

**SUMMARY OF NATIONAL RESEARCH COUNCIL (NRC) REPORT,  
WITH ASSOCIATED PAGE REFERENCES  
Scientific Review of the Draft Environmental Impact Statement:  
Drakes Bay Oyster Company Special Use Permit**

Full report is available at: [http://www.nap.edu/catalog.php?record\\_id=13461](http://www.nap.edu/catalog.php?record_id=13461)

**GENERAL RE: UNCERTAINTY AND RELATIONSHIP TO MAKING A DECISION**

As noted in the previous NRC report on Drakes Estero (NRC, 2009), there is not an extensive scientific literature on Drakes Estero and research on the potential impacts of shellfish mariculture on the Drakes Estero ecosystem is even sparser. Therefore, the NPS had little primary data on which to base the DEIS and had to rely to a large extent on inference from research conducted in other areas. Although this was the only approach that could be used under the circumstances, it not only made it difficult to differentiate impacts of alternatives B, C and D, it resulted in a moderate to high level of uncertainty associated with conclusions concerning levels of impact for most of the resource categories reviewed by the committee (Table S.1). [pg2]

All scientific information contains some level of uncertainty, but this does not mean that science does not provide actionable information for policy; rather the level of uncertainty is an attribute of scientific information that needs to be communicated as part of a scientific report (NRC, 2004). [pg17]

**SUMMARY OF REVIEW OF ATKINS' PEER REVIEW OF DEIS:**

The committee also evaluated the Atkins peer review of the EIS, which was commissioned by the Park Service. The selected experts were well-qualified, and their comments were mostly consistent with the committee's findings. However, the Atkins peer review needs additional expertise to cover the range of scientific topics in the EIS. In addition, it does not include a review of the definitions of impact intensity. [NRC press release]

**WETLANDS:**

The committee finds that the impact definitions, review of scientific information, and conclusions on wetland impacts are reasonable. The DEIS concludes that the impact of DBOC activities including physical buildings and structures, boating operations, and mariculture practices, on wetlands will be moderate adverse, a conclusion that the committee finds to be reasonable and is associated with a moderate level of uncertainty. It is likely that alternatives B, C, and D would continue to have an adverse impact on wetlands over the next 10 years, and these impacts would continue to be localized. [pg19]

**EELGRASS:**

In general, the committee finds that the data support the DEIS findings; alternatives B and C would sustain the current level of adverse impact while alternative D could increase the amount of vegetation damaged if motorboat traffic increases and there are more motorboat corridors through eelgrass beds. [pg20]

**NONINDIGENOUS BIVALVES:**

Overall, the committee agrees that the establishment of new species due to DBOC mariculture would constitute a sufficient shift in community composition to constitute a moderately adverse impact given the guidance in NPS *Management Policies 2006* for "maintenance and restoration of natural native ecosystems, including the eradication of exotic species." [pg24]

### **FISH:**

The DEIS concludes that the impacts of alternatives B, C, and D would be minor. Considering the small acreage of eelgrass disturbance (Table 2.1), the committee finds that this conclusion is appropriate, particularly because there is considerable uncertainty about whether eelgrass can be directly related to fish production. [pg25]

### **HARBOR SEALS:**

Both the DEIS and the MMC report recognize the high level of uncertainty in the scientific understanding of population consequences of disturbance, including disturbance specifically related to mariculture activities in the Estero. Importantly, the DEIS does not state that mariculture-related disturbance is likely to be a major driver of harbor seal population dynamics in Drakes Estero (compared, for example, with broader scale El Niño effects which depress seal populations due to decreased prey availability<sup>28</sup>). However, impacts from mariculture operations do appear to have a greater influence on harbor seal site choice and their resulting fine scale distribution within the Estero, than short-term human disturbance such as that from recreational activity (Becker et al., 2011). [pg27]

Viewed alongside peer review results of short-term disturbance effects in other areas (reviewed in the NRC, 2009 report), the information presented in the DEIS supports the conclusion that alternatives B, C, and D would likely result in moderate adverse impacts on harbor seals due to potential displacement from preferred haul-out sites. The assumption that production level generally correlates with the level of mariculture activities is uncertain, preventing discrimination of the predicted impact levels based on measurable differences between alternatives B, C, and D. In contrast, alternative A, after the initial short-term impacts during equipment review removal, would be expected to lead to fine scale changes in harbor seal distribution that reflect natural site preference and responses to natural, as opposed to anthropogenic, environmental variation. [pg27]

Overall, the best available scientific information was used in the DEIS [pg27]

