

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>3-4</b>
<b>PIPELINE # 1 NORTHERN PIPELINE.....</b>	<b>5-8</b>
<b>PIPELINE # 1 PHOTOS.....</b>	<b>9-20</b>
<b>PIPELINE # 2 SOUTHERN PIPELINE .....</b>	<b>21-24</b>
<b>PIPELINE # 2 PHOTOS.....</b>	<b>21-24</b>
<b>PIPELINE # 2 SCALED PHOTOS .....</b>	<b>37-42</b>
<b>METHODOLOGY .....</b>	<b>43-45</b>

CITY OF ATKA

Village Safe Water  
555 Cordova Street  
Anchorage, Alaska 99503

Phone 907-269-7614  
Fax 907-269-7509

---

**FEBRUARY 2008**

---

**VILLAGE SAFE WATER  
OUTFALL INSPECTION REPORT**



Tim Jewell \_\_\_\_\_

# EXECUTIVE SUMMARY

## FINDINGS

On January of 2008 Enviro-Tech Diving Inc. (ETD) was contracted to determine the subsurface (underwater) bottom topography where two outfall lines were deployed in the 1980's as well as determining condition of these sewer outfall lines in Atka, Alaska. The existing outfall lines were known to be damaged at the inter-tidal zone and the condition, length, and location of the pipelines were not known.

Upon arrival in Atka on February 23, 2008, the divers located the two pipes as they discharged along the beach and after one exploratory dive determined the best deployment for the ultra short sonar baseline survey system. Divers deployed the sonar transducer and commenced the survey. Detailed methodology is discussed in the methodology section later in this report.

### **PIPELINE # 1 NORTHERN PIPELINE**

The northern pipe is a HDPE pipe that is disconnected from the PVC supply side in the inter-tidal zone. The line extends approximately 330 feet in an easterly direction before terminating in -26 feet MLLW. The end appears to be sheared clean which could indicate one of the following:

- A failed weld
- Cut by vessel
- Detached diffuser

With the exception of the missing end the in water portion of the line is in good condition with fair anchorage at regular intervals along its length. The first 100 feet of the pipeline lies on rock and irregular bottom and the pipeline makes some slight bends before the bottom gives way to a soft mud bottom. There is a rock reef which is located 30 feet north of the current terminus of the pipeline.

### **PIPELINE # 2 SOUTHERN PIPELINE**

The onshore portion of the pipeline was not connected and the divers traveled approximately 80 feet south and 160 feet to the east of the steel outfall line on the beach before finding the submerged portion of HDPE outfall line. Divers observed the remains of a Mag-Lock fitting just aft of the flange face on the HDPE pipe indicating that a piece of cast iron pipe was used at the shallower

transition zone. The remaining pipe travels in roughly an easterly direction for almost 240 feet before heading south for 120 feet and becoming buried by the soft sediment in the area. The pipeline reemerges from the sediment and travels in a northeast and then a northerly direction before once again heading south and terminating in -32 feet MLLW. This would indicate that at some time the line was fouled by an anchor or some other object. Total in water remaining pipe length is estimated at 640 feet with no major structural damage to the pipe.

## **RECOMMENDATIONS**

Given the location of the outfalls and their exposure to surf in the shallow water transition zone, the outfall lines should be installed with heavy wall steel pipe with cathodic protection. Jetting and subsurface burial is recommended in the transition zone out to – 10 feet, if not for the complete pipeline.

However access the transition area for the northern pipeline for heavy equipment will be difficult if not impossible, and that fact coupled with the very rocky substrate will make trenching or jetting and burial difficult if not impossible and at the very least not very cost effective.

Trenching and burial of the southern pipeline could be easily accomplished.

Both outfalls lacked diffusers to elevate the pipe off the bottom and the installation of a diffuser pipe will increase distribution of the waste stream into the water column.

Both outfalls could be salvaged however there would be a cost and the stakeholders would have to determine whether using the remaining outfall lines would be a cost effective solution.

