoring)

Hayward Regional Shoreline. Hayward Regional Shoreline (Figure G.8) is also managed by East Bay Regional Parks. This site contains a number of inactive salt ponds that are now managed for various wildlife species. Numerous islands are found throughout the former salt ponds. A single pair of Caspian terns has nested at this site in recent years. Nesting habitat can be enhanced on Islands 2, 6, and 7 and include removing existing vegetation, installing a weed barrier fabric, saturating the site with salt to prevent vegetation growth, and improving the substrate with sand or oyster shells (via helicopter). Social attraction techniques would also be used.

Estimated costs: $ 174,000.00 (first year costs, including construction and monitoring)

FIGURE G.5 Caspian Tern Management Sites in San Francisco Bay, California



PRODUCED BY THE US ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT.
BASE MAP SOURCE: USGS 1:250,000 QUADRANGLE MAP.
MAP DATE: 23 JUNE 2004
FILE: SAN_FRANCISCO_OVERVIEW.MXD

FIGURE G.6 Brooks Island, San Francisco Bay, California

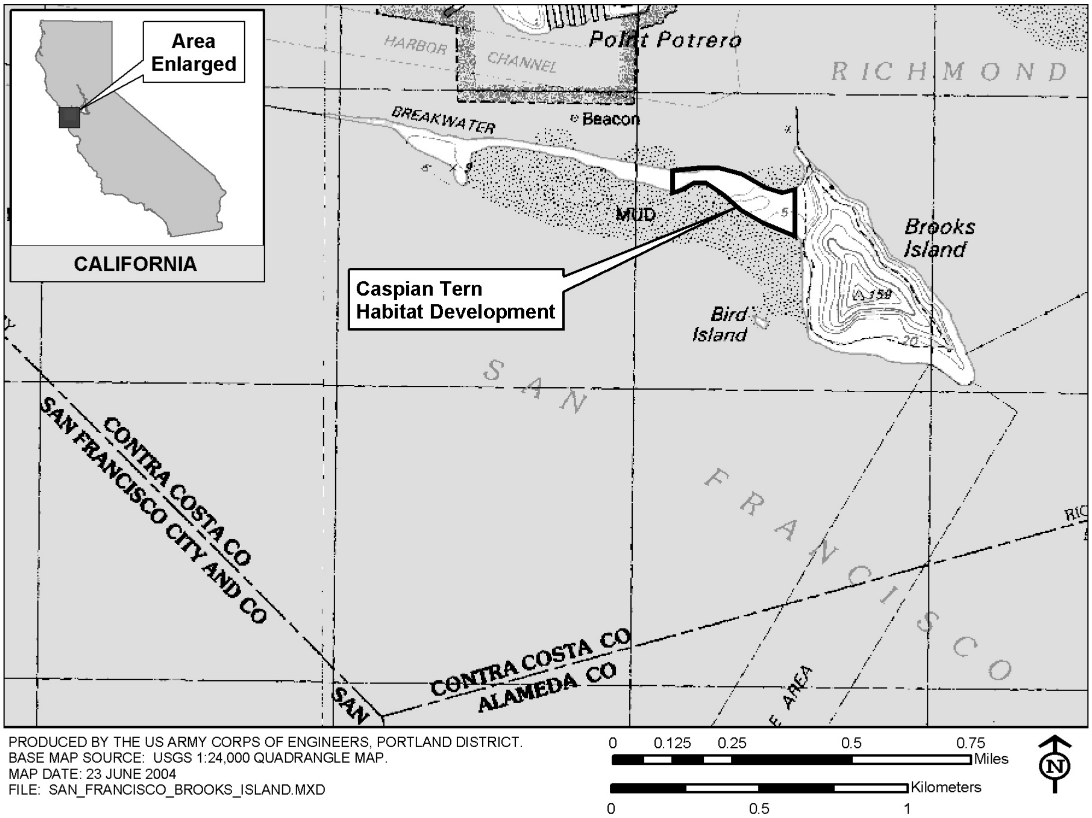


FIGURE G.7 Ponds N1/N9 in the Don Edwards San Francisco Bay NWR, California

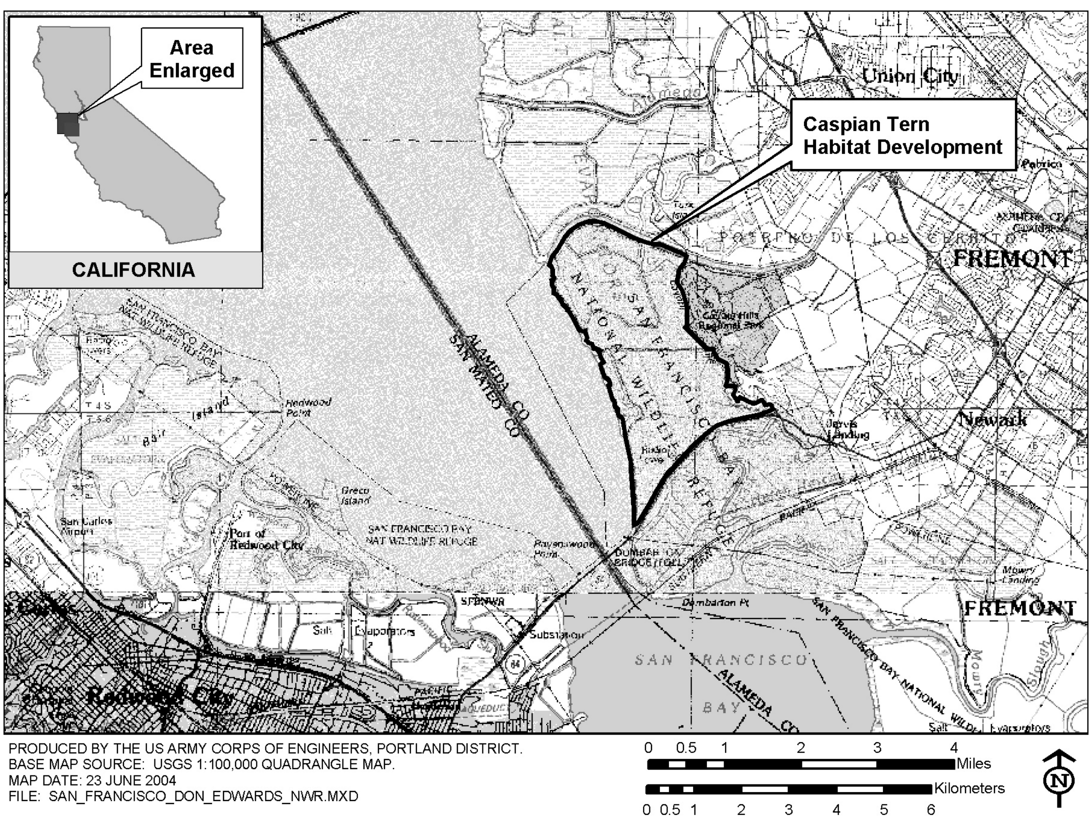


FIGURE G.8 Hayward Regional Shoreline, California

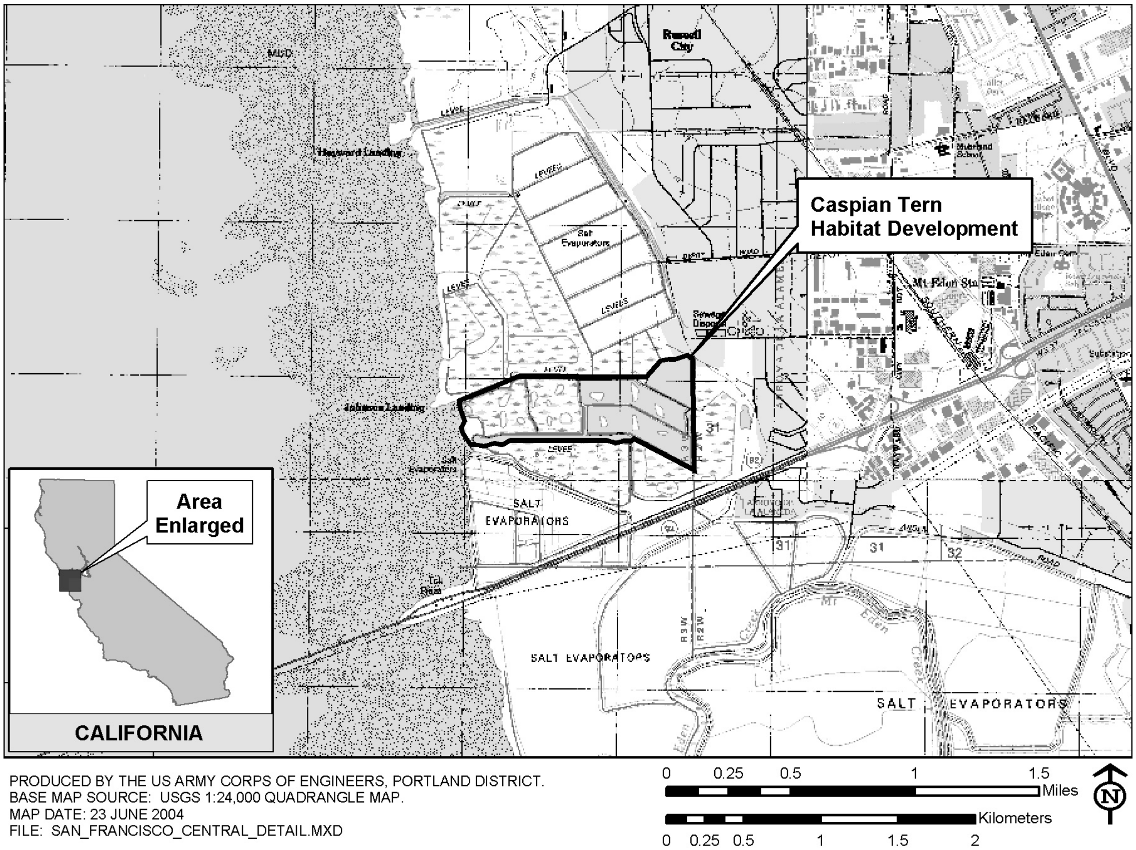


Table G.1 Assessment of Caspian tern habitat management potential at 77 sites in the Pacific Coast/Western Region. [a]

Site Name	Management Potential Yes	No	Factors limiting Management Potential
COASTAL WASHINGTON			
Sand Island, Grays Harbor	x		
No Name Island, Grays Harbor	x		
Unnamed Island, Grays Harbor	x		
Cate Island, Grays Harbor	x		
Bldg 407, Commencement Bay		x	Landowner will discourage birds
McNeil Island, Puget Sound		x	No site available
Snag Islands, Willapa Bay		x	No stable nesting habitat
Unnamed Island, Padilla Bay	x		
Jetty Island, Puget Sound	x		
INTERIOR WASHINGTON			
Solstice Island, Potholes Reservoir		x	Fluctuating reservoir water levels
Unnamed Island, Potholes Reservoir		x	Fluctuating reservoir water levels
Harper Island, Sprague Lake		x	Poor nesting substrate
Unnamed Island # 1, Banks Reservoir		x	Fluctuating reservoir water levels
Unnamed Island #2, Banks Reservoir		x	Fluctuating reservoir water levels
Goose Island, Banks Reservoir		x	Fluctuating reservoir water levels
MID-COLUMBIA RIVER			
Crescent Island		x	Will not reduce Columbia River impacts
Straight Six Island, Umatilla		x	Will not reduce Columbia River impacts
No Name Island #1, Umatilla		x	Will not reduce Columbia River impacts
No Name Island # 2, Umatilla		x	Will not reduce Columbia River impacts
No Name Island #3, Umatilla		x	Will not reduce Columbia River impacts
"Test" Island, Umatilla		x	Will not reduce Columbia River impacts
Miller Rocks		x	No available habitat
Threemile Canyon Island		x	Will not reduce Columbia River impacts
COASTAL OREGON			
Unnamed Island, Coos Bay	x		
"South" Island, Coos Bay		x	Heavily vegetated, heavy boat traffic
"Middle" Island, Coos Bay		x	Heavily vegetated, heavy boat traffic

Table G.1 (Cont.) Assessment of Caspian tern habitat management potential at 77 sites in the Pacific Coast/Western Region. [a]

Site Name	Management Potential Yes	No	Factors limiting Management Potential
"North" Island, Coos Bay		x	Heavily vegetated, heavy boat traffic
Unnamed Island, Umpqua River Estuary	x		
Steamboat Island, Umpqua River Estuary	x		
Fern Ridge Reservoir, Oregon	x		
INTERIOR OREGON/NEVADA			
Pelican/Crump Lake, Oregon		x	Site availability varies annually
Summer Lake, Oregon		x	Site availability varies annually
Tern Island, Malheur Lake		x	Site availability varies annually
Anaho Island, Pyramid Lake		x	Inadequate prey base
Stillwater National Wildlife Refuge		x	Site availability varies annually
Carson Sink, Nevada		x	Site availability varies annually
SOUTHERN IDAHO			
Unnamed Island, Mormon Reservoir		x	Site availability varies annually
Tern Island, Minidoka NWR		x	Site availability varies annually
Gull Island, American Falls Reservoir		x	Site availability varies annually
Gull Island, Blackfoot Reservoir		x	Site availability varies annually
Unnamed Island, Bear Lake NWR		x	Site availability varies annually
NORTHERN COASTAL CALIFORNIA			
Sand Island, Humboldt Bay	x		
Knight Island, San Pablo Bay	x		
Brooks Island, San Francisco Bay	x		
Runway wetland, Alameda NWR	x		
West wetland, Alameda NWR	x		
Pond A7, South San Francisco Bay	x		
Pond A16, South San Francisco Bay	x		
Pond 10, Baumberg Tract, San Francisco Bay	x		
Elkhorn Slough, Monterey Bay	x		
Salinas River, Monterey Bay		x	Incompatible with management for snowy plovers
SOUTHERN COASTAL CALIFORNIA			
Terminal Island, Los Angeles Harbor		x	Limited habitat

Table G.1 (Cont.) Assessment of Caspian tern habitat management potential at 77 sites in the Pacific Coast/Western Region. [a]

Site Name	Management Potential Yes	No	Factors limiting Management Potential
Upper Newport Bay Ecological Reserve, Newport	x		
Bolsa Chica Ecological Reserve, Huntington Beach	x		
South San Diego Bay NWR, Saltworks		x	Limited habitat
NORTHEASTERN CALIFORNIA			
Meiss Lake, Butte Valley Wildlife Area		x	Site availability varies with annual precipitation
Lower Klamath NWR	x		
Tule Lake NWR	x		
Clear Lake NWR		x	Site availability varies with annual precipitation
Goose Lake		x	Site availability varies with annual precipitation Site
Bird Island, Big Sage Reservoir		x	Site availability varies with annual precipitation Site
Honey Lake Wildlife Area		x	Site availability varies with annual precipitation Site
Mono Lake		x	Inadequate prey in close proximity
TULARE BASIN			
Lemoore Naval Air Station		x	Site availability varies with annual precipitation
Westlake Farms North Evaporation Basin		x	Site availability varies with annual precipitation
Tulare Lakebed		x	Site availability varies with annual precipitation
Westlake Mitigation Wetland, section 3		x	Site availability varies with annual precipitation
Westlake Farms South Evaporation Basin		x	Site availability varies with annual precipitation
South Wilbur Flood Area		x	Site availability varies with annual precipitation
Hacienda Ranch Flood Basin		x	Site availability varies with annual precipitation
Tulare Lake Drainage District, South Evaporation Basin		x	Site availability varies with annual precipitation
SOUTHERN INTERIOR CALIFORNIA			
Obsidian Butte, Salton Sea		x	Long-term availability of site uncertain
Morton Bay, Salton Sea		x	Long-term availability of site uncertain
Headquarters Unit “D,” Salton Sea		x	Long-term availability of site uncertain
Mullet Island, Salton Sea		x	Long-term availability of site uncertain
Unit 1-B4, Salton Sea NWR		x	Long-term availability of site uncertain
Unit 1-A4, Salton Sea NWR		x	Long-term availability of site uncertain

[a] Table taken from Table 7 in Seto, N., J. Dillon, W.D. Shuford, and T. Zimmerman. 2003. A review of Caspian tern (*Sterna caspia*) nesting habitat: a feasibility assessment of management opportunities in the U.S. Fish and Wildlife Service Pacific Region.

TABLE G.2 Potential Caspian tern management sites ranked by Tier I criteria and Categorical Factor assignments.[a]

Sites with Management Potential	Ranking Criteria						Sum of Tier I Ranks	Categorical Factor
	Site Status[b]	Potential Conflict with Salmon[c]	Proximity to East Sand Island[d]	Site Capacity[e]	Conflicts with other listed species (non-salmonids)[f]	Site Availability[g]		
COASTAL WASHINGTON								
Sand Island, Grays Harbor	3	3	3	5	3	5	22	H
No Name Island, Grays Harbor	0	3	3	5	3	3	17	M
Unnamed Island, Grays Harbor	0	3	3	3	3	5	17	M
Cate Island, Grays Harbor	0	3	3	3	3	3	15	M
Whitcomb Island, Grays Harbor	3	3	3	5	3	0	17	M
Unnamed Island, Padilla Bay	3	3	1	1	5	3	16	M
Jetty Island, Puget Sound	0	3	1	5	5	3	17	M
COASTAL OREGON								
Unnamed Island, Coos Bay	0	3	2	1	3	3	12	L
Unnamed Island, Umpqua River Estuary	0	3	2	1	5	3	14	L
Steamboat Island, Umpqua River Estuary	0	3	2	1	5	3	14	L
Fern Ridge Reservoir	0	3	2	5	5	0	15	M
NORTHERN COASTAL CALIFORNIA								
Sand Island, Humboldt Bay	5	3	1	1	5	5	20	H
Knight Island, San Francisco Bay	5	3	1	3	5	3	20	H
Brooks Island, San Francisco Bay	5	3	1	5	5	5	24	H
Runway wetland, Alameda, San Francisco Bay	3	3	1	3	3	3	16	M
West Wetland, Alameda, San Francisco Bay	3	3	1	3	3	3	16	M

TABLE G.2 (cont.) Potential Caspian tern management sites ranked by Tier I criteria and Categorical Factor assignments.

Sites with Management Potential	Ranking Criteria: Site Status [b]	Potential Conflict with Salmon[b]	Proximity to East Sand Island[c]	Site Capacity[d]	Conflicts with other listed species (non-salmonids)[e]	Site Availability[f]	Sum of Tier I Ranks	Categorical Factor
Salt Pond A7, South San Francisco Bay	5	3	1	3	3	3	18	H
Salt Pond A16, South San Francisco Bay	0	3	1	1	3	5	13	L
Baumberg Pond, San Francisco Bay	5	3	1	1	3	3	16	M
Elkhorn Slough, Monterey Bay	5	5	1	1	3	3	18	H
SOUTHERN COASTAL CALIFORNIA								
Bolsa Chica Ecological Reserve, Huntington Beach	5	5	1	3	3	0	17	M
Upper Newport Bay Ecological Reserve, Newport Beach	0	5	1	3	3	3	15	M
NORTHEASTERN INTERIOR								
Lower Klamath NWR	3	5	1	3	5	0	17	M
Tule Lake NWR	3	5	1	3	5	0	17	M

[a] Site Status: 5 = nesting colony currently active, 3 = historic nesting colony, 0 = no recorded Caspian tern nesting

[b] Conflict with salmonids: 5 = salmon not available as potential prey item, 3 = salmon present as potential prey but good abundance of non-salmonid prey items, 1 = salmon comprises primary prey base

[c] Proximity to East Sand Island: 3 = site less than 200 km from East Sand Island, 2 = site 200-500 km from East Sand Island, 1 = site greater than 500 km from East Sand Island

[d] Site Capacity: 5 = greater than 2000 nesting pairs, 3 = 350-1000 nesting pairs, 1 = less than 350 nesting pairs

[e] Conflicts with other listed species or species of concern (non-salmonids): 5 = no listed species present, 3 = listed species present but low likelihood of conflict, 1 = listed species present and relatively high potential for conflict

[f] Site Availability: 5 = site currently suitable or requires minimal habitat enhancement, 3 = site available after extensive manipulation, 0 = site needs to be constructed

[g] Table taken from Table 8.A in Seto, N., J. Dillon, W.D. Shuford, and T. Zimmerman. 2003. A review of Caspian tern (*Sterna caspia*) nesting habitat: a feasibility assessment of management opportunities in the U.S. Fish and Wildlife Service Pacific Region.

TABLE G.3 Potential Caspian tern management sites ranked by Tier II criteria and Total Site Scores.[a]

Sites	Ranking Criteria: Habitat Management [b]	Ranking Criteria: Human Disturbance [c]	Ranking Criteria: Potential Predators [d]	Sum of Tier II Ranks	Total Site Score
High Category (*5)					
Elkhorn Slough, Monterey Bay	2	3	1	6	30
Sand Island, Grays Harbor	2	5	3	10	50
Brooks Island, San Francisco Bay	2	3	5	10	50
Sand Island, Humboldt Bay	3	5	5	13	65
Knight Island, San Francisco Bay	3	5	5	13	39
Salt Pond A7, South San Francisco Bay	3	5	5	13	39
Medium Category (*3)					
Unnamed Island, Grays Harbor	3	5	5	13	39
No Name Island, Grays Harbor	2	5	3	10	30
Whitcomb Island, Grays Harbor	3	5	5	13	39
Cate Island, Grays Harbor	2	3	1	6	18
Unnamed Island, Padilla Bay	2	5	3	10	10
Jetty Island, Puget Sound	1	3	3	7	21
Fern Ridge Reservoir	2	5	5	12	12
Runway wetland Alameda NWR, San Francisco Bay	2	5	1	8	24
West Wetland, Alameda NWR, San Francisco Bay	2	5	1	8	24
Baumberg Pond, San Francisco Bay	3	5	5	13	13
Bolsa Chica Ecological Reserve, Huntington Beach	2	5	5	12	36
Upper Newport Bay Ecological Reserve, Newport Beach	2	5	3	10	30

TABLE G.3 (cont.) Potential Caspian tern management sites ranked by Tier II criteria and Total Site Scores.[a]

Sites	Ranking Criteria			Sum of Tier II Ranks	Total Site Score
	Habitat Management [b]	Human Disturbance [c]	Potential Predators [d]		
Lower Klamath NWR	1	5	5	11	33
Tule Lake NWR	1	5	5	11	33
Low Category (*1)					
Unnamed Island, Coos Bay	1	5	5	11	11
Unnamed Island, Umpqua River Estuary	1	5	5	11	11
Steamboat Island, Umpqua River Estuary	3	5	5	13	13
Salt Pond A16, South San Francisco Bay	3	5	5	13	13

[a] Table taken from Table 8.B in Seto, N., J. Dillon, W.D. Shuford, and T. Zimmerman. 2003. A review of Caspian tern (*Sterna caspia)* nesting habitat: a feasibility assessment of management opportunities in the U.S. Fish and Wildlife Service Pacific Region

[b] Habitat maintenance: 3 = short tern or infrequent management requirements, 2 = annual habitat maintenance but no heavy equipment required, 1 = annual maintenance and heavy equipment required

[c] Human disturbance: 5 = site is relatively inaccessible and no established human use, 3 = site is accessible with a history of human use; disturbance levels are manageable, 1 = site is readily accessible with regular human use and limited opportunities for managing use

[d] Predators: 5 = inaccessible to mammals and no known concentration of avian predators in close proximity, 3 = avian and/or mammalian predators on site, but potential impacts to tern colony are low or manageable, 1 = site accessible to mammals and high concentration of avian predators on-site or nearby

TABLE G.4. Sites eliminated from consideration for Caspian Tern Management under Alternatives C and D. Sites are listed in geographical order from north to south.

SITE NAME	REASON FOR ELIMINATION FROM CONSIDERATION
WASHINGTON	
Commencement Bay	Loss of site due to environmental clean-up activities
Padilla Bay	WDFW does not support site development
Jetty Island	WDFW does not support site development
Grays Harbor (4 islands)[a]	WDFW does not support site development
Willapa Bay	Loss of site due to natural erosion
Banks Reservoir (3 islands)	Some nesting terns from this colony forage in the Columbia River, and thus, management of this site for Caspian terns does not support the reduction of tern predation on Columbia River salmon
Potholes Reservoir (2 islands)	Some nesting terns from this colony forage in the Columbia River, and thus, management of this site for Caspian terns does not support the reduction of tern predation on Columbia River salmon
Sprague Lake	Some nesting terns from this colony forage in the Columbia River, and thus, management of this site for Caspian terns does not support the reduction of tern predation on Columbia River salmon
Crescent Island	Location in the Columbia River, and thus, management of this site for Caspian terns does not support the reduction of tern predation on Columbia River salmon
Threemile Canyon Island	Location in the Columbia River, and thus, management of this site for Caspian terns does not support the reduction of tern predation on Columbia River salmon
Miller Rocks	Location in the Columbia River, and thus, management of this site for Caspian terns does not support the reduction of tern predation on Columbia River salmon
OREGON	
Rice Island	Location in the Columbia River, does not support reduction of tern predation on Columbia River salmon
Miller Sands Spit	Location in the Columbia River, does not support reduction of tern predation on Columbia River salmon
Coos Bay	ODFW does not support site development
Umpqua Estuary	ODFW does not support site development
CALIFORNIA	
Humboldt Bay NWR [a]	CDFG and Service California/Nevada Office does not support site development
Knight Island, San Francisco Bay [a]	Loss of nesting area to tidal restoration project by CDFG
Bair Island, San Francisco Bay	Loss of nesting area and restoration not feasible
Turk Island, San Francisco Bay	Loss of nesting area, restoration not feasible
Baumberg Tract, San Francisco Bay	Nesting habitat currently maximized, habitat enhancement not feasible
Alviso (Pond A7), San Francisco Bay [a]	Nesting habitat currently maximized and concerns associated contaminant issues
Moss Landing salt ponds, Monterey Bay	Loss of site
Salinas River NWR	Conflict with the western snowy plover
Elkhorn Slough Ecological Reserve[a]	Nesting habitat is not maximized, no habitat enhancement necessary
Pier 400, Terminal Island	Nesting habitat currently maximized, habitat enhancement not feasible
Clear Lake NWR	Nesting habitat is not lacking

TABLE G.4. Sites eliminated from consideration for Caspian Tern Management under Alternatives C and D. Sites are listed in geographical order from north to south.

SITE NAME	REASON FOR ELIMINATION FROM CONSIDERATION
CALIFORNIA (continued)	
Lower Klamath NWR	Loss of site; extremely small historic nesting colony (15-27 pairs), last nested in 1976
Tule Lake NWR	Loss of site; small historic nesting colony (3-80 pairs), last nested in 1962
Mono Lake	Extremely small nesting colony (6 -8 nesting pairs)
Lemoore NAS sewer ponds	Extremely small nesting colony (0-20 nesting pairs)
Yolo Bypass Wildlife Area	CDFG does not support site development
City of Davis Wetlands	CDFG does not support site development
Westlake Farms South Evaporation Basin	Extremely small nesting colony (0 -3 nesting pairs)
Tulare lakebed	Extremely small nesting colony (0 -20 nesting pairs)
South Wilbur Flood Area	Extremely small nesting colony (0-70 nesting pairs)
Tulare Lake Drainage District	Extremely small nesting colony (0-1 nesting pairs)
Tulare Lake Drainage District	Extremely small nesting colony (0-40 nesting pairs)
Lake Elsinore	Extremely small nesting colony (0 -14 nesting pairs); high potential for human disturbance
Salton Sea	Uncertainty of long term water management and prey availability due to potential water transfer from Imperial Irrigation District to San Diego
IDAHO	
Mormon Reservoir	Availability of nesting habitat varies from year to year because of reservoir water levels; large distance from East Sand Island colony
Magic Reservoir	Availability of nesting habitat varies from year to year because of reservoir water levels; large distance from East Sand Island colony
Blackfoot Reservoir	Availability of nesting habitat varies from year to year because of reservoir water levels; large distance from East Sand Island colony
Minidoka NWR	Lack of nesting habitat; large distance from East Sand Island colony
Deer Flat NWR (Snake River Island)	Lack of nesting habitat; large distance from East Sand Island
Bear Lake NWR	Lack of nesting habitat; large distance from East Sand Island
NEVADA	
Carson Sink	Nesting habitat only available during high water/flood years
Anaho Island NWR	Lack of prey base
Stillwater Point Reservoir	Nesting habitat only available during high water/flood years

[a] Sites ranked "high" for potential Caspian tern management sites in Feasibility Study (Seto et al. 2003)

Appendix H

Scientific Names for Fish, Wildlife, and Plants

Appendix H. Scientific Names for Fish, Wildlife and Plants

Federally Endangered and Threatened Fish and Wildlife

The following list summarizes species lists received from the Service and NOAA Fisheries as part of ESA-consultation for the preferred alternative. These species may be affected by the proposed action in this FEIS.

Common Name	Scientific Name	Status
Birds		
California brown pelican	*Pelecanus occidentalis*	E
California clapper rail	*Rallus longirostris obsoletus*	E
California least tern	*Sterna antillarum browni*	E
Marbled murrelet	*Brachyramphus marmoratus*	T
Bald eagle	*Haliaeetus leucocephalus*	T
Western snowy plover	*Charadrius alexandrinus*	T
Yellow-billed cuckoo	*Coccyzus americanus*	C
Streaked horned lark	*Eremophila alpestris strigata*	C
Fish		
Chinook salmon	*Oncorhynchus tshawytscha*	*
Coho salmon	*Oncorhynchus kisutch*	*
Chum salmon	*Oncorhynchus keta*	*
Sockeye salmon	*Oncorhynchus nerka*	*
Steelhead salmon	*Oncorhynchus mykiss*	*
Bull trout	*Salvelinus confluentus*	T
Oregon chub	*Oregonichthys crameri*	E
Tidewater goby	*Eucyclogobius newberryi*	E
Lost River sucker	*Deltistes luxatus*	E
Shortnose sucker	*Chasmistes brevirostris*	E
Delta smelt	*Hypomseus transpacificus*	T
Warner sucker	*Catostomus warnerensis*	T
Green sturgeon	*Acipenser medirostris*	C
Mammals		
Salt marsh harvest mouse	*Reithrodontomys raviventris*	E
Riparian brush rabbit	*Sylvilagus bachmani riparius*	E
San Joaquin kit fox	*Vulpes macrotis mutica*	E
Riparian (San Joaquin Valley) woodrat	*Neotoma fuscipes riparia*	E
Reptiles		
Alameda whipsnake	*Masticophis lateralis euryxanthus*	T
Giant garter snake	*Thamnophis gigas*	T
Amphibians		
California red-legged frog	*Rana aurora draytonii*	T
California tiger salamander	*Ambystoma californiense*	PT
California tiger salamander	*Ambystoma californiense*	PT
Columbia spotted frog	*Rana luteiventris*	C
Oregon spotted frog	*Rana pretiosa*	C

Federally Endangered and Threatened Fish and Wildlife Continued

Common Name	Scientific Name	Status
Invertebrates		
Fender's blue butterfly	*Icaricia icarioides fenderi*	E
Lange's metalmark butterfly	*Apodemia mormo langei*	E
Callippe silverspot butterfly	*Speyeria callippe callippe*	E
Conservancy fairy shrimp	*Branchinecta conservatio*	E
Vernal pool tadpole shrimp	*Lepidurus packardi*	E
Longhorm fairy shrimp	*Branchinecta longiantenna*	E
Bay checkerspot butterfly	*Euphydrayas editha bayensis*	T
Vernal pool fairy shrimp	*Branchinecta lynchi*	T
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T
Taylor's checkerspot	*Euphydryas editha taylori*	C
Plants		
Willamette daisy	*Erigeron decumbens* var. *decumbens*	E
Bradshaw's lomatium	*Lomatium bradshawii*	E
Antioch Dunes evening-primrose	*Oenothera deltoides ssp. howellii*	E
Contra Costa goldfields	*Lasthenia conjugens*	E
Contra Costa wallflower	*Erysimum capitatum ssp. angustatum*	E
California sea blight	*Suaeda californica*	E
Presidio clarkia	*Lasthenia conjugens*	E
Large-flowered fiddleneck	*Amsinckia grandiflora*	E
Palmate-bracted bird's beak	*Cordylanthus palmatus*	E
Soft bird's beak	*Cordylanthus mollis ssp. mollis*	E
Robust spineflower	*Chorizanthe robusta var. robusta*	E
Showy Indian clover	*Trifolium amoenum*	E
Gold Indian paintbrush	*Castilleja levisecta*	T
Howellia	*Howellia aquatilis*	T
Kincaid's lupine	*Lupinus sulphureus* var. *kincaidii*	T
Santa Cruz tarplant	*Holocarpha macradenia*	T
Pallid manzanita	*Arctostaphylos pallida*	T

Key:

E = Endangered
T = Threatened
PT = Proposed Threatened
C = Candidate
* = see specific ESU listed-status for salmonids in Chapter 3, Table 3.2

Non-Listed Fish, Wildlife and Plants

Common Name	Scientific Name
Wildlife	
Birds	
American white pelican	*Pelecanus erythrorhynchos*
Brandt's cormorant	*Phalacrocorax penicillatus*
Double-crested cormorant	*Phalacrocorax auri*
Great blue heron	*Ardea herodias*
Great egret	*Ardea alba*
Western Canada goose	*Branta Canadensis*
Brant	*Branta bernicla*
Mallard	*Anas platyrhynchos*
Peregrine falcon	*Falco peregrinus*
Black oystercatcher	*Haematopus bachmani*
Black-necked stilt	*Himantopus mexicanus*
American avocet	*Recurvirostra americana*
Dunlin	*Calidris alpina*
Common snipe	*Gallinago gallinago*
Ring-billed gull	*Larus delawarensis*
California gull	*Larus californicus*
Western gull	*Larus occidentalis*
Glaucous-winged gull	*Larus glaucenscens*
Caspian tern	*Sterna caspia*
Forster's terns	*Sterna forsteri*
Mammals	
Black-tailed deer	*Odocoileus hemionus*
Mule deer	*Odocoileus hemionus*
Coyote	*Canis latrans*
River otter	*Lutra canadensis*
Nutria	*Myocastor Coypus*
Skunk	*Mephitis spp.*
Raccoon	*Procyon lotor*
Mink	*Mustela vison*
Beaver	*Castor Canadensis*
Muskrat	*Ondatra zibethicus*
Red fox	*Vulpes vulpes*
Gray fox	*Urocyon cinereoargenteus californicus*
Cat	*Felis catus*
Weasel	*Mustela spp.*
Black-tailed jackrabbit	*Lepus californicus*
Western harvest mouse	*Reithrodontomys megalotis longicaudus*
Voles	Muridae
Fish	
Pink salmon	*Oncorhynchus gorbuscha*
Cutthroat trout	*Oncorhynchus clarki*
Northern anchovy	*Engraulis mordax*
Herring	*Clupea pallasii*
Shiner perch	*Cymatogaster aggregata*

Non-Listed Fish, Wildlife and Plants Continued

Common Name	Scientific Name
Fish (Continued)	
Pacific sand lance	*Ammodytes hexapterus*
Sculpin spp.	Cottidae
Surf smelt	*Hypomesus pretiosus*
Surf perch	Embiotocidae
Silversides	Atherinidae
Sunfish	Centrarchidae
Gobies	Gobiidae
Toadfish	Batrachoididae
Tui chubs	*Siphateles bicolor*
Rainbow trout	*Salmo gairdneri*
Pacific cod	*Gadus macrocephalus*
English sole	*Parophrys vetulus*
Rockfish	*Sebastes spp.*
White sturgeon	*Acipenser transmontanus*
Starry flounder	*Platichthys stellatus*
American shad	*Alosa sapidissima*
Black Crappie	*Pomoxis nigromaculatus*
Sacramento splittail	*Pogonichthys macrolepidotus*
Striped bass	*Morone saxitilis*
Marine Invertebrates	
Dungeness crab	*Cancer magister*
Plants	
Red alder	*Alnus rubra*
Willow species	*Salix spp.*

Appendix I

List of Preparers

Appendix I. List of Preparers

Name	Position	Education	Years of Experience
U.S. Fish and Wildlife Service			
Nanette Seto	Wildlife Biologist	BS, Zoology MS, Wildlife Biology	14
Michelle Whalen	Technical Writer	BA, Language and Literature	11
Tara Zimmerman	Chief, Branch of Bird Conservation	BS, Wildlife Management	26
U.S. Army Corps of Engineers			
Geoff Dorsey	Wildlife Biologist	BS, Wildlife Science MS, Wildlife Science	24
Gregg Bertrand	Geographer	BS, Geography	20
NOAA Fisheries			
Jim Bottom	Technical Editor	BJ, MA Journalism	16
Cathy Tortorici	Chief, Oregon Coast/Lower Columbia River Branch	MA, Biology	16

Appendix J: Comments and Responses

This appendix contains a summary of the comments received (section J.1), responses to general comments that were raised by numerous commenters (section J.2), and responses to each specific comment letter that was received (section J.3). Responses to comments represent a joint response from the three cooperating Federal agencies (Service, Corps, and NOAA Fisheries). The use of "we" in the responses refers to the three agencies collectively.

