symposium on coastal zone management

the university of west florida

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foreword

The coastal areas have always been a source of sustenance for the human community. They have provided food, freedom of movement and aesthetic satisfaction as well as ingress to the great land masses of the world. They have also been a force of uncontrollable natural power which has often devastated human settlements.

The magnitude of the mutual impact of the coastal zone and the human community, while great in the past, is increasing rapidly. Energy demands argue for more offshore oil production. Populations require more food, recreation and services as cities disgorge increasing amounts of residential and industrial waste into the coastal areas. Never before have so many overlapping, and often conflicting, demands been placed on the coastal zones. Regularly the complex and powerful forces of the sea and weather demonstrate the dynamic nature of the coastal areas. Often these forces are in direct conflict with human demands for resources and stability.

The management of the coastal zones is becoming an activity of great human concern. In a very real sense, however, the management of the coastal zones is a reflection of the human communities' ability to manage itself. The effort on the part of the human community to meet the challenge of management has varied both in form and success. In the United States this effort has involved the activities of federal, state and local governments as well as private interest and industry. Sometimes this effort has been creative and effective; often it has been plagued by an appalling lack of communications and planning.

It is our hope that this symposium has highlighted some of the more difficult problems facing the management process at various levels of government. We further hope that by highlighting these problems we have encouraged the development of creative and balanced management of the coastal zone in the United States.

LUTHER W. SKELTON
Editor

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Symposium on Coastal Zone Management
The University of West Florida

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3:30 - 4:00	Panel Discussions (Questions from Floor)
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4:30 - 5:30	Light Dinner

introduction

The symposium was divided into four very general discussion topics and there were three presentations in each group. In most cases, the presentations were formally prepared papers. Following each group of presentations was an open discussion during which the entire symposium was invited to participate.

The first group of presentations focused on aspects of coastal mobility and management. We were fortunate to have had Dr. William F. Tanner of the Department of Geology at Florida State University lead off our program with his presentation on beach mobility. Arthur J. Butt of the Florida Department of Environmental Regulations elaborated the topic in excellent detail and David Worley of the Florida State Bureau of Coastal Zone Planning described some of the complex techniques which are used to evaluate and plan coastal zone activity.

The second group of presentations dealt with the administration in the coastal zone. John G. Cowley, head of the Santa Rosa Island Authority, began this section. Mr. Cowley represented the position of the Florida Shore and Beach Preservation Association in his presentation. He was followed by George W. Allen of the U. S. Army Corps of Engineers who discussed the Corps' role in Coastal Zone Management. Mike Applegate of the Florida Department of Environmental Regulations represented aspects of State-level administration.

The third section of the program centered on planning and was introduced by Patrick W. Ryan, Director of the Louisiana State Planning Office. Mr. Ryan discussed the development of the Coastal Zone Planning effort in Louisiana. He was followed by Daniel Penton from the Florida Bureau of Coastal Zone Planning who discussed Coastal Zone Planning in Florida. John Hall, Area Supervisor of the National Fisheries Service completed this section with a discussion of coastal resource management and conservation.

The final section of the symposium was devoted to Coastal Resource Management, particularly offshore oil. Dr. Jerry D. Ham, began this section. Dr. Ham is Assistant Director for Oil and Gas in ERDA's Fossil Energy Program. Following Dr. Ham's discussion was a presentation by Dr. Sneed Collard of the Faculty of Biology at the University of West Florida. Dr. Collard discussed some of the problems associated with offshore oil production. The last presentation in this section was presented by Dr. Luther Skelton who is the Coordinator of the Coastal Zone Management Program at the University of West Florida. Dr. Skelton discussed policy strategies for offshore oil.

We have attempted to reproduce the discussions which follow each of these sections as accurately as possible. In some cases, it has been necessary to shorten and /or clarify some of the discussion, but in all cases we have tried to protect the essential meaning.

Finally, a word must be said concerning the selection of symposium participants. Every attempt was made to secure the participation of both practicing administrators and academicians. We feel that the communication linkages developed out of their dual participation has been of great value and should be encouraged, where appropriate and possible, in other major discussions of natural resource and environmental policy.

coastal mobility

Coastal mobility refers to the actual motion of the coast itself. The first group of papers and the ensuing discussion considers this mobility and its effects upon the environment, coastal development planning and management.

Dr. Tanner, in the first presentation describes very clearly some geological reasons for coastal mobility. He concentrates on beach mobility and outlines a range of management options for beach erosion. Neither the management options nor the process itself can reasonably be ignored by the responsible planner.

Arthur Butt concentrates on the estuarine shoreline, that area along a coast where the mutual effects of river currents and tides are most pronounced. Mr. Butt defines clearly a very difficult value conflict between coastal development interests and commercial fishing interests with regard to the estuarines. He discusses this conflict with regard to Escambia Bay.

David Worley discusses the use of remote sensing in Coastal Zone Planning. He outlines how this technology has been instrumental in forming the base line data for the Coastal Zone Plan in Florida and how it has been used as an environmental sensor. Of importance in this regard has been the application of color water-penetration imagery to aid in analysing adversely affected health of coral in the environmentally critical coral reefs.

The discussion surrounding this section of the symposium focused on beach erosion, which perhaps indicates how important this issue is to economic and environmental interests alike. Much concern was expressed over the techniques available for mitigating or reversing erosion and the long range effects of these techniques. Of particular interest seemed the discussion of the replacement of sand on beaches which have eroded. This process occurs naturally as a result of unrestricted river flow but is interrupted as a result of damming because sand which would ordinarily replenish eroded beaches is trapped in inland reservoirs.

William F. Tanner
Geology Department, Florida State University

"Our Mobile Coast"

Introduction

The coastline is not a fixed line; in most places, it moves in a complicated fashion. For the last few decades this movement has been visible as coastal erosion. During times of severe storms, such as hurricanes, this movement can be spectacular.

However, coastal erosion is not the only process at work. There are three main groups of processes which provide that the coastline will not be fixed in space and time. Coastal zone management must be predicated on at least a general understanding of these processes, and how they affect the shore.

The three groups of processes are (1) sea level changes, (2) land level changes (uplift and depression), and (3) coastal erosion and deposition.

Sea Level Changes

The surface of the world -- although certainly not "level" in the popular sense -- tends to maintain a constant surface shape. This shape is a reflection, among other things, of the shape of the basin which holds the ocean waters. Sediment delivered to that basin, such as the material carried by the Mississippi River, has the long-term effect of reducing the volume within the basin, and therefore of raising sea level. This effect, by itself, is extremely important geologically, but operates at such a slow rate that any one person would not see any alteration of the shore line in his life time.

Tectonic movements within the solid earth, such as those responsible for mountain-making, also reshape the ocean basin, from time to time, thereby modifying its volume and hence the position of sea level. The magnitude and rate of this process are not known very well, but apparently are relatively small and slow, and should not provide for profound changes in sea level within the life time of any one individual.

Much more important than sedimentation and tectonics is the growth and melting of the great ice sheets which have characterized the surface of the planet for the last few millions of years. Two of these ice caps still exist today: one in Antarctica, and the other in Greenland. Two more, which were fully developed as recently as 20,000 years ago, were located in North America and Europe. The European and Canadian ice sheets have now melted, but it is quite likely that they will return again, in view of the fact that the most recent melting was only one event in a long sequence.

The total fluctuation of sea level, in response to changes in the ice cover, has been roughly 200 meters, up and down. That is, if the two remaining ice caps were to melt, sea level would rise by roughly 70 meters (about 220 feet), and if the other two ice caps were to return, sea level would drop by approximately 130 meters (about 400 feet). The second possibility (sea level drop) is much more likely than the first (sea level rise): the two existing ice caps have not melted for the last few millions of years, but the other two ice sheets melt and then grow again at much more frequent intervals.

The last big melting started a little after 20,000 years ago, and was more-or-less complete at about 5,000 or perhaps 6,000 years ago. During this part of earth history, tremendous quantities of meltwater poured into the oceans, raising MSL* roughly 130 meters in a little more than 13,000 years. This is an average rise of one centimeter per year. Such a rise would mean a horizontal movement of the shoreline of 2.29 m/year, on a slope of 0°15', or a horizontal movement of 4.58 m/yr, on a slope of o°7.5', which are rather common slope values. It is likely, however, that at times the rise of MSL was even faster, but the maximum value is not known.

*Mean Sea Level

For the last 5,000 years, MSL has been almost stable, with fluctuations of two to four meters. These fluctuations were in the larger part of the range during the first half of the interval, and have been smaller in the second half. During the first half of the present century, MSL rose a small amount, but that rise appears to have stopped. It would not be economically wise, with present knowledge, to base our plans on the possibility of future large changes in MSL, although such changes are certainly in store for us, perhaps centuries or even millenia in the future.

As sea level rises, and large water masses are placed on the edges of the continents, increased weights are added to continental rocks. The latter adjust downward under this weight, and the result is another change in the shape of the ocean basin. Changes in this category may account for one or more of the fluctations of MSL during the most recent 5,000 years.

Land Level Changes

The rock masses which make up our continents are, geologically, constantly moving. Such movements may be very rapid, by geological standards (perhaps 5 or more centimeters per year), or very slow. By human standards, uplift and depression are relatively slow. Such movements of the rock basement may be spectacular at times of major earthquakes, when displacements of a meter or more may be observed in a few seconds. Japan, the Andes Mountains of South American, and the West Coast of North America have been subjected to such movements for a long time, mostly upward. Therefore it is not surprising that old shorelines can be identified, in these areas, hundreds of meters above present MSL. As in the case of water level rise due to melting of ice, a rise of one centimeter in one year, on a slope of 1/8 of a degree, means a horizontal translation of the shoreline -- seaward -- by more than 4 meters.

Every uplift of this kind must be countered by a downwarp of some kind, some where -- perhaps under the ocean surface, thereby changing the shape of the ocean basin, and hence changing sea level. If the land movement is upward, the compensating movement must be downward, and if the latter occurs in the ocean, sea level will drop a small amount.

Not all vertical motions of the continents are upward, however. Some are downward, perhaps compensating for uplift elsewhere. The Mississippi River delta plain is located in an area of subsidence. At the moment, this downward adjustment appears to be due to the compaction of the tremendous volume of river sediment which has been deposited there, but land movements must also be considered, perhaps in the form of uplift in the headwaters of the Mississippi system, thereby providing for greater erosion, and hence more sediment to be dumped into the Gulf of Mexico.

The combination of downward adjustment due to loading, and downward adjustment due to compaction of sediments, produces the result that the shoreline in eastern Louisiana is now migrating landward. This migration is quite obvious in the Chandeleur Islands, where no one lives, less obvious in the delta country proper. Not only is the shoreline moving landward, but land areas behind the shore are sinking, which should be of considerable importance to the planner, especially in areas such as New Orleans.

Outside of the Mississippi River delta plain, most of the eastern half of the United States is, by-and-large, stable. There are relatively small up and down movements here and there, but they are typically only a fraction of a millimeter per year (at present), and hence should not be made the basis for short-range planning.

Geological history is filled with examples of changes in rates, and it is certainly conceivable that vertical movements in the eastern United States will be faster at some future date; there is now no rational basis for making any such predictions.

Erosion and Deposition

The changes reviewed up to this point are erratic and, in the eastern part of the United States, generally small at present (exception: Louisiana). Erosion of our beaches is quite a different matter.

Erosion and deposition are the two end effects for a single process: sediment transportation. Where a sand beach is marked by breaking waves sufficiently large to be of interest to tourists, one can be sure that the sand is geologically in motion. That is, the grains of sand which make up the beach in front of a given motel today are not the same grains of sand which were present in the same area 25 years earlier. Only if there are no breaking waves can one be reasonably sure that the sand is not in motion. "Zero energy" coasts are known, but they don't make popular tourist resorts.

Along most moving beaches, the motion is predominantly in one direction, although there may be excursions in other directions from time to time. It is common for beach sand to move the length of the beach (in one direction or the other), but transportation also occurs in the landward and/or seaward directions.

The quantity of sand moved, and the rate at which it moves, depend on the wave climate: wave height, wave period and wave approach direction. Small waves which approach head-on, or nearly so, move relatively little sand. Large waves, which approach at an angle, move a great deal of sand.

In the Mississippi-Alabama-Florida region, small waves approaching from the south provide for only small transport quantities and rates. Very large waves, approaching from the southeast, on the other hand, can do a tremendous amount of damage; this was the pattern during Hurrican Camille.

Excluding onshore and offshore transport for the moment, the beach can be though of as a giant conveyor belt, which runs primarily in one direction. Because we see only the sand, and one grain looks pretty much like any other grain, we do not ordinarily note that the conveyor belt is moving. But moving it is, and the effects can be catastrophic.

It must be kept in mind that this particular conveyor belt - along sandy shores -- never runs empty. This means that, as the system continues to operate, at least one of two actions will be required: either *new* sand is dumped onto the conveyor belt, in the source area, or sand will be obtained from the beach itself, to keep the belt fully loaded. When the latter happens, we say that the beach is eroding.

Somewhere there must be a deposit, where the conveyor belt track ends. At first glance it would appear that the amount eroded, along one part of the belt, will equal the amount deposited along another part. However, we must now recognize that onshore and offshore motions, at least at the present, represent losses to the system, and therefore that we can have serious erosion without compensating growth of land elsewhere.

This seems to be the situation today, throughout most of the world. Perhaps 70-80% of our coast is eroding, and part of the rest is stable. Only a small fraction is aggrading. Most of the sand, lost by erosion, is carried into deeper water, from which it is not being returned.

Erosion Rates

The preponderance of coastal erosion, over coastal growth, is our present "crisis of beach erosion." Where vertical movements of the land are rapid, this erosion may be offset, or perhaps -- as in Louisiana -- it will be compounded. In more-or-less stable area, however, beaches generally are retreating. The beach at Cape San Blas, on St. Joseph Peninsula, has been retreating at an average rate of

11.2 m per year since about 1875. This is more than one kilometer since the Civil War. The Cape San Blas lighthouse has had six different locations or potential locations, and at least two of these locations are now out in the Gulf of Mexico (one of the six was an error in judgment, which was rectified before construction was completed). The erosion rate from 1770 to 1870 was, apparently, about the same, and perhaps a bit faster. This is not a record rate, but may well be the fastest in the Florida Panhandle.

At other places in the Panhandle, erosion rates vary from "very small" (e.g., undetectable) to values greater than 1.0 m per year.

In one study of 135 km of open Gulf beaches in the Florida Panhandle, 34% of the total was judged to be more-or-less stable (erosion not more than 20 cm/yr), and 14% was aggrading. Outside of the so-called stable areas, the ratio between eroding and aggrading beaches was roughly 4-to-1 (km vs km). The deposition, however, took place in restricted localities, and generally did not involve seaward growth of the beach, but rather lengthening of spits and points.

Rates of erosion and deposition do not hold constant with time. Studies in three different areas, controlled by carbon-14 dates, show that deposition rates peaked more than 500 years ago, and that erosion has been replacing deposition subsequently. The shift from deposition to erosion has not been synchronous from place to place. In one study area (Pacific coast of Mexico), the deposition rate has been declining for more than 1,000 years; projections indicate that the shift to erosion will take place at some time perhaps 100 years into the future.

Causes of Erosion

Human activity is widely held to be responsible for beach erosion. It is, indeed, the culprit in some cases, but cannot be responsible for the pronounced recent erosion of the shores of the state of Rio Grande do Sul, in southern Brazil, for example, where the most permanent structure has been a grass hut.

Sea level rise is also widely blamed for beach erosion, or at least for coastal retreat. At times of marked rapid MSL rise, there must be retreat of the shoreline. However, MSL is essentially stable now, and has been for a few centuries, and hence cannot be responsible for the present beach erosion crisis.

Depression of the land surface may lead to beach retreat, as in Louisiana today, but cannot explain beach erosion in essentially stable areas.

A change in the wave climate, from lower energy levels to higher, may cause increased beach erosion, but at the moment we do not have enough data to state whether or not we now live in a time of more energetic waves, and we are certainly not able to predict such changes for the next 20 to 30 years.

The maturing of the sand-transport system may also be responsible for increased beach erosion. In this concept, erosion is something of a symptom of "beach senility." A more precise statement of this idea is founded on physical reasoning, as well as observation, but the "aging" analogy is adequate here. If this concept is correct, we can say that, in general, coastal erosion is going to grow more severe -- barring another major change in MSL.

The "a-b-c" Model

In this construct, the shoreline is divided into cells, or compartments, each of which is thought to act more-or-less independently of its neighbors. Wide inlets, river mouths, and major capes, among other features, commonly separate

adjacent cells.

Within any one cell, five critical points can be identified, designated "a" through "e." The point "a" is the drift divide, such as on a cape, which separates two cells. Erosion occurs throughout the "a" to "c" segment, with a maximum value at "b." All of the material eroded in the "a-b-c" segment passes the "c" point, except for sediment lost to the system (such as by being transported offshore). Deposition marks the "c-d-e" segment, with maximum deposition at the point "d." The end of the cell is located at "e" which is probably also the end of the adjacent cell; this dividing line commonly is found near bay heads.

The amount of erosion in the "a-b-c" segment should balance the amount of deposition in the "c-d-e" segment, except where there are losses and gains to the system (mostly losses, today). It is not always possible to get records suitable for confirming the balance, but fortunately in many instances depositional features in the "c-d-e" segment permit the investigator to make a statement about that balance. In general, such areas have passed from "excess of deposition" to "excess of erosion." That is, the "c" point has been shifting farther from "a" and toward "e."

Although the "a-b-c..." model cannot be applied to all coasts, it is extremely useful in many areas, particularly where barrier islands are present. By use of the model, based on a few historical data, one can project future erosion and deposition sites, and even make reasonable estimates as to rates.

Erosion Defense

There are several different ways of approaching the beach erosion problem. One is to ignore it, unaware that beach erosion is actually taking place, and considering the occasional destructive hurricane as an unusual event that probably won't be repeated. This is the prevalent attitude, but is hardly the basis for sound planning.

Another approach, very close to the first, is to acknowledge the problem, but to classify beach damage as an "act of God" and therefore simply one of the risks which people must run.

A third approach is to attempt to eliminate, or at least greatly reduce, the incident wave energy, thereby cutting the erosion problem down to manageable size. This may not be desirable from a tourist point of view (most tourists are not interested in wave-less beaches), but in any event is financially out of reach.

A fourth approach is to try to stop the transport of sand, usually by building a set of structures known as groynes. These may be temporarily successful, but generally create even worse problems along some other part of the beach.

A fifth procedure is to surrender the beach entirely, and to try to defend the adjacent city or town by building a sea wall. This has been the recourse in various places, such as Atlantic City, N.J., Jacksonville Beach, Fla., and Galveston, Texas. It is expensive, and it has the obvious disadvantage of permanently degrading the esthetic value of the coast.

A sixth method is to nourish the beach artificially. This requires dredging of suitable sand from some location where the dredging will not in itself be injurious, a point which has been missed in some previous studies. The volumes of sand needed are very large, commonly tens or hundreds of thousands of cubic meters, per year, for a few kilometers of beach. At present prices, this might mean as much as $1,000,000 per year for one strip of beach. Furthermore, in certain areas, adequate volumes of sand are not available within economic transport distance. Nevertheless, this is probably the most widely-favored method at the moment, especially by those who don't have to pay for it.

A seventh approach is to provide a buffer zone, located seaward of all construction, where the sand is considered to be expendable. If this zone is sufficiently wide, storm activity can be absorbed without appreciable damage to the

adjacent structures. The mechanism for establishing such a buffer zone is known as a "coastal set-back law." In theory it is a perfect solution, because the buffer zone can be made very wide (100 meters or more), and further it can be shifted landward from time to time, so that it never gets dangerously narrow. In practice, few legislatures or regulatory bodies wish to provide a meaningful width to the zone, because of the unpleasant choice which they then must face: either pay for the expensive land involved, or undertake to confiscate it without payment.

From one point of view, actual confiscation is not necessary; but if the land owner, who holds a water-front lot 70 meters deep, is told that no buildings may be erected within 100 meters of the beach, the result is, for all practical purposes, the same as confiscation.

It can be seen that none of the solutions are really attractive. All of them are expensive, either in terms of immediate monetary outlay, or in some other way. Nevertheless, along eroding coasts, erosion is -- with the present wave regime -- inexorable. Planners should be fully aware of this process, and should be doing everything they can to make the socio-economic impact as light as possible.

Arthur J. Butt
(and Michael Applegate)
Department of Environmental Regulation

Coastal Development Along Estuarine Shorelines

There are an estimated 17,000 to 20,000 miles of estuarine* shorelines along the Gulf Coast of the United States. In Florida alone, there are over 8,000 miles of tidal coastlines, more than any other of the 48 contiguous states (Collier, 1975). In recent years, the monetary value of Florida's shorelines has increased rapidly and continues to do so as a consequence of population increases of 5,000 people a day. As a result, various special interest groups are competing for the right to develop or otherwise use the dwindling stretches of undeveloped shore to accommodate this growth. Aside from the ecocatastrophies caused by Soil Conservation guttering of all of the meandering streams that are too little for the larger regulatory agencies to bother with, the DOT** has an allegiance to rectalinear surveying; the private land developers and non-developers have cut up coastlines and swamps on paper to sell to starry-eyed private investors who hope to win a piece of Paradise by speculating in land. The purpose of this talk is to present the mystique and demise misfortunes of waterfront development along the Gulf Coast, and the impact such development has upon our natural resources. It is hoped that some light may be shed upon the status of presently undeveloped shorelines before they succumb to the rigid and unnatural contours of subdivision plots.

There are two general shoreline types along the estuarine systems of the northern Gulf Coast; open and exposed beaches characterized by shallow sand flats and inland sheltered estuaries characterized by vegetated shorelines. The former shorelines are normally located along open bays and sounds and respond strongly to the forces of wind, waves, currents and tides. Shore types in the areas correspond to: sand and clay banks, typically one-five feet or higher, scarps in excess of five feet, or sandy berm fringes overlying peat soil along low flat uplands or lower smooth cordgrass and black needlerush marshes. These shore types may suffer beach losses in excess of 20 feet per year; however, greater losses can occur as a result of a single hurricane. Hurrican Eloise of last September resulted in a loss of 360,000 to 400,000 cubic yards of low, bluff lined sand along only a few miles of protected beach. Average shore erosion, however, is approximately two to three feet each year.

The inland sheltered shorelines are of three general types; one-five foot sandy banks, grass marshes bermed as described above, or open marshes. The latter constitutes the major type. Erosion occurs in these areas, however, it is limited to moderate losses of two-three feet per year, and usually along exposed shorelines only.

It should not be understood that shoreline erosion is a rule rather than an exception. Where existing shorelines are subject to erosion or are otherwise unsuitable in their existing conditions, the shore has been stabilized by construction of seawalls, or bulkheads. As the value of waterfront land increases, the protection of the shoreline becomes proportionately more important.

Presently, the bulkhead line for the state is the mean high water line, except when land loss is excessive and involves "artificially induced erosion" over a short period of time. In such cases, shore reclamation can be accomplished. This type of shore protection, however, is often exploited by waterfront property owners in order to "improve" their property by filling a marsh or expand their real estate seaward. As a result, extensive wetlands have been destroyed or rendered less productive.

Another major objective of coastal zone construction is to check or impede existing erosion conditions. These shore protections typically protect only the land directly behind them and represent a hidden cost burden to the owner, for it

*A water passage where the tide meets a river current.
**DOT--Department of Transportation

may cost as much as $1,000 to protect just 50 feet of waterfront. If the seawall is not built properly with wingwalls and other protective features (e.g. rip-rap, tie backs, dead men, back fill, etc.) the structure may last only a short time, resulting in financial loss. To shortcut ever increasing prices, about one-third of the walls are improperly built and last from only six months to three years. Usually, such structures aggravate the erosion problem along natural or "unprotected" beaches. Once one protective measure has been taken to stabilize the lot, it neccessitates continued shore protection measures in a domino effect until the whole shoreline has to be bulkheaded. The exposed sand-clay banks supply the bulk of sand for the stretches of beach within the estuaries. As more of the beaches are bulkheaded, more and more of the source material for sand beaches is cut off resulting in the loss of the water-upland interfact--the intertidal zone. As a result, property owners lose that magical stretch of white beach they invested in, experience unexpected hidden costs of continual wall maintenance, and the public loses that shoreline guaranteed to them under the state constitution.

Barrier islands characterize much of the southern Atlantic and Gulf state shorelines. Along Florida and most of the other Gulf states these islands are typically long, thin stips of white beaches that separate river waters from open oceanic waters. This mixing zone is one of the most productive areas in the aquatic environment. Tidal marshes fringe much of the coasts, and submerged vegetation blankets much of the clear, shallow-water bottoms. Southern Florida has dense mangrove swamps with the more northern coastlines consisting of black rush and smooth cordgrass marshes. The submerged vegetation consists primarily of turtle grass, widgeon grass and cuban schoalweed in higher salinity waters, and tape grass in freshr schoalweed in higher salinity waters, and tape grass in fresher waters. Such grasses thrive in clear waters as found in the sounds, bays, and bayous behind the protective barrier islands.

It is estimated that 90 percent of the total harvest of seafood comes from continental shelf fisheries, and two-thirds of the species involved depend on estuaries for their existence. This value is even higher in the Gulf of Mexico for the standing crop of zooplankton (a primary constituant of the food chain) and is second only to that of Peru (Austin and Jones, 1974). Ninety percent of the commercial catch in the Gulf is made up of fish and shellfish which spend some part of their life in these estuarine waters (Thompson, 1967; Gunter, 1967).

The chief fisheries of the Gulf are: menhaden, mullet, flounder, croaker, seatrout, oysters, blue crabs, stone crabs, and shrimp. Shrimp are the most important species landed along the coast. Most of these animals enter the lower salinity nursery grounds to develop and escape predation from more salinity-tolerant predators.