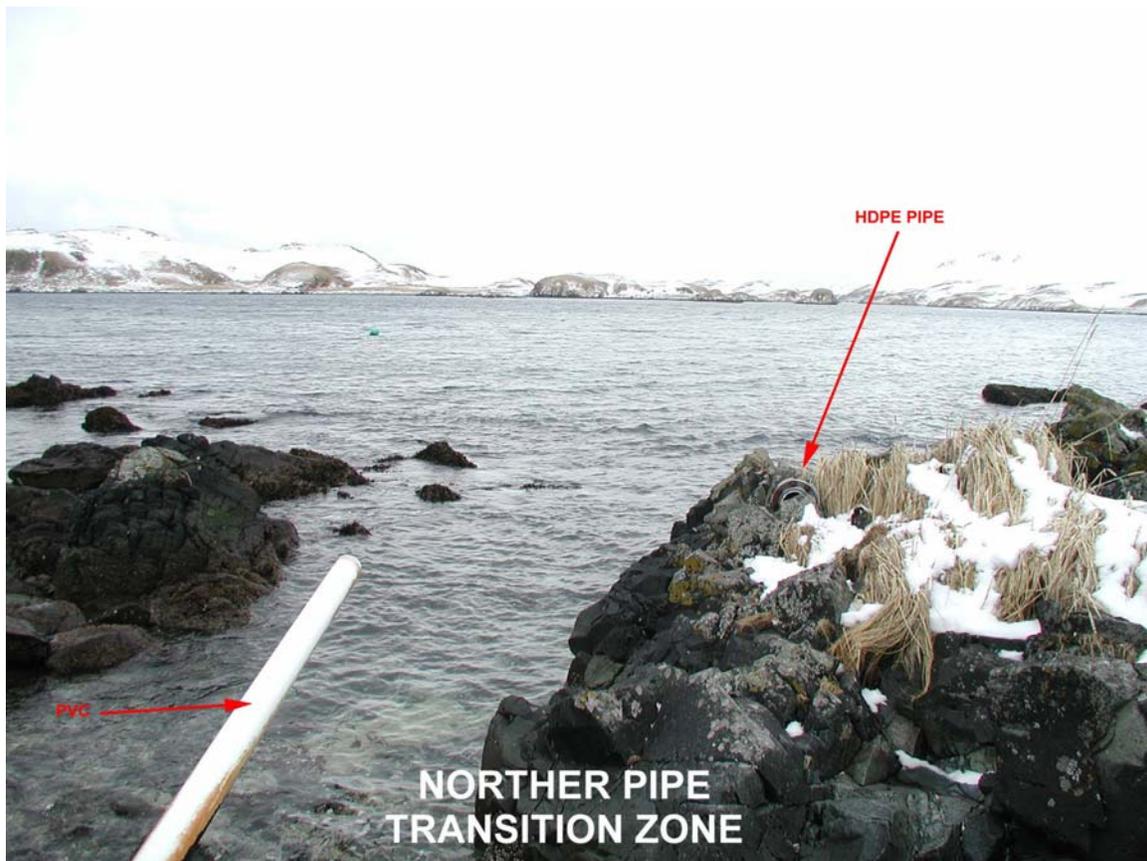
The best application for this area would be heavy wall pipe from the manhole or septic tank out to the required agency required depth and with a diffuser at the terminus. Subsurface trenching would greatly reduce the danger of the line becoming fouled by vessel which transit and use the area for anchorage during heavy weather events.

# PIPELINE # 1

## NORTHERN PIPE

### DIVER OBSERVATIONS

The northern pipe is a HDPE pipe that is disconnected from the PVC supply side in the inter-tidal zone.

