VIDEO	AUDIO
Film opens with bubbles, lights, then a mini-sub descending into darkness on a dive	(Sound Effects: machine noises and radio talk)
Sediment and the odd jellyfish pass through the sub's lights as it goes farther and farther down	NARRATION : (Comes in with music) Thirty miles off central Florida's east coast, on the edge of the continental shelf, scientists in 1975 discovered a series of delicate coral reefs that are unique in the world. We are just beginning to learn about them, because they lie hundreds of feet down in the Atlantic Ocean, swept by the Gulf Stream.
The sub approaches bottom	Pressure, darkness and strong currents make this a difficult place to explore, yet the deep ocean is becoming increasingly important not only to commercial and recreational fishermen, but to all of us.
Lights come on and reveal an Oculina reef	Reefs like this support dense communities of fish and invertebrates that are as rich and diverse as their shallow-water equivalents. And as we find even deeper marine resources, the tools and techniques we are developing now are essential for finding and protecting these fragile forests of the deep.
MAIN TITLES appear as if made of Oculina branches, and after reading time they are broken up and swept off	(music up)
Dissolve to: Black & White archive photo of a coastal cruiser in full sail	In 1851, the United States Coast Survey commissioned the first scientific study of Florida's coral reefs. Its goal was to describe and map areas which could prove hazardous to navigation.
Louis Agassiz image	Louis Agassiz, a world-famous naturalist, led the science team.

VIDEO	AUDIO
Close-up of Oculina illustrated in his report	One of the corals he studied was an inconspicuous variety called Oculina varicosa, which was illustrated in his published report.
Back to color : modern shots of shallow water-reefs	Oculina, and almost all the other corals known at the time, were what we now call shallow-water corals. Each is made up of tiny animals which secrete hard external skeletons made of calcium carbonate that often form elaborate colonial structures.
Closer views of shallow-water corals	A hundred years earlier, corals were still wrongly classified as plants, mainly because of their shape and the way adult forms are rooted to one spot. But there was, it turned out, an unexpected element of truth in this misconception. Many tiny coral animals contain even tinier plants, called algae. For the most part, shallow-water corals contained algae and built reefs, while deep-water, also called cold-water, corals did not.
More shallow coral reefs, emphasizing light shining down onto them	Well into the 20th century, it seemed as if, as long as there was enough light for photosynthesis, the algae provided the extra energy that the filter-feeding coral polyps needed to build bigger and better skeletons.
Camera moving down into dark water, and shots of some non-reef-building deep-water corals	Down where light from the surface disappeared, this symbiotic relationship disappeared too -- deep-water corals don't have algae partners.
Oculina reef	But when technology let us actually look into the deep ocean, instead of just dredging up broken pieces of the bottom and guessing about what they meant, we found reefs there, too. They were not as common as shallow-water reefs, but they were equally full of life.

VIDEO	AUDIO
An image of the Oculina illustration from Agassiz's report appears over deep reef footage	Two hundred feet deep off Cape Canaveral, here was Oculina coral similar to what Agassiz found, but without symbiotic algae, and forming dense underwater forests, which it doesn't do in shallow water. And there's another difference -- unlike shallow corals, deep-water corals are white and pale when they're healthy and brown when they're dying or dead.
Interview with John Reed - I.D. tag says "Marine Ecologist, Harbor Branch Oceanographic Institute"	JOHN: *Fishermen knew there were bumps out there, knew there were fish out there, but nobody knew that it was a living reef. It was just awesome to see this big, white mound of pure white coral sticking up off a flat, sandy bottom that was just covered with an incredible amount of fish. These deep-water Oculina reefs occur nowhere else on earth, as far as we know. We realized that they had an incredible biodiversity of fish fauna and invertebrates, very fragile coral .... They grow 10 or 12 centimeters long, about 5 or 6 inches long, and you can just take your finger and flick it, and they break. So they're fragile in that sense, and if you drop a heavy fishing weight on it, it would crush, and certainly if you dragged a thousand pound net over it, it would certainly crush. And at the same time, I had found out that there was a different type of trawl, bottom trawl that was made primarily to work on a rough, reef-type bottom, so it was my concern that this was coming to Florida, and so it was a very high priority to stop that coming on living reef bottoms. So in 1981 I submitted it to NOAA to be a National Marine Sanctuary and to Marine Fisheries to be a*