The State has recognized the importance of these waters as necessary to maintain a balanced system for the continued propagation and management of fish and wildlife. Florida has established water classification types ranging from public water supplies (Class I) to waters used for utility and industrial usage (Class V). This classification, however, has failed to stop continued degradation of our coastal waters. For example, Class II waters for shellfish harvesting are degrading to Class III waters (recreational and resource management) and these to Class IV for agricultural and industrial supply. Escambia Bay is a good example to study. Industrialization and growth have resulted in the destruction of one of the most significant estuaries along the northern Gulf states. All of the 1500 acres of submerged grasses that once supported well-balanced fisheries have been destroyed (McNulty, *et al* 1972). The Florida Game and Fresh Water Fish Commission iin 1970 estimated a decrease in fishing value in the bay of 80 percent since 1952. Over the past six years, the bay has suffered mass mortalities of fish and shellfish and now the production of shrimp and oysters is almost zero as compared to production in the 1950's. Escambia Bay is not

atypical in its growth; on the contrary, it represents a general pattern that is occurring all along the Gulf Coast, particularly, in the now productive estuaries of Mississippi, Louisiana, and Texas.

Relative to the United States, Florida's commercial marine landings in 1972 ranked seventh among the same over the past 20 years; however, the average price is twice the average U. S. PRICE (Prochaska, 1976). Pensacola fishermen must now travel to Louisiana or as far as Yucatan to catch much of the tonnage that they once collected in these bays.

The inshore bays and bayous have become developed or are rapidly undergoing present modifications, as discussed above. As a result, aquatic production in many of these areas has declined. Many of the largest remaining nursery grounds are now located in the lower bayous and sound waters just inside barrier islands. As land increases in value, new and viable real estate resources are being sought for the ever growing population. The barrier islands with their white beaches, clear and quiet sounds, and close proximity to Gulf waters makes them very attractive to development.

As development encroaches along the coastal plains and wetlands, upland clearing and drainage of lowlands occurs to facilitate development of otherwise "useless" land. The result is a lower water table and increased runoff into the estuarine systems. As exemplified in Santa Rosa Sound, there has been a general lowering of the salinity followed by a general reduction in water quality. We are destroying what we moved here to enjoy.

With the development of coastal areas and specifically barrier islands, people look for ways to improve their original designs. To facilitate the fast growing sport of deep sea fishing, new and quicker means of access to and channelization across barrier islands allows quicker access to deeper waters.

What do such activities change in an aquatic environment? Dead-end canals typically result in stagnant or slow circulating pools, resulting in poorer water conditions. The systems must be maintenance-dredged at increased expense. As local water conditions deteriorate, channelization across islands is thought to help flush the bays and sounds. When dug, such canals result in higher salinities and greater saltwater intrusions. Between freshwater runoff and increased salinity introduction, the estuarine system must now cope with rapid fluctuating stresses establishing conditions for "anastrophes" or mass mortalities of aquatic life. Stresses that were once seasonal are maintained year round. Continued stressful conditions tend to lower an animal's resistance to diseases. This is typified by the presence of "fin rot" on fishes associated with polluted waters and an increased incidence of parasitism.

We now have laws to prevent the destruction of entire estaurine systems, and our presentation was not intended to be a preservationists'plea. We note in closing, however, that the laws are effective only when they are enforced without consideration for special interest groups. To date, this has not been the case.

Conclusions and Recommendations:

Water-front property can be expected to experience continued development. Detailed shoreline analyses for each coastal county should be made. Vegetated fringes, sandy berms, swamp forests, resistant clay bluffs and peat marshlands all function as natural barriers to shoreline erosion. Such areas should be designated areas of environmental concern. Most of these areas are well within flood-prone areas or transitional zones, and developmental reviews by both state and federal agencies should be critical. In areas where shoreline protection or natural erosion barriers prove unsuccessful or are unfeasible due to ecological or economic conditions, setback regulations may

provide the only solution. Such setbacks are generally unpopular due to the obvious reasons of condemnation or "grandfather" rulings. The alternative is unacceptable ecological, economic and visual chaos, as each property owner does as he pleases without regard to the effect it may have on adjacent or downshore property. Natural beach segments must be planned as units rather than as individual disasters. In areas where shoreline protection measures are essential, building codes should be established to maximize the efficiency and longevity of protective structures and to prevent the present exploitation of unknowing property owners.

As long as there is coastal development in and near wetlands, there will be local degradation of water conditions. Therefore, certain precautions can be made to minimize the impact and allow the aquatic environment more time to adjust. "Green belts" should be implemented to reduce sedimentation along natural drainage patterns or newly constructed ditches. More productive waters with submerged grasses need to be classified as areas of environmental significance. Not only are these nursery grounds sources for today's resources, but they must also serve as such for our children, and theirs. The state needs to reevaluate the water classification as presented in Chapter 17-3 FAC. Reclassification of water bodies will help assess statewide water changes. Our nursery grounds are rapidly dwindling with the advancing forces of man's alterations. Soon, we will have to make a decision: surrender our fisheries to ultimate shore development, or preserve that which remains in hopes of maintaining our natural resources. The latter is our constitutional right in Florida and surely is in the public interest.

David R. Worley
Technical Services Administration
Bureau of Coastal Zone Planning
State of Florida

Remote Sensing Application As Utilized In Florida's Coastal Zone Management Program

Introduction

The Florida Coastal Coordinating Council (FCCC)* was established by the Florida Legislature in 1970 (Florida Statutes 370.0211) to carry out the following primary charges:

(1) To, "... develop a comprehensive state plan for the protection, development and zoning of the coastal zone, making maximum use of any federal funding for this purpose."
(2) To, "... conduct, direct, encourage, coordinate, and organize a continuous program of research into problems relating to the coastal zone."
(3) To, "... review upon request, all plans and activities pertinent to the coastal zone and to provide coordination in these activities among the various levels of government and areas of the state."
(4) To, "... provide a clearing service for coastal zone matters by collecting, processing and disseminating pertinent information relating thereto."

. Mindful of these legislative charges, the staff of the Coastal Coordinating Council recognized the necessity for a planning/management methodology that would illustrate the need for a flexible coastal management plan and provide a basis for a multiple range of data input. The first task was to define the State's coastal zone and then develop a planning/management process for that area. Lengthy research revealed that the most practical method for defining the coastal zone is to use physical features in combination with boundaries of areas for which socio-economic data is readily available. On this basis, it was decided to use physical characteristics selected on the basis of terrestrial areas influencing the adjacent waters in combination with boundaries of selected Census Enumeration Districts. Physical characteristics involve defining an area by such factors as drainage basins, coastal swamps and coastal marshes, selected fresh-water swamps and marshes, flood zones, etc. Defined in this way, Florida's coastal zone has an inland boundary varying from two to twenty-five miles from the coastline, with the seaward boundary being the limit of Florida's territorial sea.

Within this coastal zone, the Council staff has proposed a state zoning system for land and water areas which recognizes three basis categories of management areas:

Preservation (no further development)
Conservation (limited development permitted)
Development (suitable for intensive development)

Preservation areas would protect ecologic units of sensitive flora and fauna as well as areas of dunes, marshes, swamps. Conservation areas would include those lands with soils and topography suitable (or suitable with minor corrections) for intensive development.

Areas throughout the coastal zone have been designated one of these three zoning categories by the FCCC after consideration of the following eight factors:

(1) Soils suitability of the area.
(2) Ecological significance of the area.
(3) Susceptibility of the area to flooding, both from runoff and hurricane-driven tides.
(4) Historical and archaeological significance of the area.
(5) Unique features that may warrant protection.
(6) Water quality standards.
(7) Present land cover and/or use.

*The Florida Coastal Coordinating Council is now the Bureau of Coastal Zone Planning, Florida Department of Natural Resources.

(8) Geological factors to the extent possible with existing information.

There are twenty-nine subcategories that constitute coastal phenomena within the FCCC zoning categories. Many of these subcategories are considered representative of coastal phenomena essential to Florida's coastal environment, such as: freshwater marshes and swamps, saltwater marshes and swamps, marine grass beds, beach and dune systems and buffer zones such as adjacent woodland-upland areas to the wetland-marine systems. The proper management of such coastal phenomena has become critical in Florida as pressure on these coastal resources has continued to grow with increased population, wealth, mobility and leisure time.

To date, only the photographic remote sensors have been utilized in support of FCCC planning/management methodology. To illustrate how these sensors have been utilized the following products are described reflecting their use on the broad application format to and including specific application as needed for data support requirements.

The Florida Coastal Zone Management Atlas

This document was received from the printer in December 1974 and widely distributed during 1973 and 1974. To date, over 600 full atlases and more than 1500 county sets have been sent to governmental officials at all levels, planning groups, developers and real estate interests, consultants, environmentalists and private citizens. Panchromatic imagery with a range of dates from 1965 through 1971 and a photo scale of 1 inch to 2000 feet was the primary data source used for the inventory requirements, with supplemental data and ground truth verification utilized when necessary. Standard photo-interpretation procedures and cartographic application for map compilation were used in preparing the FCCC methodology base maps. Thirty-eight county sets (four maps each, i.e., Preservation, Conservation, Development, Composite) were prepared in-house at a map scale of 1 inch to 1 mile. These in turn, were photographically reduced to 1 inch to 2 miles, resulting in a final printed map format size of 22 inches by 26.

The basic purpose of this atlas was and continues to be a means to provide decision makers and concerned citizens with an overview of the components that make up the coastal environment of Florida. At the same time, this Council would have a means by which the FCCC planning/management approach could be disseminated and evaluated by potential users. As a reflection of the FCCC methodology, the atlas delineates those areas already developed by our rapidly expanding coastal population but at the same time indicates those areas physically suited to accommodate further development where such activity will have a minimum detrimental effect on the environment. Following the proposed FCCC methodology format, the Atlas contains an inventory of coastal phenomena still relatively undisturbed, i.e., Preservation subcategories, and recommends that essential, indicated segments of these be "preserved" in order to insure the maintenance of living marine resources, the aesthetic qualities of the coast and the physical integrity of the shorelands. Additionally, a buffer or "caution zone" between development and the preservation areas are designated for "Conservation" where limited development with controls can occur, but whenever possible such conservation lands would be considered as a land bank for future generations.

Response to the Atlas has been widely favorable and the planning approach used has been accepted and is being implemented by planners throughout the state in private and public capacities.

Florida Keys Coastal Zone Management Study

In April 1973 Council members approved the

development of a Florida Keys coastal zone management plan. Because of the many unique features and problems involved in planning for the Keys, and because of the development pressures in the region, it was felt that it would make an excellent area for the development of a pilot management plan. Beginning in May, the full Council staff began work on the Keys study. The study format consisted of the following major sections.

1. Biographical Analysis.
2. Socio-Economic Analysis.
3. Environmental Quality Analysis.
4. Planning Analysis.
5. Summary and Conclusions.

This study was completed and published in July, 1974, and widely distributed to local, regional, state and federal agencies. This study represented a major extension of the FCCC methodology that had previously been developed for the Coastal Zone Atlas of 1972, particularly in terms of remote sensing and mapping requirements, while the 1972 Atlas was essentially a Level II (U.S.G.S. Land Use Classification System) data analysis, the Keys study required a Level III analysis. Two primary base maps were required: (1) a land cover or vegetation map of upland and adjacent marine vegetation and (2) a land use inventory mapping effort with a minimum Level II analysis.

In a joint funding and mapping effort between the FCCC and the State Department of Transportation, Topographic Office, color infrared imagery was obtained (photo scale: 1:24,000) for stereo analysis and the primary base maps preparation. Thematic maps then generated from the completed primary base maps were the standard FCCC methodology maps, i.e., Preservation Conservation, Development and Composite maps, and a Land Availability Map, all of which were basic to the Biophysical Analysis Section. Land Use maps and support services maps were generated for the Social-Economic Analysis section. The remainder of the analysis sections were then developed from these data sections. Work maps were prepared in-house with a map scale of 1 inch to 2000 feet. The maps were then photographically reduced and printed at a map scale of 1 inch to 4,000 feet. The format size was the same as the previous Coastal Zone Atlas, 22 inches X 26 inches.

Present Remote Sensing Application

The FCCC and the state's regional planning councils which include coastal counties are now working jointly on a Level II analysis of the 1972 CZM atlas following the format developed by FCCC for the Florida Keys Management study. FCCC is doing this biophysical analysis in-house using color infrared imagery (photo scale: 1:80,000) which the state purchased in 1973. Panchromatic imagery (photo scale L:24,000) is available as a supplementary data source for a majority of the coastal counties with exposures dated 1974 and into 1975. Ground truth checks are being made in addition to the supplemental data used.

The state regional planning councils are using 1:24,000 photo quads, supplemental imagery and other data sources, as well as ground truth checks in order to provide data for the social-economic analysis phase for input into the jointly prepared coastal zone management plan. Land use, land ownership, primary and secondary support services, are some of the data that are currently being generated in part through the use of remote sensing imagery.

Map preparation for all in-house work by the regional councils and FCCC will have data delimited at map scales of 1 inch to 2,000 feet. The regional coastal zone management atlases will be printed at this scale or photographically reduced up to 50%, depending upon complexity of data representation. Atlas formats will again be 22 inches X 26 inches.

Another important on-going remote sensing application is the use of a color water-penetration imagery (photo scale: 1:24,000) to provide a synoptic overview of the Coral Reef

Tract off the Florida Keys. This mapping effort is a preliminary step to a coordinated federal, state, regional, local effort for long term study of the Reef Tract in an attempt to obtain some answers as to what is affecting the health of the coral; i.e., is degradation being caused from natural occurrences or man's activities in and adjacent to the Reefs, or a combination of both influences?

Future Remote Sensing Requirements

Implicit in the FCCC planning/management methodology, whether a Level II or Level III analysis is used, are the requirements for continuous data updating and a rapid means of data dissemination. Systems for acquisition and dissemination of remote sensing information are less than adequate, or non-existent at the state/regional/local governmental levels, particularly for the data presently in demand, as well as known future requirements. The problems facing remote sensing users who seek information are many and varied, given their respective data requirements, data display and/or dissemination format, in-house expertise, access to necessary funding, etc.

In Florida, governmental agencies are awakening to the fact that these varied problems exist and that expansion of a centralized capability for remote sensing activity is necessary if various program requirements are to be met. The focus of the interest is presently with the State Department of Transportation and its Topographical office. In the last two years, by working through inner-local agreements, data derived from a variety of remote sensors, including photographic, thermal and SLAR have demonstrated the need for remote sensing application. Gradually, a multiple remote sensing program will be in demand as greater numbers of present and potential users learn what segment of remote sensing technology can benefit their own program's data requirements.

John G. Cowley
President
Florida Shore and Beach
Preservation Association
Tallahassee, Florida

The Economics of Erosion Control

I want to make one point at the outset. Perhaps it should be the title of my talk today.

And that is when you think of coastal zone management, please don't forget to consider fully the role and importance of our beaches.

I say this because it's my distinct impression that all too many professionals in coastal zone management and planning seem to quickly skim over beaches in their scheme of things. At least, very little seems to get said about beaches in the context of coastal zone planning.

Yet in Florida, our beaches are perhaps our most important single coastal asset. Certainly they are from an economic standpoint. Repeated surveys have shown that beaches are the number one attractor of tourists to Florida. And we all know that tourism is our number one industry in the Sunshine State. Beaches are also the number one defense against damage to coastal property from storms and hurricanes. And that in itself is a tremendous economic value.

Beaches are also the most significant geographic feature of our coastline. Some 1160 miles of our shoreline is composed of sandy beaches.

So I don't think I am being unreasonable when I ask that our beaches be given full and fair consideration in coastal zone planning and management.

If this sounds overly defensive, so be it. The fact is, I'm very concerned about the state of our state's beaches. And I'm hopeful that the new emphasis on coastal zone management will help alleviate the problem.

According to the State Department of Natural Resources and the Corps of Engineers, some 500 miles of Florida beaches are in a critical state of erosion. Much of this serious erosion is taking place in heavily-populated resort communities.

At Miami Beach, at high tide, there is virtually no beach remaining. The ocean laps right up to the seawalls of luxury hotels.

Jacksonville Beach is almost gone.

The situation is similar in many other parts of Florida. Instead of the wide, magnificent beaches that are featured in our tourist brochures, we see in all too many places a narrow strip of sand with hardly room for a beach blanket.

The one big exception is right here in extreme Northwest Florida. By and large, our beaches are wide and beautiful -- the way they should be. But let me emphasize that we are the exception. The erosion problem statewide is serious. Our beaches are disappearing. Some areas are losing beach at the rate of 10 to 15 feet a year.

Along the upper east coast of Florida, The Florida Department of Natural Resources says 90 miles of beach are in a critical state of erosion.

Along the lower east coast, it is 137 miles. Along the lower Gulf coast, it is 90 miles. And there are large stretches of the Panhandle coast that also are in a bad state.

It's not just an esthetic problem. It's also an economic problem for the whole state. Let me tell you why.

Tourism is far and away our number one industry, our number one revenue-producer. Last year, more than 27 million tourists came to our state. They spent over 9 billion dollar. They contributed 414 million dollars in direct state taxes and generated another 386 million in collateral fees and revenues -- a total of some 800 million dollars for our state treasury.

The point is that tourism is very important to our economy.

What does this have to do with our beaches? Simply this: Our beaches are Florida's number one tourist attraction, the number one reason tourists come to Florida in the first place.

This is borne out in every tourist survey taken over a period of many years by the State Department of Commerce.

Two out of three tourists say they come to Florida to enjoy our beaches. No other recreational activity comes close. That includes fishing, golf, tennis, nightclubbing and visiting attractions such as Disney World.

On the average, these visitors say that they use our beaches about five times during their stay in Florida.

It's no accident that the majority of our resort centers are located near a beach.

Our beaches are, in truth, "the goose that lays the golden egg of tourist dollars in Florida."

The point is that if we want tourists to continue coming to Florida in ever-increasing numbers, we'd better hurry up and do something about our eroding beaches. We'd better hurry up and restore those postage stamp size beaches in some of our major resort areas and make them once again into the wide, magnificent beaches we see in the tourist brochures.

Otherwise, it's possible the tourists may stop coming in the volume we need to sustain a healthy economy.

If we want to expand tourism, it's not enough for us just to increase the advertising budget for tourism.

Advertising puffery is no substitute for a beautiful beach if the beach is what brings the tourist to Florida in the first place.

Our beaches, themselves, can and should be Florida's best advertising.

The Department of Commerce estimates that during 1976 tourists will spend 10.2 billion dollars in Florida and generate almost 900 million dollars in direct and collateral tax revenues. That's a lot of money.

And our beaches play an important role in generating it. Shouldn't we then be good businessmen -- as well as good stewards of our natural resources -- and allocate a small portion of this 900 million dollars into product improvement -- into rebuilding our eroding beaches?

And if that isn't enough economic justification for spending more to save and rebuild our beaches, let me give you another important economic reason -- hurricane protection.

The simple fact is that our beaches are our best protection against hurricane damage.

A good dune and beach system is nature's way of absorbing the brunt of the hurricane force.

Let me give you a good example of what I mean.

Last September, Hurricane Eloise lashed the Panama City area causing an estimated 150 to 200 million dollars worth of damage.

As hurricanes go, Eloise was strictly average. Compared to some of the storms that have hit our state, Eloise was a weak sister.

But Eloise demolished or damaged a high percentage of hotels, motels and other structures along the Gulf Coast. And the reason was that the beach there had become so eroded that it offered little protection to coastal properties. Most of the damage to the buildings occurred not because of the wind but because the storm surge from Eloise undermined the foundations of the buildings.

This wouldn't have happened with a good beach system.

I talked to an engineer with the Corps of Engineers who surveyed the damage and he told me this:

He said, if the beach restoration project proposed several years ago for the Panama City area had been completed prior to Eloise, damage to coastal properties probably would have been a tiny fraction of what it was.

In other words, with a comparatively small investment in beach restoration, we could have saved many millions of dollars in property losses. That's a good investment.

We might as well face it. Florida is a hurricane prone state. Over the past hundred years, an average of two hurricanes a year have struck Florida. And we've had as many as five hurricanes in a single year.

So you'd think we'd want to take all possible precautions. And a good beach is the best defense against hurricane damage.

I'd like to emphasize that the Panama City area isn't alone in being especially vulnerable to damage from hurricanes.

There are many resort cities in this state which are needlessly exposed to severe hurricane damage--simply because of badly eroded beaches.

A concrete sea wall or similar fixed structure is poor protection against hurricane waves. And they're expensive to build.

A good beach, on the other hand, is the best and cheapest protection we can provide against hurricane damage.

Despite the growing erosion problem--despite the great economic importance of our beaches to Florida--we're doing precious little to preserve and protect our number one natural resource. In fact, beach erosion is taking place at a faster rate than the state's beach restoration program.

Since the creation of the State Bureau of Beaches and Shores in 1966, 10 years ago, the State of Florida has spent the grand total of $11,864,613 in state matching funds for beach erosion projects.

That's an average of a little more than a million dollars a year to protect Florida's number one tourist magnet--not to mention our best hurricane insurance.

It's a pittance when you consider that the Department of Commerce estimates that tourism will generate, this year, about 900 million dollars in state taxes and fees.

What's worse, the level of state support is declining. We're spending only 1.9 million dollars this year on erosion control--a reduction of one-third from the amount allocated two years ago.

It doesn't make sense. It's not logical. It's not realistic.

Happily, our beaches can be saved. Eroded beaches can be rebuilt. And erosion can be reduced. The technology is available. And so are the conservation techniques.

A good example of what can be done in the way of beach restoration is the beach at Bal Harbour, just north of Miami Beach. Two years ago, the beach at Bal Harbour looked exactly like Miami Beach. It was almost non-existent. The ocean washed against the seawalls.

Bal Harbour is a wealthy community. It was able to sponsor a major beach nourishment project which pumped sand along the shoreline and artificially built a magnificent new beach over 200 feet wide. Today Bal Harbour has one of the finest beaches in the State of Florida.

And the prognosis for that beach holding up against erosion is good. Part of the project involved construction of a specially designed jetty at the entrance of Haulover Inlet. That seems to have solved the primary erosion problems.

Artificially pumping sand to rebuild an eroded beach may not appear to be a strikingly imaginative solution to our disappearing beaches. But the fact is that it works very well if it is done right.

In the near future, Miami Beach will be rebuilt in just this way. And so will the beaches of Duval County and other areas which have suffered severe erosion. Construction on both projects is scheduled to get underway next year.

It's expensive. But it's a good investment. It's a good investment because it enhances recreational opportunities for our citizens ... it enhances Florida's attractiveness to tourists ... and it provides vital protection against hurricane damage.

Beach restoration, however, is only part of the effort to preserve and rebuild our beaches.

Even more important are the efforts to use "preventive medicine" to reduce erosion to a minimum.

It needs to be emphasized that we can't eliminate erosion entirely. It's a natural process. The wind and tides and current shift sand back and forth through the year and over the years.

The problem has been man-made interference with the forces of nature which creates unnecessary erosion has been the unfortunate tendency to build homes and hotels too near the water. In the process, dunes have been flattened, vegetation destroyed, and seawalls built and as a result the coastline's natural resiliency to the erosion process has been destroyed.

We can't undo what's done. It's not feasible to tear down all the buildings that have been constructed too close to the water along the coast of Florida. But we can do the next best thing -- prevent it from happening in the future.

Largely, at the prodding of the Florida Shore and Beach Preservation Association, the 1971 Legislature adopted

landmark legislation known as the Setback Line Law. This act gives the Department of Natural Resources the responsibility for establishing a safe buffer between new construction and the sea.

The setback line ranges from about 100 feet inward from mean high water to over 500 feet. Its location depends entirely on local conditions. It is based on a complicated -- but sensible -- formula which considers such factors as "historical storm and hurricane tides, predicted maximum wave uprush, erosion trends, the dune or bluff line and existing upland development."

Needless to say, some property owners aren't happy at the restrictions to developing their coastal lands. But the new setback line is doing a good job of preventing unnecessary future erosion and we think the Department of Natural Resources is doing a good job in its implementation.

The effectiveness of the line was proven in Hurricane Eloise. Properties located behind the line suffered only superficial damage. And that was from wind and rain, not tidal surge.

In closing, I'm happy to report that we're making progress in our fight to protect our beaches from the ravages of erosion.

At long last, we're headed in the right direction.

Of course, we still have a long way to go before Florida's beaches look as good as the picture postcards.

We have a lot to learn from research. We have much rebuilding to do to undo the damage of our past follies.

But with the right kind of support from the State of Florida for erosion control programs ... and with the right kind of decisions in coastal zone planning ... Florida can once again enjoy the most beautiful beaches on the North American continent.

I make no apologies for emphasizing the economics rather that the esthetics of our beaches.

Frankly, our experience in promoting erosion control has been that sheer beauty doesn't do much to generate needed state support.

So we are now singing a song of economic benefits to try to achieve the same ends.

It's a valid argument if our representatives in the Legislature will only pull out their pocket calculators.

Good beaches are important to the tourist economy.

They're important for recreation of our own citizens.

And they're important from the standpoint of hurricane protection.

The benefit to cost ratio is enormous.

Coastal Mobility and Management:
Panel Discussion

Bruce Johnson: (Bureau CZM Planning, Florida) Question to Dr. Tanner:

Dr. Tanner, what is your professional opinion concerning the material that is being processed in Panama City Beach as a result of harbor deepening and harbor dredging in Bay County.