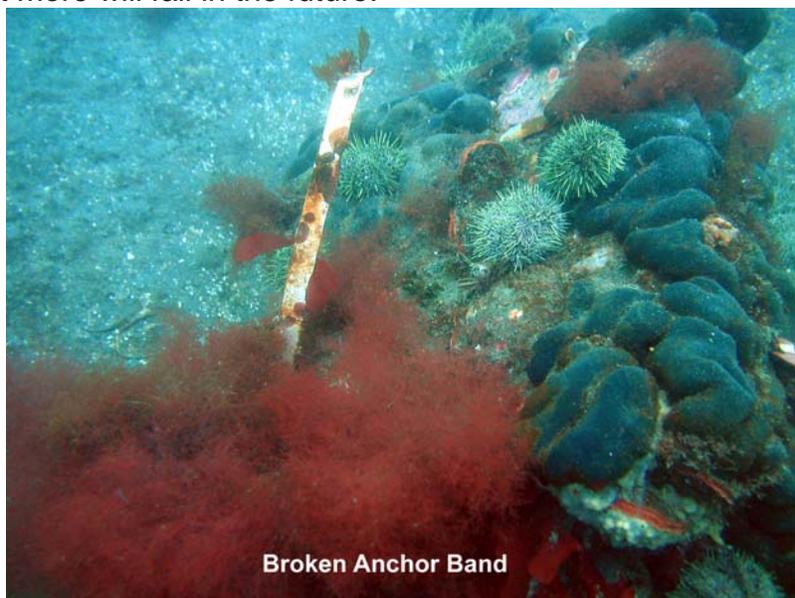


From the water entry to the terminus of the pipeline divers estimate approximately 300 feet of pipe before terminating in -27 feet MLLW. Divers measured 240 feet of outfall line to -4 feet of water where sonar signals could no longer be received. The construction of the pipeline is HDPE pipe that is fused or welded in 40 foot sections that are anchored with concrete blocks at regular intervals.

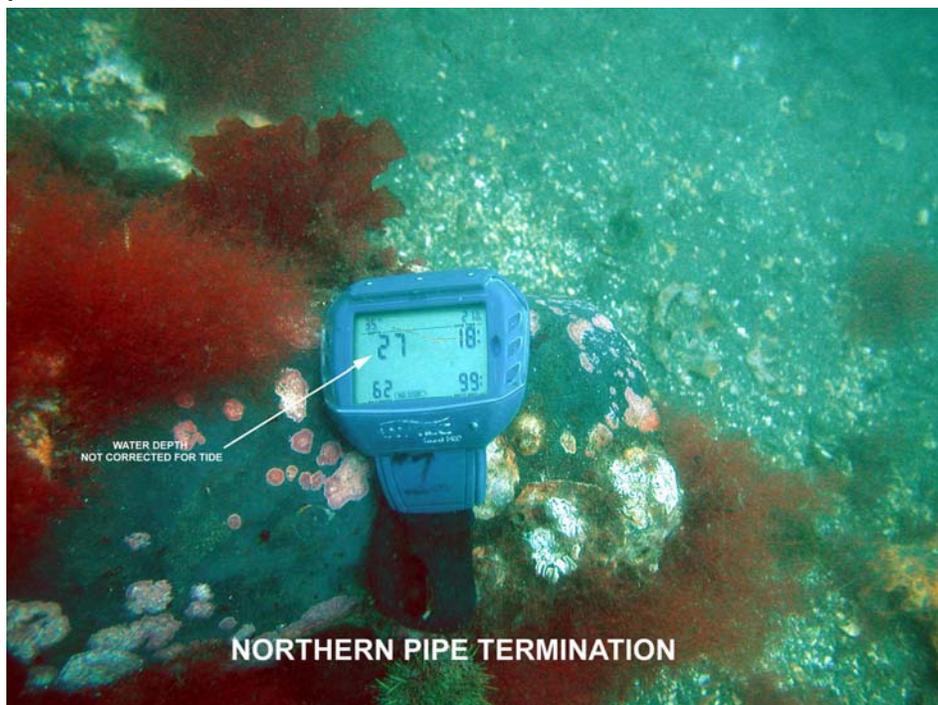
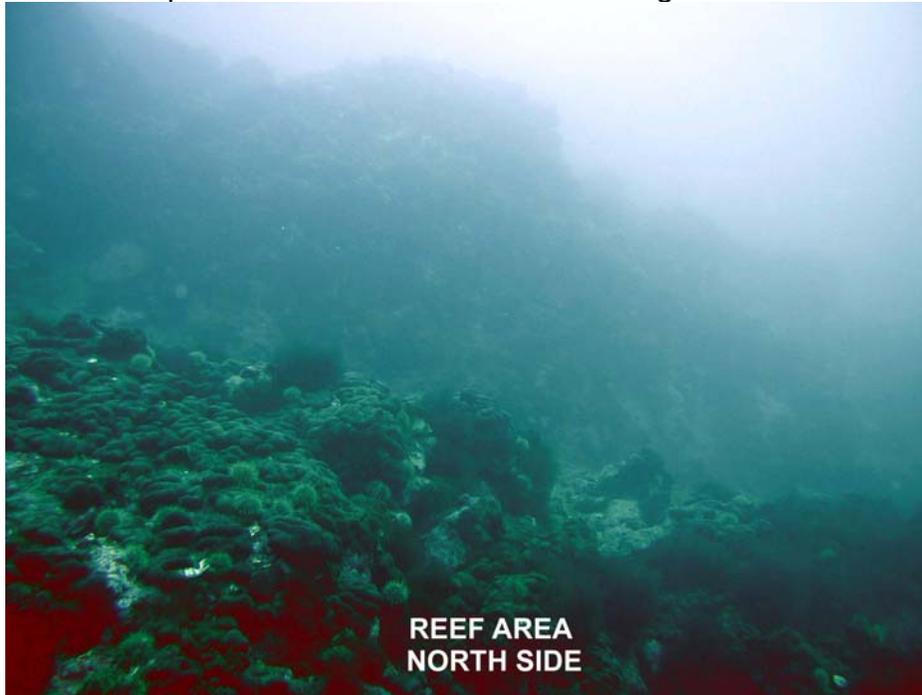
The shallow water section is very rocky with evidence that this is a high energy zone. The pipeline snakes through this area, before making a slight bend to the north, straightening and terminating on a mixed mud, small cobble bottom. There are a few fairly steep transitions as the pipeline progresses toward deeper water.