VIDEO	AUDIO
	Habitat Area of Particular Concern.
Interview with Grant Gilmore - I.D. tag says "Fish Biologist, ECOS Science Consulting"	GRANT: *Habitat is important for any animal -- they need it for feeding, they need a place for hiding from predators, they also need it for reproduction. And in this case, the Oculina Bank and the coral reefs there, we discovered were a prime spawning site for groupers. All the groupers went up into the water column over the reef, and we filmed them as they went up and came back down again. What we were using was a very special low-light camera called a "sit camera", and it intensified the light -- so some of these images you're seeing at 300 feet down, up to an hour after sunset, and we can still see the fish. In fact, I couldn't see the fish outside the submarine, but the cameras could.* *Most of the color patterns we see associated with spawning are not necessarily the colors you see when you catch the fish and put it on board the boat. We found that there were colors in the scamp that no one had ever seen before. One was the gray head phase, which was indicative of the male. For just a few seconds, he could go into this gray head phase and dive on a female, display to her, then WHOOP! -- right back to the brown phase that we typically know as the Scamp. So you had to be there -- you had to be there with the submarine to observe this behavior.*
MAP GRAPHIC showing the Florida peninsula	NARRATION: The scientists had found that one of Florida's most productive fisheries was connected to a deep ridge

VIDEO	AUDIO
	of Oculina corals -- also called Ivory Tree Corals -- running along an old submerged Florida coastline. The best reefs were concentrated roughly parallel to today's beaches, between Cape Canaveral and Ft. Pierce. In 1984, a small part of this area, known as the Oculina Banks, was declared a Habitat Area of Particular Concern by the South Atlantic Fishery Management Council and closed to bottom trawling. Bait fishermen could still anchor there, though, and use weights to send their lines to the bottom. Ten years later, as fishing got worse, the area was made an Experimental Research Reserve and closed to all bottom fishing or anchoring. But fish populations continued to drop, and in July of 2000 the Management Council closed a larger habitat area to trawling or anchoring. It was almost too late.
Interview with John Reed picks up again	JOHN: *Our initial research on the Oculina reefs kind of ended around 1985 due to lack of funding, so we had a hiatus of nearly 15 years, and 2001 was the first time I got to go back and see the reefs first hand. And it was devastating to me to see a reef that I had dove on in 1977 right off Cape Canaveral, and I saw that it was once thriving, living coral. I went back in 2001, and it looked like a bulldozer had gone through -- it was completely crushed. The hill was still there, but all the coral was completely crushed. There was no living space for any animal, and there were no fish -- all the fish were gone.*
Historic shot of Oculina reef full of fish. Camera tilts up to show more and more fish -- hundreds of them --	NARRATION: When they were discovered, these unique reefs, full

VIDEO	AUDIO
swirling around the lens.	of food and hiding places, were natural gathering spots for fish. But while scientists were learning about this important fish habitat, the rest of us were still under the impression that the sea was an endless resource and that fish could live pretty much anywhere. And the fishing industry, by targeting these particular concentrations of fish, was -- without realizing it -- destroying the reefs that helped cause the concentrations in the first place.
Underwater shots of trawl nets	People have always caught as many fish as they could. Now, though, there are many more people -- the world's population has doubled in the past 50 years. Now too, we have the technology to catch, basically, ALL the fish, and we might be doing just that.
Graph showing fish catch, then aerial shots of fishing boats	A hundred years ago, the whole world caught about 5 million tons of fish. By the late 1980's it was up to an incredible 86 million tons. People were fishing so heavily that the world supply of fish was being reduced faster than fish populations could recover. Smaller fish, and fish that had never been commercially important before, were now being taken, in a frenzy of industrialized fishing. And the numbers started to drop, down to 80 million tons in the 1990's. Today, More than three-quarters of the world's fish stocks are either at their sustainable limits or are being over-harvested, and several important commercial species, like the Atlantic halibut and cod, have been fished out.
Interview with "Laurilee Thompson, Manager, Dixie Crossroads Seafood Restaurant"	LAURILEE: *My father was a boat builder -- he built sport boats,*