J.1 Overview and Quantitative Analysis of Comments Received

The Service, Corps, and NOAA Fisheries released the DEIS for review and public comment on July 23, 2004, in accordance with the National Environmental Policy Act (NEPA). This section provides an overview of the comments that were submitted during the public comment period, July 23 to September 21, 2004.

Notification of DEIS Availability and Outreach Efforts
A notification of the release of the DEIS was sent to more than 450 people that were either on the project mailing list or recommended for notification. The notice announced the availability of the DEIS, listed the opening and closing dates for the comment period, gave locations of public libraries and three Federal websites where copies of the document could be viewed, and provided an option for obtaining hard copies or CDs of the DEIS. Follow-up phone calls were also made by Service staff notifying key partners regarding the availability of the DEIS.

In addition, local media, and local congressional offices in Washington, Oregon, and California were sent a News Release and Q&As (questions and answers) via email or fax. Media coverage on the DEIS included 2 local television broadcasts (one each in Washington and Oregon), 15 newspaper articles (Washington, Oregon, and California) and 12 internet website articles. Meetings were requested by the Olympic Peninsula Audubon Society and the Quinault Indian Nation to discuss the DEIS. See Chapter 1, section 1.4 for more details regarding outreach efforts and coordination with others during the DEIS public comment period.

Process for Responding to Comments
All comments were reviewed and organized so that an objective analysis and presentation of the comments could be made. Note that for simplicity sake, the word "letter" is generally used throughout this appendix to refer to any comment received, whether by letter, fax, postcard, or email and "commenter" for each individual or organization that submitted comments. Some comment letters were signed and submitted by more than one commenter (individual or organization). Each commenter was assigned an identification number and every comment submitted under a multiple signature letter was counted for each commenter on the letter. A database was created to help analyze the nature and extent of the range of comments received.

Responses to comments are organized into "General Comments" and associated responses in section J.2 and "Specific Comments" from individual letters and associated responses in section J.3. General Comments consist of the main themes or subjects that were raised throughout all or the majority of the comment letters. Specific Comments are identified on copies of individual letters. In cases where a letter pointed out a minor typographical or editorial error in the DEIS the change was made in the FEIS, but no response is included in this summary.

Number and Types of Comments Received
The Service received 37 comments (by letter, fax, postcard, or email) on the DEIS. See section J.3 for copies of all comment letters received. Comments ranged from detailed scientific comments, to expressions of opinion on various issues, to comments that were simply votes on different alternatives. Comment letters were divided into seven affiliations: (1) Federal; (2) State; or (3) Local Government; (4) Academic Institution; (5) Nongovernmental Organization (NGO); (6) Business; and (7) Individual Citizens. Table J.1 presents a summary and breakdown of the affiliation of comments received (listed in order of number received)

TABLE J. I - Affiliation Type of Comments Received

Affiliation Type	Number of Comments Received
General Public	13
Nongovernmental Organization (NGO)	10
State Agency	5
Federal Agency	3
Academic Institution	3
Business	2
Local Agency	1

Comments were received in a variety of formats. Eighteen letters were submitted via email, 13 were mailed in (five of which were form letters), and six were faxed. Comment letters were received primarily from the three states in the Affected Environment (Washington, Oregon, and California), but a small number were also received from Idaho and Washington, D.C. .

Range of Comments

Comments were received on a wide range of issues. This range is best categorized into six main issues:

1. Need for Action – comments associated with justification for the proposed action;

2. NOAA Fisheries Tern Predation Analysis- comments specifically addressing the tern predation analysis report (Appendix C) or any aspect of tern predation that commenters suggested was missing from the analysis;

3. Management Alternatives – comments associated with support or opposition to a particular alternative, suggested modifications to alternatives, monitoring, or cost estimates;

4. Alternative Sites – comments associated with specific concerns regarding impacts at alternative sites or appropriateness or suitability of alternative sites;

5. Effects to Terns – comments associated with potential impacts to Caspian terns; and

6. East Sand Island Ownership – comments regarding ownership and long-term protection of resources on East Sand Island.

The number of comments received associated with the six main issues are summarized in Table J.2.

TABLE J. 2 – Key Issues of Concern Received in Comments

Issue	Number
Alternative Sites	29
Management Alternatives	19
NOAA Tern Predation Analysis	14
Effects to Terns	12
Need for Action	11
East Sand Island Ownership	8

Comments Received on Alternatives and Preference for Alternatives

The DEIS presented 4 alternatives: Alternative A (Current Management Program), B (No Management), C (Redistribution of East Sand Island Tern Colony – Preferred Alternative), and D (Redistribution and Lethal Control of East Sand Island Tern Colony). Comments often expressed support for (or opposition to) a particular alternative by name. In many instances, comments qualified support for a given alternative, that is, they noted that they preferred a particular alternative overall, but also recommended certain additions or deletions of specific action components. For this analysis, we refer to this conditional support in this summary as support with “modifications.” Several commenters expressed support for Alternative A with modifications. However, after reviewing these comment letters, we interpreted their proposed modified alternative to be more similar to Alternative C with modifications. Thus, these comments were counted towards preference for Alternative C with modifications. Overall, there was a strong support expressed for Alternative C with modifications. Table J.3 summarizes preference for alternatives and Table J.4 summarizes opposition to alternatives received in comment letters.

TABLE J.3 - Support for Alternative

Alternative	Number of Supporters
C with Modifications	12*
C	3
B	1

* Comments identified support for Alternative A with modifications, but commenter description is actually more similar to Alternative C with modifications.

TABLE J.4 - Opposition to EIS and Alternative

Alternative	Number
D	8
C	1
EIS	1

General Comments
Comments that were similar or contained similar themes or subjects in all or the majority of the comment letters were grouped into General Comments (listed below). Many of the Specific Comments can also be placed within these General Comment categories, and Specific Comment Responses often refer back to a General Comment Response number.

List of General Comments

1. There is no sound scientific evidence (peer-reviewed) that terns are limiting ESA-listed wild salmon in the Columbia River, thus, the necessity of further tern reduction or colony dispersal has not been demonstrated.

2. The Draft EIS and NOAA Fisheries Predation Analysis show minimal (negligible) benefit to ESA-listed salmonids from the proposed action, and thus, would not result in a significant impact (benefit) on population growth rates of ESA-listed salmonids in the Columbia River.

3. The primary impacts to salmonids in the Columbia River are associated with the Four Hs, rather than Caspian tern predation. The EIS must fully discuss the Four Hs, their impact on salmon recovery, and put tern predation in that context.

4. The EIS should acknowledge and discuss the fact that the relocation of terns to East Sand Island has already substantially reduced salmonid predation rates and that there has been record returns of salmonids in recent years (coinciding with the years in which there was high tern predation).

5. The NOAA Fisheries Predation Analysis misrepresents the population growth rates of steelhead and the formula used for calculations is not supportable.

6. Salmon mortality is to some extent compensatory, not 100 percent additive as the NOAA Fisheries model and calculations assume. Thus, the actual increase for the four steelhead ESUs analyzed might be substantially smaller than estimated in the model. The model should include an analysis accounting for compensatory mortality.

7. The EIS should evaluate the impact of tern predation on juvenile salmonids as it relates to adult returns.

8. The EIS presents maximum benefits to Columbia River steelhead from the proposed action but these benefits cannot be transferred to other salmonids. Benefits to other salmonids would be non-significant.

9. To what degree does tern predation impact hatchery-reared salmonids versus wild stocks?

10. Support a modified Alternative C. The dispersal and relocation of some of the Caspian terns from the colony on East Sand Island to other locations in the region is necessary. However, the size of the tern nesting area on East Sand Island should be maintained until suitable habitat is established elsewhere in the region and there are assurances that displaced terns will colonize and breed at these sites successfully. The minimum acreage on East Sand Island should not go below 1.5 or 2 acres.

11. The Dungeness NWR site may not be a dependable and secure alternative location for East Sand Island terns because of human activity and predation issues. The DEIS fails to state what management actions would be considered and what criteria would need to be met before those actions would be implemented if mammalian predators and human disturbance were to limit the size of a tern colony at this site.

12. There are endangered and threatened salmon in Dungeness Bay. A large tern colony may negatively impact salmon and would be cause for concern.

13. The Summer Lake Wildlife Area is in the midst of a water management controversy. A complete and unbiased ecological study should be completed before a decision is made to relocate Caspian terns to Summer Lake.

List of General Comments (Continued)

14. There may be limiting factors for nesting Caspian terns already existing at San Francisco Bay.

15. It is premature to conclude that Caspian terns would not have a significant effect on fish resources in California.

16. Relocation of Caspian terns in California should occur with minimal impacts to Threatened and Endangered Species and to Species of Special Concern.

17. The EIS relies on a model which predicts a substantial increase in the size of the East Sand Island colony. However, this model has failed in its predictions of tern population levels in the past two years.

18. The EIS underestimates the potential magnitude of the issues surrounding tern redistribution. This provides added impetus to the need for adequate monitoring and may suggest the need for additional nesting area and contingency planning.

19. The DEIS fails to fully assess the impacts to the regional Caspian tern population from Preferred Alternative C and Alternative D. The discussion on expected impacts could be strengthened and more effective. There should be some discussion as to why a 50 percent decline in the regional tern population is an appropriate level and what some potential responses might be if that decline occurs. This should be part of a more general review of what an appropriate population size is for the larger west coast tern population to ensure sustainability and consider interactions with other species.

20. The preferred alternative does not provide adequate assurances of suitable alternative habitat, primarily because they are distant and substantially different from East Sand Island. Much more effort needs to be put into developing safe and productive sites for Caspian terns before plans to disperse or reduce numbers within the estuary can be pursued. The current proposed alternate sites are highly unlikely to support approximately 12,000 Caspian terns. The EIS should consider some other sites such as Grays Harbor or Malheur Lake.

21. Will monitoring along the Pacific Coast be done to determine if alternate sites are indeed being found and used by displaced Caspian terns?

22. East Sand Island contains the largest unprotected seabird colony in North America. Caspian terns have faced mounting pressures and even extirpation from much of their range due to human activities, therefore, East Sand Island should be protected to ensure long-term protection of Caspian terns and other seabirds using the island.

J.2 General Comments and Responses

1. There is no sound scientific evidence (peer-reviewed) that terns are limiting ESA-listed wild salmon in the Columbia River, thus, the necessity of further tern reduction or colony dispersal has not been demonstrated.

NOAA Fisheries has determined that the number of juvenile salmonids consumed by terns, combined with predicted poor ocean conditions, will impair the survival and recovery of ESA-listed salmonids if left at current levels or allowed to increase (Fresh et al. 2004, NOAA Fisheries 2004b). Scientific evidence supporting this determination has been documented in research conducted in the Columbia River estuary and off the Washington and Oregon coasts (see below).

The magnitude of juvenile salmonid consumption by terns has been demonstrated through research conducted in the Columbia River estuary from 1997 through 2004 (reported in Collis et al. 2002a, 2002b, 2003a, and 2003b, Roby et al. 1998, 2002, and 2003b, Ryan et al. 2003, and K. Collis pers. comm.) and is summarized in this FEIS. Additionally, NOAA Fisheries (Fresh et al. 2004) identified tern predation as a limiting factor to salmon recovery in the Columbia River because of its' effect on viable salmonid population (VSP) parameters, which include abundance, productivity, life history diversity, and spatial structure.

Research in the Columbia River estuary has demonstrated that consumption of juvenile salmonids by terns varies annually in terms of percent of diet and total consumed. This variation is most likely correlated with ocean conditions and availability of alternative prey. Productive ocean conditions result in an abundance of alternative prey and thus, tern consumption of salmonids decreases. For example, juvenile salmonids constituted 47 percent of the tern diet on East Sand Island in 2000 compared to 17 percent in 2004 (Collis et al. 2002b and K. Collis pers. comm.), a period in which ocean conditions improved and alternative prey comprised an increased portion of the tern's diet (Peterson and Schwing 2003).

Poor ocean conditions are expected to result in higher consumption of juvenile salmonids by terns and decreased ocean survival of salmonids. For example, NOAA Fisheries surveys assessing distribution and abundance of juvenile salmonids off the Washington and Oregon coasts in September 2004 are recording the lowest observed levels for a twelve year period, signaling a downturn in ocean survival of salmon. This conclusion is based on several pieces of evidence. First, the strength of the Pacific Decadel Oscillation (PDO) signal has become positive this year. A positive PDO is associated with warming conditions off the coast, which does not favor salmonid survival. Several publications have shown a strong relationship between the strength and signal of the PDO and salmon survival in the Pacific Northwest (Benson and Trites 2002, Koslow et al. 2002, Mueter et al. 2002a and 2002b, and Peterson and Schwing 2003).

Secondly, a weak El Nino is evident and is typically associated with unfavorable conditions for salmonids. Third, NOAA Fisheries has noted that abundance anomalies for northern copepod species, a northern latitude dominant species, off the Pacific Northwest coast are also falling. Changes in the abundance of copepods have been shown to contribute to unfavorable ocean conditions for salmon survival.

In conclusion, NOAA Fisheries have determined, based on the scientific evidence described above, that current tern numbers, combined with poor ocean conditions will impair the survival and recovery of ESA-listed salmonids in the Columbia River.

2. The Draft EIS and NOAA Fisheries Predation Analysis show minimal (negligible) benefit to ESA-listed salmonids from the proposed action, and thus, would not result in a significant impact (benefit) on population growth rates of ESA-listed salmonids in the Columbia River.

Population growth rate, derived from empirical data on tern consumption of juvenile salmonids, is the common measurement used in the NOAA Fisheries analysis (Appendix C) and is also used when addressing other limiting factors [e.g., hydropower (FCRPS), habitat loss, and harvest]. The estimated benefits described in Appendix C raise the percentage change in population growth rate to a level equivalent to improvements in hatcheries and operation of the FCRPS. When added to benefits gained from other actions being proposed and implemented throughout the Columbia River Basin to support ESA-listed salmonid survival and recovery, the short-term and cumulative benefits of the reduction in tern predation are important. To view examples of salmon recovery actions, please refer to Table 8.9 in Chapter 8 of the 2004 Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan prepared by the Lower Columbia Fish Recovery Board. Chapter 8 can be found at the following website: http://www.lefrb.gen.wa.us/Oct%2004%20Draft%20Plands/lower_columbia_salmon_recovery_a.htm.

The preferred alternative of this FEIS is based on the best scientific information currently available on tern biology, predator-prey interactions in the Columbia River estuary, and the potential benefits to juvenile salmonids. We recognize there is some uncertainty when attempting to predict a biological response from complex organisms (i.e., migratory birds and fish) that are highly mobile, adaptable, and difficult to monitor. Thus, we intend to use the best scientific information available; engage with the scientific community in future research, monitoring, and evaluation; and ensure flexibility in our management as new information becomes available (i.e., adaptive management).

3. The primary impacts to salmonids in the Columbia River are associated with the Four Hs, rather than Caspian tern predation. The EIS must fully discuss the Four Hs, their impact on salmon recovery, and put tern predation in that context.

The proposed action of the EIS is the management of terns in the Columbia River estuary to reduce predation on juvenile salmonids. We recognize that hatchery practices, harvest, hydropower operations, and changes in habitat affect ESA-listed salmonids in the Columbia River. Other documents assess the Four Hs (hydropower, harvest, hatcheries, and habitat) in greater detail and integrate tern predation in the context of overall salmon recovery (see below). The FEIS compares the benefits that would be gained through management of terns, the hydropower system, and harvest. A thorough assessment of the effects of the Four Hs on salmonids in contained in McClure et al (2003), Fresh et al. (2004), and NOAA Fisheries (2004b). We have included these documents in our EIS analysis to place our proposed action and tern predation in context with the Four Hs, as evidenced by their reference throughout the FEIS.

Additionally, Appendix C of the FEIS includes a general survey of the impact of hatcheries, harvest, and hydropower on salmonid populations in comparison to the impact of tern predation. A more detailed description of the affect of the these factors and how these actions effect juvenile salmonid survival in the Columbia River Basin is contained in Chapters 5, 6, and 8 of the 2004 NOAA Fisheries Biological Opinion (NOAA Fisheries 2004b) for the operation of the FCRPS. Table 8.1 displays a summary conclusion for that biological opinion which includes impacts from tern predation. This biological opinion can be viewed at: http://www.salmonrecovery.gov/R_biop_final.shtml

Additional information on the "All H" strategy identifying the impact of harvest, hatcheries, hydropower operations, and harvest can be found in Conservation of Columbia Basin Fish: Final Basinwide Recovery Strategy. This document can be found at the following website: http://www.salmonrecovery.gov

4. The EIS should acknowledge and discuss the fact that the relocation of terns to East Sand Island has already substantially reduced salmonid predation rates and that there has been record returns of salmonids in recent years (coinciding with the years in which there was high tern predation).

We acknowledge that relocating terns to East Sand Island has decreased the number of juvenile salmonids consumed by terns from that observed in 1997 and 1998. However, because of the high number of terns nesting in the estuary, tern consumption rates are still at levels that warrant further management actions (see response to General Comment 1, above). In addition, as described above in the response to General Comment 1, the level of tern predation on ESA-listed salmonids could increase if productive ocean conditions change and alternative prey are not available. Productive ocean conditions have supported salmonid survival (i.e., high adult return rates) over the last two years. While ocean conditions for ESA-listed salmonids have improved over the last few years, NOAA Fisheries assessed the extinction risk (including changing ocean conditions and historical population numbers) for Pacific salmonids in their status review of all ESUs (dated June 14, 2004) and proposed that Columbia River salmonid species still require ESA protection. The Federal Register notice for this proposal can be found at the following website: http://www.nwr.noaa.gov/reference/frn/2004/69FR33101.pdf.

5. The NOAA Fisheries Predation Analysis misrepresents the population growth rates of steelhead and the formula used for calculations is not supportable.

The NOAA Fisheries analysis uses the best science available and represents a "state-of-the-art" analysis. Additionally, the analysis used the same unit of measure (smolt survival) that is used to assess the benefits of other salmon recovery actions implementated or proposed throughout the Columbia River Basin. The population growth rate that forms the basis for the NOAA Fisheries analysis is derived from spawner-recruitment information (i.e., adults, as reported in peer-reviewed literature). The change in population growth rates are annualized percent increases derived from life cycle modeling (critical juvenile life stage to the adult stage) that could potentially be obtained by improving juvenile survival rates by reducing their mortality. These concepts are described in Appendix C.

6. Salmon mortality is to some extent compensatory, not 100 percent additive as the NOAA Fisheries model and calculations assume. Thus, the actual increase for the four steelhead ESUs analyzed might be substantially smaller than estimated in the model. The model should include an analysis accounting for compensatory mortality.

The management actions we are proposing for terns are intended to improve the survival of juvenile salmonids in the Columbia Basin. NOAA Fisheries acknowledges that tern predation may not be 100 percent additive. As such, the actual increase in survival of juvenile salmonids, as a result of our proposed management actions for terns, is likely to be below the maximum estimates. We modified the FEIS to clarify this point.

Specifically, NOAA Fisheries stated the following in their November 2004 Biological Opinion on the FCRPS (Appendix E, NOAA Fisheries 2004b):

The projected benefit of reduced tern predation is sensitive to assumptions about the additive or compensatory nature of mortality from tern predation. The projected benefits assume complete additivity (no compensatory mortality), i.e., every salmonid not consumed by terns survives all other sources of mortality. Although tern predation likely falls between being completely additive or completely compensatory (Roby et al. 2003 [b]*), current literature and empirical data do not identify more specific estimates or ranges. Although NOAA Fisheries cannot estimate the appropriate value of compensatory mortality, there was consideration of the effect of a range of compensatory values on the benefit to ESU survival. Based on the projected levels of tern colony size resulting from implementation of alternatives C or D, and assuming multiple compensatory mortality scenarios, NOAA Fisheries estimates the following quantitative survival improvements for stream-type ESUs:*

ESU	*Potential Survival Increase*		
	Compensatory Mortality Scenario		
	0%	*50%*	*75%*
Snake River Steelhead	*6.6%*	*3.3%*	*1.6%*
Upper Columbia River Steelhead	*15.4%*	*7.7%*	*3.9%*
Middle Columbia River Steelhead	*6.6%*	*3.3%*	*1.6%*
Lower Columbia River Steelhead	*5.1%*	*2.6%*	*1.3%*
Spring Chinook	*2.3%*	*1.2%*	*0.6%*

Numerous factors affect survival of juvenile salmonids as they move through the Columbia River estuary and into the Pacific Ocean. The survival rate of juvenile salmonids that escape tern predation, as a result of our proposed management actions, will likely be same as other juvenile salmonids that migrate through the Columbia River estuary into the Pacific Ocean. The actual number of juvenile salmonids that escape tern predation and return to the Columbia River as adults, will depend, in part, on the success of our management actions aimed at increasing juvenile survival in the estuary. The specific survival rate of juvenile salmon that benefit from our proposed management actions in any given year would likely be quite variable, difficult to measure, and subject to interpretation.

However, we recognize that other estuary predators (e.g., double-crested cormorants, northern pikeminnow) will continue to consume outmigrating salmonids in the estuary. This may include some portion of the juvenile salmonids that escape tern predation due to our management actions. As such, there will likely be some level of compensatory mortality by other predators. Unfortunately, there is no specific information to determine how other predators may react to additional juvenile salmonids in the estuary, the magnitude of any change in predation rate, or whether these changes can be measured or are significant.

Reducing tern predation is expected to increase the number of juvenile salmonids that survive migrating passage to the Pacific Ocean. This could increase the number of adults returning to the Columbia River in the future, although the actual rate of return is unknown. As such, research, monitoring, and evaluation would continue to determine tern response to management actions in terms of population levels, productivity, and predation levels on juvenile salmonids. For example, several Federal agencies (i.e., NOAA Fisheries, Corps, and BPA) are developing acoustic tag technology to evaluate juvenile salmonid survival through the estuary. These survival studies may be able to indirectly determine the changes in survival associated with the proposed tern management in the future.

Please note that the risk of compensatory mortality accompanies virtually all measures to improve salmonid survival in the Columbia Basin. For example, not all juvenile salmonids protected at Bonneville Dam by the operation of the "Corner Collector" (see Chapter 1, photo on page 1-3) will eventually return as adults. They too must find their way to the ocean and back again if they are to contribute to future generations of Pacific salmon. It is possible that by operating the "Corner Collector," there may be an increase in salmonid predation by, for example, northern pikeminnow, since there will be more juvenile salmon available for consumption. The risk of compensatory mortality increases the difficulty of estimating the benefits of any specific management action to protect juvenile salmonids; however, this risk is not of sufficient magnitude for us to not attempt management actions that could contribute to salmon recovery. Management decisions should and must be made on the basis of the "best available science." Our ability to quantify and fully understand all of the complex interactions associated with the salmon life cycle in the riverine, estuarine, and marine ecosystems should not serve as restrictions to forego management directed at the recovery of ESA-listed salmonids. Also, these "unknown" factors should not be the cause for inaction or the demise of ongoing efforts to improve smolt survival in the Columbia River Basin.

7. The EIS should evaluate the impact of tern predation on juvenile salmonids as it relates to adult returns.

Salmon recovery efforts, directed by NOAA Fisheries, in the Columbia River Basin are focused on maximizing juvenile salmonid survival through the hydropower system to maximize the number of juvenile salmonids that enter the ocean. Although we recognize that the number of adults returning to spawn is a measure of salmon survival and recovery, NOAA Fisheries uses juvenile salmonid survival through the Columbia River hydropower system and out into the ocean as the "currency" to measure the effectiveness of actions that support salmonid survival and recovery. Improving juvenile survival during the outmigration period is a critical strategy in salmon recovery efforts (Fresh et al. 2004). This juvenile stage of the salmon life cycle can be influenced by management actions such as hydropower improvements, management of avian predators, and habitat improvements. NOAA Fisheries supports, encourages, and requires actions, such as management of tern predation, that increase the number of juvenile salmonids that enter the ocean and have the potential to return as adults.

8. The EIS presents maximum benefits to Columbia River steelhead from the proposed action but these benefits cannot be transferred to other salmonids. Benefits to other salmonids would be non-significant.

Based on best available science, NOAA Fisheries determined that while other salmonids are eaten by terns, steelhead appear to be most affected by tern predation. NOAA Fisheries therefore chose to focus their analysis on steelhead, reasoning that if management actions resulting on this analysis would protect the most vulnerable stocks, then other ESA-listed stocks in the Columbia River Basin would also benefit.

9. To what degree does tern predation impact hatchery-reared salmonids versus wild stocks?

Data indicates that hatchery-raised yearling Chinook are more vulnerable to tern predation than wild counterparts, but no difference between hatchery and wild stock was detected for steelhead (Collis et al. 2001, Ryan et al. 2003). Regardless of these differences in consumption levels, hatchery salmonids are equally protected under the ESA as wild salmonids. NOAA Fisheries recently revised their status review for all ESUs, including hatchery salmonids. Based on the newly proposed listing (June 14, 2004, 69 FR 33102), wild and hatchery salmonids have equivalent status in considering measures to support the survival and recovery of ESA-listed salmonids. Based on the status review, hatchery salmonids were, in certain cases, found to be representative of the same genetic and ecological diversity as wild stocks.

10. Support a modified Alternative C. The dispersal and relocation of some of the Caspian terns from the colony on East Sand Island to other locations in the region is necessary. However, the size of the tern nesting area on East Sand Island should be maintained until suitable habitat is established elsewhere in the region and there are assurances that displaced terns will colonize and breed at these sites successfully. The minimum acreage on East Sand Island should not go below 1.5 or 2 acres.

The preferred alternative proposes to reduce the size of the area that terns are currently using only after alternate habitat is developed. For example, the reduction of nesting habitat on East Sand Island would need to occur in concert with the enhancement of nesting habitat at other sites to encourage the redistribution of terns throughout the region. However, once alternate sites are available, the redistribution of terns from East Sand Island would most likely not occur if terns are not encouraged or "pushed" off East Sand Island (i.e., because a smaller nesting area would not accommodate all terns and thus, some terns would need to seek other locations to nest). The "ideal" conditions that exist in the Columbia River estuary (e.g., reliable food supply and stable nesting habitat) would most likely continue to attract the current number of terns (if not more) to nest if the habitat remained fully available. Thus, delaying reduction of nesting habitat on East Sand Island until successful breeding by terns occurs at enhanced alternative sites could substantially delay attainment of the redistribution of terns in the region and reduction of the East Sand Island tern colony to 2,500 to 3,125 pairs.

The size of the tern nesting area on East Sand Island proposed in the preferred alternative was based on the expected benefit (increase in population growth rate) to four steelhead ESUs as described in Appendix C (NOAA Predation Analysis). If a larger tern nesting area (minimum acreage of 1.5 or 2 acres) was proposed for management on East Sand Island, we would not expect to achieve an increase of at least one percent in the population growth rate of one of the more endangered steelhead ESU (i.e., Lower Columbia River steelhead). NOAA Fisheries determined that a minimum of one percent change in the population growth rate of the four steelhead ESUs included in the analysis would be necessary to contribute to recovery efforts for Columbia River steelhead.

11. The Dungeness NWR site may not be a dependable and secure alternative location for East Sand Island terns because of human activity and predation issues. The DEIS fails to state what management actions would be considered and what criteria would need to be met before those actions would be implemented if mammalian predators and human disturbance were to limit the size of a tern colony at this site.

We have revised the text in Appendix G to include a more specific description on the proposed management actions at this site. We expect management efforts (e.g., increased protection from human disturbance and non-lethal predator management) at the Dungeness NWR site would improve the suitability of this site for nesting terns. The Dungeness NWR site and other proposed alternate sites would add to the current number of nesting sites distributed throughout the region to provide a diverse suite of locations from which terns can select for nesting from year to year based on varying annual conditions (e.g., water levels, prey availability, and/or predator presence). However, each site is not expected to be available or used by nesting terns every year. Instead, this regional network of tern nesting habitat in various combinations is expected to provide sufficient nesting habitat for the entire regional population. The number of sites and specific location used by terns is expected to vary annually.

12. There are endangered and threatened salmon in Dungeness Bay. A large tern colony may negatively impact salmon and would be cause for concern.

We acknowledge that ESA-listed salmonids are present in Dungeness Bay and that terns may consume these salmonids. We are proposing, as part of the Monitoring and Adaptive Management Plan (see Chapter 2), to monitor the diet of this tern colony in this location to assess effects to ESA-listed salmonids. As described in Chapter 4, we expect the tern colony at Dungeness NWR would most likely stay within the lower to mid- end of the range documented in coastal Washington (e.g., 100 to 3,500 pairs). We do not expect this colony to grow to numbers as large as the Columbia River estuary because we do not believe that resources in the Bay are comparable to that in the Columbia River estuary. Thus, effects to ESA-listed salmonids are expected to be limited.

13. The Summer Lake Wildlife Area is in the midst of a water management controversy. A complete and unbiased ecological study should be completed before a decision is made to relocate Caspian terns to Summer Lake.

Management actions for Caspian terns at Summer Lake would not materially alter the hydraulics or water conveyance in the basin. One construction scenario would use previously dredged and sidecast material to form the nesting islands plus rock to revet the shoreline. This construction scenario might result in displacement of a few acre-feet in a particular and existing impoundment as each island occupies a minor portion of the total impoundment. Displaced water could result in a very slight increase in water depth within the impoundment or send that water over the weir to Summer Lake proper. The other construction scenario would use soil borrowed from within the existing impoundments to form the islands plus rock to revet their shorelines. The volume of material excavated would be expected to balance with the island volume. Thus, there should be no discernible change in the volume of water required for the existing impoundment.

The proposed development of three islands, extent of 0.5 acres each, would not constitute a consumption or diversion of the water resources of the basin. The requests presented in the comments are outside the scope of this effort and do not pertain to the proposed action.

14. There may be limiting factors for nesting Caspian terns already existing at San Francisco Bay.

We acknowledge there may be factors that currently limit tern numbers and success in San Francisco Bay. The preferred alternative is addressing one of the primary limiting factors (lack of suitable nesting habitat) by creating more stable nesting habitat in the Bay than currently exists. A review of the existing habitat in San Francisco Bay indicates that nesting habitat is probably limiting because terns are using sites in poor condition with regard to size, substrate, or location. Suitable nesting habitat has been lost due to human disturbance, predators, or changing water management. The objective of the preferred alternative is to add to the current available sites in the region to ensure that terns have a suitable network of sites available for nesting. Similar to other sites available to terns in the region, suitable conditions for successful tern nesting are expected to vary from year to year.

15. It is premature to conclude that Caspian terns would not have a significant effect on fish resources in California.

We determined, based on studies conducted in 2003 and 2004 (Roby et al. 2004) monitoring diets of Caspian terns in San Francisco Bay, that negative effects to fish resources in the Bay would be limited. These studies demonstrated that the tern's diet varied considerably between the two years (see Chapter 3, page 3-8). Based on these findings and the predicted total number of nesting terns in the Bay (less than 4,500 pairs), we do not expect negative effects to fish resources in the Bay. Additionally, as proposed in the Monitoring and Adaptive Management Plan (Chapter 2), monitoring of these managed alternate sites will include studies to monitor effects to local fish resources. The criteria to determine a significant level of effects has not been determined at this time.

16. Relocation of Caspian terns in California should occur with minimal impacts to threatened and endangered species and to species of special concern.

Our preferred alternative is specifically designed to result in minimal effects to threatened and endangered species or species of special concern. This was achieved by identifying sites for habitat enhancement and tern attraction in areas that in which threatened and endangered species or species of special concern are absent or present in low numbers. ESA consultation was initiated with both the Service and NOAA Fisheries and we have included modifications to our preferred alternative to ensure minimal effects to ESA-listed species. We will also incorporate into our adaptive management plan measures that would be implemented to ensure that our actions would result in minimal impacts to these species.

17. The EIS relies on a model which predicts a substantial increase in the size of the East Sand Island colony. However, this model has failed in its predictions of tern population levels in the past two years.

The EIS analysis does not rely on the tern population model and a substantial increase in the size of the East Sand Island tern colony (see Chapter 1, section 1.2, Purpose of and Need for Action). The current number of nesting terns remains at a level in which NOAA Fisheries has determined would impair survival or recovery of ESA-listed Columbia River salmonids (see response to General Comment 1, above).

With respect to the tern population model described in Chapter 4, it is apparent that one or more of the assumptions is no longer valid and thus, the projected increase in nesting terns was not observed in 2003 and 2004. One or more of the original input values of the model appear to no longer be accurate. For example, preliminary band returns indicate the age of first breeding is not the 3 years which was used in the model, but possibly older (Roby pers. comm.). Although this model does not provide an accurate estimate of tern numbers, it can be used to project a reasonable population trend for the East Sand Island tern colony. Nonetheless, whether or not the East Sand Island colony increases in size, a reduction of tern predation from current levels is expected to aid salmon recovery (see response to General Comment 1).

18. The EIS underestimates the potential magnitude of the issues surrounding tern redistribution. This provides added impetus to the need for adequate monitoring and may suggest the need for additional nesting area and contingency planning.

The FEIS acknowledges that terns may start new colonies at locations that have not been identified, but it is difficult to project and assess effects at all possible locations. Based on comments received on the DEIS, it appears there are two areas of concern, Grays Harbor and mid-Columbia River. We have modified the Monitoring and Adaptive Management Plan (section 2.4) for the preferred alternative to include monitoring and contingency plans at Grays Harbor. Research and monitoring is currently being conducted at sites in mid-Columbia as part of 2000 FCRPS Biological Opinion (NOAA Fisheries 2000).

19. The DEIS fails to fully assess the impacts to the regional Caspian tern population from Preferred Alternative C and Alternative D. The discussion on expected impacts could be strengthened and more effective. There should be some discussion as to why a 50 percent decline in the regional tern population is an appropriate level and what some potential responses might be if that decline occurs. This should be part of a more general review of what an appropriate population size is for the larger west coast tern population to ensure sustainability and consider interactions with other species.

We do not state in the EIS that a 50 percent decline in the regional tern population is an appropriate level. Instead, we describe on page 4-10 that a 50 percent decline would be a threshold level that would trigger management actions to prevent any further decline. This level was selected because it represents historic regional population numbers that were observed after an initial exponential growth that was reported from the 1960s through the early 1980s but prior to the exponential growth that occurred in the mid- to late- 1990s.

Caspian terns have exhibited great resiliency over time in the Pacific Coast region by pioneering into new areas when faced with habitat loss (Shuford and Craig 2002). Absent any concerted management effort, terns have been able to sustain and increase their population in the face of extreme habitat loss and can be reasonably expected to do so in the future. Even given this information, the proposed Monitoring and Adaptive Management plan discussed in Chapter 2 includes regional population monitoring to ensure that if population trend moves towards a 50 percent decline, management efforts would be implemented to ensure the decline does not continue. Consequently, there would be mechanisms in place to track the regional population and to enact management measures if necessary.

20. The preferred alternative does not provide adequate assurances of suitable alternative habitat, primarily because they are distant and substantially different from East Sand Island. Much more effort needs to be put into developing safe and productive sites for Caspian terns before plans to disperse or reduce numbers within the estuary can be pursued. The current proposed alternate sites

are highly unlikely to support approximately 12,000 Caspian terns. The EIS should consider some other sites such as Grays Harbor or Malheur Lake.