Dr. Tanner: As far as I know, none of that is being obtained by harbor dredging. The only dredge operation that we have observed down there have been from dredging immediately on or immediately offshore of the outer bar. This is a mix of quartz sand and some peaty material and some humate. The quartz sand is apparently just a little bit coarser than the quartz sand that was removed from the beach during Hurricane Eloise and for this reason should be at least as stable as the original sand was. I doubt that the size difference is great enough really to make a whole lot of difference, but at least it isn't so fine that it should be lost instantly. The peat will be bleached and broken up and spread out very quickly. It composes as a guess, perhaps two or three percent of the total. The humate is a different matter. Again, it composes one or two or maybe three percent of the total. We do now know yet, because as far as I know, there is no experience whatsoever for putting humate on the beach. I have never heard of this under any circumstances and in this case apparently, it was an accident. The humate, however, is although less resistant that quartz sand, much tougher than peat, and other organic mucks. It does not bleach in natural exposures of humate that are 30 or so years of age; or this is, if they were exposed by dredging or cutting operations 20-40 years ago. There has been no detectable bleaching over that period of time. On the other hand, the humate is not tough in the sense that quartz sand is, and, therefore, wave action when it gets to it, will break it up and when it gets it small enough, particles of it will be carried away. How fast that will occur will depend on what combinations of tide, high tide levels and the storm waves we happen to have in the next year. Without storm wave activity combined with high tides, some of this material could still be present and start *color* on the upper beach years from now. (From a color point of view now, if they are lucky enough to have pretty good wave activity with high tides in the next month or so, we could have it all washed out in short order, but it will not bleach. Thank you.

Shirley Gade: Question to *Arthur Butt*

Mr. Butt, I don't know if I heard all of your statement, but when you were showing the wetland marsh areas and tidepools, you made the statement that we have a protective legislation for development of the backpart of that area. Which legislation are you referring to?

Arthur Butt: The legislation analysis referred to is Florida Statute 253 and 17-4, 17-3 Florida Administrative Codes related to dredging and filling activities and water quality maintenance. Chapter 17-4 (Seventeen-four) dredge and fill gets into the application for permits of dredging or filling within wetlands or within the sovereignty or jurisdiction of the state are waters or areas of less than the mean high water line. Water transitionals require permits from the state and if a project is deemed environmentally significant or detrimental to the propagation and management of wildlife, then the department, particularly in Class II waters will recommend denial of the project unless the economic implications could outweigh the public interest of propagation and management of wildlife.

Shirley Gade: Does the Cabinet determine this or does DER?

Arthur Butt: The applications are based upon a two-form platform. There is a short-form application and a long-form depending upon the size of the operation. The short-form application is based in the district level and the long-form application is reviewed in Tallahassee. A denial or approval can be ascertained at either one of the local levels. If an individual, I believe, does not like the determination by the department, he can petition the Cabinet. Mike Applegate will present a little more on this legal aspect further along in the program.

Tom Bell: Question to *Dr. Tanner:*

Dr. Tanner, In relation to the dam on the Apalachicola, will that have any or some adverse environmental effects?

Dr. Tanner: I am a geologist, and I speak as a geologist and I make no pretense of being able to evaluate what the biologist for example should be evaluating. Geologically, they have already done all the damage to the Apalachicola that they can do.

Jane Marques: Question to *Dr. Tanner:*

Dr. Tanner, since the area around the Gulf of Mexico has only two tides per day, in contrast to the area along the North Atlantic Coast where there are four tides per day, will our area suffer less beach erosion than in that area?

Dr. Tanner: You will find that the mixed tide that we have, particularly in this part of Florida's coast considering the various small tidal range that we have, I don't think makes a great deal of difference. The primary factors that enter into the amount of erosion are first the wave climate. This is the size of the waves at the angle at which they approach. The wave that approaches head on so that it breaks simultaneously all up and down the beach with some exceptions doesn't cause any erosion problems. It's the breaker that comes in from an angle so that it breaks on one part of the beach, and then this break point slides along the beach and drives sand in the direction in which the break point is moving. This is primarily the important factor. However, there are some other things involved. One is whether or not we have any new sources of sand to nourish the system. When we started putting dams on rivers, we began cutting out maybe our number one source of sand because this sand is trapped in the reservoirs behind those dams; and it may take quite a while like say 10, 50 or a 100 years before we recognize that we have had a serious loss there. If I wanted to run for President, on a platform of just one plank that pleases me very much from a narrow professional point of view, it would be on a platform of dynamiting all of the dams in the United States. I recognize that that would have some bad effects in other ways so I won't really run on that, but I hope you understand my point. There are some other factors that enter into it, but those are the main ones.

Joan Ren: Question to *Dr. Tanner:*

Dr. Tanner, I noticed, in the paper, that there is going to be some rather major renourishment programs in Duval County and in the Miami area. Is there any precedent for this type of project and if so, how successful would it be for the renourishment of the beaches?

Dr. Tanner: Yes. This is not a new project. This has been on the way for quite some time. I think you have Army Corps of Engineer representatives here for these two days, and they can certainly give you data on the programs that they have taken part in and this is our number one agency for this purpose. I'm not sure when the first beach renourishment program was undertaken, but we have been doing it in the United States for a number of years. In a small way, for 40 years to my knowledge. In my opinion, they are extremely successful although not completely so. I can give you an analogy that I think will wrap is up beautifully. Its like asking somebody if eating dinner ends hunger and the answer is, well, only momentarily. After erosion takes place next year, then you need another renourishment program. Furthermore, we have serious problems as to the quantity of sand available for nourishment. In many parts of the state we do not have enough sand to carry on successful nourishment programs. What we will do next after this is a more difficult problem.

administration of the coastal zone

It is one thing to understand the delicacies and natural caprice of a mobile coast and quite another to live on one. The difficulties of living in a coastal area are often focused, with no small degree of frustration, on the administrator, whether that person is a representative of a major federal agency involved in Coastal Zone Management or leader of a local government. The administrator is frequently required to share the difficult burden of a community, firm or individual attempting to protect an investment made in good faith, but also made with little real understanding of the coast. The administrator faced with such a problem is often forced to deal with past financial commitments, and presently occuring environmental deterioration which may be its result.

John Cowley is very much concerned with many of these problems in the first paper of this section. Mr. Cowley also emphasizes the importance of beaches and Coastal Zone Management and he indicates that the cost benefit ratio suggests that much more money should be spent on beach restoration. Mr. Cowley points out the great economic importance of tourism in the State of Florida and the dependence of that industry upon beach upkeep.

Mike Applegate and Arthur Butt in their paper very clearly outline another aspect of coastal zone administration; the relationship between state and federal administration of Coastal wetlands. They clarify aspects of the state's perceived role regarding the administration of public law 92-500, particularly section 404 which, as interpreted, assigns new and important environmental responsibilities to the U. S. Army Corps of Engineers.

George Allen describes the official attitude of the U. S. Army Corps of Engineers toward Coastal Zone Management quite well. He also expressed the very interesting and important role change which the corps is experiencing as a result of the increasing environmental concern on the part of the general public.

The discussion surrounding this section again focused primarily on beach erosion and restoration with particular emphasis on restoration and maintenance. Some consideration was given to restoration of vegetation and to the policy which might be adopted by state and federal agencies regarding the authorizing of industrial permits on restored land.

George W. Allen
South Atlantic Division
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The Role of the U.S. Army Corps of Engineers In the Coastal Zone Management Program

Mr. Webster defines management as the judicious use of means to accomplish an end. Coast Zone Management is an effort to manage the coastal zone, but the definition of the coastal zone is more complicated than the definition of management. The wide range of what is considered the Coastal Zone is best exemplified in the diverse methods that the states have developed to describe their own coastal zones for the purpose of their proposed management. Some states utilize methods involving geographic elevations, others appear to consider socio-economic involvement, and others merely use political boundaries. There are reasons for such choices, of course, for administrative procedures relating to certain practical and very real problems must have recognized parameters of applications.

The Corps of Engineers is not the principal administering agency of the Coastal Zone Management Act of 1972. Its activities are not confined to any one state: therefore, its consideration of what constitutes the Coastal Zone must be broad enough to encompass the areas which will be within the legal definition of the Coastal Zone as developed by the many states with which the Corps becomes involved in coastal programs.

For the purpose of this program the Corps of Engineers considers the Coastal Zone as the band of dry land and adjacent ocean space in which land ecology and use directly affect ocean space ecology, and vice-versa. The Coastal Zone is a band of variable width which borders the continents, the inland seas, and the great lakes. Functionally, it is the broad interface between land and water where production, consumption and exchange processes occur at high rates of intensity. Ecologically, it is an area of dynamic biochemical activity with but limited capacity for supporting various forms of human use.

Necessarily, this definition is not specific, but it does include all of those lands on our continental margins, and the adjacent waters, in such a manner that it will include the specific definitions as developed by the administering states within their program. The Corps of Engineers does not wish to develop an argument based on semantics when the objectives are so important. Very simply, the objectives of this program are to organize, plan and instill logical and orderly development in a very important but limited area, where heretofore such development could best be described as on the first-come, first-served basis.

What is the mission of the Corps of Engineers in the Coastal Zone as assigned to it by governmental authority?

Lt. General W. C. Gribble, Chief of Engineers, perhaps condensed the assigned responsibility into a concise package in a recent publication.

"During June, 1975, both the United States Army and the Army Corps of Engineers commemorate their two-hundredth anniversaries. And for the past century and a half, the Corps, at the direction of Congress, has planned for the wise use and proper development of America's water resources.

"Since 1814 the Engineers have been charged with improving rivers and harbors, with the responsibility for both the coastal work and the nation's emphasis on environmental and developmental needs of the nation."

The key to the entire environmental situation, as it exists today, lies in the last portion of General Gribble's statement: "...**serving the people of the United States and responding to their needs.**"

In order to understand the position relative to the Corps and our environment within the Coastal Zone one must recognize that public agencies are prime examples of cause and effect. Over and over again can be seen the political application of Newton's Third Law of Mechanics, *For every action there is an equal and opposite reaction.*

In some respects reaction can be seen by immediate response to action. The Continentals on Bunker Hill needed their first fortifications, and the Engineers built them in immediate response. When Camille visited the Mississippi Gulf Coast, the Corps of Engineers was on the scene while the debris was still flying about. However, reaction to social changes or new social demands appears to be much slower.

In 1802 the Corps of Engineers, as it exists today, was formed by congressional act. President James Monroe had two objectives in mind for the new organization: advancing the continental frontiers and protecting the nation's sea coasts. The Corps did both. This period of the 1800's was the nation's Expansionist Period. The American public and Congress needed and demanded the exploration of the continent, and the Corps of Engineers responded accordingly. They guided, surveyed and mapped while they broke trail for the westward migration. They surveyed the Chesapeake and Ohio Canal. They extended the National Road from Cumberland to the Ohio. They made the Ohio, Missouri and the Mississippi safe for navigation. They opened harbors in the Great Lakes and maintained the lighthouses.

In the late 1800's the U. S. Army Corps of Engineers developed and administered Yellowstone National Park. They moved on from Yellowstone and established, administered and protected Yosemite, Sequoia and General Grant National Park. Even as late at 1933 there were a number of national monuments, battlefields and historic areas under the protection of the Corps of Engineers. As the national park objectives became more acceptable and widespread, the military was withdrawn and the National Park Service assumed total control.

The history of the Civil Works Program of the Corps of Engineers is but a reflection of public interest in management of the nation's resources. There has been much said about the "new" image of the Corps relative to resource planning. This "new" image has been brought about by the continued application of the Corps' initial policy, to reflect the needs and desires of the people.

Those of us who have worked within the parameters of coastal zone interests for any period can remember only too well how "good" the "good old days" were when related to Coastal Zone Management.

Many were the public meetings that would be called for the purpose of reviewing a new coastal development program. These meetings were called for the single purpose of informing the public of what was being considered, and to provide that public with an opportunity to present its views on the proposed program. During that time this speaker was an administrator of a state resource agency, the president of a large conservation organization, and active in conservation programs throughout the Southeast. When notice of such a meeting was issued, the bushes would be shaken and the woodwork pounded to arouse attention among those individuals and organizations who should have been interested and informed of such programs. When the meeting was held, seldom was the time when there would be over three or four interested sportsmen or conservationists, and many times this speaker would be the sole representative of conservation interests.

On the other side of the aisle would be forty or fifty farmers, industrial leaders, chamber of commerce officials and usually a congressman or two. It was a most disheartening experience, and one to which many of us became well accustomed. Obviously the public pulse was not beating for the interests relative to the total resource management problems. Certainly, no other group or individual is as responsive to the interests of the public as is a congressman when surrounded by his constituents, and in most cases he would be there to receive the plaudits of the crowd and not the disparagements of a minority.

In 1969 the sudden love affair of the public for the environment resulted in the National Environmental Policy Act, and the affair has not cooled down as of this date. Shortly thereafter; Lt. General Clarke, then Chief of the Corps of Engineers issued a policy statement on the environmental considerations relative to Corps projects. The objectives of the policy were as follows:

(A) To preserve unique and important ecological, aesthetic and cultural values of our national heritage;

(B) To conserve and use wisely the natural resources of our nation for the benefit of present and future generations;

(C) To enhance, maintain and restore the natural and man-made environment in terms of its productivity, variety, spaciousness, beauty and other measures of quality;

(D) To create new opportunities for the American people to use and enjoy the environment.

This policy, among other things, emphasized the determination and evaluation of alternatives and strongly encouraged broad public participation in Corps planning.

Roland Clement, who describes himself as a field ornithologist, a generalist in environmental science, is an individual of high-standing in the conservation community and served as vice-president of the National Audubon Society. He was also a member of the Corps of Engineers environmental advisory board. After two years with this board, Mr. Clement arrived at a conclusion that has been held by many environmentally concerned Corps personnel. After 200 years of serving a public demand for materialistic growth, the Corps had to react overnight to the social readjustment of the nation which suddenly realized that materialistic objectives were not necessarily those which brought about the fullest life or the greatest happiness to the individual or perhaps to the entire nation.

To quote Mr. Clement, "Two years of Corps' watching has convinced me--and most of my colleagues--that the Corps is more scape-goat than culprit in the current environmental controversy. The general confusion that plagues public discussion of these matters seems to be a result of naive political outlook, more specifically, of a failure to identify the 'structural' causes of what disturbs us. We seldom inquire into an agency's congressional mandates, for example, or into what is possible and what impossible, especially given the defined statutory procedures and the 'public demands' the Corps was organized to satisfy. Those who do not realize the distortions of public demand inherent in our present form of government are doomed to belabor scape-goats to the end of their days. Correcting these abuses calls for the much more demanding task of building fences to keep the neighbors' cows out of the back pasture. This is up to you and me because the Congress has not, of course, authorized the Corps to build political fences or shape national policy by decreeing policies of "no growth".

It is difficult, therefore, to specifically point to any single "new posture" relative to environmental matters by the Corps of Engineers. Increased public participation has been due to increased public interest, and the desire to express this interests. Be it building national parks, exploring frontiers, building waterways or flood protection, the activities of the Corps have always been a reaction to the public and national demand. The increased and demonstrated efforts of the Corps in environmental matters is due to a continued effort to respond to the stated and demonstrated desires of the American people. In this respect, the passage of the Coastal Zone Management Act of 1972, was a demonstrated desire of these people, and the Corps of Engineers will respond to that demand in the manner directed by the Congress of the United States. This being the case, what is the direct interest of the Corps of Engineers in the coastal areas of the United States?

This interest may be expressed in terms relative to one of three planes of interest; monetary investment of federal funds; social well-being of the residents of the coastal area; and the environmental concern of the area.

While it would appear to be rather prosaic and mundane to consider the economics in relation to environment in some circles, the facts of life still dictate that dollars and cents must contribute to the final outcome of projects, even though they be called public works.

It is of interest to note that the Corps of Engineers, in the Coastal zone contained in the Gulf and South Atlantic states, from North Carolina to and including Texas, has a responsibility for over 1.5 billion dollars in public works developed through their programs. The coastal counties of this area include approximately 75,000 square miles and over 10.5 million people. Applied arithmetic will show that this is an investment of approximately $150.00 per person,

and $21,536.00 per square mile. It must be kept in mind that these expenditures were made at the request of the American taxpayer. Naturally, such investments must be protected and preserved, providing of course that the public desires to maintain them. There is every indication that not only do they wish to maintain existing projects, but the demand for additional projects to satisfy what they believe as their needs of the area continues to increase each year.

The impact of management programs on the coastal area in relation to the continued existence of this large investment is obvious. Protection or preservation of previous investments is a concern of the Corps in relationship to the Coastal Zone Management Program. The compatibility of developed projects to Coastal Zone Management Programs of the States will result in a more fulfilling program from both points of view. This will involve trade-offs and compromises on the part of all interested parties, but with the stated objectives of the Coastal Zone Management Act of 1972 in mind, it can be done and it will be done.

The second plane of interest that can be used when considering the Corps' interest in the Coastal Zone concerns the social well-being of the people of the area. A healthy and viable community, regardless of its location, requires diversity of interests. As with man who cannot live by bread alone, a community cannot live in a satisfactory manner on industrial development alone, but neither can it exist as a pristine wilderness and still be considered as a community of man.

Social necessities must be provided in the form of sewage treatment plants, school systems, law enforcement agencies and other such public services. So also must there be social amenities which make life worthwhile. It is about as difficult to have an enjoyable picnic in the middle of an active steel foundry as it is to have a school system supported by a whooping crane rookery.

Common to both industrial efforts and recreational pursuits is a system of communication and transportation. By the development of its waterways, improved channels and harbors, the Corps of Engineers has contributed towards the total development of an area, sometimes in a direct manner, and certainly more often in an indirect manner. The development of the coastal area is due to the fact that it provides water transportation to the ports of the world.

There are those who would state that many people are in the coastal areas primarily for the aesthetic enjoyment they receive. This may be true. However, the thing that makes the coastal areas so desirable to many individuals is the fact that in this area they can "have their bread and eat it too." The sign-painter or the bank executive in Houston, Mobile or Pensacola does not find it necessary to work all week, then drive hundreds of miles to sail his boat, hunt for waterfowl, or catch a fish. He can do it in his front yard for all practical purposes.

Such circumstances contribute towards the social welfare of the people involved, and the Corps of Engineers is closely associated with the very basics of the situation that made this geo-social niche possible. It is responsible for its actions and therefore is very interested in any activity that would have an effect on these developments.

The third plane of interest upon which the Corps of Engineers bases its concern for Coastal Zone planning and administration is the most reasonable and logical, that of total concern for the overall environment of the Coastal Zone. The concept of total concern for the overall environment is full of popular appeal. It embodies the principles that all worthwhile objectives must contain, but it is most difficult to achieve. John Muir stated the problem very succinctly when he said, "When you try to pick out anything by itself you find it attached to the Universe." Total absorption of interests includes total absorption of ideals, philosophies, economics, social equity and the entire spectrum of human activities. Practically, it is next to impossible to combine such a potpourri into a totally satisfactory unit, but the Coastal Zone Management Program has been directed to do this, and the Corps of

Engineers, while not the administering agency, has been directed to cooperate in every way possible.

The first step in this journey is to develop a generally acceptable series of definitions in order that everyone involved be headed in the same direction. We must determine what it is that we are trying to do.

Our concern for the continued existence of the natural processes of the Coastal Zone is essentially the recognition of man's ability to protect himself from the results or impacts of his own activities as related to the utilization of coastal resources. Logical and rational decision making, relative to these areas, can only be achieved after a thorough consideration of the means at his disposal for exercising such administrative power. A management process should be developed to achieve a set of instituted objectives. Such objectives should be directed towards maintaining and improving coastal usefulness by improving the parameters of the natural system he desires to use as a foundation for his activities. Consideration of the present and future should be done in a manner most benefiting the economic, social and environmental objectives. If we utilize the best-use concept, it is possible to develop a basic definition of coastal zone management in the process of (1) understanding the coastal zone as a system, (2) utilization of this understanding in the development of a viable plan for its best use; and (3) application and enforcement of the plan.

Where does the Corps of Engineers fit into the above process? The recognition of the Coastal Zone as a system can only be done by developing a composite of accumulated data from its components. Many of these parts are presently available through data obtained in the development of Corps of Engineers projects in the Coastal Zone.

As an example, the environmental impact studies relative to the ICWW maintenance dredging through North Carolina points out the many eco-types and eco-systems through which the waterway extends, the situation relative to endangered species, and to the extent and location of nesting sites and rookeries. It contains sediment analysis, soil type determination, socio-economic situations and water quality considerations.

Granted, much of this information is retrieved from existing records, but it is compacted into a single document, readily available to anyone who is attempting to understand the Coastal Zone system.

Once this understanding of the Coastal Zone system is reached, the next step in the development of the management process is the utilization of this understanding in plan development.

The Corps of Engineers will be the first to admit that in the Coastal Zone the environmental unknowns exceed the environmental knowns to a considerable degree. In their particular sphere of specialization, that of coastal engineering, the Corps has entered into the sequential engineering and development efforts with close observation and considerations of their previous activities in a studious attempt to avoid adverse consequences that may have developed in the past. In some situations the consequences can be avoided, in others they cannot. Astute coastal planning must consider the positive and negative effects of its developments upon the total environment of man.

The Corps of Engineers was the first public agency to enter the field of public works in the coastal areas. Its records and reports relative to the Southeastern States and their coastal areas go back to 1815 when the first Civil Works Commission in this area was a coastal survey of the Carolinas, south of the Cape Fear River, and a coastal survey of the area around Mobile and Pensacola. Thus, the Corps of Engineers is a good source for material collected over the years that is of inestimable benefit to planners. As an example, some of the states have already utilized old coastal charts and records in determination of coastal variations over the years.

Research and resulting developments relative to the establishment of coastal marshlands from dredge material is a program of the Corps of Engineers. This program has opened a cornucopia of opportunities for marshland

development and management.

The state of Florida and the Corps have cooperated in disposal area locations to make such areas suitable and desirable for nesting sites of the brown pelican. In so doing the nesting range of this endangered bird has been extended into areas where heretofore there were not nesting activities on record.

The Corps research with Clemson University on the feasibility of using dredge materials for the manufacture of ceramic building material has lead to development of the industrial manufacturing of brick and other such building material in areas where appropriate clays were not available.

Such projects as these have developed a potential for coastal management that should be considered in the planning processes. The data needed is already available for utilization by interested parties.

The third phase, that of application and enforcement, is primarily a state responsibility, but this phase can be successfully developed only through the cooperation of all private and public bodies involved in the Coastal Zone activities. The Corps of Engineers can assure the involved states of this cooperation. Certainly there will still be specific actions within the management program that will be retained within the federal sphere of responsibility, even though the state program is fully effective. In such programs the Corps of Engineers can promise these states that the Corps appreciates their program objectives, and every effort within reason will be made to remain within the parameters set forth in the states' program.

Lastly, and perhaps to the greatest extent of all other reasons, the Corps is sincerely interested in the state Coastal Zone Management Program. Hopefully it will result in a specific and detailed management effort into which the Corps of Engineers can mold its coastal programs to the benefit of all concerned. In so doing, the Corps of Engineers can continue to serve its primary function, to respond to the desires of the people within its spheres of assigned responsibility.

Michael Applegate
(and Arthur Butt)
Department of Environmental Regulations

Management of Coastal Wetlands
Perspective Enforcement of State Regulations
Governing Dredging and Filling of Wetlands

By rights of sovereignty, the State of Florida owns all submerged lands below the line of mean high water of navigable water bodies except for those lands conveyed by a submerged land deed or specifically through Spanish grant.

As many of you may know, the State of Florida in its infancy promoted the sales of submerged swamp and overflowed lands for the purposes of promoting development and growth. Many of these lands were conveyed to the railroads in the 1870's for as little as 25¢ per acre. For example, in the Hamilton Disston Railroad Deeds, 4 million acres of sovereignty lands were sold for one million dollars. Subsequently, many acres of wetlands have been conveyed into private ownership. Current demand for waterfront property has escalated values of even marginally developed property to as high as $400 per waterfront foot.

Therefore, land speculators and waterfront taxpayers place a high premium on the highest and best use of their land. The highest and best use frequently does not coincide with the preservation of coastal wetland resources, since development often requires land alteration consisting of dredging upland canals or access channels or filling to meet local, State, and Federal building requirements.

According to a recent article in Newsweek, about two-thirds of the coastal wetlands of the Gulf of Mexico have been destroyed by developmental exploitation. This destruction has invariably caused the demise of our commercial fisheries which depend so greatly on the coastal wetlands and estuaries.

Increased population and growth in the State of Florida have created the necessity for more stringent coastal regulations.

Consequently, the State of Florida has provided in its Constitution for the preservation of its natural resources and beauty. Laws enacted by the State have been promulgated to carry out these constitutional mandates.

The Environmental Reorganization Act (Chapter 75-22 of the Laws of Florida) as outlined in Chapter 403 of the Florida Statutes and implemented by Chapter 17-4 of the Florida Administrative Code, provides for certain water related projects which do not require a permit for the State. These include: 1) bulkheads on artificial water bodies, 2) private docks and boat shelters with less than a total of 500 square feet over water surface area, 3) mooring dolphins, 4) the repair or replacement of existing bulkheads as long as they remain within one foot waterward of or behind the existing structure, and...5) the installation of boat ramps on artificial water bodies, 6) replacement or repair of existing docks (in original configuration), 7) maintenance of existing dikes and ditches, 8) maintenance dredging to maintain navigability of previously permitted projects*, 9) repair of storm water runoff pipes, 10) the installation of overhead transmission lines which will not create a navigational hazard and 11) the construction and maintenance of swales. All projects must adhere to water quality conditions established under 17-3 of the Florida Administrative Code.

Those water related projects not specifically mentioned above require permits from the Department of Environmental Regulation.

State Permit Requirements and Federal Permit requirements are generally overlapping with certain exceptions. Those items listed above as not requiring permits by the State of Florida do require permits from the Corps of Engineers if the project requires dredging or filling within waters of the United States.

