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Dear Mr Allen:

Please allow me to introduce myself. I was a biologist with the USFWS from 1969-1990. In Region 1, from 1974-1990, I worked on refuge acquisition, migratory bird and endangered species management issues, and nongame bird species. In the 1980s until 1990, I was the regional nongame program manager, when Portland was the first region in the nation to develop a nongame program. I have 37 years of experience as an ornithologist, have conducted field research on songbirds, raptors, shorebirds, seabirds, and such colonial birds as glossy ibis and white pelicans, and have published ornithological papers from my field research and data analyses. If you would like more information, I will be happy to provide you with my Resume.

The purposes of my writing are: 1) to provide comments on the Caspian Tern management EIS prepared by the Service; and 2) to bring to your personal attention that the EIS is leaves much to be desired as a science-based document. It is replete with unsupported assertions, things that don't make sense, and inconsistencies.

The EIS fails in three critically important ways: 1) Most importantly, it fails to make the case that the proposed action is necessary. It asserts that the proposed action will increase salmon populations, but the data used to support this assertion are unconvincing. Terns, as I think you may be aware, are not a limiting factor on salmonids. The EIS moreover fails to address the real problems that are jeopardizing salmonid populations. 2) For no compelling reason, therefore, the EIS proposes to sacrifice the greater portion, 6,000-7,000 pairs (or 12,000-14,000 birds) of the 8-9 thousand pair tern colony on Sand Island. This action will result in the net loss, not merely displacement, of thousands of terns, and would constitute at least a betrayal of the trust responsibility of the Service, if not a possibly illegal take under the Migratory Bird Treaty Act. 3) Finally, the EIS makes the claim, unsupported by any data whatsoever, that the action is "in the terns' best interests", which is simply outrageous and untrue.

I deeply regret having to bring the serious flaws and inadequacies of this EIS to your attention. If this proposed action were to go forward, it would mark a low point in the Service's history of protection of a nongame wildlife species. Perhaps it is not too late to avoid this pitfall in the making.

I urge you not to approve the action proposed in the EIS. I suggest instead, that the preferred alternative needs to be completely revised to take into consideration the ecological realities affecting both salmon and terns, including the 4 H's, something with which I believe you could agree.

Sincerely,

Brian E. Sharp

Comments on the "Caspian Tern Management to Reduce Predation of Juvenile Salmonids in the Columbia River Estuary" by U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and NOAA Fisheries. Draft Environmental Impact Statement, July 2004.

by Brian E. Sharp,  
Ecological Perspectives  
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## GENERAL COMMENTS

1. The US Fish and Wildlife Service, U.S. Army Corps of Engineers, and NOAA Fisheries (hereafter "USFWS" or "Service", USACE, and NOAA, respectively) are charged by the Court Settlement of 2002 to "Determine if habitat management for Caspian tern conservation is necessary..." (Seto et al. 2003). This EIS attempts, but fails, to demonstrate that necessity. Further reduction of tern predation rate, involving the moving, dispersing, or mortality of these terns, will not restore salmonid populations.

This task was assigned by the court to USFWS, with assistance to be provided by USACE and NOAA. The necessity of further tern reduction or colony dispersal has not been demonstrated on the basis of the significance of tern predation on salmonids. The relocation of the tern colony from Rice to E. Sand Island had, by 2002, already reduced predation levels on smolts by 67% (Roby et al. 2003). In 2003 and 2004, there was a further reduction of predation rates. Furthermore, the EIS does not prove - and the argument is flawed - that reducing tern numbers will increase the rate of population change of salmonid populations of even the most highly predated ESU, Snake River steelhead, and certainly not salmon ESU's. In addition, steelhead and other salmonid runs increased dramatically in 2002-2003, even in the presence of supposedly "limiting" levels of tern predation. Further decrease of tern numbers and predation rate are therefore unnecessary.

2. Furthermore, as regards the "necessity" of the proposed action: The EIS states (p.1-2): "Although the relocation of terns from Rice Island to East Sand Island resulted in a decreased percentage of salmonids in the tern diet, NOAA Fisheries continues to be concerned about tern predation on juvenile salmonids because of a projected increase in the tern colony size on East Sand Island." It is quite incredible that the reason for the proposed action is because NOAA is "concerned" when the "concern" is so at odds with the facts. These facts are:

- a) The tern colony size has NOT continued to increase as stated: in 2003 it decreased by 1600 pairs;
- b) Tern predation on juvenile salmonids pales into insignificance when contrasted with the real limiting factors that have caused the endangerment of, and continue to depress, salmonid populations in the Columbia River watershed; and
- c) The truth or credibility of the "expectation" (EIS p.1-4) that predator control, i.e., breakup of the tern colony, will significantly increase "adult [salmon] returns" is incorrect, as will be shown in comments below.

3. The EIS states (p. 1-5): "Many of the measures taken to restore salmonids ... have focused on improving survival or juvenile salmonids through the mainstem dams. These measures are associated with the operation and management of the Federal Columbia River Power System (FCRPS)..."

Nowhere in this EIS are the mitigating "measures... associated with operation and management of ...FCRPS" described. It is therefore possible neither to judge their adequacy, per se (i.e., to recover ESA-listed fish), nor, and more importantly, to judge their contribution to salmonid recovery relative to the "proposed action" of this EIS. The failure of the EIS to address this question is critical to understanding the efficacy of the proposed action, and its failure to include it is a serious and fundamental omission.

The obvious truth is that such FCRPS measures and operations taken throughout the history of operation of the hydropower system in the 20th century, have proved to be less than adequate. Nevertheless, the terns, which NOAA admits are a minor, insignificant factor, are equated with, and blamed for, the inadequacies of FCRPS operations, and modifications to them, thus far.

4. The Mission, Authority, and Responsibility of the US Fish and Wildlife Service, referred to in the opening pages of the EIS (p. 1-5), are derived from international treaty and congressional action: "the Service has specific trust responsibilities for migratory birds." The Caspian Tern is a nongame migratory bird species that is protected by treaty, law, and congressional appropriation. These "trust responsibilities" are not carried forward or referenced again throughout the EIS document in any meaningful way. The effect of the "proposed action" in this EIS (the "preferred alternative") is just the opposite, namely, Caspian Terns are not protected as called for by the trust, legal and budgetary responsibilities of the Service.

5. The public expects the Service to protect, not sacrifice wildlife when no necessity has been convincingly established, especially if alternatives solutions are available but are being ignored. The public expects that the salaries of Service employees not be paid to sacrifice migratory bird species for no compelling reason.

6. If terns are lost as a result of this action, which is likely, as admitted in this EIS (p. 4-9), this action will be seen as arbitrary, capricious, and even illegal.

7. The EIS is riddled with "might be" statements. I refer you, inter alia, to the heart of the EIS's impact section, namely Section 4.2.1.3., "Effects (sic) to Biological Environment." (Note: the English language requires, after the word "effects", the word "on", not "to"). Note on p. 4-9, how many times the words "could", "would be", "would be", "may be", "we expect", "would be" again (several times), "we expect...would be", "may not be", "could" again, "we expect...possibly", "is not expected", "would most likely", "would ensure", "would be available", "would be able", "we expect... may increase but would not" are used. Why not "will be", or "is of concern" instead of "could be" or "may be of concern"?

This section 4.2.1.3. is not atypical. The whole EIS is written in the same conditional verb tense, what is possible, not what is probable, not what can be relied on by the reader as the probable truth.

8. Following from the previous Comment, the language of this EIS is not science but supposition. It is plain to see that the authors do not really know what the impacts "will be", only what is "could be." Anything "could be", anything is possible. The reader is no wiser after being told that something is possible. "Possible" is not predictive. "Possible" is not science. In a science-based document, it is necessary to use probability statements to define the degree of confidence that we can have in a particular statement or assertion. However, few such probability statements appear in this report, and fewer that support the proposed action.

9. The language of the EIS, with its overuse of the conditional tense, is revealing: it shows the authors of this report are hesitant to make declarative statements where the declarative is needed. It is as if the agencies doubt or have little faith in their own assertions. Such hesitancy on the part of the agencies is, unfortunately, not misplaced.

