

FY04 New Start

# Preliminary Environmental Analysis of Navy Seafloor Cables

## Y0817 Pollution Abatement Ashore Program 17 May 2004

### Investigators

NFESC, Code 427  
Phone 858 537-0255

NAVFAC, NFESC-07C  
Phone 202 433-5319

NFESC, Code 411  
Phone 805 982-1618

# Briefing Outline



- **Project Scope**
  - Case Histories
  - Objective
  - Need
  - Approach
  - Regulatory Drivers
- **Cable Types**
- **Cable Impacts**
- **Project Coordination**
- **Schedule**

# Introduction



- Permits and approval requirements have significantly increased for the installation, maintenance, and disposing of seafloor cables
  - Requirements not always based on scientific fact
  - California possibly being the most comprehensive for cable installation requirements as seen in the recent cable projects
- Negligible scientific data concerning short and long term environmental effects of seafloor cables (e.g. long term presence, buried and unburied and final disposition)
- Some regulatory agencies are requesting removal of out-of-service cables as a condition of permitting new or replacement installation



# Case Histories



- **Navy owned Seafloor Cable**

- FOCUS Cable Example – 2003/2004

- California Coastal Commission Permit Requirements

- **Commercially owned cable**

- Global Crossing – 2000

- California Coastal Commission Permit Requirements

- **Academic/Research Cable**

- ATOC – 1995/2001

- Located in National Marine Sanctuary
    - NOAA Permit Requirements

# FOCUS Cable Replacement



- **Fiber Optic Communication Underwater System (FOCUS)**
  - Runs between Pt Mugu and San Nicolas Island
  - Critical Communications component of the Pt Mugu Sea Range used for testing, evaluation, and training operations**
    - Radar and telemetry data are transmitted at high speed through the cable
  
- **California Coastal Commission believes the Navy's position to abandon damaged shore cables in-place is inconsistent with the Coastal Act to protect marine resources**
  - Provided Navy Conditional Concurrence based on project modification**
    - CCC requests Navy to remove bypassed damaged section of FOCUS cable within 1 year after the new sections are installed
    - CCC requests Navy to provide written confirmation to the Director of CCC that cables have been removed
    - CCC requests that the Navy remove FOCUS cable at end of their operational life or no longer used by Navy
  - Increased costs and project schedule for the Navy**
- **Environmental benefits of removal not clearly stated in CCC Consistency Determination**

**Possible opportunity to document the seafloor conditions before and after removal**

# Global Crossing Oceanic Telecommunications Cable



- Cable Shore landing near Grover Beach, CA then goes to Harbor Point Washington and cross Pacific to Japan
- CCC Special Conditions and Mitigation Measures for Permit included:

Resource	Issue	Special Conditions and mitigation measure
Marine Resources Marine Mammals	Whales may become entangled in cable, abandoned trawl nets may entangle and drown marine mammals or other wildlife	<p>Cable to be buried to 1.0 meter depth out to territorial seas (12 nmi) except where precluded by seafloor substrates</p> <p>Trained marine mammal observer on cable laying or support vessel</p> <p>Every 18-24 months for the life of the project cable route must be inspected to ensure cabled is still buried</p> <p>Cable to be removed after end of its service life</p>

# Global Crossing Oceanic Telecommunications Cable



Resource	Issue	Special Conditions and mitigation measure
Hard Bottom Habitat	Disturbance to sensitive, rare, and slow growing epifaunal species that reside on rocky substrates	<p>Cable owner to compensate for all project-related impacts to hard bottom habitat through payment of a compensatory hard bottom mitigation fee to be used to construct a new artificial reef or augment an existing artificial reef</p> <p>\$27.31 per square foot impact</p>
Commercial Fishing	Trawlers may snag their gear on cable that is insufficiently buried or exposed and thus lose gear and fishing time	<p>Cable shall be buried to a depth of 1 meter to territorial seas (12nmi) except where preclude by seafloor substrates</p> <p>Cable owner shall use all feasible measures to retrieve the trawl gear as soon as possible but NLT six weeks after notice of incident</p>
Liability for costs and attorney fees	Cable owner shall reimburse the CCC in full for all costs and attorney fees in connection with the defense of any action brought against the CCC challenging the issuance of this permit, the interpretation and/or enforcement of permit conditions or any other matter related to this permit.	