VIDEO	AUDIO
	and he also built commercial fishing boats. And so, that's the world that I grew up in. My father back in the mid-1960's figured out that the best way to eat rock shrimp was to fix them like a lobster: split them down the middle, put butter on them, and broil them, and thus began the rock shrimp industry. I was running a grouper boat in the Gulf. We were basically doing the same thing to grouper stocks in the Gulf of Mexico that was happening to the rock shrimp over here. I got off the ocean, and I came into the very different world of the restaurant industry, and the peak year for landings on rock shrimp was about 40 million pounds. In just two or three years later, the catches were down to 3 1/2 million pounds.... and Dixie Crossroads ran out of rock shrimp. It was catastrophic to our business. Finally, the fishermen were the ones that kind of drew up their own plan. They agreed to the no-trawl zone over the Oculina reef area. Commercial fishing is an honorable industry, and it's part of the heritage of our country. When you go to Maine, what do you think of -- commercial fishing. The fishermen would have no problem at all in having coral reef areas identified, and they would stay out of them. Because they know now that those coral reef areas provide habitat for the very fish that they depend on to make their living. But closing off 90% of the ocean just because there might be coral there is not the right approach. The right way to do it would be to start doing more research on what's on the bottom of the ocean, and then put those areas out so that we can

VIDEO	AUDIO
	tell the fishermen: "Don't go here".
NASA vessel Liberty Star working on the Oculina reefs	NARRATION: Studying the ocean is no easy job. It requires taking scientists -- or at least, their instruments, to very hostile environments.
Aerial shot flying across the water from the Oculina Banks and tilting up at the end to show the Space Shuttle launch pad	Ironically, just a few miles from these deep coral reefs, one of the world's great scientific institutions has been doing just that for the past 50 years.
A series of different rocket launches	At Cape Canaveral, America's main rocket base sends scientists and their instruments into a different kind of ocean. As with undersea exploration, exploring outside the earth's atmosphere also must deal with creating pressurized vehicles for human crews and tough, reliable equipment that operates alone or by remote control where people can't travel themselves.
A view back toward earth as a rocket booster drops off	This kind of coordinated program is what we need to learn about the deep oceans of our blue home, and it would cost a small fraction of what we spend to explore planets much less important to human life.
Computer simulations of exploring Mars	We know Mars, for example, in some ways better than we know Earth. Even though the Red Planet never gets closer than over 30 million miles away, we have better maps of Mars than we have of the Oculina Banks, which are only 30 miles from Cape Canaveral.
Interview with Amanda Maness - I.D. tag says "MS Candidate, UNCW Center for Marine Science"	AMANDA: *The first thing we did in investigating the Oculina reefs was to conduct a multi-beam sonar mapping cruise. During this mapping cruise, it took us about a week to map over 88 square kilometers of the*

VIDEO	AUDIO
	Banks. My job was to take the raw sonar data and clean it up to produce a bathymetric map that looks like this.
She points to the map	*The purpose of the bathymetric map was just to identify where the features on the sea floor are. It identifies humps, bumps and depressions, and I know how deep each one is in the water column. But in order to tell what these geographic features are, I need to go back and "ground truth" the area. The way that I ground truth is with ROV video and grab sampling. This allows me to get a visual interpretation of what I saw on my digital bathymetric map. Grab sampling is when we lower a device to the sea floor, and we collect a sample of whatever sediment is directly below the ship at that point. It consists of a small clamshell that grabs some of the sediment below. In the end, I'll take my bathymetric map along with all the ground truth data -- the sediment grabs and the video -- and I will create a bottom habitat map. This will help us identify what types of habitat are present in the Oculina Banks and where they are. This helps scientists better make decisions about how to manage the area as well as what deep-water corals are all about.*
Interview with Andy Shepard - I.D. tag says "Associate Director, NOAA Undersea Research Center, UNCW	ANDY; *Most of the oceans are beyond the three mile state limit that states in the United States are responsible for managing. The rest of it is federal responsibility. That's about 99.9% of the oceans -- and most of the life on earth is in that area. You can't drag a net*