10. The scientific process proceeds from data to conclusion, not the other way around. This EIS seems to proceed from conclusion (proposed action) to justification. This is fundamentally different from the scientific process.

11. The problem is not that these statements might be true - some of them might. Anything is "possible" and it is semantically an "easy way out" to hedge and make "would possibly be" statements. What is wrong here is that the statements might just as "possibly" be untrue. Instead of "would be", one could just as easily say, "might not be." The statements are mere supposition and require a leap of faith that the biologists who made the statements are credible, when in fact they may not be, and as often as not appear not be, credible.

12. The preferred alternative is presented to the reader as an article of faith. The reader is too often asked to accept on faith that the authors know what they are talking about, when they "might not".

13. Unless readers have experience with seabirds, tern ecology, evolution, their population dynamics, salmon ecology, operation of the hydrosystem, and an understanding of the climatic and other environmental factors in the Pacific Northwest that affect natural resource populations, they have no way of knowing whether the statements are true or untrue, or to what degree. Nevertheless, the authors of this document, with their "might be's" and "could's", are asking the reader to accept their view of the matter. However, many statements are unconvincing and unsupported. The reader would therefore do well to reserve judgement at the very least. No reader of this decision document should be expected, or be willing, to take the undocumented statements in this EIS on faith.

14. The reader should be suspicious of the logic contained in "possibility statements" because the authors have an agenda to prove, and made a predetermined decision to justify the necessity of the proposed action, that the terns be moved and their numbers reduced. It can be seen, however, that this predetermined decision is not convincingly supported by the data, when examined critically.

15. The proposed action in this EIS is similar to having decided in advance that Iraq is a threat to the national security, and it was "imperative" to attack preemptively. The "case" was made, based on "intelligence", that Saddam Hussein had weapons of mass destruction and would not hesitate to use them. In this EIS, it seems to have been decided in advance that the terns are responsible for the lack of recovery of endangered salmonid runs; must be preemptively reduced; drastic measures are called for to disperse the threat; and weak or flawed "intelligence" is used to justify the action. In this case, it is also claimed that the "preemptive strike" is in the terns' best interests, which is akin to saying Iraq and the world are better off without Saddam Hussein.

16. All the "might", "could", "would be" statements support the implication that there is a salmon smolt survival problem, that the terns are implicated and are in fact responsible for the problem, that breaking up the colony and reducing their numbers will do much to reduce the problem, and it is "in the terns' best interests" to boot, so everybody wins, even the terns.

Unfortunately, the truth of the matter lies elsewhere: this whole construct is a "creative stretch of the imagination."

17. If one were to substitute "might not", "would not be" for "might" and "would be" (and the data are more convincing seen the latter way, as will be shown in later comments below), the case is not cohesive, illogical, and falls apart.

18. Without supporting data, there can be no confidence in a "would be" statement. At the top of p. 4-9, after making a "would be" statement regarding the preferred alternative's "protecting the terns from catastrophic events", the EIS refers the reader to section 3.2.1. for supporting data. There are no supporting data in section 3.2.1. The EIS therefore, fails to make the case. The "would be" statement is meaningless.

The particular statement referred to in the previous Comment 4-9 is extremely important in that it is used as a major justification for the proposed action. This and related statements on the same subject in this EIS will be examined in more detail later as to whether they are supported by data, i.e., whether "in the terns' best interests" is likely a true statement or false claim (see Comments in Section 2, "IN THE TERNS' BEST INTERESTS!").

19. Two natural experiments have occurred: 1) the decline of the salmonid stocks occurred when the terns were not present in large numbers in the Columbia River basin; and 2) record salmonid runs in the late 1990's and early 2000's occurred when terns were present in large numbers. Both of these provide data points that do not support statements, such as that of the Corps of Engineers, NOAA, and this EIS, that it is "imperative" something be done about the terns to restore salmonid populations. This conclusion, mindset, or worldview is not supported by logic or the data.

20. A change in the mindset of the agencies, including the Service, US Army Corps of Engineers and NOAA, who persist in their "concern" despite the data that show no connection between tern predation and adult salmon numbers, is what is "imperative" in this situation, not a reduction of tern numbers.

Once the mindset of the bureaucracies is more consistent with the facts of the matter, the challenge then will be to relay the understanding to the public that terns are not the problem.

21. Placing E. Sand Island into the national wildlife refuge system is a viable competitive alternative that has been excluded from consideration by the agencies. East Sand Island has been identified by conservation organisations (American Bird Conservancy, Portland Audubon Society) as one of the premier ornithological sites in North America. A variety of other breeding species of colonial seabirds, including Caspian Terns, inhabit the island. The largest roost in North America - 11,000 birds in 2002 - of Brown Pelicans, an ESA-listed species, occurs at E. Sand Island; preliminary indications of breeding (courtship, nest-building, etc) have occurred (D. Roby, pers comm 9/04).

22. As the EIS states (p. 1-9), the island's acquisition by the Service as a national wildlife refuge would not affect the need to come to a science-based solution of the tern-salmon controversy. However, with the island in national wildlife refuge status, an appropriate outcome of the realization of the island's outstanding migratory bird and endangered species values, the Service, it is hoped, might take its trust responsibility to protect these colonial migratory nongame and endangered bird species more seriously.

SECTION 2. IN THE TERNS' BEST INTERESTS!

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;

2) No significant, wildlife damaging oil spills have occurred in the Columbia River mainstem. Shuford and Craig (2002. p. 36) state that "shipping traffic on the Columbia River leaves large breeding aggregations of terns ... especially vulnerable to oil spills or other spilling or shipping accidents", but there are no data to support the statement, and only minor oil spills have occurred on the Columbia River.

3) Almost all major, wildlife-affecting west coast oil spills have occurred during winter, when dangers to shipping (storms, bad weather) occur most often, but when terns are not present. By early September, terns have migrated to spend the winter along the coasts of Central America. The location and timing of major west coast oil spills is as follows:

Platform A, Santa Barbara, Jan 1969;  
Arizona and Oregon (tanker collision), Golden Gate Bridge, Jan 1971;  
Blue Magpie, Newport Oregon, Nov 1983;  
Apex Houston, Gulf of Farallones, Feb 1986;  
Nestucca, Gray's Harbor, Washington, Dec 1988;  
Exxon Valdez, Gulf of Alaska, March 1989;  
Tenyu Maru, Strait of Juan de Fuca, Washington, Jul 1991;  
New Carissa, Coos Bay/Waldport, Oregon, Feb. 1999;  
Kure, Humboldt Bay, Nov 1997;  
Platform Irene, Santa Barbara Sept. 1997;  
Cape Mohican, San Francisco Bay Nov 1996;  
American Trader, Southern California, Feb 1990;  
Cape Mohican, San Francisco Bay, Nov 1996;  
Command, San Francisco Bay, March 2000;  
Stuyvesant, Humboldt Bay, Sept 1999.

4) 14 of 15 major oil spills occurred when the terns had migrated out of the Columbia estuary. Only one major oil spill in the 35 year history of west coast spills occurred in summer (Tenyu Maru, Strait of Juan de Fuca, Washington, Jul 1991). This was near Dungeness NWR, a proposed tern relocation site.

5) Many of the above oil spills occurred along the California and Washington coasts near sites, e.g., San Francisco Bay, Gray's Harbor, Dungeness, to which it is proposed that terns displaced from the Columbia River be relocated.

The data on west coast oil spills indicate that the oil spill threat to terns during summer, when the terns are present and breeding, is remote. To include this improbable threat in this EIS as justification for moving terns "in their own best interests" is, therefore, an obvious failure to examine the available data before making an assertion that protection of terns from stochastic events such as oil spills is "in their best interests."

28. Apparently, the mention of oil spills in the EIS is an attempt to justify the proposed action. Not only were no data on oil spill occurrence provided in the EIS, the available data presented here on the history of west coast oil spills undermine one of two the major rationales presented in the EIS to justify the proposed action, namely that the proposed action (colony reduction and dispersal) protects the "terns' best interests." It is obvious that insofar as oil spills are concerned, for the EIS to even mention the terns' interests does not deserve serious consideration.