Appendix G of the EIS describes the process used in selecting the alternate sites identified in the preferred alternative. Based on historic numbers of nesting terns at proposed alternate sites, we believe the sites would provide adequate habitat for all displaced terns (e.g., 12,000 terns). See Appendix G, Table G.4 for the reasons various sites were eliminated from consideration. For example, Malheur Lake was not considered as a managed alternate site because use by nesting terns is heavily dependent upon water levels and nothing can be done to increase water availability at this site. Additionally, Grays Harbor was not an option because the State of Washington and local governmental agencies oppose active relocation of terns to this site because of potential affects to local salmonids. Without the support of these entities, necessary regulatory compliance (e.g., Shoreline Management Act) would not have been approved, thereby eliminating this site from our preferred alternative.

Based on their regional expansion in the Pacific Coast region, Caspian terns have adequately demonstrated that they can pioneer onto new nesting locations quite distant from former colony locations (e.g., Alaska). Thus, although some of the alternate sites are distant from East Sand Island, we expect displaced terns to find and use them. Additionally, banding data indicate that movement between distant sites has been documented. For example, terns banded at Grays Harbor, Washington have been documented during the breeding season on or near other colony sites in eastern Oregon, central California, southern California, and Alaska (Suryan et al. 2004).

21. Will monitoring along the Pacific Coast be done to determine if alternate sites are indeed being found and used by displaced Caspian terns?

Yes, this was addressed in section 2.4 of the EIS.

22. East Sand Island contains the largest unprotected seabird colony in North America. Caspian terns have faced mounting pressures and even extirpation from much of their range due to human activities, therefore, East Sand Island should be protected to ensure long-term protection of Caspian terns and other seabirds using the island.

The issue of long-term ownership of East Sand Island is outside the scope of this FEIS. See Chapter 1, Issue 5 on page 1-10 in the FEIS for a description of why this issue was not included in this FEIS.

East Sand Island is currently in Federal ownership (Corps). Terns and other migratory birds are protected under the Migratory Bird Treaty Act. Additionally, since the island is currently under Federal ownership, terns and other migratory birds are also protected under Executive Order 13186 (see Appendix D for description).

The Corps and the Service, through the development of this EIS, is ensuring protection and management of the tern colony on East Sand Island. The preferred alternative is intended to provide long-term protection of nesting habitat on East Sand Island for nesting terns.

J.3 Comment Letters and Responses

Comment Letter 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

September [illegible] 2004

Reply To
Attn Of: ETPA-088

Ref: 03-032-FWS

Nanette Seto
Migratory Bird and Habitat Programs
U.S. Fish and Wildlife Service
911 N.E. 11th Avenue
Portland, OR 97232-4181

Dear Ms. Seto:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (EIS) for Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River (CEQ No. [illegible]) in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309, independent of NEPA, specifically directs EPA to review and comment in writing on the environmental impacts associated with all major federal actions and the document's adequacy in meeting NEPA requirements.

Comment Noted

The EIS evaluates alternatives for managing Caspian terns in the Columbia River estuary [illegible] Endangered Species Act [illegible] the [illegible] for Caspian terns in the Pacific Coast/Western region. The EIS [illegible] alternatives. The Preferred Alternative would reduce tern predation on juvenile salmonids in the Columbia River estuary by [illegible] East Sand Island [illegible] throughout the Pacific Coast/Western region. [illegible] would be [illegible] Oregon and Washington.

Our concerns with the [illegible] proposed [illegible] alternative [illegible] quality impacts [illegible] other [illegible].

Comment Noted

We have assigned a rating of [illegible] to the Draft EIS [illegible] the preferred alternative. This rating and a summary of our comments will be published in the Federal Register. A copy of the rating system used in conducting our review is enclosed for your reference.

Comment Noted

2

Thank you for the opportunity to review this draft EIS. If you would like to discuss these issues, please contact Mike Letourneau at (206) 553-6382.

Sincerely,

Christine B. Reichgott

Christine Reichgott, Manager
Geographic Implementation Unit

Enclosure

cc: S. Rodriguez, EPA - Oregon Operations Office
D. Schmidt, EPA - Region 9

EPA's Detailed Comments
Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary Environmental Impact Statement

Tern Consumption of ESA-listed Salmonids

1-1 Outmigration of juvenile ESA-listed Puget Sound Chinook and Hood Canal summer-run chum salmon will coincide with the tern's nesting season at the Dungeness National Wildlife Refuge (NWR). Terns nesting at Fern Ridge Lake could forage on salmonids in the nearby Willamette and McKenzie rivers during the mid- to latter stages of the outmigration period for ESA-listed salmonids. In addition, Caspian tern nesting season in San Francisco Bay overlaps with ESA listed salmonid outmigration of Sacramento River winter run Chinook, Central California Coast coho, and Central Valley and Central California Coast steelhead. The EIS concludes that increasing the population of nesting terns to between 100 and 1,000 pairs at the Dungeness NWR, 5 to 300 pairs at Fern Ridge Lake and 100 to 1,500 pairs in San Francisco Bay, would have limited impacts on ESA-listed salmonids because alternative prey sources exist. The EIS should provide information that accurately depicts the impacts on ESA-listed salmonid populations from projected tern populations providing the reader with an understanding of the range of impacts based on the range of projected tern population sizes. In addition, the EIS should describe what monitoring measures will be implemented to accurately assess the consumption of ESA-listed salmonids by Caspian tern populations at these locations and what management measures can be employed if projected impacts prove inaccurate.

Potential Tern Nesting Sites

1-2 The EIS states that the Oregon Department of Fish and Wildlife (ODFW) will not support managed relocation of Caspian terns to non-historic nesting sites in Oregon and Washington Department of Fish and Wildlife (WDFW) will not support or facilitate the managed relocation of Caspian terns within Washington. The EIS lists potential suitable Caspian tern nesting sites throughout California, Oregon and Washington in Tables G1, G2 and G3 and rates them based on criteria such as physical suitability, accessibility to predators, historic usage, maintenance requirements and human activity. The EIS should identify which sites in Tables G1, G2 and G3 identified as having high management potential for development of tern nesting habitat were eliminated from consideration due to the lack of support from ODFW and WDFW. The EIS should discuss why it has proposed the Fern Ridge Lake site, a non-historic Caspian tern nesting site in Oregon and why other sites not supported by ODFW or WDFW have not been proposed. In addition, the EIS should discuss what options are available to obtain support for these sites from ODFW and WDFW. In particular, the EIS should discuss policy and budget options that might be available to support tern nesting at these high quality sites.

Water Quality Impacts from Creation, Enhancement and Maintenance of Tern Nesting Sites

The EIS states that short-term increases in sedimentation or siltation would occur in the wetland impoundment at Summer Lake Wildlife Management Area, Crump and Fern Ridge Lake

Page 1 of 2

and the Hayward Regional Shoreline as a result of the creation of tern nesting habitat activities.
1-3 The EIS should discuss in detail the frequency, magnitude and duration of the increases in sedimentation and siltation at all proposed tern nesting sites from creation, enhancement and maintenance activities. This discussion should include a determination of whether the increases in sedimentation and siltation will meet water quality standards, if the proposed activities will impact waterbodies currently on a Clean Water Act Section 303(d) list of impaired waterbodies and if the activities will comply with management plans for restoring or maintaining water quality such as Total Maximum Daily Loads (TMDLs) and the Federal, state and local plans described in Chapter 5.

Potential Impacts from the Application of Herbicides under Alternative A

1-4 Alternative A would employ the application of the herbicide Rodeo to control European beachgrass and American dunegrass on the tern nesting sites. While the application of the herbicide will not take place during the Caspian tern nesting season, there is the potential for acute and chronic exposure to fish, wildlife and humans including potential chronic exposure to the Caspian tern, and the potential to contaminate waterbodies in the vicinity. The EIS should discuss what potential acute and chronic impacts the application of this herbicide may have on water quality, fish, wildlife and humans.

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February 1987.

Responses to Comment Letter 1: U.S. Environmental Protection Agency, Region 10

1-1 The effects to local ESA-listed salmonid populations at alternative sites, described in Chapter 4 (Section 4.2.3), have been updated to clarify effects to ESA-listed salmonids. Additionally, effects are analyzed and described in the Biological Assessment (BA) that was prepared by the Service and Corps and submitted to NOAA Fisheries for ESA-consultation. We assessed potential impacts with the best available scientific information. Tern diet studies have been underway since 2003 in San Francisco Bay and 2004 at Dungeness NWR. These data were used in the EIS and BA analysis in discussing potential effects to salmonids. ESA-consultation would be completed prior to implementation of the preferred alternative. Monitoring measures are described in Chapter 2 (section 2.4), which includes analysis of tern diets at managed alternative sites and other sites of concern (e.g. Gray's Harbor) when tern numbers reach the designated threshold (see Monitoring and Adaptive Management Plan).

1-2 Table G-4 (Appendix G) lists the sites that were eliminated from consideration in Alternative C and Alternative D. A footnote was added to Table G.4, in response to this comment, to identify those sites that were ranked "high" for tern management in the feasibility study conducted in 2003. Reasons for their elimination (including lack of support from WDFW or ODFW) were already included in the table. Clarification was also made in the text of Appendix G regarding the discussion on the Fern Ridge Lake site. There are no options available to allow inclusion of these sites in the EIS, thus none are discussed. We have clarified text in the EIS on this point.

1-3 Effects to the physical environment at proposed alternate sites is discussed in section 4.1.3 of the FEIS. Additional details described below were also added to the text of the FEIS. The Dungeness NWR site is an existing upland site and no soil perturbation is proposed. Consequently, no sedimentation or siltation is expected at this location as a result of project related actions. The three sites considered in San Francisco Bay are existing islands or a levee. Habitat modification at these locations would consist primarily of removal of vegetative cover and the placement of filter fabric and sand or other suitable nesting substrate material for terns. All material would be imported to the site via shallow draft craft or helicopter transport and no material would be dredged or placed inwater at these locations. Consequently, no or very little sedimentation or siltation is expected at these locations.

Caspian tern habitat development at Fern Ridge Lake, Oregon would require the construction of an island within the drawdown zone of the lake. Construction would occur during the fall when the lake is drawn down for flood control purposes, allowing habitat development under dry conditions. Fern Ridge Lake is on Oregon's Water Quality Limited Streams – 303(d) List (http://www.epa.gov/r10earth/maplib/orlist.xls) for turbidity and Water Contact Recreation (Fecal Coliform) – Fall through Spring. A Section 404 (b)(1) evaluation would be prepared and water quality certification obtained from the Oregon Department of Environmental Quality prior to island construction. We anticipate no increase in the frequency, magnitude, and duration of sedimentation or siltation over baseline levels from construction of this island.

In Summer Lake, three islands, each 0.5 acres in extent, are proposed for construction. All three islands are located within diked impoundments on the Oregon Department of Fish and Wildlife's Summer Lake Wildlife Management Area. Construction of these islands may occur in the dry, in water or in both conditions depending upon whether an impoundment is flooded or dry and how many islands are constructed during one season. Construction of the Summer Lake islands is not anticipated to impact frequency, magnitude or duration of sedimentation and siltation at these locations. A Section 404 (b)(1) evaluation would be prepared and water quality certification obtained from the Oregon Department of Environmental Quality prior to island construction. Summer Lake was not on Oregon's Water Quality Limited Streams – 303(d) List.

Responses to Comment Letter 1: U.S. Environmental Protection Agency, Region 10 (Continued)

At Crump Lake, a one 1-acre island is proposed for construction. Construction of an island in Crump Lake would have logistical and physical constraints. These will be explored further in an implementation planning stage which would include preparation of an Environmental Assessment to address Clean Water Act requirements, among others, and to address this comment. Crump Lake was not on Oregon's Water Quality Limited Streams – 303(d) List. A Section 404 (b)(1) evaluation would be prepared and water quality certification obtained from the Oregon Department of Environmental Quality prior to island construction.

1-4 Rodeo (active ingredient glyphosate) is an EPA registered herbicide (EPA Number 62719-324) for use in aquatic environments. Use of this herbicide at East Sand Island is principally for control of European beachgrass and American dunegrass, which are invasive on the tern nesting site. These two grass species are rhizomatous, thus tillage operations in late winter used to prepare the site for tern nesting, cut and spread the rhizomes throughout the colony area. Tillage operations result in only minor mortality of these two grass species. Hand pickup and removal of rhizomes has been tried in the past but has only limited effectiveness as many rhizomatous cuttings remain below the soil surface.

The Rodeo herbicide would be applied in upland areas on East Sand Island during periods with no rainfall or high winds. Since this herbicide is strongly absorbed into soil, exposure to fish is not expected. Application is made in the fall, as product label requires, and typically from a sprayer mounted on an ATV by trained personnel with appropriate protection equipment. Terns are not present at the time of application. A review of the U.S. Department of Agriculture, Forest Service Glyphosate Pesticide Fact Sheet (U.S. Department of Agriculture 2004) did not reveal any specific areas of concern relative to the use of Rodeo and the health of humans and fish and wildlife resources. Death or injury may occur to non-target plant species but these will principally be non-native species in the areas where we propose to use this herbicide in a limited manner per label requirements. The half-life of this herbicide can range from 3 to 130 days, thus, adverse impacts to Caspian terns that return to the site six months after application of the Rodeo herbicide is not expected. Text was added to the FEIS to clarify effects of Rodeo.

Comment Letter 2

USDA

Caspian Tern Management EIS [illegible]

[illegible]

[illegible] Avenue

Portland, OR [illegible]

[illegible]

[illegible] 2-1

[illegible] 2-2

[illegible]

Sincerely

[illegible]

Responses to Comment Letter 2. U.S. Department of Agriculture

2-1 We acknowledge that there is a potential for terns to relocate and attempt to establish colonies at sites not identified in the FEIS. This is described in Chapter 3 but new text has been added to include the potential use of urban environments in response to this comment. However, we believe it is unlikely that a large number (greater than 500 pairs) of terns would attempt to nest in urbanized environments, and thus, result in potential conflicts. Instances in which nesting in urban environments (e.g. rooftops) occurred, simple site alterations during the non-breeding season were successful in preventing terns from nesting at those sites again. Regional population monitoring would be implemented and thus, should detect establishment of new colonies in urban areas. The Service would work with U.S. Department of Agriculture and local landowners to assess impacts, if any, and address them accordingly.

2-2 We believe that individual sites would have differing levels in which effects could be considered significant, thus “substantially” can not be defined in specific terms. Regional population monitoring will monitor nesting colony sizes and landowners may contact the Service, as they can with any migratory bird issue, if nesting terns are impacting their property. The Service would work with U.S. Department of Agriculture and local landowners to assess impacts, if any, and address them accordingly.

Jointly signed letter: U.S. Geological Survey, Oregon State University, and Real Time Research

Comment Letter 3

21 September 2004

Nanette Seto
Migratory Bird and Habitat Programs
U.S. Fish and Wildlife Service
911 NE 11th
Portland, OR 97232-4181

RE: Draft Environmental Impact Statement on Caspian Tern Management

Dear Nanette:

We offer the following technical comments on the Draft Environmental Impact Statement (DEIS) on Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary. Our general comment is that you all have done a commendable job of preparing a detailed, comprehensive, and well-researched DEIS that presents the various alternatives and their anticipated effects clearly and concisely. Congratulations! As with any document the size and complexity of the DEIS, however, there are some technical aspects that can be improved prior to the issuance of the Final EIS. It is in the spirit of assisting in the revision process that we offer the following comments.

3-1 Throughout the body of the DEIS, the estimated improvements in lambda for the various steelhead ESUs considered in the NOAA Fisheries predation analysis (Appendix C) are accepted as unbiased estimates of realizable improvements. In the conclusion of the NOAA predation report, however, the following caveat is presented (page C-17, paragraph 2): "Given these limitations and uncertainties [the primary unknown being how additive, versus compensatory, tern predation may be], the estimates of percent change in population growth rates should be viewed as maximum potential improvements. Realized improvements in population growth would likely be lower from any management action that reduces Caspian tern predation impacts on salmonid ESUs." This caveat is ignored elsewhere in the EIS, e.g. p. 2-4, column 2, paragraph 2: "The NOAA Fisheries analysis estimated that a reduction in the tern colony to approximately 3,125 nesting pairs would result in a 1 percent or greater increase in population growth rate (recommended by NOAA Fisheries) for four Columbia River Basin steelhead ESUs (Table 2.2 or Table 5 in Appendix C)." The correct interpretation of the NOAA Fisheries analysis would be that reducing the colony to approximately 3,125 nesting pairs could AT MOST result in a 1.08 percent increase in lambda for the Lower Columbia River steelhead ESU, 1.32 percent increase for the Middle Columbia River ESU, 1.34 percent increase for the Snake River ESU, and a 3.41 percent increase for the Upper Columbia River ESU; however, the actual increase for all ESUs might be substantially smaller than these maximum estimates if smolt mortality due to tern predation is largely compensatory. This caveat needs much greater consideration in the body of the EIS or the quantitative statements regarding benefits to Columbia River salmonids from tern management lack credibility.

Text Changed Page ES-1 column 2, paragraph 1: should read "late March or early April" instead of "late May or early April."

Text Changed

Page ES-3, column 2, last sentence of 1st paragraph: This sentence should read "Numbers of terns nesting in the Columbia River estuary have been relatively stable since 1998 following the earlier….."

Comment Noted and Text Changed

Page ES-3, column 2, 2nd paragraph, last sentence is not accurate. This statement also appears on page 3-8, column 1, 2nd paragraph, 1st sentence. Salmonids have consistently comprised about two-thirds of the prey items at Crescent Island and about 80% of the prey items at Three Mile Canyon Island, both in the Mid-Columbia River. Although "uncommon" is a highly subjective term, we think that if salmonids constitute a third of prey items in the diet of a tern colony (e.g., Dungeness Spit in 2004) salmonids are common in the diet. At the Knight Island tern colony in San Pablo Bay, salmonids represented about 26% of all prey items; over a quarter of prey items doesn't seem "uncommon."

Comment Noted and Text Changed

Page ES-4, 1st column, 3rd paragraph: Caspian terns are described as "casual" at Fern Ridge Lake. The term "casual" in the context of bird occurrence is generally used to indicate very rare, not usually recorded every year, and then almost always just one or two individuals. Roger Tory Peterson defined the term casual to mean "from one to several records in a decade in a state or province – a bird to be looked for again. It implies greater rarity than "rare"…" Is this the intended meaning in this context? Our impression was that Caspian terns are recorded regularly at Fern Ridge Lake during the spring and fall migrations, and although they might be described as "uncommon", they are a regular transient in the area. Caspian terns are called a "casual visitor at Fern Ridge Lake" again on page 3-9, column 2, 2nd paragraph.

Comment Noted and Text Changed

Page ES-4, column 2, last paragraph and page 3-14, column 1, 1st paragraph: The Central Valley Fall and Late Fall-run Chinook Salmon ESU is not ESA-listed, nor is it a candidate for listing (see 5th paragraph of the same page). The NOAA Fisheries web site (last up-dated June 2004) lists the Central Valley Fall and Late Fall-run Chinook ESU as a "species of concern," but it is not currently proposed for listing.

Comment Noted

Page ES-8, column 2, 2nd paragraph: Regarding Alternative C, it states that "we expect that the managed sites would provide suitable habitat to accommodate displaced terns." We assume that this refers to all of the approximately 6,000 – 6,500 pairs that are expected to be displaced from East Sand Island under management Alternative C (ES-2; first column, last sentence). While the 7 sites listed under this alternative represent a significant addition to nesting habitat currently available for Caspian terns in the Pacific Coast population, we are skeptical that these 7 sites can accommodate 6,000 – 6,500 pairs. This is admittedly something of a judgment call, as it is difficult, at best, to predict how large a colony might be sustainable at a particular site, let alone how large a colony the land owner and local stakeholders would permit. While these 7 sites may accommodate most of the displaced terns, we think that 4,500 – 5,000 pairs is closer to the capacity for all these sites combined. While providing 2 acres of tern nesting habitat for each acre of nesting habitat lost at East Sand Island sounds like more than adequate mitigation, the location of the 8 acres of tern nesting habitat is clearly relevant. Forage

fish availability, accessibility by mammalian predators, potential for human disturbance,
and competition with other colonial ground-nesting waterbirds all influence the quality of
the nesting habitat provided, nesting substrate being equal.

Dungeness Spit does not seem a suitable site for up to 3,500 pairs. Sand Island in
Grays Harbor briefly supported a colony that large, but that was on a remote island in a
protected estuary with plentiful stocks of schooling marine forage fishes. The acreage of
continuous potential tern nesting habitat at the current colony site is limited by a tidal
slough on two sides and Dungeness Bay on the third. No other site on the spit offers this
degree of protection for nesting terns from mammalian predators and human disturbance.
So despite an apparent surfeit of suitable tern nesting habitat, some major habitat
improvement would be necessary if a colony of 3,500 pairs was to grow up at the current
site. The colony site at Dungeness Spit is highly vulnerable to mammalian nest predators
(as pointed out on page 4-3, column 2, 2nd paragraph, last sentence), and protecting the
2+ acres of habitat necessary to support a colony that size would require monitoring the
colony 24-7 to detect and deter potential predators or, alternatively, constructing a
predator-proof electric fence to enclose the colony area. One mink that swam out to
Three Mile Canyon Island in 2000 caused an entire breeding colony of about 250 pairs of
Caspian terns to fail and abandon, and the site has not been re-colonized in the
3-2 subsequent 4 years. The Dungeness Spit colony in 2004 was about the same size as the
Three Mile Canyon Island colony in 2000. Although the terns on Dungeness Spit
withstood the nest predation and disturbance from the coyote and other predators
remarkably well this year, the success of the colony in raising any young was likely due
to the early detection of the coyote problem by the colony monitors and the hazing of the
coyote by Wildlife Services. Also, about a third of the diet of terns nesting at this colony
consisted of juvenile salmonids. Many of these salmonids were likely from stocks reared
and released from hatcheries on the Dungeness River. These stocks include the ESA-
listed Puget Sound Chinook ESU. How likely is it that the Jamestown S'Klallum Tribe
will tolerate such a large colony so close to their main tribal fishing area? (See page 3-17,
column 2, 2nd paragraph.) Finally, concerns have already been raised about the potential
effects of a large Caspian tern colony at Dungeness Spit on water quality in Dungeness
Bay, where shellfisheries have been closed due to high fecal coliform counts (see page 3-
16, 3rd paragraph). The fecal output of about 7,000 terns nesting on the bayward side of
the spit might be hard to explain away. A more realistic goal for a Dungeness Spit
Caspian tern colony might be about half that size, or about 1,500 pairs. Even a colony
this size would require new and innovative predator control measures to ensure that the
colony is not decimated and subsequently abandoned.

While a large colony at Dungeness Spit appears necessary to accommodate the
number of terns proposed to be displaced from East Sand Island under the preferred
alternative, the actual management intent of the federal agencies at Dungeness Spit is
unclear. Specifically, on P. 4-7, EIS states "***If management efforts are implemented***
[emphasis ours], we expect the size of this colony ***could*** [emphasis ours] grow to range
3-3 somewhere within the historic colony sizes observed on the Washington Coast (100 to
3,500 breeding pairs)." However, in Appendix G, which discusses the proposed
management at the alternative nesting sites, it is stated on Pp. G-2-3, "If predators,
primarily mammalian, become a problem, a predator management program ***may***
[emphasis ours] be considered to ensure successful tern nesting." In addition, no

enhancement of nesting habitat or social attraction to the site is considered. Further, in the accompanying document "Frequently Asked Questions about the Caspian Tern Draft EIS And Implications for the Dungeness, Washington Area" (available at the website: http://migratorybirds.pacific.fws.gov/CATE_DEISNews_QA.htm), it is stated "Because the size of the nesting colony is ***expected to remain relatively small***… [emphasis ours]". Given the apparently limited intent and capability (i.e. no budget considerations are mentioned for predator management, etc. in Appendix G) of the federal agencies to engage in active management for terns at the Dungeness Spit site, the probability of a large colony occurring at the site (i.e. larger than what currently exists there) seem extremely unlikely, even, seemingly, to the authors of the EIS. Consequently, without a prospectively large colony at the Dungeness Spit colony site, the EIS fails, by its own accounting (even with the most optimistic assumptions of colony growth at the other six sites), to allow adequate habitat for the number of terns potentially displaced from East Sand Island under the preferred alternative.

3-3 Continued

All three potential colony sites in Oregon have limited potential to support Caspian tern colonies. Based on our research at Summer Lake, we believe a colony of ca. 150 pairs, possibly 200 pairs could be accommodated, considering limited forage fish resources, limited foraging habitat, and mammalian predators. We agree that the Crump Lake site could accommodate up to 300 pairs, if a suitable nesting island were available. Fern Ridge Lake seems like it would support no more than 200 pairs, based on extent of foraging habitat in the area and apparent forage fish availability. Although all three of these sites would offer valuable nesting habitat for Caspian terns and other colonial waterbirds in areas where few suitable alternatives are currently available, accommodating 650–700 pairs at these three Oregon sites would be about the best one could expect. The limited alternative nesting habitat for colonial waterbirds in these areas raises the possibility of interspecific competition for the available new habitat.

3-4

In San Francisco Bay we think it is very unlikely that Ponds N1-N9 in Don Edwards National Wildlife Refuge could accommodate anything close to 1,500 pairs. Other Caspian tern colonies that have become established in salt ponds in the Bay area have been in the range of 30 to 300 pairs. These colonies are plagued by nesting substrate issues, mammalian predators, and a contaminated food supply (the bulk of the tern diet in the southern part of San Francisco Bay consists of demersal fishes). So while we see significant benefits to the regional population of Caspian terns to have nesting habitat designated for Caspian tern use on the Refuge, we do not see the Refuge supporting a large tern colony. With the exception of the Brooks Island colony in the central Bay, all Caspian tern colonies in the Bay area appear to be in decline: Knight Island is now marginal tern nesting habitat since the levee was breached, the Agua Vista colony is declining because the pier on which the terns nest continues to collapse into the Bay, the Baumberg Pond colony was abandoned in 2004 after mammalian predators destroyed early nests and the pond was converted to a muted tidal pond, and Alviso Pond (A-7) supports a dwindling number of tern nesting pair. As these colonies decline, the displaced breeding pairs will need to find alternative colony sites, thus potentially competing with displaced East Sand Island terns.

3-5

Hayward Regional Shoreline has, we believe, considerable potential as a Caspian tern colony site, but a colony as large as 1,500 pairs seems quite unlikely. The former salt ponds where the colony would be developed are shallow, the islands in the converted salt ponds are thus vulnerable to mammalian predators, and suitable nearby foraging habitat for Caspian terns is limited, at least compared to Brooks Island. A more realistic estimate of potential colony size at Hayward Regional would be about 800 pairs. A colony this size would require habitat improvement on one or two existing islands in the converted salt ponds and a persistent sentinel trapping program for mammalian predators.

3-5 (continued)

Brooks Island offers the best prospects for accommodating large numbers of Caspian terns, in addition to the more than 1,000 pairs that nested there this year. We think that, with appropriate habitat management on the spit where the tern colony currently nests, about 1,500 – 2,000 additional nesting pairs could be accommodated. We do not think that suitable habitat for 1,500 – 2,000 more pairs of Caspian terns can be providing by hand-pulling vegetation (see page 4-3, 1st paragraph). To provide 1-2 more acres of suitable tern nesting habitat on Brooks Island it will require stabilization structures on the spit to prevent annual loss of tern nesting habitat during winter storms and additional fill (sand, oystershell) to build up the spit where the terns are intended to nest. If only hand-pulling of vegetation is employed, we think a colony of 1,500 pairs (500 more pairs than the current colony size) would be a challenge to attain.

3-6

In conclusion, we believe that in order to accommodate all the Caspian terns that would be displaced from East Sand Island under Alternative C, more alternative sites would need to be developed and more management of the proposed sites than is currently described in the DEIS would be required. We believe that suitable habitat for nesting Caspian terns is limited throughout the range of the Pacific Coast population, and that reduction of available tern nesting habitat on East Sand Island will result in a decline in the population unless sufficient suitable nesting habitat is provided elsewhere.

3-7

Page ES-9, column 1, last paragraph: Although our research on Caspian tern colonies in San Francisco Bay indicated that juvenile salmonids were a minor part of the diet at all five colonies studied in 2003, results from 2004 indicate that the proportion of salmonids in the diet may vary among years, and at some colonies in the Bay area juvenile salmonids can represent a significant part of the diet. Specifically, at the Knight Island colony, Caspian terns consumed about 26% salmonids, and at the Brooks Island colony terns consumed 3.3% salmonids. Despite the small portion of the diet (compared to Rice Island terns) and the smaller size of the colonies (current and projected under the preferred alternative), intentionally managing for Caspian terns in an area where resource managers are struggling to restore ESA-listed salmonid runs seems problematic. We believe, however, that most if not all the juvenile salmonids consumed by Caspian terns nesting at Knight Island and Brooks Island in 2003 and 2004 belonged to the non-listed Sacramento River Fall and Late Fall-run Chinook ESU. This ESU is by far the most commonly caught in trawls near the mouth of the Sacramento River during the tern nesting season, and five release sites for hatchery-raised smolts belonging to this ESU are within 20 km of Knight Island and within 32 km of Brooks Island. Also, the juvenile salmonids that were identified as they were brought back by terns to the Knight and Brooks island colonies were usually in the length range of 8-10 cm, occasionally up to 12 cm. Most threatened Central Valley Spring-run Chinook smolts are larger than this, and California Central Valley Steelhead smolts average 20 cm, much larger than the smolts seen on the San Francisco Bay Caspian tern colonies. So while some Caspian tern

3-7 (continued) colonies in the San Francisco Bay area consume a significant proportion of juvenile salmonids in some years, the salmonid consumption appears to be almost entirely hatchery-raised smolts belonging to a non-listed ESU.

Photo Changed Page 1-2, photo at top of page: the forage fish in the tern's bill is misidentified; it's a juvenile herring, not a salmon smolt.

3-8 Page 1-3, column 1, paragraph 2: "Steelhead were the focus of this analysis because they are consumed in the highest numbers by terns..." Steelhead are consumed at the highest RATE (% of available fish that are taken) by terns, not the highest number -- more chinook salmon smolts and coho salmon smolts are consumed annually by East Sand Island terns than steelhead smolts. This error was also made on page 2-4, column 1, 2nd paragraph.

Comment noted and text changed Page 1-3, column 2, 1st paragraph: "...but is well below improvements that WERE gained through harvest reductions..." The McClure et al. 2003 paper conducted a retrospective analysis.

3-9 Page 2-3, column 2, 3rd paragraph: Habitat reduction on East Sand Island as part of Alternative C would likely benefit from some direct enhancement, based on previous experiences. The dredged material disposal site on East Sand Island that the terns nested on in 1984 was nearly completely vegetated in 1985, yet the terns attempted to nest at the edge of the site where the top of the beach remained unvegetated. These nesting pairs apparently completely failed due to flooding of nest scrapes during high high tides, but the attempt demonstrated that even after just one nesting season on a dredged material disposal site, terns were motivated to renest at the same site. A similar situation occurred on Rice Island in 1999 when silt fencing covered most of the colony site; once the open habitat in the center of the silt fencing was saturated, nesting pairs spilled over into marginal habitat outside the silt fencing that was not used by nesting terns previously. Although the vast majority of these nests outside the core colony area failed, the fact they were used demonstrates that, as the East Sand Island colony site becomes vegetated, terns will likely attempt to nest in marginal habitat where they did not attempt to nest previously, such as driftwood piles, semi-vegetated areas (where gulls normally nest), and near the high-water line on beaches. Nesting success at these sites would be low. This response by the terns and associated decline in nesting success can either be anticipated and predicted in the Final EIS, or terns can be discouraged from nesting in marginal habitat by erecting silt fencing in areas near the old colony site where displaced terns might otherwise be tempted to try to nest.

Comment Noted Page 2-6, column 2, 2nd paragraph: As with Alternative C (see previous comment), some terns, perhaps a large number, may seek to remain on East Sand Island under Alternative D by nesting on previously unused, marginal habitat. Reducing the colony size quickly, and thereby minimizing the lethal take of terns to reach the target colony, could be accomplished by erecting silt fencing on marginal nesting habitat near the formerly unvegetated areas previously used by nesting terns.

Text Changed

Page 3-8, column 2, photo credit: Keith Larson should be credited with this photo, not Dan Roby.

Text Changed

Page 3-10. Column 2, 4th paragraph: Although there are some ESUs of both chinook salmon and steelhead in the San Francisco Bay area that are ESA-listed, there are also unlisted ESUs, notably the Central Valley Fall and Late Fall-run ESU, which represents most, if not all, of the salmonid smolts that were taken by Caspian terns during the 2003 and 2004 nesting seasons.

Text Changed

Page 3-12, Table 3.2 and Figure 3.5: Based on our communications with Larry Hansen, Pat Brandes, and Steve Foss, all fisheries biologists with the USFWS in the Bay area, Table 3.2 includes ESUs that are not part of the affected environment in San Francisco Bay. The threatened Northern California Steelhead ESU is not available to foraging terns within foraging range of the three tern colony sites under consideration in Alternative C. The threatened Central California Coast Steelhead ESU is considered extirpated from the Bay. The threatened California Coastal Chinook ESU is not recorded from the area of the Bay where tern colonies currently exist or are being considered for development, nor are the threatened Central California Coast Coho ESU and the Southern Oregon/Northern California Coho ESU. We have been told the salmonid ESUs that need to be addressed with regard to the enhancement or creation of new Caspian tern colonies in the San Francisco Bay area are the endangered Sacramento River Winter-run Chinook ESU, the threatened Central Valley Spring-run Chinook ESU, and the threatened California Central Valley Steelhead ESU.

3-10

Figure 3.5 is a little misleading in its depiction of the overlap in the timing of the out-migration for the endangered Winter-run Chinook ESU with the Caspian tern nesting season. The bulk of the out-migration by this ESU occurs in February and the first half of March, before Caspian terns return to the Bay area in any numbers.

Text Changed

Page 3-13, column 1, 4th paragraph: The paragraph should read: "OREGON. Seven salmon and steelhead species have population segments that are ESA-listed and spend a portion of their lives in the lower Columbia River (Figure 3.5). These species include 20 ESUs from the Columbia River Basin identified by NOAA Fisheries, 12 of which are ESA-listed (Table 3.2)."

3-11

Page 3-13, column 2, 4th paragraph: Our understanding is that the Upper Willamette Winter Steelhead ESU does not produce smolts that out-migrate through portions of the watershed that are within foraging range of Caspian terns nesting at Fern Ridge Lake. Has this been verified?

3-12

Page 4-6, column 2, 3rd paragraph: Alternatives B, C, and D acknowledge that the dispersal of a large number of terns away from the Columbia River estuary may potentially cause "the regional population to stabilize, possibly at a lower number than currently observed." Due to likely lower foraging habitat quality at alternative nesting sites and potentially less isolation from human and mammalian disturbance at alternative nesting sites, lower productivity at alternative sites should be expected (and has already been documented in Table 4.3) and in the long term, a smaller breeding population seems

3-12 Continued

more probable than "possible." The conclusion that the population would stabilize "well above numbers documented in [the] 1970s and early 1980s" is unsupported by any detailed analysis and could be viewed as debatable, especially considering that Grays Harbor, WA sites were available during that period, those sites supported a sizeable portion of the regional population (37%; Suryan et al., In press), and these sites are apparently no longer suitable nesting habitat.

Text Changed

Page 4-4: The paper Suryan et al. (In review) is referred to three times. This paper is now In press, and is scheduled for publication in *The Condor* in 2004.

3-13

Page 4-6, column 2, 4th paragraph: We do not concur with the Service on its assessment that there is currently suitable, unused nesting habitat for Caspian terns to move into once they are precluded from nesting on East Sand Island. Based on the sites where Caspian terns are attempting to nest in the San Francisco Bay area, in interior Oregon and Washington, and especially in coastal Washington, we interpret this as strong evidence that suitable unoccupied colony sites are not available. The dredged material disposal islands in the upper Columbia River estuary are apparently suitable from the terns' perspective, and some terns attempt to nest on these disposal sites each year, but they are certainly not suitable from the perspective of fisheries managers.

