Figure 29 is an infrared image showing the interface between salt water and fresh water at the mouth of the Merrimack River in Massachusetts. Cooperative studies recently undertaken by the Geological Survey and the State of Massachusetts have demonstrated that we can use infrared techniques not only to locate interface, but to observe movement of the interface with time. We are now extending these observations to other estuaries, and we look forward eagerly to repetitive viewings of the dynamics of estuaries from space and to studying the relationship between these dynamics and the food resources of estuaries.

They Can Help Us Make Effective Use of the Sea as a Source of Food and Minerals

One can see further beneath the water from space than from any other vantage point. Improved knowledge of the configuration of the bottom in nearshore areas could help us significantly in our search for mineral deposits beneath the sea. Interior's Bureau of Commercial Fisheries, working cooperatively with the Navy Oceanographic Office, has demonstrated the feasibility of observing relative ocean temperatures from aircraft or space. Knowledge of water temperatures plays an important role in guiding our fishing fleets to their resource targets. Through the techniques of absorption spectroscopy, it now appears possible to identify the species in a school of fish by analyzing the light reflected from minute traces of oil that fish release to the surface of the ocean. It also appears possible that our ultraviolet investigations may lead to a system whereby we may observe bioluminescence directly from space platforms.

They Can Help Us in the Management of Our Nation's Lands

Recent Gemini photographs have shown that relative conditions of range lands in the United States may be assessed from space, and we plan to employ data from the initial EROS satellite for this purpose. We believe that this observational capability can be refined through the use of multispectral imaging systems so we can make a rapid determination of range condition—this would help in adjusting grazing densities to achieve greater food production from our national lands. Observations from space will, of course, help us in assessing the use of our recreational facilities, in monitoring changes in our national seashore areas, and in conserving our national parks and wilderness areas.

What Else Can They Do?

The resources potential of observations from space can be the subject of lengthy speculations, but in all probability some of the largest benefits will come from applications as yet undefined, and perhaps unimagined. We expect the unexpected, and we are prepared to adjust our programs to take advantage of these unforeseen uses.

What is our philosophy?

Our philosophy is very simple: We wish to take the best available tools, apply them directly toward solution of resource problems, and make the results available to the public for their use and benefit, as rapidly as possible. Our philosophy is perhaps best exemplified by our recent infrared survey of the periphery of the island of Hawaii. Because the temperature of fresh, ground water differs from the temperature of the ocean, we were able to map the distribution of approximately 250 large, unknown springs issuing into the ocean from the island. In effect, we were mapping the distribution of lost water. The presence of a number of these springs has been confirmed; their total flow is hundreds of millions of gallons per day. Maps have been prepared and released so that the public can use them to guide their search for water. Unquestionably, this survey will speed development of the island of Hawaii, and it has stirred world-wide interest.

SELECTED PROGRAMS—INFORMATION SYSTEMS TECHNOLOGY

NEW APPROACHES TO INFORMATION HANDLING

The most important input to all research, and especially that carried out in Interior, is the intellectual prowess and creative talent of the scientists and en-