29. Despite the occurrence of a spill being an unlikely event, if one assumes that the threat of oil spills during the breeding season were "of concern", there are alternatives to dispersing the most impressive and successful tern colony in the world. An obvious alternative would be oil spill preparedness. Since the Exxon Valdez spill of 1989, oil spill contingency planning and preparedness are a legal requirement. Oil spill readiness along the Columbia River could be reviewed in relation to a potential spill event in the vicinity of East Sand I. with its rich wildlife resources. If there were any doubt as to the level of preparedness, after review and evaluation, insufficiencies of oil spill contingency plans in the lower Columbia River Subbasin could be rectified.

30. Furthermore, if an unlikely oil spill did occur in the breeding season when terns were present, the question arises as to whether terns would be adversely affected. Is this "a concern"?

The answer is no. Available data from all the wildlife-affecting oil spills in the United States, on Pacific, Atlantic, and Gulf coasts, have found that terns, like gulls, and unlike Common Murres, cormorants, and even Brown Pelicans, are not particularly vulnerable or susceptible to oil spills (Rice et al. 1996; Jeremy Hatch, pers. comm. Nov. 2003). After past oil spills that have been studied, tern species have been found (like gulls) to be unlikely to encounter, and to experience mortality from, oil slicks.

31. Furthermore, as regards oil spills and "terns' best interests", an additional consideration is that reproductive effects from oil spills are minimal for Caspian Terns: The USACE says as much (US Army Corps of Engineers 2002): "Birds with long life spans, like the terns, can withstand short-term production losses, since the adults will produce young in future years." Would a "stochastic event" like an oil spill be "catastrophic" in the sense that production of the colony might be affected? The answer again is that it would not: even according to a worst case scenario in which all egg/chick production was completely obliterated by the oil spill, it would not be catastrophic for the tern colony. Caspian Terns survival strategy is based on the long-term survival of breeding adults, and in the short term, the production of young is not critical to the survival of a colony or a population. Terns, being long-lived, can withstand losses of production in any given year. Any oil spill effects on productivity would be short-term and therefore not a threat to Caspian Terns (US Army Corps of Engineers 2002).

32. In summary, as regards oil spills, there are no data on the historical occurrence of oil spills, and no data from the ecology and evolution of the Caspian Tern as a species, that support the contention in the EIS that oil spills constitute a threat of "catastrophe" to the tern colony at East Sand Island. The corollary that dispersing the tern colony, so that such a "stochastic event" does adversely affect the terns, and that dispersal is "in the terns' best interests", are either claims based on ignorance, or they are an attempt to justify the proposed displacement of terns from E. Sand Island. The whole oil spill argument is specious, and has no place in this EIS.

IN THE TERNS' BEST INTERESTS!  
CATASTROPHIC STOCHASTIC EVENTS - STORMS

33. A second "catastrophic event" mentioned in the EIS (p.4-9) that supposedly requires that the terns to be moved "in their own best interests" is the stochastic threat of "storms." Many of the same considerations and questions apply to this supposed threat as to oil spills: is it, as supposed, a "catastrophe." What is the likelihood of summer storms occurring during the terns breeding season?

34. Not a shred of data on the occurrence of storms, or the effects of storms on terns, is presented in this EIS, not in Section 3.2.1., to which the reader is referred, nor elsewhere in the EIS.

35. Like oil spills, the threat posed by storms needs to be examined in greater detail.

Like oil spills, storms are usually winter events which would not affect breeding terns, either adults, chicks, or eggs, because terns are not present in winter. The occurrence of oil spills is sometimes caused by storms.

36. What is the probability of summer storms occurring during a breeding season, in successive breeding seasons? I have not looked at the weather data on storm frequencies, and this burden of proof remains on the shoulders of the EIS writers. In the meantime, the assertion remains unsupported by data, and the question therefore a mere possibility rather than a probability.

37. If a storm occurred during the breeding season, what would be the effect on the tern colony of the loss of production? Assuming that a storm were occur during summer, and that it eradicated the colony's eggs and chicks, would it be catastrophe? Caspian terns are long-lived, and longevity, not a high reproductive rate, is the strategy they have evolved to survive. So the loss of a year's production, or even two years in a row, is not significant, because terns depend on high survival of breeding pairs, not on high productivity, to survive "stochastic events."

38. If the terns were dispersed to other sites, as proposed, what is the probability of a storm system affecting those colony sites? How large are typical storm systems hitting the west coast in summer? Again, the burden of proof remains with the asserters of "catastrophe."

39. A storm that killed approximately 1000 chicks at E. Sand Island in 2000. This obviously had little effect on the population of terns, the terns weathered it successfully, and the population increased in the following 2 years.

40. It can again be seen that this threat is inserted in the EIS without much thought and no evidence. One cannot help speculating that the hobgoblin of storms are another weak or misplaced attempt to provide additional justification for the proposed action. However, there are no supporting data. Whether it has any basis in reality is not proven but unlikely. The probability of an effect on the survival of the tern colony is insignificant: the species' survival strategy is to survive "stochastic events" that affect reproduction. Biologically, the threat of storms is a meaningless exaggeration.

41. Without supporting data, a reader might suspect that the assertion of protecting the terns' best interests against storms is included in the EIS to induce fear in the minds of an uneducated, trusting public. It certainly functions as a weak but not altogether incredible argument to bolster the justification for the proposed action. Whether an arm-chair biologist can sincerely take alarm at the prospect of storms, pretending in a show of "concern" that he/she is proposing to displace the terns because it is in "the terns' best interests", stretches the credulity of the reader, however.

THE TERNS' BEST INTERESTS!

CATASTROPHIC STOCHASTIC EVENTS: DISEASE

42. The third "stochastic catastrophe" advanced in the EIS that "might", or "could" occur is the threat of disease. Again, however, no data on either the incidence or effects of disease in tern colonies are presented in this EIS. The statement that the proposed action would displace the terns "for their own good" is, once again, unsupported by data.

43. The simple assertion of the threat of disease is, however, insufficient justification for the decimation of the world's largest, and most magnificent Caspian Tern colony. However, this is what the reader is presented with, the simple assertion of a threat. "Take our word for it" is apparently what the authors of this EIS again expect us to believe on this subject. Who is to gainsay? Anything is possible -- we have seen that throughout this EIS, but again what is the likelihood, the probability? What can we rely upon? There are in fact, again, no data presented in this EIS that indicate that disease is a threat to Caspian Terns in general, or in this tern colony in particular.

44. The threat of disease in tern colonies is an interesting and germane question to make a preliminary evaluation of. In a backup review of information for this EIS, Shuford and Craig (2002) state that "Caspian Terns sometimes die in outbreaks of Newcastle disease and botulism, but these diseases do not appear to be a threat to the survival of the species..."

Virtually nothing is known of disease in terns (J. Hatch, Mass. Audubon, pers. comm. Nov. 2003). It is stated that Newcastle disease has occurred in cormorants at Salton Sea; but it is hardly appropriate to extrapolate this occurrence, affecting a different species in an inland, contaminated site, to the Columbia River estuary. Salton Sea is badly contaminated, with water quality degraded with runoff containing agricultural chemicals, whereas the Columbia estuary is, relatively speaking, pristine, with better water quality. There seems to be little probability that the estuary is a site where one would expect disease outbreak. Synergistic effects of poor water quality would not be expected to exacerbate the virulence of any such outbreak. There seem to be too many suppositions, and countervailing tendencies, to justify the inclusion of disease as a threat deserving of serious consideration in the present context.

45. The implication is that the larger the colony, the greater the threat. No data are advanced to back up the assertion. It is possible that greater resistance and immunity could be a likely result of sublethal exposure to contagious disease. If so, there is thus an advantage to larger colony size.

46. Many seabird species - sooty terns, noddy terns, murrelets, albatrosses, 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 probable 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:

There is some evidence from field studies of seabirds, including murrelets 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

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.

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.

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.

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."

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"?

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

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

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.

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.

