

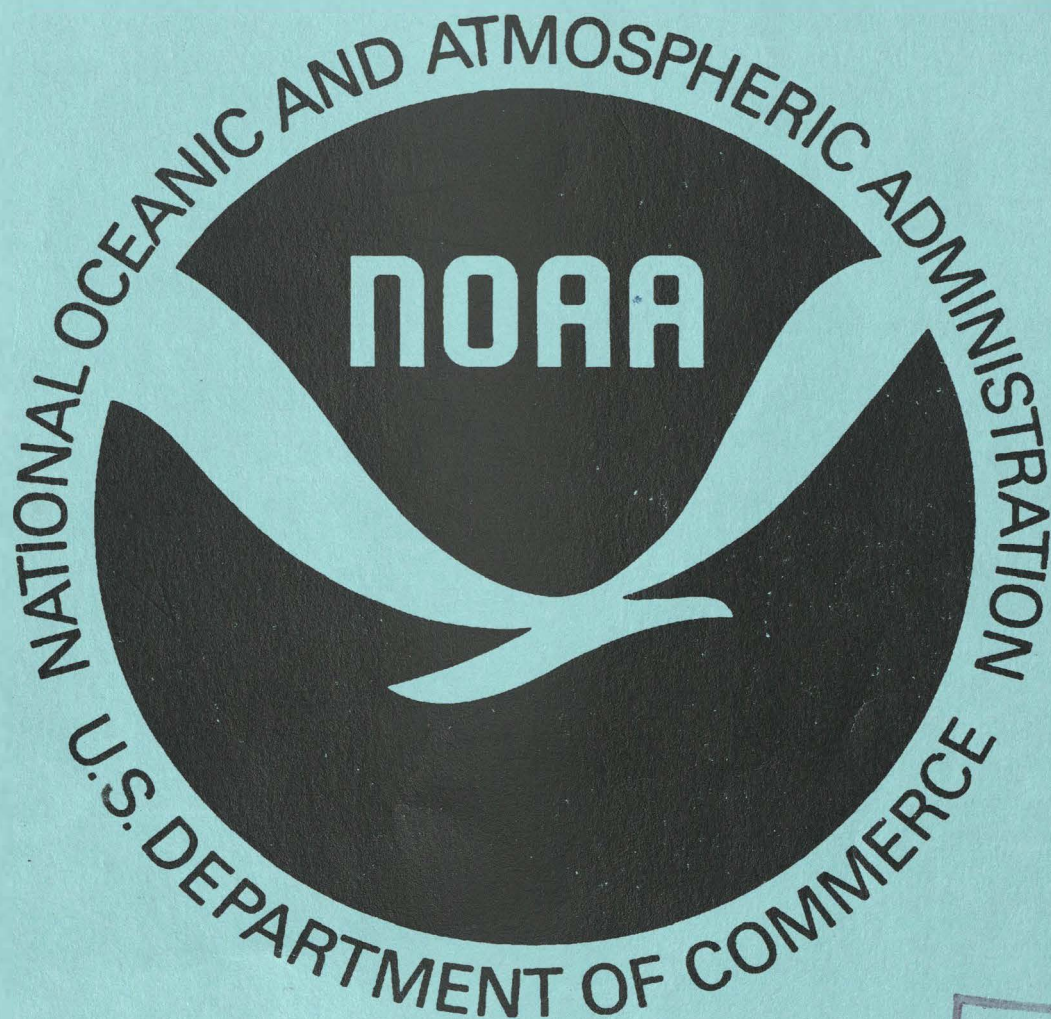
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National Oceanic and Atmospheric Administration

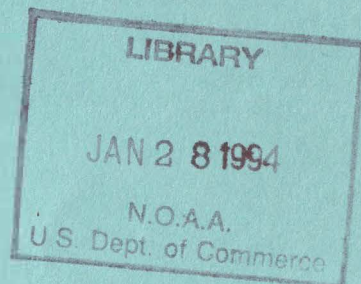
1995 - 2005 STRATEGIC PLAN

Summary

DRAFT



June 1, 1993



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National Oceanic and Atmospheric Administration
Strategic Plan
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Proposals for Investments in NOAA for the Next Decade

June 1, 1993

Portfolio for Environmental Science and Policy

The economic and environmental problems facing our Nation demand our attention. As the Federal agency charged with being the steward of the oceanic and atmospheric realms, we have a special responsibility to look at the environmental issues which we are facing in the future and to develop a strategy for moving us forward. Over the past 10 weeks, more than 400 senior managers have been involved in developing a vision for NOAA in the 21st century. This vision and accompanying strategic plan will set the directions for NOAA over the next 10 years. We solicit your comments and reactions to this plan. We want to hear from as many people as possible as to your vision for NOAA's future and what we should be doing to get there. This is an evolving process. Your involvement in helping us shape NOAA's future is key to our success. Please let us hear from you as soon as possible.

Portfolio for Education

Portfolio for Cross-Cut Initiatives

Diana H. Josephson
Diana H. Josephson
Deputy Under Secretary

• Education and Training Research

• Environmental Technology

• Environmental Systems and Management

• Environmental Information

• Global Partnerships

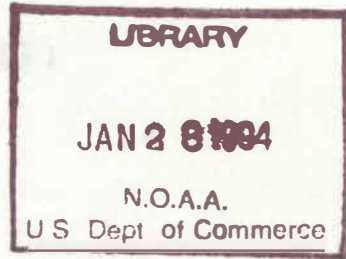
Your comments on the draft NOAA Strategic Plan should be directed to:

Portfolio for Infrastructure Requirements

• Fleet Replacement

• Environmental Compliance

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National Oceanic and Atmospheric Administration Strategic Plan

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Prospectus for Investment in NOAA for the 21st Century

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- Recovering Protected Species
- Coastal Ecosystems Health
- Modernize Navigation and Positioning Services

Portfolio for Environmental Assessment and Prediction

- Implement Seasonal to Interannual Climate Forecasts
- Predicting Decadal-to-Centennial Changes
- Advance Short-Term Forecast and Warning Services

Portfolio for Cross-Cut Initiatives

- Education and Human Resources
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- Environmental Systems Dual Use/Convergence
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- Global Partnerships for Fulfilling the Goals of the Earth Summit (UNCED)

Portfolio for Infrastructure Requirements

- Fleet Replacement and Modernization
- Environmental Compliance

PROSPECTUS FOR THE 21st CENTURY

VISION FOR 2005

Economic decisions will be guided by a comprehensive understanding of the environment.

PROGRAMMATIC STRATEGY

NOAA has developed a comprehensive strategy for attaining its vision for 2005. This will be done through investment in world-class research and development to integrate approaches to environmental management and coastal resource development and significantly improve environmental assessments and prediction. Public-private partnerships will be formed in environmental technology. New environmental information networks will be built to ensure NOAA's information reaches the appropriate communities. The following programs reflect some of the actions to be undertaken.

- **Environmental Stewardship:** NOAA envisions U.S. coastal regions as places of healthy ecosystems, wise human development, and safe maritime commerce. U.S. fisheries will be rebuilt by refocusing policies and fishery management planning on increased scientific information. Efforts to promote the wise use of fishery resources will enhance long-term economic opportunity. Marine mammals will be protected in order to recover marine species which have tremendous, although often immeasurable, value to the American people. Healthy coastal ecosystems will be promoted by ensuring that economic development in coastal ecosystems of the U.S. will be managed in ways that maintain biodiversity and long-term productivity. This will increase recreation and tourism opportunities while reducing user conflict in coastal areas and avoiding costly ecosystem restoration in the future. Navigation and positioning services will be modernized to integrate electronically accurate chart data, satellite-based locations, and real-time environmental information, thereby reducing risks to life, cargo, and the environment from ship groundings.
- **Environmental Prediction and Assessment:** NOAA will develop integrated environmental observation, assessment, and forecast services that enhance the Nation's economic and environmental security. Modernization of weather services will be completed, resulting in immediate service improvements. Reliable seasonal-to-interannual forecasts will be available to guide economic planning in many industrial sectors to mitigate losses that can occur during an El Nino event. Science-based advice will be provided to environmental policymakers by detecting and assessing decadal-to-centennial changes in the global environment so the most cost-effective choices can be made in protecting the environment. Significantly improved short-term warning and forecast services will be implemented for the total environment: atmosphere,

water resources, coasts, oceans, and the space environment that will allow the Nation to mitigate the effects of the environment.

INVESTMENT STRATEGY

These programs are of high priority because they have the greatest potential for maximum return on investment and for helping our Nation balance its need for economic growth with concern for the welfare of the environment. NOAA will employ a competent and diverse workforce with skills matching NOAA's mission to implement this strategy. NOAA will realize its programmatic goals by investing wisely now to save money later. In addition, NOAA will take advantage of other opportunities to leverage these programmatic investments. Management efficiencies and redirection of lower priority resources will be implemented. Opportunities for convergence of programs with other Federal agencies will be investigated. New partnerships will be formed with the private sector and academia to take advantage of their capabilities. Resources will be pooled internationally to build global partnerships. This strategy ensures that investments will be targeted in programs that will result in significant benefit to industry and the public.

CONCLUSION

Sustainable economic growth requires investment in maintaining a healthy environment. NOAA aims to provide the best scientific basis for environmental policymaking and sound marine resource management decisions that affect every industrial sector and the general public.

REBUILD U.S. FISHERIES

VISION FOR 2005

NOAA's vision for the next decade is to greatly improve the Nation's wealth and the quality of life of tens of millions of Americans through wise use of its fishery resources. This vision includes sound, comprehensive scientific information to focus policy decisions, rather than allowing scientific uncertainty to fuel controversy and confusion. It also includes the ability to implement effective fishery management plans, now being prepared by the Fishery Management Councils, which attract public and environmental participation in fisheries, overexploitation, overfishing and resource depletion, controversial allocation decisions, and support by the industry.

ENVIRONMENTAL STEWARDSHIP

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

This initiative directly addresses the President's and the Secretary's goals, as reflected in the Department's mission statement. Rebuilding U.S. fisheries will enhance long-term economic opportunity and raise the standard of living for tens of millions of Americans. These benefits can only be delivered by working with the private fisheries sector and the public that participates in recreational fishing. The initiative will promote good environmental stewardship by wise, sustainable use of U.S. fishing resources and by advancing methods of fishery science and management that are applicable worldwide. It will make the U.S. fishing industry and tourism associated with recreational fishing more competitive internationally. In the long term, distressed communities and minority businesses that depend on fisheries will be better off when fisheries are rebuilt and coastal resources move into aquaculture or other sectors. New technology will be developed and commercialized, domestically and worldwide, in order to efficiently produce and use the available fishery resources with minimum adverse impact on other components of ecosystems. There is strong potential for commercialization of new technology for sampling fishery resources and for aquaculture.

THE PROBLEM

Billions of dollars in potential economic growth, hundreds of thousands of jobs, and countless recreational fishing opportunities are being wasted as a result of overfishing and overexploitation. Of 145 assessed fishery resources, 63% are overfished. There is insufficient scientific information to assess 34% of all U.S. fishery resources. U.S. fisheries are troubled by essential "bycatch" of non-target species, including marine mammals and endangered species of sea turtles, which are accidentally killed by some common fishing methods; and by extremely controversial "allocation" decisions between elements of commercial and/or recreational fishing industries, in some cases requiring the attention of the highest levels of government, and resulting in law suits against the Department.

REBUILD U.S. FISHERIES

VISION FOR 2005

NOAA's vision for the next decade is to greatly increase the Nation's wealth and the quality of life of tens of millions of Americans through wise use of its fishery resources. This vision includes sound, comprehensive scientific information to focus policy decisions, rather than allowing scientific uncertainty to fuel controversy and confusion. It also includes the ability to implement ambitious fishery management plans, now being prepared by the Fishery Management Councils, which attack problems of uncontrolled participation in fisheries, overcapitalization, overfishing and resource depletion, controversial allocation decisions, and wasteful bycatch of non-target species. Lastly, the vision includes a U.S. aquaculture industry growing at least at the global rate.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

This initiative directly addresses the President's and the Secretary's goals, as reflected in the Department's mission statement. Rebuilding U.S. fisheries will enhance long-term economic opportunity and raise the standard of living for tens of millions of Americans. These benefits can only be delivered by working with the private fisheries sector and the public that participates in recreational fishing. The initiative will promote global environmental stewardship by wise, sustainable use of U.S. fishing resources and by advancing methods of fishery science and management that are applicable worldwide. It will make the U.S. fishing industry and tourism associated with recreational fishing more competitive internationally. In the long term, distressed communities and minority businesses that depend on fisheries will be better off when fisheries are rebuilt and excess resources move into aquaculture or other sectors. New technology will be developed and commercialized, domestically and worldwide, in order to efficiently produce and use the available fishery resources with minimum adverse impact on other components of ecosystems. There is strong potential for commercialization of new technology for sampling fishery resources and for aquaculture.

THE PROBLEM

Billions of dollars in potential economic growth, hundreds of thousands of jobs, and countless recreational fishing opportunities are being wasted as a result of overfishing and overcapitalization. Of 156 assessed fishery resources, 43% are overutilized. There is insufficient scientific information to assess 34% of all U.S. fishery resources. U.S. fisheries are troubled by wasteful 'bycatch' of non-target species, including marine mammals and endangered species of sea turtles, which are accidentally killed by some common fishing methods; and by extremely controversial 'allocation' decisions between elements of commercial and/or recreational fishing industries, in some cases requiring the attention of the highest levels of government, and resulting in law suits against the Department.