The outfall line is anchored with concrete saddle blocks at regular intervals. The amount of anchorage on the line appears to be adequate for keeping the line from floating and restricting movement, however the anchor construction is not the best for a high energy salt water environment. Anchorage consists of 2 piece concrete blocks which are banded with 2 stainless steel bands. Some of these bands are failing from corrosion and given the saltwater environment more will fail in the future.

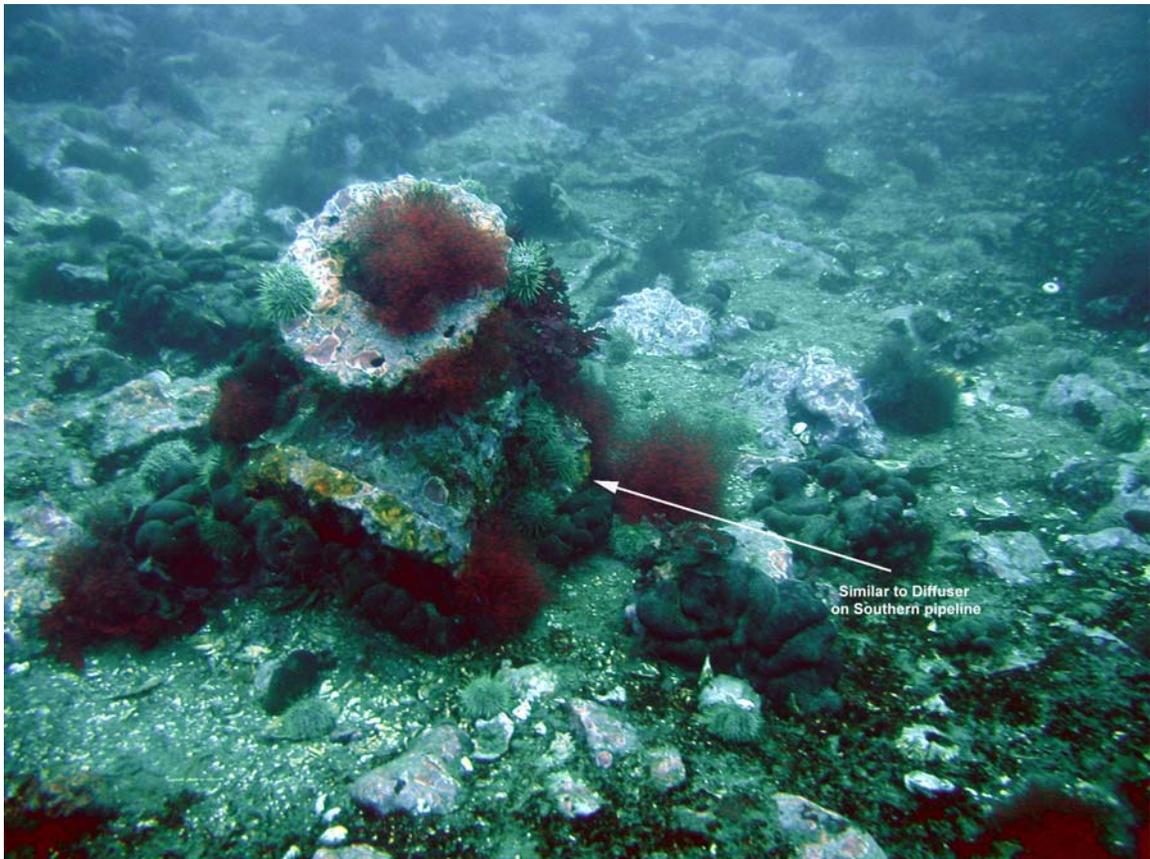