60. Since the combined Washington and Oregon sites are obviously insufficient to accommodate 7,000 pairs of terns, California is the last hope in this EIS for accommodating significant numbers of terns. What about California?

The EIS states (p. 4-8): "The number of terns nesting in California would most likely increase substantially from the immigration of terns displaced from the Columbia River estuary. Although these sites are some distance from East Sand Island, we expect displaced terns to nest at these sites because only a small number of sites would be managed for terns in Washington and Oregon."

The EIS further states (p. 4-9), that one colony "could grow" from its present average size (681 pairs, p. F-3) to 1500 pairs, "if ...gulls do not encroach... [and] if conditions [prey abundance and predators) are suitable." At 2 other colonies, "colony sizes are expected to range between 100 and 1500 breeding pairs (at each site)."

Comments:

- 1). Note again that the statements made are all conditional: "would most likely increase substantially", "could grow", etc. What is the likelihood of their being true? What is the likelihood of the statements not being true?
- 2). Why are the number of terns at existing colonies in San Francisco Bay limited to the number of terns already present, only a few hundred pairs? and why have the number of terns in San Francisco Bay been stable for 30 years? Is some factor, e.g., prey base, or predation, limiting their numbers? Why doesn't this EIS provide data on the prey base in San Francisco to support a likelihood statement that San Francisco Bay will support a significant proportion of the 14,000 terns that will be displaced from E. Sand Island?
- 3). The basis for believing that California will accommodate terns displaced by the proposed action "because only a small number of sites would be managed" elsewhere in Oregon and Washington" is again unsubstantiated by any data and is hypothetical. San Francisco Bay is some 600 miles from E. Sand Island, not an impossibly long distance, but considering strong philopatry in terns, perhaps that is an unreasonable expectation. It is as or more likely that any terns displaced from E. Sand I. will find and attempt to colonize suitable nesting closer at hand. The project to deepen the Columbia River channel could produce an abundance of alternative colony sites in the Columbia River basin.

61. Is this EIS therefore "realistic" to expect that the majority of the terns on E. Sand Island will accept sites in San Francisco Bay? The answer to the preceding question, I suggest, is that it just as easily "might not." To think that an optimistic scenario is realistic seems merely wishful.

62. Mathematically adding up the numbers, sites in California in aggregate can accommodate between 200 and 3800 extra pairs (the worst case and most optimistic scenarios, respectively). Even under the most optimistic (unrealistic?) scenario, the maximum number of pairs that can be accommodated falls far short of the necessary 7,000 displaced pairs. Under the worst case scenario, there is a discrepancy of MORE THAN 6,000 PAIRS (or 12,000 birds).

Note that San Francisco Bay is the best hope for the relocation of terns displaced from Sand Island. Even if they do relocate in very large numbers, in the thousands, the whole alternative site mitigation aspect of the management proposal falls apart. It is insufficient to relocate the terns. The mathematics of the numbers of terns that might be accommodated at all the alternative sites indicates that any assertion that the terns will even be protected, let alone that "their best interests" are being served, makes no mathematical sense at all.

63. Note that no consideration is given in this proposal of the fact that San Francisco Bay, site of "the last best hope", also has contaminant problems. It is stated (EIS p. 4-9) that "Terns nesting in San Francisco Bay are exposed to contaminants and this may be (sic!) an issue of concern." AGAIN note the use of the expression "may be." Why does the EIS not say "is of concern"? The agencies are proposing to decimate the successful colony at E. Sand Island and expose it to contaminants in San Francisco Bay. How is this consistent with the terns "own best interests"?

64. The answer to the preceding question is of course that it is NOT consistent with the terns' best interests. The agencies have repeatedly said it would be a benefit to terns, but repeating a misapprehension doesn't make it any more true. For yet another reason, therefore, this time having to do with contaminants, the assertion of "terns' own best interests" is exposed for what it seems to be, namely justification to displace the terns and reduce the numbers in the Columbia estuary,

65. Finally, as regards the overall effect of the proposed action: If the majority of the displaced terns moved to San Francisco Bay, then most of the terns in the Pacific Region would again be localized in one area, and subject to "stochastic events like storms, disease and oil spills"! The concentration of terns in San Francisco Bay is the very thing that the project claims to want to protect the terns from. More oil spills have occurred in San Francisco Bay than in any other place on the Pacific coast except Humboldt Bay. Contrast this with zero oils spills in or near the Columbia estuary. Furthermore, there are additional threats in San Francisco Bay that are not problems in the Columbia estuary: 1) contaminants (mercury, etc); 2) human disturbance; and 3) high predation rates from coyotes, foxes, rats, feral cats, etc.

66. Adding up the possible and probable numbers at all potentially alternative, managed sites in Washington, Oregon and California, these sites "might" accommodate between 315 and 8200 pairs displaced from Sand I. However, the best case scenario is far too optimistic since it includes a maximum potential of 3500 pairs at Dungeness, a mainland colony. It is not realistic to expect that the Dungeness tern colony will prosper to that extent in the presence of predation. The lower range of numbers thus seems more likely. The colonies in San Francisco Bay are not likely to grow significantly due to predation, contaminant levels that affect reproduction, human disturbance, and prey base considerations.

67. At some relocation sites, predator control is proposed to prevent access by predators to the colonies. However, predator control is famously less than 100% successful. The USFWS or APHIS cannot guarantee that mainland-connected colonies (at Dungeness and in San Francisco Bay), or even at some island sites, will remain predator-free. It is thus extremely probable that even with predator control, mammalian predators (raccoons, coyotes, mink) could "breach tern colony security" and access mainland colonies. All it takes is for one or two predation events to render a Caspian Tern colony site unacceptable to terns or unsuitable for breeding or population growth. Island sites, e.g., E. Sand Island, are more isolated and more secure from predators, and are selected by nesting terns for this attribute. The terns are in a better position of judging what is in their own best interests, including a relative degree of freedom from predators, than biologists. Armchair biologists will not be there, at a colony in the middle of the night, when they are needed, i.e., when a predation event is occurring. Thinking about this probability, however, is unlikely to cause any of the authors of this EIS to lose any sleep at night.

68. A further point as regards avian predation (e.g., from Bald Eagles, Ravens, crows, and gulls):

A larger colony size deters successful avian predation. Mass mobbing by large numbers of terns dissuades avian predators. Small colonies, of a few dozens or a few hundreds of terns, are proposed by the agencies in this EIS. Such colonies are at the mercy of avian predators. It is "in the terns' best interests" to maintain larger terns in large colonies rather than disperse them to small colonies in which the terns are defenseless against predators. This EIS therefore proposes an action that will be opposed to the terns' best interests.

69. To summarize briefly, where is the advantage to the terns of moving and concentrating them somewhere else? Where is the gain to the terns in the overall project? The consequences of the "proposed action" have obviously not been logically thought through! Insofar as the provision of alternative sites is concerned, the work the USFWS has put into developing the proposed action makes little mathematical or ecological sense.

70. The data suggest, or indeed indicate, that none of these relocation sites is adequate in size, nor are they free of contaminants, predators, and other problems. Taken together, all the alternative sites are inferior to the colony in the Columbia River. I suggest that the terns, located right where they are, are where their "best interests" are already being served, i.e., in the mouth of the Columbia River.

71. The EIS admits (Table G-4) that political pressure by the states (presumably the wildlife departments, or governors, of California, Oregon, and Washington) resulted in the elimination of several good potential breeding sites for displaced terns, most of them better candidates than Dungeness, Crump Lake, Summer Lake, or Fern Ridge. For the USFWS to accede, or surrender, so easily, to political pressure, smacks, well, of politics, or lack of commitment to the wildlife resource. It is obvious that this EIS is not driven by biology. Certainly the "terns' best interests" have quickly taken second place to these politics. Asserting that managing these alternative sites protects the terns' best interests is obviously "far from the truth." That 7000 pairs of displaced terns will not and cannot be accommodated elsewhere, politics or no politics, is the outcome of the proposed action in this EIS.

72. One last question arises:

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."

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.

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 SUPPRESSING 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.

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.