3-14

Page 4-7, column 2, 1st paragraph: This paragraph acknowledges that factors such as mammalian predators and human disturbance could severely limit the size of a tern colony at Dungeness Spit under Alternative C. It is stated that actions to manage these factors "would be considered," but the paragraph fails to state what management actions would be considered and what criteria would need to be met before those actions would be implemented. The primary short-coming of Dungeness Spit (and any other unfenced site connected to the mainland) as a Caspian tern colony site is the accessibility to mammalian predators. This short-coming was well-demonstrated during the 2004 breeding season, although the colony was surprisingly productive considering the amount of mammalian predator activity on or near the colony. This is only the second year that Caspian terns have nested on the Spit, however, and it is likely that if nesting continues, more mammalian predators will learn of the colony and exploit it as a food source. Management of mammalian nest predators is not a straightforward and simple task, especially if lethal control and/or fencing are not allowable due to other considerations. If lethal control and/or fencing are not options, then it is unlikely that the Dungeness Spit colony will persist for many more years or reach the size of 1,000 or more pairs.

3-15

Page 4-7, in Table 4.3, Antolos (2002) is cited for a measure of productivity at Solstice Island, but this gives a falsely high indication of typical productivity in this area. Other data (colonies lost to flooding, human disturbance, etc.) collected since 2001 (Chris Thompson, University of Washington, and colleagues) suggest that colonies in Potholes Reservoir more typically have low nesting success (< 1 fledgling/nesting attempt, perhaps < 0.5).

Page 4-8, column 2, 3rd paragraph: Likely outcomes of implementing Alternative C at Fern Ridge Reservoir seem based on the premise: "since there are not many other

3-16

colonial nesting birds at this site, it is expected that [the] majority of the newly created island would be available for nesting terns." This does not seem to adequately consider the possibility of other colonial waterbirds, which may be equally or more numerous in the area than are Caspian terns, of colonizing an island first. In particular, double-crested cormorants, California gulls, and/or ring-billed gulls might begin using the island before Caspian terns do.

3-17

Page 4-10, Table 4.4: We do not understand this table or how these numbers were calculated. The table needs more explanation in the text or in footnotes. For example, how does a colony whose estimated pre-implementation size is 3,200 pairs become a post-implementation colony of 2,700 pairs after lethal removal of 3,000 individuals?

Comment Noted and Text Changed

Page 4-16, column 1, 1st paragraph: Impacts to Columbia River salmonids as a result of Alternative C are described as "...well below improvements that could be achieved by harvest reductions (4 to 8 percent increase, see Table 6, NOAA Fisheries 2004, Appendix C)." These modeled improvements in lambda were part of a retrospective analysis based on harvest reductions that had already been implemented (McClure et al. 2003).

3-18

Page 4-16, column 1, 2nd paragraph: Regarding impacts to Columbia River salmonids as a result of Alternative C, it is stated that "Cumulatively, these actions [i.e. addressing hydropower operations, harvest impacts, habitat conditions, hatchery operations, and introduced species] have the potential to influence population growth rate to a substantially greater degree than would be realized from solely reducing predation from avian predators in the Columbia River estuary". While this may be true, reducing avian predation is an important component of the Final Draft Updated Proposed Action for the FCRPS Biological Opinion Remand (USACE, Bureau of Reclamation, BPA 2004). Putting this Caspian tern management EIS in the context of that plan and accompanying draft Biological Opinion by NOAA Fisheries (2004) could and should be better done throughout the tern EIS, now that those documents have been released.

Text Changed

Page 4-17, column 2, 6th paragraph: "Forster's terns" is misspelled.

Text Changed

Page 4-18, column 2, 2nd paragraph: It should be pointed out here that red foxes are not native to the San Francisco Bay area and are an invasive species.

3-19

Page 4-21, column 2, 3rd paragraph: It would be difficult to argue that actively managing for a larger Caspian tern colony on Dungeness Spit while reducing the available tern nesting habitat on East Sand Island would have a similar effect on tribal fisheries in Dungeness Bay as Alternatives A and B, particularly if the Dungeness Spit colony grew to over 1,000 nesting pairs and it continued to rely on juvenile salmonids for about one third of its prey items. Based on the diet composition data collected at the Dungeness Spit colony in 2004, it appears that the impact on smolt survival in Dungeness Bay of a large Caspian tern colony (> 1,000 pairs) at the spit would not be negligible.

Some comments specific to the NOAA Fisheries Predation Report, EIS Appendix C:

3-20 The method of estimating predation rates using PIT tag detections has a couple problems not discussed in the predation report. The report states "Predation impacts derived from PIT tags … represent minimum estimates of the proportion of stocks consumed". Actually, predation rates derived from PIT tag recoveries represent minimum estimates of the proportion of groups of tagged fish that were consumed. It is unknown how well the groups of tagged fish represent the ESUs in question. There are at least two reasons to question whether the sample of fish tagged from a given ESU are representative of the (listed) ESU population: (1) a majority of smolts PIT-tagged are hatchery reared, and (2) PIT-tagged fish sometimes receive different treatment than untagged fish. At least some of the time, PIT-tagged fish captured in bypass facilities are preferentially returned to the river for in-river migration, but untagged fish are transported by barge and/or truck to below Bonneville Dam and released. So the rearing and migration history of listed ESUs may not be well represented by PIT-tagged fish. In addition to these issues, temporal and spatial biases in sampling of an ESU by the tagged fish group(s) is unexplored in this report. Significant biases could be present. This possible sampling issue should at least be acknowledged in the NOAA Fisheries report and could even be investigated using existing datasets. In particular, the analysis of the Snake River ESU, where the majority of smolts are transported but the vast majority of PIT-tagged smolts likely migrate in-river (at least in some years of this analysis) is a glaring example where the PIT-tagged fish likely do not well represent the larger ESU.

The uncertainty of PIT tag derived predation rate estimates is not considered. Recovery rates of different release groups of PIT-tagged fish within an ESU could be compared to develop some measure of the variation within ESUs.

3-21 Page C-11, paragraph 1: "This suggests that the Caspian Tern predation rate is not affected by prey availability, at least over the range of values experienced from 1999-2003." Replace "prey availability" with "predator density".

3-22 Table 4 appears to be based on Figures 6 and 7, not Figures 7 and 8.

3-23 The "(East Sand Island tags/Bonneville Dam tags x 100)" should be dropped from the y-axis label of Figure 7 as it implies that the graph is based on data exclusively from smolts reared above Bonneville Dam. The figure is actually based on an extrapolated predation rate including fish that were reared/released below as well as above Bonneville Dam (D. Lyons, unpublished data).

3-24 The caveat mentioned on page C-17, paragraph 2, that the calculations assume there is no compensatory mortality for reductions in smolt mortality due to tern predation, should be considered throughout the report, but most especially when comparisons are made to other potential improvements in lambda from changes in hydropower or harvest operations. If compensation were 50%, the benefits of the proposed action (EIS alternative C) would be approximately half or less of the benefits of hydropower improvements and a smaller fraction of the benefit of the modeled harvest restrictions. This would significantly alter the statement in the Executive Summary: "The effect of Caspian tern predation on recovery may be comparable to fish passage improvements at

3-24 Continued

Columbia River dams and harvest reductions for some Evolutionarily Significant Units." While the level of compensation is unknown, given the uncertainty the conclusion that tern predation "may be comparable …" is insufficiently qualified. Under the most generous of assumptions this may be true, but the most generous of assumptions are not likely true.

3-25

Additional Avian Predation Impacts and Table 7. It is probably worth mentioning that detection efficiency for PIT tags on the East Sand Island cormorant colony is probably much lower than on the East Sand Island tern colony, so that the estimated predation rates by cormorants are biased lower than those for terns.

Thanks for the opportunity to provide these comments and suggestions for changes and best wishes for the revision and finalization process.

Sincerely,

Dan Roby	Don Lyons	Kim Nelson	Ken Collis
USGS/OSU	OSU	OSU	RTR

Responses to Comment Letter 3. Jointly signed letter: U.S. Geological Survey, Oregon State University, and Real Time Research

3-1 Comment noted. Text was changed throughout the FEIS to clarify this point. See also, responses to General Comment 6 (section J.2)

3-2 Comment noted. Since the actual number of nesting terns varies annually based on environmental conditions (e.g. food availability, predators, water levels), we do not attempt to predict the precise number of terns that could nest at Dungeness NWR, but rather provide a range of colony sizes that have been observed on the Washington coast. We have revised the text in the FEIS to reflect that we expect the tern colony at this site to be in the mid- to lower end of the historic range observed on the Washington coast (100 to 3,500 pairs).

3-3 Comment noted. Also see response to Comment 3-2 above.

3-4 Comment noted. We did not attempt to specifically estimate how many nesting terns would use managed alternate sites since this would most likely vary from year to year based on a variety of factors (e.g., prey availability, water levels, success of dispersal from the Columbia River estuary). Instead, we determined the range of nesting terns that occurred in interior Oregon historically and used that data as our best estimate of the potential number of terns that could nest at each interior Oregon site.

3-5 Comment noted. Similar to the response for Comment 3-5 above, we determined the range of nesting terns that occurred in San Francisco Bay historically and used that data as our best estimate of the potential number of terns that could nest at each site within the Bay. We acknowledge that there are probably limiting factors at each site that we still need to identify. We also recognize that there could be some need for stabilization of the spit on Brooks Island, and have proposed to study this as part of the preferred alternative. Despite these limiting factors, we expect numbers to vary from year to year but have the potential to fall within the identified range.

3-6 See response to General Comment 20 (section J.2).

3-7 Updated data from the 2004 Study in San Francisco Bay was added to the FEIS.

3-8 Text has been changed in the FEIS to reflect this correction.

3-9 Comment noted. We have revised text in the FEIS to allow for the use of non-lethal measures (e.g., silt fencing) to prevent terns from nesting outside of the managed area on East Sand Island.

3-10 Comment noted and the figure was corrected.

3-11 Comment noted. Text was changed in the FEIS to change Upper Willamette winter steelhead ESU to Upper Willamette steelhead ESU. We concur that smolts for this ESU do not outmigrate through portions of the watershed within foraging range of terns that would nest at Fern Ridge Lake. The Calapooia River, which has a population of Upper Willamette River steelhead, is approximately 30 miles distant from the proposed colony location at Fern Ridge Lake. Distance and habitat conditions (e.g., small stream, shallow depths, and/or overhanging bank cover) render foraging by Caspian terns on the stream unlikely. The text in the FEIS was revised to reflect this comment. However, Upper Willamette River Chinook located in the McKenzie River could still be consumed by terns that may nest at Fern Ridge Lake.

Responses to Comment Letter 3. Jointly signed letter: U.S. Geological Survey, Oregon State University, and Real Time Research (Continued)

3-12 Comment noted. It is our opinion, based on the nesting behavior of Caspian terns in the Pacific Region, that numbers would remain "well above" those documented in the 1970s and early 1980s. The large colonies at Grays Harbor were unsustained and only occurred under ideal conditions (e.g., predator absence and abundant prey). East Sand Island can clearly support an even greater number of terns and will continue to do so on a long-term and sustainable basis after implementation of the EIS. We expect the long-term management of nesting habitat for terns on East Sand Island and the alternate sites would maintain the regional population of terns above historic levels (e.g., 6,200 pairs). See also response to General Comment 19 (section J.2).

3-13 Comment noted. Based on the Feasibility assessment conducted in 2002 (Seto et al. 2003), we believe that the proposed managed alternate sites, East Sand Island, and unused sites in the region provide a network of suitable nesting habitat for terns throughout the region. These sites vary in suitability from year to year and thus, may not be consistentialy used by terns every year. For example, at Carson Sink, Nevada, approximately 475 pairs nested in 1986 and 685 pairs in 1999 because these were both post-flood years. Nesting activity was low or absent in all other years. We acknowledge that terns are opportunistic, plastic, and adaptable to capitalize on the availability of nesting habitat and have described this in the FEIS.

3-14 See response to General Comment 11 (section J.2).

3-15 Comment noted and Table 4.3 was revised in FEIS.

3-16 Based on the average nesting density observed on East Sand Island (0.55 pairs per square meter, Collis et al. 2003b, Roby pers. comm.), the expected range of nesting terns (5 to 300 pairs) would require less than 0.25 acre nesting area on the 1 acre island. Thus, even if other bird species attempt to nest on the island, there would be sufficient nesting space for the anticipated number of nesting terns. We acknowledge that other colonial nesting waterbirds are present, including white pelicans, double-crested cormorants, and gulls, and that these species may use a nesting island developed for terns and have described this in the FEIS.

3-17 Comment noted and Table 4.4 was revised for clarification and corrections (see page 4-12).

3-18 We recognize that reducing avian predation is identified as an important component of the 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b) that became available after the DEIS was completed. We have added references to the 2004 FCRPS Biological Opinion and have clarified text in the FEIS on this matter.

3-19 Comment noted. We have modified text in the FEIS to recognize that effects to Tribal fisheries may increase under Alternative C.

3-20 NOAA Fisheries recognizes that uncertainties exist in the use of PIT-tag data. The use of PIT-tag data to characterize the response of a salmonid ESU to mortality inducing events is well characterized in the white paper (soon to be NOAA Technical Memorandum) authored by John H. Williams et al. and titled, *Effects of the Federal Columbia River Power System on Salmon Populations*. This white paper was produced to address the effect of the FCRPS on juvenile salmonid survival and adult smolt to adult returns by utilizing PIT-tag data to derive mortality estimates in much the same manner (using the same PIT-tag data sources) as used in Appendix C and the Northwest Fisheries Science Center Technical Memorandum entitled, *Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead: An Evaluation of the Effects of Selected Factors on Salmonid Population Viability*. This publication can be found at: www.salmonrecovery.gov.

Responses to Comment Letter 3. Jointly signed letter: U.S. Geological Survey, Oregon State University, and Real Time Research (Continued)

Although within year variability was evident, for reasons including potential spatial and temporal biases as suggested by the comment, these unknown biases did not overwhelm the interannual variation evident within and between monitored PIT-tag groups and ESUs. Appendix C relied on interannual variation to assess effects of terns on juvenile salmonid mortality. It is not clear that knowledge of within group and within year variability, as suggested by the commenters, would have improved the resolution of interannual variation, which was the focus of the analysis in Appendix C

The commenters' suggestion that within year variability was a dominant factor was not borne out in the larger analysis conducted by NOAA Fisheries to evaluate the impact of the Columbia River hydropower system on juvenile salmonid survival. During the review of the available data for the tern predation analysis, the assessment of tern induced mortality using PIT-tag data or a bioenergetics assessment provided very similar results. Thus, this outcome reinforced the view that the PIT-tag data reasonably represented the impact of tern predation on salmonids. Because the PIT-tag assessment provided ESU specific information, use of the PIT-tag derived dataset would provide an ability to assess ESU specific impacts, an approach not amenable to data derived from a bioenergetics approach.

3-21 Comment noted and text changed in Appendix C of the FEIS.

3-22 Comment noted and text changed in Appendix C of the FEIS.

3-23 Comment noted and text changed in Appendix C of the FEIS.

3-24 Comment noted. NOAA Fisheries addressed compensatory mortality in Appendix E of the 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b) and determined that although some level of compensatory mortality is likely to occur, there are no existing data from which to estimate the appropriate value or range. In the absence of an estimate of compensatory mortality, NOAA Fisheries evaluated the sensitivity of the projected benefit from reduced tern predation under differing scenarios of compensatory mortality. Based on that evaluation, compensatory mortality would need to exceed 50 percent to reduce the contribution of offsetting actions towards filling the hydropower system survival gap below that anticipated by the Action Agencies (Corps and BPA) from this action. NOAA Fisheries believes that the estimated benefit from reduced tern predation on this ESU is robust across a wide range of estimates of compensatory mortality. Text on this issue was clarified in the FEIS.

3-25 Comment noted and text changed in Appendix C of the FEIS.

Comment Letter 4

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

September 20, 2004

Caspian Tern Management Environmental Impact Study
United States Fish and Wildlife Service
Migratory Birds and Habitat Programs
911 Northeast 11th Avenue
Portland, Oregon 97232

The following are comments from the Washington Department of Fish and Wildlife (WDFW) on the Draft Environmental Impact Study (DEIS) for Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary. We appreciate the opportunity to comment, and appreciate the way that many of our comments on the earlier Agency Review Draft have been incorporated in this document. In general, we think it is well written and deals appropriately with the issues. In our comments we will highlight key issues that we think will strengthen the document and be more effective in achieving our common goals.

Review of the alternatives

Comment Noted

Alternative A - No action (current management), though not preferable, is a viable alternative from the perspective of retaining terns as part of the Columbia River ecosystem and maintaining regional tern population levels. It does not meet the objectives of protecting terns from stochastic events in the Columbia River and dispersing terns to other locations at "traditionally" lower densities. It also does not reduce salmon smolt predation to the levels indicated by the National Oceanic and Atmospheric Administration fisheries model. It is interesting to note that in the past two years the number of tern nesting pairs in the lower Columbia appears to have stabilized, and that percentage of salmonids in the terns diet has continued to decline. (Collis, et. al. weekly reports and trends)

Comment Noted

Alternative B - No management does not meet the stated objective of retaining terns as a part of the Colombia estuary ecosystem and also may result in quickly dispersing terns in mass to a point were they become a nuisance or impact important salmonid stocks in another area.

Comment Noted

Alternative D - Redistribution and lethal control preliminarily looked like it could be a viable option. However, we concur with the author's analysis that in using lethal control methods (cannon nets, shot guns) you run too high a risk of total colony abandonment. We also concur with the assessment that, while egg oiling would reduce productivity, it would not reduce colony attendance.

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Page 2

WDFW can support Alternative C (preferred alternative), but with the strong caveat that several
elements of the plan need to be enhanced as described below. Implementation of this alternative
may have potential benefit to salmonid stocks, particularly steelhead. It meets the goal of
4-1 retaining Caspian terns in the Columbia River estuary. However, to determine whether regional
tern populations are retained or enhanced and whether reduction in tern predation is benefiting
salmonids stocks will require continued monitoring and the fiscal resources to support these
studies. In addition, close monitoring will need to be done to ensure that movement of terns does
not impact listed salmonids elsewhere in the region.

The following elements of the draft need to be strengthened:

Monitoring - The Monitoring and Adaptive Management Plan (page 2-7) needs more specific
details on how the monitoring will be accomplished. This will provide greater confidence in the
potential effectiveness and adequacy of the efforts. At a minimum, it must be enhanced to
include:

- Monitoring of tern colony size and production, not only at the identified sites (e.g.
Dungeness Spit), but also at <u>any</u> site that the terns may re-colonize or occur pursuant to the
4-2 habitat reduction on East Sand Island. This should include a description of how the
dispersion of the displaced terns will be tracked to validate that the full range of sites is
monitored.
- Monitoring of tern prey at the dispersal sites, particularly salmonids, through such methods
as observation of bill loads, stomach contents, and lipid analysis. This is particularly critical
4-3 in locations where the terns may be feeding on listed or important commercial or recreational
salmonid stocks.
- Monitoring of the success of the alternative. The whole premise of the Environmental
Impact Statement (EIS) is that a reduction of nesting tern pairs will result in a significant
increase in the survival of Endangered Species Act (ESA) listed steelhead smolts and adults.
4-4 Monitoring should remain in place to determine whether predation levels decline and, as
importantly, whether this reduction in predation results in increased adult breeding fish. This
will be difficult given the number of variables. However, why go through expense of heavily
managing terns if it does not result in tangible/measurable support to the recovery of the
endangered fish stocks.

Tern redistribution and adequacy of alternative areas - We are concerned that the analysis
underestimates the potential magnitude of the issues surrounding tern redistribution. This
provides added impetus to the need for adequate monitoring and may suggest the need for
additional nesting area and contingency planning. On page 2-6 the potential number of terns to
be redistributed from East Sand Island is estimated at 5,945 to 6,570 breeding pairs. This is
4-5 based on the 2000 to 2003 average population of 9,070 pairs. However, in Table 4.2 the
predicted population in 2006 (the first year for exclusion) is 14,000 pairs, growing to 18,500 in
2009. If we assume a target population of 3,000 pairs on East Sand Island the predicted
redistribution is actually 11,000 pairs the first year with an additional 1,000, 1,500, and 2,500
pairs in 2007, 2008, and 2009. On pages 4-8 and 4-9 the potential capacities of the alternate sites
are identified as Summer Lake (0-300 pairs), Crump (0-300), Fern (0-300), Brooks Island
(<1500), Hayward shoreline (100-1500), Ponds N-1-N9 (100-1500), and Dungeness Spit (500 –
3500). If we take the most optimistic value for each of these, we get a predicted capacity of

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Page 3

8,900 pairs, over 2,000 pairs short of the initial displacement. The document notes in several cases that it may take several years for terns to find and establish themselves at the alternate sites, so even if the eventual utilization is at the higher levels there will be a lag period after the displacement occurs. At best, there is not enough expected capacity in the managed locations to cover the expected displacement. It is much more likely that the actual gap will be much greater. Along with the increased monitoring already identified we suggest the draft be modified to:

4-5 Continued

Text Changed

- Indicate in alternatives B, C, and D that there will be unanticipated redistribution.
- More clearly identify contingency plans for dealing with the unanticipated movements of the displaced birds. We are particularly concerned that the pressure to find nesting sites will increase the likelihood that terns will end up in places (the mid-Columbia) where impacts may be worse than the current situation.

4-6

Effects to regional tern populations - The document appears to be relatively optimistic about the expected impacts on the regional tern population. We feel that it could be strengthened and more effective if the issue of the impact to the tern population was handled more directly and by providing additional analysis and support for the conclusions. As the document notes, the regional tern population has grown to the large current population level largely because of the unique combination of habitat availability and resource abundance at the mouth of the Columbia. The discussion about Table 4.3 clearly indicates that the alternate sites are less productive and the information in Appendix G seems to suggest that there are nesting area or food resource limitations at most of the alternate sites that have been identified. This suggests that there may be a significant long term reduction in the tern populations. On page 4-7 and in several other locations the document asserts, "Ultimately, we expect the regional population trend would stabilize, possibly at a lower number than currently observed, but above numbers documented in the late 1970s and early 1980s." However, no support for this conclusion is provided. We think that the document will be strengthened, and readers will have greater confidence in the results if supporting evidence is available.

4-7

On page 4-9 the DEIS provides some ability to make corrections if the population declines to less than 50 percent. This is a good step, particularly when combined with the improved monitoring identified above. There should be some discussion of why 50 percent is the appropriate level and what some potential responses might be. This should be part of a more general review of what an appropriate population size is for the larger west coast tern population to ensure sustainability and consider interactions with other species.

4-8

Analysis of expected benefits to salmon and steelhead - We have a concern with the analysis of the expected benefits to salmon and steelhead, due to the lack of any sensitivity analysis of the assumptions about compensatory and additive mortality. This issue was specifically raised on page C-17 where it was suggested that only 50 percent of the mortality due to terns is additive. This would suggest that only half of the expected benefits are likely to occur from the action, potentially changing the benefit/cost analysis and comparisons with other actions. At a minimum the analysis of benefits should be run with different levels of additive mortality to determine, and display, the effect of any assumptions. In addition, the potential benefits of the tern management may be better portrayed as a range rather than only the maximum.

4-9

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Page 4

4-10 The current approach is rather misleading since any caveats about the benefits of the action have been placed in a single paragraph at the back of the appendix rather than in the discussion in the main document.

Comment Noted As we noted above, WDFW supports the adoption of Alternative C, provided that there is careful monitoring of the outcomes and the ability to make adjustments as needed. At the same time, we think that there can be some improvements in the DEIS that will make it a more effective and accurate document for decision making.

Sincerely,

Peggy Ireain for

Dave Brittell, Assistant Director
Wildlife Program

RS:jp:wec

cc: Rocky Beach
Richard Stone

Responses to Comment Letter 4. State of Washington, Department of Fish and Wildlife

4-1 Comment noted. Clarification of the Monitoring and Adaptive Management Plan is included in the FEIS (section 2.4). Specific responses to suggested monitoring plan items are below.

4-2 As described in the DEIS, monitoring of colony sizes for all colonies in the region would occur immediately following implementation of the proposed action. This regional population monitoring would be accomplished through coordination with local biologists and managers, similar to the monitoring that has been conducted in recent years. Efforts would be made to conduct surveys during the appropriate time period to accurately assess nesting effort and number of breeding terns.

Displaced terns from East Sand Island would not be specifically tracked to determine their dispersal from the estuary. The overall regional population trend, rather than dispersal and nesting success of individuals, would be the focus of monitoring efforts.

4-3 Not every future tern colony warrants intensive diet composition studies. As we have described in the FEIS (in the Monitoring and Adaptive Management Plan), we would focus monitoring efforts at the managed alternate sites and other critical sites as identified during the DEIS comment period (e.g., Grays Harbor and mid-Columbia River sites). Stomach contents and lipid analysis would not be conducted at alternate sites, as this technique would require the collection (killing) of adult terns. Diet studies using these techniques places new colonies in jeopardy due to the potential abandonment from disturbance caused by the research activities. In these instances, bill load observations would likely be the method for conducting the diet analysis.

4-4 The measure of success for this project would be the reduction of tern predation and consumption of juvenile salmonids, not increased adult breeding fish. This is also the same measure used in determining effects and mitigation measures of the hydropower system.

4-5 See response to General Comment 18 (see section J.2). In addition, the preferred alternative is proposing to provide nesting habitat for the current number of terns. Data from recent years indicate that the number of terns on East Sand Island may have stabilized because young birds have not returned to nest. This indicates that the expected growth of the colony will be delayed. Thus, the number of displaced terns is expected to be within the range stated in the FEIS (6,000 to 6,675 pairs).

4-6 See response to General Comment 18 (see section J.2). Specific contingency plans cannot be identified at this time, as specific management actions would need to be developed for each site, if and when impacts are identified. Action 102 in the 2000 FCRPS Biological Opinion (NOAA Fisheries 2000) directed the Action Agencies (Corps and BPA) to conduct studies to evaluate avian predation of juvenile salmonids in the FCRPS reservoirs above Bonneville Dam and, if warranted and in consolidation with the Service and NOAA Fisheries, develop and implement methods to reduce avian predation of juvenile salmonids. The study will be concluded in 2006. Management prescriptions, as warranted, will be developed upon completion of the study and evaluation of results.

4-7 See response to General Comment 19 (see section J.2).

4-8 See response to General Comment 19 (see section J.2).

4-9 See response to General Comment 6 (see section J.2).

4-10 The caveat regarding benefits of the action has been stated more clearly in the FEIS.

Comment Letter 5

Oregon

[illegible]

Department of Fish and Wildlife
[illegible]

[illegible]

[illegible]

[illegible]

Comment Noted

[illegible]

5-1

[illegible]

5-2

[illegible]

Comments on the Preferred Alternative

Comment Noted

The preferred alternative "C" proposes to relocate approximately 65% of the East Sand Island Caspian tern breeding population (2003 colony size) to 7 existing/potential nesting sites in Washington, Oregon and California. We continue to have concerns about the significant numbers of birds remaining in the estuary. Even if these relocations are successful in the time-frames envisioned, modest increases in tern and cormorant colonies in the interim years (see Table 4.2 of the EIS) before tern numbers are reduced in the estuary could result in the consumption of upwards of 30 million smolts. This is assuming the return of salmonids in diet proportions observed in earlier years at ESI. If smolt proportions in seabird diets ever approach levels observed at Rice Island during the interim period, impacts could increase up to 60 million smolts annually. Although unlikely, this underscores the need for more timely and complete management of avian predation, neither of which will likely occur under the preferred alternative.

5-3

We feel additional justification is needed under alternative C for managing a higher number of terns on ESI long term (i.e., 2500-3100 pairs). There are no historical records of terns nesting in the Columbia River estuary prior to 1984 when terns were first recorded nesting on new ESI dredge spoils. We therefore see no reason why the proposed future colony size should be any larger than what might be found at other more natural locations throughout the west (i.e., less than 1000 pairs).

5-4

As proposed in the preferred alternative C, three of the relocation sites for Caspian terns would be in Oregon at Summer Lake Wildlife Management Area, Crump Lake in Warner Valley and Fern Ridge Reservoir west of Eugene. All sites would require extensive site construction or restoration and some level of periodic maintenance. Both Summer Lake and Crump Lake have been historic nesting areas for terns. Field research at both areas in 2003 identified the primary prey species selected as tui chubs and introduced exotic species. Fern Ridge Reservoir is Corps of Engineers (Corps) administered lands and has no current nesting habitat. A conceptual plan for construction of a one acre island for terns was completed by the Corps in 1998 as an earlier alternative nesting site. The proposed island would be located within the boundaries of the Fern Ridge Wildlife Management Area managed by the department. Terns are observed on the areas during migration periods and potential forage fish would be introduced exotic species although there are some concerns for salmonids if birds foraged in the Willamette River. From an adaptive management standpoint, should this or any other site be developed and it was found that birds foraged on listed salmonids at an unacceptable level, those sites should be closed to nesting terns.

Comment Noted

Another positive benefit of further improving these alternate nesting areas is that a number of other native bird species are expected to use any nesting islands developed (EIS, page 3-14). This has been the case in the past at Summer Lake and Crump Lake. Various species of waterfowl, shorebirds, white pelicans, and gulls will use these areas for nesting and resting. This will provide both conservation benefits for these species and recreational opportunities to the public for wildlife hunting and viewing.

5-5

Development and enhancement of alternative nesting sites will require significant federal startup and annual (operation and maintenance) funding as states are unable to provide little in the way of financial resources. ODFW continues to face additional budget cuts in the next state Legislative session which will prohibit accepting any new management obligations without full federal funding. As estimated in the EIS, the three Oregon sites alone could cost approximately $2.2 million for construction and start up management. What is not included in the estimated budgets and should to be added are annual

operational and maintenance costs over time. All areas regardless of location will have continual
5-5 wave/water erosion problems, require regular vegetation management, should include public outreach
Continued and education, and may require periodic predator control.

From an adaptive management and fiscal standpoint, strong consideration should be given to looking
at alternate nesting sites in the Warner Valley area and Malheur National Wildlife Refuge. Some of the
northern lakes in Warner Valley (Anderson Lake and Hart Lake) could provide nesting habitat in good
water years and construction of suitable islands could be done at much lower costs in dry years (at least
5-6 50 % of the years). Malheur Lake should provide the same kind of options depending upon water
years. Recent tern nesting use at Malheur indicates a high potential for meeting distribution objectives
once nesting habitat is more secure (600 pairs in 1994-95). The department recommends that Malheur
Lake be added to the preferred alternative as it is similar to other eastern Oregon sites and tern
management is appropriate for the refuge.

The EIS indicates under all alternatives that Rice and adjacent upriver islands will continue to be used
as dredge spoil sites. This will only serve as an attractive nuisance for terns in the Columbia River
5-7 estuary for nesting and roosting, while expensive and extensive efforts are ongoing to move terns out
of the estuary. Unless this issue is addressed in another manner (e.g., periodic mulching and seeding),
the Corps can expect to continue hazing terns for many years until those areas are no longer suitable
for dredge spoil disposal.

Research and Monitoring

Research to date has made important contributions to understanding the population dynamics of terns
on the lower Columbia River, cormorants on ESI and terns upriver at Crescent Island. A
comprehensive research and monitoring program needs to be developed for the entire basin and
5-8 alternate sites to assess the overall status and impact of avian predation and the outcome of the
management program selected. The department requests that this include specific focus on detailed
fishery assessments and long-term avian population change among the states. The research effort
should also include expansion of existing PIT tag programs as well as developing reliable estimates of
smolt abundances in areas where avian predators forage.

If you have any questions regarding our comments, please contact my office.

Sincerely,

Ron Anglin
Wildlife Division Administrator

Cc: Roy Elicker
Ed Bowles
Chris Wheaton
Chip Dale
Dave Brittel, Washington Dept. Fish and Wildlife

Responses to Comment Letter 5. Oregon Department of Fish and Wildlife

5-1 This EIS is specifically focused on management of Caspian terns in the Columbia River estuary and the general avian predation issue is outside the scope of this EIS. This issue is part of the overall salmon recovery effort and is addressed in other documents. The 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b) acknowledges that double-crested cormorants currently consume more juvenile salmonids than terns in the Columbia River estuary and requires the Action Agencies (Corps and BPA) to begin addressing this concern. Since the Settlement Agreement requires an EIS prior to altering double-crested cormorant habitat in the estuary, efforts are underway by various Federal agencies to begin accumulation of the necessary research and management data for the development management actions and EIS. See also response to General Comment 3.

5-2 Evaluating and addressing impacts from other avian predators such as the double-crested cormorants are outside the scope of this EIS.

5-3 The proposed colony size for East Sand Island (i.e., 2,500 to 3,125 pairs) is consistent with colony sizes observed historically in coastal Washington (range of 100 to 3,500 pairs). Since these colonies have been lost, the East Sand Island colony now represents one of the few coastal colonies (currently only two) in the Pacific Northwest. NOAA Fisheries has determined that the proposed colony size is compatible with salmon recovery efforts in the Columbia River Basin (NOAA Fisheries 2004b). Additionally, East Sand Island serves as an important part of the network of nesting sites for terns in the region, thus, we believe that the proposed colony size is appropriate.

5-4 Comment noted. Managed alternative sites would be monitored to determine if there is impact to listed salmonids (see Monitoring and Adaptive Management Plan, Chapter 2). If impacts were observed, discussions with the appropriate entities (e.g. landowners, State and Federal agencies) could be initiated to develop management plans to address the impacts. This monitoring data would be used to support an adaptive management approach.

5-5 Specific estimates of annual budgets will be provided more fully in an Implementation Plan that would be developed after the completion of the EIS. The Implementation Plan would include expenses associated with wave/water erosion issues, vegetation management, public outreach and education and possible predator control. We recognize the need to provide funding to assist in implementation of the preferred alternative. While we do not currently have funds to fully implement the preferred alternative at this time, the Federal Agencies are working to secure funds in future budget allocations.

5-6 See response to General Comment 20. In addition, northern lakes in the Warner Valley suggested by the commenter may provide easier and cheaper island construction because dry conditions are more frequent. For this same reason, the likelihood that nesting habitat would be suitable (e.g. prey and water levels) would be less as compared to Summer and Crump Lakes.

5-7 The Corps has determined it necessary to dispose of dredge spoil material on Rice Island, Miller Sands Spit, and Pillar Rock Island (U.S. Army Corps of Engineers 2003). The Corps recognizes that they will need to invest resources to discourage tern nesting at these islands.

5-8 We agree with the commenter and propose to monitor managed alternate sites as described in the FEIS. Additionally, monitoring of the tern diet would also be conducted at other sites (e.g., Grays Harbor and mid-Columbia River) based on comments received on the DEIS . Overall avian predation monitoring through the Columbia River Basin and long-term fisheries assessments and the expansion of existing PIT-tag programs is outside the scope of this EIS. Although also outside the scope of the EIS, the Service is currently conducting long-term population monitoring for other bird species such as the double-crested cormorants in the Pacific Region as part of migratory bird conservation and monitoring efforts.

Comment Letter 6

State of California - The Resources Agency
ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
1416 Ninth Street
Sacramento, CA 95814
[illegible]

September [illegible], 2004

Caspian Tern Management EIS
U.S. Fish and Wildlife Service
911 NE 11th Avenue
Portland, Oregon 97232-4181

The Department of Fish and Game (Department) has reviewed the Draft Environmental Impact Statement (DEIS) dated July 2004 and entitled "Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary". The DEIS was prepared by the U.S. Fish and Wildlife Service (FWS), U.S. Army Corps of Engineers, and NOAA Fisheries. The DEIS describes how Caspian terns are now found nesting in unusually high numbers near the mouth of the Columbia River, Washington, due to the presence of artificial islands created from dredge spoil material and the large prey base that is available. FWS seeks to relocate these terns to other areas of Washington, Oregon, and California to protect juvenile salmon and steelhead, a primary food source of this population of terns.

Under the preferred alternative, relocation of some of the terns ([illegible] breeding pairs) would occur by reducing the available nesting habitat acreage of their nesting islands in the Columbia River estuary, thereby forcing displaced terns to nearby or new nesting sites in Washington, Oregon, and California. The new sites would be enhanced for tern nesting through removal of vegetation, predator management, and social facilitation use of tern decoys and tern vocalizations to attract terns to the newly prepared nesting sites. Table 2.1 of the DEIS lists eight areas of potential new tern nesting sites in the three states, of which 3 areas are in the San Francisco Bay Area. Thus, California would have approximately 44% of the burden for replacing lost tern nesting habitat on East Sand Island in the Columbia River estuary.