Many of the problems that plague fisheries are related to the tradition of uncontrolled participation in most U.S. fisheries (i.e., open access) resulting in serious overcapitalization, exemplified by more and more vessels racing to catch fewer and fewer fish. Attempts to limit the catch are met with stiff opposition because an economically unhealthy fishing industry cannot afford to temporarily cut back its catch. Uncertainty in scientific information fuels arguments that cutting back is unnecessary, which leads to risk-prone decisions and disastrous economic, social and ecological consequences. Bycatch and allocation decisions are also more problematic because of overcapitalization and uncertain scientific information. Further, this large industry contributes a small part of its potential tax revenues. Also, the domestic aquaculture industry is growing at half the rate of the global rate, putting major strains on our balance of trade as we import increased amounts of shrimp and salmon and other products which could be produced in the U.S.

Management of U.S. fisheries is now at a critical juncture. The problems are well documented and publicized by the news media. For example, the *U.S. News and World Report* says, "America's last frontier is seriously overfished, badly polluted, poorly managed and in deepening trouble." The public, Congress and the fishing industry want solutions, which are also required by law. All eight Fishery Management Councils are responding by considering fishery plans that control access to the fisheries and attack other fundamental problems. These changes are controversial, but clearly the tide has turned, and solutions to the problems that plague U.S. fisheries are achievable.

The U.S. is both a world leading exporter and importer of fishery products with a trade deficit in seafood of \$2.2 billion in 1992. This is partly due to the inability of U.S. fishery resources to meet domestic market demand for specific products. Aquaculture can increase the amount of fishery resources available through new cultured production and through supplementing natural wildstock populations.

PROGRAM ELEMENTS

Fulfilling the NOAA vision of greatly increasing the Nation's wealth by rebuilding U.S. fisheries requires new approaches. The National Marine Fisheries Service Strategic Plan calls for commitment to making risk-averse decisions, reducing uncertainty in management decisions, controlling access to fishery resources, and developing more selective fishing practices to reduce bycatch and waste. NOAA conducted a systematic evaluation of each U.S. fishery to estimate the required increase in a series of scientific and management activities, which collectively form a complete system of strategic actions:

- **Assessing the Status of Fishery Resources.** This action addresses the seriously inadequate information on the condition of fishery resources. This information is the basis of policy options for rebuilding fisheries. NOAA will fill critical gaps and expand programs that collect and manage fisheries data, including from observers; conduct resource surveys; study population biology; model population dynamics; and advance data management.

ENVIRONMENTAL STEWARDSHIP PORTFOLIO

VISION FOR 2005

NOAA envisions United States coastal areas with healthy ecosystems, wise human development, and safe and efficient maritime commerce.

KEY PROGRAM ELEMENTS

As Federal trustee for living marine resources and their habitats, NOAA forsees both coastal economic health and coastal ecosystem health. To attain this vision, NOAA's Environmental Stewardship investment strategy includes the following:

- **Rebuilding U.S. fisheries by refocusing policies and fishery management planning on increased scientific information, rather than letting controversy and confusion drive the decisionmaking.** This is one of NOAA's most significant goals for the next decade. NOAA will implement ambitious fishery management plans. It will address problems of uncontrolled access in fisheries, overcapitalization, overfishing, controversial allocation decisions between various fishing groups, and wasteful incidental catch.
- **Recovering protected species by protecting marine mammals as the public expects and the law requires, while still allowing for economic and recreational opportunities.** NOAA will implement recovery plans, take a proactive approach to preventing depleted status designation for species before it happens, and develop new approaches to reduce conflicts between protected species management and users of marine resources.
- **Promoting healthy coastal ecosystems by ensuring that economic development in coastal ecosystems of the U. S. is managed in ways that maintain biodiversity and long-term productivity for sustained use.** Working in partnership at the Federal and state level, NOAA will integrate its operational management activities in an ecosystem-wide approach, increase monitoring in coastal areas, conduct assessments to provide better information for decisionmakers, provide education and outreach to increase public understanding, and undertake a more proactive effort in understanding and maintaining marine biodiversity.
- **Modernizing navigation and positioning services to meet the Nation's needs to electronically integrate accurate chart data, satellite-based locations, and real-time environmental information.** NOAA will exploit emerging new technologies and redefine its products and services with updated nautical surveys, digital nautical

information, modern marine forecasts, and basic data and coordinate reference network for geographic information systems for coastal decisionmaking.

EXPECTED BENEFITS FOR THE NATION

The Nation can anticipate significant benefits from NOAA's investments in these areas. Rebuilding the Nation's fishery resources will yield additional value from commercial and recreational fisheries and a reduced trade deficit from additional fishery exports. Protected species recovery will result in healthy marine mammal populations with immense but immeasurable values and prevent irreversible species losses that foreclose on options for future generations. Healthy coastal ecosystems will increase opportunities for recreation and tourism, reduce user conflicts in coastal areas, and avoid costly ecosystem restoration in the future. Modern NOAA navigation and positioning services will reduce the risks to life, cargo, and the environment from ship groundings.

- **Advancing Fishery Predictions.** This action addresses important limitations that exist in the current scientific underpinnings of fisheries management. NOAA will conduct research on ecological processes that regulate populations, methods of taking account of pollution stress in fishery management models, and advanced sampling technology.
- **Managing for Economic Growth.** This action addresses the fundamental problems that plague U.S. fisheries, such as overcapitalization and controversial allocation decisions. NOAA will provide Fishery Management Councils with the technical support they need to develop plans that control access, and allow market forces to determine allocations instead of Government; and it will implement these plans. This will require a large expansion of information on social and economic factors.
- **Establishing Adequate Compliance.** This action addresses the need for adequate compliance, which is essential to the success of fisheries management.
- **Reducing Bycatch.** This action addresses wasteful bycatch (of young or non-target species) which impedes rebuilding of many fisheries, and kills marine mammals and endangered species. NOAA will expand data collection to quantify the problem, take account of the effects of bycatch in fisheries management models, and work with the fishing industry to develop new technology and strategies to reduce bycatch.
- **Foster Marine Aquaculture.** This action brings NOAA-wide expertise to bear on the opportunities to develop environmentally sound, efficient marine aquaculture systems and industry and strengthen depleted fisheries.

EXPECTED BENEFITS FOR THE NATION

This program will add \$2.9 billion in potential net value due to recovery of overfished stocks and reduction of excess harvesting capacity. This will lead to increased tax revenues of about \$1 billion as the harvesting sector becomes profitable; much more if the flows of fisheries profits to other investments are included. The \$25.4 billion total impact (direct, indirect, and induced) on the national economy (including an increase in the GDP of about \$8 billion) will develop about 300,000 new jobs.

There will be improved recreation for millions of Americans and a reduced trade deficit. There will also be reduced controversy associated with fisheries management with fewer legal challenges, and restored credibility and public trust in our ability to manage fisheries.

RECOVERING PROTECTED SPECIES

VISION FOR 2005

In 2005, NOAA will be on the road toward making the Endangered Species Act (ESA) obsolete for marine species. NOAA will also protect marine mammals, as expected by the public and required by law, without unnecessarily impeding economic and recreational opportunities. Included in this vision are conservation actions initiated before species are pushed into depleted status and require the special protection afforded by the ESA. The vision also includes an enhanced scientific data base to support management decisions, which help minimize adverse, and maximize positive, impacts on living marine resources. For those species that are currently depleted, NOAA will have fully implemented plans to promote their recovery to functional components of marine ecosystems. This vision places NOAA as the model steward of our Nation's natural marine resources.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

Through conservation of the Nation's living marine resources, NOAA will enhance economic opportunities for future generations. The President, in his Earth Day 1993 speech, said, "America can maintain our lead in the world economy by taking the lead to preserve the world environment." In Earth in the Balance, Vice President Gore deplored the short-term exploitation of natural resources without regard to impacts on the future health of the world's environment. This initiative contains actions that will promote the long-term stewardship of the global environment and will enhance the development of environmentally safe technologies for using our Nation's marine resources.

The actions of this initiative will help place NOAA as the leader in preserving marine biodiversity by balancing our exploitation of natural resources with the management of protected species. The initiative will provide mechanisms to achieve scientifically sound stewardship of the Nation's living marine resources and, thus, promotes the long-term health of marine ecosystems. This stewardship of the marine environment will ensure that future generations of Americans will have a rich diversity of marine life for their consumptive and non-consumptive enjoyment.

THE PROBLEM

The symptoms of the problem are simple: populations of marine organisms that are most valuable for commercial and recreational users are declining. In some cases, the declines are critical while others are not. For example, northern right whales were pushed nearly to the edge of extinction and today's population in the Atlantic Ocean numbers only 350 individuals. Mortality incidental to commercial activity, particularly shipping, prohibits recovery of the population. There are 214 salmon runs considered at risk, 4 of which are

endangered, due to commercial exploitation and habitat degradation. These declining populations diminish the rich biodiversity of our marine ecosystems.

Although the major symptoms of the problem are simple, underlying conflicts are difficult. Use of marine resources contributes billions of dollars to the Nation's economy; however, many commercial and recreational activities adversely impact marine species. In many cases it is difficult to assess the extent of the conflicts between protected marine species and users of marine resources because we have insufficient data. We cannot detect the trends of over 85% of the Nation's populations of marine mammals. Recovery plans have been completed for only 6 of the 30 marine species listed as threatened or endangered under the ESA, and the status of the vast majority of marine species is currently unknown.

Both the ESA and the Marine Mammal Protection Act (MMPA) recognize that the severe decline of marine species represents a major loss to society. This loss encompasses commercial and recreational opportunities as well as the aesthetic value of healthy, stable marine ecosystems.

PROGRAM ELEMENTS

To fulfill NOAA's vision of full recovery of depleted species and healthy marine ecosystems, we must promote the recovery of currently depleted species and take proactive steps to avoid depletion of species of concern, complete assessments of all protected species, and develop management strategies and technologies that would reduce the impact of interactions between protected species and users of marine resources.

Reducing the Impact of Human Activity on Protected Species. This action will result in management actions that will mitigate detrimental interactions between marine species and human activities in the marine environment. The action includes research to gain a greater understanding of protected species and their role in their marine ecosystem and developing environmentally safe technologies to exploit marine resources.

Assessing the Status of Protected Species. This action provides a mechanism to address the shortfall of scientific data needed to determine the status of all protected species. The MMPA requires that NOAA determine the status of all cetaceans and most pinnipeds with respect to their Optimum Sustainable Populations. The ESA also requires monitoring of listed species so that status can be updated. Efforts to monitor commercial and recreational activities, and the impacts of these on marine species, are also a necessary part of status assessments.

Develop and Implement Conservation/Recovery Plans. Thirty marine species are listed under the ESA as threatened or endangered, and 2 species of marine mammals are determined to be depleted. We have yet to develop recovery plans for 24 of the ESA-listed species and conservation plans for 1 of the depleted species of marine mammals. Each of the

plans contain or will contain specific management activities to promote recovery of the species, and all of these plans must be implemented fully in a timely manner.

Proactive Approach to Avoid Future Listing. NOAA must develop and implement action plans, similar to conservation and recovery plans for listed species, to avoid listing in the future. This action will address these plans, which will avoid the more stringent regulations accompanying protection under ESA or MMPA.

EXPECTED BENEFITS FOR THE NATION

The benefit from this initiative is the restoration, in a cost-efficient manner, of marine species which have tremendous, although often immeasurable, value to the American people. The recovery of these species, and avoiding the decline of others, will contribute to the overall health of the marine ecosystem. The actions from this initiative will also result in a greater understanding of marine species and the ecosystems in which they occur. This understanding is of great scientific value, and it can be applied to management strategies that will allow NOAA to conserve the Nation's living marine resources for future generations of Americans as well as those who may enjoy them today. Scientifically based management strategies convey optimum benefits to American society.

THE PROBLEM

The health of the Nation's coastal ecosystems is declining and the long-term prognosis is becoming increasingly bleak.

Today, over half (54%) of our total population lives on the 10% of our land area that can be defined as "coastal." Population along our Gulf of Mexico and Pacific coasts have more than doubled since 1960. Excess Florida's population has increased more than 200 percent. By 2025, rapid and continuing population growth will drive total U.S. population from 252 million to 345 million people and most of that growth will be in coastal areas, especially in California, Texas, and Florida.

Even more important, more than a half of American jobs are located in coastal areas. About a third of the Nation's Gross National Product (GNP) is produced there (coastal GNP is rising at a rate faster than total US GNP). Coastal recreation and tourism are growing at impressive rates in many coastal areas. But this growth is threatened by poor environmental quality conditions. In 1971, beaches were almost everywhere listed against swimming on more than 7,000 occasions by water that lowered beach quality (only 4 miles meet the entire length of their shoreline).

COASTAL ECOSYSTEMS HEALTH

VISION FOR 2005

NOAA will ensure that economic development in coastal ecosystems of the U.S. is managed in ways that maintain their biodiversity and long-term productivity for sustained use. To move toward this vision, the paradigm for managing coastal ecosystems health will shift from a fragmented to an integrated approach, from a site-specific to an ecosystem-wide context, and from a reactive to preventive mode.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

At last December's Economic Summit in Little Rock, President Clinton and others asserted that no long-term conflict exists between economic growth and environmental responsibility. A "healthy" environment is good for business. An "unhealthy" environment indicates a waste of natural resources, reduces our ability to achieve "sustainable use" of these resources over time, and reduces America's ability to compete in the global market. The President has also said the U.S. will sign the Biodiversity Convention, thereby supporting the international community's commitment to conservation of biodiversity.