79. Despite these two experiments from the real world - salmon endangerment in the absence of terns, and record salmon and steelhead runs when "large" numbers of terns were present - some agencies such as NOAA, USACE, the states, still "remain concerned that the observed level of predation remains injurious to ESU's."

What would it take to alleviate agency "concern" if not record salmonid runs despite the presence of terns, and the endangerment of salmon before terns arrived on the scene? The data on fish runs on the Columbia River should surely suggest to a right-minded person that their "remaining concern" about the terns might be misplaced.

80. The Service and other agencies in this EIS, by its "preferred alternative", ignores these findings and other data (see below) and proposes to manage the terns as if they were an impediment to salmonid recovery.

81. On the very first page of the EIS (p. ES-1) it is stated that "Although the relocation of terns ... to East Sand Island resulted in a decreased percentage of salmonids in the tern diet, the Caspian tern colony on East Sand Island is anticipated to increase in size. Thus the predation of juvenile salmonids by terns may increase in the future, maintaining a concern for salmon recovery by NOAA Fisheries."

Several errors are made here:

- 1) The colony has not continued to increase in size. Either the model itself, or the data input to the model, used in this calculation failed to "anticipate" correctly the reality of colony size dynamics. The model was not predictive: the colony decreased by 1600 pairs (about 16% or almost a fifth) in 2003, and was at about 9200 pairs in 2004 (D. Roby pers comm 9/8/04);
- 2) "Concern" by the Service or other agencies, that predation "may increase" is not sufficient basis for deciding that the drastic reduction of tern population (envisioned by the proposed alternative) is necessary;
- 3) "a concern for salmon recovery" is also not a valid or sufficient substitute for proof that the terns have anything to do with limiting salmon recovery; and
- 4) Since the mission and legal trust responsibility of the Service is to protect the terns, the burden of proof is surely higher than a mere possibility statement.

82. The US Army Corps of Engineers (USACE)(2002) states: "Although significant mortality of juvenile salmon and steelhead occur (sic - "occur" is incorrect) 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 salmon and steelhead.... These efforts will be part of a long-range comprehensive plan in support of recovery efforts for salmonids in the Columbia River Basin, which includes habitat enhancement and management of harvest, hatchery production, and hydroelectric operations." "

Statements such as this have been repeated ad nauseam in many places in connection with tern predation, including in this EIS, and used as a basis for justifying the proposed reduction in tern numbers.

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.

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.

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., Gray'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.

88. Let's have a look at the scientific evidence that terns might "remain injurious" to salmon and steelhead recovery. The questions that need answering are:

1) What is the extent of tern predation on smolts?; 2) of the significance of that tern predation on smolts and smolt-adult ratios (recruitment)?; and 3) what factors affect salmonid smolts other than tern predation?

What are the data, the findings, that provide answers, or begin to provide answers, to these questions?

89. Unfortunately, it has to be noted first that the Service, USACE, and NOAA have excluded an examination of many of these questions because they are "beyond the scope" of this EIS. However, it should be obvious that answers to these question are central to the decision that this EIS is supposed to examine, namely "the necessity" of the proposed action.

The EIS even admits (on p. 1-9) that "issues were raised ... that were outside of the scope of this project ... [and] "ALTHOUGH SIGNIFICANT (emphasis mine!), will not be addressed in this EIS."

The "scope" of the decision supposedly to be developed in this EIS REQUIRES answers to these questions.

90. It is categorically stated, without explanation or rationale, that even though the 4 "H"'s "are the major causes of salmon declines, not avian predation", "This EIS is not addressing the issue of ... salmon recovery"! The EIS (on p. ES-9) also admits that "Cumulatively, the variety of salmon recovery actions [among which were the "Effects of Hydropower, Habitat Loss, Hatcheries, and Harvest - 4 "H"'s - on Salmon." ] have the potential to influence population growth rate [of salmonids] to a substantially greater degree than would be realized from ... reducing predation from avian predators in the Columbia River estuary."

91. The EIS continues: "Instead, the EIS and proposed action is focused specifically [i.e., only] on the management of Caspian terns in the estuary to reduce predation on juvenile salmonids as one measure to aid salmon recovery."

I find IT simply astounding that this EIS intends to avoid the necessity of examining necessary questions. How is it possible for the reader, or even for the authors of this EIS, to gauge the relative contribution of tern predation unless one gains some idea of the effects of other salmonid mortality factors? The answer is that it is simply not possible. Neither the writers of this report, nor the readers of it, can judge whether the proposed action (namely, to decimate the tern colony at E. Sand I.) is necessary or justified. The question of the necessity of the action has been side-stepped. And the agencies do not even provide the reader with a reason. The decision as to "whether the proposed action is necessary" is to be made "in the dark."

92. USFWS, with assistance from USACE, NOAA, is legally charged with developing an EIS for the management of the Caspian Tern, and included as a basic mandated task is "to determine the necessity of reducing tern numbers in the estuary" (Seto et al. 2003). In order to accomplish this task, it is necessary for USFWS/USACE/NOAA to evaluate tern predation in relation to the other mortality factors that affect salmon recruitment. Unfortunately, both USFWS and NOAA as far back as last November refused to examine this question (Nanette Seto, USFWS, pers. comm., Nov. 2003; Cathy Tortorici, NOAA, pers. comm., Nov. 2003). Although later, a half-hearted attempt was made in the EIS to mention the problem of the other, more significant factors in passing, they are still not examined in any detail or in any systematic or meaningful way, and many of them are excluded.

93. One of the important questions not addressed in this EIS is SAR's, smolt-adult ratios, which are the process by or after which smolts become adults. Tern predation is one of but not among the important factors affecting SAR's. Most of the factors that have important effects on SAR are "outside the scope of the EIS." This is one of the reasons why this EIS is mistaken in excluding important factors as outside the scope,, because it bears importantly on the question of predation and recruitment. Therefore, the discussion of SAR's is deferred to a later set of comments combined in the Section on THE REAL FACTORS LIMITING SALMONIDS IN THE COLUMBIA RIVER.

94. Let us, nevertheless, attempt to examine the first 2 questions WITHOUT looking at the whole context: 1) What is the extent of tern predation on smolts?; and 2) what is the significance of that tern predation on smolts and smolt-adult ratios (recruitment)?, keeping in mind that only a limited, partial answer is possible because much of the discussion is out of the "scope" of the EIS.

95. In 1997-98, when the colony nested at Rice Island, predation by Caspian Terns in the Columbia River estuary was estimated at 8-12 million salmonid smolts (Roby et al. 2003). These are old data from Rice Island, not current data from Sand Island. They are not appropriate for use in calculating current predation rates and delta-lambdas at E. Sand Island. However, it is not clear whether they have been used to do so. Table C-5 (p. C-14), calculates lambdas for up to the year 2000, relying on data in Figure 7 (p. C-27), which are also current only through 2002, even though a large reduction in the rate of predation has occurred since that time. Thus, the most current data on predation rates are apparently not reflected in the calculations used to "support" the decision to "go" with the proposed action. The justification of the proposed action is based on out-of-date data and therefore flawed.

96. The available data up to the present are as follows: In 1997-98, predation by Caspian Terns in the Columbia River estuary was estimated at 8-12 million salmonid smolts when the colony nested at Rice Island, and salmonids in the diet of Caspian Terns were 71-74% of the biomass taken (Roby et al. 2003). If the number of smolts reaching the estuary was 100 million (ibid), the tern take in 1997-98 would have been 8-12% of the smolts. In 1999 and 2000, the Rice Island colony at River Mile 20 was relocated to East Sand Island at the mouth of the river (at RM 5), by 2001 the proportion of salmonids in the diet of Caspian Terns was reduced to 33%-47%, and the total number of smolts taken by Caspian Terns had been reduced by approximately 50%. In 2003, the number of smolts taken by terns dropped even further to 4.2 million, or to 1/3 of the levels seen at Rice Island in 1997-98, and marine fish species comprised the major portion of the diet. In 2004,

preliminary figures indicate that the percent of salmonid smolts in the tern diet was even lower than in 2003, or 17% (D. Roby pers comm 9/2004), and numbers of terns had only partially recovered from the 1600 pair drop in 2003. Overall, the relocation of Caspian Terns from Rice Island to E. Sand Island has reduced predation on salmonid smolts by more than 2/3 between 1997 and 2004.