# Acoustic Thermometry of Ocean Climate (ATOC)

- Pioneer Seamount Cable (95 km)
  - Transmits data to shore
  - 2/3 of cable lies within Monterey Bay National Marine Sanctuary
- NOAA & CCC Permit Involvement
  - Burial
  - Monitoring
    - Ensure burial
    - Understand impacts
  - Program required to produce cable survey report
  - Results
    - Cable strumming
    - Unraveling Armor
    - Cable colonization



Cable Strumming



Unraveling Armor



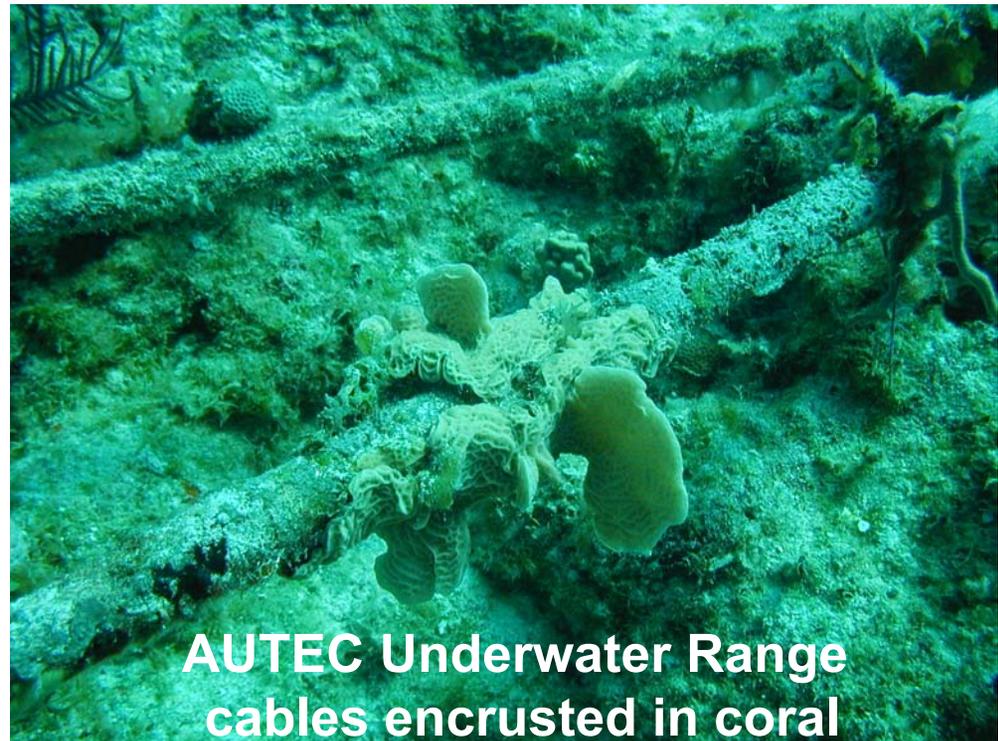
Cable Colonization

# Objective

Provide the Navy a scientific basis for making sound decisions, balancing operational and environmental requirements, concerning installation, operation and disposition of seafloor cables.

Secondary, supporting objectives include:

- to summarize existing knowledge, data, case histories and issues;
- to develop a framework of the overall problem and issues; and
- to outline future scientific efforts needed to address specific problems



**AUTECH Underwater Range  
cables encrusted in coral**

# NEED



1. **Support the warfighter (training & testing new systems)**
2. **Protect assets and ports (Navy Force Protection & Homeland Security)**
  - **Driving new underwater surveillance systems that require the laying of seafloor hardware and cable**

- **Underwater Ranges (7 existing ranges)**
- **New Shallow Water Training Ranges Slated for Both Coasts**
- **Anti-Submarine Warfare (littorals & fixed deepwater)**
- **Centurion**
  - Underwater Harbor Protection
- **Underwater Swimmer Detection System (USDS)**
  - Underwater Harbor Protection
- **Hydroacoustic Data System (HDAS)**
  - Nuclear Test Ban Treaty

