cancer but, like many research scientists, is not sure that spending $500 million or $640 million in the present manner will do it. Furthermore, he feels strongly that someone should be asking where problems of nutrition, alcoholism, and drug abuse fit into the total picture of the nation's health. "We need a health voice with an overall view and only a partial sense of advocacy," he said.

To help him in his efforts to better coordinate budget policies within health, Edwards has considerably expanded his own staff in a major reorganization of HEW that took place in May. There used to be 209 persons in the office of the assistant secretary for health. Today, there are nearly 1000, and many of those who have been added will be dealing with budget matters. The majority of the "new" employees were already on the HEW payroll, working in other agencies such as NIH or the now disbanded Health Services and Mental Health Administration. Now, at least on paper, the assistant secretary for health has a much more powerful role than ever before. But the extent of his influence and the degree to which his views about the budget-making process will really affect the biomedical community cannot be measured until January, when the fighting will be over and the fiscal 1975 budget released.—BARBARA J. CULLITON

The NOAA Budget: Agency's Role in Ocean Research Threatened

The National Oceanic and Atmospheric Administration (NOAA) has, for the last 8 months, been afflicted with the budgetary equivalent of the 40 days and 40 nights of rainfall that fell on Noah and his ark. If the trends signaled in the recent actions continue, NOAA's role in ocean research, which it considers half of its mission, could be all washed up.

To an outsider, it might seem that, when a federal agency receives smaller budget increases than expected (as have most science agencies in recent years), simple belt-tightening is the result. But in the case of NOAA's 1973 and 1974 budgets, small increases were accompanied by impoundments of $43 million by the Office of Management and Budget (OMB). This caused shifts in funds, bringing about the most drastic realignments of other programs in the agency's 3-year history. Although international programs have been allowed to grow, marine science and fisheries work has been substantially reduced and emphasis on atmospheric programs has been shifted. Approximately 600 scientists, technicians, and support staff have been dislocated; and, although 400 were offered other jobs or retired, 246 are unemployed. Making the changes, one top NOAA administrator has said, was "a nightmare."

Last December, OMB told NOAA administrators that the agency would receive only $353.6 million of the record $389.3 million budget that both the Administration and Congress had sought for fiscal 1973. OMB told NOAA some of the impounded money would be restored in fiscal 1974 but there would be no new increases that year, giving the agency $385 million. NOAA Administrator Robert M. White and Associate Administrator John W. Townsend, Jr., were also handed a list of priority areas slated for increases. Thus, while a congenital optimist might conclude that NOAA's budget actually increased by $32 million from 1973 to 1974, what actually happened was that to accommodate the OMB-dictated increases in some programs, White and Townsend were forced to make major and painful cutbacks in others.

The major cuts were in oceans research, which Thomas Malone, a respected member of the National Advisory Committee on Oceans and Atmospheres, terms "a premature truncation of NOAA's expanding into the areas outlined for it by the Stratton Commission" which argued in January 1969 for a large U.S. presence in ocean work. Cuts in ocean-related research areas totaled $28 million—or roughly the cost of building 28 miles of rural highway. "We have to fight as hard with OMB for $500,000 as the highway administration fights for $5 million and the defense department fights for $5 billion," Townsend philosophized in an interview. He added, "But the loss of . . . two research vessels made us madder than hell."

The vessels he referred to are two of NOAA's largest research ships, the *Surveyor* which cost $8 million to build and the *Discoverer* which cost $10 million, each of which cost $1.5 million a year to operate. "We were told to get out of marine geophysics and that's what these ships largely did," Townsend explained. In addition, NOAA's mapping of the continental shelf was canceled. Expansion of its survey of the seaward U.S. boundary, of tides, and of estuaries was also cut back. Its Marine Minerals Technology Center was closed and a marine mining test was canceled. All of which led one elder don of oceanography, who asked not to be named, to speculate that NOAA appeared to have lost out to "hatchet men" in the Department of the Interior, whose Geological Survey (USGS) "is the most powerful scientific block in government. They don't want any geophysical research they can't run themselves. And they're not oceangoing types." If the USGS is one enemy of NOAA's ocean geophysics programs, apparently the oil and minerals industries are another. One official noted, "The oil companies get upset if those maps get too detailed." Officials declined comment on whether oil interests had a role in the decision to chop NOAA's geophysics research, but the move nonetheless appears to be a victory for NOAA's foes.

NOAA also decided it should get out of the earthquake business. NOAA's seismology programs, totaling roughly $2 million in fiscal 1973, have been canceled. Efforts have been made to transfer the 68 scientists involved and their support staff to other agencies. This decision was a response to a General Accounting Office report last September accusing three government agencies, including NOAA, of triplication of effort in their earthquake research (*Science*, 6 October 1972). Outside scientists, however, while agreeing that some consolidation was in order, noted the inconsistency in the Administration's favoring earthquake research,

while downgrading marine geophysical work. The latter, through further study of the movement of the sea floor, will ultimately be the key for global earthquake understanding and prediction.