Past -14 feet the bottom becomes a mix of small cobble and mud which slopes in a southeast direction to deeper water. Just to the north however there is a large reef which rises dramatically 10 to 15 feet from the mud bottom. This reef will have an impact on currents and water exchange in the area.



The outfall line has no actual diffuser, just the end of the pipe lying on the bottom in -26 feet MLLW. One 40 foot section of pipe was discovered to

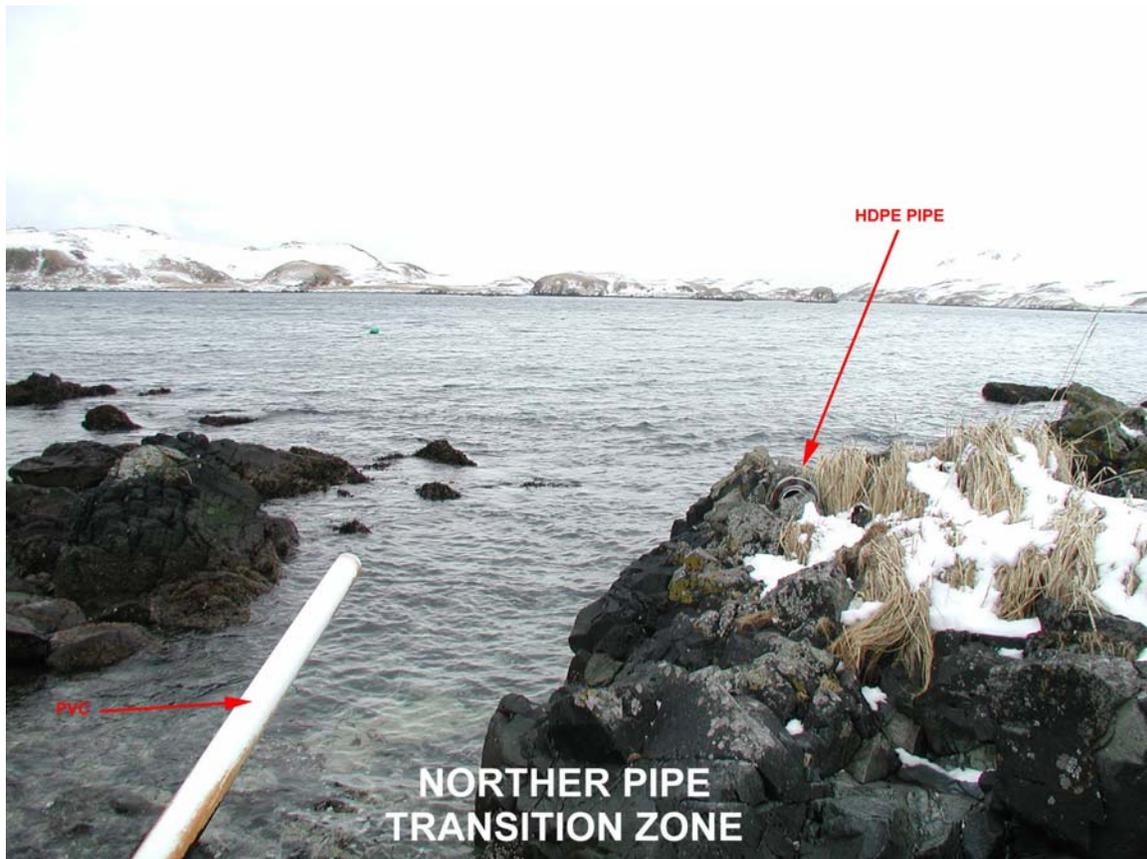
southeast of the terminus and divers believe that this was once attached to the outfall line. Divers also discovered pipe a fitting which is similar to the diffuser used on the southern pipeline in -50 feet of water.