# Approach



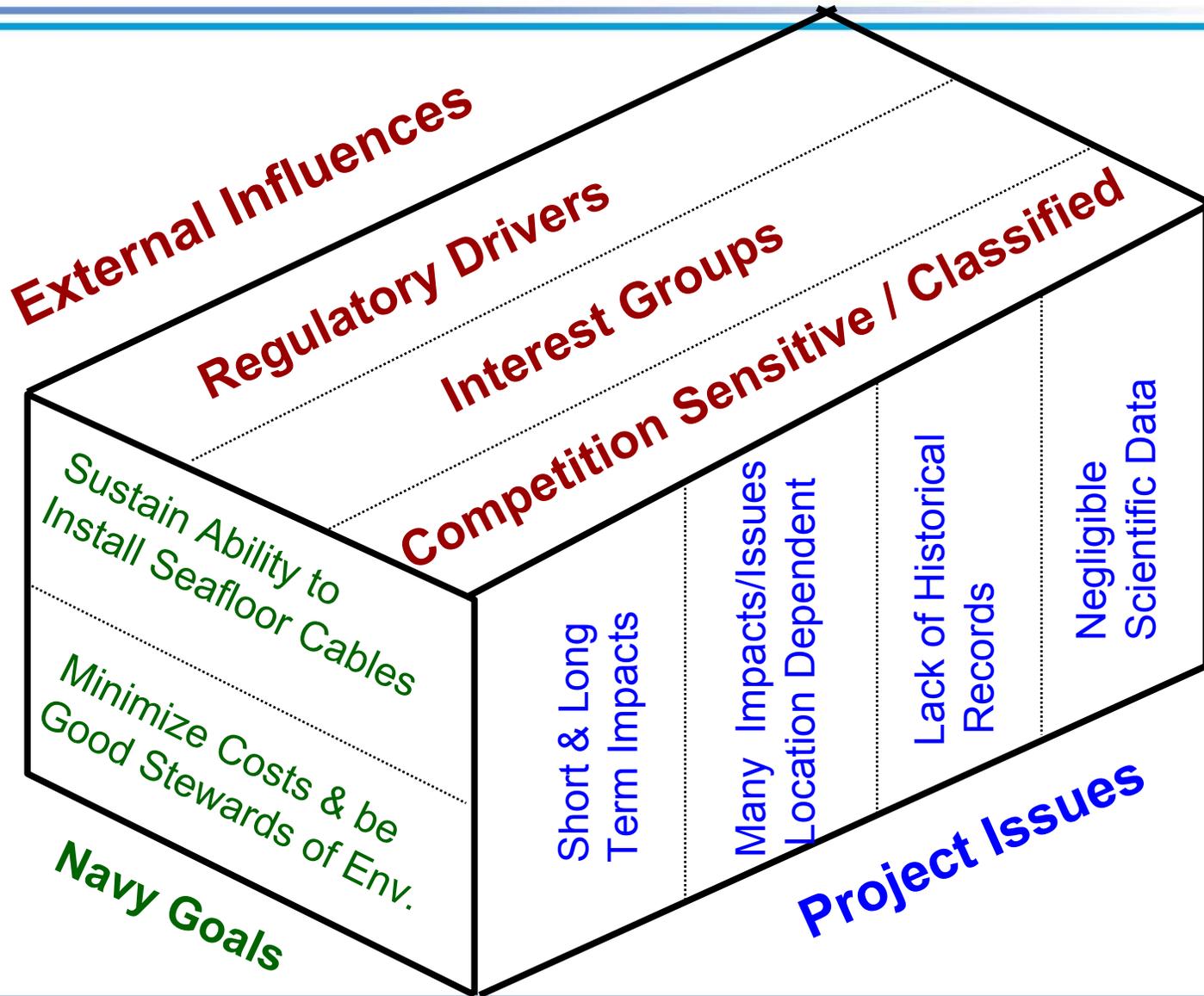
- Investigate and understand the material components used in Navy seafloor cables.
  - This will include looking at past, present, and future (if available) Navy seafloor cable designs
  - Assess the materials used in Navy seafloor cables for their potential to adversely impact the marine environment
- Investigate Navy and commercial practices for seafloor cable installation, removals, and justification for abandoning in-place after their operational lifetime
- While this effort is directed at Navy interests and requirements, the experience and data available from the commercial telecommunications industry will be included when applicable

# Regulatory Drivers/Issues

Issue	Regulatory Driver	Mitigation
Approvals/Permit	Coastal Zone Management Act (CZMA), National Environmental Policy Act (NEPA)	N/A
Coral	EO 13089 Coral Reef Protection	Avoidance, horizontal directional drilling, possibly artificial reef construction and monitoring
Marine Mammals	Marine Mammal Protection Act (MMPA)	Avoid offshore activity during migration and breeding Shipboard mammal monitors and protocol for crew awareness and avoidance
Threatened & endangered species	Endangered Species Act (ESA)	Pre-construction surveys
Bottom habitat (seagrass, eelgrass)	CZMA, NEPA, Marine protected areas, National Marine Sanctuaries	Pre-construction surveys Surface lay cable, re-vegetation
Commercial Fishing	Cable could snag fishing gear Liability issues	Avoidance and Burial

