

December 8, 2008

To: Dr. Susan Roberts, Director, Dr. Pete Peterson, Chair, and members, Ocean Studies Board panel to investigate NPS science concerning Drakes Estero, National Research Council, National Academy of Sciences

From: Dr. Corey Goodman, Marshall, CA; member, National Academy of Sciences

RE: **Disturbance records and relationship between oyster harvest and mariculture-related disturbances in Becker II vs. Becker I**

Although some errors were corrected, new errors were introduced into Becker's October version of his manuscript (Becker II) compared to his original version presented to your panel on September 4 (Becker I). Each version contains errors of fact and each misrepresents the NPS harbor seal database. The errors are non-random – they favor, and in some cases are required, to support the conclusions.

Many revisions and new data appeared in Becker II as compared to Becker I. Here I will focus briefly on new mariculture-related disturbance data and the changing way of calculating the relationship between these disturbances and the annual oyster harvest.

The Becker I and Becker II papers are a distraction, in that the research leading to them began AFTER Senator Feinstein's July 21, 2007 meeting that led to the commissioning of your study. Feinstein intended you to focus on the May 2007 NPS testimony and publications, claims that were all based on a major decline in seals at sandbar A, far away from the oyster farm.

Nevertheless, since the Becker paper has received so much attention, it is worth considering whether its data are solid and its conclusions valid. Interestingly, both versions – Becker I and Becker II – are full of mistakes in terms of data and analysis, and in all cases, the mistakes favored the false conclusion that the oyster farm was disturbing the seals. Coincidence? Bias? The mistakes appear to be non-random in that every mistake has favored the false conclusions.

Becker I considered disturbances from 2000-2007 (months not specified).

Becker II considered disturbances from 1996-2008 (March-July).

Becker I calculated the percent of mariculture-related disturbances (over total disturbances) vs. year and vs. pounds of shucked oysters (Figure 2B).

Becker II calculated mariculture-related disturbances per survey and plots it relative to the annual oyster harvest in lbs (Figure 2B). Both ONLY consider disturbances at three of the eight subsites in Drakes Estero (UEN, OB, and UEF).

Becker I claimed six oyster-related disturbances in 2007 or 86% of all disturbances.

Becker I made no claims about 1996 disturbances.

Becker II claimed six oyster-related disturbances in 2007 out of a total of 56 surveys, or 0.11 oyster-related disturbance per survey. Becker II claimed six oyster-related

disturbances in 1996 out of a total of 21 surveys, or 0.29 oyster-related disturbances per survey.

If you look carefully at Figure 2B in Becker II, you will see that the relationship of mariculture-related disturbances per survey to annual oyster harvest is driven by two years: 1996 and 2007. Without the high numbers of those two years, the relationship would be flat and there would be no statistically significant relationship (i.e., $P < 0.05$; Becker claims $P < 0.03$). The whole story of disturbances vs. oysters rests on 1996 and 2007. Let's take a look at each one of these two years. The disturbances were low in 2008, but Becker II falsely attributes that decline to new restrictions prohibiting the oyster boats from entering the channel between UEN and OB, a prohibition that has been in effect since the early 1990's - nothing changed between 2007 and 2008. Thus, he argued that 2008 should not be considered in his analysis, a false argument.

1996 oyster-related disturbances

Becker II claimed six oyster-related disturbances (head alert, HA; flushing, F; or flushing into water, FW) in 1996. Becker I and Becker II defined a disturbance as:

"We define disturbance as any activity that elicited a reaction by the seals; which was either a head alert, a flush towards water, or flush into water."

Becker II went further to define these events as occurring between March and July. Becker II measured the number of disturbance events over the number of surveys. Within a single survey, multiple disturbances can and do occur.

On August 13, 2007, at the request of Senator Feinstein on July 21, 2007, I was sent a copy of the NPS harbor seal database with disturbance data going back to 1996. It is this NPS database upon which Becker draws all of his seal numbers.

I recently examined the NPS harbor seal disturbance data for 1996, and was unable to derive the number used in Becker II. The NPS database does not support the new numbers that he has included in Becker II.

The NPS harbor seal database contains only two, not six, oyster-related disturbances for 1996, and both occurred on May 4, 1996 and were caused by the same oyster workers. Both events led to HA and not F or FW. There were three other motorboat disturbance events in 1996, but none of them was identified as being caused by an oyster boat and thus can not be counted. There is no way to know, 12 years later, whether those boats were owned by the oyster farm or someone else. Note that in the same year, fisherman on motorboats and barges were observed to disturb the seals, so these motorboat records remain of unknown ownership. Thus, the real number of oyster-related disturbances from March to July 1996 is two, not six.

Becker II, like Becker I, continued to ignore the other five subsites in Drakes Estero. If we consider all eight subsites, then there were 38 harbor seal disturbance events, of which two were oyster-related. Of the 38 disturbance events, nine were caused by Park visitors on land (hikers) and 14 were caused by Park visitors on water (kayaks and

canoes). Six were caused by birds, three by airplanes, three by motorboats, and one was of unknown cause. Only two disturbance events were caused by oyster workers.