NOAA also found its fisheries research cut to the tune of $11 million. Four fisheries ships were tied up (one was then recommissioned for fiscal 1974); three fisheries labs, at Boothbay Harbor in Maine, Brunswick in Georgia, and St. Petersburg in Florida, were shut down, and the fish protein concentrate program was discontinued. The decision did not lack for critics in Congress, and Senator Ernest Hollings (D–S.C.) attacked Roy Ash, OMB director, vigorously on the subject: "The President . . . has urged Americans to eat more fish to avoid the high cost of beef. But Mr. Ash and the OMB have 'watergated' him again by ordering the closing of fisheries research laboratories . . . and canceling major studies on how to increase our fish harvest." The decision is also odd in the light of the United States' need to defend its fishing rights at Law of the Sea Conference meetings and in other international forums. However, OMB seems to feel that its decisions on present and future NOAA fish budgets will not affect the U.S. negotiating postures, which are already fixed. "We still spend more on ocean research than any other country in the world," an OMB official said.

Further evidence of Administration hostility to NOAA's role in ocean policy also came in the bitter dispute—not resolved until a few weeks ago—over whether NOAA will get the lead role in future management of coastal areas. Under legislation passed last year, NOAA would have planning responsibility for state-run development of the entire U.S. coastline—including rivers, harbors, and offshore resources—to introduce some rationality into what promises otherwise to be pell-mell offshore development by oil and other interests. But despite the fact that the President signed the act into law, the OMB has refused to fund it and hence NOAA has never been able to get started. The ostensible reason was that the White House wanted to integrate coastal management with overall land management policy. But a more immediate reason was that the Department of the Interior covets the coastal zone assignment as part of the planning empire it would acquire under the Administration's pending land use bill. The coastal zone management issue was obviously a sore subject during the months that OMB and NOAA administrators were at loggerheads over the question of how to wield the budgetary ax. However, in late July, perhaps because the White House thought its land use bill would not pass Congress this year and that someone had to start work on coastal development, the OMB reversed itself and awarded NOAA $5 million for coastal zone planning. Whether the change represents a NOAA victory in the battle with Interior over coastal zone management or one in the overall war, remains to be seen.

The changes in NOAA's oceans programs are most significant because they could herald a decline of that part of its mission; but atmospheric programs did not get off unscathed. An OMB official states that "NOAA's main mission is the Weather Service, and when you're retrenching you preserve the main mission and cut secondary things." Nonetheless, some of the program changes in atmospheric work occasioned howls from the scientists involved.

Most controversial was the decision, made by White and Townsend, to abolish the jobs of state climatologists —60 scientists, stationed in universities around the country, who assemble climatological data into charts, booklets, and other services useful to the locality. The state climatologists have

Biologists Need Work

Unemployment among biologists now appears to have exceeded the national unemployment rate. More and more people are choosing careers in biology, even though a recent survey indicates that the unemployment rate for biologists is about 6 percent, and trends indicate that the situation won't improve in this decade. By contrast, enrollments in the physical sciences and engineering continue to drop, despite the fact that the dislocations of the past few years are over and unemployment is falling to below 1 percent.

The survey of biologists, conducted by the American Institute of Biological Sciences (AIBS), "would seem to indicate an abruptly deteriorating position for biological sciences," says Betty Vetter, head of the Scientific Manpower Commission in Washington. Demand forecasts by the government indicate there will be new shortages of physical scientists and engineers and an oversupply of life scientists. The situation will be particularly bad for biologists in institutions of higher education, where 60 percent of them are employed, because tenured faculty are now fairly young and little expansion of departments is expected.

It is difficult to get a handle on the true employment status of biologists because of the vast size and diversity of the life sciences professions (biologists at the doctoral level outnumber physicists by about seven to one). The AIBS survey indicates that the rate of unemployment is 4 percent at the very least—a considerable jump from the 1.7 percent calculated from a survey conducted by the National Science Foundation in early 1971.

Vetter reports that in the past 3 years both the Labor Department and the NSF have predicted an oversupply of life scientists. Nonetheless, enrollments continue to rise. Stanford University, for example, recently announced that biology has become its largest undergraduate major.

It would appear, then, that students are not basing career choices on future employment prospects or on the availability of federal aid. Rather, the choice of biology reflects in many cases the desire of young people to contribute to improved health care, nutrition, increased food production, and preservation of the environment, as well as the fact that many now associate physical sciences and technology with war technology and environmental degradation.

Joan Creager of AIBS points out that students are enrolling heavily in fields where there is a clear need, but demand for their services—that is, jobs—is in question as long as the Administration persists in its tight-fisted domestic policies.—C.H.

been part of the federal network on climate information since 1954. Throughout the Midwest they give farmers relevant data on drought, rainfall, and humidity; in seaboard states, they help the tourist industry; in the northeastern corridor, they study pollution.