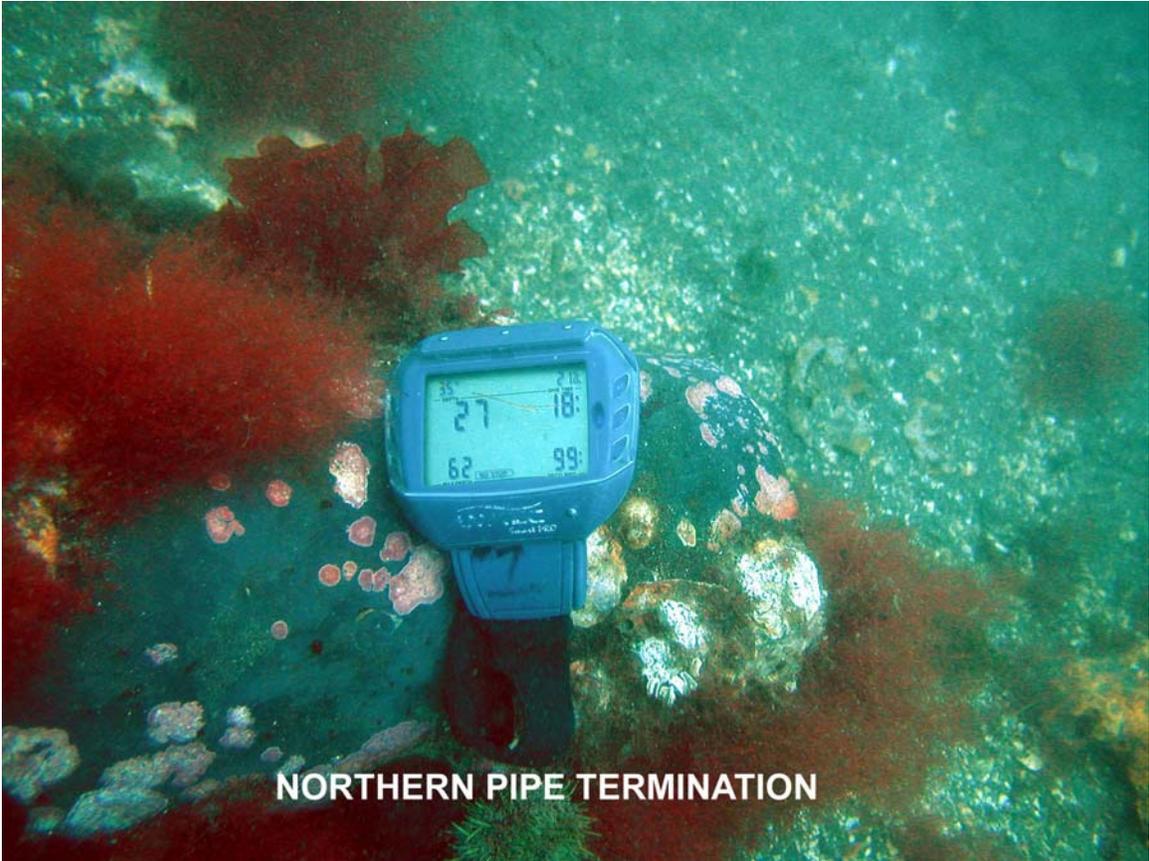


With the exception of the missing end the pipeline is good condition and appears to have no major deflection or damage to the pipe. The outfall's location and the bottom substrate in the shallow water area would make burial and trenching in the area difficult at best if not impossible.