VIDEO	AUDIO
	through the water and pull up a bag of fish and say anything about where they're living or the condition of where they're living. There's far more deep corals beyond the photic zone than there are shallow corals. Oculina Bank is from 50 to 100 meters. It's an intermediate zone, and Oculina Bank should serve as a proxy for the work that needs to be done at deep-sea coral ecosystems around the world. And one of the advantages we have there is we can reach it. So we've now gotten, I'd say, about half the Oculina reserve area mapped, and we've got about , maybe, one tenth -- not even that: one hundredth of the Oculina habitat outside the closed area mapped. And that's a critical point, because as we watch this reserve, we want to know what's going on inside the reserve, because we want to see that it's working, but how are we going to tell that without comparing it to the area that's still open?
More scenes aboard the research ship	NARRATION: So far, studies of the Oculina reefs in and outside the protected areas have been few and far between. Tight federal budgets have limited the time scientists have to figure out how the reefs work and how well they are recovering. And instead of the highly maneuverable manned submarines that were used in the original research, workers now are making do with cheaper equipment operated by remote control.
Interview with Grant Gilmore resumes with Grant outside showing us his hydrophones	GRANT: *Of course, when we were on the Oculina reef, we were filming groupers spawning. When they spawn, they actually produce sound. Now, as the sun goes*

VIDEO	AUDIO
	down, we can't use the cameras any longer, so the submarines are not going to work. The fish are spawning at night, typically, and this is true of most fish. So, how do you record them in the darkness? One of the instruments we've developed is this hydrophone system -- an underwater microphone and a computer and a battery pack, which allows us to put an instrument in the water and record sounds. The sounds of groupers calling is diagnostic for the species, so we'll know which species of grouper is spawning, and not only groupers, but other fish as well. This unit here is good to 3,000 feet, and we can leave it on the bottom for several days, so we know who's doing what down there. One of the problems we're facing, not only with this project, but nationally and internationally in marine science, is lowering budgets for marine research. So most biologists, like myself, are trying to determine how we can study animals remotely with cheaper tools. This is unfortunate, because so much of the ocean has to be explored yet, and we're talking about food resources and all kinds of biomedical resources that we need to find in the ocean.
Interview with Andrea Bourdelais - I.D. tag says "Pharmacologist, UNCW Center for Marine Science"	ANDREA: *The terrestrial environment, or the land environment, has really been explored extensively. People go into the rainforests and go into the deserts and visit tribal communities to get biologically active plants, but the marine environment is a little bit different. There's a huge number of species of different types of organisms found in the marine environment. It's*

VIDEO	AUDIO
	also relatively unexplored. Coral reefs are also just of organisms found in the marine environment. It's also relatively unexplored. Coral reefs are also just loaded with marine species. They probably have the highest density of marine species anywhere. In the marine environment there are many organisms that are basically unarmored or don't have defenses. They often produce either very bitter compounds, bad-tasting compounds, or compounds that are toxic to protect themselves, that can either be drugs themselves or changed just a little bit and made into better drugs -- more medicines for humans or even animals. The overall focus of our research group here at UNCW is to kind of take these organisms apart and find out what types of compounds they produce, and so serendipity had it that we found this new compound -- it wasn't a toxin, it wasn't toxic even. Normally we would have just thrown it out! But I thought, well, why don't we just see what it does, so I did a fish bioassay -- it was non-toxic to the fish bioassay -- and I thought, well, let's see, maybe it's an antagonist to brevetoxin, and lo and behold if you gave brevetoxin to a fish, and you gave this new compound, brevenel, it actually prolonged the fish's life! So, what you find in marine organisms are very specific compounds that have very specific activities, so they do make very good therapeutic drugs.
Recovering Oculina habitat	NARRATION: Like land sanctuaries, protected areas of the ocean are, ideally, places where we can see how natural