Comment Noted

The Department has previously commented on this issue in letters to the FWS dated January [illegible] and June [illegible], 2004. We appreciate the coordination that has occurred between the Department and FWS on this complex and controversial problem, and we are particularly appreciative that some potential relocation sites in California have been removed from consideration based on our earlier input. However, we still have serious concerns with the project.

Comment Noted

Conserving California's Wildlife Since 1870

We maintain that relocation in California should occur only in historical
6-1 locales and in historical numbers, while minimizing impacts to Threatened and
Endangered species and to Species of Special Concern.

The Department appreciates that food habits studies were undertaken on
Caspian terns in California. However, as expressed earlier, studies of short
duration, conducted via one method, cannot accurately set a baseline from which
to fully evaluate potential impacts to sensitive fish populations, fisheries, and
6-2 other fish eating birds in California. We remain concerned that tern diets would
be dynamic in response to prey availability, changes in the estuary environment,
and as terns learn of ideal foraging locales and compete with other fish eating
birds.

We understand terns can only forage a set distance from the colony while
still maintaining a successful nest. Also, we know from existing data that they do
move around between colonies, and often take advantage of other available nest
sites. Thus, one cannot easily predict where the birds will nest in the short or
long term as fish numbers fluctuate, as predators cause disturbance and colony
abandonment, and as new habitat becomes available, however temporary. The
DEIS also makes this point on Page 3-1: "Caspian terns may pioneer into
locations not discussed in this DEIS on their own volition. Thus, since this
6-3 species takes advantage of ephemeral habitat and forage conditions over a wide
geographical range, we cannot predict with complete certainty where colonies
would establish themselves in the future". For these reasons, it is premature to
conclude that Caspian terns would not have a significant effect on fish resources
in California. The Caspian tern numbers that potentially would occupy sites in
California could have an impact on sensitive salmonids and other fish resources
and fisheries (anchovies and herring), and could result in prey competition with
other seabirds, including the Endangered California least tern and marbled
murrelet. One point to consider: because Caspian tern productivity is low in the
6-4 San Francisco Bay Area (Bay Area) compared to East Sand Island, it may be
that prey is already a limiting factor controlling their numbers.

Under the preferred alternative, up to 2,890 pairs of Caspian terns (6,570
pairs displaced x 0.44 California nesting habitat replacement burden) would
potentially be relocated to the three new nesting sites in the Bay Area. In 2003,
6-5 approximately 1,190 breeding pairs nested in the Bay Area in five colonies. The
preferred alternative would therefore *more than triple* the existing population of
nesting Caspian terns in the Bay Area, resulting in a population of up to 4,080
breeding pairs. Populations at these levels would likely affect sensitive salmonid
resources in the Bay Area, and other fish populations as well. A worst case
6-6 scenario (as displaced Columbia River estuary Caspian terns nested and

successfully reproduced over time) could potentially result in an additional 6,564 breeding pairs of Caspian terns in the newly created 3.5 acres of habitat in the Bay Area, resulting in a total population size *over six times the current level*. This is based on tern nesting density data provided on pages 2-4 and 2-5 in the DEIS for the managed population size for the Columbia River estuary: 2,813 pairs of terns to be managed on 1.5 acres of habitat. These colony sizes are not normal for Caspian terns, and do not match historical data available for California. By comparison, the average size of tern colonies in the Pacific Coast region since 1997 ranges from 8 to 681 nesting pairs (page 3-7 in the DEIS). For California, based on data from the late 1970s – 2000, approximately 2,500 breeding pairs has been the normal population size for the entire state (page 3-9 in the DEIS). Considering this information, the potential displacement of at least 2,890 pairs of Caspian terns from the Columbia River estuary into California or the Bay Area ecosystem is not biologically sound.

6-6 Continued

In order to overcome the biological problem with facilitating relocatron of such a large number of displaced terns into various locales, the Department recommends reducing the amount of replacement habitat for this project from 2:1 to 1:1 or less. This seems reasonable based on the fact that the Columbia River estuary population of Caspian terns is capitalizing on a human-caused situation. This would result in a revised alternative where nesting habitat is reduced on East Sand Island as planned under the preferred alternative, but no new sites are prepared in other locales. The displaced terns will not be able to breed, and will probably slowly disperse across a fairly broad area (satellite telemetry studies would prove useful to test dispersal routes and new nesting locales), but would not find prepared sites specifically created for their use. A more limited control program could also potentially be factored in, much less than proposed under alternative D. This may be necessary in case displaced terns do not disperse, but simply linger in the area as non-breeders and continue to prey on salmonids.

6-7

Because of the flexibility that Caspian terns can exhibit in nesting locales and substrates, and because some banded terns from the Columbia River are occasionally seen in California, the Department recommends against the use of social facilitation techniques in California. The Department does not support encouraging a more rapid colonization than will occur naturally. Social facilitation has a high likelihood of success based on recent case studies for other seabirds.

6-8

Caspian terns are not listed as a Threatened or Endangered species under the federal Endangered Species Act or the California Endangered Species Act (CESA). Additionally, they are not classified as a California Species of Special Concern. The Department believes management and conservation

6-9

emphasis should be on ecosystem restoration to the maximum extent feasible, with special consideration for Threatened and Endangered species, and designated species of concern with known threats and declining populations. In this regard, managing for increasing populations of Caspian terns is not a priority in California. Particularly in the highly-modified environment of the Bay Area, management emphasis should be placed on the state and federally listed California least tern, the federally listed western snowy plover, and listed and sensitive fish. The recovery plan for the snowy plover documents multiple nesting sites in close proximity to potential Caspian tern "relocation" sites. Information from San Diego National Wildlife Refuge indicates that Caspian terns are known to nest on high spots in salt ponds. Thus, there is a high probability for conflict even between these two species. The DEIS failed to address potential significant impacts to least terns and snowy plovers from an increasing Caspian tern population. Such impacts include competition for nesting substrate, displacement of nesting terns or plovers, prey competition between tern species and other seabirds, and disturbance from large flocks of roosting Caspian terns.

6-9 Continued

We reiterate our comments from page one of our January 7, 2003 letter: There is evidence from southern California that the larger and more aggressive Caspian terns can displace the Endangered California least terns from nesting sites. This is of considerable concern to the Department since many of our coastal wetland areas were established, and are currently managed, to help conserve and recover least terns. The California least tern is both state and federally listed as Endangered. It is also classified as a Fully Protected species under Fish and Game Code Section 3511; take or possession of fully protected species is not allowed except by approval of the Fish and Game Commission under special circumstances.

6-10

Summary

The Department is concerned about the precedent-setting implications of this proposed project that spans several States and areas of jurisdiction. We consider the current human-created problem in the Columbia River estuary to be similar to depredation problems that our wildlife agencies sometimes encounter. An example we can provide would be depredation problems caused by double-crested cormorants on fish producing facilities. We would generally not support the relocation of fish-eating cormorants utilizing a stocked fish pond from another state to California in order to ease the burden in the home locale.

Comment Noted

In reviewing the DEIS and other documents produced by the FWS on this tern/salmonid conflict, the human-created nature of the existing problem strikes

Caspian Tern Management EIS Page 5

us as a driving issue that should form the appropriate biological/management response: ecosystem restoration. Because Caspian terns did not even nest in the Columbia River estuary according to historic records, and they apparently first nested on human-created salt pond dikes in very small numbers in south San Francisco Bay, it is not in keeping with ecosystem restoration principles to
6-11 encourage large colony sizes in either locale. In this regard, we repeat our recommendation from our June 10, 2004 letter: The Department supports Caspian tern management in California only at historic colonies and at the level of historic numbers. If management efforts are undertaken to encourage Caspian tern nesting, there should be adequate funding and staffing to manage this species and potentially affected listed and sensitive species *in perpetuity* (the final EIS should address how FWS would respond if least terns or snowy plovers nest in newly created habitat for Caspian terns). In all cases, it will be important to avoid or minimize any impacts to sensitive/listed species and to document any impacts.

We have several examples demonstrating unanswered questions regarding factors affecting Caspian tern nest site establishment or persistence. Two cases in California are the Humboldt Bay region as described in the DEIS and supporting documents, and the apparently suitable nesting habitat at Batiquitos Lagoon area in San Diego county. Why Caspian terns abandoned a nesting area in Humboldt Bay for approximately 30 years is unknown; why
Comment Noted Batiquitos has yet to become a Caspian tern colony is also unknown. Given these environmental complexities, we think it is particularly dangerous to facilitate an increased population level of a widespread species in California, where our coastal and inland wetlands and normal ecosystem processes have been significantly altered. Attempting to manage and control Caspian tern nesting preferences and population numbers in space and time, while avoiding impacts to endangered species over a broad geographic area is particularly risky, especially when annual funding appropriations are not secure. If the necessary federal appropriations were not made for Caspian tern monitoring in the future, then environmental impacts would not be properly documented or addressed.

Impacting native predators via predator management is also questionable when the species being managed is not imperiled. Predator control for protection of nesting waterbirds is a sensitive, often controversial activity, even if the
6-12 predator is non-native and the prey is endangered. This has been particularly true in the Bay Area. Additional predator control proposed for protection of new colonies of the non-listed Caspian terns in this area would potentially compound, perhaps jeopardize, endangered species protection efforts for California least terns, snowy plovers, and California clapper rails.

Thank you for the opportun ty to comment on the DEIS and previous documents. The Department recommends that FWS continue to coordinate closely with us on this project, especially in regard to CEQA issues and recovery planning for endangered species in California. To the extent FWS will rely on landowners and State or public agencies in California for this project, the appropriate CEQA processes will need to be followed. CEQA requires mitigation and monitoring for significant impacts; this requirement needs to be built into the future planning and funding process for this project.

Comment Noted

If you have any questions, please contact Ms. Esther Burkett, Associate Wildlife Biologist, of my staff by telephone at (916) 654-4273.

Sincerely,

Sandra C. Morey, Chief
Habitat Conservation Planning Branch

cc: Ms. Debra Schlafmann
U.S. Fish and Wildlife Service
California/Nevada Operations Office
Sacramento, California

Mr. Ryan Broddrick, Director
Californ a Department of Fish and Game
Sacramento, California

bc: Department of Fish and Game continue

Ms. Karen Kovacs
Northern California – North Coast Region
Eureka, California

Mr. Rob Floerke
Mr. Carl Wilcox
Central Coast Region
Yountville, California

Mr. Chuck Raysbrook
Ms. Terri Stewart
Ms. Lyann Comrack
South Coast Region
San Diego, California

Mr. Curt Taucher
Mr. Glenn Black
Inland Deserts – Eastern Sierra Region
Chino Hills, California

Ms. Marilyn Fluharty
Marine Region
San Diego, California

Responses to Comment Letter 6. State of California, Department of Fish and Game

6-1 We consider San Francisco Bay in its' entirety a historic locale since terns have nested at various sites within the Bay since 1916 (Shuford and Craig 2002). Specific colony sites in the Bay change from year to year because of various reasons such as the loss of habitat (e.g., vegetation growth, fluctuating water levels, encroachment by gulls), predators, and human disturbance (e.g., salt pond levee maintenance, recreational activities). All three sites have been used historically by terns: Brooks Island is currently used by nesting terns; Hayward Regional Shoreline has been used by 1-2 pairs from 1995-2002; and Ponds N1-N9 has been used by 5 to 22 pairs from 1995 to 1998 (Shuford and Craig 2002).

We specifically included the 3 sites in San Francisco Bay in the preferred alternative to minimize impacts to threatened and endangered species, primarily the California least tern and western snowy plover. The text on page 4-22 has been expanded to better describe effects to these species. Additionally, we have initiated ESA-consultation with the Service and will complete the consultation prior to implementation of the preferred alternative.

6-2 We acknowledge that tern diets could be dynamic in response to prey availability and other environmental factors, but, as stated in the EIS, we do not expect the number of nesting terns to rise above 1,500 pairs at each site (or 4,500 pair total for the 3 sites). Additionally, based on tern diet studies conducted in 2003 and 2004 (see response to General Comment 15 (section J.2)), we do not expect to see substantial impacts to sensitive fish populations (e.g., ESA-listed salmonids, herring). We also do not expect to see impacts to other fish-eating birds because prey preference for terns do not strongly overlap with other fish-eating birds in the Bay. For example, Caspian terns consume prey ranging 5 to 25 cm in size, while California least and Forster's terns consume smaller prey (2 to 9 cm and 1 to 10 cm, respectively).

6-3 The statement on page 3-1 refers to terns nesting on a regional scale. The scenario would be different in San Francisco Bay. Nesting habitat is currently limiting in the Bay and thus, we believe that we can predict that terns would nest on the managed alternate sites. As described in the above response and in response to General Comment 15 (section J.2), we do not expect to see substantial impacts to sensitive fish populations. Additionally, as described in Chapter 4, section 4.2.6, we do not expect prey competition with the endangered California least tern since least terns consume smaller prey than Caspian terns (see above response to 6-2). With regards to marbled murrlets, since they are rarely found foraging in the bay, prey competition with terns is not expected (K. Nelson pers. comm.).

6-4 See response to General Comment 14 (section J.2).

6-5 As described in General Comment 15 (section J.2), we do not expect to see substantial impacts to sensitive salmonid resources in the Bay Area.

6-6 We do not expect tern numbers to reach six times the current levels because conditions in the Bay Area would not support the high productivity that is observed in the Columbia River estuary. Although habitat would be available for terns, food resources in the Bay are not as abundant and concentrated as observed in the Columbia River estuary, prohibiting an exponential growth similar to that observed in the estuary. Additionally, we expect individual site colony sizes to fall within the range historically observed on the California coast (100 to 1,500 pairs) rather than 2,813 pairs as the commenter suggests. The data summarized in Chapter 3 (section 3.2.1) for statewide tern population numbers in California shows a range from 2,586 pairs in the late 1970s, a peak of 4,350 pairs in 1997, to approximately 2,373 pairs in 2003 (Appendix F). Thus, the "normal population size for the entire state" has not been documented to be "approximately 2,500 pairs." The significant alteration of California's inland wetlands is most likely a major contributing factor to the dispersal

Responses to Comment Letter 6. State of California, Department of Fish and Game (Continued)

of terns towards the coast and into the Pacific Northwest. Numerous colonies on freshwater marshes (e.g., Tule Lake, Lower Klamath Lake) have been lost or altered, such that terns can no longer nest there or only small colonies can be supported. Gill and Mewaldt (1983) noted that by approximately the mid-1950s, terns had ceased to nest throughout the San Joaquin and Sacramento Valleys. Thus, the enhancement of nesting habitat in San Francisco Bay would assist in restoring some of the habitat that has been lost in the State.

6-7 Development of alternate habitat in the region at a 2:1 ratio provides a stable network of nesting habitat for terns throughout the region. Although fluctuating environmental conditions occur at each site, affecting annual suitability for terns, we expect that this network, including the alternate sites proposed in the preferred alternative, would accomodate the current regional tern population. Additionally, revising the preferred alternative to exclude or reduce the development of new nesting sites will not assist in our project's objective of redistributing a portion of the tern colony on East Sand Island throughout the region. Newly created habitat is intended to attract displaced terns from the Columbia River estuary and to minimize the potential that adult terns would remain in the estuary despite the lack of nesting habitat. Specifically, if sufficient alternate sites are not available in the region, displaced terns would have no place to go. Finally, reduction of nesting habitat on East Sand Island without enhancement of alternative nesting sites in the region could result in a decline in the regional tern population at an unacceptable level.

6-8 We concur with the commenter in stating that social facilitation has a high likelihood of success. It is for this reason that we are proposing to use social facilitation in San Francisco Bay. Social facilitation would attract Caspian terns to the specific locations managed for Caspian terns. This would assist us in "controlling" where Caspian terns may nest in the Bay, minimizing potential conflicts with the California least tern and western snowy plover. If social facilitation is not used, there is a greater potential that displaced Caspian terns could nest at sites where conflicts with ESA-listed species (i.e., California least tern or western snowy plover) could occur.

6-9 We agree that management and conservation emphasis should have special consideration for threatened and endangered species. The purpose of the preferred alternative of this FEIS is to assist in recovery of ESA-listed salmonids in the Columbia River by minimizing tern predation. The essence of our Guiding Principles (Chapter 1) is to take a balanced ecosystem approach towards managing terns and ESA-listed salmonids. Thus, we included alternate sites that offered the best potential for terns while minimizing effects to ESA-listed species. Additionally, we believe that development of Caspian tern nesting habitat would also result in increased habitat for other colonial nesting waterbirds, such as Forster's terns, a species which is known to nest adjacent to Caspian tern colonies. Thus, we believe creating nesting habitat for a variety of colonial nesting waterbirds is consistent with ecosystem restoration.

See 2nd paragraph in response to comment 6-1 above regarding potential impacts to the California least tern and western snowy plovers.

6-10 As described above in responses to comment 6-1, 6-8, and 6-9, we have designed the preferred alternative in this FEIS to minimize impact to California least terns by including management sites that are not adjacent to the current California least tern nesting colony (Alameda NWR). Additionally, we propose to use social facilitation to attract terns to locations that would reduce conflicts with the western snowy plover and California least terns at traditional nesting sites

.

Responses to Comment Letter 6. State of California, Department of Fish and Game (Continued)

6-11 We respectively disagree with the commenter in stating that the preferred alternative is not consistent with ecosystem restoration on two points: (1) the distribution of the regional tern population and (2) habitat loss in California.

The large colony on East Sand Island is atypical for Caspian terns and appears to represent an imbalance resulting from the creation of secure artificial nesting habitat combined with an abundant and intensively managed prey base. The preferred alternative in this EIS is attempting to redistribute majority of this colony throughout the region into more numerous and smaller colonies, a scenario more similar to the historic tern distribution in the Pacific Coast region. This also aids in preventing an ecosystem imbalance at any one particular location.

Secondly, the loss of historically used habitats (interior freshwater wetlands) has most likely led to the colonization of nest sites on the Pacific Coast. Thus, we respectively disagree with the commenter in stating that terns nesting in the Columbia River estuary and San Francisco Bay is "human-created" and would not have occurred under natural conditions. Caspian terns are a highly migratory species and it is not unusual for terns to shift their nesting locations in response to local environmental conditions. It is this behavior that has allowed the natural shift and expansion of their breeding range (as has been observed in the Pacific Region with terns now breeding as far north as Alaska). Thus, since the Columbia River estuary and San Francisco Bay are within their breeding range, the fact that they are nesting on artificial substrate is irrelevant to their native status in the ecosystem. In particular, the extensive loss of natural habitat in San Francisco Bay has led terns to use artificial habitat (i.e., salt ponds) because it is most available.

The Action Agencies are committed to funding efforts to monitor implementation and effects of the proposed action. See the proposed Monitoring and Adaptive Management section in Chapter 2 for more detail. The Action Agencies have initiated ESA-consultation regarding potential effects to ESA-listed species. This consultation will be completed prior to implementation of the preferred alternative.

6-12 Predator management activities that would be implemented to protect Caspian tern nesting colonies would be within the programs currently being conducted for threatened and endangered species (e.g., California least tern, western snowy plover, California clapper rail) that nest in the Bay. Thus, we expect efforts to protect Caspian terns would enhance, rather than compound, predator management efforts for threatened and endangered species.

Comment Letter 7

[illegible]

7-1 [illegible]

Comment Noted [illegible]

Comment Noted [illegible]

[illegible]

Response to Comment Letter 7. Idaho Fish and Game

7-1 This EIS is specifically focused on management of Caspian terns in the Columbia River estuary. Thus, the overall avian predation issue in the Columbia River Basin is outside the scope of this EIS. This issue is part of the overall salmon recovery effort and is addressed in other documents (see response to General Comment 3 for more details).

Comment Letter 8

Office of Species Conservation

Comment Noted

Comment Noted

Comment Noted

"Steve Bobzien" <sbobzien@ebparks.org>

09/20/2004 02:37 PM

To: <csteeis@r1.fws.gov>
cc:
Subject: Comments for the Draft Caspian tern Management EIS

Comment Letter 9

September 20, 2004

Caspian Tern Management EIS
U.S. Fish and Wildlife Service
911 NE 11th Avenue
Portland, Oregon 97232-4181

Thank you for providing the East Bay Regional Park District (District) with the opportunity to comment on the Caspian Tern Management Draft Environmental Impact Statement (DEIS). The District currently manages 65 parkland units including Brooks Island Regional Preserve and Hayward Regional Shoreline which are identified as potential enhancement sites in the DEIS.

9-1 Because of the California budget crisis the District does not have the ability to fund any of the proposed enhancements identified in the DEIS. This includes funding for vegetation removal and control, elevating and improving nesting substrate, social attraction, erosion control, predator control, increasing law enforcement, developing public out reach programs and providing educational opportunities at Brooks Island Regional Preserve or Hayward Regional Shoreline. In addition, alternative public landing sites on Brooks Island will need to be created away from the sandy spit to successfully close the colony area from the public. Furthermore, the estimated costs in the DEIS

9-2 for proposed enhancements should not only include the first year, but also mid and long term costs associated with each location. For example, $56,000.00 is the estimated first year cost to implement limited enhancement on Brooks Island (Appendix G-5). Although, these first year costs estimates may be adequate to begin the proposed enhancements it is likely to cost significantly more to successfully create, enhance, maintain, and protect viable Caspian tern nesting habitat in perpetuity at Brooks Island Regional Preserve and Hayward Regional Shoreline.

If you have any questions please contact me at (510) 544-2347

Sincerely,

Steven Bobzien
Ecological Services Coordinator
East Bay Regional Park District
2950 Peralta Oaks Court
Oakland, CA 94605
sbobzien@ebparks.org

Response to Comment Letter 9. East Bay Regional Park District

9-1 We recognize the need to provide funding to assist in implementation of the preferred alternative. However, we propose to seek partners to fund associated outreach and education opportunities at Brooks Island Regional Preserve and Hayward Regional Shoreline.

9-2 Detailed construction (first year) and operations and maintenance (O&M) costs will be provided more fully in an Implementation Plan that would be developed after the completion of the EIS. We will be coordinating extensively with the East Bay Regional Park District on the Implementation Plan, specifications for construction actions, and future O&M requirements at Brooks Island and Hayward Regional Shorelines. Our intention is to resolve any questions at that time through development of cooperative agreements and to complete any further environmental and/or regulatory requirements associated with the proposed management actions. Implementation of the preferred alternative is dependent upon the availability of funds from the implementing Federal Agencies. While we do not currently have funds to fully implement the preferred alternative at this time, the Federal Agencies are working to secure funds in future budget allocations to support implementation of the preferred alternative.

Comment Letter 10

Shugart, comments on Caspian Tern DEIS, 9/19/2004 1

Comments on Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary, *Draft Environmental Impact Statement*

From: Gary W. Shugart, Ph.D, Slater Museum of Natural History, University of Puget Sound, Tacoma, WA 98416 (gshugart@ups.edu, gwshugart@hotmail.com)

Overview:
I reviewed two previous drafts of Appendix C as well as the North American Status by
10-1 Shuford and Craig and the Site Evaluation by Seto et al. The DEIS is disappointing in
that there is no evidence that terns harm steelhead runs or that the management proposed
will have any impact on actual population growth rates of the four steelhead runs
considered. In the current Appendix C the projected increases in population growth rates
of ESUs are not estimated, rather the authors compute assumed % changes in smolts due
to management. These %'s are then misrepresented as population growth rates of the
10-2 ESUs. Throughout the DEIS and associated material the phrase "population growth rate"
should be changed to "projected change in smolts" to accurately reflect the superficial
analysis.

Title: The title should be changed to "Caspian Tern Management to Reduce Predation of
Juvenile Steelhead in the Columbia River Estuary". The DEIS is confined to steelhead.
10-3 The title of Appendix C is a holdover of the previous version (see NOAA 2002) and
should be titled "Caspian Tern Predation on Juvenile Steelhead (Outmigrants) in the
Columbia River System". Drop "Outmigrants" it isn't needed. Of the four steelhead runs
considered, two (Snake River, Upper Columbia) are stable to growing without
management [see first row of Table 2.2 (page 2-5) and Appendix C Table 5 (page C-14),
10-4 which are from Table 1 in McClure et al. 2003] and the other two are close if 95% CI are
recognized (see McClure et al 2003). It appears that this obvious point was missed in the
formulation of the plan.

General comment: Intentional misrepresentation of population growth rate. There
are 69 occurrences of the phrase "population growth rate" in the DEIS and associated
material. It is explicitly stated or implied throughout the DEIS is that the proposed
management will result in growth rates of the fish populations (i.e., ESUs) at up 1.4-1.9%
(see Fig. 2.2, Table 2.2). However these %'s actually refer to the projected % changes in
smolt survival relative to smolt survival projected with 10,000 pairs of terns. For
10-5 example, from Table 4, page C-12, smolt survival with 10,000 pair is 91.3% and 5,000
pair survival is projected at 95.7%. Percent change in smolt survival is 1% =
$((95.7/91.3)^{1/4.79})$ -1) x 100. The percents are from the linear relationship generated from
the four data points in Roby and Collis and the origin (0 terns eat 0 salmon). Note that 1
is subtracted simply to produce a proportion which is then multiplied by 100 to make it a
percent.

In examining result of calculations, for all steelhead (Table 4a, b, page C-12), what is presented as % change in population growth rates are simply the % change at increments along the line compared to the baseline of 10,000 pair (see Table 1, Fig 1 page 8 of comments). The starting λ's listed in Table 2.2 (p 2-5) and Appendix C Table 5 (page C-

14) were taken directly from McClure et al. (2003) and simply serve as the starting points for the projections for individual steelhead runs. However, rather than simply citing the source from which the values were lifted, the impression is that some sophisticated analysis was done. From page C-11, "We then used these estimates of predation rate (derived from the number of terns) to derive the likely impact on the overall population trajectory for steelhead in the Columbia River. We first calculated the median population growth rate lambda (λ) using the methods in Holmes (2001) and McClure *et al.* (2003)." All that was done was to extrapolate projected % changes in smolts to % changes in λ's. For example a change in smolts of 1% is equivalent to a change in λ of 1 to 1.01.

Using % changes in smolt survival for changes in annualized population growth rate (λ) appears to rely on some algebra and some unreasonable assumptions. The algebra apparently comes from Holmes' papers, McClure et al. (2003), and ultimately Caswell's
10-5 Continued (2001) formula for computing generation time ($T = \log R_o / \log \lambda_1$) which can be rearranged to $\lambda = R_o^{1/T}$. This is the annualized (or time specific) value for population growth rate (R_o =1 is stable, >1 increasing, 1< declining). The intent was to allow comparison among populations or species that had different generation times for which a biological meaningful R_o had been calculated. However, one can substitute any value for R_o - limited only by imagination and inattention of reviewers. McClure et al. (2003) used population counts in successive years which have a long tradition in salmon and wildlife management, but the 95% CI for resulting λ*'s* are relatively large rendering them useless for the manner in which they are being used (see Table 1, McClure et al 2003). In Appendix C the authors use the projected changes in smolts relative to the projected number taken by 10,000 pair of terns as a population growth rate. There is absolutely no attempt to place these minor changes in the broader context of the actual population growth rate. Clearly the projected % changes in smolt survival have unknown biological significance and certainly are not reasonable estimators of population growth rates of the ESUs. A requirement for these types of calculations are the assumption that all else remains constant. These only work on paper and not in a dynamic system.

The misrepresentation of population growth rate highlights a major inconsistency in thinking and policy. From page C-12. "We did not use a formal Leslie matrix analysis to estimate changes in population growth rates because data to parameterize a detailed model for steelhead were not available." indicates they lack the data or the time to do a
10-6 thorough analysis. However, the policy of concentrating on estuarine predation is based the Kareiva et al (2000). This was a computer model of the Poverty Flat Chinook that has little to do with steelhead. So, although they are unable to place the steelhead data in the context of the actual populations growth rate, they have no problem relying on a computer model of another species with some guesstimated data for the single relevant citation that the DEIS need only focus on increasing smolt survival.

In summary, NOAA/NMFS misrepresents the population growth rate, has no idea how
10-7 minor increases in smolts would affect fish populations, and use a computer model of another species to prove that they only need to look at smolt survival. The analysis is then supposed to provide the scientific basis for the DEIS. The analysis needs to be rewritten as follows:

Shugart, comments on Caspian Tern DEIS, 9/19/2004 3

10-7 Continued

Based on Collis and Roby, a linear relationship might describe terns' consumption of steelhead juveniles. Based on this possible relationship, fewer terns might eat fewer salmon. Given that zero terns will eat zero salmon and that predation is generally considered harmful to the resource, we hope that reducing terns will increase smolt survival. However, we have no idea if this might affect steelhead populations as whole and have no methods or plans to assess the impact.

Comment Noted

Picking an alternative: Of the existing alternatives, I prefer B, then A, followed by C. In choosing B, I am amazed at the lack of data for the dynamics of the system they propose to manage. For example Alternative B, no management, is rejected as unworkable because managers feel that vegetation would push terns out in three years. There are no data to support this assertion. There may be confusion over the need for site preparation of new heavily vegetated sites occupied by gulls versus traditional sites. Initially on East Sand in 1999-2000, vegetation and gull management might have been needed to get the colony established, although even this is doubtful. Once terns are established, continued management has exacerbated the perceive problem of too many terns. On East Sand, management has provided terns with high and dry nesting space not susceptible to flooding from waves, downpours, and tides and well as removal of gulls (shooting, removal vegetation & objects attractive to gull nesting) that are one of the few tern predators East Sand. The result is high productivity of terns. Left alone, gulls would occupy high sites, vegetation succeeds in the larger gull territories, and terns nest in available space. Typically, many would occupy marginal habitat on the edges that tend to be more exposed and susceptible to weather related effects (flooding from wind and tides). In addition, the large dense colony would likely be fragmented with gaps and more edges allowing more predation and interference from gulls. More thought and planning is needed regarding alternatives. As a starting point I suggest an Alternative E (E for the Ecological Alternative) in which the gulls, tern, vegetation, and habitat interaction are allowed to play out for five years.

10-8

Comment Noted

10-9

There is little else in the body of the DEIS that is worth commenting on. However the conclusions in the main body of the DEIS are based on the calculations in Appendix C, which is at least the third attempt at trying to make an argument that tern predation is a problem. In considering Appendix C, I have compared it to the previous version (NOAA 2002), which was supposedly part of the legal settlement and is still available as background material (NOAA 2002). In the two, the background is about the same. Kareiva et al's. (2000) computer model of the Poverty Flat Chinook run is cited as the proof that predation is a problem (see comments below). Major changes are in modification or Estimating Predation Impacts (page C-7) (see below) and in the complete redoing of Data and Analysis (page C-10) by focusing on steelhead. Dropped was the Appendix 1 which provided the mathematical justification for the calculations. Errors in notation and lapses in logic made the derivation incomprehensible in Appendix 1 of NOAA (2002). Now, the formula on page C-11 is used for the calculations without any justification.

Appendix C, Table 1: Changes in total fish available. In Appendix C Table 1 the pool of salmonids available is much reduced from the same Table in NOAA 2002. Yet numbers consumed are listed as smolts for both and values are the same for the years that appear in both (1999-2001). The two tables appear to be based on the same and references. Without comment this looks fishy and the effect is to increase the percentage take, however the same estimate of "6% to 14%" is given for total take.

10-10

NOAA 2002, Table 1. Estimates of juvenile salmonids (in millions) consumed by Caspian terns in the Columbia River estuary 1997-2001[3] and numbers reaching the estuary[4].

Year	Consumed (95% confidence interval in parentheses)	Estimated number of smolts migrating to the estuary
1997	7.48 (5.36 - 9.6)	57.5
1998	11.2 (8.3 - 14.2)	116.9
1999	**11.7 (9.4 - 14.0)**	86.3
2000	**7.3 (6.1 - 8.6)**	117.3
2001	**5.9 (4.8 - 7.0)**	96.4

[3] Collis et al. 2001a.

[4] Data from NOAA Fisheries Fish Ecology Division and Fish Passage Center. No estimates were made for steelhead in 1997. Includes estimated numbers of hatchery coho salmon only, no estimates are available for wild coho. Since no values for coho survival through the power system are available, estimates of survival of hatchery coho through the system were developed through the use of SIMPAS (NMFS 2000a) values for yearling Chinook.

DEIS (NOAA 2004), Appendix C, Table 1 (page C-10). Estimates of outmigrating steelhead, yearling chinook and hatchery coho smolts reaching the estuary [a] and of juvenile salmonids consumed by Caspian terns in the Columbia River estuary 1997-2002 (**should be 1999-2002**).

10-11

Year	Number of smolts reaching estuary in millions	Number of smolts consumed in millions (95% C.I.)
1999	63.1	**11.7 (9.4 - 14.0)** [b]
2000	65.6	**7.3 (6.1 - 8.6)** [b]
2001	60.6	**5.9 (4.8 - 7.0)** [b]
2002	55.5	6.5 (5.5 - 7.6) [c]

a Data from NOAA Fisheries Fish Ecology Division, Sustainable Fisheries Division and Fish Passage Center. Includes estimated numbers of hatchery coho salmon only, no estimates are available for wild coho. Since no values for coho survival through the power system are available, estimates of survival of hatchery coho through the system were developed through the use of SIMPAS (NMFS 2000a) values for yearling chinook.
b Collis *et al.* 2001a c Collis *et al.* 2002

Page C-10. (DEIS text is copy/pasted in a smaller font, my comments are bold or larger font). Although the relationship between tern abundance and predation rate is not known with certainty, possibilities include linear, exponential, asymptotic, and logistic. A simple linear response of the predation rate on all steelhead to the number of Caspian terns nesting on East Sand Island during the breeding
10-12 seasons of 1999-2002 appears to describe the relationship. **Of the six linear relationships (Appendix C, figs 6-11), only two are significant ($p<0.05$). This means that there are insufficient data or that there is not a relationship as the authors assert.**

10-13 **Page C-11** (DEIS text is copy/pasted in a smaller font, my comments are bold or larger font).

Shugart, comments on Caspian Tern DEIS, 9/19/2004 5

10-13 Continued

We next calculated the deterministic change in population growth rates given standard reductions in mortality. Because the vast majority of steelhead in the interior Columbia are semelparous, the percent increase in λ attributable to an increase in survival at a particular life history stage can be approximated as:

$$\Delta\lambda = \left[\left(\frac{S_{new}}{S_{old}}\right)^{1/G} - 1\right] \times 100$$

where S_{old} is the initial survival rate before recovery action, S_{new} is the survival rate following the recovery action, and G is the average generation time (McClure *et al.* 2003). **This formula is simply the percent change from a smaller value "averaged" over time G (or T). For example, What is the % increase in going from 10 to 11? Answer: (11-10)/10 x 100 rearranged as ((11/10)-1) x 100 or 10%. For time of 1, T=1. A similar formula appears in McClure et al 2003 Formula 12 or 14 but G should be T, the standard notation for generation time. The S referred to spawners in the incomprehensible derivation of the above in Appendix 1 of the previous draft (NOAA 2002). So the right side is nothing magical. To the left of "= =" is the magic. What this says is if wave our magic wand and utter a magical spell (Kareiva perhaps ?), then the % change in the population growth rate of an ESU is sort of like the % change in the number of smolts. (Their point about semelparity is puzzling. Annualizing survival for salmonids, overestimates the value of a smolt and underestimates the value of an adult.)** This calculation assumes that the change in survival due to tern predation is independent of density and of changes in survival elsewhere in the salmonid life history. **i.e., is independent of reality. To repeat, what the authors have done is simply calculate % changes in smolt survival relative to smolt survival associated with 10,000 pairs of terns and call in population growth rate. This is the parroted in the main body of the DEIS.** We did not use a formal Leslie matrix analysis to estimate changes in population growth rates because data to parameterize a detailed model for steelhead were not available. **A lack of data didn't stop Kareiva et al (2000) when modeling Chinook, McClure was one of the et al's. When the modeling gets tough and data are sparse, good modelers guesstimate then generate response curves. Perhaps stick the % change in smolts in as increments to estuarine survival (s_e). Oops, I forgot, the model was based on a different species.**

10-14

Page C-12. The maximum proportional increase in λ corresponding to complete elimination of mortality due to tern predation was 1.9% using the PIT tag estimate of predation rate and 1.3% using the bioenergetics modeling estimate of predation rate; the proportional increase in λ.