If we consider what Dr. Sarah Allen considers the most egregious disturbance – an FW or flushing into the water – then the oyster farm caused none of the FW's in 1996. There were 21 FW events in 1996. Four were caused by Park visitors on land (hikers), and 13 by Park visitors on water (kayaks and canoes). Two were caused by birds, one by an airplane, and one was of unknown cause.

A total of 861 seals were reported by observers as being flushed into the water from March to July of 1996, but not a single one of those seals was flushed into the water by the oyster farm. However, 809 of them were flushed into the water by humans, mostly by Park visitors getting too close to the seals. No FW's were caused by oyster workers.

Had Becker II used the correct number for 1996 of 2/21 (0.09) rather than 6/21 (0.29), the statistics of the relationship with annual oyster harvest ($P < 0.03$) might have been different, and > 0.05 (and thus not statistically significant). Moreover, as shown below, the correct number for 2007 is less than the 6/56 reported, and possible 0/56, and that too would have abolished the statistical significance between oyster harvest and oyster-related disturbances.

Coincidence? How can NPS scientists so blatantly misread their own database? There are only two records that can be clearly attributed to oyster workers. How does Becker II derive the number six that is claimed in Figure 2B?

2007 oyster-related disturbances

In addition to 1996, Figure 2B in Becker II shows that the other year with a high number of mariculture-related disturbances per survey was 2007. This claim is also false. Every single one of the disturbance events is suspicious and should not have been included in a scholarly paper (see #18-#20 in the “NPS Errors, Omissions, and Misrepresentations” document provided to you in October 2008). The data for other years are inaccurate as well. The one oyster-related disturbance in 2006 referenced a boat not owned by DBOC and was called “*possibly oyster related*” in the database and should not have been included (see #17 in “NPS Errors, Omissions, and Misrepresentations”).

I previously pointed out that the high number of oyster-related disturbances in 2007 came from three survey dates: April 26 (3 disturbances), April 29 (2 disturbances), and May 8 (1 disturbance). You will remember that Superintendent Neubacher had claimed to Supervisor Kinsey on April 5, 2007 that he had overwhelming data showing oyster-related disturbances of harbor seals, when in fact he had no such data (as Dr. Allen admitted by email to a colleague on April 24) (see timeline at end of my October 25, 2008 letter to your NRC panel). The first disturbance was recorded on April 26, several weeks later and right before the May 8 hearing of the Marin County Supervisors.

The April 26th claim was not in the original August 13, 2007 database provided to me after QA/QC, but rather it was represented in Dr. Allen's controversial April 26 Trip

Report and only entered into the database nine months later, shortly before submission of Becker's original manuscript, and without the proper forms and database integrity justification. The Department of Interior Inspector General report documented the controversy concerning this data entry – the boat in question was not on the estero since its engine was being repaired, and the workers had clocked out and gone home at the time of some disturbances.

The May 8th claim is also controversial, since it occurred on the day of the Marin County Supervisors hearing and described a situation that is suspicious – a single oyster boat was claimed to have simultaneously disturbed seals on three different islands well over one mile apart. That seems physically impossible.

Recently we concluded that the April 29th claim is also suspicious and could not have occurred as reported in the NPS database. April 29 was a Sunday. The oyster boat workers do not work on Sundays. Drakes Bay Oyster Company has electronic time card records that reveal that no oyster boat workers had clocked into work on that Sunday. There was only one employee (the owner's daughter) working on shore at the retail counter on that date. Based on payroll records, this observation is not credible.

Summary

One of the major conclusions of Becker II is that as the number of oysters increased, the number of oyster-related disturbances to the harbor seals increased. The relationship of disturbances to oysters is shown in Figure 2B, and is based largely on two years: 1996 and 2007. The numbers claimed for both years is not credible. The 1996 claim cannot be replicated by analysis of the NPS harbor seal database. The 2007 claim is based on disturbance observations between April 26 and May 8 that are controversial and were all recorded during a politically-charged eleven-day period of time. None of the 2007 disturbance data are credible. In summary, this major conclusion is untenable.

Becker's paper has inappropriately dominated the NRC study. It is post-Feinstein (i.e., begun after July 21, 2007) and not what Feinstein intended as your focus. Nevertheless, since it has received so much attention, it is worth considering whether this paper passes the NPS Dept. of Interior Code of Scientific and Scholarly Conduct which states:

"To enhance their contribution to quality, objectivity, utility, and integrity of such information, all NPS employees working with scientific and scholarly information will, in performing their duties:

- *Act in the interest of the advancement of knowledge and contribute the best, highest quality scientific and scholarly information for the NPS; ...*
- *Be responsible for the quality of collected data and interpretations, and for the integrity of conclusions drawn in the course of scientific and scholarly activities; and*
- *Place integrity, utility, and objectivity of scientific and scholarly activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations."*

This paper does not meet the NPS standard of scholarly science. The paper also does not meet the National Academy of Sciences standards for scholarly and unbiased science. Becker II contains errors of data, misrepresents the NPS data, omits key NPS data, and cherry-picks the NPS data to support its conclusions.