Since the numbers of terns was up by 700 pairs or so in 2004, the total number of smolts taken may remain comparable to the low numbers in 2003 (D. Roby, pers comm 9/04). The proportion of smolts in the diet have reached new lows in 2003 and 2004.

This latest predation rate data are not incorporated into the calculations of lambda, or by implication, into the justification for the "decision", the choice of the preferred alternative. The older data provide inflated estimates of tern predation effects on salmonid smolts, and inflated estimates of the advantage to salmonid smolts of reducing tern numbers.

97. The statement (EIS p. C-5) that "the terns feed on large [sic] numbers of migrating juvenile salmon and steelhead, and ... losses to avian predators now constitute a substantial [sic] proportion of individual salmon runs (Roby et al. 1998)" is therefore now out of date. Since the late 1990's, "large" and "substantial" are now "small", "insubstantial" or "negligible": there has been a great reduction, upwards of 70%, in numbers of smolts taken.

98. This reduction in the percentage of salmonid smolts in the diet calls into question the necessity of the proposed action, which is to reduce tern predation on salmonid ESU's because of a continuing but mistaken or misplaced "concern" that predation "may still be injurious" to and impede ESU's recovery.

99. Note too that other data used in the NOAA analyses in Appendix C (e.g., Table 1) don't include the most up to date data, i.e., the much reduced predation rates from 2003 and 2004, and are out of date. By 2000, there was already a 72% reduction in predation by terns by moving the terns from Rice to E. Sand Island, and there has been a further reduction in tern predation due to changed ocean conditions and availability of marine fish species in 2003 and 2004.

100. Of all salmonid ESU's, upper Columbia River steelhead experienced the highest predation rates from terns; this run, therefore, represents the worst possible tern predation scenario from the salmon/fisheries managers' point of view (Collis et al. 2001, Roby et al. 2003). It has been calculated (NOAA 2002, Roby et al 2003, EIS p.1-3) that reducing the level of salmonid predation by 50% would increase the growth rate of the steelhead population by a mere 1/2 of 1%, that is, from a 5% decline to a 4.5% decline.

A reduction of 50% of the tern predation was in fact already accomplished by the relocation of the tern colony to E. Sand Island.

101. It has further been calculated, given the same assumptions, that the total elimination of the tern colony, and consequently all predation by terns, would increase the rate of salmonid population change by not more than 1% (Roby et al. 2003). Thus even the total elimination of tern predation would not reverse salmonid declines (Roby et al. 2003). Some parties (e.g., NOAA 2002, US Army Corps of Engineers 2002) persist in asserting that "terns constitute one of the factors that limit salmonid stock recovery ... reducing

Caspian tern predation in the estuary is one potential mechanism to reduce mortality, thereby increasing population growth rates of Endangered Species Act ... listed ... ESU's in the Columbia Basin (ibid.)."

This is despite the fact that analyses of the data by NOAA (2002) and Roby et al. (2003), and even in this EIS, though flawed, indicate that reduction or total elimination of tern predation would have a negligible effect on adult salmon recruitment. Tern predation is clearly not having a significant effect on recruitment.

102. It is important to note that the above small increases in salmonid rates of population change (0.5% to 1%) "should be viewed as maximum" (NOAA 2002), because the model makes the assumption that the reduction in tern predation would be "fully realized", i.e., would not be compensated by other mortality, e.g., in the ocean. NOAA's assumption, however, is more than likely false: the mortality is to some extent at least compensatory, not 100% additive as the NOAA model and calculations in this EIS (Appendix C) assume it to be. Because of this flawed assumption in the model itself (which adds to the fact that the data input to the model are out of date) (see Comment above), the results of these calculations therefore overestimate the positive effects on lambda of reducing tern numbers. Both the model and the data inputting into the model, overestimate expected improvements in lambda.

103. Whether predation is additive or compensatory is still an open question. Though calculations of lambda changes were calculated by NOAA on the basis of an additive model, there are no data to indicate that this assumption is valid. The appropriate model may in fact be, and likely is, partly or completely compensatory. Roby et al, assumed 50% compensatory, but for no compelling reason. He calculated lambda changes of 1/2% for the most predated steelhead ESU's. It appears that the model used by NOAA exaggerates the increase in lambda due to the tern management/ reduction proposed in this EIS. If the model assumed that tern predation were 100% compensatory, lambda change goes to 0 (zero).

104. The likelihood is that much of the tern predation is compensatory, since survival of smolts to adults occurs in the ocean, when many other factors and predation affect the SAR's (smolt-adult ratios).

105. Since NOAA relies on old data on predation rates to calculate the effect the removal of terns would have on salmonid ESU's, the newer data on tern predation rates would demonstrate that the changes in lambda calculated by NOAA would be even more negligible than those calculations presented in Appendix C.

106. These calculations of lambda change, which are flawed and exaggerated, are relied on by USFWS to justify the "preferred alternative" in this EIS.

107. NOAA itself admits that "Over the last few years, consumption of salmonids in the estuary has been lower than previously, while consumption of alternative prey species has increased...."(EIS p.C-9). Unfortunately, NOAA fails to incorporate the more recent data that reflect these reductions into their calculations.

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.

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.

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.

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.

114. It is inappropriate, not supported by the data on PIT tag recovery rates, and scientifically INADMISSIBLE to apply data from steelhead (the worst case scenario) to other much less-affected ESU's, which do not experience nearly as high a tern predation rate. This approach is biased. That the data from steelhead are applied to salmon is a serious flaw in this EIS. The EIS needs to analyze and calculate the effects of reducing tern numbers on salmon ESU's separately to be used in the decision-making process. Steelhead and salmon predation rates and survival are entirely separate issues.

115. Casillas (pers comm 2003) confirms that steelhead runs have been at record high levels in recent years. From that, as we have seen, it can be deduced that tern predation even on steelhead ESU's is therefore not limiting. It can also be deduced that since PIT tag data for tern predation on salmon are an order of magnitude less than for steelhead, the bottom line for salmon is that positive changes to lambda for salmon would be even more negligible than they are for upper river steelhead (which are about 0.5%). Assuming that salmon lambda is proportional to predation rate from PIT tags, a rough estimate of salmon lambda is 0.05%, which is negligible, not significantly different from zero!

116. These changes in lambda really are negligible and really hardly worth considering. Using data from various fishery studies, Roby et al (2003) state: "ESU's appear to require 5-15% increases in lambda to change the population trajectory from negative to positive..."

117. The EIS (p. 2-4) talks about some PIT tags not being found, and therefore that the predation rate derived from PIT tags is a minimum. This approach seems quite unsupportable since the PIT tag data and bioenergetics model agree quite well on the calculated predation rates. Despite this agreement, the EIS doubts the data, and uses the logic of the minimum number of PIT tags as a reason for setting a "conservative" tern population management level. In other words, the agencies propose to reduce the number of terns at E. Sand Island even further, to be sure of achieving a 1% increase in lambda (for steelhead).

118. What the EIS fails to mention however, is that PIT tags do not show real, or absolute smolt survival, but merely give relative data. The implant or carrying of the PIT tags apparently reduces smolt survival. However, the EIS makes no adjustment in the objective population level to take this effect of PIT tag on survival into consideration, as it did to adjust for a less than 100% proportion of PIT tags found, and the tern objective level in the proposed action does not adjust for this survival effect fairly in the same way.

119. It should also be noted that most of the smolts available to terns are hatchery-raised, and that Caspian Terns take more hatchery smolts than wild, naturally reproducing wild salmonids, and hatchery raised smolts are twice as vulnerable to predation by terns than wild fish (Collis et al. 2001; EIS p. 3-6).

If a greater proportion of the salmonids taken by terns are hatchery fish, not wild fish, most of the relatively small remaining predation of 4.2 million smolts in 2003 is of hatchery fish, which are not ESU's nor ESA-listed. Therefore, for this additional reason, the "expectation" that ESU's will benefit from eliminating tern predation is again exaggerated.