**EQ: 1.II.02.d - regulator approved and protocols for conducting marine and terrestrial risk Assessments**

# Scope of Environmental Analysis of Seafloor Cables



# Harbor Defense Seafloor Cables



- Harbor Defense Cables are 1950s generation communication and power cables
- Materials
  - copper wire
  - dielectric material
  - mylar tape
  - synthetic resin
  - galvanized steel

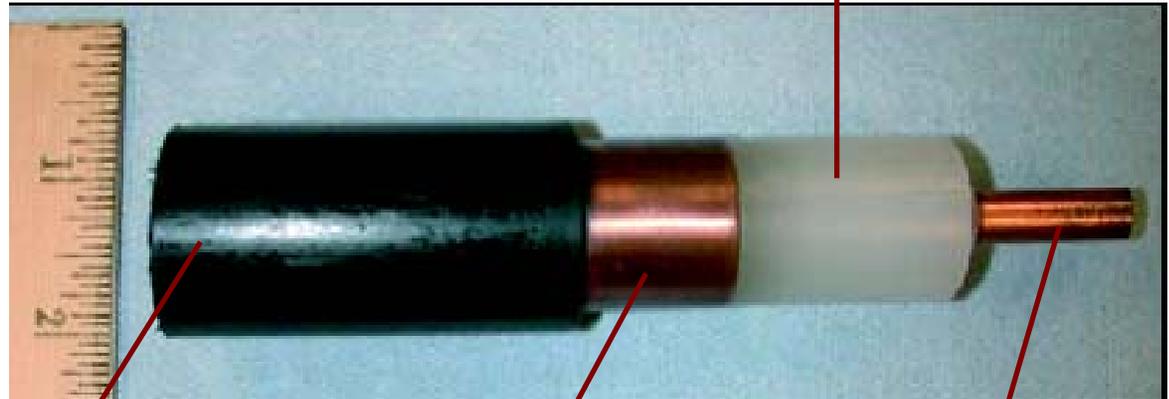
# Seafloor Coaxial Cable



## Materials found in Coaxial Cables

- High density polyethylene
- Copper
- Steel wires

White polyethylene insulating material



High density polyethylene jacket

Copper sheath

Copper inner conductor w/steel wires

# Seafloor Fiber Optic Cables



## • Materials in Fiber Optic Cables

- Optical fibers
- Steel
- Copper
- Polyethylene
- Nylon
- Elastomer
- Waterblock compound



# Seafloor Cable Burial



- **Soft Sediments**
  - **Two surface bottom impacts**
    1. Two depressions from sled tracks
    2. Burial cut ~ 1 meter deep
  - **Surface dweller such as fish and crustaceans will avoid**
  - **Slow-moving, non-motile species may be crushed beneath tracks, cut by blade or buried**
    - Sponges, sea pens, anemones, sea stars, sea cucumbers, etc
  - **Mild turbidity event, highly localized and temporary**

If no species of special interest are found along cable route then impacts from installation and burial would be minimal and insignificant.



# Cable Impacts



## Seafloor Cable Impacts

- Hard bottom abrasion
- Impacts of cable repair
- Organisms colonizing cable
- Provides new habitat
  - Fish congregate near cables (rock fish, flat fish)
- Cable could snag fishing gear
  - Trawling nets becoming free floating causing entanglement threat



# Seafloor Cable Colonization off Coast of California



*M. faricmen*  
(white plumed anemone)  
colonizing cable

Common to central California



The thin white organisms  
are *Halipteris sp.* (sea pens)

# Seafloor Cable Artificial Reef



- **Artificial Reef built from seafloor cables**
  - 21 miles from Ocean City Maryland
  - Exposed seafloor cables can be colonized by borers and epifauna and can serve as reef habitat
- **Tracking down any studies associated with this reef**
  - Responsibility of the USACE to regulate the construction and maintenance of fishing reefs in the U.S.
  - Baltimore USACE district issued permit
  - Section 404 CWA
  - Section 10 of the River and Harbor Act