It is unclear at this writing what the waters of the United States include. Previously Corps' jurisdiction was governed by the Rivers and Harbors Act of 1899, which included navigable waters used for commerce.

*Projects permitted previously by the Trustees of the Internal Improvement Trust Fund

Public Law 92-500 enlarged the jurisdiction to wetlands contiguous to navigable waters of the United States. Presently Congress is debating the implementation of Phases II and III of a plan to expand the Corps jurisdiction to all tributaries and certain lakes. Phase I has been implemented and extends from coastal waters and wetlands to inland navigable waters and freshwater wetlands subject to periodic inundation by saline water.

Dredge and fill permitting and enforcement jurisdiction extends throughout the waters of the state and the adjacent transitional zone and on sovereignty lands.

Waters of the state may generally be defined as waters traversing the lands of more than one owner and, of course, the sounds, bays, bayous and Gulf (within the three mile limit). Dredging is the excavation by any means of submerged lands or the transition zone of a submerged land. Filling is the deposition by any means of materials onto submerged lands or the transitional zone.

The transitional zone is determined by certain vegetative species found on the lands lying between *submerged* lands and true uplands.

Sovereignty lands, as have been mentioned, are those submerged lands lying waterward of the high water line of the navigable waters of the state.

Frequently, citizens from out of state buy a piece of Florida waterfront from uninformed or unscrupulous land salesmen. Such purchases bought in good faith and accompanied by high hopes for making a retirement home or making a fruitful investment, often are soured by the land's unsuitability for development and the purchaser's too late education concerning Florida's environmental laws.

The recent land fraud cases in south Florida are representative of such speculation. Much of the lands involved were submerged lands bought, sight unseen, by people from out of state. As people moved south to occupy their "paradise," they found their lots in the midst of a giant savannah unsuited for the construction of roads, sewers, septic tanks or even proper foundations.

Had environmental laws and proper coastal management and planning been available prior to the sales of such lands, these sour deals could have been avoided.

Presently, the enforcement of Florida's dredge and fill laws is accomplished in several ways: 1) through permitting 2)through informal administrative enforcement 3) through civil or criminal litigation 4) through education.

Permits for dredging or filling coastal wetlands may be obtained upon application and environmental review and approval. Projects of small size require a "short form" application and a $20 nonreturnable application fee. Short form permits can be granted from the District Office of the Department of Environmental Regulation.

Citizens wishing to take an active part in the permitting of projects may request a public hearing in accordance with the Administrative Procedures Act, Chapter 120 of the Florida Statutes.

Larger projects require an extensive biological, ecological and often hydrological, review prior to permitting. Both projects require water quality certification in areas deemed environmentally significant.

Permits from the Army Corps of Engineers are generally required in addition to the state permits.

When an unauthorized coastal construction project is noticed, informal measures are initially taken to notify the owner of the necessity for permits or restoration.

Generally, citizens are surprised that authorization for their project was required by law, and are usually willing to apply for a permit or to restore the damaged area.

More formal procedures are required when a violator is reluctant to cooperate on an informal basis.

In such cases, administrative procedures are initiated with a warning letter from the district, and, if that fails, a case report is prepared and forwarded to the Office of Counsel for review.

Additionally, criminal charges may be initiated at the local level through an information to the State Attorney.

Criminal conviction of Chapter 403.161 could result in a

maximum fine of $25,000 per day per violation, however, such high fines are rarely implemented.

The Office of Counsel may decide to issue a Notice of Violation (N.O.V.) and Corrective Orders requiring the respondent to initiate restorative measures. The N.O.V. normally includes a fine to pay for the cost of processing the case.

However, a civil case may be initiated if there are sufficient conditions meriting such actions.

Civil conviction could result in a maximum fine of $10,000 per day per violation as well as restoration.

Is restoration successful? Oftentimes a site is so changed by fill or dredging and subsequent restorative measures that it is artificially reverted to a secondary pioneer status. Ecological succession in such cases may take several pathways over a period of years prior to the development of the original climax community. Since this is the case, we cannot yet be sure if restoration is successful ecologically; however we are certain that a quasi natural area in an environmentally significant area is better from an environmental standpoint than most developments.

Finally, and most importantly, education through public information is paramount to effective coastal management and to effective law enforcement.

Therefore, it is necessary to "get the word" to the public. This can be accomplished through increased dissemination of knowledgeable information from local and regional planning bodies, new releases, publications and a better state public information system.

Summary

Evolution of population and growth in Florida has resulted in regulations governing construction projects in waters of the State, sovereignty lands and transitional zones. Enforcement of the laws are implemented in many ways. Permits from the State of Florida are necessary for certain water related projects, yet there are certain projects which are exempt. The U.S. Army Corps of Engineers requires permits for dredging and filling in the the waters of the United States.

Some discrepancies exist in permit requirements of the State of Florida and the Corps of Engineers.

Enforcement of violations of Florida Statutes may be through informal conferences, formal administrative procedures, criminal prosecution, and/or civil prosecution.

Education is thought to be the best enforcement tool. Progress must be made in advancing this valuable enforcement tool.

Acknowledgments

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3. Federal Water Pollution Control Act, Section 404, Public Law 92-500, 86 Stat. 816, United States Code, 1344.

4. Florida Administrative Code, Chapter 17-3, Supplement number 25, pages 7-12A.

5. Florida Administrative Code, Chapter 17-4, Supplement number 62, pages 13-16JJ.

6. Florida Statutes, 1-380. 1975, Chapter 120, Pages 477-488.

7. Florida Statutes, 1-380, 1975, Chapter 253, pages 1190-1249.

8. Florida Statutes, 381-959, 1975. Chapter 403, pages 132 to 163.

Administration of the Coastal Zone: Panel Discussion

Shirley Gade: Question to *Mr. Cowley:*
Mr. Cowley, Using the example of Bal Harbor, you mentioned that the restoration was about 200 feet in depth, but you never mentioned what the length of Bal Harbor was, and also, what other part of the country this might take place in. Also, isn't there usually an ideal of accretion and attrition on one side and I wonder who is losing out next to Bal Harbor, and you never mentioned what the cost of such an operation would be.
Mr. Cowley; I am not sure that I can answer it fully. I've been to Bal Harbor and I would estimate that the length of the beach is approximately one mile, perhaps a little bit more. The techniques in building the protection at the inlet--I'm not familiar with them. It is a new type of cone-shaped protection structure there. Usually, when you have a problem like this, they use what they call a nourishment program. They will construct a pumping station which will pick up the sand that is deposited on one side of the groin and pump in over on the other side so that it will flow down the beach. If you don't do this, you will pick up an excess amount of sand on one side of the groin and you suffer an extreme loss of sand of the other side. In many cases they have done this by pumping the sand that is accumulated back down and letting it deposit back on the beaches. I don't think that this is the type of protection they have used at Bal Harbor. This is something new. Of course, I'm not an engineer as you all know, but I do know that so far they are very pleased with the way it has performed. As to the cost, I wish I had that information. The last information I had was somewhere in the neighborhood of six to eight million dollars. The one in Jacksonville is in the neighborhood of $20 million, if I'm not mistaken. Maybe Mr. Allen will know that. It's being done by the Corps of Engineers.
Shirley Gade: Is it a continuous beach nourishment program?
Mr. Cowley: Yes, all types of beach nourishment program work requires maintenance. If you don't maintain it, the forces of nature will gradually take it away and you will be back where you started, and I think all of these communities that have used this type of beach nourishment have built into their budget plans for maintenance of the beaches.
Bruce Johnson: Question to *Mr. Cowley:*
How do you feel about introducing legislation to expand the setback line to cover an estuarine beach of selective recreational potential? Now we have suggested that legislation three years in a row and I wondered if your association would back that sort of thing.
Mr. Cowley: Mr. Johnson had reference to an annual meeting of our Florida Shore and Beach Preservation Association which is going to be held probably right here in October. We have not, to my knowledge, considered any support of this issue so far, but this may be a good subject for you to bring up at our meeting. We don't want to proliferate our work too much. We have been concentrating with a good deal of success on beaches. Now I can see where our support of some of your work might help, particularly if it is going to assure us of a continuing supply of sand for the beaches or something along that line, but I think that you can find that our association will be extremely interested in anything that will improve the preservation and protection of our public beaches.
Bruce Johnson: **Does your organization take any stand on the impression of public right of access to the beach?**
Mr. Cowley: We haven't taken a stand on that as yet. There has been a serious problem, however, in obtaining funds, especially federal funds to restore some of the upland owners to give access to the public. I think, that in Bal Harbor, they required public entrances to the beach every so many 100 feet; however, I'm not sure about the details.

Frankly, our association has been trying to stay out of anything controversial where we would not be needed. We have to work closely with the legislature, and we would like to keep our working relations with the legislature as smooth as possible. If we go too far afield, and get caught into an argument as to who is going to use the beaches, after they

are restored, we are going to be getting out of our field.

I don't want to discourage you from bringing that up, Bruce; you are certainly welcome to do it. I'm just saying, that what we are trying to do is to rifle in on our objective, the beaches, and not to use a shotgun, and perhaps get bogged down with some political problems.

Sneed Collard: **"I was wondering if I could ask you about the beach restoration program -- is any effort being made to restore vegetation?**

Mr. Cowley: Yes indeed, that is one of the primary subjects of our annual meetings each year. How to vegetate the sand areas and consequently restore the dune areas because we all know dunes are built by vegetation and either vegetation or some type of protection that will cause the sand to accumulate, and in addition to having our annual meetings, like we are going to have here in October, we have a seminar each year at the University of Florida and the Coastal School of Engineering down there and there are a number of experts in this field that have put a lot of stress on the importance of revegetating you might say, the beach areas to build up the dune preserves, which are your primary protection. Now, like everything else, all of this takes money and this has been the problem. I remember we did some beach restoration along the Sound here a number of years ago and we have pumped in quite a bit of sand out of the Sound and put it up on the beaches and we rolled it up in sort of a dune and we put snow fence in there and planted sea oats in and along the entire length of it and then fertilized it. Once it became vegetated I would say that it maintained that beach 10 to 12 times longer than it would have if it had not been vegetated. It is very important.

It is very important.

John Hall: Question to *Mr. Allen:*

How would the Corps of Engineers handle the problem of industry trying to come into a region that has been restored in regard to the permitting of land?

Mr. Allen: The first most direct answer to how would the Corps handle it: With a great deal of confusion. Our permits in the future on all coastal zone areas are required by law to conform to the State's Coastal Zone Management Program. We now venture into the field of federal consistency which we better back away from. However, if all of a sudden this industry, we will say for instance, violates even what you might consider a reasonable industrial utilization, the first question might be "How did the marsh get classified as an industrial area?" Somebody in the state fell asleep when they were supposed to be down there looking at the marsh. There are so many ramifications to this thing. Are you going to be issuing the permit at this time or are we going to be issuing the permit at this time? Who is going to have the authority? I mean, that this is all in the mill. Well, lets assume that we retain the authority for permits. We certainly wouldn't issue a permit based on a map. We would still continue, I am sure, to go directly to the source of the Coastal Zone Program. Now, how is that done? I am afraid that what we would do is stand back and tell you, the State government, to make up your mind about what you want to do with it and then let us know about it because the ultimate purpose of the Coastal Zone Management Act when you get right down to the nitty-gritty, is to let the States handle their own coastal zone in the best way they feel it is to be handled. We (The Corps) are not a big brother in this deal. We have got enough problems of our own without asking for more of them, and I still think that the ultimate decision would be with the State. Does that answer your question?

Luther Skelton: to *Mike Applegate:*

How would you handle that Mike?

Mike Applegate: We have had recent experience in that; a ten-acre area up on Escambia Bay. It was out of our jurisdiction actually because of indices that were not right with our laws, but in any event, a man came in for a Federal 404 permit to fill a wetland area and the flood plain and there was marsh vegetation there, and there was a public uproar. Once the public announcement had been made and the project became so controversial, then I think that the public pressures on the State on an instance such as an industry in a

marsh would be such that they would never get a permit.

John Hall to *Mike Applegate:*

This is how it stands right now, but I am talking about after the Coastal Zone Management Plan is approved and effected by the State.

Mike Applegate: If a marsh area were to be designated as an industrial area, I don't believe that designation would exceed the present environmental laws that the State has. Am I wrong?

Darryl Segraves: Question to *Mr. Cowley or Mr. Allen:*

Are there any proposed dredge and fill operations for the Port St. Joe area, and if so, what is the extent of such a proposal?

Mr. Cowley; I'm afraid I can't answer that, so I'll pass the buck down here.

Mr. Allen: To the best of my knowledge, the answer is "No." Now I may be wrong on that, but there is something that you should appreciate on this beach nourishment, beach erosion problem, and that is the local participation that is involved. There are a lot of times your representative may recommend that the Corps go ahead and make such a project, and the locality involved has to put up a considerable wad of money, sometimes greater than the community can afford. I mean it is just physically impossible to do it. In such a case, I believe they go to the legislature and get a State appropriation for this problem if the community itself cannot handle it, and these are all the millstones of democratic action and they grind slowly, but if it is going to be a severe problem, I am quite sure that eventually, at the request of local interest, things are going to be done.

Mr. Cowley: I might elaborate on this just a bit. The federal government in most cases will put up anywhere from 60 to 75 percent of the cost of these erosion projects. The State of Florida will put an additional amount, but the States requires that the local community match whatever amount the State has to put up and sometimes this will cause a project to bog down. Now, I have not heard of one in the Port St. Joe area.

planning

Planning is a subtle and often dangerous profession--frequently for the planner. Of all aspects of public administration it involves the most delicate balance of the various dimensions of management and the allocation of value. Patrick Ryan is well aware of this balance and the fact that planning may in some cases be a severe political process involving who gets what, when and how. In his paper, Mr. Ryan indicates that much more than the present is at stake and that the future may be quite difficult to evaluate, especially when projects of very important short-term benefit may lead to long-term disaster. A case in point is the fact that the state of Louisiana is losing sixteen and one half square miles of land per year and suffering pronounced salt water intrusion of delicate estuarine systems as a result of flood control measures which serve important social and economic objectives.

Dan Penton echos this concern with the long and short term view in planning as he reviews the Florida Coastal Zone Planning effort. Mr. Penton sees this effort as a necessary balance of development and environmental interests which is multidimentional in approach. He describes the use of test studies in the development of a general planning procedure which must adjust to particular demands of particular situations.

John Hall focuses on the management and planning of one natural resource---fish habitats. He develops case histories which demonstrate that planning and resulting management involve a great deal of negotiation. He indicates persuasively the danger of a " piecemeal approach to planning." Finally he outlines a range of potential research efforts regarding fish habitats which could be of value in negotiating planning directors.

The discussion of this section concentrated to some extent on the interrelation of federal, state, and local agencies in planning and management. It highlights the extreme complexity of the federal process and opened the question of "one stop shopping" for development permits.

For a time the discussion centered on the problems of urban planning in the coastal zone. In the process, the extreme dependence of the human community on environmental balance was indicated in the case of New Orleans, Louisiana.

Patrick W. Ryan
Director, Louisiana State Planning Office

Louisiana Coastal Zone Management Program Development

The opportunity for me to talk with you today on what is happening administratively in coastal zone management has come at a key time, because the Louisiana Legislature adjourned last week and we have our marching order for the coming year.

I see that most of you are from Florida and only a few are from Louisiana, so I thought that before we get too serious, I might tell you a story about some of the people we have to deal with on occasions in Louisiana. Many of them are from south Louisiana and live in the coastal zone, so when you get involved in public participation programs you have to learn a few of their stories.

It seems that Alphonse and Gaston were building a house outside of Breaux Bridge, which is in the heart of the Cajun country, and Old Alphonse told Gaston, he say, "Gaston, go down there to the lumber yard and get us some 2x4's." Old Gaston he go down there to the lumber yard and told that man, "Pardon me, I need some 2x4's." The man say, "OK, how many 2x4's you want?" Gaston said, "Goshdog, I forgot to ask Alphonse that." So he went on back down there and asked Alphonse, he say, "Alphonse, how many of them 2x4's you want?" Alphonse say, "We going to need about 150 of them 2x4's." So Gaston he went on back there to the lumber yard and he said, "Pardon me, I need 150 of them 2x4's." The man said, "All right, how long do you want them 2x4's?" "Goshdog man, I forgot to ask Alphonse that." So he went to ask Alphonse, and you know, Alphonse told him. Gaston went back once more to the lumber yard and the man said, "How long do you want them 2x4's?" Gaston said, "Pardon me, he said I want them 2x4's a long time; we're building a house, you know."

As you can see, things can get a little confused down there in Louisiana. What I might do briefly today is tell you what has happened relative to the development of our coastal zone management program. I suppose that administratively, as far as folks from Washington are concerned, we are going into our third year, as are most states. We presented a bill to the Legislature this year which would have established the management setup or administrative arrangements and authorities and boundaries which would have been the operating force in Louisiana. We felt that this would be healthier to do this year rather than next year so that we could gear up for the management phase. However, the Legislature felt that they would rather wait another year so we will have to do it without the guts of the legislation.

We formed what we called a study management team composed of four agencies: State Planning, Louisiana Sea Grant Program, the Louisiana Wildlife and Fisheries Commission and the Louisiana Coastal Commission. The Wildlife and Fisheries Commission is our present marine and coastal management agency which reviews and comments on Corps of Engineers applications, does marine research, and in essence, has an army of biologists and enforcement individuals out in the field maintaining the coastal environment. We also have the Louisiana Coastal Commission, a commission that in the past has dealt primarily with water resource activities surrounding the Gulf Intercoastal Waterway. These four agencies have worked over the past couple of years toward evolving the coastal management program, and along with the legal research section at Sea Grant, we proposed a bill to the Legislature.

This bill could have done several things. One, it would have placed the administration, what we call Section 306, in the Louisiana Department of Wildlife and Fisheries. We felt that this was important and Governor Edwards also felt that this was important because of the administrative and economic impacts of creating a new agency in government. Louisiana has recently completed a reorganization of state government and is in the process of consolidating agencies. So in that spirit, we recommended that Wildlife and Fisheries should be strengthened to handle the 306 Program and that the planning agencies and research agencies would be involved in continuing planning aspects. As of now, the State Planning Office has been designated as contact for Section 305 of the planning program. The designation for

306 will move from State Planning to Wildlife and Fisheries, which is where we feel it ought to be. So that was one significant point.

Another point I would like to make is that our Wildlife and Fisheries Commission has perhaps the largest review load of any state in the nation. Louisiana receives around 3,000 permits a year for review and comment and around 3,000 Corps of Engineers permits. In fact, 60 percent of all permits issued by the Corps of Engineers in the United Sates are issued in Louisiana. This is because our 10 million acres of coastal wetlands comprise 25 percent of the nation's total. So Louisiana, we feel, does have a great deal at stake in how its coastal resources are handled. As a matter of fact, we in Louisiana call our program the Coastal Resources Program rather than Coastal Zone Management. We don't want the terminology to frighten our citizens.

A great deal of activity exists on the Louisiana coast. In fact, as far as the fishing industry goes, we are the number one state in the nation in pounds of fish and shellfish production. It is because of the Mississippi River's extensive estuarine system that the delta has built up over the years. This is an extremely productive area. It is also an extremely active area as far as oil and gas is concerned. We have been interested in the new federal amendments, particularly those dealing with outer continental shelf development, because oil and gas production is moving further offshore. In the past we had a great deal of oil and gas development activity in the coastal marshes. Now production is moving offshore into federal waters where we have absolutely no taxing authority but at the same time are called on to support these industries. So this is one of the reasons that we have been so interested in it.

I might mention that we had recommended in our legislation that the state have a permitting authority similar to that of the Corps of Engineers for dredge and fill operations. We had hopes that we could make a federal consistency provision of Section 307 of the federal act work, which means that any federal activity, project or program permits must be consistent with the state's activities in its programs, to the maximum extent practical.

I suppose I have encountered one question more than any other: If we set up a program in Louisiana, will that mean that the Corps of Engineers are going to back off? The language in the amendments in Congress at the present time would clarify this point and specifically give the authority to the Corps to delegate this type of authority to a state which has an adequate program. We worked out a tentative arrangement with the Corps in which they allow the state to provide the initiative, leadership and actual decision on local and state matters, while they maintain the national type activities. We feel that is the way it should be. The Corps requires a permit for any construction in the marsh, even for such as a fishing camp, a boat dock, or a duck blind. Cease and Desist orders issued by the Army appear almost weekly in newspapers across the state. This angers local people who would rather deal with state and local government. Solving this problem will be difficult because traditionally we have had no support from state and local government. This is why we need strong guidelines for the agency to utilize. These are some of the things we are building on.

We plan to establish a permit authority within the Wildlife and Fisheries Commission. Presently this authority exists nowhere in Louisiana law. We can only comment on permits. Of course, policy has been that the Corps turns down any permits about which the state or local governments comment adversely and agrees with those which do not conflict with the national interests; however, the people in Louisiana would prefer a state and local permitting system rather than a federal system. I feel that if we pass substantive legislation in this coming year, we will have worked out a liveable arrangement with the Corps. The Corps has agreed to work with us but wants to refrain from any agreement until a permitting procedure has been established and approved by the Legislature. This year we passed a commission-type bill. In essence, it is a study commission with the charge to come back next year to

present the Legislature with a substitute bill dealing with boundary permits and agency designations.

Let me just move over to the map and I will explain. This dark black line is a boundary recommended in our legislation which is approximately five foot contour; in Louisiana this is generally a break between the wetlands and the nonwetlands environment. We based this delineation on research done through Louisiana Sea Grant. They considered all of the different biophysical characteristics of the area--saltwater content, species distribution, salt characteristics and other breakdowns such as salt, brackish, intermediate and fresh marshes and swamps. Based on the language of the federal act, we have delineated what we feel is a boundary acceptable to the federal government. A major point of controversy in the Legislature was the vast area included, about ten million acres. We had excluded New Orleans even though it is within the boundaries, and we had excluded what we call "fastlands," which are the areas that are levied off, drained, and developed. In essence, this excludes most municipalities. We are primarily aiming our bill at the wetlands in this area on the map. This area is the Atchafalaya Basin, the largest inland swamp (hardwoods) and delta in the United States. The area goes as far as the inland delta, but this area here is 77 percent dryland. For this reason, we use Interstate 10 as the cutoff. This is most of the wetlands and swamps in the Atchafalaya Basin. Lake Charles is here, and below are a series of game management areas and federal refuges along the coast. Over here are the Rockefeller Refuge and Marsh Island.

The bill that received final passage set up a study commission composed of the ten coastal parishes, or counties, which are the Gulf-fronting parishes including New Orleans. Each parish has one representative from their police jury (governing body of a parish) on the commission. The governor has ten appointees who include interest groups such as Oil and Gas, Outdoor Recreation, Ports and Shipping, Municipalities, and Industry and Environmentalists. The director of the Louisiana Wildlife and Fisheries Commission is final member of the commission. The balance of local government appointees versus the governor's appointees was a problem. Local government wanted the majority but the governor refused to have an imbalanced commission.

Louisiana's highly productive wetlands environment is quite different from those of other states. The Mississippi River, which drains more than one half the continental United States, has over geologic time built an extensive delta in southeast Louisiana. However, levees built in recent years to control flooding have resulted in deterioration of this delta and the extensive marsh system. This controlled river situation is causing Louisiana to lose 16.5 square miles of land a year. In addition, the system has robbed estuaries of their freshwater flow, which causes saltwater intrusion into previously fresh or brackish areas.

The legislation has proposed a one-half mile boundary from the Supreme Court decision laying out the land from which the state's ownership three-mile limit would be measured. The legislators agreed to the three miles, which would have been maybe one half inch on this map. However, federal law does not refer to mileage, rather to the measurable amount of seawater and intertidal basins. This limit inevitably would have left out 90 percent of the viable coastal wetlands in Louisiana. Robert Knecht from the National Office of Coastal Zone Management came to testify before the Legislature, and Congressman John Breaux also testified, but our Legislature was not convinced. Legislators were not concerned with using contours as measurement. They asked, "Why not the three footer, the four footer, why not the two foot contour; why the *five* foot?" Our answer was that the five foot is the one mapped and that it approximates the wetlands, drylands, and boundaries. However, the mileage concept was, in the end, what the Legislature agreed on.

Negotiating the boundary of the coastal zone is going to be our biggest task this coming year, that is, determining the area to be included in order to meet federal requirements. It

will be a year of negotiations between the state and federal authorities on the federal-state consistency question, as well as a year of developing guidelines to qualify for loans and grants under the Outer Continental Shelf Program. It will also be a year of negotiating between state and local governments. There was a tremendous battle in Louisiana with local government officials who did not want to be dictated to. We referred to the language in the federal law which permits local implementation but requires state criteria and guidelines and state enforcement of those guidelines. The local governments cannot receive more authority than the federal law allows. The state has to be in the program for the maintenance and enforcement of guidelines to prevent local governments from any violations.

Another point that is important is that the local governments are very lucky to have received end-of-the-year funding with OCZM. We will be able to provide funds directly to these coastal parishes so they can begin the development of their own parish coastal management program. Identifying their issues, goals and problems and solutions to those problems at the local level, we feel, is extremely important. Presently there is a little money available for them, and the interest in the situation is changing. We feel that this is very important. Previously they felt left out, not that they *were* left out. We had co-sponsored public participation in interest group meetings and elected official meetings all over the coast. Anyone can agree that this program is a good idea, but when a bill is written, i.e., put in the form of a proposed piece of legislation, it is often opposed. I would suggest that you in Florida who are working toward the same goals as we are in getting a program initiated should get ideas down on paper and begin negotiating on legislation. I recommend this because elected officials are attracted and interested in these plans. A most extensive public participation effort, which includes slide shows and presentations all over the state, have been going on for quite some time, and these have been well-received. However, when the bill reached the Legislature it failed because we did not have the meaningful approval of the key elected leadership, both local officials and state legislators. Apparently we did not work hard enough, so we will be going at it again.