120. Actions to benefit hatchery fish do not fall under the auspices of the ESA. The justification of reducing tern numbers to benefit hatchery fish must be considered separately from wild ESA-listed fish.

121. Predation rates by terns, between 0.5 and 6.3% (Table 3, p. C-10) are very low.

122. Predation rates are well below what could, and should, be considered an "allowable natural predation rates" by native avian species on a prey base. Predation of the Common Murre colony at Farallon Islands NWR on juvenile rockfish is circa 25%, for example (D. Ainley pers comm).

123. NOAA (2000) states that predation rates "are considered by most investigators to be an insignificant contribution to the large declines..." but may be significant at narrow river mouths and barriers such as locks! Those conditions do not apply to the estuary environment that is the context of the present controversy, and are not pertinent to the discussion.

124. The EIS states (p. 3-8): "From 1999 to 20003, the tern diet on East Sand Island ... was primarily non-salmonids... In all other areas that have been studied, except Commencement Bay, salmonids were found to be uncommon diet items."

The EIS seems to recognize the fact that tern predation is quite low, and because of SAR's smolt-adult ratios (discussed below), certainly has a negligible effect on adult recruitment, but the EIS again ignores its own data in its statements, including this critical piece of information, in reaching a conclusion of the "necessity" of reducing the colony at East Sand Island.

125. The case has clearly not been proven in this EIS that the Caspian Terns are a significant limiting factor on salmonids. Calculated changes in lambda are exaggerated, based on poor data, poor model assumptions, do not consider all the factors, and despite flaws leading to exaggerations, are still negligible!

126. However, in Table 2-3, it is stated that the "anticipated effects" of Alternative A on salmonids are: "Continued/anticipated increase in juvenile smolt consumption; no improvement in population growth rate of ESA-listed salmonids." Certain salient facts are ignored. These include: 1) a reduction in the population of terns at Sand Island in 2003 by 1600 pairs, not a growth of the population; 2) a reduction in the proportion of salmonids in the diet of Caspian Terns; and 3) calculated small to negligible changes in lambda.

127. Also in Table 2-3, it is stated that the "anticipated effects" of Alternative C (the proposed action) on salmonids are "Substantial reduction in juvenile (sic) smolt consumption; anticipate increase in population growth of ESA-listed salmonids." (Are there, by the way, any smolts that are not "juvenile"?). Again, the facts are: 1) that a substantial reduction of smolt consumption has already occurred; and 2) that population growth for "ESA-listed salmonids" is not significant, not more than 1/2 of 1% for upper Columbia River steelhead, the run with the largest predation rate, and certainly less for salmon ESU's. The EIS ignores these inconvenient facts. Changes in lambda are calculated to be small to negligible for steelhead, and almost zero for salmon ESU's.

128. There is therefore no necessity for further reduction of smolt predation, and therefore no necessity for reducing the tern population. Tern numbers have already failed to increase as predicted: in 2003, the tern population dropped by 1600 pairs, and recovered only partially in 2004 (D. Roby pers comm 9/2004), and the predation rate of this smaller number of terns is dramatically reduced in the last 2-4 years. Lambda changes are small to negligible.

Nevertheless, statements such as that in EIS (p. C-5) are still repeated, even by the USFWS, that terns are "one of the factors that currently limit salmonid stock recovery." As we have seen from the data, as NOAA itself has stated, and as these comments have demonstrated, terns are NOT, according to the data, "one of the limiting factors."

129. The statement: "Therefore, reducing Caspian tern predation ... is one potential mechanism to reduce mortality" is illogical and unsubstantiated. Again, note the use of the conditional "potential" -- is it "a mechanism" or isn't it?). There are no convincing data to justify the use of the word "Therefore." There is in fact no "therefore" there!

130. This finishes the section on answering the question "what is the significance of the observed tern predation rates on salmon", within the context of the EIS, and not considering the real, significant factors affecting salmon that were considered by the writers to be "outside the scope of the EIS." We now turn to those factors.

#### THE REAL FACTORS LIMITING SALMONIDS IN THE COLUMBIA RIVER

131. This set of comments (131-167) will address some of the considerations that this DEIS considers "outside the scope." It augments the preceding section (on "The effects of terns on salmonids"). These considerations, questions and their implications bear directly on the significance of the impacts of tern predation. Without a complete understanding of the significance of the tern predation, the EIS fails to convince the reader of the necessity or correctness of its preferred alternative.

132. NOAA (2002) states that "Human activities have contributed to salmon and steelhead population declines in the Columbia River Basin." "Contributed to" is an "understatement": That human activities "have caused...the declines" is a more accurate and truthful, and necessary, acknowledgement of the situation. It is these human activities, particularly the 4 "H"'s, that are responsible for the plight of the salmon and steelhead, not tern predation.

133. Salmonid smolt mortality factors other than tern predation include high mortality rates of smolts passing dams and impoundments, impaired stream/watershed processes such as sedimentation from logging and road-building, and higher water temperatures from riparian tree removal. For example, smolt mortality between the McNary and John Day dams during the period 1999-2002 varied from 23% to 42% (Williams et al. 2003). This mortality applies to the stretch of the Columbia River between just two of its 13 mainstem dams and impoundments.

134. The mortality rate of salmonid smolts between the McNary and The Dalles dams is about 30% of the smolts. Other dams on the Snake and at Bonneville Dam add to this mortality. Since the mortality due to tern predation is only 4.2 million smolts, or 2% of the 200 million smolts released from hatcheries, it can readily be seen that mortality due to terns is far less than the mortality due to dams.

135. Marmorek and Peters (1996) state that upstream stocks declined more than lower Columbia stocks since 1974. In the 1970's the John Day dam and Snake River dams were completed, and with 8 dams now on the lower and mid-Columbia River, there was subsequently an 89% reduction in recruitment of Snake River stocks due to the hydrosystem during 1975-1990, compared to 65% reduction due to the hydrosystem during 1952-1970, during which period salmon smolt migration involved passing through 2-7 dams.

136. According to testimony to Senate Committee on Environment and Public Works by the American Bird Conservancy, on 10/16/98, there is a 6-15% mortality of smolts through turbines. Through 13 dams on the Columbia River mainstem, this equates to a minimum 78% mortality. Up to 70% of Snake River chinook don't reach the estuary.

Obviously, a major problem facing salmonid smolts is the dams on the Columbia River.

137. The tern predation of smolts (a maximum of 13% and 5% for particular steelhead and salmon ESU's, pales into insignificance in comparison with mortality at dams.

138. If Snake River dams are "bypassed", there is a 99% probability of Snake River fall chinook recovery in 24 years, and an 80% probability of recovery of spring-summer chinook in 24 years. Without "bypass", extinction is the other option ([www.idahorivers.org](http://www.idahorivers.org)).

139. "PATH" is the acronym for "Plan for Analyzing and Testing Hypotheses", which was a comprehensive effort to understand effects of watershed factors on salmonid populations: "Major conclusions [from PATH Level-2 analysis] were that hydrosystem, habitat, and climate conditions have all contributed to observed patterns of decline in Snake River stocks.... habitat changes alone were not sufficient to explain these patterns... harvest effects did not contribute significantly to post-1974 declines, and hatchery programs [hatchery releases] were probably also not a major factor..." (Marmorek and Peters 2001).

("Habitat changes" referred to above included loss of quality pools, temperature increases, and point-source discharges.)

The conclusion is that effects of the operation of the hydropower system are more important than the other 3 "H"'s.

140. Marmorek and Peters (2001) state that "two key uncertainties that have the strongest effects on survival and recovery of Snake River spring/summer and fall chinook are extra mortality of non-transported fish, and relative post-Bonneville survival of transported fish compared to post-Bonneville survival of non-transported fish...." They conclude that dam avoidance is the key to increased salmon survival and recruitment.

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.

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.

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."

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.

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.).

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?

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."

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.

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.

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.

This comparison, however, is never seen side by side in this EIS. One suspects that if it were presented, the reader would realize, or be informed, that addressing the 4 H's is overwhelmingly more important than tern predation. It therefore hardly surprising that there is inuendo here, because it is not stated in this EIS. Though it is outside the scope, what WILL lead to "full recovery" of any listed salmon or steelhead stock would be useful to know.