This is what is cited in the main body of the DEIS. This should say "The maximum proportional (should be %) increase in % of smolts corresponding to complete elimination of mortality … was 1.9%…"

Page C-16

10-15 Table 9. Estimated predation rates (%) for Caspian terns and all birds breeding on Crescent Island on all steelhead ESUs in the Columbia River basin. Predation rates were calculated as the percent of PIT tags detected at Lower Monumental Dam that were later detected on cormorant colonies on Crescent Island (B.

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10-15 Continued

Ryan, unpubl. data). **It makes little sense to estimate tern predation rates based on tags found in cormorant colonies. I assume they mean bird colonies?**

CONCLUSIONS (page C-17)

10-16

Many evaluations of salmonid predation by Caspian terns in the Columbia River estuary have indicated that substantial numbers of juvenile salmonids are being consumed (Roby *et al.* 1998, Collis *et al.* 2001a, 2001b, Ryan *et al.* 2001, Ryan *et al.* 2003, Roby *et al.* 2003).

Sounds like Caspians are doing the evaluations. The fact that a lot of terns eat a lot of salmonids was known before the start of the studies. Roby and Collis work on the subject is impressive. However, there are no data for the leap in logic that because terns eat salmon, terns are problem. They may be, but they may also benefit the system by removing the hatchery fish and reducing competition in the system. Who knows? Tern predation is a part of the perturbed system consisting of 100+ million hatchery fish, ACE dredging & channeling the Columbia thus preventing the formation of sites and well as and creating nesting area through deposition of dredge material, lobbyists for and against terns and salmon, the other 3 H's, the decadal oscillations in the Pacific, and a changing political landscape.

10-17

Several factors must be considered when interpreting the results of these calculations. Perhaps the most important factor is that this type of calculation assumes that there is no compensatory mortality later in the life cycle, and that the benefits from any reduction in tern predation are fully realized. **Benefits to salmon populations from a reduction in predation have not been documented nor is there any balanced attempt to document the impact of predation on salmonid populations. At the very least the data from the last few years showing large runs of adult salmon from cohorts most exposed to predation would indicate that predation has had no effect. These data should be included rather than the selective inclusion of predation data in attempt to support the idea for the need for predator control.** In their assessment of predation impact by Rice Island terns on salmonids in 1997-1998, Roby et al (2003) hypothesized that tern predation was 50% additive. Given these limitations and uncertainties, the estimates of percent change in population growth rates should be viewed as maximum potential improvements. Realized improvements in population growth would likely be lower from any management action that reduces Caspian tern predation impacts on salmonid ESUs. These results may not be as easy to achieve as they are to calculate. It is also important to recognize that other factors such as ocean conditions may also influence population growth rate to a greater degree than the potential gains that may be realized from reducing predation by one species of avian predator on one island located in the lower estuary of the Columbia River basin. **i.e., Our calculations are so constrained by unrealistic assumptions and expectations, that the entire exercise is pointless.**

Comment Noted

Not all listed salmonid populations have declined because of the same factors or combination of factors, and not all populations could be expected to respond positively to any particular management measure or combination of measures. Check the Table In the case of the avian predator populations discussed here, artificial islands (such as Rice Island) have promoted the development of unprecedented large colonies of picsivorous birds with subsequent increases in losses of juvenile salmonids from predation. **A repeat of an earlier comment, the islands, in large part dredge material from Mt St. Helen outflow, and are no more unnatural than the 100 million hatchery fish dumped into the system. Without the interference of the ACE dredging, the**

estuary and the river would have much more nesting area than is now allowed to exist.

10-18 Finally, additional factors may influence the **speculative** gains in population growth rate that may be realized from reducing predation rates on outmigrating juvenile salmonids. These include, but are not limited to: hydropower operations, harvest rates, habitat conditions, the influence of hatchery fish and exotic species, ocean conditions, and climate change.

References:

Kareiva, P., M. Marvier, and M. McClure. 2000. Recovery and management options for spring/summer chinook salmon in the Columbia River Basin. Science 290:977-979.

McClure, M. M., E. E. Holmes, B. L. Sanderson, and C. E. Jordan. 2003. A large-scale, multispecies status assessment: anadromous salmonids in the Columbia River Basin. Ecological Applications 13:964.989.

NOAA Fisheries. 2002. Caspian tern predation on salmon and steelhead smolts in the Columbia River estuary. NOAA Fisheries. Portland, OR, 14 pages. (actually 20 pages). http://www.nwr.noaa.gov/1habcon/habweb/ternfinalprint_09-26-2002.pdf

NOAA 2002 (also referenced as Good, T. P., K. Barnas, D. M. Marsh, B. A. Ryan, B. Meyers and E. Casillas. 2003). Caspian Tern Predation on Juvenile Salmonid Outmigrants in the Columbia River Estuary cited in Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead: An Evaluation of the Effects of Selected Factors on Population Viability, Kurt L. Fresh, Edmundo Casillas, Lyndal L. Johnson, and Daniel L. Bottom,NOAA Technical Memorandum, NMFS/NOAA, Seattle, WA 98112 ,June 2004

Seto, N., J. Dillon, W.D. Shuford, and T. Zimmerman. 2003. A Review of Caspian Tern (*Sterna caspia*) Nesting Habitat: A Feasibility Assessment of Management Opportunities in the U.S. Fish and Wildlife Service Pacific Region. U.S. Department of the Interior, Fish and Wildlife Service, Portland, OR. http://migratorybirds.pacific.fws.gov/CATE%20Feasibility%20Assessment.pdf

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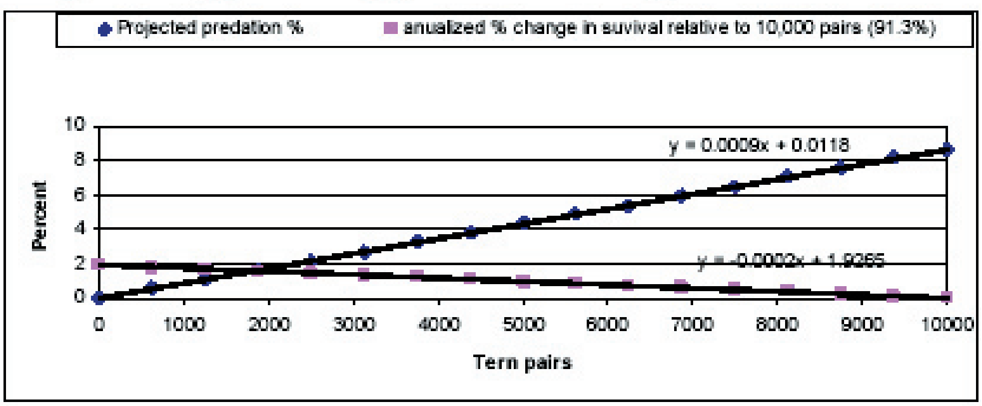
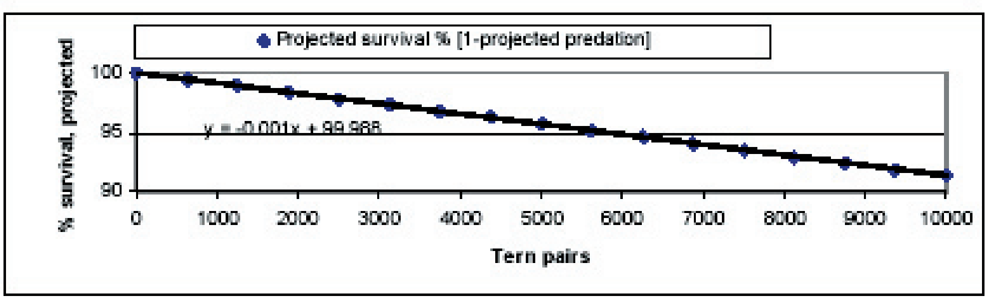
Table 1 & Fig. 1. "Life cycle model" used for calculations of % change in smolts survival which is misrepresented as the annualized population growth rate of steelhead ESUs.

Pairs	predation %	% survival rate (1-predaton %)	"lambda", % change in smolt survival relative to survival associated with 10,000 pairs as a base
10000	8.7	91.3	0.0
9375	8.2	91.8	0.1
8750	7.6	92.4	0.3
8125	7.1	92.9	0.4
7500	6.5	93.5	0.5
6875	6.0	94.0	0.6
6250	5.4	94.6	0.7
5625	4.9	95.1	0.9
5000	4.4	95.6	1.0
4375	3.8	96.2	1.1
3750	3.3	96.7	1.2
3125	2.7	97.3	1.3
2500	2.2	97.8	1.4
1875	1.6	98.4	1.6
1250	1.1	98.9	1.7
625	0.6	99.4	1.8
0	0.0	100.0	1.9





Response to Comment Letter 10. Gary Shugart, University of Puget Sound

10-1 See response to General Comment 1 and 2 (section J.2).

10-2 See response to General Comment 5 (section J.2).

10-3 See response to General Comment 8 (section J. 2).

10-4 Table 5 in Appendix C presents population growth rates (lambda) for steelhead in two ways. The first lambda is calculated under the optimistic assumptions about hatchery fish assumptions, in which hatchery fish do not reproduce and thereby negatively affect the population growth rate of natural-origin fish; the second (lambda-h) is calculated under the pessimistic assuption about hatchery fish reproduction, in which hatchery fish on the spawning grounds reproduce at the same rate as wild origin fish. This is explained in the text and in the table legend.

The range of lambdas under the latter assumptions is 0.63 to 0.95, which is considerably lower than those calculated under the former assumptions and highlights the significant hatchery component in the Snake River and Upper Columbia River ESUs.

10-5 See response to General Comment 5 (section J.2).

10-6 and 10-7 Comment noted.

10-8 Tillage operations each year successfully provide the bare ground, sandy substrate that terns prefer for nesting. However, tillage also cuts up and further distributes rhizomes of these plants throughout the tern nesting area, thus increasing their presence. Photographs taken each year by the tern researchers document the vegetation progression during the nesting season. By the end of the nesting season, a substantial portion of the site is covered with vegetation. Consequently, in the absence of tillage, we are confident that vegetation cover on the tern colony area at East Sand Island would be sufficiently dense and tall, precluding terns from nesting within 3 years after tillage operations are discontinued.

10-9 Comment noted.

10-10 Smolt abundances in Table 1 of Appendix C are improved over the previous numbers derived from the Table in this comment. NOAA Fisheries refined these estimates, but it is still a product derived from within the Northwest Fisheries Science Center. The smolt consumption data are from D. Roby's research and were done using the older estimates. The percentage in the text (end of 1st paragraph, page C-8) was changed to read 10 to 19 percent rather than 6 to 14 percent.

10-11 Comment noted and text changed in Appendix C.

10-12 NOAA Fisheries concurs that there is insufficient data to characterize the relationship for all ESUs. The figures were included to remain transparent about the analyses used to develop Appendix C of the EIS.

10-13 Comment Noted. NOAA Fisheries recognizes that there are differing opinions of the use of life cycle models. However, their value and limitations have been acknowledged in the peer reviewed literature. The use of life cycle modeling as used in Appendix C of the FEIS is consistent with peer reviewed and published studies on the subject.

10-14 Comment noted and text changed (to replace "proportional with "percent") in Appendix C.

10-15 Comment noted and text changed in Appendix C.

10-16, 10-17, and 10-18 Comment noted

Comment Letter 11

[illegible]

[illegible]

[illegible]

[illegible]

11-1

[illegible]

Comment Noted

[illegible]

Comment Noted

[illegible]

[illegible]

BRIAN E. SHARP,
ECOLOGICAL PERSPECTIVES
September 16, 2004

AN ANALYSIS OF AND COMMENTS ON "Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary", U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and NOAA Fisheries, Draft Environmental Impact Statement. July 2004. 41 Pages.

This is Ecological Perspectives Contribution No. 3 in the Public Interest

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SECTION 2. IN THE TERNS' BEST INTERESTS!

11-15

23. It has been suggested that the terns themselves would benefit from reduction and dispersal from E. Sand Island, that the proposed action is "in the terns' own best interest." Protecting terns from "stochastic events" - storms, disease and threat of oil spills - has been (rather facilely) suggested and then repeated by various parties as justification for the assertion (US Army Corps of Engineers 2002, Shuford and Craig 2002, Roby et al, 2003, etc).

The statement in the EIS (top p. 4-9) repeats the suggestion: "The dispersal of this large concentrated colony would be a benefit to the regional population because the potential risk of this large segment of the population to catastrophic events (e.g., predators, storms, and disease, see section 3.2.1) would be removed...." The statement needs further examination.

24. We have already seen that there is nothing in section 3.2.1. to support the "would be a benefit" statement, and that a statement not supported by data has little credibility.

25. It is also important to note that there are also NO DATA ANYWHERE in the EIS, not in Section 3.2.1, nor anywhere else in the EIS, not in backup documents (e.g., Shuford and Craig 2002) to support the assertion.

These assertions therefore remain mere "possibility statements." Anything is possible, but is it likely, or how probable is it? A quantification is needed 1) of the likelihood of these risks actually occurring, and 2) the likelihood of adverse effects on terns.

26. It is therefore important, since the EIS fails to do so, to examine here in these comments whether the argument is convincing that events mentioned are in fact catastrophic.

It will be seen that the answer to this question, upon more rigorous examination, is that these events are not catastrophic to the terns.

IN THE TERNS' BEST INTERESTS!
CATASTROPHIC STOCHASTIC EVENTS - OIL SPILLS

27. Oil spills have been proposed as the sort of catastrophic event because of which the large tern colony at Sand Island needs to be dispersed for its own protection. Since the EIS provides no data to back up the claim, a review of the historical occurrence and an evaluation of the risk of oil spills on the west (Pacific) coast in general, and in the Columbia River estuary in particular, follows:

In 1969, a Santa Barbara oil platform blew out. This was the first major west coast spill that affected the environment and seabirds. A review of the history of west coast oil spills from 1969 to 1994 (White and Sharp 1994), updated to the present (pers obs; J. Casey pers comm 9/04) finds that:

1) Since 1969, no significant, wildlife damaging oil spills have occurred in the Columbia River estuary;

6

11-15 Continued

2) No significant, [illegible] oil spills have occurred in the Columbia [illegible] Shuford and Craig [illegible] "shipping [illegible] large breeding aggregations [illegible] especially [illegible] spills [illegible] spilling or shipping [illegible] data to support the statement [illegible] oil spills [illegible]

3) Almost all major [illegible] shipping [illegible] By early September, [illegible] west coast oil spills [illegible]

[illegible]

4) [illegible] major [illegible] Only the [illegible] oil spill in the [illegible] history of [illegible] Strait of Juan de Fuca, [illegible] proposed [illegible]

5) [illegible] California and [illegible] from the Columbia [illegible] relocated.

The data on west coast [illegible] oil spill [illegible] terns [illegible] breeding [illegible] therefore, an [illegible] protection of terns from stochastic [illegible]

28. Apparently, [illegible] attempt to [illegible] the proposed action. [illegible] presented here on the [illegible] coast oil spills [illegible] proposed action, namely that the proposed [illegible] It is [illegible] of oil spills are concerned [illegible] serious [illegible]

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[illegible]

11-15 Continued

46. Many seabird species - sooty terns, noddy terns, murres, albatross, petrels, shearwaters, etc. - live in large colonies, numbering tens of thousands of birds. Though they nest in vast colonies, they don't suffer from, or obviously survive, disease outbreaks. Obviously, disease is not a limiting factor in these colonies. The reason is circular, but by definition, they wouldn't survive if disease were a significant mortality factor.

47. It seems quite clear that since no data are adduced to draw any conclusion of its likelihood, disease may be just another chimera raised to justify the proposed action. The USFWS itself appears to be uninformed on the probably effects of disease. It is possible (and I would not suggest this if any data were presented in the EIS that disease is a real threat) that the hobgoblin of disease outbreak is being used as a scare tactic to make the uneducated public afraid, or perhaps the USFWS is attempting to convince itself of the necessity to "do something about the terns."

48. If disease is a real threat to the Caspian Terns to the extent that this threat requires their dispersal "in their own interests", a precedent is established for similarly managing other seabird colonies, for reducing their size and dispersing them into smaller colonies. The idea is dangerous.

IN THE TERNS' BEST INTERESTS: - PRODUCTIVITY

49. A antepenultimate consideration as regards "the terns' best interests" is colony size in relation to productivity:

11-16

There is a some evidence from field studies of seabirds, including murres and terns, that productivity is higher in larger, dense colonies. Protection from predators is a, or the mechanism that results in higher productivity in larger, dense colonies. Gull predation is a significant cause of reduced tern productivity. There is some suggestion at Rice and Sand Islands that productivity is affected by colony size. Tern productivity was low (0.15) at Rice Island in 2000 due to gull predation when the population was reduced to 590 pairs (the population was in the process of being moved from Rice to E. Sand Island). If this relationship is true of this Caspian Tern colony, density dependent effects of low tern numbers are NOT in the best interests of colonially nesting terns. Moreover, if so, then it is "in the terns' own best interests" to let them make their reproductive effort within the context of a larger colony, since it is more likely they would produce more young. Breaking the large Sand Island colony into small colonies, as suggested in this EIS, would make the colonies more vulnerable to and at risk from predation. Therefore, the "terns' best interests" are NOT served by the "preferred alternative" in this EIS.

IN THE TERNS' BEST INTERESTS! - SUMMARY OF COMMENTS ON STOCHASTIC EVENTS

11-17

50. To summarize Comments 27-49, it can be seen, "stochastic events" of oil spills, storms, and disease are either not proven to be catastrophic to terns (no data), or the data and an understanding of the species' ecology indicate that the opposite effect is likely. There is certainly no indication that the terns' best interests are protected by decimating the Sand Island colony.

No data are provided on the probability of any of these catastrophic events happening, nor is any attempt made in this EIS to assess the effect on terns. This part of the EIS is beginning to look less like a decision document than an apology for the proposed action.

The statement in the EIS that the proposed action protects the "best interests of the terns" is based either on ignorance of the data, ignorance of the species' ecology, or is a purposeful attempt to justify the proposed action.

It can be seen that not only is there no evidence for so-called "stochastic threats", there are additional advantages to terns of not decimating the colony at Sand Island.

51. A penultimate comment on "protecting" the terns:

"Concern" that the terns are concentrated in a large colony is baseless, because, even if an unlikely "stochastic event" completely eradicated the Caspian Tern colony at E. Sand I., both adults and young, there exist other west coast colonies that provide insurance that the western population would not be extirpated. Birds from these other colonies could recolonize E. Sand I. naturally through pioneering or be translocated with the aid of human intervention. The Sand Island colony would revive and is therefore at no risk, even though a large number of birds congregate there.

Thus the concept that the regional population is "in jeopardy" is groundless, mere worry for worrying's sake. The terns do not need the protection of the USFWS or other agencies. They have insurance and are quite capable of taking care of themselves.

Comment Noted

52. Finally, a conceptual point on the subject of "terns' best interests": The probability is far higher (close to 1.0!) that "the terns' best interests" are far better decided by the terns themselves, than the other way around. The terns have been "struggling for existence" a lot longer -- adapting for millions of years -- than the biologists that are supposedly protecting them, whose experience extends to a few months or 3 or 4 years. The probability is close to nil that the authors of this report know more what is in the terns' best interest than the terns themselves. "Adaptive management" is a buzzword used by biologists who are arrived lately on the scene. The terns have been practicing "adaptive management" a whole lot longer than agency biologists. Insofar as deciding anyone's "best interests" for them, the biological decision proposed in this EIS borders on hubris, and there is a real and present danger that the biologists might not know what is actually in the terns' best interests.

12

Comment Noted

So without intending offense to the agencies, who have little or no personal knowledge of tern or salmon ecology, population dynamics, and environmental or anthropogenic limiting factors, and with respect to the researchers who have made the effort to go into the field and observe and study the terns, but who have seen only three or four reproductive seasons, and those results only dimly understood, it should be noted the terns have seen millennia come and go, and have adapted and fine-tuned their morphology, physiology, ecology, and behavior to the circumstances. To weigh this human experience (some of which may even be biased and blindly pro-salmon) against the terns' experience, when deciding what the terns' best interests are, is a no-brainer: the terns know better than armchair biologists and bureaucrats, even assuming they do not have an agenda to justify.

Comment Noted

53. In fact, the factor that could be the most limiting for Caspian Terns in the Lower Columbia Subbasin is the intentional human management and reduction of nesting tern numbers by state and federal fish- and wildlife-managing agencies! The major limiting factors for Caspian Terns include not only a suitable nesting island, a prey base, freedom from disturbance and predation, but "human attitudes and perceptions."

Comment Noted

54. The Division of Wildlife Services (USDA-APHIS) killed several hundred Caspian Terns inland along the Columbia River; this "management action" is currently suspended (Range Bayer pers. comm. December 2003). Serious, but misplaced, consideration is now being given to the possibility of reducing and/or dispersing the Sand Island colony, with lethal control an option. Supposedly, lethal action is also "in the terns' best interest"?

Comment Noted

55. Since climate and ocean conditions cannot be managed, and because there is no will to make fundamentally significant modifications of the hydropower system, it has been called "imperative" that something be done about the terns (US Army Corps of Engineers 2002). The limiting factor for this colony and for the regional population, may be human intervention - the killing of, reducing numbers, dispersing the colony, etc., with adverse consequences for the terns. East Sand Island, the largest Caspian Tern colony in the world, listed as one of the 500 most important bird areas in the United States (Chipley et al. 2003) is in more jeopardy from Homo sapiens, particularly professional natural resource managers who rely more on an agenda-driven ideology than supporting data, than any other factor! What is the likelihood that such thinking will produce a solution, a decision, a proposed action that is "in the terns' best interests." With friends like that, who needs enemies?

THE TERNS' BEST INTERESTS - ALTERNATIVE SITES

11-18

56. The EIS envisions displacing 6,000-7,000 terns and their use of alternative sites in California, Oregon, and Washington. It is improbable, for reasons discussed in the following comments, that 12000-14000 birds will utilize alternative sites. Since the EIS divides its argument into sections for each state, my comments do likewise

13

11-19

57. In Washington, the EIS states (p. 4-7) "the colony at Dungeness NWR could increase in size from the immigration of displaced terns from East Sand Island ..." under the preferred alternative. It is further stated that "we expect the size of this colony could grow to range somewhere within the historic colony sizes observed on the Washington coast (100 to 3,500 breeding pairs)."

Comments on the forgoing include:

1). Note the language again, "could grow." What about "probably will grow"? What is the likelihood of this happening? What is the likelihood of the opposite of this happening? Equally likely? There is no estimate of these likelihoods.
2). Or what if it grew but only to the lower limit of the range (100 breeding pairs)? This would not go very far in accommodating the 7,000 pairs the proposed action proposes to displace. How could the small new colony on Dungeness Spit be expected to substitute for the 3 or 4 relatively large historic colonies in Washington, at Gray's Harbor, Willapa Bay, Commencement Bay, and the Everett Naval Base (several thousand pairs at most sites)?
3). Dungeness is a spit, not an island, and not a secure nesting site. It is more likely than not (P>50%) that the terns will recognize that their "own best interests" are not to be protected by investing in a large colony at a site with easy access to predators. Therefore, the size of this "mainland" colony at Dungeness will likely remain in the low range of dozens of pairs.
4). Dungeness is not an adequate mitigation site for the large number of pairs it is proposed will be displaced from Sand Island.
5). The EIS is either flawed or wishful in its thinking if the agencies are optimistic about this site, i.e., if they consider it likely (P>0.5) that the upper range of 3,500 breeding pairs will be reached for this site. It would be unreasonable for agency and other biologists to expect that a mainland colony could be so large. To my knowledge, most mainland colonies are small.

11-20

58. In Oregon, 3 sites are being considered under the proposed action for management and relocation. These sites are Summer Lake, Crump Lake, and Fern Ridge Reservoir, each one of which the EIS states (p. 4-8) "could" accommodate 5-300 breeding pairs. In the worst case scenario, therefore, 3 X 5 or 15 pairs of terns would be accommodated. In the best case scenario, 900 pairs of terns could be accommodated. Which is more likely is not indicated or supported by data.

The inadequacy of these three Oregon sites can be clearly seen. These 3 sites taken together, even if tern numbers reach into the high end of the stated range, will accommodate an insignificant, paltry portion of the 7,000 pairs of terns the agencies propose to displace from E. Sand Island.

59. "Where did those numbers (5-300 pairs) come from anyway? At the Oregon sites, Summer Lake, Crump Lake, Fern Ridge, no data are provided in this EIS on the site capacity or expected size of the potential colony relative to the prey base. No data are provided on whether a larger number of terns could rely on anything to eat. There is no analysis of this question and it is apparently not considered a necessary part of this so-called "management EIS." We cannot assume that the prey base will accommodate colony sizes at the high end of the range (300). Lacking data, it would be conservative to assume the worst.

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Comment Noted

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[illegible]

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[illegible]

11-29

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Comment Noted

[illegible]

Comment Noted

[illegible]

17

72. One last question arises:

11-30

Since, the figures don't add up mathematically, and it is unlikely that the sites to be "provided" can in any way, shape, or form be relied upon to accommodate 12,000-14,000 displaced terns, and if the displaced terns are therefore not accommodated elsewhere, what is the fate of these terns? If they just die, does this constitute a taking under the Migratory Bird Treaty Act?

73. Regardless of the answer to the forgoing question, it is clear that neither the terns nor the "terns' best interests" are being protected by the USFWS under this proposed action. The proposed action would therefore be a violation of the mission and legal responsibility of the Service to protect migratory birds.

EFFECTS OF TERNS ON SALMONIDS

74. The EIS states (p. 1-4), as basis for the justification for the proposed action, that "Nearly every population of naturally producing anadromous salmonids in the Columbia River Basin is now listed (or is a candidate for listing) under the ESA."

Comment Noted

75. The obvious point to be noted first is that Caspian terns were not responsible for, did not cause, and had nothing to do with, salmonid stocks being listed as endangered or threatened. Until recently, there were no large concentrations of terns along the Columbia River, and the decline of ESU's in the Columbia Basin antedated the terns' arrival and population increase. This fact is an experimental, non-theoretical datapoint from the real world. It should be understood and acknowledged by everyone concerned that Caspian Terns WERE NOT RESPONSIBLE FOR THE ENDANGERMENT of salmonid ESU's.

11-31

76. The second important point to be noted is that during the past several years, and especially in the past 2 years, record salmon and steelhead runs have occurred in the Columbia basin. Among the record increases are Snake River and upper Columbia steelhead ESU's (Ed Casillas, NMFS, pers. comm. Nov 12 2003), which are the ESU's that experienced the highest observed levels of tern predation (Roby et al 2003; this EIS). However, even the "high" level of tern predation on those steelhead ESU's DID NOT PREVENT the dramatic recovery of steelhead runs that occurred in 2002 and 2003. Terns ARE NOT RESPONSIBLE FOR SUPRESSING THE RECOVERY of salmonid ESU's, INCLUDING EVEN THE MOST HIGHLY PREDATED STEELHEAD ESU's.

77. The question that arises: how could these record salmon and steelhead runs have occurred if the presence of what has become apparently the world's largest Caspian Tern colony were depressing recovery? The real world, has provided us with compelling, observable, non-theoretical data, which have to be acknowledged by tern detractors and those who would affix blame onto the terns, when the data indicate the terns are not to blame as a suppressing factor.

Comment Noted

78. To summarize these two points, Caspian Terns are neither limiting recovery, nor did they cause the endangerment of the salmon in the first place.

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Comment Noted

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11-35 Continued

83. In reply to this statement, first, the logic is both dubious and insufficient: because nothing can be done about factors which cause most of the mortality, and since we can do something about tern predation, the effects of which on salmonids could well be small or negligible, the numbers of terns must be reduced. The "logic" is simply NOT LOGICAL that since we cannot influence the important factors, a focus on non-significant factors will make a significant difference.

11-36

The relevant question is whether tern predation of salmonid smolts significantly affects the number of returning adult salmon. I will refer to available data in comments below that will show that this hypothesis has not been convincingly proven in this EIS.

84. Also note use of the word "can" in this USACE statement above. The authors of the statement appear to be reluctant or unable to say "will directly affect." Why is the statement left as a mere possibility? There is in fact a distinct probability that "do not directly affect" would be as true a statement, or even truer. For example, available data clearly show that there are many factors involved in smolt survival in both fresh and saltwater, and that there is a long way between smolts and adult recruitment. These questions will be discussed in detail below.

85. Shuford and Craig (2002, p. 38) state that a long-range goal is to disperse the Columbia River's "highly concentrated terns to a number of smaller colonies over a wider area ... minimizing the impacts ... on any one fishery."

Demonstrating the necessity of dispersing a large portion of the lower Columbia River tern colony is a question that the US Fish and Wildlife Service (USFWS) is charged with (Seto et al. 2003). The statement cannot be accepted at face value, accepted as true, without an examination of whether the available data are supportive of the statement, or whether they are inconsistent with it.

86. The EIS relies on a model which predicts a substantial increase in the size of the Sand Island colony. However, this model has failed in its predictions of tern population levels at E. Sand Island in the past two years. A large part of the increase in terns at Rice Island resulted from immigration, not intrinsic rate of increase. Percent of pairs breeding, lower survival of first-year birds, lower survival of adults (D. Roby, pers comm 9/04), or lowered site fidelity because of larger colony size (pers. obs.) are other factors that are not included in the model which may have caused the erroneous, non-predictive discrepancy between the model and what was actually observed in 2003 and 2004.

11-37

87. "The initial colonization and growth of the Rice Island tern colony appears to have occurred because of the immigration of terns from large colonies in Washington (e.g., Grey's Harbor and Willapa Bay)..... The continued growth and success of this colony at Rice Island, and now East Sand Island, are attributed to ... reliable food supply, vulnerability of some hatchery smolts to tern predation..." (EIS p. 3-6).

The EIS thus seems to recognize the fact that immigration is responsible for a major portion of the growth of the Columbia River estuary colony, but the model seems to ignore this factor in its prediction of increase of the tern colony to 20,000 pairs.

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Comment Noted

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108. Even despite the flaws in the model and the data, estimated changes in lambda calculated by NOAA (EIS Table 4, p. C-12) are actually very very low. E.g., for 8125 pairs (close to the 2003 tern population level), the calculated increase in lambda from reducing to this number from 10000 pairs would be 0.4%, assuming additive mortality (bottom, p. C-12). This is reduced to 0.2% assuming 50% compensatory mortality.

These increases in lambda of 0.2-0.4% are negligible by any standard and do not provide compelling benefits of the proposed action to sacrifice thousands of pairs of terns.

11-48

109. If the tern population were reduced to 3000 pairs, the change in lambda from Table 4 is 1.2% assuming 100% additivity, or 0.6% assuming that 50% of the predation is compensatory. The compensatory calculation of 0.6% is probably closer to reality. 0.6% is still extremely low. If a higher %age of the tern predation is compensatory (possible, though the question is still open), the % change in lambda, already negligible, would be even less. An increase of something less than 0.6% in lambda is not a compelling justification for the proposed action, i.e., breakup of the tern colony.

110. The bottom line is that the proposed action is not justified because it will not result in a significant increase of salmonid populations.

11-49

111. It should be remembered that upper Columbia and Snake River steelhead runs have been at record high levels in recent years Casillas (pers comm 2003). Obviously, even though tern predation on these steelhead ESU's were the highest observed, tern predation at the observed levels have not been limiting to these steelhead ESU's.

11-50

112. It is important to point out that these calculations are based on tern predation rates on steelhead. Steelhead experience the greatest tern predation (Roby et al 2003). The EIS states (NOAA, in EIS p. C-10): "We focus on steelhead because they are the most heavily affected of the outmigrating juvenile salmonids..." The steelhead data are then used as a basis for the statement that "the potential benefit ... are greatest for steelhead and would encompass (sic) potential benefits afforded to other salmonid species." Elsewhere it is stated (p. 4-15): "estimates of the potential benefit of reducing tern predation are the greatest for steelhead and serve as a surrogate for potential benefits to other salmonid species." "Surrogates"? "Encompass"? These statements are misleading.

113. From PIT tag data, predation rates on salmon were found to be between 1/6th and 1/20th (16% to 5%) of the levels of steelhead predation (Collis et al. 2001). It can be seen that the "potential benefits" to salmon 1) cannot be extrapolated from the data for steelhead; and 2) the "potential benefits" to salmon certainly are "encompassed" by the benefits to steelhead (by an order of magnitude!), but steelhead benefits can't be seen as "surrogates" for salmon benefits in any way.

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141. Marmorek and Peters (2001) state, "Transportation of smolts improves the direct survival of smolts, but there was insufficient information about delayed effects of transportation to say whether transport of smolts improves overall spawner-to-recruit survival rates...."

Insofar as delayed hydrosystem mortality is concerned, transported smolts die at a greater rate after release than smolts that were allowed to migrate in-river (Williams et al, 2003). Delayed mortality may be a factor affecting smolt survival more than tern predation.

It may be worth considering whether smolts impaired by transportation below Bonneville Dam are also subject to increased tern predation. Tern predation, therefore, may in this sense be compensatory. This hypothesis is speculative.

142. Marmorek and Peters (2001) state that carcass fertilization effects are "only modest and insufficient on their own to recover the stocks."

Note that carcass fertilization and tern population reduction "on their own" are of the same order of effectiveness in restoring ESA-listed stocks, i.e., "modest and insufficient"!

143. This EIS makes no attempt to estimate or address in-tributary smolt mortality, which is usually caused by denigration of the spawning habitat by soil erosion, turbidity, and sedimentation of spawning gravel. Much of this in-tributary mortality is due to logging of and road-building in forested watersheds. (Lower Columbia Fisheries Board, unpub. data, 2004).

144. Two thirds of salmonid mortality outside of migration pathways (i.e., outside of the Columbia River mainstem) occurs within Columbia subbasin tributaries due to impairment of salmonid spawning and rearing habitat, and another 1/3 of the mortality takes place at sea (Lower Columbia Fisheries Recovery Board unpub. data 10/13/2003).

It should be noted that neither tributaries or open ocean are Caspian tern foraging areas insofar as salmon are concerned, and terns are therefore not a mortality factor in the tributaries.

145. It has been estimated that the condition of tributary habitat is the major factor limiting Wind River summer steelhead, with 44% of the juvenile mortality caused by this factor (more than any other single factor). Predation, mostly by introduced warm-water fish, contributes 17% to the mortality of summer steelhead. Hydropassage contributes an estimated 16%. (L. van Tussenbrook, Wash. Dept of Wildlife, pers comm. 11/2003).

146. Various other factors have a strong affect on salmonid smolt survival, much more so than tern predation. None of these factors, also identified as significant or limiting to salmonid numbers by Marmorek and Peters (2001) and only named in this EIS (e.g., p. C-4, Appendix C) are addressed or described in this EIS: they are in fact "outside the scope of this EIS."

147. Some (e.g., ocean conditions and climate) cannot be addressed because they are beyond human control. Others (e.g., hydrosystem operation) are within human control but hydrosystem project managers have refused or been unable to modify them substantially. THE ONLY REMAINING OPTIONS for fisheries and wildlife managers are therefore the futile options of addressing those factors that do not significantly affect salmon runs.

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The logic is dubious, and strategies derived from illogicality are unlikely to be successful.

148. It seems clear that the non-wildlife-related mortality factors outlined above, studied by wildlife and fisheries biologists, have been found to be more significant than tern predation in their effects on the numbers of smolts and the numbers of adult salmon recruited into the breeding population.

11-57 Continued

Logically, if salmon recruitment is to be increased and populations are to be recovered, salmon restoration should consist of addressing and alleviating these more important mortality factors, i.e., the effects of the hydrosystem, and the condition of spawning and rearing tributaries. These higher-tier limiting factors need to be addressed and alleviated BEFORE non-essential lower-tier, draconian, but futile measures, like reducing tern populations, are addressed.

149. The non-significant other factors include managing terns, which have been found "by most investigators", and in the analyses made to prepare these comments, to have an insignificant effect on salmonid population numbers. This ineffective approach is the one taken in this EIS document.

150. After analyzing this EIS, the reader comes away with the impression or message: "We won't address what is important, but we confine ourselves to things that don't matter."