One of the series of negotiations we have been involved in this year has been with federal agencies, the Army, Air Force, Navy, Coast Guard, Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Environmental Protection Agency. These meetings have been sponsored by the Southwest Federal Regional Council, a conglomerate of federal agencies brought together to address specific programs to assist the states. Willard Lewis, the regional director of the Department of the Interior, chairs these meetings. The Department of the Interior assumed the lead role since the Department of Commerce had no regional offices. Since that time, the Department of Commerce has set up offices in the federal regions, and Rick Montoya of the Department will assume these duties for Willard. These meetings have succeeded in identifying federal ownership in Louisiana by size and by classification of ownership and have clarified the federal decision making role in Louisiana. The initial data gathered showed that the Corps controlled around 250,000 acres of land in Louisiana. When the information was compiled and presented, even the Corps of Engineers was surprised to find that they controlled almost 400,000 acres.

From our meetings we have learned that federal agencies seem to want to work with states. They have been very cooperative, and I would suggest that it might be helpful to other states to work with the federal regional council in their respective federal regions.

In the development of our program we have utilized the assistance of various state agencies and state universities in gathering technical information. The Louisiana State University Sea Grant is doing a good deal of work in the biophysical and environmental characteristics and the writing of guidelines. We are also getting the legal research from the Sea Grant Legal Program. The University of

Southwestern Louisiana has worked with us on agriculture and forestry research, and we are also doing a characterization of the development of oil and gas industries in the south central part of the state around Morgan City, Louisiana, an area which is becoming an exporter of oil and gas technology, particularly offshore. Other universities from which we are receiving assistance are Nicholls State University and the University of New Orleans. UNO, until recently a branch of Louisiana State University, has an excellent planning school, the only one in the state, and a group there has done a characterization of the history and suggestions for future expansion of interface between growth in the urban areas and the wetlands. They are also studying the effects of shell dredging in Lake Ponchartrain on fishing and recreation, as well as the effects that hurricane protection devices such as levees and locks would have on productivity in Lake Ponchartrain and Lake Maurepas.

These are the areas the State Planning Office is and has been working in toward coordinating the coastal management effort. We are trying to involve local, state and federal agencies, as well as universities, interest groups, and individuals. If last year and the legislative sessions were an indication of what lies ahead, this should be an exciting year.

I appreciate being with you. If there are any questions, I would be happy to answer them. Thank you.

Daniel Penton
Bureau of Coastal Zone Planning
State of Florida
Tallahassee, Florida

Coastal Zone Planning

I want to give you a brief overview of how Florida has addressed the Coastal Zone Management program and then concentrate on where we are now and the kind of problems that we are facing as we approach the finalization of the State Coastal Management Plan and prepare for implementation of that plan. As George Allen indicated yesterday, anybody can plan and some people can plan well. Very few people have the inclination or the guts to implement what they plan. I think our agency does. I won't take the credit for this since I am a newcomer compared with the originators of the planning methodology and approach. The intent of the people who founded the CZM program in Florida was not to develop a plan for the sake of planning, rather, from day one, the intent was to set up a management system that could be rationally realized and effective in managing the coastal resources. You've heard people mention the Stratton Commission report off and on, yesterday and last night. The formal name of that group was the Commission on Marine Science Engineering and Resources. It was a blue ribbon committee established by Lyndon Johnson; I believe the date was around 1966. In 1968, and 1969 they issued a report called *Our Nation and the Sea.* This report is the single document that you can point to which turned the federal government around in dealing with environmental resources and resource management. Reading through the report you can see the basis, not only for the CZM Act, but for the National Environmental Policy Act and a full disclosure of federal agencies and the accountability of federal agencies. You can also see some of the 1976 amendments which were added to the CZM Act expressed in this document. I would like to mention a couple of comments from the Stratton Commission to give you some indication of the thoughts of the people who actually coined the term "Coastal Zone Management," and the intent behind their program. "The principles for the state coastal zone authorities were designed to include the concept of fostering the widest possible variety of beneficial uses so as to maximize net social return." I think that statement alone is a guiding principle that we in Florida have operated under. We are not an environmental program, we are not a development program, but we are a balanced, rational program for the allocation of our coastal resources. The second comment regards the concept that the coastal zone authority should be organized to prevent domination by State agencies charged with narrower responsibilities. As we enter into the phase of trying to define the State's existing management authorities and work out a relationship which will successfully meet the requirement of the federal CZM program, we find that is the single greatest problem we face. Very few agencies are willing to come forth and give up their legislative responsibilities. They are very prickly about this and it causes no end to the excitement that we face on a daily basis. In the presentation by Dave Worley you had an indication of the state statutes which established, in Florida, the Coastal Coordinating Council; the first effort at the state level in Florida to address CZM and planning. This was Chapter 370.0211 of the Florida Statutes and it set out four primary legislative directives and programs which have resulted in programmed efforts on our part. These planning efforts were directed toward development of the State CZM Plan, utilizing available federal money as appropriate. We were directed to conduct a continuous program of research concerning coastal problems. We were directed to coordinate this program with all levels of government and we were directed to make available coastal management information to any member of government or the public, upon request. This has formed the basis for the internal organization of our agency. As a result of some funding changes at the State level, the research effort, conducted over the last four or five years, has been cut back consistently. Our state legislature does not have a great deal of understanding or tolerance for the funding of research projects. Some of the causes behind this have been the number of research projects in the past which were poorly justified and poorly executed. As a result we all suffer.

We've seen the research/technical assistance program swing from primarily research to primarily technical support data management, which is reflected in the maps that we have generated and in all the visuals that you have seen off and on this year. After our methodology was established, which was basically a modified overlay system, we began to map the Coastal Zone in a manner that depicted the situation on the landscape and the way management and legislative actions affected these resources. The second thing that was done was to define a planning boundary. This boundary was a combination of the biophysical situation as well as some aspects of a political delineation, in that we used the census enumeration districts that most closely approximated the realistic physical environment that we were dealing with. The first test case or pilot study that demonstrated this methodology was done in this area. It was the Escarosa Study, which was a detailed, primarily biophysically oriented study dealing with Santa Rosa and Escambia Counties. This area was picked because it had most of the natural elements that we felt the coastal management program should address. It has also experienced some of the most severe problems that a coastal environment could experience. We, at the outset, determined that it was inappropriate to re-create data. We preferred to utilize data where it did exist and delve into the generation of new data only when there was a defined need. The first report on that effort was the Escarosa Study. Then, in 1971, a report to the 1972 legislature was completed and was called the "Coastal Management in Florida-1971." That study demonstrated that the methodology was appropriate, it did work, and we felt that it was time to move on to a State-wide basis. As of 1972 there was not one single source that one could go to that showed the physical situation in Florida, what we had in the way of coastal resources, and what we could afford to give up. There was not one single document that gave you the comprehensive picture. Consequently, in 1972, utilizing some old and new aerial photography, among other tools, we published the *1972 Florida Coastal Zone Management Atlas.* It had some errors in it because of the material that we were working with, but for the first time people could see what we had in the coastal zone and how the existing legislation, rules and regulations of state and federal agencies impacted upon these resources. Shortly thereafter, we published the *Recommendations for Development Activities in Florida's Coastal Zone.* This again, was an attempt to pull together in a single document the existing policies that were implemented on a day to day basis by state agencies. This had never been done before. Many of the state agencies knew what their policies were but they never bothered to write them down and we felt that it was impossible for a developer, for another state agency, or interested citizens to adequately react to a given development activity unless he knew what existing state policies were determining those activities. All of these efforts, were well received, but in 1972-1973 the force of the environmental awareness that swept the country was beginning to diminish at the state level. We were peaking out on our economic assets. The building boom was beginning to top out; we were beginning to get too many condominiums and the mood of the legislature began to shift. It made us realize that there were missing elements in the data that we were gathering which inhibitied a comprehensive presentation. We had not, up until that point in time, had the opportunity to consider environmental quality and socio-economic considerations and to plug these into our basic methodology. So we decided we would pick a test study area, in the same manner as the Escarosa area was chosen, to test the expanded methodology. The Florida Keys were chosen as the study area. The reason behind this choice was that the keys were subject to a great many development pressures, they were an extremely fragile and unique area as far as the state was concerned and something had to be done. In 1974 we published the *Florida Keys Coastal Management Study.* It indicated problem areas, it indicated a great deal of state and federal jurisdictional overlap, it indicated certain development potentials, it indicated certain

development constraints and it created an uproar. We like to feel that we have been fairly successful because, based primarily on that report, the Governor and Cabinet designated the Florida Keys as an area of critical state concern. We've been catching it over that ever since.

In 1974 the monies made available under the 1972 *Federal Coastal Zone Management Act* were first brought into the state of Florida. At that point in time we expanded our staff to accommodate the additional requirements in meeting the federal program and established a formal mechanism of working with local governments. In the cases that we handled, the biggest problem was that we didn't have enough money or staff to work directly with the 38 coastal counties and some 250 coastal cities within our planning boundary. The next best alternative was to work through the regional planning councils as instrumentalities of local government. This has been fairly successful the first two years and we're now finishing up our second year and approaching our third year. In the first two years the regional planning councils developed base line data on socio-economic considerations, land use, land ownership, support services, etc. They are working at the present time on an environmental quality analysis. They are assisting us in the development of areas of particular state concern and they are also working on power plant siting, deep water ports, and outer continental shelf activities.

As we enter into our third year, we are regrouping now from a standpoint of data collection and trying to develop a state coastal management plan that we can submit to the Governor and Cabinet, then to the Governor as Chief Planning Officer, and then to the legislature as required. In the third year, the regional planning councils will continue to be involved, but the extent of the involvement will be somewhat different from what it has been in the past. Their primary responsibility will lie in increasing the citizen awareness of the state coastal management program and assisting local government in meeting the requirements of the *Local Government Comprehensive Planning Act* that was passed by the 1975 Florida Legislature. We feel that a viable state coastal management plan has to be a type of two-tiered approach. There are certain areas where the state already exercises jurisdiction; areas such as submerged bottoms, certain wetland areas (the state has water quality certification responsibilities as a result of 92-500 federal laws) but there are certain adjacent areas which are important to intelligent coastal management and which are outside the states normal regulatory responsibility. We feel that the best, most efficient way to expand rational control and management over these adjacent areas is through local government. We don't feel that the state legislature is of any mind to create a greatly expanded state authority for managing these adjacent areas and local government does have the necessary tools for effective management programs. The one thing that we are hoping that the legislature will do is readdress the Local Government Comprehensive Planning Act, especially the coastal protection element, and put in some additional language and some specific requirements for consistency between the developing state coastal management program and the coastal protection element. I can give you some sort of overview of how we see the draft plan developing, and give you some idea of the steps that we need to go through from this point in time. I realize that I haven't addressed some of the impacts that were generated by the 1975 Environmental Reorganization Act, but from 1974 up through May 1975, the state agencies and the citizens at large were just beginning to understand how the state permitting and management system operated. The legislature decided it was time to change. Perhaps in two or three years we may again understand how the state management and permitting system works. It has created quite a problem for us. We've had to revamp our governmental authorities organizational charts and quite frequently when we talk with management agencies or regulatory agencies at the state level, they don't know what their legislative responsibilities are. That has created something of a problem. Our draft state plan will

consist of four or five chapters and I will list these briefly to give you some idea of the content. The first chapter will be dealing with the coastal management program in Florida, the historical overview and the intent and federal requirements behind it. The second one will be the proposed standards, policies and criteria that need to be established to have an effective state management plan, and within that, we would have a discussion of recommended priority uses in the coastal zone, as required by the federal legislation. A discussion of areas of particular state concern is also required. The third chapter will deal with the existing roles and responsibilities related to coastal management and we're presently working with a consultant group at the University of West Florida to develop a compendium of state and federal laws, local ordinances, and court cases which relate to coastal management. The intent behind this is to understand what tools are available to us now that can be brought to bear on managing coastal resources and not go out and set up an independent coastal management agency that duplicates activities already ongoing. We think that this is a more intelligent use of the resources. The fourth chapter would be a proposed state managerial networking and, in essence, is how the coastal management plan would be implemented at the state level. I have alluded to a two-tiered approach, with the state assuming certain roles in those areas which have traditionally been considered sovereign responsibility, and the local governments assuming the adjacent responsibilities. The last chapter would deal with continuing program development. We don't want this plan to be static. We want it to reflect the real life situation and we feel the only way we can do this is to establish a standardized method of updating the plan on a regular basis. This means updating not only the policy recommendations that have been developed jointly with citizens groups, regional planning council, and state agencies, but also maps and the supportative technical documentation that are important to local and regional planners as well as other state agencies. After we pull together a draft plan, then the fun really starts and I can give you sort of a step by step walk through on this. This is where we get into the political arena with both feet and I think it is appropriate to remember the story that Abraham Lincoln remembered in one of this biographies. It was 1863, the dark years as far as the union was concerned, in the Civil War, and they had just received information that the Union had won one of those rare battles. The soldiers around the War College were ecstatic, one soldier was esctatic and he ran after Lincoln and said, "Mr. President, I feel very patriotic and politically inclined." Lincoln was a little disconcerted with the apparent incongruity of the term politically inclined. He said, "I mean I either want to run for office or steal something." I think this is the attitude we have to keep in mind when we move to obtain state approval of the plan. We're beginning the third contract year under the federal program, and by January 1977 we will have a draft set of state policy recommendations on coastal zone management and a status report on how we intend to go through the development process as far as the Legislature and the Cabinet are concerned. This will be submitted internally for departmental view and then it will be submitted to the Governor and Cabinet for their review and instructions prior to preparing a final draft of the state plan. After we have received the Cabinet's instructions, suggestions, and criticisms, and have taken those into consideration, then we will develop the first draft of the state comprehensive coastal management plan and this would include published copies with pertinent supportative data. Then we will hold a series of public meetings, public workshops and finally public hearings as required by state and federal guidelines. Our intent behind having public meetings and public workshops is to attempt to reach those people who we haven't reached in the past. We have gone out of the way in the two years that we have been in the federal program to solicit all coastal community users input into the program. We have tried conscientiously to take their comments into account on a rational systematic basis. Most people don't

get concerned until we get right down and say, hey, we are going to regulate you or its going to impact you directly. We're going to try and flush out a lot of people from the woodwork before we get to the formal public hearing so that the public hearing would be nothing more than a perfunctory occurance. Concurrent with the public meetings we will be submitting our coastal management plan to the A95 clearing house process in an attempt to get as much public input at one time as we can and make the appropriate modifications to the draft plan. Then we will have what would be referred to as a "second draft" document that would again go to our departmental review. At that point, it will be placed as a formal item on the Cabinet agenda and will be submitted to the Governor and Cabinet for their adoption. We hope that we have taken care of all the concerns raised by the Governor and Cabinet as a result of their first review and there won't by any hitches there. After we have received adoption from the Cabinet, the plan will be submitted directly to the Governor as the Chief Planning Officer for the State of Florida. We assume that he needs to vote in the affirmative on the Cabinet action, so therefore, when its submitted to him as a planning officer there won't be any unforeseen problem. At that point, the Governor determines whether or not additional state legislation is needed, and if so, submits that plan to the legislature and recommends the action that they need to take in order to give us an implementation system at the state level. He will also, at that point, send an information copy of the draft plan to the Office of Coastal Zone Management. I don't know how long it will take the legislature to act. I don't know the kinds of actions they are likely to take. I've given up betting on the legislature. I lost a lot of money last year. When we get the necessary legislative action to implement the program, it will be returned to the Governor and then passed on to the Office of Coastal Zone Manmagement; and the Secretary of Commerce with the Governor's certification that the required elements of the Federal Act are met. Now one thing that is creating somewhat of a problem for us is the time schedule for the 1976 Coastal Management Amendments. I think these amendments are good; they are needed; they increase the funding level and I think all these things are fine, but they throw us into somewhat of an awkward period. I would like to point out the things that were specifically mentioned in the amendments which directly impact upon the planning process. They listed nine things in the amendments which have to be specifically addressed by the state during the planning phase and six of these have already been done, in reaction to the guidelines established by the office of Coastal Zone Management. I think we have a good start on the other three, but they will take some additional effort. The first one is management boundaries. This requires defining those boundaries which you intend to manage; permissible land and water uses, areas of particular state concern, means by which you intend to implement state coastal management controls, priority uses of the coastal lands and waters, including those of lowest priority uses, and the organizational structure for implementation. I think we have a good hand on all of these and there is no real problem. Now there are three additional things which requires some additional work from the standpoint of our planning efforts and these include planning for beach protection and public access and other selected environmentally significant areas, energy facility sighting, and associated impacts, and shoreline erosion. All of these things are included in our program planning efforts but not as distinct efforts, so they will require some additional attention.

In general, that is the status of our coastal management program. I know that we have a long road ahead of us and there is one main thing that I hope to get across to the decision makers. We have to learn to live in a way that will benefit the social environment as well as the natural environment. Remember one principle, "Nature Bats Last."

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An Application of Coastal Resource Management and Conservation

Introduction

Under the Reorganization Plan Number 4 of 1970, the U. S. Bureau of Commercial Fisheries became the National Marine Fisheries Service (NMFS) and was transferred from the Department of Interior to the Department of Commerce. The NMFS is a branch of the National Oceanic and Atmospheric Administration (NOAA) which includes agencies such as the National Ocean Survey (NOS), National Weather Service (NWS), and the Office of Coastal Zone Management (OCZM).

One of the goals of the NMFS is to restore, maintain, enhance and utilize in a rational manner, fisheries resources of the United States. Achievement of this goal is in large measure charged to the Environmental Assessment Division (EAD), an organization of which I am a part.

Mission, Responsibilities, and Work Opportunities

The Environmental Assessment Division's major mission is protection of fishery habitat. This is accomplished by reviewing, evaluating, and providing comments and recommendations on projects controlled or initiated by constructing, licensing, and permitting agencies. This task is undertaken by a total of 55 biologists and other professionals stationed throughout the country in five regions. The Southeast Region has 12 EAD biologists: 3 in the regional office in St. Petersburg, Florida; 3 in Beaufort, North Carolina; 2 in Panama City, Florida; and 4 in Galveston, Texas.

In accordance with our mission, numerous requests for commentary, suggestions, revisions, and recommendations concerning water development projects arrive each day. The primary user of our responses is the U.S. Army Corps of Engineers who seeks our response under provisions of the Fish and Wildlife Coordination Act. As an indication of the regional work load under the Act, the Southeast Region receives each month, an average of about 470 public notices advertising permit applications for work in waters of the United States. We are further involved in meetings with applicants, and in planning processes leading to new federal projects (channel deepenings, dams, for example) and maintenance of older ones (Pensacola Harbor, Mobile Bay, Tampa Bay, for example). Other agencies seeking responses are the Coast Guard, Bureau of Land Management, Forest Service, Federal Highway Administration, Nuclear Regulatory Agency, and the Environmental Protection Agency. The EPA for example, solicits commentary on an average of 150 National Pollution Discharge Elimination System Permits (NPDES) each month. Added to these totals are requests for review of Environmental Impact Statements, statements at public hearings, coordination with various state agencies, and review and commentary on Coastal Zone Management plans. On an annual basis, over 14,000 opportunities for response are made available in the Southeast Region alone. Obviously, we cannot respond to each work opportunity with equal alacrity and detail, and priorities must be set. The potential irreversible impact of a project on the Nation's living marine and estuarine resources is a major criterion determining a priority work situation.

Following determination of a priority work situation, two requirements must be met:

To specifically identify problem areas in relation to protection and/or enhancement of fishery habitat and,

To formulate constructive, innovative, and attainable recommendations designed to accomplish a resolution of the problems identified.

To fulfill the first requirement, we call upon personal knowledge, experience, and training. We will also involve

personal contact, coordination with other arms of the Service, or other agencies, such as the Fish and Wildlife Service (FWS), and searches of the literature. The second requirement involves the constructive interaction between our interests in protecting habitat and those described in the request for commentary and recommendations. Eventual resolution of a problem may involve negotiations, and occasionally a certain amount of verbal combativeness. In some cases it does not. As an indication of the former process, two abbreviated case-histories are presented.

Case History 1: Coal handling, spoil disposal, and maintenance of estuarine resources

In 1972, a prospering Mississippi seaport disclosed an interest in providing a site for a 526-acre combination coal and fuel oil handling facility. The harbor was a successful shipping center and the labor, finances, and social climate were generally favorable to such a project.

An industrially zoned upland site was available but the facility would also require filling of about 180 acres of estuarine waterbottoms and 50 acres of saltmarsh, and dredging of 10 acres of saltmarsh. These activities required a Department of the Army permit, and an application was made and circulated for review. Due to the size, location and potential impact on the human environment, an environmental impact statement was later prepared and circulated for review in early 1974. Responses to the statement were mixed. Local sponsors were aware that the facility could possibly be shifted to another location and urged that the permit be given priority status. They also notified their congressman who similarly urged resolution of the application.

Meanwhile, the Corps had been evaluating responses to the original application and the draft EIS. Facing a questioning analysis regarding the necessity of losses of some 240 acres of waterbottoms and wetlands, the Corps initiated discussions with the applicant that resulted in a revised application reducing the proposed losses of waterbottoms and marsh to 40 and 5 acres respectively. The fuel oil facility was deleted from the revised proposal. Recognizing these concessions, the Corps urged speedy commentary by the NMFS and other agencies. A discomfiting aspect was that a draft EIS of questioned thoroughness had been circulated and the final EIS had not. It also appeared that the facility was a small portion of a long-term, large-scale, harbor deepening. Wary of a piecemeal approach to planning, it was almost unanimously concluded that the role of the facility in the Port's long-range plans should be discussed, and in June 1975, and interagency workshop was formally proposed. By October 1975, the workshop had not been scheduled and the Corps sent telegrams to commenting agencies requesting final recommendations. The almost uniform reply was that a joint workshop would be held, that the final EIS was not at hand, and that current plans clearly depicted irreversible losses of 45 acres of estuarine habitat.

In December 1975, the workshop was held. The Port described its long-range plans in relation to the project. The developers of the coal handling facility described their needs. The EPA, NMFS, FWS, and state agencies described their concerns. A face-to-face encounter allowed each party to make its position, responsibilities, and needs known. It was agreed that problems associated with the permit application could be resolved.

One month later, in a space of one hour, the losses of 45 acres of waterbottoms and marsh were reduced to 10 acres of marsh. The 40 acres of fill was eliminated since the transfer of the coal to ships could be successfully and economically undertaken from a system of trestles and piers. It was also agreed that 15 acres of new saltmarsh would be created from uplands adjacent to the facility. The basic capabilities of the coal handling facility were unchanged. The originally proposed filling and dredging of 240 acres of marsh and waterbottoms were eliminated.

Following circulation of a letter from the Corps outlining

these conditions, uniform responses of no objection were received and the permit was issued. The final EIS filed with the Council of Environmental Quality included the alternative plan after which the permit was issued.

Case History 2: The bridge across the bay: Economics and ecology interact

By public notice dated October 8, 1973, the Corps of Engineers identified a project to dredge and fill in Mobile Bay, Alabama. Dredging was to take place to a depth of 9 feet below mean low tide to construct a barge work channel 139 feet wide and 6.9 miles long. The purpose of the work was to allow construction of a four-lane bridge for Interstate Highway I-10. Approximately 863,000 cubic yards of material would be removed by hydraulic dredge and was proposed to be placed on any of three wetland sites in a state park. Review of the notice and field inspections revealed that the dredging would remove about 18 acres of coastal marsh and 200 acres of shallow waterbottoms. Disposal of dredged material would bury some 200 acres of marsh.

Faced with these losses, a joint FWS and NMFS letter was issued in December 1973. The response detailed the value of the habitat to be impacted and recommended that construction be undertaken by building from the bridge itself, thus, obviating requirements for either dredging or disposal of dredged materials.

On March 7, 1974, participants at an interagency workshop discussed construction and disposal alternatives. The following disposal alternatives were considered: (a) refilling the work channel after construction, (b) open-water disposal in the bay and (c) use of Corps of Engineers' sites used for maintenance dredged materials from Mobile Harbor. The highway department however, concluded that disposal on the park represented the most economical method of handling the spoil although this would entail permanent destruction of 118 to 150 acres of marshlands.

Telephone and written communications by several state and federal agencies noted their understanding that the bridge could not be built from itself but reiterated that an environmentally less damaging spoil disposal solution should be sought. Another workshop was convened with the development of additional alternatives: (a) disposal in a borrow pit six miles from the bay and 150 feet in elevation; (b) use of the material to create a marina and convention facility in the bay near the city; and (c) use of nearby sites that were already diked or upland and held by various state, federal, and private property owners.

Following joint field investigations, an upland location near the site was purchased by the Federal Highway Administration, enclosed by dikes, and spoil from the work channel was pumped inside. Construction of the bridge began immediately following this action. Losses of wetland habitat were reduced to that removed by construction of the work channel. These losses were not regarded as irreversible since the channels would probably fill in over a reasonable length of time. It was also recognized that the work channel became the only access route across upper Mobile Bay at low tide. Generally too shallow for commercial traffic, the channel is used by fishermen and hunters utilizing the estuarine resources safeguarded by the habitat protection effort.

It is apparent that many of the problems, philosophies and viewpoints governing actions described in these case-histories will affect coastal zone management. The CZM Act provides that competitive interests be given a voice. Management decision however, should be made on facts and informed opinion. Writing in the May-June 1976 issue of *Fishersies,* Robert H. White-Stevens quoted Sir Peter Medewar:

> "There is a strange ambivalence abroad today in scientific and philosophical circles as if the insufficiency of precise evidence and man's reasoning

has curiously bestowed a paradoxical validity to nonsense."