VIDEO	AUDIO
	systems work without human interference. Among other things, this gives us a yardstick by which we can judge the effect we're having on resources we will continue to need in the future.
Back to Andy Shepherd	ANDY: *We really feel like we're starting to see trends out there in recovery of fish populations in the Oculina Bank, as well as coral populations in some areas. And keeping enforcement tight out there is going to be a key, because there was a poacher that was caught earlier this year, and he was a shrimper, and he was out there shrimping, so if we can keep them out I think we're going to see positive results from this closed area.*
Fishing activity	NARRATION: Keeping the area closed to illegal fishing, though, is easier said than done, because the places to be protected are well off shore. Even one net or fishing line can do enormous damage. And fishing for deep-water shrimp is done at night...
Night sequence patrolling with pilot Lt. George Waldeck FFWCC	(*We hear a bit of the dialog between the pilot and his observer as they use their infrared equipment*)
Interview with Richard Chesler - I.D. tag says "Special Agent, NOAA Fisheries Enforcement"	RICHARD: *Enforcement of the Oculina Bank regulations revolves around threats by commercial and recreational fisheries. We approach both of those differently. One of the methods that we use is at-sea patrols, by vessels such as this, the C.T. Randall, and we'll patrol areas -- not only the HAPC, or the Habitat of Particular Concern, but also the Experimental Closed Area -- particularly during*

VIDEO	AUDIO
	fishing tournaments or increased fishing activity. We detect violations of the Oculine Bank regulations practically every season, whether it be rock shrimp, recreational, or a commercial long-liner. And generally what occurs with these cases is that there is a monetary fine -- the highest penalty we've had so far is $50,000 -- forfeiture of any catch that was seized, which was several thousand dollars, and also permit sanctions of federal fishery permits for several months. And this prevents the fisherman from fishing ANY federally-regulated species during that permit sanction. In addition to at-sea patrols using patrol vessels, whether they're state or Coast Guard, we also have air patrols, usually in conjunction with the at-sea patrols, and the air patrols can be both overt and covert. And what I mean by that is that they can fly where they are noticed -- which is kind of a deterrent factor -- or they can fly where they are unnoticed, using different technologies such as Forward-Looking Infra-Red at night or other camera systems to detect possible violations of Oculina Bank regulations. And when they detect these violations, they can vector-in a patrol boat to make the stop. Since approximately October of 2003, the Vessel Monitoring System has been required on rock shrimp trawlers, and what the Vessel Monitoring System is is a satellite-based monitoring, that uses GPS satellites to send a position back to NOAA Fisheries Office for Law Enforcement, who monitors the VMS system.
Interview with Beverly Lambert - ID	BEVERLY:

VIDEO	AUDIO
tag says "Program Manager, Southeast Vessel Monitoring Service"	*VMS has been a very good enforcement tool for both State of Florida and National Marine Fisheries and Coast Guard outreach and patrol efforts to monitor that area. The position reports are received from the satellite communication providers directly to our server. It's kept protected, and it's kept archived for historical evidence and analysis data. This data is available to fishery plan managers, but it is kept proprietary because it is fishermen data. We now have about 1100 vessel owners under the Gulf of Mexico Reef Fish program. Compliance by the commercial fishing fleet has been about 80% compliance, with VMS now on those vessels. Unfortunately, there's the recreational side that is a resource that we don't monitor, so we don't know the damage or effect that they may have on that Oculina coral bed.*
Recreational boaters	NARRATION: The Oculina reefs were the first deep water coral reefs in the world to be given legal protection, and much of the world is watching to see how well (or badly) that protection works. And it will only work if every one of us -- recreational fishers and boaters as well as commercial operations -- know where the so-called protected areas are and understand the importance of leaving them alone. This is our last chance to give the corals, shrimp and fish which used to be so abundant there a chance to recover.
A montage of Oculina shots and other scenes covering the various topics we have seen in the film	There's a lot at stake on the Oculina Banks. The ocean is our most valuable source not only for food, but for potential new drugs and other organic

VIDEO	AUDIO
	chemicals we will eventually need. And these fragile forests are just the shallowest of a whole series of deep ocean habitats we know little about. We have a lot to learn, and we need to get going.
End credits	(Music up to finish)