On 29 January, all NOAA personnel learned in a message from White that the climatologic program was to be ended, and NOAA sources state that the rationale was that if these programs were locally useful, the states would pick up the bill. A total of $1.1 million was saved, and although the amount is small, this decision brought NOAA and Congress more mail than any other. Regardless of the merits of the decision, J. Murray Mitchell, Jr., project scientist for the NOAA Environmental Data Service, believes discarding the program was a mistake. "The state climatologists were one of the best links to the public that NOAA has ever had," says Mitchell. Regardless of the wisdom of the decision, he adds, its timing was poor: NOAA brass could at least have given the climatologists a grace period in which to find new employers.

OMB had told NOAA—perhaps partly as a result of the devastation of Hurricane Agnes last year—that its environmental monitoring and natural hazard prediction activities should receive high priority. Also, it said, satellite programs, radar systems, major computer projects, and international programs should receive increases. A major Western cloud seeding experiment was moved (where else?) to the Department of the Interior. Cut by a third was the Data Buoy Program, which collected data concerning the sea surface and atmospheric conditions by means of instrumented buoys placed in remote locations such as the southwestern Pacific. Project Stormfury, which has been attempting to modify Atlantic hurricanes, had its aging airplanes grounded for fiscal 1973. However, it received money toward the eventual purchase of new equipment for work in the Pacific, a condition which provoked the memorable remark from one official, "They have some money, it's just that they can't do any research. . . ."

All in all then, with the beefing up of NOAA's hardware (satellite, radar, and computers) and the corresponding cuts in service programs such as the state climatologists, the atmospheric programs changes are more extensive—and controversial—than the rather small amounts of money involved might suggest.

If there is rhyme or reason to the changes detailed above it would seem that the Administration has been beating a fast retreat from prior commitments to the oceans, or as Malone said NOAA's oceans role has been "truncated." Officials emphasized that this latest marine budget fight was part of a long-standing reluctance by OMB to have a U.S. ocean "presence" in the form of a strong federal agency. Since the early 1960's when the mission agency approach was successfully applied to outer space, the oceanographers, congressmen (70 percent of all U.S. states border on the coasts or Great Lakes—a fact which helps explain the historic popularity of ocean programs in Congress), and eventually a presidential commission headed by Julius Stratton, then chairman of the board of the Ford Foundation, urged creation of a "wet NASA" or some similar body. NOAA was first heralded as that group when it was assembled from other agencies in 1970. But, says Townsend, "Each Administration has said, 'Yeah, but oceans aren't as important as race relations,' or 'Oceans aren't as important as Vietnam.' Now they're saying. 'Oceans aren't as important as inflation.' "

Now, however, that the energy crisis is upon us, and the public is aware that much badly needed oil comes from beneath the sea floor, and the food shortage could be attenuated by more knowledgeable harvesting of fish, the oceans might finally become recognized as a legitimate place for Uncle Sam to set sail. The latest intelligence from NOAA's and OMB's sessions on the new budget indicates that the antiocean trend of the last two budgets, which has caused the agency so much grief, may be changed.

—DEBORAH SHAPLEY

Foreign Scientists in U.S.

The postwar migration of foreign scientists into the United States may not match the importance of other intellectual exoduses, such as the dispersal of Greek scholars after the fall of Constantinople or the flight of Jewish ones from Nazi Germany, but it is nonetheless a movement of more than passing interest. A sociological profile* of the emigré scientist has been compiled by the National Science Foundation. It discloses, among other things, the value placed by their countries of origin on expatriate alumni—more than a third of the immigrant scientists and engineers questioned by the NSF had been approached by foreign employers with offers for re-emigration.

The most common reason given for emigrating to the United States is a higher standard of living (cited by 64 percent of those answering the NSF questionnaire), followed by the less material motives of "curiosity about the U.S." (46 percent), better opportunities for research (42 percent), and more opportunity for one's children (33 percent). Emigrés from Cuba and Eastern Europe commonly cited the political environment as a reason for leaving, and some 430 English scientists, possibly with tongue in cheek, told the NSF that their dislike of the weather was an important reason for emigrating.

The immigrants tend to be well qualified. In mid-1970, when the survey data were gathered, 28 percent of the foreign scientists and engineers held doctoral degrees (compared with 10 percent of American scientists) and 29 percent had master's degrees. An index of their contribution to technological development is that more than a third hold foreign patents and 8 percent have also been issued U.S. patents.

Scientists who decide to stay in the United States find that intellectual stimulation, opportunity for professional advancement, and the "respect of society for science" are generally better than in their home countries. But most discover they have less leisure time than before. Many of them "find the pace of our society faster than abroad," notes the NSF study, but not so fast that it makes them want to go back home.—N.W.

* *Immigrant Scientists and Engineers in the United States* (Government Printing Office, Washington, D.C., 1973); $1.25.