We shall probably never overcome an insufficiency of precise evidence. However, answers to the following questions should diminish some of the uncertainty in the decision making process.

Research Efforts Of Value To The Management Process

1. Comparative productivity values of differing substrata and waters should be determined. For example, how much biomass or productivity would be lost by filling an acre of sand, mud, or marsh? Can this be turned into pounds of fish or shellfish or into dollars? Also, by knowing comparative values, mitigative measures can be specifically proposed. A counterbalancing might involve, for example, 3 acres of mud bottom being replaced by 2 acres of oyster reef on another mud bottom. Perhaps 1.5 acres of grass bed could be created on a sand substratum. Perhaps 3.7 acres of estuarine pond could be established on a comparable acreage of fastlands adjacent to the shore.

2. Comparisons should be developed that more fully describe contributions to estuarine productivity by marsh plants such as *Spartina patens, Distichilus* sp. and *Juncus* sp. to that of *Spartina alterniflora* at various elevations in relation to tidal inundation. Also, the elevation at which optimum growth and density of each species occurs should be determined. Again, answers describing pounds of fishes or recreational or commercial dollars based on their existence and perpetuation may be required.

3. Can impoundments of high marsh or upland be used as tools for mitigation and enhancement?

4. Can successional phases of a community be managed to produce greater output of desirable species or communities?

5. It is most probable that navigation channels act as passageways for subadult fish and shellfishes, especially in areas such as Mississippi Sound. Accordingly, are there acceptable or totally unacceptable dredging periods based on seasonal passages of estuarine dependent organisms?

6. Studies should be undertaken to describe various physical modifications that would increase marsh productivity. Cutting shallow channels through marsh vegetation, such as *Juncus,* to increase tidal flushing could become a fishery management practice.

7. Are there long-term effects (or problems) of placing oil and gas well drill cuttings and/or drilling muds in estuarine and marine waters although petroleum residues on the cuttings and muds are within water quality criteria limits?

8. We should know annual and seasonal average and minimum freshwater flows needed to sustain or enhance the present levels of production of oysters, shrimp, and other estuarine-dependent organisms. Answers to these questions could exert a powerful influence on coastal zone management decisions, mainly because of the competitive requirements of industry for the same fresh water.

In conclusion, we see the evolution of mutual consideration by both developmental and environmental interests. We are reminded that state and federal legislation has set forth the rules and thus the roles of this mutuality. The National Marine Fisheries Service acknowledges the challenges of this undertaking and will carry out its mission in an informed and equitable manner. By doing so, the concept of restoration, enhancement, and rational utilization of the fisheries resources of the United States will become a functional reality and a significant aspect of coastal management.

Planning:
Panel Discussion

George Allen question directed to *Pat Ryan:*
Pat, how does your CZM program handle, at the present time, such problems as the proposed use of the Bonne Carre Spillway for the release of waters through Lake Borne to enhance water quality.
Pat Ryan: For those who are not from Louisiana, periodically folks up North have to contend with a lot of rain and snow; but we in Louisiana have to contend with the *water* from that rain and snow. Periodically, we have flood stages that require some outlet in addition to the Mississippi River. Basically, there are two outlets. One is the Atchafalaya Basin that I mentioned to you. The Corps built it as a result of the 1927 flood and put locks on the Atchafalaya River. The other outlet is the Bonne Carre Spillway which is utilized to run flood waters from the Mississippi River through Lake Pontchartrain out to Lake Borne. They have had to use these-in fact, they used both of them recently in the 1973 flood that we had. What this does is change the salinity and productivity in the Lake Pontchartrain area. We felt that this short-lived decrease in production due to the large amounts of freshwater from the Mississippi River would, in the long-run, be beneficial due to the addition of nutrients. One of the disadvantages the spillways have is the fact that they (use the Atchafalaya Basin for example) reduce in capacity because when you let the water out into the basin, the rate of flow slows down, and a lot of silt drops out causing tremendous siltation in the basin areas. This causes two problems. One, from the Corps' standpoint, is that it reduces the ability of the floodway to handle flood waters. And, from the fisherman's-hunter's standpoint, it fills up a lot of the natural lakes and swamps and areas that have traditionally been outstanding hunting and fishing areas. In fact, there is a gradual filling of the basin from north to south; and as it fills, it changes from a wetland habitat to an upland habitat and is then available for things like agricultural production. So they pull the trees out and put in beans. This is something that is causing a lot of people concern. The Atchafalaya Basin Commission is trying to work out arrangements with the Corps and the Fish and Wildlife Service to protect this natural habitat here. In the Bonne Carre Spillway, after every flood, they let people go in there and haul out filled material. Again, there is a tremendous buildup of fill in there, but it's a situation that we are just going to have to live with and do the best we can with because without opening Bonne Carre or the Atchafalaya Basin, you are going to flood New Orleans. It is also the reason they put locks or dams up on Old River. Without that setup, the Mississippi River would have changed its course and gone down the Atchafalaya Basin isolating Baton Rouge and New Orleans. You would also have had a tremendous influx of saltwater up the river. So this is what the situation is with the flood control structures. They are required--in fact, even with them open, New Orleans really is on the brink of flooding. If a situation would arise where flood waters were coming down from the North and a hurricane were coming from the South, New Orleans would be wiped out. There are just not enough control mechanisms to handle that much water. As a geologist at Louisiana State University told me, he said, "Man, it is really a very dangerous situation. If that circumstance were to ever happen, there would be a tremendous loss of life and everything else in that area." So, basically, the reason the Atchafalaya Basin is so productive is because of the annual overflow that spills in there. We feel the same, as a result of Bonne Carre utilization for the spillway, about the park and range system. It does temporarily knock back the productivity of those people who require the salinity balance, but in the long-run, we feel it is beneficial.
Dr. Skelton: You know, yesterday, the first presentation we had was Dr. Tanner's. He mentioned, in passing, that New Orleans was sinking into the Gulf. At other times, several people who talked here at the symposium have mentioned the same thing. Now, as Planning Director of the State of Louisiana, what do you have in mind?
Pat Ryan: We've got a number of sinkage problems in

Louisiana. In Baton Rouge, some areas have sunk six feet in industrial areas. This is the result of extreme high rates of freshwater pumping in the industrial areas. It just changes the hydrostatic pressure holding the area up, and it sinks when you pull that water out. New Orleans sunk two feet in the past thirty years--again, from the freshwater pumping below the city. They don't have too much freshwater to pump out below it, but they get a lot of their water out of the Mississippi River. They have that type of subsidence problem in the outlying areas. New Orleans was built on a natural levee; and as the population has expanded, they have gotten further and further away from the natural levee. Because of expansion, marshes have had to be drained for subdivisions. Sometimes these areas will catch on fire because they are such high organic heat-generating areas. In order to develop this area, the houses have to be built on pilings. However, the driveways and sidewalks are not built on pilings. Therefore, everything sinks, but the house. If you drive around Metarie, you will notice that the older houses look like they were constructed on hills. However, they were built flat and everything else around them has sunk. Because of the sinking problem, gas lines will become dislodged causing minor explosions. This has happened several times in the outlying areas of New Orleans. Gas and water lines cannot withstand the sinking. Movement of the earth is also causing problems with the streets and sidewalks buckling. Dan Earl of LSU conducted a subsidence study, and he estimated an annual maintenance cost of $600 per year (per house) to maintain these homes built on unstable soil or wetlands areas of the state. You will see where some people have boards leading to their garage because their driveways have sunken and they cannot afford to reconcrete. The price of developing wetlands, I think, is becoming prohibitive.

Geraldine Bachman: **Does the managerial program include regulations and guidelines about where building can occur?**

Pat Ryan: Yes, we are designing so-called development guidelines with the University of New Orleans. We are looking at various studies that have been completed regarding the cost of development, both to the homeowner and the public.

Geraldine Bachman: **Well, what about responsible developments? Are they grouped in various categories?**

Pat Ryan: Well, we hear most from Harold Cook with the New Orleans East or Eden Isles type of development. They are trying to work with us, as best they can, to minimize damage, and they realize the obvious opposition they can run into. The greatest problem is the New Orleans area. Too, around Morgan City area, where there is a lot of oil and gas development, the city has not space for expansion without ring leveeing, pumping out and filling.

Amy Ferdinand: **You mentioned a seawall in the Lake Borne Area that we were discussing. How is this compatible with the Bonne Carre Spillway? Would it back the waters up in the Lake Pontchartrain?**

Pat Ryan: Well, there are provisions to open the gates to let the flood waters escape. The Corps of Engineers handles both of them. They would naturally not create a dam that could not handle the flood waters.

Bruce Johnson: **I've got a question, and I'd like to make a comment. First the quesion. Pat, I understand you to say that you have a supplement to your grant this year, and you were able to fund some parishes. Could you give us a sample amount for a typical parish because we are now looking at the same problem.**

Pat Ryan: We are talking about approximately $15,000 with the parishes putting up the matching funds. We feel by providing the matching funds and participating in the planning phase of the program, the parishes will feel more a part of our program. Twenty-two parishes are included in the coastal area. However, I don't believe all will participate.

Bruce Johnson: Have you got enough money for 15x22?

Pat Ryan: The amount of money distributed to each parish will depend on the wetland area in each parish. We are going to base the distribution primarily on the acreage of wetlands

in the parishes. Some parishes only have a small area.

Geraldine Bachman: With regard to funding local governments, I think that is one of the best ideas you can have when you are trying to develop your program. In the new amendments, there is a new provision on 305 called "Partial Implementation." It is, or it can be coded, 305 and 1/2. It is implementation money to implement certain parts of the program before the whole program is approved. It is like contingent approval for certain segments. You can get implementation money for that and it seems one idea to feed into the process in doing rules and regulations would be to try to get some of that early implementation money for local governments to develop and implement their programs. I know that in the state of Washington, that is the program that has been approved into 306 now. The money that they were passing through the local governments was really an important incentive to the state to get the program on line. It was so important that they had local government people in Washington DC lobbying to get that program approved, because they wanted that money at the local government level. I think that could be a very good handle, and I think that when you all come to Washington and give your views on the new provisions, that might be something you could think about.

Pat Ryan: I will agree with that. It is amazing when you have money available how this will change people's opinions.

Geraldine Bachman: It is a way to get at the whole political participation, or whatever we want to call it, effort, because the local government (that is really where the people are)--and the local people, when they can begin to see how they are going to benefit, that when they really start backing Coastal Zone Management.

Luther Skelton: You don't mean sort of a payoff?

Geraldine Bachman: No, I don't!

Pat Ryan: There was a lot of talk about the carrots, and they even mentioned bribes in the legislative testimony. One guy said, "Look, we want to know how big the bribe is before we've got to bite this business." They have a way of sort of getting down to rock-bottom issues there in the legislature.

Bruce Johnson: I wanted to elaborate on just one point that Dan Penton touched in our program. He mentioned the organizational structure to implement the plan, and this is the real toughy in the whole program. We got our feet wet in this in the Florida Keys in the very memorable public hearing down there that started about 7:30, a public meeting actually, and went well past midnight to standing room only audiences. We were presenting our findings. We had researched the various agencies controlling part of the marine and terrestrial resources in the Florida Keys. So we looked at them and went out and got the largest piece of paper we could find, and we started plotting the name of the agency, what they did, and what their authorities were. Then we went out and got another sheet, and we scotchtaped that to the other sheet. The thing ended up like a window shade. It would go from the top of the ceiling to the floor; there were 42 agencies from the federal level down to the local government level that were separately controlling, or managing part of the puzzle down there. We unrolled that in front of all these people and a "Conch" (for those of you not from Florida, Pat Ryan's got his "cajuns" we've got our Florida "Conchs") from the back of the room jumped up and shouted, "Never have so few been governed by so many," and he stormed out. This has been a real problem since the 1960's and continuing in the 1970's. Congress and the state legislatures, in other states and especially in Florida, have been spewing out agencies to solve a special problem that comes up. It's a reaction. Nobody has taken a big step backwards and looked at what we've done. So they're all stepping on each other. We try to consider each executive director. He is looking down a tunnel. There are so many things going on, yet he has got to mind his own business. As a result, he has tunnel vision. We try to take a picture of what he is seeing at the end of the tunnel, put it on a wall and then we get a mosaic. In effect, we see some guy saying the same thing three times. Well,

thats the guts of coastal management--to weed something out and to take an overview position. Let's streamline this confusion, and get a role for local government for regional overview, state, and federal roles and put it together.That's all I have to say.

Phillip Tallon: I am here representing the Florida Area Office of the United States Department of Housing and Urban Development, and we have a number of programs in HUD that may be related to some of the things you talked about here and this is what Bruce said, I guess HUD is taking some steps backwards in as much as we've done away with a lot of our individual consolidating programs. We have a new program that was created a few years ago called "Community Development Grant Program." It covers all the previous things that were separately covered under Urban Renewal, Open Space and Public Facility Grants and Loans and things of that nature. But I wanted to ask Pat something. I'm not familiar with the situation in Louisiana, but I have heard that you have some special provisions under the "Federal Flood Insurance Program" which is administered out of Federal HUD, particularly as far as New Orleans and some of these other very low areas are concerned. New Orleans, I understand, or at least a good portion of it, is below sea level. And I was wondering if you know of any situations in which any of the HUD communities have used development Block Grant Funds to cover any of these subsidence costs that are involved in development, either existing development or future development in relation to insuring development in low-lying areas, or so-called high-hazard flood areas, under the Federal Flood Insurance Program? And the reason I'm asking that is because I understand that in some places and in Florida in particular, which I guess has the bulk of the communities involved and certified under the Federal Flood Insurance Program, the coming about of the Federal Flood Insurance Progam has had an impact on the shoreline and the coastal areas, which is just the opposite from what was originally anticipated in that it sort of spawned some development, rather than having discouraged it.

Pat Ryan: Well, there is a tremendous amount of controversy over the Federal Flood Insurance Program in Louisiana. I'm not sure if it is a result of the extent that the communities are using the Block Grant Funds to offset these types of development costs. In fact, I sort of doubt that they could be. We've had a number of problems with it and with the Flood Insurance Program, particularly the mapping of what is and what isn't a flood area. They've utilized a lot of core data and information. We feel there is better information available that would provide the people in Louisiana with less hardship in development. Federal Flood Insurance people were in our office a while back. They're kind of frustrated with their efforts to get something going in the state; the Department of Public Works is the one that handles the flood insurance effort from the state standpoint, and they're sort of not doing it--not going after it too strong and hard because it is against their basic philosophy. They wanted us to get involved in the thing, and we told them "Well, we would be happy to help you if you would pay us to help you," but they didn't seem to have any money for us to help them with, so we just kind of told them to come back when they had funds. I can't see the Block Grant Program subsidizing homes that are in flooded areas or flood-prone areas, and this is the thing that they're having a difficult time with--laying out what are the flood-prone areas and what aren't the flood-prone areas. This is the area that we've got the problem with at the moment. We've done a great deal of mapping in soil-data and flood data information that's contrary to the maps put out by HUD. So, I don't deal directly with the administration of either the Flood Insurance Program or the HUD Community Block Grant Program. We are participating in the 701 Statewide--as far as the land use and housing--Program; but I know that there are severe problems with it, and we're trying, if HUD can come up with some funds to help. HUD wants to develop guidelines and manuals for communities to go by in implementing their flood insurance program which don't

exist right now. There is just a lot of confusion you know, on behalf of the people.

Luther Skelton: I echo that a little bit. I was in charge of the program in the state of Missouri when I was Director of Planning for the Department of Natural Resources there. One of the problems we had was that, frankly, we didn't get enough federal financial support to the state to make it worthwhile to really get into the Flood Insurance Program. We couldn't afford it. And I think that is one of the problems that you all are going to have to get through somehow. There is going to have to be some federal support for the states in order to make it worthwhile in terms of time and people.

Phillip Tallon: The Block Grant Program has really just gotten off the ground. Even though it's about two years old, we're really in the first implementation year, and we're beginning to see what communities are really doing. They really just got their funds a short while ago. In the state of Florida, the bulk of the funding seems to have gone either into housing rehabilitation efforts--which you all are not too concerned with here--or into things like drainage and public facilities, utilities and to a certain extent, into canal activity and things of that nature in the coastal areas. And presuming this program will continue, and it will get additional funding after the third year--and who knows what will happen if we get a democratic administration--we really might take off. We may see more funding going into these kinds of things.

Luther Skelton: It has to be one of the more important programs, federal programs involved in coastal zone management. There is no question about that, but I'm reminded of Bruce's view of the projected Federal Organization Chart on the wall, and how you (HUD) fit in the mosiac, and I guess we're all trying to figure that out. You know it is one of the things we've got to communicate more about--so that some kind of coherent view of the Federal coastal zone direction emerges.

Phillip Tallon: One final thing. We view the Flood Insurance Program and the Block Grant Program as a local program and decisions on how communities are going to use it are made locally and the community decides if they want to use it to correct some subsidence program or something else. You would have to figure out your role in relationship to that.

Pat Ryan: One of the reasons the states are not that much involved in this is because money is poured down to the local community and the states look at it as a local matter. I see weaknesses in that. I don't think it ought to be moved from a local problem to a state problem at all. However, having a 100 percent local program with zero state involvement, is not going to work either. I think the state could provide HUD and the communities with the needed data and mapping type things neither one of them have now.

Phillip Tallon: Well, this sort of points out the need for state agencies like yours and the other that are here.

Pat Ryan: It is going to take some money because no state agency anywhere in the United States will go out and spend their money to do it for you--unless they dearly love that kind of thing.

Phillip Tallon: And the regional agencies to get involved; they are doing that thing here in Florida.

Pat Ryan: About tunnel vision: HUD has just gotten a new brand of tunnelitis. The 701 program used to be a comprehensive program. Well, Congress beat them about the head and shoulders so they decided to concentrate on land use and housing. I have a Ph.D. Sociologist doing studies involving human resources. I advised her that under our HUD grant she could no longer work on human resources--she must concentrate on doing housing work. "But," she said, "It's important to the overall comprehensive view." I advised her that because of our HUD funding, she would have to work on housing or she would be out of a job.

Jeff Fisher: I would like to ask Dan Penton a direct question that relates to what Mr. Johnson was saying—by the way, I happen to be a "Conch" and I was at that meeting that

night—what specific mechanisms are being contemplated or are going to be tried to get all these state and federal local agencies with specific or narrower roles in coastal zone management to relinquish some authority and to get something done in a management sense?

Mr. Penton: We have about four or five suggestions or alternate ways of approaching the problem. One is that, at the present time, we are identifying the existing, regulatory authorities at the state level--those that will require the least amount of legislative tinkering to realize the comprehensive plan. It appears that the state level of the Department of Natural Resources with their coastal construction setback, their land ownership responsibilities and marina permitting or releasing; the Department of Environmental Regulations, from the standpoint of their permitting program and water quality certification program; and, the state Division of State Planning, which has the authority as a result of 1972 legislation to develop a comprehensive land and water management plan for Florida, are all involved. Now we can either opt to go with either one of those programs and build the coastal management program around that; we can operate from the standpoint of an interagency agreement or legislation to that effect, saying these people will meet together and reach broader-based coastal management decisions as a unit. I suppose, we could establish a separate coastal management agency which I don't think will ever happen in Florida. It is against our basic philosophy of creating additional layers of red tape. But basically, what we're striving for is to have a management system that utilizes what we have at hand and makes each of these agencies, which has narrower responsibility, cooperative through a vehicle of intergovernmental agreements, interagency agreements or a specific legislative act to, in effect, broaden their vision to incorporate economics for the social environment as well as say water quality. There's got to be some balancing there, that that's our primary approach right now.

Mr. Fisher: Will a citizen have to operate the way he presently does, going through three or four agencies to get a permit to build?

Dan Penton: No what we envision especially as it relates to Federal actions, is that with an approved coastal management plan, Federal actions, for example in the Corps case, they won't issue a dock permit or a dredge and fill permit for a project that is found to be inconsistent with the adopted and approved state plan. What we anticipate and would like to see in Florida would be a one-stop effort from the standpoint of a coastal management certification and permitting that would be issued at one point in time based on one application. Without coastal management certification being separate at the state level, you may get a permit from the Department of Environmental Regulations for a marina, but it its on sovereignty waters, you've got to go back to the Department of Natural Resources and get a lease to use that land or buy it or what have you. And so, in Florida, the Environmental Reorganization Act--which was intended to streamline the permitting system--really didn't do anything except shuffle people around. It is still the biggest mess you've ever seen from the standpoint of an individual application. A similar problem but in another area--fisheries--John Hall, maybe you would like to feel this. What is going to be the agreement among state and federal agencies in managing fisheries? Another question relates to your research items. I'm wondering about offshore fisheries' resources that might be affected by coastal activity. I noticed that all your research ideas related to estuaries, bays and marshes. What about snappers and groupers and other valuable offshore fisheries--codfish in the northeast.

John Hall: Well, the way I look at it, if we can streamline any of these processes its fine with me. I've got a territory that runs from the East Pearl River in Louisiana all the way through Mississippi and Alabama, both coasts in Florida and Puerto Rico and the Virgin Islands. That's all right, I have an assistant; a part-time secretary. If we can find some ways to handle these permit problems as they relate to

fisheries and other forms of natural resources, that's fine with me. If coastal zone management is going to do this, I'm all for it. Just in day-to-day operations, I find that this is a terribly complicated process, just trying to deal with people, because I don't think we're ever going to get away from situations where a permit will be required. And once we get into situations like this, tradeoffs of industrial municipal recreational activities for long-term naturally producing resource systems, we've got a serious conflict of interests. I think those interests must be strongly represented. I also have a slight problem in trying to get it all under one roof. Once it all gets under one roof, a person can find the pressure point in that roof, the whole building might come down. I do appreciate the way things work right now with the separation of power, because, frankly speaking, the state takes certain actions that we find incomprehensible. As a result, we'll strongly argue for permit activity at a federal level, and, in some cases, it happens. Most of the time, things go rather smoothly. So, I'm just a little bit worried about the pressures and implementation of it. Then your second question dealt with who is going to take care of the resources offshore. Well, we've got this 200 mile legislation, 200 mile extended jurisdiction business. I'm not too familiar with how we're going to implement the regulations and permitting involved in that. I would suspect that there will be a concerted attempt to try to license people in these areas and share the resources. One of the problems we have is that we really don't know what the populations are of fishes. We have rough estimations but we don't know how many kingfish there are, how many mackeral, how many red snapper. So when you're talking about managing something, you had better find out what you've got first. And I think there is some step made in this direction with regard to depleting resources like the blue fin tuna; we're getting an idea of what it looks like, but things like the red snapper; there aren't many red snappers out there. There is so darn much natural variation in population to begin with that we run into some serious problems just trying to make up our minds what kind of percentage of population change we are going to describe. So it's a tough, tough problem. I envision a greater role on the part of NOAA offshore, using vessels. The National Fisheries Service, for heaven's sake, has laboratories and a lot of people who deal specifically with these resources, and I think we ought to get their efforts involved in this too.

Luther Skelton: I had a question to tack on to some of the concepts that were mentioned here, John. You know it almost appears that commercial fishing is at about the stage of advanced food gathering in a historical sense. Now, as it makes a transition from a hunting and gathering economy in a highly diverse eco-system, sort of skimming off the top, to an intense farming system, and that system becomes extensive enough to begin to interfere with eco-system diversity, how will you preserve system stability. I wonder if you give this problem any consideration as you are developing your economic tradeoffs. Do you do that?

John Hall: We are talking about tradeoffs. We have seen in the past situations where a developer will come in and he will say, "O.K., State, I've got 400 acres here and 300 acres in Mangrove. If you will let met develop 150 acres, I'll give you 150 acres in Mangrove, which you can maintain for the joy of the people of the state." The way it works out, the way the legislation reads it, you do have defacto control, so we don't consider it as a tradeoff. Instead, if we see a situation like in this coal handling facility where the actual physical constraints of the facility require that they had to fill in 10 acres of salt marsh, well, we said "O.K. We're going to lose the productivity of a productive salt marsh grass for some time." And we said, "Why don't you build us some out there on these uplands? We are not going to build it on these lowlands. We'll just build some marsh in this area." They agree because the technology exists for building marshes, and after a few years, we are very hopeful that the productivity will return.

George Allen: All this talking we were doing about one-stop shopping for the permit application (i.e. one permit which

would satisfy the requirements of all concerned agencies)--I think the permit applicant is probably the most longsuffering, penalized, confused individual that there is in the United States today. All of us sitting here are talking about our bureaucratic processes and how difficult they are going to be. Woe unto us! I often times wonder how many times we have considered the position of a man who wants to put a fencepost or a lightpost out in his front yard and because it happens to be in front of a navigable waterway, he has to have a permit to dig a posthole. But, I don't think the one-stop shop will ever work. It's a utopia that everyone hopes for. Its not practical as long as you are dealing with human beings on boards such as we serve on. The human prerogatives are such that I don't want John Hall telling me how to design a bridge, and conversely he doesn't want me to tell him how to save an estuary. If I'm going to tell him how to save an estuary, I had better not do it in a public forum. I had better do it over a martini at a bar somewhere where we can sit down and talk as individuals and not representatives of agencies. Another thing that is against the one-stop shop is that you eliminate the check and balance system, and the check and balance system is entirely what this system of government is founded on. If John doesn't like something and I do, if I try to railroad something through then John tries to stop it; conversely, the other way around. If that system is destroyed, we are going to find ourselves not only environmentally but politically in a system I don't think any of us want to live in. Now with regard to his comment about the oil problem. Unfortunately, the Corps of Engineers has to write these confounded environmental statements even if the projects themselves are being built by a private enterprise. To a certain degree, we are stuck with the job of writing the statement. Congress has so directed. Now there are so many things that go into these environmental considerations that we wonder sometimes, is it our prerogative to comment on it? If the state is willing to do it, and its not a hindrance to navigation, should we bother with it? Is not this the state's responsibility? And if you don't think it is, you try to do something that steps on the state's prerogatives and see what happens. I don't believe the one-stop shop, as much as it is desired, will ever be an accomplished fact, and in some ways, I hope to God it never will, although it would certainly be convenient. Who wants to be a dictator? Do you Dan?