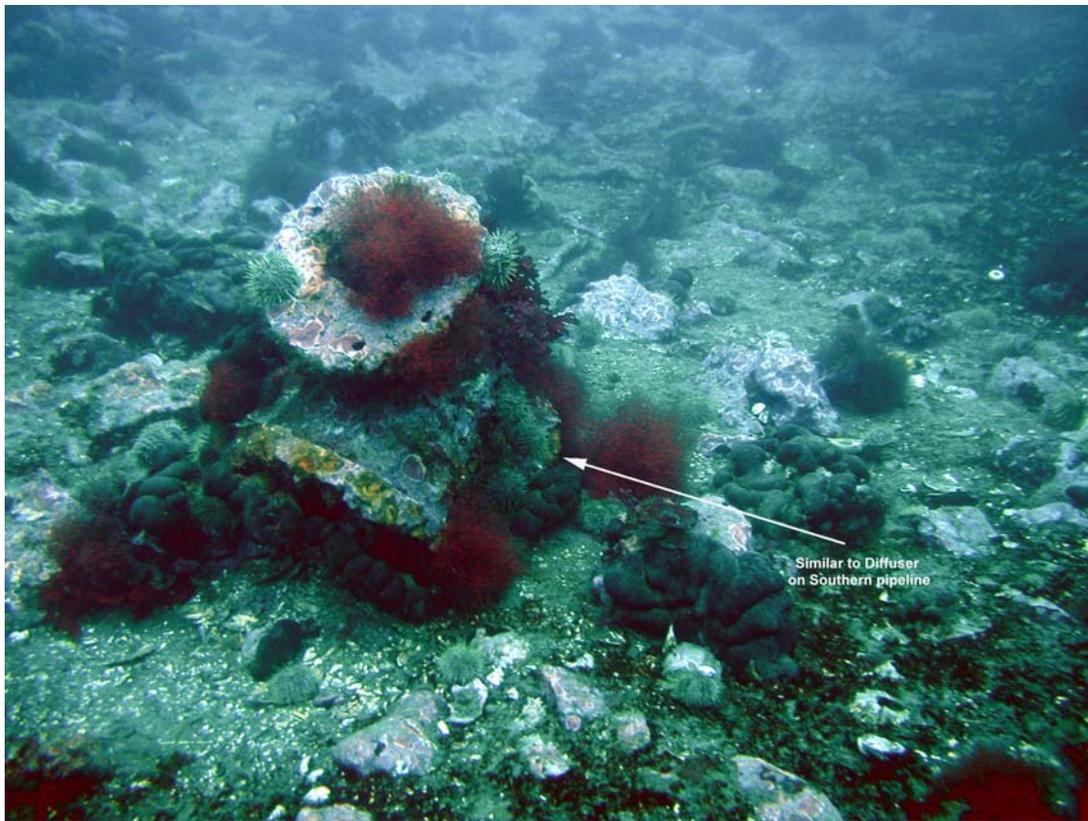
# PHOTOS PIPE # 1