A goal of the Department of Commerce is to ". . . work with businesses and communities to promote economic growth by achieving sound environmental assessment, prediction, and stewardship." It's not a question of jobs versus the environment. We must bring to bear our collective resources in both the private and public sectors to identify strategies that provide jobs without sacrificing the health of coastal ecosystems.

THE PROBLEM

The "health" of the Nation's coastal ecosystems is declining and the long-term prognosis is toward accelerating decline.

Today over half (54%) of our total population lives on the 10% of our land area that can be defined as "coastal." Populations along our Gulf of Mexico and Pacific coasts have more than doubled since 1960. Eastern Florida's population has increased more than 200 percent. By 2030, births and immigration will drive total U.S. population from 252 million to 345 million people and most of that growth will be in coastal areas, especially in California, Texas, and Florida.

Somewhere between a third and a half of American jobs are located in coastal areas. About a third of the Nation's Gross National Product (GNP) is produced there ("coastal" GNP is rising at a rate faster than total US GNP). Coastal recreation and tourism are growing at impressive rates in many coastal areas. But this growth is threatened by poor environmental quality conditions. In 1991, beaches were closed or advisories issued against swimming on more than 2,000 occasions in states that monitor beach quality (only 4 states monitor the entire length of their shoreline).

Coastal areas are also some of our most ecologically sensitive areas, providing important habitats for over 75% of the total US commercial landings of fish and shellfish (and an even larger proportion for recreational fish and shellfish). But over a third of the shellfish-growing waters of the US are "harvest-limited" (including half of Gulf of Mexico growing waters), representing both an ecological problem and an economic problem. If current trends continue, wild, natural shellfishing could be wiped out soon. Populations of virtually all estuarine and inshore species of fish have been reduced to historically low levels of abundance by over-fishing, habitat loss, and pollution.

Equally insidious are the indirect ways human activities affect marine biodiversity, such as by habitat loss and introduction of non-indigenous species. As the human population increases, the anthropogenic impact on the diversity of life will increase, especially in coastal zones. Loss of organisms and species threaten to decimate the diversity of our rich marine ecosystems.

Even in those areas that show evidence of progress toward improved conditions, increasing human population and development could offset short-term improvements. Clearly, if there is to be increasing use of the natural resources in coastal areas to produce goods and services, the Nation must pay more attention to the way it manages the use of coastal ecosystems.

PROGRAM ELEMENTS

NOAA proposes to rebuild, re-focus, and integrate its management activities on a coastal ecosystem basis, creating cross-disciplinary science and management teams to work on the range of issues that affect the resources for which NOAA is a steward, at the national level as well as in selected coastal ecosystems.

NOAA will enhance its integrated operations for coastal ecosystem management, including (a) support for state coastal watershed management objectives, particularly coastal non-point source management strategies; (b) revitalizing NOAA capabilities to manage special protected areas on an ecosystem-wide basis; (c) re-energizing habitat protection and restoration efforts to make them more responsive and predictable in their outcome; and (d) expanding NOAA spill-response and contingency planning capabilities for all major U. S. coastal ecosystems. Cross-disciplinary teams will focus initially on problems in 3-5 ecosystems that reflect the diversity of management issues facing coastal managers today.

NOAA proposes to enhance ecosystem assessment activities. Building upon characterizations and syntheses being carried out today, NOAA will expand biological assessments of U.S. coastal waters, and assessments of economic conditions and land-use patterns, pollution sources, ambient conditions, and resources at-risk. NOAA will expand and re-direct its capabilities to assess damages to natural resources on an ecosystem-wide basis, to negotiate and litigate settlements with responsible parties, to identify areas within coastal systems suitable for protection or restoration, and to undertake restoration as appropriate.

NOAA will develop a comprehensive, national information system needed to support decisionmaking at the ecosystem and coastal watershed level. The system can describe the health, biodiversity, and integrity of coastal ecosystems as well as changes in land cover and land use. The system will make use of satellite imagery, aerial photography, in situ monitoring and research data and other collateral data within a GIS context. This effort will be cooperative and cost-shared with other Federal and state agencies.

NOAA will undertake an accelerated program to develop and make available new techniques for environmental monitoring of our coastal ecosystems. Managers need diagnostic tools, not just data, to permit implementation of ecological risk assessment. By 2005, NOAA intends to publish protocols and develop technologies for ecosystem-level monitoring and have them verified and in use by appropriate management agencies. To maintain biodiversity, achieve sustainable use of coastal resources, and effectively link our economy and environment, we will need new tools and approaches for dealing with the complex interactions among coastal habitats, valued natural resources, and societal needs.

By 1999, NOAA will have developed management support protocols and models incorporating cumulative effects information for 5 representative coastal ecosystems. By 2005, such information will be available for 8 additional ecosystems. As a result of NOAA's contributions, NOAA/state partnerships for biodiversity and ecosystem health research, monitoring and assessment will be in place throughout most of the U.S. coastal zone.

NOAA will enhance efforts to translate scientific information into language and scales appropriate for application to management issues. Determination of an ecosystem's "health" is both a scientific and a public perception issue. NOAA scientists and outreach specialists will work collaboratively with colleagues in environmental management agencies at Federal and state/local levels, with private industry, and with the public.

EXPECTED BENEFITS FOR THE NATION

Benefits of improved coastal ecosystem management are difficult to quantify, since many of the natural resources within ecosystems are "common property" without market values. As a Nation we spend almost \$35 billion annually to manage water quality, about a third in coastal areas, with questionable results (i.e., declining water quality in many areas). By the year 2000, costs will reach an estimated \$56 billion (primarily costs to private industry for the control of effluents and pretreatment of wastewater, and to local government for construction and operation of sewage treatment facilities). If intelligent coastal ecosystem management reduced these water quality management costs by only 10-15%, it would achieve a 10:1 benefit:cost ratio. If the use of the same amount of management investment resulted in greater environmental benefits (e.g., restoration of coastal productivity or maintenance of biodiversity), similar or higher ratios would be possible. Efforts to maintain biodiversity will ensure a sustainable harvest of the sea's resources, and the resulting wide genetic variability will support the biotechnology industry's contribution to the health and welfare of the Nation.

MODERNIZE NAVIGATION AND POSITIONING SERVICES

VISION FOR 2005

NOAA will meet the Nation's need for marine and aeronautical navigation systems that electronically integrate accurate chart data, Global Positioning System-based locations, and real-time environmental information. Databases supporting these navigation systems will provide basic layers of coastal zone geographic information at the touch of a keyboard.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

Accurate positioning, charts and navigation services are essential components of the national infrastructure.

"While our economic competitors have invested heavily in their infrastructure, we have not done as well. To regain our economic edge, we must invest more. . . put Americans back to work, spur productivity, and make transportation safer, faster, and easier for all Americans." (President Clinton, Vision of Change for America, February 17, 1993)

This initiative will contribute to the "National Information Infrastructure" by providing foundation layers for the spatial information expected to flow on the Nation's "information superhighways" -- opening market opportunities in emerging spatial information industries.

This program directly addresses a number of Department of Commerce goals. It will foster the development of technologies for air and marine navigation, surveying, positioning, and handling geographic information. It will expand export opportunities by assuring safe, efficient harbor and airport operations. It will promote sound environmental stewardship by providing basic environmental and geographic information for management decisions. It also will promote economic development by opening new market opportunities.

THE PROBLEM

NOAA has a statutory mandate "to provide charts and related information for the safe navigation of marine and air commerce; and to provide basic data for engineering and scientific purposes and for other commercial and industrial needs" (33 U.S.C. 883). Private industry and defense are dependent on these services. No other agency or organization in the country gathers these data or responds to these needs in the U.S. and its surrounding waters. Today, however, NOAA faces a crisis in not being able to meet this responsibility. The reasons are threefold.

NOAA's products and services are becoming inadequate due to lack of maintenance. 98% of U.S. international commerce (half of which is oil or hazardous material), valued at nearly \$500 billion, moves through U.S. waters on ships using charts created with data 50 years or older. Fully half of U.S. waters less than 30 meters deep (including 25% of our harbors and harbor approaches) were surveyed prior to World War II. Uncharted obstructions such as those encountered by the QUEEN ELIZABETH 2 may result in other more serious accidents. Fleet support available to obtain new survey data has declined by 60% over the past 15 years. Tidal current predictions for several ports have been withdrawn because of inaccuracies. Modernization of the U.S. national water level measurement network remains only half completed.

User needs, driven by potential productivity gains made possible with new navigation and positioning technology, are changing. NOAA cannot now provide the digital chart data required by rapidly emerging electronic chart systems. At sea, these systems can reduce bridge workload by integrating information. They can help to avoid accidents such as the EXXON VALDEZ disaster. Many deep-draft ships cannot enter U.S. ports except near times of high water. Real-time water level and current information is needed for safe navigation. In the air, a new generation of navigation data sets will be required for the developing air traffic control and landing systems. On the ground, at sea, and in the air, the existing coordinate reference system must be renovated to provide the higher accuracy and different accessibility needed for space-based technology such as the Global Positioning System (GPS).

Demand for consistent, compatible databases for engineering, scientific, and management purposes is increasing. The annual public expenditures for spatial data collection, maintenance, and manipulation nationally are estimated to be about \$7 billion in 1993. Development of the needed geographic data is the largest cost factor in Geographic Information Systems (GISs). Convenient, quick and inexpensive access to the National Spatial Reference System will ensure that these data are located accurately and compatibly. The fundamental layers of a coastal zone GIS, resting on this framework and derived from the charting database, must be available to a broad community.

PROGRAM ELEMENTS

Emerging technologies will redefine NOAA's products and improve its ability to respond to demands for modern navigational and positioning services. To remain responsive NOAA must accomplish the following efforts to modernize its navigation data products and services and the National Spatial Reference System:

Navigation Data, Products, and Services:

Update nautical surveys. The level of effort on hydrographic and photogrammetric surveys will be doubled to resurvey commercial traffic routes with critical needs and dynamic shoreline areas in the next 5 years. More efficient and effective survey systems will be introduced to improve productivity and seafloor coverage.

Develop and distribute digital nautical information. Digital chart data, tide and tidal current predictions, as well as real-time data, will be provided to electronic chart systems. Chart production will be converted to an automated digital nautical charting system. The automated system is developed; however, at current level of effort it will take 40 years to load the system.

Modernize marine forecasting capability. NOAA will modernize the national network of water level, water temperature, and meteorological sensors to provide data needed for forecasting in realtime. The system will be installed in ten major U.S. ports by 2005.

Provide modern aeronautical navigation information. NOAA will develop the digital aeronautical database to support the air traffic control's Advanced Automation System. NOAA will obtain and provide the navigation information for operation with new generation instrument landing systems.

National Spatial Reference System:

Provide basic data layers for Coastal Zone Geographic Information Systems. NOAA will provide accurate, detailed, and consistent spatial datasets describing the shoreline, nearshore areas, seafloor, and legal boundaries for use as fundamental layers of GISs to support scientific, engineering, and management decisions.

Improve accuracy and access to a unified coordinate reference system. NOAA must renovate the current "localized" network of monumented points supporting line-of-sight surveying and positioning to support space-based techniques. A basic framework of high accuracy reference points will be established with an array of continuously operating GPS receivers. It will provide easy access and prevent unnecessary duplication and waste.

Provide accurate, satellite-based techniques to determine height above sea level. The program will develop new GPS techniques to determine accurate elevations with sufficient accuracy to meet general surveying requirements for construction surveys, damage predictions for flood-prone coastal areas, or altitude for an aircraft, etc.

Transfer GPS application technology to increase government and private sector productivity and effectiveness.

EXPECTED BENEFITS FOR THE NATION

This program will reduce risk of loss of life, cargo and other property, and environmental damage from vessel accidents and groundings. The productivity of maritime commerce will be increased through timely, digital information products for navigation. The Nation's response to marine spills of oil and hazardous materials will be improved by providing

realtime environmental data and coastal forecasting models. Coastal planning and management will be aided by geographic databases for decisionmaking.

Air navigation will be safer and more efficient and the National airspace will have increased capacity with the necessary navigation products for a new generation of control and landing systems. Finally, government agencies at all levels and private companies will be able to concentrate their efforts on using data, rather than collecting it, through common standards and use of a common reference system.

EXPECTED BENEFITS FOR USER GROUPS

This program will reduce the cost of the data and data processing and environmental data. The program will also reduce the cost of the data and data processing and environmental data. The program will also reduce the cost of the data and data processing and environmental data.

ENVIRONMENTAL ASSESSMENT AND PREDICTION PORTFOLIO

VISION FOR 2025

NOAA will have an integrated environmental observation, assessment, and forecast service that enhances the Nation's economic and environmental security.

KEY PROGRAM ELEMENTS

This vision will be achieved by providing widespread advice to policymakers to manage the global environment, predicting future environmental climate variability, and improving short-term warning and forecast services and services. NOAA will improve its capability to observe, assess, and predict environmental conditions.