The committee is not aware of any data supporting other hypotheses to explain these patterns, and given current understanding of potential disturbance effects in wildlife populations, support a conclusion that moderate impact of mariculture activity is the most parsimonious and reasonable conclusion to be drawn from available data. The suggestion that the extension of the DBOC lease (alternatives B, C, and D) will have moderate adverse impacts on harbor seals is consistent with the peer reviewed literature, and reasonable given current general understanding of the potential impacts of chronic and cumulative disturbance on pinnipeds and other wildlife populations. [pg27]

Alternate hypotheses of impact on the harbor seals could be proposed based on scientific logic but even less information is available to support such hypotheses. [pg27]

### **BIRDS:**

The committee finds that the DEIS conclusion that alternative A would have a beneficial impact, because habitat would improve for foraging and migratory birds, is valid and scientifically sound. For example, this alternative would have beneficial impacts to birds using the Estero to forage, rest during migratory stopovers, etc., by replacing 7 acres of oyster racks with eelgrass and allowing an estimated 50 acres (based on NRC 2009 calculations) of additional eelgrass to recover from boat scarring (although it is difficult to determine if such increases would have any detectable effect on species of concern like the black brant). [pg29]

For alternative B, the conclusion that this alternative would result in long-term moderate adverse impacts on birds and bird habitat, because noise disturbances from DBOC motorboats and the displacement of

natural habitat by shellfish racks and bags “would be clearly detectable and could appreciably affect natural processes,” is scientifically sound according to current literature, but it has not been demonstrated in systems like those in Drakes Estero. [pg29]

### **SPECIAL STATUS SPECIES:**

For each species, the DEIS categorizes alternative A as being long-term beneficial, and alternatives B, C, and D as having long-term minor adverse impacts. The committee proposes no alternate conclusions to the DEIS findings for special-status species. [PG32]

### **WATER QUALITY:**

Summing across the parameters contributing to water quality, the DEIS concludes that the action alternatives would have a minor adverse impact. This is based on assessment of minor adverse impacts from increased turbidity due to sediment disturbance, leachates from lumber used in the docks and racks, and a small amount of stormwater runoff, outweighing “local” beneficial impacts from filtration by the cultured shellfish. However, data on water quality parameters that could be affected by shellfish culture (e.g., turbidity, suspended organic matter, phytoplankton biomass, nutrient concentrations) were not provided in support of this conclusion. Thus, given the small amount of information provided in the DEIS related to water quality impacts by DBOC, conclusions reported in the DEIS concerning impacts of DBOC operations on water quality are assigned a high level of uncertainty by the committee. [pg36]

### **SOUNDSCAPES:**

The DEIS concludes that implementation of alternative A, after an initial increase in sound levels associated with removing the DBOC footprint, will reduce overall anthropogenic noise levels and restore Drakes Estero soundscapes to a more natural state. This conclusion is well supported. [pg37]

The DEIS concludes that alternatives B, C, and D would present a major adverse impact. The committee assigns a high level of uncertainty to this conclusion regarding impacts of DBOC operations on the soundscape because there are no data on underwater sound, lack of a scientifically-based sampling scheme (e.g., poor spatial and temporal coverage), lack of direct measurements of sound levels associated with DBOC activities, limited data on how noise impacts harbor seals at the population level, unknowns related to boat traffic with potential decreases or increases in production, and uncertainty associated with potential changes in human noise from onshore improvements proposed in alternative D. Because of these unknowns, the committee finds that other conclusions could be reached for alternatives B, C, and D, i.e., adverse impacts could be classified as moderate or minor, rather than major, even with the impact criteria used in the DEIS. The committee concurs with and assigns a low level of uncertainty to the conclusion that alternative A would have beneficial impacts since anthropogenic noise levels would be reduced in the long-term. [pg39]

### **SOCIOECONOMIC:**

The conclusions reached in the DEIS might change if a more rigorous, cost-benefit analysis were conducted. The committee makes no finding as to whether the DEIS socioeconomic analysis is sufficient to meet NEPA requirements for such an analysis. However, the committee finds that what is in the DEIS does not constitute a scientifically valid economic analysis. Because the DEIS economic impact assessments were not based on quantitative metrics, it includes inferences and interpretations of impacts that have a high level of uncertainty. For example, even if a person who visited DBOC still continued to visit the Seashore for other types of recreation if DBOC closed under implementation of alternative A, there could be some reduction in consumer’s surplus for this person.<sup>65</sup> Therefore, the committee finds the overall analysis of socioeconomic impact intensities in the DEIS to have a high level of uncertainty. [pg41]