**Flounder on artificial reef made from seafloor cables**

**What are the impacts???**

# Disposition of the Under Water Tracking Saint Croix



## Environmental Assessment (EA) Completed January 2004

Resource	Findings	Findings
<b>Marine Environment</b>	Abandoning cables in place would not impact the marine environment (including threatened or endangered species).	Removing the cables would adversely impact the marine environment. Cable have become part of the marine habitat
<b>Water Quality</b>	Abandoning cables in place would not impact water quality in foreseeable future.	Removing the cables would have temporary, short-term impacts to water quality due to increased turbidity from physical removal of the cables.
<b>Cable Material</b>	The cables are copper conductors encased in polyethylene. These plastics biodegrade at a very slow rate. The lifetime of a plastic material in the marine environment is quite variable, total mineralization or total conversion of the plastic to carbon dioxide and water would take hundreds of years because most plastics mineralize at extremely slow rates (Andrady 2000).	
<b>Environmental Contamination</b>	The cables and hydrophones, which would be left in place, are not expected to contribute to any environmental contamination on site. The cables are made of a copper core shielded in a near inert polyethylene polymer.	

# Disposition of the Under Water Tracking Saint Croix



**Seafloor cable encrusted in reef habitat approximately 200 feet offshore in 60 feet of water**

# Disposition of the Under Water Tracking Saint Croix



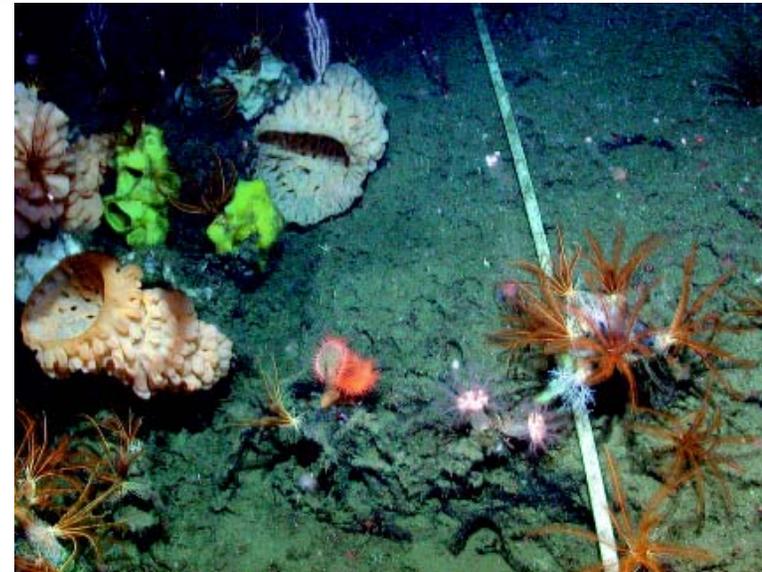
Cables run offshore 27 miles to depths of 10,000 feet

**Network of seafloor cables running through reef and hard bottom habitat**

# Seafloor Cable Research



- **Extensive research on cable survivability**
  - Cables designed to withstand broad range of marine environments
  - Typical design life of 25-30 years
  - Fish bite studies
- **Minimum research done on cable impacts to the marine environment**
  - Some done under auspices of NEPA
  - **Acoustic Thermometry of Ocean Climate (ATOC) seafloor cable study**
    - EIS completed and environmental monitoring



# Project Coordination



- **Range Commander Councils Underwater Systems Group**
  - Primary stakeholders for this study
  - Provided brief of project, solicited input, guidance and participate in meetings
- **LANTDIV**
  - (EA for Disposition of the Under Water Tracking Saint Croix)
- **Naval Undersea Warfare Center, Newport Division, RI**
- **Navy Cable Manufacturers**
  - Tyco, Simplex, Rochester
- **Pacific Fleet (PMRF & Environmental Office)**
- **U.S. Army Space and Missile Defense Command**
  - US Army's use of seafloor cables at Kwajalein

# Schedule – Major Milestones



<b>Task</b>	<b>Completion Date</b>
<b>Collect stakeholder input and develop Project Plan</b>	<b>12/03</b>
<b>Develop initial problem-solution framework</b>	<b>2/04</b>
<b>Finalize listing of Navy cables (materials)</b>	<b>3/04</b>
<b>Complete collection and analysis of disposal case histories</b>	<b>5/04</b>
<b>Complete environmental assessment of cable materials</b>	<b>7/04</b>
<b>Hold technical workshop review TBD</b>	<b>8/04</b>
<b>Final report</b>	<b>12/04</b>

? QUESTIONS ?