ENVIRONMENTAL ASSESSMENT AND PREDICTION

- Modernizing NOAA's environmental assessment and prediction capabilities will ensure that past investments in the environmental assessment and prediction capabilities in the weather service improvements, modernized as a system to be used. These improvements will allow the Nation to mitigate the impact of the environmental assessment, infrastructure, and other programs.
- Implementing reliable regional and international climate forecasts to guide economic planning. To better understand weather, NOAA's goal is to develop a national climate prediction system and national and international climate research centers. Data systems development, research efforts, and a greatly enhanced model-based assessment are needed to realize the investment.
- Providing science-based policy advice to decision makers to deal with decadal-to-centennial changes in the global environment. Prediction and assessment on decadal to centennial time scales require improved understanding of global environmental change, enhancing existing environmental teacher networks, and convening research efforts to provide the scientific basis for implementing the Clean Air Act Amendments of 1990.
- Advancing short-term warning and forecast services for the entire environmental atmosphere, water resources, climate, oceans, and space. The primary objective of the forecast and warning services strategy is to apply the lessons learned from the weather service modernization effort to create a truly NOAA-wide forecast and warning service. Achieving these goals will save lives and improve U.S. economic productivity. The goals are achievable. Each year, 1,000 Americans die directly from severe weather, and thousands more die indirectly. Economic damage from severe weather usually costs the Nation tens of billions of dollars.

ENVIRONMENTAL ASSESSMENT AND PREDICTION PORTFOLIO

VISION FOR 2005

NOAA will have an integrated environmental observation, assessment, and forecast service that enhances the Nation's economic and environmental security.

KEY PROGRAM ELEMENTS

This vision will be achieved by providing science-based advice to policymakers to manage the global environment, producing forecasts of global climate variability, and improving short-term warning and forecast products and services. NOAA will improve its capability to observe, understand, and predict the environment by:

- **Modernization of the National Weather Service:** NOAA will ensure that past investments in technological development will result in immediate weather service improvements, maintained at a cost-effective level. These improvements will allow the Nation to mitigate the effects of the environment on our citizens, infrastructure, and economic processes.
- **Implementing reliable seasonal and interannual climate forecasts to guide economic planning.** To foster this investment strategy, NOAA's goal is to develop a national climate prediction center and national and international climate research centers. Data systems development, continued research efforts, and a greatly enhanced social science infrastructure are needed to realize the investment.
- **Providing science-based policy advice on options to deal with decadal-to-centennial changes in the global environment.** Prediction and assessment on decadal to centennial time scales requires improved understanding of global environmental changes, enhancing existing operational weather networks, and commencing research efforts to provide the scientific basis for implementing the Clean Air Act Amendments of 1990.
- **Advancing short-term warning and forecast services for the entire environment: atmosphere, water resources, coasts, oceans, and space.** The primary objective of the forecast and warning services strategy is to apply the lessons learned from the weather service modernization effort to create a truly NOAA-wide forecast and warning service. Achieving these goals will save lives and improve U.S. economic productivity. The stakes are sizeable. Each year, 1,000 Americans die directly from severe weather, and thousands more die indirectly. Economic disruption from adverse weather annually costs the Nation tens of billions of dollars.

EXPECTED BENEFITS FOR THE NATION

Implementing this NOAA investment strategy for environmental assessment and prediction will provide significant benefits to society. Policymakers responsible for making appropriate societal decisions must possess confidence in the credibility of the prediction system. Over the next decade, the application of NOAA's sound, scientific analysis will allow local, national, and international policymakers a sound scientific rationale on which to base important public policy questions concerning climate change. Improved scientific understanding and technological advancement will save lives and enhance economic opportunity. New partnerships and cooperation between local, state, and federal government and industry will enhance NOAA's environmental assessment and prediction programs to further benefit American citizens.

- Modernization of the National Weather Service: NOAA will ensure that past investments in technological development will result in immediate weather service improvements, including a new forecast level. These improvements will allow the Nation to manage the effects of the environment as our climate, infrastructure, and economic processes.
- Improving reliable regional and international climate forecasts to guide economic planning. To meet the investment strategy, NOAA's goal is to develop a national climate prediction center, national and international climate research centers. Data system development, regional research efforts, and a greatly enhanced social science infrastructure are needed to realize the investment.
- Providing advanced policy advice on options to deal with development, environmental changes in the global environment. Prediction and assessment on local to regional time scales enables improved understanding of global environmental changes, enhancing existing regional weather services and encouraging research efforts to provide the scientific basis for implementing the Clean Air Act Amendments of 1990.
- Advancing short-term warning and forecast services for the entire environmental atmosphere, water resources, coastal, ocean, and space. The primary objective of the forecast and warning services is to apply the lessons learned from the weather service modernization effort to create a truly NOAA-wide forecast and warning service. Advancing these goals will save lives and improve U.S. economic productivity. The forecast service will save 1,000 American lives annually from severe weather, and generate more than \$1 billion in economic development from advance weather warnings each year.

IMPLEMENT SEASONAL TO INTERANNUAL CLIMATE FORECASTS

VISION FOR 2005

NOAA will provide reliable one-year lead-time forecasts of global climate variability, especially El Niño and the consequent precipitation and surface temperature distributions, to a society that responds to the forecasts so as to increase its economic advantage, and mitigate against economic losses and social disruption.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

Prediction of interannual climate-variability events and resulting environmental change (including ecosystem response) is a direct, major contribution to the U.S. commitments to United Nations Conference on Economic Development (UNCED). This proposal responds strongly and affirmatively to the Department of Commerce concerns with our combined focus on environment and economic health. In particular, this Initiative directly addresses the DOC mission by working "*to ensure economic opportunity,*" and "*to promote stewardship of the global environment,*" and is one of the five NOAA mission areas, namely, "*Implement Seasonal to Interannual Climate Forecasts.*" In addition, the development of the observing components requires a close partnership with U.S. industry. This Program Initiative is a principal NOAA contribution to the World Climate Research Program (WCRP), Global Ocean Observing System (GOOS), and Global Climate Observing System (GCOS).

THE PROBLEM

The largest climate uncertainties on the monthly to decadal time scales are those that occur every few years, known as the El Niño-Southern Oscillation, or ENSO. The temperature and rainfall/snowfall patterns, changes in oceanic circulation, and changes in hurricane and coastal storm frequency that are caused by ENSO wreak global havoc, especially in the agriculture sector, but also in the fishing, energy, and forestry sectors, and in water resource management. Advance warning of ENSO consequences permits farmers to choose their crop or plant deeper or shallower, permits energy suppliers to stockpile fuel, permits forest managers to move resources to potentially dry areas, and allows fishery management councils time to adjust catch quotas on sensitive stocks.

A decade of intensive research has shown that ENSO events are predictable approximately a year in advance, given sufficient oceanic and atmospheric information and validated computer models. There is a global community of researchers that has demonstrated the validity of these predictions in a research mode. The observational systems and computer efforts required to make these predictions in a continuing, routine, operational mode have been defined and are technically feasible and cost effective. The economic studies show a societal payback potentially many times the size of the investment needed. The research has

been done, the technology is ready, the users are preparing to use these predictions. It remains only to decide to predict ENSO operationally, and to implement the programs to do it. This initiative is a NOAA-led U.S. effort to reap the benefits of our past research investment, and to continue the research so we enter 2005 with 2004 knowledge and tools instead of 1993 knowledge and tools.

PROGRAM ELEMENTS

The problem is interannual climate variability and the threat of extreme weather changes; the solution is to predict ENSO and its global consequences so society can prepare and respond. This requires:

- Operational prediction models and supporting ocean-atmosphere observations
- Research to improve the 1993 capabilities
- Assessments of impacts of ENSO to guide the predictions and research.

The current efforts in NOAA are deficient in three areas: (1) the efforts are supported mainly by research funds and performed mainly by research personnel, which does not supply the long-term permanence, robust systems and disciplined operating structure that are required for an operational effort; (2) the current observational systems provide only minimal information and cover only a few of the important oceanic regions; and (3) the current predictions of temperature and precipitation patterns must be improved to provide the desirable level of services to the users in the long term.

Predictions: It is proposed to blend an enhancement of current, experimental climate prediction activities in the National Meteorological Center with plans for an international research effort in climate prediction, so as to achieve a single, integrated, climate prediction program. The program will have responsibilities for operational climate forecasts for the U.S. and for U.S. interests abroad, and will provide -- in a multinational framework -- for climate forecasts for developing countries, primarily in a research mode.

Observing and Data Systems: It is proposed to evolve the research-funded observing system that was developed for the Tropical Ocean Global Atmosphere (TOGA) program into an operational and operationally-funded effort; the system includes moored and drifting buoys, volunteer ships, sea level measurements, and sea surface temperature fields blended from satellite and *in situ* data. Other observational and data programs are long-term ocean time series, improved atmospheric data from satellites, enhanced sea-surface temperatures and upper-ocean temperature profiles, continuation of data management and data distribution for the TOPEX-POSEIDON and GEOSAT follow-on satellite(s), improved data systems including a low-earth-orbit satellite data relay capability, and monitoring of ocean color and zooplankton for their response to ENSO.

Research: The follow-on to the very successful TOGA program is the Global Ocean-Atmosphere-Land System (GOALS) project. It is a 15-year effort to refine and develop further the understanding and predictability of interannual climate variability. The key

international program to improve the parameterization of water and energy fluxes in coupled air-ocean-land models is the Global Energy and Water Cycle Experiment (GEWEX), of which the critical first process experiment is the GEWEX Continental-scale International Project (GCIP) in the Mississippi River basin. The coastal and ecosystem response to ENSO is a critical element of this initiative: the ENSO forecasts need to be validated and tailored in the context of the uses to which the forecasts will be put.

Human, Education and Economic: Predictions and Observing and Data Systems forecast ENSO and monitor its effects, while Research improves the forecasts. This element assesses the impacts and provides an improved interface to the public so that the forecasts are understood, believed, and responded to.

This is a continuing program, especially the operational parts of Predictions and Observations and Data Systems. It is intended that research results will evolve into operational programs in the future, and that additional research for improvements will continue.

EXPECTED BENEFITS FOR THE NATION

The economic benefits of interannual climate forecasts derive mainly from the agriculture, fishing, forestry, energy, water resources, recreation, and construction sectors. In each of these, major losses that occur from ENSO events can be partially mitigated by prior knowledge of the event. For example, in the U.S. agriculture sector alone, which was valued at \$95B in FY1992, it has been estimated that at least 10% of the sector value is lost due to an ENSO event, but that some 15-20% of that loss is preventable by a climate forecast that is right 3 out of 4 times. This suggests a loss-mitigation (savings) of \$4B due to ENSO forecasts over a 12-15 year period, for the U.S. agriculture sector alone.

Benefits to the water resources and energy sectors are as large as those for agriculture. The availability of fresh water for irrigation and household use is fundamental to the nation's economic well-being and varies drastically during an ENSO event. Decisions on the purchase and distribution of fuels can be made more cost-effectively with reliable climate forecasts. For example, knowing the anticipated severity of the upcoming winter, schools can estimate the funds needed to plan for fuel purchases versus textbooks.

Thus, a conservative estimate of the averaged value of an ENSO forecast approaches a total of \$1B annually in terms of mitigated losses (including jobs saved and social disruption minimized) in the U.S. economy. Globally, the estimate of the value of ENSO forecasts exceeds \$2B. In addition, the forecasts provide improved planning for the agriculture, energy, forestry, water-resources, construction, and recreation sectors; economic advantage is thus derived. Finally, global cooperation on an interannual, global, environmental problem presages cooperation on other, longer-term, global environmental problems.

PREDICTING DECADAL-TO-CENTENNIAL CHANGES

VISION FOR 2005

NOAA will provide science-based advice to policymakers by detecting and assessing decadal-to-centennial changes in the global environment, specifically for climate change and greenhouse warming, ozone layer depletion, and air quality improvement.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

A DOC goal is "achieving sound environmental assessment, prediction, and stewardship." A sound assessment of the current state of scientific understanding is the fulcrum that yields the effective balance in decisions regarding environmental protection and a healthy economy. At the heart of these scientific assessments lie predictions whose credibility rests upon careful observations and insightful characterizations of key Earth-system processes. Formulating and carrying out research, presenting results in up-to-date assessments, and describing the implications in policy-relevant terms to government and industrial leaders are the cornerstones of environmental stewardship.

This initiative also assists the Administration's environmental goals. On Earth Day, the President committed the Nation to stabilize greenhouse gas emissions by the end of the decade. The cost-effective implementation of that commitment requires priorities based on a sound understanding of the global warming problem and its relation to natural changes. Furthermore, the flagship of the Nation's current environmental legislation -- the Clean Air Act Amendments of 1990 -- will soon be implemented. Implementation strategies need to incorporate the most up-to-date air-quality science to enhance the environmental payoff of the substantial expenses to be involved.

THE PROBLEM

Our planet is naturally a place of change, often with severe human impacts. The recent Sahelian drought and the Midwestern U.S. Dust Bowl of the 1930's are recent examples of decadal climate changes. The Little Ice Age of earlier times exemplifies high-impact climatic fluctuations for century-long time periods. Undoubtedly, such natural climatic swings also will be a part of our future.

Human activities can induce additional changes, with equally large impacts. Atmospheric pollution now hangs over many regions of the Northern Hemisphere. The thinning of stratospheric ozone layer is expected to be a new human-caused feature of the planet for nearly another century. The greenhouse gases being added to the atmosphere will reside there for decades to centuries and are predicted to increase average global surface temperatures by several degrees Celsius, which would be a larger change than the natural variation occurring over the past 15,000 years.

The problem is to foresee high-impact decadal and longer changes. Such decadal-to-centennial changes have enormous impacts on societies and governments, and they pose critical prediction and assessment needs for a world of increasing population, food requirements, and societal stresses. Foresight of natural variations will enable industry, trade, and lifestyle to adapt to a future environment that we cannot influence. Furthermore, foresight of the perturbations we are causing to the environment will allow us to make sound choices as to how we can live in better harmony with the environment. The framework for these choices is already on the tables of governments and industry: the U.N. Montreal Protocol and Climate Convention and the U.S. Clean Air Act.