158. Climate is the remaining major factor that significantly influences salmon population change. Climate is out of human control. However, because dams have not changed, and tern numbers have not changed in the estuary or on the mainstem Columbia River, it is likely that the interaction of climate and ocean conditions is probably the cause of the record salmonid runs observed in the past few years. More to the point, tern predation, even by the large numbers of terns at the E. Sand Island colony, was not a factor.

159. Kareiva et al. (2000), in a statement apparently heavily relied on by other agencies, e.g., USACE and in this EIS, state that "Salmon experience high mortalities as juveniles in freshwater, the estuary, and early (sic) in the ocean, leading researchers to suggest that reducing mortality during the juvenile stage has the potential to increase population growth rates."

"Has the potential", however, is not a good enough basis to justify the proposed action of the EIS. What is needed is how to reduce juvenile mortality significantly so that it translates into adult recruitment. That question is not answered by this EIS. It is outside the scope.

160. However, it is implied that reducing tern predation WILL translate into adult recruitment. That implication is not supported by data. Presumably marshalling data to support the implication is also outside the scope of the EIS.

161. Roby et al (2003) state: "Predation rates on juvenile salmonids cannot, however, be easily translated into effects on the number of returning spawning adults."

This EIS makes no attempt to consider the factors that affect recruitment of adults.

162. The EIS fails to consider SAR's (smolt-to-adult ratios). Instead the EIS makes "a leap of faith" from smolt predation to tern reduction to greater returns of adult breeding salmonids. No data are provided in this EIS to elucidate the mechanism that translates smolts into spawning adults.

163. Williams et al. (2003) state that smolt-to-adult ratios are the critical statistic for salmonid lambda (population change). An SAR of 2-6% are necessary for population increase. Most SAR's are too low (below 2%).

164. Models of impacts on SAR's (smolt to adult ratios) show little relationship between tern predation, or the absence thereof, and recruitment. Factors that probably affect SAR are ocean conditions, climate, and hydrosystem operation, not tern predation. Reduction or even elimination of tern predation do not increase SAR significantly. Other factors have a far greater effect on adult recruitment into the breeding population than tern predation.

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

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.

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., murre, 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 Murre 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

Rock Island and Rocky Beach dams (G. Winegrad, Am. Bird Conservancy, pers comm, 8/04). Gulls, it should be noted on the other hand, eat 75% northern pike-minnow in their diet; this gull predation therefore benefits salmon (ibid.).

172. The EIS provides no information on mortality from marine mammals. There are apparently no available estimates of the number of smolts taken by seals and sea lions (F. Dobler, WADFW pers comm, Jan 2003).

173. Estimates of mortality from these other factors, derived from the few data we have from certain stretches of the Columbia River mainstem between certain dams, particularly predation by northern pike-minnow and to a lesser extent cormorants, allow us to glimpse the outlines of the problem of recovering salmon populations, and to realize the sheer relative insignificance of the tern predation at the mouth of the Columbia River. By corollary, the anticipated effects on salmonid recruitment of even drastically reducing the number of terns in the colony at E. Sand Island insignificant relative to all the predators present.

174. Terns are obviously only one fish or wildlife predator, and not even the most important one at that.

175. Human disturbance is another factor that the agencies have not addressed in this EIS. The likelihood of human disturbance in San Francisco Bay, a proposed alternative site, for example, is higher than the current site at E. Sand Island. Moving the terns to San Francisco Bay would expose them to greater human disturbance.

176. Insofar as human disturbance is concerned, the agencies also do not address malice on the part of the public. If the public believes that terns are a significant and limiting factor on salmon, and if fishermen perceive their livelihood, which is dependent on salmonid runs, to be threatened, resentment against the terns may break out in acts of malice or vandalism of the colony. This is unpleasant to contemplate but perhaps a real threat given the controversy surrounding this issue.

177. The solution to this problem is not this EIS. The agencies must take a proactive and honest approach by the telling the exact truth of this controversy to the public, and avoid the kind of polarization that characterized the Spotted Owl controversy. The difference between terns and owls is that a substantial part of the tern colony is vulnerable to a single act of malice on the part of a disgruntled anti-environmentalist, perhaps misled by agencies that have not put the issue of tern predation effects into a proper perspective.

It is the trust responsibility of the agencies to inform the public of the true impacts of tern predation, as outlined in these comments, not as outlined in the EIS. If this decision-making EIS fails to do that, it might have extremely unfortunate consequences. The agencies are inviting disaster.

178. Seabirds native to North America are a natural part of the food web. A portion of the prey base utilized by seabirds should be considered and allotted by fish and wildlife managers to "an allowable natural predation level." At the Farallon Islands, for example, Common Murres take between 20-30% of the juvenile rockfish populations (of certain species) (D. Ainley, formerly Point Reyes Bird Observatory, pers comm). The "allowable natural predation level" cannot be allocated to either the commercial or sport fish

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:

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.

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.

## 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.

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.

197. This EIS document substitutes supposition and faulty logic, lack of data, and speculation, for science-based inferences and supporting data.

198. The EIS ignores scientific evidence that is pertinent to the hypothesis inherent in the decision. It also exaggerates findings to justify the proposed action. This isn't science; it is ideology.

199. Factors other than terns - the 4 H's, climate, ocean conditions, and other fish and wildlife predators - are far more significant than tern predation. These other factors are what are really limiting salmon populations. Tern predation is negligible and on a par with carcass fertilization of tributaries.

200. More strenuous efforts to significantly modify the operation of the hydrosystem are undoubtedly the most important management action the responsible agencies can do to recover salmonid populations.

201. "The purpose of the proposed action is to comply with the 2002 settlement Agreement ... that reduces ... conflicts with ESA-listed salmonids..." Supposed conflicts with ESA-listed species are seen to be negligible. The EIS fails to consider the predation reductions that has already occurred. The colony size was down by 1600 pairs in 2003, the proportion of salmonids in the diet was down to 17% in 2004, and the tern diet has been predominantly non-salmonids since the colony was moved from Rice to E. Sand Island.

It is time for the USFWS, NOAA, USACE, the States, and other interested parties, to declare victory and leave the terns alone. It is time also for the Service to stand up to pressures from uninformed quarters, who are mistaken and/or misled about salmon limiting factors, to defend the negligible tern take of salmonid smolts, and to protect a magnificent colony of terns in the Columbia River estuary.

202. I predict that "managing" terns according to this proposal will be a public relations disaster, will have a significantly adverse effect on the terns, and will result in an abject and utter failure to recover ESA-listed salmonid runs, i.e., it will have almost no effect on salmon runs at all. If this proposed action goes forward, the colony of terns at East Sand Island will have been decimated for no benefit.

203. The US Congress provides the Service with a budget as part of the Interior appropriation, using revenue derived from the general tax-paying public. This is provided by Congress with the expectation by both Congress and the public that the Service will shoulder its trust responsibility. The document makes a show of doing so, but actually does not: the terns' best interests are NOT served by the management actions proposed in this EIS. The Service would be violating the public trust.

204. The EIS attempts to reassure the reader, the public, and itself, by stating (p. 4-9): "If the regional population declines to 50 percent... management of tern nesting sites ...would be reevaluated as part of the adaptive management approach proposed in this DEIS...."

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 corrective action could or would be taken 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? 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."

Considering its less than stellar record of protecting declining populations of other nongame birds (spotted owl, marbled murrelet, snowy plover: all threatened; yellow-billed cuckoo: extinct in most Region 1 states; white pelican and white-faced ibis: reduced to a small number of colonies), the record is not reassuring. Answer to the above questions? Perhaps 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 salmon runs are not addressed by, indeed are outside the scope of, 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 so 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%.

207. The maximum predation rate (on steelhead) of 9000 pairs terns at East Sand Island is about 8.0% (EIS p. C-12). This steelhead predation rate is relatively small. Salmon predation rates are much lower.

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, murrelets, 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 portion 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 Murrelets 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.

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

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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