Comment Noted

It is hard for any logical reader to avoid coming to the conclusion that terns are not the problem, and that the agencies, despite protestations to the contrary, realize this, however dimly. However, the agencies seem determined to find reasons for justifying the proposed action, finding the terns guilty of "high crimes and misdemeanors." One gets the impression that the Service is caving in under pressure, and giving up the terns for sacrifice to atone for the crimes that have been, and continue to be, committed in the Columbia River Basin.

11-58

151. Insofar as historic and current modifications of the hydrosystem are concerned, Marmorek and Peters (2001) state: "modifications to the existing hydropower system were not likely to improve juvenile survival rates." The authors were talking about the inadequacy of modifications of the hydropower system - i.e., tinkering around the edges, not fundamental changes like "bypassing dams", for example.

152. The number of smolts released from hatcheries is approximately 200 million fish, of which perhaps 100 million die before reaching the estuary. PATH studies have demonstrated that hydrosystem, habitat and climate conditions contribute most significantly to observed declines in Snake River stocks (Marmorek and Peters 2001), and that little can be done (short of dam removal or barging smolts) to modify the hydrosystem that will have any significant effect on salmon recruitment (ibid.).

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11-58 Continued

153. The EIS states (Appendix C, p. C-4, C-15): "The effect of Caspian tern predation on recovery may be comparable to fish passage improvements at Columbia River dams...". Note the language "may be comparable." What is the probability of the statement being false? that the truth is closer to "may not be comparable"? Where are the data on the effects of modifying the hydropower system? What "modifications" have been implemented? Did they fall short of doing what was needed?

11-59

154. Note that nowhere in the EIS, including in Appendix C, are the "modifications" or "improvements" to the operation of the power system described. The reader is apparently expected to take the statement in the previous Comment on "faith."

11-60

155. This EIS makes no attempt to estimate and indeed hardly mentions mortality at dams. As regards this issue, the only statement the EIS makes is that "measures" taken to increase salmonid survival at dams is similar to the decreased mortality from predation by terns under the preferred alternative.

This statement is false and misleading: it is quite clear from the data provided above (not in the EIS -- it was "outside the scope") on both mortality at dams and mortality from tern predation, that the complete elimination of tern predation is NOT comparable in its effects to the complete elimination of the mortality that dams cause. Complete elimination of the tern colony at E. Sand Island would not "by itself" allow salmonid ESU's to recover. In contrast, complete elimination of dams would recover ESU's.

11-61

156. The statement that tern predation is "comparable to improvements in operation of the hydrosystem" is like mixing apples and oranges. What the statement actually means is that tern predation effects "may be comparable" to modifications of the power system because modifications in themselves, as Marmorek and Peters (2001) have stated (see comments above), to date have been too limited, too little, too insufficient, to restore ESUs. As mitigating factors, these adjustments to the power system could not increase salmonid runs. That their effects equate in magnitude to the removal of tern predation effects is a condemnation of the (never described!) "adjustments" to the hydrosystem, not of the magnitude of the tern predation.

157. NOAA (2002) states: "removing all tern predation will not, by itself, lead to full recovery of any listed salmon and steelhead stock." It implies, but never expressly states, that removing tern predation will lead to partial recovery. As we have seen from numerous comments above, reduction or elimination of tern predation makes little difference to salmonid lambda, so the statement is prima facie, false.

11-62

There is something more subtle at work here: the "by itself" in this statement is inuendo, somehow dishonest, certainly misleading. The statement avoids the question (because it is "outside the scope of this EIS): would addressing the 4 H's, "by themselves", lead to full recovery of listed salmonid stocks, without the need for decimating the tern population? The answer to that is yes, because the 4 H's are in fact THE limiting factors on ESA-listed salmonids, whereas tern predation is insignificant in comparison.

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165. That predation on smolts and adult salmonid recruitment into the breeding population are two different things seems unappreciated both in this EIS and by some of the agencies (USACE, NOAA, now USFWS) that rely on statements like that of Kareiva et al (2000).

166. Tern predation has not been proven to be significant correlate of survival and breeding of returning adults. Predation is insignificant insofar as adult salmonid recruitment is concerned. Since reducing the number of terns at E. Sand Island will not result in a significant increase in the SAR, it is clearly not an effective strategy for increasing salmonid return and recruitment. The "preferred alternative" cannot therefore be justified on the basis of translating reduced smolt predation into increased recruitment of adult salmon, and therefore lambda. Changes in lambda seem to be related to SAR, not to tern predation.

167. Nowhere in this EIS is it stated what would be effective in increasing listed salmonid populations. What should be the necessary SAR? How is this necessary SAR achieved? What predation rate by terns would be effective (or allowable) in increasing the various, specific, salmonid runs? Apparently, this discussion is outside the scope of this EIS.

PREDATORS OTHER THAN TERNS

Comment Noted

168. Predation by fish and perhaps seabirds are probably significant mortality factors at sea. SAR's at sea are probably the single most important process affecting recruitment rates of adult salmonids. The EIS does not estimate at-sea mortality, or its variation between years, of salmonids. The record salmon runs of recent years are probably related to these processes, and have nothing to do with tern predation.

11-65

169. Salmonid smolts have predators other than Caspian Terns, predominant among them fish. This EIS does not estimate mortality from fish predation, including northern pike-minnow and hatchery salmonids (which cannibalise smaller wild fish), and introduced warm-water fish predators (bass) in spawning, rearing, mainstem migration habitat, and in impoundments behind the 13 dams on the Snake and Columbia Rivers. The effects of these fish predators are thought to far exceed mortality of salmonid smolts than Caspian Tern predation. Northern pikeminnow alone is estimated to take 16 million juvenile salmonids, which is FOUR TIMES the current level of tern predation (Roby et al. op. cit.).

170. Quantitative estimates of predation are not available for other native and introduced warm-water fish. Hatchery salmon and steelhead tend to be larger than and cannibalise wild smolts, but quantitative estimates of that predation are also not available.

171. Terns are not the only fish-eating bird species along the Columbia River. However, the EIS does not estimate mortality from other piscivorous birds, including grebes, loons, cormorants, and other seabirds, e.g., murres, and mergansers. The mortality estimate due to cormorants, for example, is "several million" smolts (Roby et al 2003). Gulls were estimated to take 1 million smolts (ibid.) Several grebe species forage in the estuary and pools behind dams, but predation on salmonids has not been estimated. Common Murres inhabit the estuary plume, but estimates of predation are unavailable. In 2004 J. Parrish found that mergansers take more young salmon and steelhead (80% of the diet) than any other bird in the slack water reservoirs behind

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harvest. And without compelling evidence that the predation adds significantly to adult fish recruitment, seabirds should not be reduced to increase a prey population depressed by other human-caused factors.

179. The EIS presents "Guiding Principles" (section 1.2.1.). There is nothing in these guiding principles that justifies the proposed action, and nothing that eliminates favorable consideration of Alternative A. The use of the guiding principles are used more to justify the proposed action than to protect the terns:

11-69

Principle 3 states that "Management actions will be implemented ... in a manner consistent with salmon recovery" and Principle 5 that "Management actions will be implemented to ensure that the recovery of ESA-listed salmonids is not impeded by tern predation." These "guiding principles" are not inconsistent with Alternative A. For example, a substantial recovery of ESA-listed salmonids has already occurred in 2003 and 2004 without the "management action" called for in Alternative C, the preferred alternative. The preferred alternative is therefore unnecessary. The guiding principles are also inconsistent with Alternative C for similar reasons; the "management actions that will be implemented" are unnecessary to increase salmon populations.

180. Why does the Service not take care of its "trust responsibility" under "Guiding Principle 1", that Caspian Terns are a naturally occurring native species, and are entitled to a place/role in nature. It is obvious that the guiding principles are more to justify the proposed action than to protect the natural right of Caspian Terns to an "allowable" portion of the prey base. Why do the agencies not attempt to protect terns by allotting an "allowable level" of natural tern predation, "that does not impede salmon recovery" (NMFS, August 2002).

Unfortunately, the guiding principles seem to attempt to justify, and produce a halo in which to enshroud, the preferred alternative.

Comment Noted

181. Some parties (Idaho F&G) have proposed a "conservation level" take of smolts "by all seabirds everywhere" of less than 5%. It should be noted (see comments above) that the rate of predation by terns on wild, upper Columbia and Snake River steelhead ESU's (the most heavily predated runs) are less than 5%.

On the whole, however, this is an unrealistic and unbalanced understanding of naturally occurring predation by a multitude of species of fish-eating birds. Seabirds such as Common Murres, for example, take more than 25% of juvenile rockfish of various species at the Farallon Islands, California, and this level of predation for centuries has not suppressed rockfish populations; populations of rockfish have been decimated by human overharvest.

182. Even if predation from such natural causes as total bird predation from all species were reduced to less than 5%, salmon recovery would still not be assured because of the continuing effects of other, more significant mortality factors, e.g., the 4 H's.

36

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

183. There is no compelling scientific evidence that terns are limiting salmon numbers. The case has not been made.

184. The proposed action is not justified by the available scientific evidence on the effects of terns on salmonid recruitment. Indeed, the available data militate against and contradict the hypothesis in this EIS that a reduction in tern predation is justified.

185. Absolutely no convincing data exist to support the statement that the proposed action to reduce the number of terns at the Columbia estuary is "in the terns' best interests."

186. The proposed action would break up the outstanding tern colony at E Sand Island for no compelling reason.

187. Tern predation has already been reduced substantially. The evidence is clear that terns are no longer, if they ever were, a factor significantly affecting salmonid recruitment.

188. The case that there is no necessity for reducing tern predation is far stronger than the case for reducing tern predation.

189. The proposed action violates the mission, legal and trust responsibility, and the public's expectations of the US Fish and Wildlife Service.

11-70

190. There exist significant limiting factors that are far more important than tern predation, which need to be addressed to achieve salmon recovery. Among these are operation of the hydrosystem.

191. The USFWS should make clear to fisheries managers that they should look elsewhere than to the Caspian Terns to alleviate the real factors limiting salmonid populations.

192. Reducing the tern population in the Columbia River estuary will be a precedent-setting disaster. It will fail to have the desired result for salmonids because it does not address the real problems affecting salmonids.

193. Despite protestations to the contrary, reducing the tern population will not provide any positive result for terns.

194. should themselves accept the scientific data that do not support their premise that tern reduction is "imperative." Fisheries managers responsible for the endangerment and/or recovery of salmonid stocks should themselves accept the responsibility of the need to look elsewhere than to the terns for the reason(s) for the sorely reduced status of ESA-listed salmon and steelhead. Unfortunately, this is not the recommendation of this EIS.

195. Calculated delta-lambda due to tern reductions are insufficient to significantly increase even the steelhead, for which lambda changes are maximum.

196. This EIS is incomplete; it does not address important factors that it says are outside the scope of the EIS.

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However, once half the tern population is lost due to the management failures written into this EIS, what assurance does the public, do the terns, have that the Service would take corrective action in the future? What is the likelihood of a commitment of the necessary human talent and budgetary resources to the recovery of half of the tern population, once it is gone? Where is the continuity within the Service? What's to stop the USFWS from defining the problem of the loss of half the regional population out of existence, by deciding that "perhaps we didn't need half of those terns anyway." What is the bottomline tern population objective anyway?

11-70 Continued

Considering the Service's less than stellar record of protecting even endangered populations of other nongame birds (Dusky Seaside Sparrow: extinct; Spotted Owl, Marbled Murrelet, Snowy Plover: threatened; Yellow-billed Cuckoo: extinct in all but one state in Region 1; White Pelican and White-faced Ibis: reduced to a very small number of colonies), the record is not reassuring. The answer to the above questions must be either "remains to be seen but unlikely" or even "almost nil."

205. I share the "concern" about the poor condition of ESA-listed salmonid runs in the Columbia River watershed. However, my concern is that the real factors that affect the salmonid runs are not addressed by this EIS.

206. There is no urgency to control numbers of terns at E. Sand Island. The proportion of salmon in their diet is now low (17%), and most of these, by a factor of 2:1, are hatchery fish. The proportion of wild fish (ESU's) in the diet is therefore only 5-6%.

11-71

207. The maximum predation rate (on steelhead) of 9000 pairs terns at East Sand Island is about 8.0% (EIS p. C-22). This predation rate is relatively small. Predation rates on salmon are even lower.

Comment Noted

208. Since there is no need for urgency, population and distribution objectives in the Pacific Region should be 1) to maintain current numbers and distribution of Caspian Terns, and 2) to encourage the natural colonization of other islands on the California, Oregon and Washington coasts.

209. Terns are fish-eaters and a natural part of the estuary ecosystem, as are grebes, murres, mergansers, and numerous other species of fish-eating birds. They eat a portion of the fisheries occurring in an area. "Take" by native species of a proportion of the prey base is natural and inevitable, and should be considered "allowable" by fisheries managers. The "allowable take" by native fish-eating predators should not be allocated to the sport or commercial fisheries. In California, the take of juvenile rock fish by Common Murres at the Farallones is about 25%.

210. If tern populations are to be controlled at the "whim" of the agencies, and if the USFWS, in response to uninformed pressure from sister agencies, abdicates its responsibility to protect them, there is no reason to protect other fish-eating birds. Why not reduce the murre population at the Farallon Islands? albatrosses at Hawaiian Islands? Both are National Wildlife Refuges.

11-72

211. The Service should acquire E. Sand Island and incorporate it into the National Wildlife Refuge System.

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Comment Noted

212. In a number of comments, for example, in the section on "IN THE TERNS' BEST INTERESTS", I have suggested that this EIS attempts to justify its proposed action, that the proposed action seemed predetermined, and that the data on the significance of the predation on salmonid recruitment are, or seem to be, exaggerated, or misinterpreted, in order to fit the proposed action, rather than the proposed action fit the data, that there is something hollow about the approach taken, that there is something that smacks of pretense when the agencies talk about proposed action being "in the terns' own interests." Whether my feeling about this is true or not, it is telling that this reader is suspicious, and unconvinced. There are too many places in this EIS where the authors make assertions but do not support them with data. The result is that the document is tainted with the suspicion that the preferred action is either dishonestly arrived at or dishonestly justified. It appears that the agencies are not trustworthy or believable, and in some places that can be, and has been, demonstrated in these comments. I regret the suspicion, the lack of trust. It seems that the USFWS particularly, because of its special responsibility, has broken its trust responsibility. This EIS is a half-hearted effort to salvage credibility, but, again I say this regretfully, the agencies, USACE and NOAA, and even the Service, fail to convince this reader, this reviewer of the evidence, of the necessity, the correctness, the scientific integrity, of their proposed action(s).

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41

Response to Comment Letter 11. Brian Sharp, Ecological Perspectives

11-1 We recognize the commenter's concerns and assume that the remaining comments contained in this letter identify specific comments. We have responded to all specific comments below.

11-2 See response to General Comment 4 (section J.2).

11-3 See response to General Comment 2 (section J.2).

11-4 See response to General Comment 4 (section J.2).

11-5 See responses to General Comment 1, 2 and 17 (section J.2).

11-6 Page 1-3 and 1-4 gives some examples of hydropower improvements (e.g., increased spill, improved passage facilities, increased fish transportation), including a photo of the Bonneville Second Powerhouse corner collector which diverts juvenile salmonids away from dam turbines. Further description and analysis of these measures is not included in this FEIS because analysis of these measures is outside the scope of this EIS and are part of the 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b). The tern consumption level for juvenile salmonids in 2003 (4.2 million, Collis et al. 2003b) exceeded the estimated survival objective for 2003 (1.24 million additional juvenile salmonids surviving passage past Bonneville Dam) if all aggressive hydropower measures to aid juvenile salmonid survival were in place (M. Langeslay pers. comm.). The Bonneville Second Powerhouse Juvenile Bypass System project to improve juvenile salmonid survival had a total project cost of approximately $54 million. Discussions with Corps fish biologists indicate that the net increase in juvenile salmon survival attributable to the Juvenile Bypass System is estimated to range from 1,212,571 to 2,831,667 fish annually.

11-7 The proposed action should not be considered arbitrary, capricious, or illegal because the three cooperating agencies have made efforts to use the best available scientific data in the EIS analysis as a basis for the decision. Although we cannot guarantee that no terns will be lost (die) as a result of the proposed action, the current regional population is at a level that allows for some amount of fluctuation without a substantial impact to the regional population.

11-8 We are attempting in the EIS to predict the effects of various management alternatives but cannot guarantee with any certainty exactly what the effects would be. However, by using the best available scientific data and models to make these predictions, these should be close to the actual effects. Hence, we used terminology in the EIS such as identified in the comment (e.g., would be," "would most likely").

11-9 See response to comment 11-8, above.

11-10 As described in responses to comment 11-7 and 11-8, above, we used the best available scientific data and models to predict the effects of the four management alternatives. There was no predetermined decision on the proposed action.

11-11 The data referenced in section 3.2.1 is to point out to the reader that the colony on East Sand Island is not similar to those observed throughout the region and in fact, supports approximately 70 percent of the regional population. Chapter 1 (section 1.2) describes the concern regarding this breeding concentration.

11-12 See responses to General Comment 1 and 4 (section J.2).

11-13 See response to General Comment 7 (section J.2).

Response to Comment Letter 11. Brian Sharp, Ecological Perspectives (Continued)

11-14 See response to General Comment 22 (section J.2).

11-15 The fact that 70 percent of any population is concentrated in one location is a risk to that population if some catastrophic or stochastic event were to occur at that location. We appreciate the data that the commenter has provided to demonstrate that the likelihood of these catastrophic events occurring would be low. However, we continue to assert that this large segment of the tern regional population is at risk.

11-16 We appreciate the commenter's concern that smaller colony sizes may affect overall reproductive success. However, in 1999, when terns first nested on East Sand Island and the colony size was small (550 pairs), the terns' measured reproductive success was good (1.20 young/breeding pair) compared to current nesting success (1.08 young/breeding pair) observed in the large colony. Therefore, we expect productivity of the reduced colony (2,500 – 3,125 pairs) to remain comparable (at least 1 young/breeding pair).

11-17 See response to comment 11-15, above.

11-18 See response to General Comment 20 (section J.2).

11-19 See response to General Comment 11 (section J.2). Additionally, text in the FEIS was revised to clarify the potential number of nesting terns on Dungeness NWR.

11-20 The expected range of nesting terns for each Oregon site (5 to 300 pairs) is based on historic numbers observed in interior Oregon (which these sites represent). It is expected that the actual number of terns that nest at each site would vary every year depending on prey abundance or water levels, hence, a predicted range of nesting terns is described. We concur with the commenter in stating that prey base may limit the number of terns at these sites and have stated this in the FEIS (page 4-9).

11-21 The expected range of nesting terns is based on historic numbers observed in San Francisco Bay. As at the other alternate sites, we expect the actual number of terns that nest at each site would vary from year to year, depending on prey abundance and predators. Also see response to General Comment 14 (section J.2).

11-22 We have assessed suitable nesting habitat for terns in Washington and Oregon, and unless habitat management is conducted, there are very few suitable sites. Thus, we expect terns to search for nesting habitat early in the nesting season or during migration and eventually find more suitable habitat in California. The Columbia River Channel Improvements Project will not create new islands in the Columbia River. Dredge material will be deposited on Rice and Pillar Rock Islands and Miller Sands Spit. Thus, no new nesting habitat is expected to be created for terns. Additionally, the nesting behavior of terns in the Pacific Coast region has not shown to have "strong philopatry" as the commenter states. Thus, we expect terns to continue searching for new nesting sites, even if they have to travel some distance.

11-23 See response to General Comment 20 (section J.2).

11-24 We acknowledge in the FEIS (page 4-10) that contaminants may be an issue of concern. However, current tern monitoring efforts show that reproductive success in the Bay fall within the range observed in the region, thus, there is currently no direct evidence that contaminants are limiting nesting success of terns in the Bay.

Response to Comment Letter 11. Brian Sharp, Ecological Perspectives (Continued)

11-25 We acknowledge the concerns the commenter has raised regarding the risks that may be present in San Francisco Bay for terns. However, we do not believe that increasing habitat for terns in the Bay would lead to the same concentration risk that occurs with the Columbia River estuary colony. The overall goal of this project is to redistribute the regional tern population so that 70 percent of the population is not located in one site. Although we expect the number of terns to increase from present numbers in the Bay, we do not expect it to rise above 50 percent of the regional population.

11-26 See response to General Comment 20 (section J.2).

11-27 We acknowledge that predators may be an issue at some of the proposed alternate sites. However, the presence of predators is part of normal events that may occur at any site. Thus, proposing predator management at some of these managed sites, would help with ensuring nesting success. Predator control efforts are already established at all sites in San Francisco Bay.

11-28 See response to comment 11-16, above.

11-29 As stated in the FEIS, the purpose of the of the proposed action is to reduce tern predation on juveile salmonids in the Columbia River estuary. An additional benefit is removing the risk of having a large concentration of the entire regional population vulnerable to stochastic events. The proposed action would redistribute terns throughout their breeding range in the Pacific Coast region with a larger number of smaller colonies. See response to comment 11-15, above.

11-30 We acknowledge that there may be the possibility that the number of breeding terns in the regional population may decrease if some terns are not able to successfully find new nesting sites. However, we do not anticipate that a large number of terns would actually die since terns are long-lived birds and have proven to seek out new nesting sites successfully. The proposed action would not constitute a violation of the Migratory Bird Treaty Act because we are not proposing to directly "take" or kill adults (as defined in the Migratory Bird Treaty Act).

11-31 See response to General Comment 4 (section J.2).

11-32 See response to General Comment 4 (section J.2).

11-33 See response to General Comment 17 (section J.2).

11-34 See response to General Comment 1 (section J.2).

11-35 Comment noted.

11-36 See response to General Comment 7 (section J.2).

11-37 See response to General Comment 17 (section J.2).

11-38 See response to General Comment 1 and 7 (section J.2).

11-39 See response to General Comment 3 (section J.2).

11-40 Comment noted and see response to General Comment 3 (section J.2).

11-41 See response to General Comment 1 and 7 (section J.2).

Response to Comment Letter 11. Brian Sharp, Ecological Perspectives (Continued)

11-42 NOAA Fisheries used the best available science at the time Appendix C was prepared. The 2003 data that the commenter refers to was not available at the time the analysis was performed and summarized in Appendix C.

11-43 See response to General Comment 4 (section J.2) and comment 11-42, above.

11-44 Based on the analysis conducted in this EIS, we believe that reduction in the tern colony on East Sand Island would contribute to the survival and recovery of ESA-listed salmonids (see response to General Comment 1, section J.2).

11-45 See response to General Comment 6 (section J.2).

11-46 See responses to General Comments 2 (section J.2) and comment 11-42, above.

11-47 See response to comment 11-43, above.

11-48 See response to General Comment 2 (section J.2).

11-49 See response to General Comment 4 (section J.2).

11-50 See response to General Comment 8 (section J.2).

11-51 See response to General Comment 2 (section J.2).

11-52 PIT-tag data was used for detailed analyses because the information derived is amenable to ESU and population specific assessments whereas the predation rate derived from the bioenergetics approach can only be used for a species level assessment. There are no determinations of the number of PIT-tags deposited off the nesting site by terns, therefore, predation rate estimates are truly minimums, which was accurately characterized in the report. Short-term effects of PIT-tags on juvenile salmon survival has been assessed repeatedly and is negligible (Prentice et al. 1986). There are no known reports of any long-term effects of PIT-tags on juvenile salmon survival.

11-53 See response to General Comment 9 (section J.2).

11-54 See response to General Comment 1 (section J.2).

11-55 See response to General Comment 2 and 4 (section J.2).

11-56 See response to General Comment 1 (section J.2).

11-57 See responses to General Comments 1 and 3 (section J.2).

11-58 The effect of tern management was compared against fish passage improvements at the dam from the standpoint of improvements in population growth rate of steelhead ESUs. Any modifications to the dams as indicated by the commenter are identified in 2004 FRCRPS Biological Opinion (NOAA Fisheries 2004b) and documents associated with the implementation of previous Biological Opinions on that project. Further information on the 2004 FCRPS Biological Opinion can be found at NOAA Fisheries website: http://www.nwr.noaa.gov/1hydrop/hydroweb/default.html, and the salmon recovery website: http://www.salmonrecovery.gov.

11-59 See response to comment 11-6, above.

Response to Comment Letter 11. Brian Sharp, Ecological Perspectives (Continued)

11-60 See response to General Comment 3 (section J.2).

11-61 See response to comment 11-58, above, for a response to the first paragraph of this comment. In response to the second paragraph, the increase in population growth rate identified in Appendix C by tern management increases the population growth rate of at least one percent. Any action that is able to contribute this kind of a change in population growth rate is an important contribution to the survival and recovery of ESA-listed salmonids.

11-62 See response to General Comment 3 (section J.2).

11-63 We would agree that favorable ocean conditions were a large contributor to the increased number of ESA-listed salmonids returning to the Columbia River to spawn over the past few years. However, the presence of favorable ocean conditions, does not alleviate the Federal government of responsibility from taking actions that contribute to salmonid survival in the short-term and buffering against changes in climate shifts that would impair the long-term recovery of these species as described in the FEIS.

11-64 See response to General Comment 7 (section J.2).

11-65 Examining predation impacts to ESA-listed salmonids stemming from species other than Caspian terns is outside the scope of this EIS and can be found in other documents. Predation impacts for pinnepeds, gulls, cormorants, northern pikeminnow, walleye, and bass are discussed in the 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b). Predation impacts of grebes, loons, and mergansers are currently being studied (C. Thompson pers. comm.).

11-66 The sites San Francisco Bay are closed to the public and thus, human disturbance issues are minimized.

11-67 We recognize that malice actions could be taken on the terns at East Sand Island because they have been “villianized” by the public. This EIS is proposing an action to aid salmon recovery and thus, demonstrates that a solution, which includes the protection of the regional tern population, to the conflict with listed salmonids is possible. A perceived lack of action by management agencies would more likely lead to disruptive actions detrimental to Caspian terns at East Sand Island.

11-68 We recognize that terns, as well as other seabirds, are a natural part of the native ecosystem (e.g., food web). However, threatened and endangered salmonids within this system are in need of some assistance in recovery and thus, management of terns could aid in their recovery. See response to General Comment 7 in regards to tern predation as it relates to adult returns.

11-69 The Guiding Principles are not meant to justify the proposed action but rather to set guidelines for the development of management actions to resolve the conflict between tern predation and salmon recovery.

11-70 Comments are noted and have been answered in responses above.

11-71 See response to General Comment 2 (section J.2).

11-72 See response to General Comment 22 (section J.2).

Comment Letter 12

Comments submitted by Cheryl Strong, San Francisco Bird Observatory, via email, September 3, 2004

[illegible]

Comment	[illegible]	[illegible]	[illegible]	[illegible]
12-1	[illegible]	[illegible]	[illegible]	[illegible]
12-2	[illegible]	[illegible]	[illegible]	[illegible]
12-3	[illegible]	[illegible]	[illegible]	[illegible]
12-4	[illegible]	[illegible]	[illegible]	[illegible]
12-5	[illegible]	[illegible]	[illegible]	[illegible]
12-6	[illegible]	[illegible]	[illegible]	[illegible]
12-7	[illegible]	[illegible]	[illegible]	[illegible]
Comment Noted	[illegible]	[illegible]	[illegible]	[illegible]
12-8	[illegible]	[illegible]	[illegible]	[illegible]
Text Changed	[illegible]	[illegible]	[illegible]	[illegible]
12-9	[illegible]	[illegible]	[illegible]	[illegible]
12-10	[illegible]	[illegible]	[illegible]	[illegible]
12-11	[illegible]	[illegible]	[illegible]	[illegible]
12-12	[illegible]	[illegible]	[illegible]	[illegible]
12-13	[illegible]	[illegible]	[illegible]	[illegible]
12-14	[illegible]	[illegible]	[illegible]	[illegible]
Comment Noted	[illegible]	[illegible]	[illegible]	[illegible]
Comment Noted	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
12-15	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]

Response to Comment Letter 12. Cheryl Strong, San Francisco Bay Bird Observatory

12-1 See response to General Comment 19 (section J.2).

12-2 Other measures to aid salmon are addressed in the 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b). Measures include removable spillway weirs, guidance curtains to direct juveniles away from turbines, bypass improvements including extended length screens, fish guidance efficiency measures, and outfall relocations, spill improvements to increase survival through a reduction in total dissolved gasses and injuries, transport improvements, habitat improvements, and further research into avian predation and potential management actions to address avian predation.

Analysis of hatchery management practices are outside the scope of this EIS. NOAA Fisheries is currently developing new strategies for hatchery management practices. See the following website for more information: http://www.nwr.noaa.gov/1srd/index.html

12-3 The preferred alternative identifies management actions in the estuary through 2010. Long-term monitoring of the regional tern population will be conducted by the Service in association with other regional seabird monitoring efforts in the Service's Pacific Region.

12-4 Environmental conditions prevent the implementation of the scenario described in this comment for East Sand Island. Dredged material associated with the main Columbia River Navigation Channel is comprised of medium grained sand. This is the same material that comprises Rice Island, Miller Sands Spit, and Pillar Rock Island dredged material disposal sites. Pipeline dredges can safely be used upstream of Tongue Point (Columbia River Mile 18). Lower in the estuary, including East Sand Island, tidal currents, wave action and ground swell render operation of pipeline dredges in the main navigation channel hazardous. In addition to the environmental factors mentioned above, the 1.75 mile pumping distance to East Sand Island is excessive and would potentially require a booster pump. Costs associated with O&M actions on Rice Island, Miller Sands Spit, and Pillar Rock Island are minimal compared to dredging related costs to place material at East Sand Island. Further, the 6 acres of tern nesting habitat on East Sand Island require only about a foot of sand or less than 10,000 cy for the entire 6 acres. This represents only a portion of the dredge material that is produced during the O&M dredging of the channel upstream of Tongue Point.

The dredge material islands upriver remain viable disposal sites for maintenance of the Columbia River navigation channel. Surface acreage of bare sand substrate at these three islands already far exceeds the habitat requirements for the Caspian tern colony in the estuary.

12-5 The proposed reduction in habitat would occur after alternative sites have been enhanced, even though terns have not used the site yet. See also response to General Comment 10 (section J.2). Social attraction will be used at all alternate sites, except for Dungeness NWR and Brooks Island.

12-6 The 2 acres on Brooks Island includes ehancement to the current nesting area and additional areas adjacent to the current site.

12-7 If lethal control were implemented, it would continue as long as needed to maintain the number of terns at the proposed range (e.g., 2,500 to 3,125 pairs). Concurrently, changes in salmonid numbers would be measured as well. We are unsure what the commenter means by a "significant increase in salmon…" The extent and continuation of any lethal control practices would continue through 2010 as necessary.

Response to Comment Letter 12. Cheryl Strong, San Francisco Bay Bird Observatory (Continued)

12-8 Yes, displaced terns from the Columbia River estuary are expected to find new nesting sites in San Francisco Bay. These new colonies would be monitored, see Monitoring and Adaptive Management plan in Chapter 2. Also see response to General Comment 14 for response to limiting factor comment.

12-9 We focused our description of western snowy plovers to the Affected Environment of this EIS (which, in California, only includes San Francisco Bay).

12-10 As on East Sand Island, gull control may be implemented, if needed to ensure success of nesting terns and the establishment of new tern colonies. After colony establishment, gull control may not be necessary. An assessment based on effects from gulls to the tern colony would be conducted prior to initiating a gull control program. Social attraction is identified in the EIS as a potential management measure for implementation at Don Edwards NWR and Hayward Regional Shoreline. Predator control is already in place at all of these sites.

12-11 Our comparison of San Francisco Bay to the Columbia River estuary is based on similar habitat (e.g., estuary based conditions).

12-12 Yes, see Monitoring and Adaptive Management Plan.

12-13 See response to Comment 11-25 in previous letter.

12-14 The numbers in the table represent the percentage of the tern's diet that is comprised of salmonids.

12-15 No, abandonment of East Sand Island by all bird species as a result of the lethal control program would be unacceptable. Hence, another reason for not selecting this alternative.

Comment Letter 13

[illegible]

[illegible]

[illegible]

[illegible]

Comment Noted

[illegible]

Comment Noted

[illegible]

13-1

[illegible]

13-1 Continued

[illegible]

13-2

[illegible]

Comment Noted

[illegible]

Comment Noted

[illegible]

[illegible]

[illegible]

Response to Comment Letter 13. Audubon Society of Portland

13-1 Responses to the comments and questions in this paragraph have been addressed in responses to General Comments 1, 3, 7, 9, 13, and 20 (section J.2).

13-2 See response to General Comment 10. Additionally, initial reduction of the tern nesting area on East Sand Island to 4 acres would be smaller than the current area used (terns have nested on 3.9 to 4.7 acres from 2001 to 2004, Collis et al. 2002a, 2003a, 2003b, K. Collis pers. comm.). Thus, the preferred alternative proposes to immediately reduce the current tern nesting area to 5 acres until alternative habitat is enhanced elsewhere.

Comment Letter 14

[illegible]

[illegible]

[illegible]

14-1 [illegible]

[illegible]

14-2 [illegible]

14-3 [illegible]

14-4 [illegible]

14-5 [illegible]

[illegible]

14-6 [illegible]

14-7 [illegible]

Comment Noted [illegible]

[illegible]

[illegible]

[illegible]

Response to Comment Letter 14. Olympic Peninsula Audubon Society

14-1 We interpret this comment as supporting Alternative C with modifications rather than "a modified version of Alternative A." See response to General Comment 10 (section J.2).

14-2 See responses to General Comment 10 and 20 (section J.2).

14-3 See response to General Comment 22 (section J.2).

14-4 See response to General Comment 3 (section J.2).

14-5 See response to General Comment 4 (section J.2).

14-6 See response to General Comment 12 (section J.2).

14-7 See response to General Comment 11 (section J.2).

Comment Letter 15

Friends of Summer Lake
[illegible] Highway 31
Summer Lake, Oregon [illegible]
Phone: [illegible]

FAXED

September 17, 2004
[illegible]
[illegible]

Nanette Seto
Migratory Birds and Habitat Programs
U.S. Fish and Wildlife Service
911 NE 11th Avenue
Portland, OR 97232

Re: Caspian Tern Relocation Proposal

Dear Ms. Seto:

I am writing this letter on behalf of the Friends of Summer Lake to provide input on the possible relocation of Caspian Terns to the Summer Lake area.

15-1 [illegible]

Comment Noted Friends of Summer Lake (FOSL) is a non-profit 501(c)(3) organization formed in August 2002 by [illegible] Summer Lake, Oregon. These members [illegible] Since 2002 the organization has grown to approximately 100 members [illegible] and regions in the USA.

Comment Noted [illegible]
Starting in the 1940s [illegible] Summer Lake [illegible]

[illegible]

15-2 [illegible]

15-3 [illegible]

Comment Noted [illegible]

[illegible]

Sincerely,

[illegible]

[illegible]
Board of Directors

Enclosure

[illegible]

Response to Comment Letter 15. Friends of Summer Lake

15-1 See response to General Comment 13 (section J.2).

15-2 See response to General Comment 13 (section J.2).

15-3 Caspian terns are native to the Summer Lake Basin and have nested in both the lake and Summer Lake Wildlife Management Area in previous years. The creation of nesting islands would provide terns with more stable and suitable nesting habitat. Thus, the proposed action would not be introducing a "new population" or "new species of birds" to Summer Lake as the comment letter suggests.

Comment Letter 16

Pacific Seabird Group

[illegible]

Nanette Seto
Migratory Bird and Habitat Programs
U.S. Fish and Wildlife Service
911 NE 11th
Portland, OR 97232-4181

RE: Draft Environmental Impact Statement on Caspian Tern Management

Dear Nanette:

On behalf of the Pacific Seabird Group (PSG) we offer the following comments on the Draft Environmental Impact Statement (DEIS) on Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary [illegible]

[illegible]

[illegible]

[illegible]

16-1 [illegible]

16-2 [illegible]

16-3 [illegible]

16-4 [illegible]

[illegible]

[illegible]

16-5 [illegible]

[illegible]

[illegible]

Comment Noted [illegible]

16-6 [illegible]

Comment Noted [illegible]

[illegible]

Comment Noted

[illegible]

[illegible]

Sincerely,

[illegible]

Response to Comment Letter 16. Pacific Seabird Group

16-1 See responses to General Comments 1, 5, and 7 (section J.2).