Doing this requires predictions sufficiently credible for actions in advance of observations of the changes. Decadal-and-longer changes place a unique credibility requirement on predictions and associated assessments. In contrast to tomorrow's weather forecast whose credibility is quickly tested, the predictions of changes that could lie decades ahead are needed for decisions that have to be made long before the predicted change can be unequivocally observed. This need is particularly acute for environmental changes that either cannot be reversed quickly (e.g., global warming from long-lived greenhouse gases) or that can occur quickly (e.g., those climatic changes seen in the paleoclimatic record in periods not too different from today). The keys to such credibility lie in the completeness and rigor of the research and its results. Therefore, a prime need facing our Nation and the governments of the world are credible predictions of natural and human-induced environmental changes of the coming decades so effective public policy, private-sector economic strategies, and other societal decisions can be made.

PROGRAM ELEMENTS

This program will address the environmental policy needs that either currently or soon will face the Administration and world governments, with an emphasis on scientific problems whose solutions will be needed for decisions in the near future. The major actions are:

Augment the NOAA Climate and Global Change Program's research that focuses on global environmental changes associated with climate and stratospheric ozone. This includes (i) characterizing greenhouse and ozone-depleting gases involved in near-term policy decisions, (ii) determining the response of marine ecosystems to climate change, (iii) focusing on ocean's role in climate change, (iv) investigating the paleoclimatic record for periods of substantial changes, and (v) increasing public awareness of global change issues.

Begin the Health of the Atmosphere program, focusing on regional environmental changes addressed by the Clean Air Act Amendments of 1990. This research will provide the scientific basis for implementing this Act by (i) developing an understanding of high surface ozone episodes in rural areas, where crop and forest damage is a growing environmental concern and which are not addressed by current regulations, and (ii) establishing a monitoring network in the U.S. that will provide the early detection of the cleaner air quality, so that the subsequent, more-difficult emission reductions can be done with a sounder scientific basis.

Enhance existing operational weather networks, observing procedures, and information management systems to fulfill requirements for long-term climate monitoring. NOAA's present in situ and space-based observation capability is designed for weather prediction and assessment, not long-term climate monitoring. As a consequence, many critical climate variables are inadequately measured and inadequately archived. Data quality and continuity have been compromised. As a result the science of global climate change, so critical for the development of sound environmental and economic policy, is being thwarted by our uncertain information about critical climate trends.

EXPECTED BENEFITS FOR THE NATION

With the focus on research that addresses the key current and emerging environmental issues that are before decisionmakers, the payoff of these proposed augmentations will be very substantial and relatively immediate.

A clearer picture of the relative roles of various greenhouse gases in causing global warming will be developed. Since the President committed to addressing emissions of all greenhouse gases, this quantitative information will help assess relative priorities, which would aid the cost-effective development of strategies to stabilize emissions. Also, better prediction of climate response to emissions changes will be available. Estimates of the cost of stabilizing greenhouse gas emissions range to \$5.1 trillion globally. Regardless of net costs, implementation will cause major shifts in many economic sectors. The incremental value of even marginal increases in our ability to assess the climate impacts of these emissions are enormous. Finally, early detection of climate change can be accomplished. One of the most critical components of implementing and sustaining a policy on anthropogenic greenhouse gas emissions relates to demonstrable impacts on the climate. With modest improvements to our existing weather watch networks, we can assure that real climate signals will be identified at the earliest possible date.

Choices will be better defined for aggressive protection of the ozone layer, e.g., which substitutes for the soon-to-be-banned chlorofluorocarbons will be the most "ozone friendly." Such information will help industry avoid production, at \$25 million per plant, of a substitute that later proves to destroy unacceptable amounts of ozone and will help our Nation's international competitiveness by having early commercial availability of substitutes.

Clean Air Act decisions which could reduce both urban ozone and rural ozone will be clarified. This would yield even larger benefits in environmental improvement for the same economic investment by the U.S. taxpayers, estimated at \$10 billion per year. For example, a 25% reduction in rural ozone would increase annual crop yield by \$1 billion. Observations of the improvements in national air quality will be available as soon as possible after the first emission reductions become law. These data will (i) substantially define the options for implementation of subsequent emission reductions and (ii) demonstrate to the public that their increased expenditures are having a positive impact.

ADVANCE SHORT-TERM FORECAST AND WARNING SERVICES

VISION FOR 2005

NOAA will have significantly improved its short-term warning and forecast products and services relative to environmental events (e.g., tornadoes, hurricanes, floods, tsunamis, and geomagnetic storms) that have the most immediate impact on the safety of lives and the economic productivity of the Nation. NOAA will attain this vision by improving its ability to observe, understand, and model the environment, and by effectively disseminating its products and services to various users.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

NOAA plays a primary role in fulfilling the Administration's and DOC's goal of "promoting stewardship of the global environment" by providing accurate environmental forecasts and warnings to protect life and property. The actions called for to reach this vision will create new "high technology" environmental observing, predicting, and information dissemination systems that support DOC's goals to "open and expand foreign markets and increase U.S. exports" and "enhance technological development and commercialization."

The challenge to NOAA and the Department of Commerce as we move into the 21st century will be to use and refine our capital investments, increase our understanding of the environment through research, and invest in critical new technologies to provide the accuracy and timeliness of forecasts that our Nation's population and economy require.

The Department of Commerce and NOAA have begun to meet this challenge through the implementation of the NWS Modernization Program and by leading the interagency U.S. Weather Research Program. NOAA will continue to implement these initiatives and other new environmental programs to provide the advanced environmental observations and understanding necessary to improve future forecast and warning services.

THE PROBLEM

Our environment has profound effects on our Nation's human welfare and economic well-being. Each year, hundreds of lives and billions of dollars are lost due to environmental events that could be predicted minutes to months in advance. Some are dramatic, such as the direct devastation caused by tornadoes, hurricanes, coastal storms, tsunamis, and widespread droughts. Others are more indirect, such as the unnecessary contamination of fresh water supplies by runoff of chemicals into our rivers and lakes from day-to-day rains. Although nothing can be done to prevent the events themselves, expanded investments in NOAA activities will help minimize their human and economic impacts.

NOAA's present ability to predict accurately short-term environmental change is restricted by observations that are incomplete in both time and space dimensions. This limits our ability to improve our understanding, and hence predictive modeling, of the environment around us. NOAA has begun reducing the impact of environmental disturbances through a fundamental restructuring of the National Weather Service (NWS). However, improvements in NOAA's environmental prediction service cannot stop here. There is an urgent need for NOAA to improve its observational systems, develop a better understanding of environmental processes, and enhance predictive models and dissemination systems in a comprehensive approach to the environment.

PROGRAM ELEMENTS

Advances in NOAA's operational atmospheric, oceanic, and space observing and prediction systems will immediately improve forecasts ranging from a few minutes to several months in advance. The improved observations and predictions are directed toward mitigating the effects of the environment on our Nation's people, infrastructure, and economic processes. The success of the program depends on a balance of activities:

- Sufficient observations, in quality, spacing, and timeliness
- Adequate understanding of the underlying environmental processes
- Resources and procedures to predict a variety of environmental events
- The ability to communicate these predictions to the public.

The following three actions will ensure NOAA attains its vision for short-term forecast and warning services:

Complete the Modernization and Restructuring of the NWS. The experience with the NWS Modernization to date has been extremely positive. This initiative will assure that our past investments in technological development will be followed to its fruition and that weather services will be maintained at a cost-effective level.

Strengthen NOAA's environmental observing and prediction systems. The NWS Modernization represents only the first step toward providing an overall system of improved environmental forecasts. Additional service improvements can only occur through a combination of scientific, technologic, and programmatic advances in the areas of predicting weather, inland water resources, oceanic conditions, and the space environment.

Improve application and dissemination of products and services. The benefits of NOAA's short-range prediction improvements will fail to reach their potential unless they can be retrieved and passed quickly and clearly to the public, both directly and through improved communications and display capabilities for emergency management agencies, public planners, the media, and private forecast providers.

Weakness in any of these actions will decrease the quality of all forecasts and warnings and the subsequent benefit to the economic and physical well-being of the population.

EXPECTED BENEFITS FOR THE NATION

With our Nation's increasing dependence on and concern for protecting the environment, the payoffs of these improvements to the total environmental prediction system will be very substantial, even in the first few years of the effort. The benefits are many.

Increased public confidence in local forecasts will reduce avoidable injury and property loss. This will be accomplished through improved public dissemination systems delivering additional advanced notice to the public and other agencies for local hazardous weather including tornadoes, hurricanes, and intense winter storms both over land and oceans.

Improved forecasts will support better stewardship and management of inland and offshore water resources by assisting water resource managers in optimizing the use of our inland and coastal waters, and avoiding unnecessary flood damage. The available information and forecasts will improve the safety and efficiency of maritime and Great Lakes commerce and provide important information for maintaining and restoring environmental quality and improving fisheries management.

Improved forecasts of solar disturbances will allow better management of space operations, power generation networks, and satellite communications networks, and will reduce disruptions from unforecast solar events.

Increases in economic efficiency provided by more accurate outlooks of future environmental conditions beyond a few days will provide planning information for weather sensitive activities both over land and ocean. The sophisticated environmental technologies used to generate these environmental technologies will allow for new growth industries and will help maintain our Nation at the forefront of advanced environmental technology development.

The observational data obtained through this initiative will also form the cornerstone for the other, longer term initiatives being proposed under the environment assessment and prediction objective.

CROSS-CUTTING INITIATIVES PORTFOLIO

VISION FOR 2005

NOAA's cross-cut initiatives build sensitive bridges to other Department of Commerce Division, Federal agencies, and private sector partners to leverage limited resources in support of mission objectives.

KEY PROGRAM ELEMENTS

By the year 2005, NOAA will be serving a diverse, international community that will demand improved and expanded environmental data and information that NOAA alone cannot now provide. Future success will require the exploitation of government-directed and private sector capabilities and global environmental agreements.

CROSS-CUT INITIATIVES

- NOAA will explore new opportunities for convergence of its data-collecting environmental satellite systems with that of the Department of Defense. Planning for future operational satellite missions will consider support for a NOAA-led civilian system, with international participation, for realization of a coherent national program, significant cost savings, and improved space-based environmental monitoring.
- Dual-use of previously classified environmental systems, data, and information will successfully bolster NOAA environmental research and reporting efforts with a relatively small investment.
- NOAA will promote effective distribution of data and information from its unique and massive environmental data holdings through information technologies built on the new National Information Infrastructure. New, very high performance computing and visualization systems will enable NOAA to produce improved forecasts and assessments from sophisticated models not limited by computational technology.
- NOAA will be instrumental in building demand and creating market demand for its environmental technologies, paving the way for the introduction of American products and services abroad. A vibrant marketplace of environmental technologies will sustain the competitiveness of the U.S. economy.

CROSS-CUTTING INITIATIVES PORTFOLIO

VISION FOR 2005

NOAA's cross-cut initiatives build effective bridges to other Department of Commerce bureaus, Federal agencies, and private sector partners to leverage limited resources in support of mission objectives.

KEY PROGRAM ELEMENTS

By the year 2005, NOAA will be serving a diverse, international community that will demand improved and expanded environmental data and information that NOAA alone cannot now provide. Future environmental technology businesses will be fueled by the exploitation of government-directed research and development, and reliant on NOAA predictions and global environmental assessments.

- **NOAA will explore new opportunities for convergence of its polar-orbiting environmental satellite system with that of the Department of Defense.** Planning for future operational satellite missions will consider options for a NOAA-led civilian system, with international partnerships, that result in a coherent national program, significant cost savings, and augmented space-based environmental monitoring.
- **Dual-use of previously classified environmental systems, can successfully bolster NOAA environmental research and technology efforts with a relatively small investment.**
- **NOAA will promote effective distribution of data and information from its unique and massive environmental data holdings through information technologies built on the new National Information Infrastructure.** New, very high performance computing and communications systems will enable NOAA to produce improved forecasts and assessments from sophisticated models not limited by computational technology.
- **NOAA will be instrumental in building domestic and foreign market demand for its environmental technologies, paving the way for the introduction of American products and services abroad.** Accelerated introduction of environmental technologies will increase the competitiveness of the U.S. economy.

- **By strengthening involvement in international fora, NOAA will play a lead role in implementing UNCED recommendations, building an integrated, global approach to addressing environmental problems and enacting solutions.**
- **NOAA will invigorate opportunities for education and human resource development in its work force through the development of a new recruitment strategy, a Diversity Resource Center, and a NOAA Training Institute.**

EXPECTED BENEFITS FOR THE NATION

The cross-cutting initiatives place NOAA in a better position to respond to dramatically increasing demands for its critical services of environmental prediction and assessment.

NOAA can greatly enhance environmental research and operational prediction at a fraction of the costs of establishing new programs by leveraging the billions of dollars of investments already made by other agencies and through exploitation of applicable dual-use programs. NOAA can consolidate various national assets to greatly increase the cost efficiency of ongoing efforts.

U.S. business, government, research, and the public will all experience improved productivity through dramatically increased use of NOAA environmental data and information resources.

The environmental technology sector of the national economy will show increased vigor and market share. American industry as a whole will become more resource-efficient. And, by acting now to anticipate human resource needs, a smarter NOAA work force will be led by visionary, innovative public managers and scientists in the future.