Dan Penton: I'd rather be King! George, I think maybe we have sort of a misunderstanding, but I know you well enough to know that maybe we don't. I think that in Florida, for example, at the present time at the state level we've got the damnest mess you've ever seen in trying to get an application through. There is no reason for it except legislative oversight. That is the only reason. When the state of Florida issues a permit under the present system, (for example, DER), and if it involves sovereignty lands, DNR goes ahead and issues a lease, that action is always affable and it can be affilable to the governor and cabinet for example. But somewhere, somebody in the state has to make the decision on the total action. Whether we do it at the permitting agency or somewhere else. We can have one agency issuing water quality certification, another agency issuing coastal management certification, a third administering dredge and fill regulations, a fourth doing land ownership of sovereignty lands, etc. Somebody at the state has still got to put those together, ultimately, to make a state commitment, be it pro or con. All we are saying is that it is easier to get that broader-based input in coastal management perspective, which the Straton Commission called for, at the bureaucratic level. If there aresome additional considerations, let the governor and cabinet or some elected policy board address those extraneous considerations to make the normal paperwork processing, bureaucratic input system as administerable as possible.

Geraldine Bachman: I disagree with George Allen a little bit, too. I certainly think that more streamlining is possible, and we're going to try for it. It's important to many of the states to do that kind of a job; we've got a project going on in

North Carolina to try and do that as part of their coastal management program. I think this is part of what we're all about here. I don't think anybody would argue that it's not needed and it's not time to try. It's part of our act and it's a good place to start. I certainly agree with the checks and balances, and I don't think it will ever disappear from our system. I think we have it, maybe not in the permitting authorities, but certainly in the different levels of government--local, state, and federal. There will certainly always be an override by the Corps of Engineers at the national level, as happened on Marco Island. There will always be the override in our own office with relation to a matter of national interest and security. So I think that we need that check and balance; I think we've got it and will continue to have it. But the streamline of the permitting process makes so much sense, and the time seems so right for it, from many points of view, and many states want to try it. I think we should try it.

Pat Ryan: Let me add a comment. Louisiana permitting is a major issue in coastal zone management. Really, if you look at the 3,000 permits that are issued each year, about 95-96 percent of these permits are automatically issued with no problems associated with them. The remaining three to four percent are controversial so to speak. I think that we have recommended sufficient appeals and an open procedure on all of them that the conflicting points of view would come across. I would never recommend any system where you have only one voice and all the battling and everything took place in the back of a smokefilled room and you never know whether it was a controversy or not. You just knew that the action took place. The system we recommended in Louisiana was that the Louisiana Department of Wildlife and Fisheries would be the permitting agency and the administrator for coastal zone management. The applicant would request a permit from Wildlife and Fisheries. As soon as Wildlife and Fisheries received it, they would send a copy to the local government and to the Corps of Engineers and anyone else who would wish to comment on it. There was a specific time limit involved for returning comments (20 to 30 days) and then a decision was made. The local government would make the decision. The local decision would hold unless there was some conflict with the statewide criteria and guidelines. If there was conflict, the state could override the decision. There was also an appeal procedure involved in any decision that local government or state government made. The appeal went to the commission we talked about. There was a balanced local government interest group body. Anyone who disagreed with the decision, either from the public or the applicant, made by the administrator or the local government, would appeal to this body and it would make a decision. If there was disagreement with the commission's decision, then it would go to court. I think streamlining is important, and we tried to design a system whereby the paperwork could be quickly handled.

Luther Skelton: We approached it somewhat similarly in Missouri. We set up a concept of lead agency that would do the same kind of thing in most cases. The only trouble we had occurred when we were faced with a commission or a constitutional body that had occurred when we were faced with a commission or a constitutional body that had a particular statute responsibility and then the system fell flat because of the inherent veto. It depended upon the issue. There were as many as six or seven possible vetoes through the process. I think it's time for some experimentation. I think, George, of the poor man who is trying to get a lightpole built and has to go to 18 different people to do it.

George Allen: Well, the problem is, has any system been devised where you won't have to go to 18 different people. You could be just changing names of a lot of agencies.

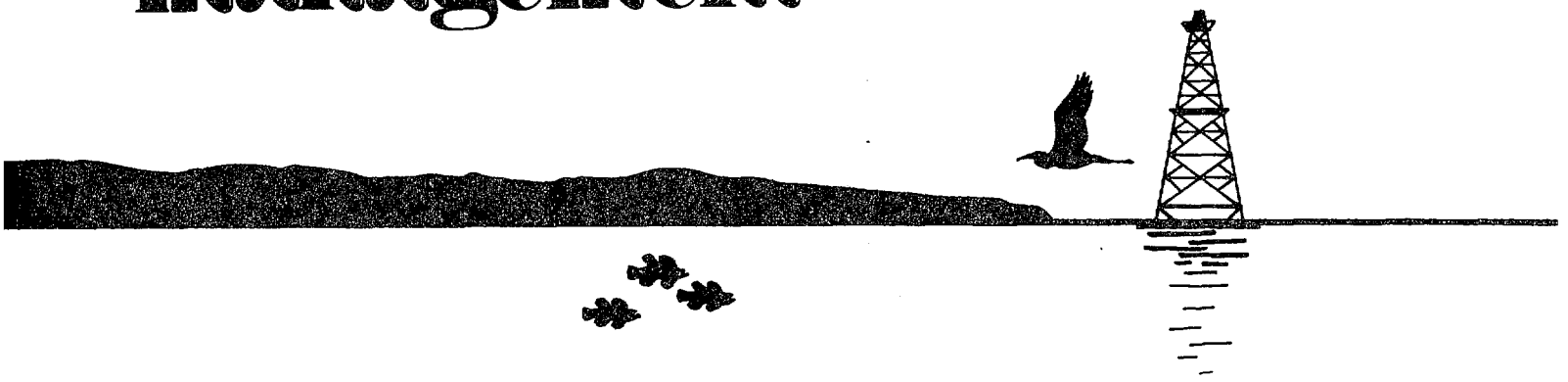
Luther Skelton: Well, one wonders why we need 18 different agencies to build a lightpole.

Phil Tallon: I couldn't resist commenting on this situation. Before I came back with the Feds, I would say for about the last 15 years, I've been operating at the state and local level and just recently up in the city of Baltimore we had a very serious problem with this business of getting permits and

reviews and things like that from quite a few different agencies--not only federal agencies--but state agencies--and I am sure this is characteristic of just about any place in the country. But we set up a--this involved larger projects, larger activities--dredge and fill permit review process and a coordinating program which made it possible for everybody to sit around the same table. Whereas previous to this, they were going to individual agencies and getting conflicting reactions, and things of that nature. The magnitude of this project was pretty extensive. It involved Bethlehem Steel's largest steel-producing plant in the country. It involved the development of a new containerization terminal for report administration. It involved dredging a channel which ran quite a ways down the Chesapeake Bay, including the establishment of a spoil disposal area which is probably going to create a new island in the Chesapeake Bay. It involved a multi-million dollar sewage treatment plant that was going to be built and it took about a two to two and one-half year period--and it was precipitated by a demand and I guess started with the Fish and Wildlife Service up in Boston and came through the Corps of Engineers to force the Port Administration to develop a plan. What the Port Administration viewed as a plan, and what the federal agencies viewed as a plan was about 180° different. We did manage to get this thing going and get it started. And as a result of it, the more critical things were freed up, and we managed to negotiate on both sides and enable some of these developments to go ahead with the same type preservation of the more critical environmental features that people were concerned with. Now this did not end up with a one-stop shopping permit office. The permits still came from the same places--the same people were involved--but it shortened the time considerably. It got everybody on the same wavelength. Maybe that sort of thing could be done.

Luther Skelton: That technique, as well as the one John Hall mentioned earlier as the workshop concept, is a good one for shortening permit time.

coastal resource management



Natural resource management has become a focus for much of the value negotiation characteristics of what has recently been termed the development/environment dichotomy. Whether or not this dichotomy really exists is moot; it does, however, resound behind much of the present day policy dialogue.

In this section of the symposium we considered off shore oil as a natural resource very closely related to both the energy shortage and the environment. Dr. Jerry Ham in his paper describes the role of ERDA (The Federal Energy Research and Development Administration). He restates the currently accepted federal policy which holds that off shore oil production is a necessity in view of the present energy shortage. Dr. Ham argues for further technological research which can make offshore oil drilling safer environmentally.

Dr. Sneed Collard, from another point of view, describes the delicacy and importance of the neuston community, a part of the marine eco-system , near the oceans surface. He indicates that this community among others, is very vulnerable to the effects of petroleum. Finally, he points out that the problem of oil, spilled or leaked into the oceans, may be the most serious problem to be dealt with by Coastal Zone Managers.

Dr. Skelton reconsiders the question of offshore oil production as a policy. He briefly traces the development of the present policy, then outlines a range of policy alternatives and projects and some of their possible alternative futures.

The discussion surrounding this section was relatively short due to lack of time. It was indicated that research results appear to be mixed regarding the deleterious effects of oil spills. In some areas there were no appreciable effects, in others, the effects were tremendous and long term.

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Introduction

The increase in the consumption of energy worldwide, and in particular in the United States, over the past twenty years, has caused the potential for serious national energy shortages.

In response to this acute problem, Congress established the Energy Research and Development Administration (ERDA) in January 1975.

ERDA is charged with the responsibility of initiating and coordinating with the private sector research, development, and demonstration (RD&D) programs, that will assure adequate supplies of energy for the future. ERDA is further charged with the responsibility of assisting the private sector in the development of these energy sources in an economical, environmentally and socially acceptable manner.

Figure 1 displays the actual, through 1975, and the projected, through 1990, consumption of energy in this country. Various solar, synthetic fuel, geothermal, and nuclear processes currently are under development, which will reduce our dependence on a rapidly diminishing world supply of oil and gas. Figure 1 shows that in 1975, 76% of our energy came from oil and gas. This trend will continue well beyond 1990 before these alternate processes begin to contribute sufficient quantities of energy to reduce our dependency on petroleum.

Between 1960 and 1975, the Nation's consumption of energy increased from 50 quads to 75 quads. (1 quad is roughly equal to the energy available from 175 million barrels of oil). By 1990 national energy consumption is projected to reach 115 quads per year, or more than twice the consumption in 1960. Although by 1990 the percentage of contribution by oil and gas will be reduced to 61%, the increased demand for energy will require that substantially larger quantities (70 quads) be available for this interim period.

During 1975 our petroleum imports averaged nearly 40% of our yearly consumption and 1976 will clearly exceed that mark as shown by Figure 2. This has severe impacts on national security, balance of payments, and public sector energy supplies. The nation is committed to reduce dependence on imports as rapidly as possible by increasing our domestic production substantially. Where are these large volumes of domestic oil and gas coming from?

There is a consensus that most of the future discoveries will be through exploration and development of potential resources under the Outer Continental Shelf (OCS). It is also conceded however, that the problems associated with the development of potential petroleum resources in these frontier areas are complex and a great deal of care will be exercised in their orderly solution.

The technology for exploration and production of offshore oil and gas reserves worldwide has been developed primarily by the U. S. petroleum industry, mainly at its own expense. Exploration and production in frontier OCS hostile environments (deep, rough seas and ice) will require extension of existing technology as well as new technology. Many evaluations, such as the University of Oklahoma's "Energy Under the Ocean," have discussed the past performance of the petroleum industry and its suppliers in demonstrating initiative, resourcefulness, and financial strength in developing basic technology to meet exploration and development needs. The historic self-reliance of the petroleum industry is being taxed by the compression of time schedules brought about by the urgent need for offshore oil and the additional research, development, and demonstration necessary to operate in the relatively unknown frontier areas.

ERDA has been designated by the Congress in Public Law 93-577 as the leading energy research, development, and demonstration agency and has been given responsibility to integrate and coordinate national efforts. This requires that ERDA address both technical and nontechnical constraints that may pose barriers to meeting energy goals. The legislative mandate requires ERDA to define those barriers that would restrict the availability of economical energy to the American public and which would provide less than

optimum benefit to the consumer. Hence, ERDA must consider transportation, resources, manpower, capital availability, public acceptability, institutional constraints, and environmental compatability, as well as selected technology areas.

The ERDA offshore program currently is in the definition phase. During the past year, ERDA has been conducting joint meetings with industry, government, academic, and public-interest groups to identify high priority RD&D projects which would help accelerate the development of offshore areas in a safe, reliable manner. Needs for RD&D activity in drilling and instrumentation development were identified early and programs were initiated in response to these needs. First, this paper discusses the ongoing projects, that is, the existing drilling activities and the ongoing instrumentation development. This paper also discusses the ERDA Offshore Technology Program planning activities.

Drilling Technology

Drilling, both onshore and offshore, is clearly a high priority area in need of improved technology. There are hostile "frontier" conditions in drilling deeper, higher pressure, hotter, more corrosive formations. In deep, rough seas, and in the Arctic, it is the drilling operations, including providing a place from which to drill, that are most dangerous and expensive. Drilling is the largest element of the cost of oil and gas to the consumer. Drilling costs have been rising steadily from inflation and additional cost increments will result from different frontier area conditions, as shown in Figure 3. It is the drilling operations, particularly exploration drilling, that causes the most environmental concern. The unexpected encounter of high pressure fluids is a major contribution.

A "breakthrough" in improving drilling cost and safety can be achieved if the driller can obtain real-time information on downhole conditions while drilling. ERDA is supporting, jointly with a number of oil companies, two field tests or demonstrations of such sensor and downhole telemetry systems. If successful, these projects will significantly advance the time at which this capability is available to lower the cost of drilling and reduce the risk of blowouts.

In another ERDA project, downhole drilling motors are being developed. These motors will provide much greater penetration rate and control than that obtained in a conventional drill-string operation. This increased efficiency is achieved by applying the drilling torque just about the bit, rather than on top of several miles of drill pipe. Here too, both cost to consumers and reduction in risk are major objectives.

In other projects, work is underway to improve fluids and drilling practice which will more effectively clean the hole and gain practical information on optimizing fluid pressure, weight on bit, revolution per minute (r.p.m.) and bit design and selection for ultra-deep drilling.

OCS Program Areas

Offshore oil production in the United States largely has been limited to the Gulf of Mexico and the Santa Barbara area of California. Fifteen additional areas of the Outer Continental Shelf have been identified as having good potential for substantial undiscovered reserves (see Figure 4). Each of these frontier areas has, in general, a more hostile environment than the Gulf and Santa Barbara areas. New technologies are required for safe, reliable operation in these environments. New shore based support facilities will be required to support the offshore development, many of them in the Arctic.

The urgent national need for accelerated development, the need to provide environmental and ecological safeguards, the need to supply petroleum products to the consumer at the lowest possible cost, the need to reduce oil imports dramatically, and the need to assist affected state and local planning groups in the socio-economic and environmental assessments required for planning and

decision making all contribute requirements which together exceed R&D requirements normally expected from Government and industry. ERDA's role lies in the development of RD&D activities to assist in the satisfaction of these requirements. Figure 5 reflects the program areas that have been identified and that provide the basis for ERDA planning in the offshore program.

Planning and Coordination

ERDA planning and close coordination of the offshore oil and gas program with industry and other Federal agencies is essential for the successful introduction of the technology needed to enhance development of the U.S. oil and gas reserves as well as striving toward National energy independence. This will establish and maintain effective lines of communications and accelerate the development of offshore resources in the most technically, economically and environmentally feasible manner within the near-term time frame.

This program activity will be conducted by ERDA, other government agencies, and industry participation in the definition and implementation of the following areas:

- Needs Assessment
- Technology Transfer
- Nontechnical Considerations (viz. Ecological and Socioeconomic)
- Coordination of Government RD&D
- Coordination of Government, Industry, and University Cooperation

The Needs Assessment area, for example will include conduction cost-benefit studies of drilling technology, definition of the state-of-the-art of offshore storage technology, identification and development of high-priority technologies that will reduce delay times associated with offshore development. Technology Transfer will include ERDA involvement in conducting and coordinating symposia and publications, and definition of joint-agency oil-spill detection and protection responsibilities and activities.

Data Acquisition

In the joint meetings mentioned previously and in all of the literature published on offshore development, there is a continuous theme of the lack of data and information. Some years ago the phrase "information explosion" was coined. A critic of this phrase said, "The information explosion is not here yet. There is an abundance of data available in the world but few people know where it is and no one has put it together to provide information." This appears to be part of the prevailing condition in the offshore technology field. State and local governments need information to perform environmental, ecological and socioeconomic assessments of offshore operations and their related onshore support facilities. The petroleum industry needs environmental force data (winds, tides, wave heights, sediment stability, etc.) to design safe, reliable structures and support facilities such as pipelines.

Current planning at ERDA includes the development of a data acquisition, analysis and dissemination system. This system would in no way duplicate existing systems, such as the NOAA Environmental Data Services, Bureau of Land Management, U.S. Geological Survey, etc. Rather, it would identify user needs, identify and index data sources and establish procedures to provide specific summaries of information to the requesting user organization.

In the frontier areas of the Outer Continental Shelf the requirements to gather the detailed data required for extensive development and operation was not previously urgent, as it is now. ERDA planning includes sponsorship of expansion of this frontier area data base, including the development of appropriate instrumentation as required to provide the diverse family of users with complete, relevant data sets in a timely manner. Provision of these data and information, with adequate lead time for planning should

minimize the development delays experienced in the past, due to decisions or indecisions influenced by the lack of reliable data. For example, as the industry moves into deeper waters (beyond 200 meters), additional new technologies are required. Figure 8 displays the range and potential distributions of reserves and the related bottom characteristics.

From the 200 meter mark (or the edge of the Continental Shelf) to the bottom of the Continental Slope, an estimated 30 to 35% of the potential resources reside. Much of the ocean bottom in this slope area is characterized by unstable sediment deposits. Structural design is highly dependent on the availability of detailed, reliable data on this new ocean bottom environment. ERDA, through Sandia Laboratories, has a substantial project underway to develop instrumentation and methodology for acquiring data on the ocean floor. Sensors, packaged to embed themselves in seafloor sediments when dropped from ships or aircraft, will measure on site properties, such as oil strength, pore pressure, movements (mud slides and motion in response to seismic events), along with wave and current data. Data will be partially processed, selectively stored and transmitted to the surface on command. Data from this instrumentation package will provide inputs to industry structural designers and will also be useful to other agencies such as the Department of the Interior in the development of standards for regulation, certification, and inspection. For example, a project has been proposed to develop and publish design recommendations for offshore structures, based on onshore earthquake experience. As data on seafloor earthquake induced motions are obtained, this design methodology will be improved.

ERDA also is starting a project that should be of great interest and value to those concerned with long-range ecological effects of offshore oil and gas development. Samples of Gulf of Mexico waters and shallow sediments from locations both near and remote from oil operations have been taken and analyzed for physical, biological, and chemical properties. The new project will make these raw data available to any interested investigator through direct access to a user-controlled computer system for analysis and interpretation of effects of oil and gas operations.

Testing Evaluation and Demonstration

ERDA's support and sponsorship in the OCS Test Development and Demonstration area is desirable to assist in the development of OCS hardware and technology that usually must go through the developmental process of testing, demonstrations and evaluation before they will be adopted for use offshore. Because the process of applying new technology involves substantial risks and cost, companies often form joint industry groups to acquire information and to develop, test, and evaluate equipment and procedures. Small contractors cannot, in general afford to assume these risks and often their use of new technology or equipment is delayed unnecessarily. ERDA's role in sponsoring test facilities such as laboratories, test wells, instrumented platforms, etc., has been strongly endorsed and encouraged by groups with various interests. Such testing has already become a useful tool to the offshore petroleum industry through the availability of facilities such as the David Taylor Model Basin. This enables systems to be verified and performance tested under realistic operating conditions. It also fills an important industry need and established a sound basis for cooperative efforts. Currently, Exxon is conducting tests, with a small scale test structure, over a six-month winter period in the Gulf of Mexico to develop oceanographic, meteorological, and structural data required for scale-up. This is a prime type of endeavor which ERDA might cosponsor over a two year, or longer, period so additional data can be acquired over an extended time period, which includes hurricane seasons.

This program area will consist of: (1) sponsoring common test facilities; (2) sponsoring a certified materials testing program; (3) conducting equipment evaluations; (4)

conducting laboratory and field demonstrations, and (5) coordinating joint industry programs.

Basic Technology and Advanced Concepts

Basic technology is required to develop a better understanding of the behavior of materials, mechanical systems, and biological systems in the OCS environment. The need for some types of advanced research, such as knowledge of the fate and effects of oil on marine biology, is urgent to minimize environmental road blocks. Advanced research is pertinent to OCS frontier areas scheduled for development. Two such projects are the measurement of Arctic environmental forces, and the development of effective methods for cleaning up oil spills in ice-infested waters. Other vital technological concerns related to development of offshore petroleum resources in the Arctic, have to do with ice formations and movement and permafrost.

Enhanced recovery techniques may have to be applied to the OCS to bring marginal-resource fields to a commercially viable stage. ERDA has been very active in the basic technology of enhanced recovery onshore. These tests generally are less that 100 acres in size and may be regarded as large pilot projects. Due to the variability of reservoirs, the ERDA program incorporates a sufficient number of tests to develop and prove technologies that are applicable to principal reservoir types. As results from these projects are made available, further evaluations will be conducted, preparatory to increasing projects to commercial size (several thousand acres). These techniques (if feasible) may be applied to offshore discoveries which are considered marginal for commercial development, thus adding previously unattainable oil to our domestic producton.

Conclusion

As the ERDA Program Definition Phase continues many technological problems will be examined to determine the appropriate ERDA role and funding permitting, projects will be initiated on a priority basis to assist in the development of the high-priority energy-resource area.

In conclusion, the urgent national need for offshore oil and gas in the near term time frame (1985-2000) has led ERDA to plan an RD&D program to assist the petroleum industry in the development of these vital resources. Particular attention will be paid to the environmental, ecological and socio-economic aspects of offshore development. We realize that data needs vary from region to region and we will welcome suggestions from all Coastal Zone Management Groups.

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The Surface Fauna of the Outer Continental Shelf of the Eastern Gulf of Mexico and Its Relationship to Oil Production

Whether planner or scientist, few of us know enough about the complex interactions between high seas and beach environments to be able to make accurate predictions regarding the form, magnitude, or impact of stress imposed upon one environment because of stress or perturbation in the other. While the open sea and the coastal zone are geographically and in many other ways distinct, the sea and its shores are but parts of a single system. I would like to persuade planners and managers among you that what happens to the environment over the horizon may ultimately have more far-reaching affects on the coastal zone than those short-term problems that plague the more proximate and highly visible beaches with which you usually work.

The sea is almost incomprehensibly vast, yet it can be divided into workable and real zones or realms defined by their physio-chemical, biological or even bathymetric characteristics. While my remarks today deal primarily with air-water interface, or pleusal zone, surface-to-bottom water column interactions are as important as sea-to-shore relationships. I shall introduce this presentation with a brief discussion of the subdivisions of the open seas.

The seaward edge of continental shelves occurs at an average depth of about 200 m. Shelf edges may occur near the beach (e.g. the Straits of Florida) or hundreds of miles offshore (e.g. TheArcticOcean). Hydobionts living in waters overlying the continental shelf are referred to as neritic. Shelf waters are turbit, green, brown, or red in color, and are extraordinarily productive. All of our major sea fisheries depend upon the health of the neritic zone, which serves also as the most immediately accessible sink for the residues of human activities. It may be relevant here to point out that what leaves the beach not infrequently, finds it way back...

Seaward of the continental shelf and the neritic environment lies the enormous oceanic realm of the ocean. Its waters are blue as the sky, and for the same reason: it is barren.

In the oceanic realm some four bathymetric zones have been recognized. The uppermost layer, or epipelagic zone extends from the surface to about 200 m. in depth. This zone is wind-mixed, and relatively homogenous with respect to temperature and salinity. Light intensities allow photosynthesis above the compensation point. This layer of water is also called the euphotic or eutrophic zone. Animals with which you are all familiar (jelly fish, tuna, whales) live in the epipelagial.

The mesopelgic zone extends from some 200 m. to 1,000 m. in depth. This layer includes the permanent thermocline and halocline. It is a layer of marginal light (the disphotic zone) and it supports an unusual and important fauna. Mesopelgic animals are uniquely adapted to migrate from great depths to the surface of night, where they feed upon the rich plankton found there. In so doing, they cycle energy and pollutants into deepwater eco-systems.

Beneath the mesopelagic zone lies the bathpelagical layer, which extends from about 1,000-4,000 m. in length. This zone is one of perpetual cold and darkness, and its included fauna is bizarre in comparison to what we are used to seeing. For purposes of this paper, suffice it to say that bathypelagic animals eat mesopelagic animals, and by so doing further cycle energy - and pollutants - into the deep. Beneath the bathypelagic zone lie poorly defined abyssopelagic and hadopelagic zones, discussion of which would not be useful here. It is obvious that the neritic realm influences and is influenced by the oceanic realm. Each of the vertical zones of the oceanic realm influence the entire water column. The shore is, sooner or later, affected by what happens in the ocean at all distances from shore, and at all depths. The cycling of energy - and pollutants - in the sea, is not (as popularly thought) a matter of fallout; it is an active process, that, if interrupted, could result in disaster in the ocean and its margins.