16-2 See responses to General Comments 4 and 9 (section J.2).

16-3 See responses to General Comments 4 and 7 (section J.2).

16-4 Opinions quoted from C. Tynan were her own and does not reflect NOAA Fisheries' position on the subject of tern predation. Also see response to General Comment 7 (section J.2).

16-5 See response to General Comment 22 (section J.2).

16-6 Comment noted regarding Alternative A as a "fall-back position." Also see response to General Comment 10 (section J.2) regarding suggested modifications to Alternative C.

Comment Letter 17

*AMERICAN BIRD CONSERVANCY*DEFENDERS OF WILDLIFE*NATIONAL AUDUBON SOCIETY*SEATTLE AUDUBON SOCIETY*OREGON NATURAL RESOURCES COUNCIL*

[illegible] 21, 200[illegible]

Ms. [illegible]
[illegible]
[illegible] Fish and Wildlife Service
[illegible] Avenue
Portland, Oregon [illegible]

Re: Comments on DEIS for Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary

Dear Ms. [illegible]:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement for Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary (DEIS). These comments are submitted on behalf of the American Bird Conservancy, Defenders of Wildlife, National Audubon Society, Seattle Audubon Society, and the Oregon Natural Resources Council. We have [illegible] concerns with management actions [illegible] Caspian Terns in the Columbia [illegible] proposed moving Terns [illegible] the formation of [illegible].

[illegible] Caspian Tern [illegible] in federal court and [illegible] Washington [illegible] Environmental Impact Statement [illegible] in the Columbia River [illegible] detailed [illegible] scoping phase of the EIS [illegible] these comments.

[illegible] comments on the DEIS.

I. [illegible] CASPIAN TERNS IS FLAWED.

17-1 [illegible] management decisions [illegible] should be based on sound science. There is [illegible] in the DEIS [illegible]

17-1 Continued [illegible]

17-2 [illegible]

17-3 [illegible]

[illegible]

17-4 [illegible]

[illegible]

17-5 [illegible]

17-6 [illegible]

17-7 [illegible]

Comment Noted [illegible]

Comment Noted [illegible]

17-8 [illegible]

17-9 [illegible]

[illegible]

17-9 Continued

[illegible] to relocate the Tern colony from Rice Island to East Sand Island in 2000, [illegible] that there was no evidence that the Terns were limiting salmonid recovery. Dr. Cynthia Tynan, [illegible] NMFS' Northwest Fisheries Science Center, wrote regarding the Caspian Tern 2000 Management Plan:

> At present, there is no conclusive evidence to suggest [illegible] may be one of the factors that currently limit salmonid recovery. [illegible] Given the PIT tagged smolts on Rice Island [illegible] [illegible] management plan must consider the possibility that removal of Caspian terns from the estuary could actually have an adverse effect on the recovery of salmon. [illegible] [illegible]

[illegible] American Bird Conservancy's written comments dated March 7, 2001 submitted to the [illegible] 2001 Environmental Assessment [illegible].

E. DEIS FAILS TO ASSESS THE POSSIBLE NEGATIVE IMPACTS ON SALMONID RECOVERY FROM TERN DISPERSAL.

17-10 The DEIS' preferred alternative is based on Alternative [illegible] as suggested by Dr. Tynan, there [illegible] relocation of the East Sand Island Tern colony [illegible] could have an adverse effect on the recovery of salmon. [illegible] University of Washington researcher Dr. Julia Parrish for the Chelan County Public Utility District has verified that [illegible] effect [illegible] could result. [illegible] In July 2001, Dr. Parrish [illegible] the Chelan County Public Utility District Commissioners [illegible] populations which are currently [illegible]

17-11 [illegible] Caspian Terns have been [illegible] in the mid-Columbia and upper Columbia rivers under NMFS permits because of concerns that they are feeding on salmon. However, Dr. Parrish found that [illegible] small percentage

4

17-11 Continued [illegible]

17-12 [illegible]

17-13 [illegible]

[illegible]

17-14 [illegible]

> [illegible]

[illegible]

8

IV. DRAFT VIOLATES THE SETTLEMENT AGREEMENT IN FAILING TO ANALYZE PLACING CASPIAN TERN PREDATION IN CONTEXT WITH OTHER FACTORS INFLUENCING ESA-LISTED SALMONID RECOVERY.

17-15 The settlement agreement [illegible] requires the agencies [illegible] EIS [illegible] Caspian tern [illegible] ESA-listed salmonid recovery. [illegible] Thus, the EIS must fully discuss all factors limiting salmon recovery and put Tern predation in that context. [illegible] EIS [illegible] listed salmon recovery. [illegible]

[illegible] Cumulatively, these [other] actions [illegible] salmon recovery. [illegible]

The DEIS [illegible] report prepared by [illegible] NMFS [illegible] Appendix C [illegible] Chapter 4 [illegible] biological opinion [illegible] Tern predation [illegible] final EIS [illegible] DEIS [illegible] salmon recovery [illegible] final EIS [illegible] available.

6

On June [illegible], 2000, the FWS Regional Director sent a letter regarding the Caspian Tern [illegible] Stelle, NMFS Regional Director. Your office has a copy of that [illegible]. [illegible]

> [illegible] short term perspective, the actual benefits of [illegible] salmon recovery remain to be seen. Scientists from multiple [illegible] and [illegible] countries, including yours, [illegible] that [illegible] would have the most significant recovery benefits. We also know that [illegible] were [illegible] predators [illegible] before [illegible] significant predators in the estuary. Additionally, we should not ignore the record [illegible] 1995 [illegible] 1999 and 2000 and the [illegible] of [illegible] in 2000 [illegible] the number of [illegible] recovery [illegible] that will have [illegible] significant benefit for salmon recovery.

17-16 [illegible] FWS [illegible] the DEIS [illegible] salmon [illegible] not caused [illegible] predation [illegible] and ignore the record numbers of [illegible] adult [illegible].

V. DEIS FAILS TO INCLUDE AVAILABLE SCIENTIFIC INFORMATION ON RECORD RETURNS OF SALMONIDS DURING PERIODS OF INCREASED TERN POPULATIONS IN THE COLUMBIA ESTUARY.

17-17 [illegible] the DEIS [illegible] information [illegible] high [illegible] returns in recent years and [illegible] that the majority [illegible] (90%) of [illegible] consumed [illegible] terns are hatchery [illegible] salmon. A thorough discussion of both of these [illegible] in the DEIS. We request that this deficiency be remedied in the Final EIS.

17-18 The highly [illegible] NMFS [illegible] Appendix [illegible] adult salmon from tern [illegible] because [illegible] terns [illegible] and below [illegible] tern predation of salmon [illegible] number of adult salmon [illegible].

Steelhead [illegible] high levels [illegible] including [illegible] Columbia steelhead ESUs. According to the [illegible] these are the ESUs that [illegible] the [illegible] levels of Tern predation. If Tern predation [illegible] Island [illegible] the [illegible] how do the FWS, NMFS and other [illegible] the DEIS [illegible] Caspian Terns in the estuary? [illegible] adult [illegible] in the DEIS. However, given the [illegible] EIS [illegible] limiting salmon recovery, this

[illegible]

17-18 Continued [illegible] the Final EIS.

VI. LONG-TERM OWNERSHIP AND MANAGEMENT OF EAST SAND ISLAND IS NOT ADDRESSED.

17-19 [illegible]

[illegible]

[illegible]

VII. DEIS FAILS TO FULLY ASSESS THE IMPACTS TO CASPIAN TERN POPULATIONS FROM PREFERRED ALTERNATIVE C AND ALTERNATIVE D.

17-20 [illegible]

[illegible]

17-20 Continued [illegible] Pacific Coast Region.

In the peer-reviewed "Status Assessment and Conservation Recommendations for the Caspian Tern ..." by W. David Shuford and Daniel P. Craig (August 2002), it is stated that:

> [illegible] the Caspian Tern [illegible] Pacific Northwest [illegible] Columbia River estuary [illegible] North American population [illegible]

Comment Noted [illegible] the Caspian Tern colony [illegible]

> [illegible]

See [illegible] letter of Nov. [illegible] Draft Environmental Assessment for Caspian Tern Management.

[illegible]

VIII. THE PREFERRED ALTERNATIVE (ALTERNATIVE C) DOES NOT PROVIDE ADEQUATE ASSURANCES ON SUITABLE ALTERNATIVE HABITAT.

9

17-21

[illegible]

17-22

[illegible]

17-22 Continued [illegible]

17-23 [illegible]

17-24 [illegible]

[illegible]

17-25 [illegible]

11

17-26 [illegible]

17-27 [illegible]

IX. ALTERNATIVE D IS DRACONIAN AND UNSUPPORTED BY SCIENCE AND MUST BE REJECTED

Comment Noted [illegible]

12

X. NO MEASURES SHOULD BE TAKEN AGAINST THE CRESCENT ISLAND COLONY.

Comment Noted

We are concerned that other colonies of Caspian Terns will come under attack and request that the Final EIS assure that remaining colonies not be considered [illegible] all these sites. Specifically, the Crescent Island colony should be protected.

Again, thank you for the opportunity to comment on this important bird conservation issue.

Respectfully Submitted,

[illegible]
Conservation Coordinator
Seattle Audubon Society
8050 35th Avenue, NE
Seattle, WA 98115
[illegible]@seattleaudubon.org

Gerald Winegrad
Vice President for Policy
American Bird Conservancy
1834 Jefferson Place, NW
Washington, DC 20036
gw@abcbirds.org

Robert Perciasepe
Chief Operating Officer
National Audubon Society
1150 Connecticut Avenue NW, Suite 600
Washington, DC 20036
[illegible]@audubon.org

Caroline Kennedy
Director of Special Projects
Defenders of Wildlife
1130 17th St. NW
Washington, DC 20036
ckennedy@defenders.org

Doug Heiken, Western Oregon Field Representative
Oregon Natural Resources Council
PO Box 11648
Eugene, OR 97440
dh@onrc.org

15

Response to Comment Letter 17. Jointly signed letter: American Bird Conservancy, Defenders of Wildlife, National Audubon Society, Seattle Audubon Society, and Oregon Natural Resources Council

17-1 See response to General Comment 1 (section J.2).

17-2 See response to General Comment 5 (section J.2). In addition, previous comments submitted regarding the NOAA Fisheries analysis was forwarded to and addressed by NOAA Fisheries. The revised version which incorporates these comments is located in Appendix C.

17-3 See response to General Comment 5 (section J.2). Additionally, the type of anlaysis used in the NOAA Fisheries Predation Analysis (Appendix C) is now gaining wider use because it provides a common currency by which to weigh options and has proven successful in directing useful actions. An example is the use of this type of analysis to develop turtle excluder devices. The life cycle analyses used in this example suggested the contribution of the juvenile stage of turtle was more important to the potential recovery of ESA-listed turtle populations rather than the previously perceived egg stage and protection exclusively of the nesting habitats.

17-4 See response to General Comment 2 (section J.2).

17-5 See response to General Comment 6 (section J.2).

17-6 See responses to General Comment 1 and 7 (section J.2).

17-7 See response to General Comment 17 (section J.2).

17-8 See response to General Comment 17 (section J.2).

17-9 The opinions quoted from C. Tynan were her own and do not reflect NOAA Fisheries' position on the subject of tern predation. Also see response to General Comment 1 (section J.2).

17-10 Intensive diet studies of Caspian terns in the Columbia River estuary have been conducted and document that management of terns would assist in salmon recovery (Collis et al. 2000, 2001, 2002a, 2002b, 2003a, 2003b, Roby et al. 1998, 2002, 2003b, NOAA Fisheries 2004, Fresh et al. 2003). We have utilized all of these documents in our EIS analysis and have referenced them throughout in support of the need for action. Studies of avian predators and management actions at various dams conducted in the mid-Columbia is not related to management of nesting terns in the estuary. Additionally, we did not analyze whether reduction of the East Sand Island tern colony would have an adverse effect on the recovery of salmon (assoicated with the comment that less hatchery salmon, predators of wild salmon, would be consumed by terns) because a recent NOAA Fisheries determination includes both hatchery and wild salmonids in ESA-listed ESUs. Thus, hatchery salmon are also protected by the Endangered Species Act (see response to General Comment 9 (section J.2).

17-11 We are aware of the research that has been conducted at upriver dams in the Columbia River. Predator management at these sites is outside the scope of this EIS and does not have any effect on tern predation in the estuary. Also see response to General Comment 9 (section J.2) and response to comment 17-10, above.

17-12 See response to General Comment 9 (section J.2).

Response to Comment Letter 17. Jointly signed letter: American Bird Conservancy, Defenders of Wildlife, National Audubon Society, Seattle Audubon Society, and Oregon Natural Resources Council (Continued)

17-13 We agree and understand that there is a potential for displaced terns to move to locations in which there would be potential for increased consumption of salmonids (e.g., mid-Columbia, Grays Harbor) and have addressed this concern in the preferred alternative. We have proposed to include in the preferred alternative to monitor tern colony sizes and potentially diets if terns initiate nesting at Grays Harbor and San Francisco Bay. Studies in the mid-Columbia are currently on-going and thus, is not included in the Monitoring and Adaptive Management Plan of this EIS.

17-14 See response to General Comment 4 (section J.2).

17-15 The Service and the Corps do not believe that we are violating the Settlement Agreement with respect to the discussion of "tern predation in context with other factors influencing ESA-listed salmonid recovery." The EIS compares the benefits that would be gained through management of terns, the hydropower system, and harvest. A thorough assessment of the effects of the Four Hs on salmonids is contained in McClure et al. 2003, Fresh et al. 2004, and NOAA Fisheries 2004b (FCRPS Biological Opinion). We have included documents these documents in our EIS analysis to place our proposed action and tern predation in context with the Four Hs, as evidenced by their reference throughout the EIS. Also see response to General Commen 3 (section J.2)

The 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b) addresses the hydropower system and mitigating measures that will be implemented (such as tern management). The Four Hs are being addressed in a variety of forums, such as a recovery plan that has been developed by the Lower Columbia River Fish Recovery Board in coordination with NOAA Fisheries (http: // www.lcfrb.gen.wa.us/Oct%2004%20Draft%20Plans/lower_columbia_salmon_recovery_a.htm).

17-16 At the time the referenced letter was written, the Service did not have all of the data that is now available with respect to tern predation and salmon recovery. The Service continues to support the recovery for Columbia River salmonids and is committed to an adaptive management approach that is modified as new information becomes available. The Service is not ignoring analysis of the Four Hs, nor the necessity to focus recovery efforts there. The Service, Corps, and NOAA Fisheries have developed the preferred alternative regarding tern management in the Columbia River estuary to complement other salmon recovery efforts in the Columbia River Basin. Refer to the 2004 FCRPS Biological Opinion (NOAA Fisheries 2004b) and the Lower Columbia River Fish Recovery Board salmon recovery plan (see above website) for a description of how tern management is integrated with other actions to aid in salmon recovery.

17-17 See responses to General Comments 4 and 9 (section J.2).

17-18 See responses to General Comments 4 and 6(section J.2).

17-19 We are aware of the Settlement Agreement requirement regarding the recommendation of long-term ownership of East Sand Island and addressed this in the jointly signed statement by the Service and Corps in February 2003. As stated in that statement, the Service and Corps have determined that long-term ownership of East Sand Island did not have to be analyzed in the EIS and a recommendation prior to the completion of this EIS would be premature because long-term management responsibilities associated with ownership of the island has not been specified. The Service and Corps are prepared to make a final recommendation after a Record of Decision on this EIS has been issued in February 2005. Also see response to General Comment 22 (section J.2).

17-20 See response to General Comment 19 (section J.2).

Response to Comment Letter 17. Jointly signed letter: American Bird Conservancy, Defenders of Wildlife, National Audubon Society, Seattle Audubon Society, and Oregon Natural Resources Council (Continued)

17-21 See response to General Comment 20 (section J.2).

17-22 We agree that more safe and productive sites for terns in the region need to be developed. We conducted the feasibility study to examine habitat management opportunities in the region. This intensive study included an analysis of all current, historic, and potential nesting sites in Washington, Oregon, California, Idaho, and Nevada. We have also worked closely with State wildlife agencies and local government and communities in attempts to develop safe and productive sites for terns in the region. The sites included in the preferred alternative is the result of all these efforts and represent the best list of potential management sites given both biological and socio-political factors.

17-23 As described in the FEIS, terns are a highly adaptable and opportunisitic species that takes advantage of ephermeral habitats and forage conditions over a wide geographic range. This behavior lends to the likelihood that displaced terns would be able to find alternate sites identified in the preferred alternative. Social facilitation would occur at sites in which there are currently no terns nesting. This will aid in the attraction of displaced terns. Social facilitation has proven to be very successful for this species and other terns (Kress 1983, Collis et al. 2002c, Roby et al. 2002). Additionally, banding data indicate that movement between distant sites has been documented. For example, terns banded at Grays Harbor, Washington have been documented during the breeding season on or near other colony sites in eastern Oregon, central California, southern California, and Alaska (Suryan et al. 2004). Specific habitat enhancement/creation activities at alternate sites are described in Appendix G.

17-24 See response to General Comment 20 (section J.2).

17-25 We interprete this comment as supporting Alternative C with modifications rather than “a modified Alternative A.” See response to General Comment 10 (section J.2).

17-26 See response to General Comment 10 (section J.2).

17-27 See responses to General Comments 11 and 20 (section J.2).

Comment Letter 18

Stephen Bremer
624 Chenault Ave
Hoquiam WA 98550-1823

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NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

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CASPIAN TERN MANAGEMENT EIS
U S FISH AND WILDLIFE SERVICE
MIGRATORY BIRDS AND HABITAT PROGRAMS
911 NE 11TH AVE
PORTLAND OR 97232-0963

Response Card for
Draft Environmental Impact Statement (DEIS)
Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary

We encourage you to help us reduce paper and printing costs. Internet and library addresses are listed on the reverse side of this postcard.

Or, if you prefer (please check the appropriate box):

- ☐ **Please send me an electronic CD copy of the document**
- ☐ **Please send me a hard copy of the document (170 pages)**
- ☐ **Please remove my name from the mailing list or change my address (see below):**

Comment Noted

① I'm not For DEIS ② All supporting Environment groups should make restitution for salmon + steelhead loses in Wash, Oregon and Idaho. Raise fish not terns! [signature]

ber: Comments on the DEIS are due by September 4

Comment Letter 19

[illegible] To: [illegible]
Subject: Caspian Tern Management

Dear [illegible]

I am outraged at the decision by the FWS to reduce the size of the Caspian Tern colony at the mouth of the Columbia River. The terns are being used as scapegoats, and you are denying the real issues regarding the decline in salmon populations, which are 1) habitat loss due to logging, 2) Pollution from agriculture and stormwater runoff, not to mention much more non-point pollution, and 3) Dams, which prevent upstream migration to spawning grounds. A more recent hazard is salmon farming, which results in escaped fish watering down the wild stock and spreading disease. 19-1

I have strong doubts about your ability to relocate the tern colony. Birds have strong homing instincts, and generally return to the same territories over and over again. If new islands are created for tern nesting, there is no guarantee that the birds will find them, especially considering the distance of the proposed relocations from the Columbia River colony. 19-2

Caspian Terns and salmon have been living together for centuries, along with Bald Eagles and [illegible] salmon. Yet all these species have [illegible] the salmon population. So please let these alternative [illegible] and concentrate more on the real issues mentioned above. After all, the terns should have their fair share of fish too. They are part of the same planet we live on. Comment Noted

Yours truly,

Barry Ulman

[illegible]@msn.com

Response to Comment Letter 19. Barry Ulman

19-1 See response to General Comment 3 (section J.2). In response to the concern raised about salmon farming, we refer the commenter to the following document prepared by the Lower Columbia Fish Recovery Board entitled, *Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, Volume II – Subbasin Plan; Chapter A – Columbia Mainstem & Estuary Public Review Draft Comments due by November 9, 2004*. Refer to section "3.6.1.1 SAFE Hatchery Programs" in the document, which can be found at the following website:http://www.lcfrb.gen.wa.us/Oct%2004%20Draft%20Plans/Subbasin%20Plan%20Oct%2011%20pdf/Vol%20II%20A--Col%20Estuary%20mainstem.pdf. This portion of the document explains the history and operation of the select area fishery in the lower Columbia River, included indentified impacts to ESA-listed salmonids.

19-2 We concur with the commenter in stating that terns have "strong homing instincts, and generally return to the same territories" for nesting or feeding. However, terns have demonstrated the ability to adapt to changes in environmental conditions and seek out new nesting sites when needed. The species has demonstrated a remarkable adaptability in both locating and using what we would consider atypical nesting habitat (e.g., Everett Naval Base, ASARCO Superfund site, rooftops, barges, and wooden platforms). Thus, we expect displaced terns would be able to find new nesting sites when nesting habitat on ESI is reduced.

Comment Letter 20

[illegible]

Comment Noted

Comment Noted

Comment Letter 21

[illegible]

Comment Noted

Comment Letter 22

To: [illegible]
Migratory Birds and Habitat Program
U.S. Fish and Wildlife Service
[illegible] Ave.
Portland, [illegible]
[illegible]

[illegible]

Subject: Caspian Tern [illegible] — [illegible] artificial nesting [illegible] Summer Lake Wildlife Area.

From: [illegible]

The enclosed (April [illegible], 2004) comments to the U.S. Corps of [illegible] Summer Lake Wildlife Area. [illegible] to the Corps of Engineers [illegible] Oregon Fish and Wildlife Department's [illegible] Summer Lake.

[illegible]

22-1 [illegible]

[illegible]

Comment Noted [illegible]

22-2 [illegible]

[illegible]

22-3 [illegible]

Comment Noted [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

April [illegible], [illegible]

[illegible]
[illegible]
[illegible], Suite 200
Eugene, Oregon [illegible]

[illegible]

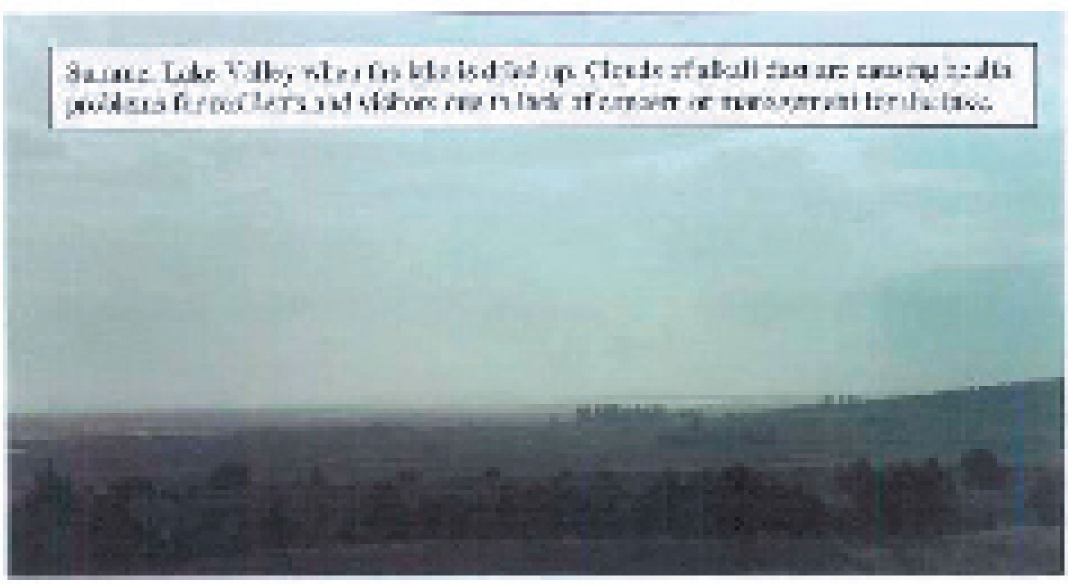
[illegible] was not considered in this project at all.

[illegible] is appreciated.

[illegible]

Sincerely,

[illegible]
[illegible] Hwy 31
Summer Lake, Oregon [illegible]
[illegible]



Summer Lake Valley when the lake is dried up. Clouds of alkali dust are causing health problems for residents and visitors due to lack of concern or management for the lake.

[illegible]

[illegible]

[illegible]

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]

2

[illegible]

9. Land use. [illegible]

10. Recreation. [illegible]

11. Water supply. [illegible]

12. Water quality. [illegible]

13. Property ownership. [illegible]

14. The needs and welfare of the people. [illegible]

Specific Request

[illegible]

[illegible]

Response to Comment Letter 22. Jointly signed by Dan Napier and Judy Blais Napier

22-1 We acknowledge that the residents of Summer Lake and Oregon Department of Fish and Wildlife are currently discussing issues associated with water management in the Wildlife Management Area and Summer Lake. However, this issue is outside the scope of this EIS and is not associated with this project. We are proposing development of tern habitat in Summer Lake Wildlife Management Area because it is part of a tern redistribution effort associated with this EIS. Also, see response to General Comment 13 (section J.2).

22-2 We acknowledge the commenters concerns regarding water management policy and practices of the State Wildlife Management Area. However, these issues are outside the scope of the EIS and would not be affected by the development of Caspian tern nesting habitat. Also see response to General Comment 13 (section J.2).

22-3 The nesting islands that would be created for Caspian terns can also be used by other colonial nesting waterbird species that use the Wildlife Management Area. Thus, the development of these nesting islands would be beneficial, rather than detrimental, to other migratory bird species. Additionally, Caspian terns already use this area, so they are native species to this ecosystem.

Comment Letter 23

AUG 21 2004

CASPIAN TERN RELOCATION
TO SUMMER LAKE WILDLIFE AREA

Ms. Nanette Seto
Migratory Birds and Habitat Programs
U.S. Fish and Wildlife Service
911 N.E. 11th Avenue
Portland, OR 97232

Dear Ms. Seto:

I am opposed to the introduction of Caspian Terns to the Summer Lake Wildlife Area until an environmental and biological study is completed of the entire Summer Lake Basin Watershed so the long-term effects on the watershed can be determined.

23-1 Personal Comments: Introducing a non native species into this sensitive environment, without first completing a comprehensive, up-to-date study by the entire Greater Summer Lake area, is unwise and [illegible].

Photo by Dennis [illegible]

Name:

Address: Peter & Sharon Harr
[illegible] NW [illegible] Circle
Corvallis, OR 97330

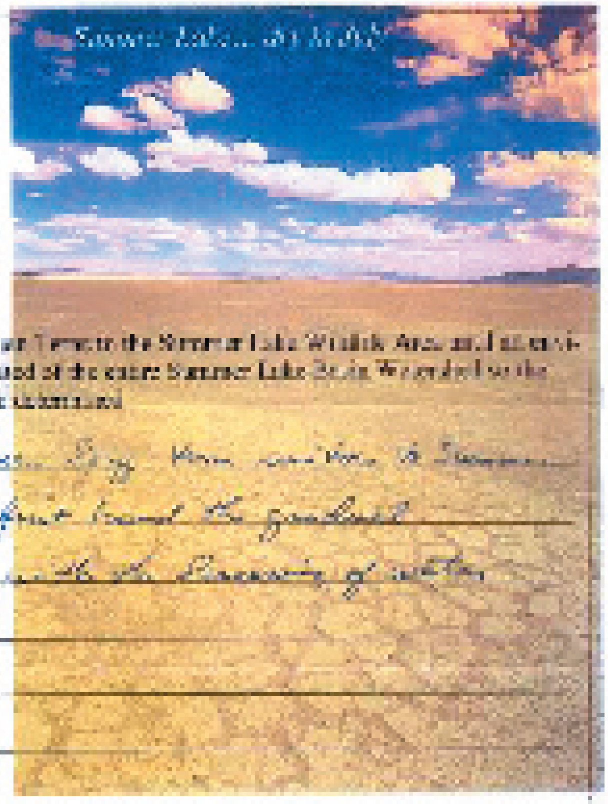
Response to Comment Letter 23. Peter and Sharon Harr

23-1 Caspian terns are native to the Summer Lake Basin and have nested historically at this site. Also see response to General Comment 13 (Section J.2).

Comment Letter 24

CASPIAN TERN RELOCATION TO SUMMER LAKE WILDLIFE AREA

[illegible]



Personal Comments: We have been [illegible] to Summer Lake and have noticed first hand the gradual deterioration of the area with the [illegible] of water in the lake.

24-1

[illegible]

Response to Comment Letter 24. Mark Burkhalter and Sue Hart

24-1 See response to General Comment 13 (Section J.2). In addition, the issue of water levels in the lake is not associated with this project and outside the scope of this EIS.

Comment Letter 25

CASPIAN TERN RELOCATION
TO SUMMER LAKE WILDLIFE AREA

To: Nanette Seto
Migratory Birds and Habitat Programs
U.S. Fish and Wildlife Service
911 N.E. 11th Avenue
Portland, OR 97232

Dear Ms. Seto:

25-1 I am opposed to the introduction of Caspian Terns to the Summer Lake Wildlife Area until an environmental and ecological study is completed of the entire Summer Lake Basin Watershed so the [illegible] can be determined.

Personal Comments: Please do not initiate another program that could very well create more costly programs because it hasn't been properly researched.

Printed on Recycled Paper

Name: W. Renee Sorsey

Address: [illegible]

[illegible]

Response to Comment Letter 25. W. Renee Sorsey

25-1 See response to General Comment 13 (section J.2). In addition, we do not expect the creation of small nesting islands in the Summer Lake Wildlife Management Area would result in future costly programs

Comment Letter 26

SEP 10 2004

Renata Sato — Sept 8, 2004

Migratory Birds & Habitat Program

U.S. Fish and Wildlife Service

Portland, Ore.

Dear Ms. Sato,

Comment Noted

I am writing about the Caspian Tern relocation proposal. I am entirely in favor of the project.

Comment Noted

I like terns, including Caspians, and it may interest you, Caspian Terns were not observed to be breeding in western or central Oregon until some time in the 1990s. It is my impression that their impressive population gain in the lower Columbia River area in the last 10 years or so is traced pretty directly to the artificial islands created by dredging spoils. They are beautiful birds, but it doesn't make much sense to me to spend so many millions of dollars on restoring endangered salmon runs, only to lose maybe about 10% of the fingerlings to predators who are present in abnormally high numbers due to human activity (dredging).

Sincerely, [illegible]

[illegible], Salem, Ore.

Comment Letter 27

RECEIVED

Comment Noted

27-1

Comment Noted

27-2

1

27-2
Continued

Response to Comment Letter 27. Range Bayer

27-1 See response to General Comment 10 (section J.2). In addition, the text in the FEIS has been revised to delete the description that the acres on East Sand Island could potentially fall below 1 acre.

27-2 The text in Chapter 4 has been revised and corrected based on these comments. See page 4-11 and 4-12.

Appendix K

Summary of Changes

Appendix K. Summary of Changes

All comments received on the Draft EIS (DEIS) were carefully considered in revising the document. All substantive comments were responded to either by modifying the EIS or in Appendix J, Comments and Responses. Based on the content and range of comments received, changes made to the text of the Final EIS (FEIS) were relatively minor and primarily served to correct, support, or clarify the analysis and recommendations made. The preferred alternative (Alternative C) of the FEIS remains consistent with that presented in the DEIS.

Changes between the DEIS and FEIS are summarized below, by Chapter or Appendix. In general, revisions are listed in the order they appear in the document. This summary addresses the most salient revisions to the document and is not a comprehensive "errata sheet" of each and every change made nor does it include editorial revisions or typographical corrections.

Revisions to Executive Summary

The Executive Summary was revised to focus on summarizing the preferred alternative of the FEIS. This was done to provide the reader with a concise summary of the preferred alternative rather than a comprehensive summary of the entire FEIS.

Revisions to Chapter 1

Based on several comments, it appeared that the Purpose of and Need for Action was not clear to all readers in the DEIS. We revised several sentences in the Introduction and section 1.2 to clarify the Purpose of and Need for Action of this FEIS. The main concepts that were clarified in the Purpose of and Need for Action included:

1. Current levels of tern predation are still substantial (rather than just a projected increase) and thus, demonstrates the need for action;

2. Estimates in the NOAA Fisheries model apply specifically to the four steelhead ESUs identified in their report;

3. Data associated with the Caspian tern colony in the Columbia River estuary was updated with preliminary 2004 data that was received after the DEIS was completed; and

4. Caveats associated with estimated benefits from the reduction of tern predation based on compensatory mortality.

We also revised section 1.3.2 to update the description of the Corps' responsibilities for tern management in the Columbia River estuary under the 2004 FCRPS Biological Opinion (which was released after the DEIS was completed). Other revisions to Chapter 1 included updating the public outreach section to include outreach efforts associated with the release of the DEIS and public comment period. Other revisions in Chapter 1 were associated with clarification of text.

Revisions to Chapter 2

We revised text in section 2.2, Similarities Among Alternatives, by deleting the last action ("Resumption of dredged material disposal on Rice Island"). Based on comments received, it was apparent that it appeared to readers that this action was part of the proposed action of the DEIS. It was not intended to be included in the proposed action, but rather a description of an action that will be occurring in the Columbia River estuary (and thus affected our proposed action). Our revision in the FEIS involved describing this action as an introductory section in the description of the first proposed action ("Prevent tern nesting in the upper estuary") in Section 2.2.

Revisions occur throughout the description of Alternative C to clarify numerous issues that were identified in the comments. These issues include:

1. Timing or schedule of proposed management actions included in Alternative C;

2. Non-lethal measures that would be used on East Sand Island to prevent terns from nesting outside the designated tern nesting area;

3. Estimates in the NOAA Fisheries model apply specifically to the four steelhead ESUs identified in their report;

4. Caveats associated with estimated benefits from the reduction of tern predation based on compensatory mortality; and

5. Data associated with the Caspian tern colony in the Columbia River estuary was updated with preliminary 2004 data that was received after the DEIS was completed.

Revisions to the description of Alternative D included updated information regarding estimated numbers of terns that would be killed under a lethal control program (based on corrected calculations presented in Chapter 4). Revisions were also made to section 2.4, Monitoring and Adaptive Management Plan to clarify components to the monitoring plan proposed for the preferred alternative and to section 2.5.2, Maximum Redistribution of Terns throughout the Region to clarify the proposed actions associated with that alternative.

Revisions to Chapter 3

Revisions to Chapter 3 were associated with addition of new information that became available since the DEIS was completed or clarification of existing information regarding descriptions of the Affected Environment. These changes were primarily associated with updating tern diet and colony size data associated with 2004 studies at the Columbia River estuary, Dungeness NWR, and San Francisco Bay; correcting text describing ESA-listed salmonids in the Affected Environment; the addition of several mammalian species to the California mammal section based on comments; and updated information regarding ESA-listed wildlife in the Affected Environment based on subsequent ESA-consultation that was initiated after the DEIS was completed.

Revisions to Chapter 4

Revisions to Chapter 4 were associated with clarification or updating descriptions of the effects to the affected environment. These changes were associated with the following analyses: effects to terns (including clarification of the tern population model under Alternative A); corrections to the lethal control program and projected number of terns that would be killed if the program was implemented; description of effects to non-listed and ESA-listed salmonids at Dungeness NWR, Columbia River estuary, and San Francisco Bay based on 2004 data that was received after the DEIS was completed. Revised text also clarified caveats associated with estimated benefits from the reduction of tern predation based on compensatory mortality.; effects to other bird species in California under Alternative C; clarification and more detailed text describing effects to ESA-listed wildlife (in particular, the California least tern, western snowy plover, California clapper rail, and salt marsh harvest mouse) based on ESA-consultation that was initiated after the DEIS was completed; and Table 4.6 was revised to include a summary of effects for all components of the Affected Environment.

Revisions to Chapter 5

Section 5.3.4 was revised to include a specific plan that was released since the completion of the DEIS.

Revisions to Appendices

Minor changes were also made to the appendix material and are summarized below. No changes were made to Appendices D, E, F, H, and I.

Several terms were added to the glossary in Appendix A.

Appendix B was updated to add pertinent references that became available after the release of the DEIS.

Based on several comments, revisions were made in coordination with NOAA Fisheries to Appendix C on pages C-7, C-8, C-11, C-12, and C-15 and are shown as italicized text.

Appendix G was updated to include more specific details regarding proposed actions at alternate sites that were developed since the completion of the DEIS.

Appendix J was added. This includes a summary of public comments and responses to comment.

Appendix K, this appendix, was added to summarize significant changes in the FEIS.