EDUCATION AND HUMAN RESOURCES

VISION FOR 2005

NOAA will be the premier source for environmental science education and information so that the U.S. population can make sound economic environmental, and public safety decisions; and a model employer with a talented, committed workforce that has skills that match its mission and reflects the Nation's diversity.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

Education and human resources contribute to Administration and DOC goals to ensure and enhance economic opportunity for the American people by fostering a scientifically literate public. They help to enhance the Nation's competitiveness in the global economy by improving science and math education. To the degree that a proficiency in science and math education will give students a lifelong edge in managing research and development, anticipating innovative technological advances in foreign domains, and publishing research that sparks the creative urge in others, NOAA's enhancement of teachers' skills in teaching environmental science will give the Nation a leg up in the global market.

It is essential to the realization of Administration and DOC goals to increase the pool of capable technicians and scientists to provide environmental assessment, prediction, and stewardship for the Nation. NOAA must make a major investment in its human resources. To attract and develop the best talent in a highly competitive market, NOAA must be recognized as an agency where talent and individual differences are respected and rewarded.

As outlined in Putting People First, President Clinton's thoughts are clear. "In the emerging global economy, everything is mobile: capital, factories, even entire industries. The only resource that's really rooted in a nation--and the ultimate source of its wealth--is its people. The only way Americans can compete and win in the twenty-first century is to have the best-educated, best trained workforce in the world, linked together by transportation and communication networks second to none." A combined educational and human resource strategy that includes teacher training, energetic recruitment, and training for NOAA employees can be expected to build up the number of qualified meteorologists, marine scientists and computer scientists entering the pool of candidates for employment at NOAA, and elsewhere. In doing so, it is essential to develop a workforce that reflects the Nation's racial, ethnic and gender diversity to ensure that NOAA meets its future mission requirements.

THE PROBLEM

The National crisis in science and mathematics education is evident. The 1992 Report of the FCCSET Committee on Education and Human Resources cited many indicators such as:

declines in American student performances relative to international peers, inadequate preparation and lack of current scientific knowledge among many American teachers, and insufficient numbers of students pursuing education and training to fill critical scientific and technical jobs. Further, they identified an under representation of women, minorities, and persons with disabilities in science courses and careers and low levels of scientific literacy among the American public.

The cumulative effect of these factors has been an erosion of the skills pool from which scientists and technicians are recruited. For agencies where core functions depend on a workforce with a high degree of competence in mathematics, engineering, meteorology, marine science and computer literacy, the effect is significant. NOAA is one of the agencies affected by this education shortfall. Sixty percent of NOAA's 14,000 employees are working in scientific, engineering and technical areas. By 1998, one quarter of NOAA's scientists and managers could retire, creating a human resources void, just as NOAA is gearing up for modernization of operations and facilities. The pipeline is not in place to cover this potential brain drain and ensure highly qualified replacements. Moreover, the blend of the Nation's workforce is changing. By the turn of the century, 70% of new entrants to the workforce will be women and minorities, and only 30% will be white, American-born males. This latter group has traditionally been the source of majority hires in the scientific and technical disciplines.

All Federal organizations must respond to these changing demographics in the American labor pool. NOAA organizational culture does not recognize and is not prepared to deal with the changing demographics of the future workforce. NOAA has a historical pattern of placing greater value on short range tasks accomplishment than on development of human talent essential to its long-range visions. This changing workforce will require a long term human resource strategy to ensure NOAA's vital role in today's changing world.

PROGRAM ELEMENTS

NOAA's agenda in the area of education and human resources involves the development of strategies to combat these problems. In the education arena, NOAA will enhance public and information dissemination programs and double the NOAA direct teacher training and education. This will require the development of innovative classroom materials using NOAA data so that by the year 2005, state-of-the-art computer software programs are the norm in America's science classrooms. In order to realize this vision, NOAA has to develop a central clearinghouse for technologies and programs to support environmental education. These activities will focus NOAA's environmental education mission to maximize its impact on our Nation's educational programs.

To face the challenges of this changing workforce, we must tap new resources and continue to assess the skills needed to achieve NOAA's mission. As we continue to build upon the recognized strengths of our professional and technical staff, new spirit, new ideas, and new people can strengthen the overall organization. We must take steps to attract, develop and retain employees. We must also provide strong training and career development programs.

Becoming a stronger, more effective, and productive organization requires special attention to promote, value, and manage diversity in the workforce. We must build a responsive human resources program that includes a NOAA recruitment strategy targeted at attracting a diverse workforce (e.g., Co-operative Education, Graduate Scientist, Presidential Management Intern, Senior Executive Service candidates). NOAA will establish a Diversity Resource Center to facilitate change in NOAA's organizational culture and to serve as an external outreach mechanism. NOAA also plans to create a NOAA Training Institute as a laboratory for development and delivery of state of the art human resources enhancement programs.

EXPECTED BENEFITS FOR THE NATION

The benefits of these programs include developing a more environmentally responsible and scientifically literate public. We will achieve an established educational base to shape public decision making. Our efforts will ensure better teaching tools for science education. Teachers, especially Kindergarten - Grade 12, will be better prepared to teach environmental and earth sciences. At the heart of our plan is a better transfer of NOAA's scientific expertise and data to educators and the public.

In regard to human resources, out of a shrinking and increasingly diverse pool, NOAA will attract and retain the most competent workforce. NOAA will develop a cadre of visionary managers who capitalize on the potential of a diverse workforce. NOAA will maximize the development of management and employee skills necessary to meet organizational needs and adapt to future changes. Feeder programs will be established to provide for a continuing level of competent, effective scientists and managers to meet the needs of the organization in the years ahead. And finally, NOAA will demonstrate its commitment to quality of life issues for the American people such as child care, flexible work schedules, and job sharing.

ENVIRONMENTAL TECHNOLOGY

VISION FOR 2005

The environmental technologies sector of the American economy will continually strengthen its share of what will be a \$1 trillion/year worldwide market by 2005. With the accelerated introduction of environmental technologies, the entire U.S. economy will be more competitive. America will prosper.

Driven by economic incentives rather than punitive measures, government and industry will work as partners to clean up the environment. Remediation and cleanup will be replaced by pollution prevention. America will be cleaner.

The application of new technologies such as biotechnology will produce new commercial products and processes based on marine resources. Such technological innovation will not only contribute to domestic economic growth but will enhance U.S. competitiveness in global markets.

Nations and peoples worldwide will respond positively to American help in natural hazard mitigation, to the American provision of environmental information and expertise, and to American help in building needed in country capabilities. Nations and peoples the world over will have a technically trained professional cadre comfortable with the analysis of environmental and economic data and developing policy and technological alternatives. World economies everywhere will be stronger and more sustainable. Our trading partners will be both more able and more inclined to buy our products.

The U.S. Department of Commerce will be instrumental in building domestic and foreign market demand for environmental technologies, in developing the technological capabilities of American industry, and in paving the way for the introduction of American products and services abroad. The Department of the future will be not only visible, but also highly regarded.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

This initiative embodies the Administration's goals for the environment and technology. It responds to the main points of President Clinton's Earth Day message. It highlights an important unifying idea underlying the entire DOC mission statement.

THE PROBLEM

In the world of the future the twin goals of economic growth and environmental protection can be obtained only together if at all. Developed nations of the world, especially Japan and the united Europe, understand this and are racing to reconfigure their economies along more sustainable lines.

By contrast the United States has fared better in environmental technology R&D than in subsequent domestic implementation and foreign export. The Nation tolerates structural impediments and disincentives to progress at home and provides no help to our own manufacturers marketing environmental technology abroad. Furthermore, we have no strategic plan for improving our position in either regard.

The Department of Commerce's current collaboration with industry is unfocused, fragmented, small in scope, intermittent, and poorly coordinated.

PROGRAM ELEMENTS

We need to take action in several areas.

We need to build foreign market demand using public/private partnerships reinvigorated through education, training, and seminars. We must tailor products for international use, and provide government-industry teams of experts to help nations expand their in country capabilities for analysis and impact assessment. We must help with needed instrumentation, communications and computing infrastructure, and education and training.

We need to remove domestic market impediments:

- the erroneous notion that environmental protection and economic growth are opposed forces, either of which can only be achieved at the expense of the other;
- the adversarial, litigious nature of the interaction between government and the private sector;
- the approach to environmental protection as end-of-pipeline correction and remediation of past mistakes versus pollution prevention.

Beginning with Commerce, we must make Federal agencies more responsive to industry and local needs. Where necessary, we must build domestic market demand by becoming the primary customer (as we have in military aerospace).

We must expedite international sales and implementation, by getting buyers together with U.S. sellers, and by providing subsidies, loans, guarantees, and other financial instruments to both sides. We must ensure the necessary protection for U.S. intellectual property, licensing rights, and franchising agreements. We must follow through, providing continuing customer service and support.

Toward these ends, we must take Federal leadership, working with industry to create new supporting mechanisms:

- A national strategic plan
- A DOC-industry entity to set strategic priorities, monitor progress, and evaluate performance

- Capabilities for integrated assessment; for new definitions of GNP that take into account environmental costs and benefits; and for measuring the progress of the environmental technologies industry and its impact on the economy overall.

We must build the technological capabilities of U.S. firms, by underwriting or providing the necessary high-risk, pre-competitive research and development activities, including those which may provide models for new commercial products in such areas as marine biotechnology. The payback will exceed the investment in such efforts, and will often transcend the specific industry targeted. For example, the potential economic and public health benefits of pharmaceuticals, pesticides, hormones, enzymes, and polymers derived from marine organisms is high, yet unexploited.

Countries ranging from Norway to Japan are making major investments in marine biotechnology. In order to remain competitive in this rapidly developing field, where it is now a leader, the United States must enhance its science and engineering research, training, and technology transfer.

Finally, NOAA must initiate a few pilot projects, to accelerate both the economic payoff and the learning curve. Those selected pilot projects are:

- developing foreign markets for and sales of U.S. weather and hydrologic technologies.
- establishing a market for GOOS and GCOS technologies
- develop new commercial products and processes by utilizing marine biotechnology to benefit pharmaceutical, chemical, and other industries

EXPECTED BENEFITS FOR THE NATION

In the short term, the environmental technologies' sector of the national economy will show increased vigor and market share. We will build good will abroad, in response to the investment we make in the well-being of our trading partners. For example, the benefits of a worldwide monitoring capability will more than pay for itself.

The Department of Commerce will become:

- a visible, dramatic example of reinvented government
- catalytic (making things happen)
- empowering American industry rather than serving (or interfering)

In the intermediate term, American industry as a whole becomes more resource-efficient, and more competitive with Japan and Europe. We will increase our trading partners' ability and inclination to buy our products and services. We will eliminate the spectre of ultimate environmental degradation driving irreversible economic depression.

In the long term, America will continue to enjoy world leadership well into the next century.

ENVIRONMENTAL SYSTEMS DUAL USE/CONVERGENCE

VISION FOR 2005

As people gain greater understanding of how man can impact nature and demand more and improved data, NOAA faces a significant challenge in meeting its mission of describing and predicting changes in the environment. In meeting this challenge, NOAA needs to look at every opportunity. Today, due to increasing budget pressures, especially in DOD, there is an opportunity for NOAA to meet some of these demands with relatively modest investments by leveraging significant investments other agencies have already made. This leveraging involves both a dual use of some assets and convergence of others resulting in a more efficient national infrastructure. By taking advantage of these dual use/convergence opportunities, by 2005 NOAA will:

- lead a single, civil environmental satellite system;
- be recognized as the civilian interface for environmental dual use National Security Systems;
- manage a consolidated environmental data collection program.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

The Clinton Administration has indicated a new approach to the creation of environmental policy, a new view of the likelihood of global change, and a new attitude toward the relationship between the economy and the environment. The President has stated, "We must move in a new direction to recognize that protecting the environment means strengthening the economy and creating new jobs for Americans." The Administration wants to ensure that environmental considerations are fully integrated into the economic, national security, and domestic policy development process. The Department of Commerce is a key organization in the accomplishment of this purpose through its mission of promoting economic growth by achieving sound environmental assessment, prediction, and stewardship.

The sound environmentally-based, economic decisions, which form the backbone of these Administration goals, are based upon the "best available" information. NOAA needs to optimize the National environmental collection capability to ensure the Nation efficiently obtains this information. Key to this economic efficiency is maximizing the dual use of national capabilities and the convergence of similar data collection systems. There are many opportunities to improve environmental data collection, capabilities NOAA needs to pursue these opportunities to provide leadership in prediction, assessment and stewardship of the environment.

THE PROBLEM

Due to the extreme importance of the environment to many government agency missions, many other agencies not only rely upon data for decisions but even operate environmental data collection systems to meet their data needs. As the demand for more and improved environmental data skyrockets, and budget constraints limit new programs, the Nation needs to assess existing assets closely and determine the most efficient way to get the environmental data it needs.

One area needing close scrutiny is satellite remote sensing. The next generation NOAA polar environmental satellite, the next generation DOD meteorological satellite, and the EOS-PM platform of NASA's Mission to Planet Earth combine to a total cost exceeding \$6 billion. Current plans involve both NOAA and DOD maintaining independent, operational, two-satellite constellations and NASA flying a research mission with meteorological instruments similar to those flown on the two operational programs. The independent development costs for these three programs combined with their mission similarities effectively tie up significant national resources in meteorological applications, limiting the U.S. in developing important environmental data collection capabilities in oceanographic, global wind, and long term climate research.

Another problem area is the affordability of some NOAA requirements (e.g. enforcement of international fishery laws). NOAA could never afford to develop new capabilities to effectively collect all the environmental data required to meet the mission needs. The only viable solution in many cases is to look at existing systems in other agencies use them for NOAA mission accomplishment. In many cases, this may involve use of systems whose primary purpose is not to collect environmental data but which, with some investment by NOAA, have the ability to be so used. This leveraging of other agency efforts may be the only way effectively to meet NOAA requirements.