Keeping this almost heroically brief introduction to the classification of marine environments in mind, allow me now to return to the surface of the sea and the subject under consideration.

Regardless of salinity, the air-water interface of water

bodies is biologically referred to as the pleustal zone. Organisms that live on the surface of the water are referred to the epineuston; those that live partly submerged are known as pleuston, and those species that live just beneath the surface film are the hyponeuston. Organisms that live *in* the surface (or foam) are simply called "neuston" (e.g. bacterio neuston).

Species which live only at the air-water interface are "euneustonic;" those (e.g. mesoplagic migrators) that regularly visit the surface are called "faculatative neuston," and those species whose main population densities lie beneath the surface but include it comprise the "pseudoneuston." Planners will soon be familiar with these terms.

Marine neuston investigations began less than 20 years ago with the work of Zaitsev in the Black Sea. These investigations conclusively demonstrated that the marine pleustal environment was unique in all respects and that it is, without question, the most extensive and important nursery area on earth.

Zaitsev's studies and my own in the eastern Gulf have shown that 60-80 percent of all of the animals captured at the surface are crustaceans. Of these, half or more are copepods. Other common members of the neuston community are arrow worms, coelenterates, larvaceans, and larvae and juveniles of virtually all marine taxa. While a technical account of neuston systematies is not appropriate in the present forum, a single example will give you a feeling for the abundance of organisms that occur on the surface. It requires little imagination to understand how important these organisms are to marine food webs. At one station off the coast of Mississippi, I caught 849 million animals in four minutes, and a million or more animals per minute using a one meter net, is common.

With the recent increase in oil exploration, production and transportation comes an increased chance of accidents. Most at-sea petroleum related accidents, (including deliberate overboard spilling) occur on the surface, and it is the fragile neuston community that first suffers from the effects of this stress. It is not my purpose here to describe an oily disaster scenario, but I can tell you from personal observation, that the entire surface of the world ocean is covered with oil and tar, and that this debris is increasing in area and volume. Adverse biological affects of oil pollution notwithstanding, this material will begin to accumulate in the coastal zone at an accelerated rate. How will Florida planners react, for example, if oil is found below the Destin Salt Dome and piped ashore to a refinery in the Pensacola area? How will you prepare the coastal zone for a tanker breakup at the head of de Soto Canyon? Perhaps the greatest challenge facing coastal zone planners is for them to anticipate and take steps to mitigate what humans might do to the surface of the offshore sea. You will not be able to see, or taste, or smell the results---for awhile.

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A Range of Policy Strategies for Offshore Oil

The purpose of this paper is to describe some very broad *policy strategies* for the management of offshore oil in the outer continental shelf of the United States. These strategies are designed to span approximately the next decade.

The description of such strategies is not a task for "angels treading," and I am well aware of the risk of being assigned the opposite role. These strategies are very general and done in very broad strokes, but I think they can, to some extent, indicate some of our alternative futures with regard to this very important natural resource.

Policy strategy is not a term which is commonly used in the literature of political science, nor is it often used in the more recent and developing literature of policy science. It is indeed more related as a concept to the theories and activities of planning since it indicates a central concept of projection and a corollary concept of future alternatives.

We who are involved professionally in policy science in one or more of its many forms are often engaged in policy analysis or policy impact studies, or in attempts to describe for ourselves and for others what policy science is. These are valuable and important endeavors because they help us understand some of the reasons that we have the policies we have. However, these endeavors, while safe and often interesting, are also often sterile because of their lack of utility and lack of projection.

The concept of policy strategy is not missing from the literature of political science. Amitai Etzioni in his description of mixed-scanning strategy discusses a means of examining a potential policy direction. His method requires us to use long vision and is of necessity indistinct, but it does project.[1] Braybrooke and Lindblom with their science of "muddling through" use a shorter vision and show how policy is incremental and disjointed, but they do project, if only their own methodology.[2]

The description of policy strategy is supported by both of these two approaches to policy projection. We need to be continually aware that policy is dynamic and that it does not move with consistency over time; that it is in many ways a reflection of the human interactions which combine with existing and potential technology to bring it about. It is as often capricious and truly unpredictable as our human interactions and as filled with surprises as developing technology itself. Our view of policy strategy must be, in the end, an indistinct vision of a pattern of competing wills, past momentum, and technical opportunity. Broadly defined, the construction of policy strategy for the purposes of this paper is an attempt to outline a series of potential patterns of events related to decisions which may be made by commission or omission and which are constrained by logical patterns of past activities and potential developments. This method is one approach in attempting to rationalize decision making. It is one tool for viewing policy possibilities, and as are all such tools, is limited.

Background

We are generally familiar with oil as perhaps the chief source of energy in use today. It heats us, cools us, transports us, lights our homes, runs our factories, and with other hydrocarbons, provides us with clothing and building materials. We know that it is of limited supply but we don't know what the limit really is. Those of us who are somewhat familiar with the turbulent history of the oil industry are aware that the limited supply of oil and the unpredictability of its discovery have left an indelible mark on the industry, and upon its relations with the political system. We are

[1]Amitai Etzioni, *The Active Society, A Theory of Societal and Political Processes* (New York: The Free Press, 1968), pp. 283-306.

[2]David Braybrooke and Charles E. Lindblom, *A Strategy of Decisions* (Glencoe, NY.: The Free Press, 1963).

aware of the interrelated, very complex technologies which demand a high degree of coordination between all stages of production and distribution. Some have argued that this required high degree of coordination has led to a "natural monopoly" and that oil's particular market has required a different definition of free enterprise than the definition which fits the traditional market model of supply and demand. We are aware that this particular market system has let to the development of a few multinational corporations which act in many ways like nations have acted in the past. We are all aware of the energy crisis and our dependency upon sources of oil outside our national boundaries. This dependency has led to a complicated series of international events which involve United States foreign policy as it relates to the Middle East and to the conflict between Israel and the Arab nations.

We are aware of the necessity of becoming energy self-sufficient and we know that this means we need new sources of oil within the boundaries of the United States. A conference of *Americans for Energy Independence* (a group of energy experts, industrialists, citizens, and union leaders) estimates that the United States consumed 74.6 quadrillion BTU's of energy in 1973. Projecting the growth of the United State's energy consumption at a conservative 2.3 percent annually this group estimates a need of over 98 quadrillion BTU's by 1985. This is a very conservative figure and it represents a shortfall or a deficit of energy of between 21 and 33 quadrillion BTU's. This deficit, after all existing and potential sources are projected (wrongly or rightly), must be made up by a large new source such as nuclear energy or by imported oil. New statistics assume that oil consumption will increase to 10 to 14 million barrels a day by 1985. Mr. Frank Zarb, administrator of the Federal Energy Administration, indicates that exploitation of all our domestic sources of oil as well as development from other sources is imperative if we are to decrease our foreign oil dependency to 6 million barrels a day by 1985.[3] We are informed that about 50 percent of the undiscovered oil in the United States is located either in Alaska or off of our shores.[4]

The above is a very general description of our conventional wisdom about oil. The picture is far more complex in detail. We can be sure, however, that oil is a very crucial, very valuable resource and that we all share in its future. The future of oil may very well be our own, at least in the short run, and that future is tied closely with the oil that lies in the outer continental shelf. Because of where it lies and who owns it and how we get it, offshore oil has its own particular policy constraints.

Oil has been mined off the shores of the United States for many years. It is not a new phenomenon nor is it without a history of heated political controversy. When World War II ended, offshore oil was an important energy source and projected to become even more important. The question of who owns this oil was a serious issue. In 1945 President Truman decided that this resource was the property of the United States. Many states disagreed and even though the administration stated that the federal government was to be the only legitimate leasing agency, some states continued to lease the rights to this oil themselves. The problem was so intensely negotiated that it became a major issue in the 1952 election, during which Eisenhower promised to stem the power of the Federal bureaucracy at that very point. After the election the Eisenhower administration was successful in getting two pieces of legislation which seemed to resolve the problem. Oil resources within the three-mile coastal limit

[3] *The Christian Science Monitor,* Friday, June 25, 1976.

[4] David S. Freeman, *Energy, the New Era* (New York: Vintage Books, 1974).

and in some cases (particularly the Gulf Coast) within a three-league limit were the property of the state. Oil resources further out on the outer continental shelf were the property of the Federal Government and the leases to that source were to be made by the Federal Department of Interior. Most of the offshore oil was therefore legally retained by the Federal Government. The Department of the Interior was not slow to grant leases as they were a welcome source of federal income.

The method of extracting this oil, as we know, involves in most cases drilling offshore. Recently, drilling has been conducted far offshore. The oil is then piped or shipped ashore for refining and then the refined material is shipped for final distribution. Offshore oil production grew rapidly and in some states particularly Louisiana, Texas, and California, it became an important part of the economic structure. The dangers of offshore oil mining were not widely recognized until the disaster at Santa Barbara in 1969 when a major oil rig blew and dumped 235,000 gallons of crude oil into the ocean and along the beach. Many organizations, particularly environmental organizations, protested the dangers of continued offshore oil drilling and President Nixon appointed a special commission to investigate the Santa Barbara disaster. The commission recognized the danger and recommended that the oil resource be pumped dry as the only overall solution to the problem, and the only solution which would prevent further leakage. On the basis of the commission's recommendation, the Department of the Interior allowed unlimited drilling to continue.[5]

The Santa Barbara disaster focused on the environmental dangers of offshore oil mining using existing technology. Subsequent research has indicated, though not proven, that the dangers of offshore oil mining might be more serious than the pollution of beaches and the destruction of fish and fowl. There are indications that oil spilled in the ocean may become part of the delicate food chain in the ocean with extreme deleterious effects. Over 3,000 barrels of oil are discharged every year into the Gulf of Mexico alone as a result of offshore operations.[6]

Policy Strategies

There are several assumptions which we can extract from the conventional wisdom which relates to offshore oil policy. These assumptions are public beliefs which have momentum: (1) The total amount of oil available is limited; (2) Consumption of oil and our subsequent dependency on it will not decrease over the next 10 years; (3) Unless new domestic sources of oil are found, the United States will remain dangerously dependent upon foreign sources; (4) It is particularly dangerous for the United States to be dependent upon Middle Eastern nations for oil because oil can be used as an economic weapon in the conflict between Israel and the Arab nations; (5) Offshore oil is perhaps the greatest single potential domestic source of oil.

Policy Strategy 1

National emphasis is placed on the conservation of nonrenewable resources, particularly oil. A system of priority exploitation is designed which encourages the exploitation of particular sources over others for a predetermined length of time. Within this system offshore oil is assigned a low priority.

Primary Policy Controls

The Department of Interior reduces new offshore oil leases for drilling to zero, but continues to encourage

[5]David Howard Davis, *Energy Politics* (New York: St. Martin's Press, 1974).

[6]Freeman, *Energy, the New Era.*

exploration of potential offshore oil fields. This exploration can be encouraged either by: (1) Granting preleases to private corporations which require exploration, but which withhold exploitation privileges for a predetermined length of time, or (2) by developing government-sponsored exploration technology which matches or exceeds that of the oil industry.

Alternative Futures

1. Offshore oil remains a national reserve which may or may not have to be used for fuel depending upon the development of new technologies for energy sources.
2. The ecology of the coastal zone is protected from oil spills resulting from exploitation.
3. U.S. Government involvement in the regulation of private industry (particularly multi-national industry) is increased as the Federal Government becomes involved in the management of natural resources.

Policy Strategy 2

National emphasis is placed upon conservation of nonrenewable natural resources, particularly oil. A system of priority exploitation is designed which encourages the exploitation of particular sources over others. Within the system offshore oil is assigned a high priority.

Primary Policy Controls.

The Department of the Interior greatly increases the number of offshore oil leases being granted. The Congress and the Administration encourage the exploitation of these leases by creating tax benefits for private oil companies based on the amount of oil extracted from offshore sources.

Alternative Futures

1. Offshore oil may be depleted faster than other sources of oil leaving other, perhaps more convenient, sources for future use.
2. Because offshore oil may be depleted relatively rapidly the ecological damage to the coastal zone while significant, might be lessened.
3. Because of the cooperative aspect of the primary policy control there is the possiblity of a mixed future in which the basic policy strategy fails and there is an exploitation of all sources.
4. The U.S. Government involvement with private industry increases but not from a regulatory position. The Federal Government and the private industry jointly develop a natural resource policy.

Policy Strategy 3

National emphasis is placed upon conservation of nonrenewable resources, particularly oil. Focus of conservation efforts emphasis is the consumer and/or oil consuming industries. Traditional mercantile market economy of supply and demand is assumed to govern so that as demand is voluntarily decreased there will be more oil for future use. Offshore oil is exploited on the basis of the oil industry's market strategy and its various negotiations with the United States Department of the Interior, the United States Environmental Protection Agency and increasingly, the independent states which charge a rental fee for pipelines crossing state lands.

Primary Policy Controls

1. Federal and state publicity campaigns will focus on the consumer and encourage conservation.
2. Various tax breaks and penalties imposed on oil consuming industries encourage conservation.

Alternative Futures

1. Consumer response to the conservation campaign may be limited. Oil consuming industries respond to proportion to tax benefits provided. Real conservation of oil may be minimal.
2. Oil industry provided great flexibility to manage resource. Activities of EPA and state governments encourage industry to exploit land sources in preference to offshore sources except in those areas where offshore oil production is already well-developed.

Policy Strategy 4

National emphasis is placed upon discovery and exploitation of new domestic sources. Discovery and exploitation are viewed inseparably. Except for token programs to appease certain groups, conservation of nonrenewable natural resources (particularly oil) is not regarded as a real possibility within the current political and economic structures.

Primary Policy Controls

1. Increased federal dollars and technology are injected into the oil industry to help develop new technology for discovery and drilling of oil.
2. Environmental standards are relaxed where they seriously conflict with the discovery and exploitation of new sources.

Alternative Futures

1. Offshore oil discovery and exploitation increase as oil corporations are given maximum flexibility. Market considerations dictate priorities of exploitation.
2. Offshore oil is transferred either into immediate use or into the reserves of multinational corporations at an increasing rate as more oil leases are purchased. Offshore oil leases increasingly become a form of private reserve as the technology of oil exploitation becomes more developed.
3. Negative environmental impact is moderated to some extent by the need of the oil industry to maintain good public relations. This moderation can be measured by the extent of public information and understanding of the activities.
4. Multinational character of oil industry poses serious questions concerning national sovereignty as more natural resources leave the public domain of the nation and are transferred to the control of extranational organizations. This may become a major political issue.

Policy Feasibility

"Between the idea and the reality lies the shadow." This quote from T.S. Elliot perhaps better than any other statement defines policy feasibility. The reality of policy is a great mix of actions and counter actions. Many of these actions are known only to the individual actors. Many are the product of conflict negotiations between interested parties. Many are accidents and errors, some serendipitous and some unhappy. These actions share a shadow zone between design and fact.

To a great degree the feasibility of any policy strategy depends on the present policy. In the case of offshore oil we find it rather difficult to determine exactly what the present policy actually is. Offshore oil is the last major source of domestic oil which can be extracted at what is called a "moderate cost." We know that President Nixon embraced a general policy of energy independence. He ordered the Department of the Interior to triple the annual acreage leased on the federally owned outer continental shelf by 1979. In 1974 President Ford ordered an increase by a factor of 10 by 1975.[7] The assumption seems to be that we will exploit our least expensive domestic sources of oil (particularly the offshore sources) and when these are exhausted, we will exploit other more expensive sources until we run out of domestic oil. All the while of course, we will be exploiting other resources such as coal and developing new energy technologies which will hopefully be ready for us when the oil and the other nonrenewable resources are gone. This seems to be the national emphasis of our policy for offshore oil. Conservation of domestic nonrenewable resources does not seem to be part of this

[7]William R. Ahern, Jr., *Oil and the Outer Coastal Shelf* (Cambridge, Mass.: Ballinger Publishing Company, 1973).

policy. The argument that it might be reasonable to conserve our resources by using foreign sources is seldom heard. If our current policy is based on the uncontrolled exploitation of domestic nonrenewable resources then the feasibility of a policy strategy which emphasizes conservation of offshore oil seems slight.

The range of potential policy strategies I have outlined is defined to some extent by the degree of conservation of nonrenewable natural resources, particularly offshore oil, involved in the individual policy strategies. Based upon a projection of the current apparent policy, it must be assumed that the feasibility of these policies is the reverse of their listing with Policy Strategy One being the least feasible and number Four being the most feasible. But, of course, policy feasibility is a "shadow zone."

In designing the above strategies I have attempted to outline one method of thinking about a policy issue in terms of some of the decisions which could be made and what might happen if those decisions are made. I have based these policy strategies and their potential alternative futures on the conventional wisdom of what could be considered a reasonably well-informed public. There are obvious limitations to this methodology. It is general and, some might argue, oversimplified. I would be the last to disagree. It does, however, indicate some dimensions of a serious policy problem and may provide one more way of viewing ourselves as we go about making public policy.

Coastal Resource Management:
Panel Discussion

John Hall: Question to *Dr. Collard*
Do we know of any effect of oil spills on the Pleuston out there; have we recorded these and quantified any of these factors?
Dr. Collard: The people at the University of California at Santa Barbara found no appreciable deleterious effects directly attributable to oil, which was kind of strange, not anticipated at least. The major adverse impact of the oil spill off Santa Barbara was largely aesthetic and the detergents applied and the mechanical means used to clean the beaches caused the death of the organisms largely. The same was found in the Torric Canyon accident, but to the contrary in Massachusetts in the Buzard's Bay oil spill, tremendous deleterious and long-lasting effects were found both in the plankton and the penthos. As far as adverse effect in the open sea, I know of no studies that have ever been attempted to show adverse effects of oil. I think the bacterial studies now in progress will be the key to that, to find out just what place they are occupying in the food chain.
Mike Lopez: Question to *Dr. Skelton:*
In your policy alternative #1, *you mentioned oil*
In your policy alternative #1, you mentioned oil exploitation. Are there any areas in particular for exploitation that you had in mind?
Dr. Skelton: Yes, the question is how much it would cost. And we must use the term relative expense. It would cost more in the short-term to exploit remaining land resources. But this could be done.

conclusion

It was earlier mentioned that we hoped this symposium would clarify some problems in the policy-making process related to Coastal Zone Management. We feel that it has done so, primarily by re-emphasizing the need for balanced management and careful planning in the Coastal Zones. Perhaps the most pronounced demand for such planning and management is focused as a result of the conflict between human requirements for stability in the coastal zones and the natural dynamics of coasts. Beaches move, hotels do not (except as a result of hurricanes and other forces related to coastal mobility). There are no simple management techniques which can resolve this conflict which seems to go to the heart of the concept of Environmental Management itself. Also of great importance is the interrelatedness of so many of the problems in the coastal zones. Not only are these problems related to each other, they are also often related to values which conflict with each other over time. Beaches are permanently eroded because they are not replenished as they would be naturally, if rivers were not dammed to protect life and property.

These considerations and many others seem to point out once again that there are no simple solutions to complex environmental problems over time and that the demands for careful, well informed and balanced planning and management will continue to grow.

biographical information

George W. Allen
Corps of Engineers
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Mr. George Allen attended Michigan State University and Cornell University. He was a Federal Aid Coordinator for the Georgia Game and Fish Department. He was a Chief of the Division of Marine Resources in the Alabama Department of Conservation. He was a District Biologist in the Corp of Engineers in the Mobile District and he is currently a division biologist for the South Atlantic Division. Currently, Mr. Allen is consulting editor with the Journal of Environmental Education of the University of Wisconsin in Madison.
Mr. Allen's paper was entitled:
"The Role of the Army Corp of Engineers in the Coastal Zone."

Michael C. Applegate
Department of Environmental
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Mr. Applegate attended the University of Alabama, majoring in biology and is a graduate of the University of West Florida with a Bachelor of Science in Marine Sciences. He was employed with the Trustees of the Internal Improvement Trust Fund before the 1975 Environmental Reorganization Act. Then, he was transferred to the office of enforcement of the northwest district of the Department of Environmental Regulation. He is presently enrolled at the University of West Florida working towards his Masters of Science in Biology.
Mr. Applegate's paper was entitled:
"The Management of the Coastal Wetlands: Perspective, Enforcement of State Regulations Governing Dredging and Filling of Wetlands."

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Mr. Butt attended the University of West Florida where he received his Bachelor of Science Degree and his Master of Science in Biology. He has done extensive work as a research assistant at The University of West Florida, and was previously employed as a biologist in Northwest Florida for the Board of Trustees of the Internal Improvement Trust Fund, State of Florida. He is presently a Field Inspector for the Department of Environmental Regulations for the State of Florida.
Mr. Butt's paper was entitled:
"Coastal Development Along Estaurine Shorelines."

Sneed Collard
Department of Biology
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Dr. Collard received his B.A. degree in biology, an M.S. in zoology, and a Ph.D. degree in immuno-parasitology (1968) from the University of California, Santa Barbara; post doctoral studies were undertaken at Harvard University, the Woods Hole Oceanographic Institution, the University of Jerusalem, and the Steinitz Marine Laboratory at Eilat, Israel. At the University of West Florida, Collard specializes in biology of high-seas animals, with emphasis on mesopelagic fishes and neuston communities. Collard currently teaches oceanography, biological oceanography, evolution, medical parasitology, and graduate seminars in evolution and oceanography.
Dr. Collard's paper was entitled:
"The Surface Fauna of the Outer Continental Shelf of the

Eastern Gulf of Mexico and its Relationship to Oil Production."

John G. Cowley
Florida Shore and Beach
Preservation Associaton, Inc.

Mr. Cowley has been the general manager of the Santa Rosa Island Authority since 1951. He has been a resident of Pensacola since the early 1920's. His education was in Escambia County schools and was supplemented by further studies in accounting and business administration. Mr. Cowley is the President of the Florida Shore and Beach Preservation Association; he has been a member since 1959.
Mr. Cowley's paper was entitled:
"Beach Preservation and Restoration."

John Hall
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Mr. Hall attended the University of Iowa where he received his Bachelor of Arts degree majoring in zoology and freshwater ecology. He furthered his education at the L'Alliance Francaise School in Paris where he received his second degree. He received his Master's degree at the University of South Florida, where his major field was marine biology with emphasis on invertebrae ecology and behavior. Mr. Hall has written and co-authored several publications and manuscripts in his field of expertise.
Mr. Hall's paper was entitled:
"An Application of Coastal Resource Management and Conservation."

Jerry D. Ham
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Dr. Ham attended the University of Texas where he received his Bachelor of Arts degree and Master's of Arts degree in Petroleum Engineering. He received his Ph.D. at the University of Tulsa while working full-time for the Bureau of Mines, Department of the Interior, Bartlesville, Oklahoma. In Fall, 1971, he was transferred to Headquarters where he was responsible for managing Oil and Gas Production for the Bureau of Mines. In January 1975 he was transferred to ERDA by the Non-Nuclear Energy and Research Act of 1975. He is presently the Assistant Director for Oil and Gas for the ERDA.
Dr. Ham's paper was entitled:
"ERDA's Perspective on Outer Continental Shelf Development."

Daniel Penton
Bureau of Coastal Zone Planning
State of Florida

Mr. Penton attended Florida State University where he received his Bachelor of Arts degree and his Master of Arts in Anthropology. Mr. Penton has done a great deal of archeological field work including working at excavations in such areas as Leon County, Citrus County, Madison County, and Tallahassee. In addition, Mr. Penton has also written and presented several papers on the subject of archeology.
Mr. Penton's paper was entitled:
"Coastal Zone Planning."

Patrick W. Ryan
Louisiana State Planning Office
Director

Mr. Ryan attended Louisiana State University where he received his Bachelor of Science degree in Zoology and subsequently received his Master of Science in Fish and

Wildlife Management. Prior to holding his current position as Director of the Louisiana State Planning Office, Mr. Ryan was in charge of the statewide outdoor recreational planning for the Louisiana State Parks and Recreation Commission. Mr. Ryan has also been extremely active in professional activities and has held positions such as President of Louisiana Wildlife Biologists Association, President, Southern Council of State Planning Agencies. He is currently President elect of the National Council of State Planning Agencies.
Mr. Ryan's paper was entitled:
"Louisiana Coastal Zone Management Program Development."

Luther W. Skelton
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Dr. Skelton received his Bachelor of Science degree at the U. S. Naval Academy. He received his Masters degree and Doctoral degree in political science from the University of Missouri in Columbia with emphasis in Asian and environmental studies. Prior to joining the faculty of The University of West Florida, he was Director of Planning for the Missouri Department of Natural Resources. He is currently Assistant Professor of Political Science and Coordinator of the CZM emphasis in the Masters of Public Administration program at The University of West Florida.
Dr. Skelton's paper was entitled:
"A Range of Policy Strategies for Offshore Oil."

William F. Tanner
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Dr. Tanner received his Bachelor of Arts degree at Baylor University; his Masters degree at Texas Tech University and his Doctorate Degree in Geology from Oklahoma University. Dr. Tanner had commercial experience with such firms as Carter Oil, Shell Oil, and Exxon, as well as the Oklahoma and Arkansas Geological Surveys. Dr. Tanner has more than 200 professional publications and is a contributor to various encyclopedias. He has held various distinguished positions such as National Program Chairman, Geological Society of America, 1964, Vice-President National Highway Geology Symposium, 1960.
Dr. Tanner's paper was entitled:
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Mr. Worley is a Planner with the Florida Bureau of Coastal Zone Planning Department of Natural Resources. He is manager of the Remote Sensing/Cartographic secton. He received his B.S. and M.S. in Geography from Florida State University. His interests are in the practical application of remote sensing techniques as related to resource management problems, in particular as required for coastal zone management application.
Mr. Worley's paper was entitled:
"Remote Sensing Application as Utilized in Florida's CZM Program."

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