

research—understanding what is involved in these various physical processes and understanding more about our environment itself rather than any specific research problems.

Dr. BUCKLEY. Yes, I think this is generally so. I would say that there are some opportunities for synthesis of knowledge now available that have up until now been overlooked.

I think we have, for example, information on distributions, changes and things of this sort hidden away in minds of men that ought to be extracted and put to use. One of our problems in talking about pollution always is that we sort of imply that pollution is in fact disadvantageous change. Then you are faced with the problem, change compared to what? And even in such an important area to us as San Francisco Bay, if you want to go back and look at what San Francisco Bay was like chemically, biologically 10 or 20 years ago, quantitative evidence is very scarce. You end up with the recollections of a fisherman who remembers that he used to catch x number of fish and now he catches x minus number of fish. But you don't know whether he really caught that number of fish before or whether he forgot the days when the fishing wasn't so good—you don't know whether distance in time has dulled his recollection. There are very real problems here, it seems to me, in just this matter of assessing change.

The next point that I should comment on is the statement by the Research Management Advisory Panel that change of an abnormal nature in animal populations may be considered as a sort of warning of things that may happen to man. Again, I would raise the question of what constitutes "normal" and, therefore, what is "abnormal." For most wild population we don't really have any good idea how great the change may usually be without the pressures of man—from one place to another, from one year to another. We do know that such changes are very considerable in some cases.

The third point related to this is that these animals don't live by "averages," yet the numbers one often ends up with are monthly averages of dissolved oxygen for example. It doesn't do a fish much good to have dissolved oxygen that is totally adequate for 30 days in a 31-day month, and have essentially no oxygen on the 31st day. The average figure will provide you with information about changes in time, or permit comparisons of one place with another but it won't help the organism a great deal.

Mr. DADDARIO. How do we get this information? We aren't getting it now since there is no way of distinguishing the normal from the abnormal.

Senator Nelson has introduced a bill which would establish a Department of Ecology. Do you think we ought to centralize in this way or how do you suggest we go about it?

Dr. BUCKLEY. Well, you put me in somewhat of a spot, sir. Senator Nelson's bill has not been either favorably reported upon or unfavorably reported upon.

Mr. DADDARIO. I understand and I bring it up not because I support it or don't support it, but rather because you raise this question in such an interesting way. You remind this committee that we need certainly to know more about this area where you say a great deal of work needs to be done.