Finally, there are some environmental data collection and processing systems so scattered throughout other agencies considerable inefficiencies result. The problem then, is how to consolidate such efforts to more efficiently collect these environmental data while simultaneously using the synergy of this consolidation to provide opportunities to expand the data collection capability while reducing overall overhead costs.

PROGRAM ELEMENTS

There are many dual use/convergence opportunities for NOAA to pursue. Following is a summary of those activities showing the most promise. NOAA needs to continue investigating other opportunities to take immediate advantage of these cost efficient means to meeting NOAA mission requirements.

Environmental Satellites: NOAA is developing a plan for a national, civilian, operational environmental satellite system and work with DOD and NASA to establish a strategy to reach a converged solution. This solution should emphasize a merged NOAA/DOD

operational environmental satellite program with minimal overlap with NASA's Mission to Planet Earth Program. This program should cost less than the sum of the current independent programs and meet additional data needs -- especially in the areas of global winds, oceanography, and long term climate change. Once conveyed, it can form part of an international operational satellite system.

Dual Use: NOAA will coordinate and lead working groups with other agencies to identify and implement dual-use projects for NOAA missions and civil-user access. NOAA will also conduct research and development on methods to apply newly available data, and will examine options for placing research instruments on Navy craft. NOAA will integrate surveillance asset data into its operational systems, building secure communications links to protect classified sources, and establishing civil access centers for unclassified oceanic and atmospheric data. NOAA's National Undersea Research Program may allow civilian research on Navy submarines. In addition, NOAA will continue to monitor the development of other agencies' environmental satellite systems and open negotiations to ensure NOAA access to the data from these satellites. Finally, NOAA will evaluate its communication and data handling infrastructure thoroughly to determine approaches to accept, process, and archive the vast quantities of data projected to be collected by these satellites.

Convergence of Assets: NOAA will further investigate the feasibility of consolidating hurricane research and reconnaissance aircraft under NOAA. NOAA needs to expand the cooperation already underway in the existing Shared Processing Agreement with DOD and to further explore joint operational efforts. Key efforts should be made to establish a joint NOAA/Navy team to work on a range of satellite data processing and analysis activities. NOAA needs to establish an Office of Climate Services in each government agency which is a potential user of climate data, to address the needs of each economic sector.

EXPECTED BENEFITS FOR THE NATION

The benefits of these activities are clear. NOAA can lead the effort to better focus the resources of the Nation towards meeting its environmental stewardship mission. NOAA can greatly enhance environmental research and operational prediction at a fraction of the costs of establishing new programs by leveraging the billions of dollars of investments already made by other agencies. In addition, NOAA can consolidate various National assets to greatly increase the cost efficiency of ongoing efforts.

RELATIONSHIP TO ECONOMIC GROWTH

This initiative supports the President's Economic Growth, Regulatory Relief, and Consumer Protection Agenda. The Vice President, who is responsible for the economic recovery, is achieving this goal through

ENVIRONMENTAL INFORMATION

VISION FOR 2005

By the year 2005, all NOAA environmental data and information products will be readily available to the Nation. NOAA information will be disseminated as part of the National Information Infrastructure (NII) for global use by business, government, researchers, educators, and the general public. New information products and services will be made possible by nationwide networking connectivity at high data rates using advanced information technology.

Every U.S. business will take for granted the availability of reliable short- and long-term weather forecasts to increase productivity, such as by scheduling production around potential weather-caused parts delivery delays as a part of "just-in-time" inventory systems. Airlines, shipping companies, and even trucking companies will be taking advantage of real time forecasts and historical environmental trend information to optimize travel, minimizing energy consumption and non-productive time of people traveling and waiting for products to arrive. Accurate, readily available long-range weather forecasts and climate outlooks will be indispensable tools for agricultural planning. In schools across the Nation, from Kindergarten through graduate school, both real time and historical weather information will be used together with demographic, economic, and other environmental information available from all parts of the Commerce Department.

Government and business policy decisions relating to the environment will be made with the confidence that NOAA's short term, seasonal, and long-term environmental forecasts and assessments, which will be readily available in a timely way, provide an excellent basis for policy and operational decisions. NOAA's environmental modeling systems that support these improved forecasts will take into account the effects of clouds, ocean eddies, and other small scale physical phenomena, by incorporating improved physics and higher resolution. This will be made possible by the use of the VHPCC (very High Performance Computing and Communications) computing systems that will have evolved from the Government's intensive stimulus of technological advances by the U.S. information technology industry in the late 1990's, in which NOAA will have played a pivotal role.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

This initiative responds directly to the February 1993 report on "Technology for America's Economic Growth, A New Direction to Build Economic Strength," by the President and the Vice President, which highlights the goal of making Government more efficient and responsive through the use of technology. Special attention is given in this report to achieving this goal by promoting effective dissemination of Federal Government information.

The initiative responds to the goal of promoting the development of the NII through application of technologies that are derived from the High Performance Computing and Communications Program, and will facilitate technological development that increases the commercial strength of American industries and creates jobs for American workers. NOAA programs will be both a beneficiary and an enabler of the NII. NOAA will benefit by using it to move data internally in support of its mission, and will support the NII evolution through widespread dissemination of NOAA information products.

The broad scale information dissemination enabled by this initiative will help meet the goal of creating a solid base for growth and business creation in economically distressed communities, by helping to equalize the availability across the Nation of information essential for growth and business in all communities. Assuring that NOAA's environmental information products are readily available to U.S. industry supports economic growth and achieves Department goals of sound environmental assessment, prediction and stewardship.

THE PROBLEM

NOAA information products are now disseminated only on a limited basis, largely in response to specific requests. Real time data is sometimes delayed and historical data can take days or even weeks to retrieve. NOAA environmental information is not integrated with other NOAA information or with information from other parts of Commerce or other Federal agencies having environmental programs. Further, the accuracy and reliability of NOAA's information products are limited by current computational performance.

As a result, business must now often make decisions without relevant environmental information, and new ventures built on environmental information lie dormant. Even computer-literate researchers must struggle to access that part of NOAA's information that they can reach with today's limited computing and communications systems.

NOAA is significantly under-invested in the information technologies necessary to take the next step in numerical modeling that will lead to significantly improved weather and climate prediction and environmental research. Without an aggressive program to stimulate the application of these emerging technologies, NOAA will find itself tackling a 21st century mission with 1980's technology.

PROGRAM ELEMENTS

- NOAA information will be made available through the Internet and other new networks of the National Information Infrastructure to all businesses, Government agencies, schools, and homes. Network connectivity for enhanced access to information and computational resources and for advanced teleconferencing will be enabled by new network routing and workstation systems. A NOAA Network Information Center will be made fully operational to support network users.

- NOAA's environmental data and information management system, including its national data centers and its over 30 centers of data will be modernized to produce a virtual national distributed environmental data base. It will be able to receive, archive, and provide improved access to the expected huge volume of environmental data for which NOAA is responsible.
- New, very high performance computing systems that execute new, parallel models will be acquired that support much higher resolution modeling. Such models will represent detailed atmospheric and oceanic phenomena much more realistically, making possible improved understanding and predictions.
- NOAA's staff will be trained to exploit new, advanced information technology, including massively parallel computing, and appropriate new NOAA information products will be developed and disseminated to support the Nation's educational process from Kindergarten through graduate school as well as continuing education.
- NOAA will develop new software tools that make its vast array of diverse environmental information more readily searched and combined with other data, and will apply these tools together with its data in pilot information dissemination projects. New tools for data integration, or "data fusion," and data visualization will enable new types of information products. These products will be used in pilot projects such as an Earth Watch service and a new coastal monitoring information system.
- Together with other Commerce agencies, NOAA will demonstrate broader dissemination of selected information, with an emphasis on new products that result from integrating different types of data, such as demographic and economic data with NOAA environmental data.
- With other Federal agencies that have environmental programs, NOAA will demonstrate broader dissemination of environmental information, highlighting uses that combine data from multiple sources. Other Federal agencies such as EPA and NASA will be able to depend on information from NOAA to support their missions.

EXPECTED BENEFITS FOR THE NATION

Business, government, researchers, and the public will all experience increased productivity, and there will be improved decision making at all levels. This will include high level Government policy making, in which false choices will be avoided between the environment and economic growth. Education for all Americans will be improved, and business opportunities enhanced, using environmental data as an "enabler" for entrepreneurs.

GLOBAL PARTNERSHIPS FOR FULFILLING THE GOALS OF THE EARTH SUMMIT (UNCED)

VISION FOR 2005

In 2005, the planet will be well on its way to environmentally sustainable development. We will have a greatly increased scientific understanding, which will result in reliable predictive capabilities of natural and anthropogenic effects on our global ecosystem. Things will be different, in part because organizations like NOAA promptly and effectively responded to the needs identified in 1992 at the Earth Summit.

NOAA will have established a program for providing global climate predictions regionally with core facilities in the United States and participating regional centers in Latin America, Africa, and Asia. The Inter-American Institute for Global Change Research, established to coordinate scientific and economic research on the extent, causes and consequences of global change will be replicated in Asia and Africa.

Most nations will have integrated coastal zone management systems allowing governments to make decisions about human activities based on knowledge of natural climate variability, the effects of pollution, habitat destruction, fishing, sea level rise and other anthropogenic changes. Most nations will manage their living marine resources based on an interdisciplinary regional ecosystem approach. This approach will facilitate understanding of the principal driving forces affecting these resources and decision-making in response to this understanding using precautionary, adaptive methods.

Monitoring systems will be comprehensive; we will be within two years of full implementation of a Global Ocean Observing System. NOAA will be a center of excellence for marine biological diversity. Key international organizations will be strengthened by qualified NOAA employees who are assigned there to promote the achievement of these goals.

RELATIONSHIP TO ADMINISTRATION AND DOC GOALS

Unless we act, and act now, we face a future where our planet will be home to nine billion people within our lifetime, but its capacity to support and sustain our lives will be very much diminished.
President Clinton, Earth Day, April 21, 1993

The goal of sustainable development is predicated on a close nexus between environmental goals and economic development. NOAA's post-UNCED actions will enhance the factual basis upon which differences among competing groups may be more easily resolved. A case in point is the contribution of NOAA science to adoption of an international program to protect the ozone layer -- the Montreal Protocol. Adoption of this program required resolution among numerous competing interests both domestically and internationally. It was facilitated greatly by agreement on the scientific facts.

Establishing global partnerships to fulfill our UNCED commitments is a confirmation of the DOC commitment to promote global environmental stewardship. It is also a demonstration of the pursuit of environmental goals in concert with economic development considerations.

THE PROBLEM

Accelerating degradation of local and global ecosystems undermines the socio-economic well-being of developing countries. Ecological stress impedes this potentially vast market for U.S. exports and threatens long-term world stability. Presently 60% of the world's population lives within 60 kilometers of the coast, with coastal areas expected to absorb the doubling of the population by the year 2020. This population growth and the concomitant poverty, disease, over-fishing caused by the demand for protein, contaminated water supplies, and vulnerability to severe weather and climate change are serious challenges to sustainable development. The global community looks to the U.S. for an improved understanding, better predictive capabilities, and technical assistance to foster stewardship of our shared global environment.

PROGRAM ELEMENTS

Examples of needs identified by UNCED that are NOAA's mission --from Chapter 17, Agenda 21

<u>Para</u> 17.14	States should cooperate in the development of necessary coastal systematic observation, research and information management systems
17.16	Coastal States should promote and facilitate the organization of education and training in integrated coastal and marine management ...
17.92	States... should cooperate to develop financial and technical cooperation to enhance the capacities of developing countries in small-scale and oceanic fisheries, as well as coastal aquaculture and mariculture
17.114	Developed countries should provide the financing for the further development and implementation of the proposed Global Ocean Observing System

One year ago, the U.S. along with other countries made commitments at the Earth Summit to take actions toward environmentally-sustainable development. An 800-page blueprint for action, Agenda 21, was adopted, and the U.S. signed the Framework Convention on Climate Change. In April 1993 President Clinton announced the intention of the U.S. to sign the second UNCED Convention -- the Convention on Biological Diversity.

Many of these commitments were made with the understanding that developed countries will provide the necessary assistance to developing countries, who do not have the endogenous capacities necessary. Many of the actions proposed are within NOAA's purview and areas of expertise. Although some actions are presently being taken by NOAA, NOAA has virtually

no funds to carry out the direct technical cooperation and assistance to developing countries called for by UNCED. NOAA's FY95 budget initiatives propose activities that address needs identified by UNCED but again do not provide for the extent of technical assistance needed to build developing country research and operational capacities. This initiative is a statement of the importance of responding to our UNCED commitments.

NOAA proposes cooperative programs with other organizations and countries to provide technical assistance and training, building on its existing programs. Programmatic categories of assistance, all of which are called for in Agenda 21, are:

- Global Climate Change/Weather Forecasting
- Coastal Zone Management
- Living Marine Resources
- Global Ocean Observing System
- Data, Information, and Monitoring Systems
- Biodiversity
- Strengthened International Mechanisms

These programs are to be designed as a catalyst to stimulate governments, scientists, and international organizations. Financial contributions by NOAA can also be leveraged to obtain resources of AID, EPA, and others, trading on the emerging recognition of the need for U.S. interagency cooperation and commitment.

EXPECTED BENEFITS FOR THE NATION

The commitments of UNCED are a national responsibility; they also provide us with opportunities. Building global capabilities to understand and predict environmental changes will enhance our own capacity to do so. More fundamentally, an understanding of our regional environment and predictive capabilities for our nation require global data; global cooperation thus enhances our national posture while fostering environmental quality globally.

Advanced understanding of regional and global processes and the effects of human activities are the essential underpinnings of wise stewardship. Training and technology cooperation with other nations will create a demand for U.S. products and services as they build their ability to use advanced technology.

Finally, U.S. national security will be enhanced by the adoption of sustainable development practices which will lead to economic growth, consistent with natural resource constraints. Sustainable development will increase the likelihood of adoption of democratic institutions. Global cooperation will spur new formal regional and global environmental agreements. This in turn should reduce regional tensions and enable further reductions in the U.S. military budget.

INFRASTRUCTURE PORTFOLIO

KEY PROGRAM ELEMENTS

NOAA's vision for the 21st century requires investment in the infrastructure to enable the agency to carry out its programs efficiently, effectively, and reliably. In addition to the correcting deficiencies in the current support base for administrative services, the following investments are needed:

- **Fleet Replacement and Modernization.** This 15-year capital investment program is designed to replace and modernize NOAA's research and charting

INFRASTRUCTURE REQUIREMENTS

- **Environmental Compliance.** This program will upgrade NOAA's facilities to safe, healthful, and energy efficient standards and meet environmental compliance requirements.

EXPECTED BENEFITS

From NOAA's investments in these areas, there are significant benefits including: data collection vital to the health and economic well-being of the Nation in order to manage fisheries stocks, predict short and long-term climate changes in order to allow for safe marine commerce; stimulate the economy in terms of the U.S. shipbuilding industrial base; assurance that NOAA facilities are in legal compliance with environmental, occupational health and safety regulations and that NOAA facilities are in full support of NOAA program missions, and reduction in operating costs due to use of energy efficient equipment and buildings.

FLEET INFRASTRUCTURE PORTFOLIO

KEY PROGRAM ELEMENTS

NOAA's vision for the 21st century requires investment in the infrastructure to enable the agency to carry out its programs efficiently, effectively, and reliably. In addition to the correcting deficiencies in the current support base for administrative services, the following investments are needed:

- **Fleet Replacement and Modernization.** This 15-year capital investment program is designed to replace and modernize NOAA's research and charting fleet to meet critical data collection requirements.
- **Environmental Compliance.** This program will upgrade NOAA's facilities to safe, healthful, and energy efficient standards and meet environmental compliance requirements.

EXPECTED BENEFITS

From NOAA's investments in these areas, there are significant benefits including: data collection vital to the health and economic well being of the Nation in order to manage fisheries stocks, predict short and long-term climate changes to allow for safe marine commerce; stimulate the economy in terms of the U.S. shipbuilding industrial base; assurance that NOAA facilities are in legal compliance with environmental, occupational health and safety regulations and that NOAA facilities are in full support of NOAA program missions, and reduction in operating costs due to use of energy efficient equipment and buildings.

FLEET REPLACEMENT AND MODERNIZATION

THE PROBLEM

The majority of ships in the NOAA fleet are rapidly approaching the maximum age for cost effective and productive operations. Prevailing practice within the marine community uses a major service-life extension of ships after 15 years of operation, and replacement after 30 years. Most U.S. and foreign ship operators follow this practice. In contrast, the current NOAA fleet will average nearly 30 years of age by the year 1995.

None of NOAA's ships have received a major service-life extension and only six have received partial midlife rehabilitation. These ships are experiencing increasing levels of downtime because of equipment failures caused by age and the scarce availability of replacement parts. If NOAA takes no action to ensure the future capability of its fleet, there is a strong possibility that the agency will have no serviceable ships by the year 2000. The impact on NOAA programs will be significant.

Of equal concern is the fact that NOAA ships cannot fully meet current mission requirements. Virtually all NOAA ships were built with the technology of the 1960's to satisfy specific objectives of that era. Since then there has been a dramatic evolution in methods for collecting and analyzing survey, fisheries, and oceanographic data. Acquisition and analysis of these data place demands on ships that often cannot be met by the present generation of NOAA ships. This problem is not unique to NOAA ships but is characteristic of any ship built 2 to 3 decades ago that has not had the benefit of a modernization program.

NOAA completed an Ocean Fleet Modernization Study in October 1990, that included participants from several federal agencies, academia, and the private sector. The goal of the study was to state clearly the ocean mission of NOAA in its three areas of responsibility and to determine the capability and size of a modern fleet necessary to carry out these missions. This study recommends that fleet modernization should be an urgent, NOAA-wide priority, and that NOAA should implement a long-term, cost-effective fleet modernization strategy. The study further recommends the modernization and replacement of the NOAA fleet should become a national priority and that information for decision-making on environmental matters must be based on sound research and survey data as acquired by NOAA's research vessels.

Based on this study, a Fleet Replacement and Modernization Plan was completed in March 1991, and updated in September 1991. This Plan identified mission requirements and the fleet mix and ship capabilities necessary to meet those requirements. The Plan also reviewed options for providing ship support, assessed costs, benefits and risks of various alternatives, considered future fleet operation and management issues, and provided fleet replacement and modernization implementation activities and schedules. A more concise and updated program plan was completed in July 1992, and is currently being revised. NOAA's ocean-oriented mission requirements must be accomplished on ships configured to provide the

necessary end products in an efficient manner. Ships which are appropriately designed, equipped and outfitted are critical to providing the observations, detailed studies, and information required to accomplish NOAA's mission.

RELATIONSHIP/CONTRIBUTION TO NOAA INITIATIVES

NOAA has unique responsibilities to improve understanding of the coastal and global oceans through research, assessment, surveying, and long-term monitoring. To accomplish its ocean missions, NOAA's efforts focus upon three major activities: mapping and charting, assessment of living marine resources, and oceanographic research and monitoring. These missions respond to statutory requirements for managing fisheries stocks, providing nautical charts for safe marine commerce, and conducting research to understand global environmental issues such as global warming and preservation of the coastal ocean. These missions require the collection of data from areas that extend from the inshore regions of the Continental United States including estuaries and the Great Lakes, to the far reaches of the world's oceans.

The modern fleet will be able to meet the increasing demands being placed on NOAA by legislation and ocean programs such as the Magnuson Fishery Conservation and Management Act, the Marine Mammal Protection Act, the Exclusive Economic Zone Proclamation, the Climate and Global Change research effort, and the Coastal Zone Program.

PROGRAM ELEMENTS

This program will replace and modernize the fleet using today's technology for both the ships and data collection instrumentation. The effort will continue the 15 year program begun through a FY 1992 appropriation. The program will build to a 6,240 days-at-sea annual capability and will include:

- Critical and routine maintenance;
- Defining detailed ship and mission equipment requirements for future ships;
- Performing RTE on selected NOAA ships;
- Preparing designs and specifications for future ship actions;
- Construction or lease of new ships;
- Converting excess Navy T-AGOS ships to meet NOAA's needs;
- Defining requirements and specifications for construction of small boats;
- Developing existing technology to meet NOAA's operational needs.

The primary objective of the Fleet Replacement and Modernization Program is to revitalize the fleet using a multi-phased approach through routine and critical maintenance for existing ships, repairs-to-extend (RTE) the lives of existing ships, conversions of existing vessels to meet mission needs, and the construction of new vessels including small boats. Critical maintenance includes repair, upgrades, replacement and modifications of ship systems, subsystems and equipment. Critical maintenance is less comprehensive than repairs to extend, but will improve a ship's condition to allow safe and effective operation to meet mission requirements until it is replaced or an RTE is performed. These items are generally required because maintenance was deferred in previous years due to insufficient resources. The RTE portion of the program will repair and modernize selected existing NOAA vessels. RTE is not intended to be a complete rehabilitation of these ships, rather to do only what is necessary for these ships to perform their mission reliably until a replacement ship is operational.

To further enhance this approach, NOAA has pursued two other avenues of acquiring modern vessels, namely the acquisition of surplus T-AGOS type vessels from the U.S. Navy and the planned acquisition of an AGOR type vessel as an option under an existing 3 ship Navy contract. Conceptual studies of the T-AGOS vessels have shown that when properly converted these ships can meet selected NOAA missions. Further investigations are being conducted to determine if other ocean-oriented missions areas could be adequately supported with converted T-AGOS ships.

EXPECTED BENEFITS

The modernized NOAA fleet of ships will provide data vital to the health and economic well being of the nation. These data will be used to manage fisheries stocks, predict short and long-term climate changes and allow for safe marine commerce. Also, the program will provide shipyard jobs and help maintain the U.S. shipbuilding industrial base.

RELATIONSHIP/CONTRIBUTION TO NOAA MISSIONS

The basic premise of this initiative is that NOAA's budget and the shipbuilding industry are in operations with significant savings. In addition, it is necessary to address agency construction needs. New construction projects will reduce the backlog to about 10% of the overall agency requirements.

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ENVIRONMENTAL COMPLIANCE

THE PROBLEM

NOAA occupies an extensive and widespread inventory of 443 staffed facilities in every state and territory. More than 1000 buildings at these facilities house a startling variety of activity from remote observatories to urban office buildings to ubiquitous Weather Service offices. Perhaps pre-eminent in this inventory is the network of 39 highly specialized laboratories. The buildings at NOAA's 91 owned installations now have a median age of over 30 years, but are in a spectrum of conditions ranging from new and well-maintained to wooden, former military structures exposed to salt water environments and deteriorating from long-deferred maintenance. The challenge here is to assure that these facilities are in the right condition configuration, and location to support fully NOAA's missions. However, achieving this objective is hampered by the ability to take care of only the most pressing problems of deteriorated buildings, deferred maintenance, safety hazards and environmental threats with the limited resources available. Because of limited resources, there necessarily has been an ad hoc, reactive approach to repairs, major replacements, environmental and safety concerns and new construction. Recent building failures have threatened facility missions.

Cleanup of major environmental problems at various NOAA sites is a major priority. While there are not a large number of such contaminated locations, each requires intensive attention. Of paramount and immediate importance is the immediate need to ensure cleanup of many sites in the Pribilof Islands in Alaska, formerly administered by NOAA and its predecessor agencies. The project is likely to be very expensive (probably well over \$100 million) and take a decade to resolve.

NOAA operates with energy-inefficient buildings and equipment. Since bulk of life-cycle costs of building are in operations rather than construction, reducing utility costs can effect large long-term savings. In addition, a mechanism is needed to assess agency construction needs. New construction projects often reflect the ability to attract Congressional interest, rather than overall agency requirements.

RELATIONSHIP/CONTRIBUTION TO NOAA INITIATIVES

The basic premise of this initiative is that NOAA's headquarters and field installations represent major agency assets without which its missions could not be accomplished. Furthermore, how well NOAA performs those missions will depend in large part upon how well its facilities support agency program activities. Therefore, it is in NOAA's best overall interests to insure that, in administering its physical infrastructure, the agency strives toward providing facilities to NOAA units that are safe and healthful, in compliance with all applicable laws and regulations, efficient, in proper repair, and fully supportive of the completion of agency missions.

The achievement of these objectives are absolutely critical to providing continued facilities support for all agency initiatives. To keep NOAA and its program initiatives at the forefront of scientific and technological advancement requires providing facilities which themselves are state-of-the art. Furthermore, failure to provide facilities which are safe, healthful and legally in compliance, can only divert attention and funds from the true missions of NOAA.

PROGRAM ELEMENTS

Facility Repair and Renovations. NOAA proposes a comprehensive facility program that supports vital NOAA programs. This involves major repairs aimed at resolving life/safety threats, continued program of Facility Condition Surveys and promoting installation of energy-efficient equipment and building components. There will be an evolution into steady-state where only regular maintenance and replacements are needed on a scheduled basis.

Environmental Compliance. First, this involves an institutionalized program to ensure legal compliance and support identification, cleanup and prevention of facility environmental problems. Second, a major Environmental Cleanup of the Pribilof Islands is required with with 60 sites identified. Work under way, and the long term effort is designed to complete cleanup and remove NOAA from further involvement. Another component is a Safety Program to improve policy development and oversight of safety field operations to assure proper inspection of NOAA facilities and correction of deficiencies.

New Construction. NOAA requires new facilities at Boulder, Seattle, Juneau, Monterey, Narragansett and Washington for NOAA units with changing program missions, for consolidations to reduce costs and improve program efficiency, and to improve operating conditions.

The FY 1995 Facilities Initiative includes all items in the Construction Account except for those supporting NWS Modernization.

EXPECTED BENEFITS

The benefits of a well-designed facilities program will provide many long term benefits. It provides assurance that NOAA facilities are in legal compliance with all environmental and occupational health and safety regulations and that NOAA facilities are in full support of NOAA program missions. There will be long-term reduction in operating costs due to use of energy-efficient equipment and buildings as well as long-term reduction in repair and replacement costs. Long-term planning and scheduling of facilities maintenance and major equipment replacement will be done, thus avoiding catastrophic, life- or mission-threatening failures.

However, undertaking a program such as this will achieve some significant short-term benefits, as well. It will correct life/safety hazards, replace deteriorated building components and systems, and cleanup obvious environmental insults. We can better accommodate shifting agency missions, utilize space efficiently, and replace severely deteriorated or

outmoded facilities with new, high priority structures or additions. It should be noted that virtually all of the work undertaken in the facilities initiative will be accomplished through contracts, which in addition to providing the above social and economic benefits and provision of a physical asset, will provide substantial numbers of jobs in the construction and related fields.