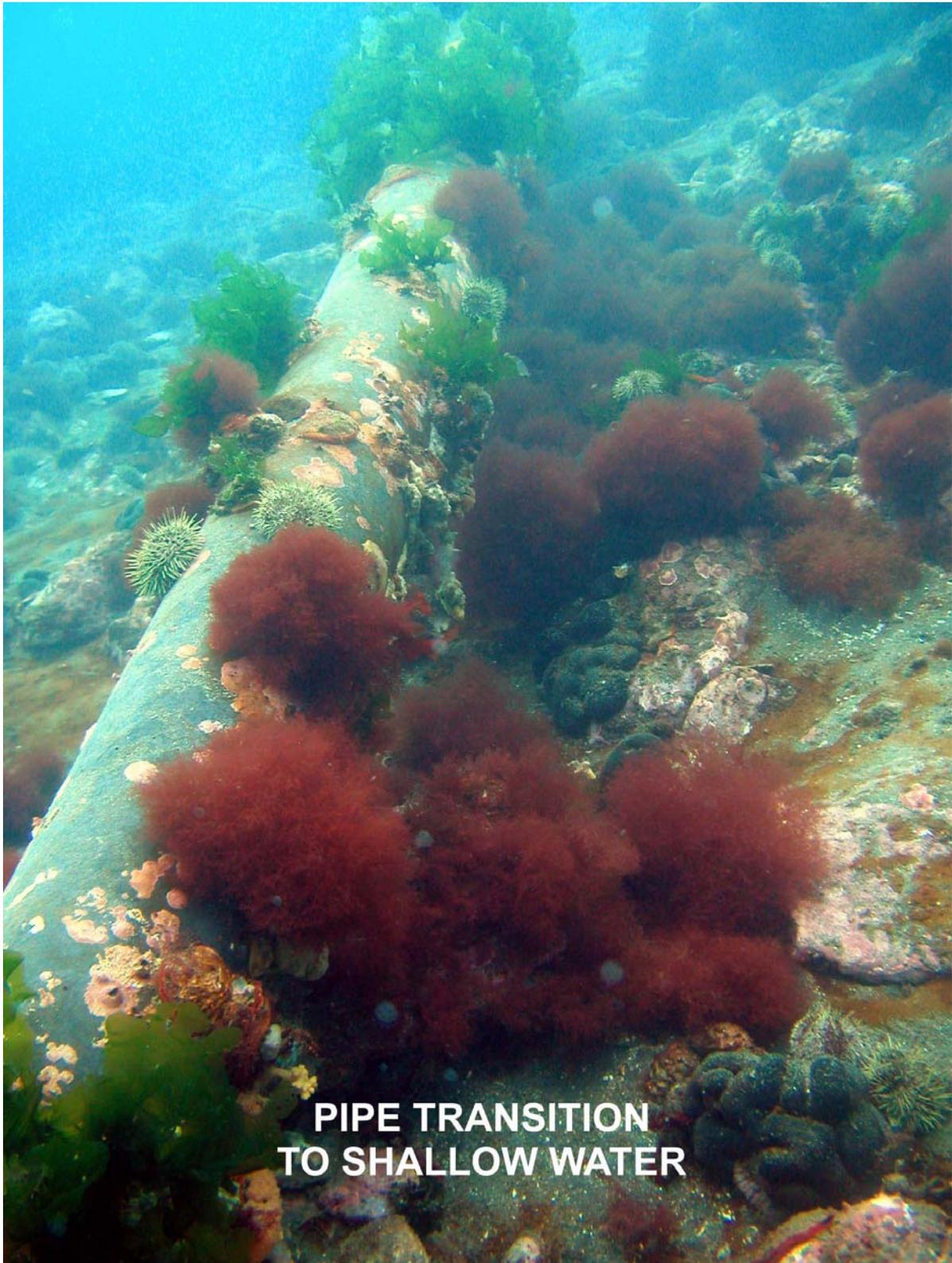
## NORTHERN PIPE

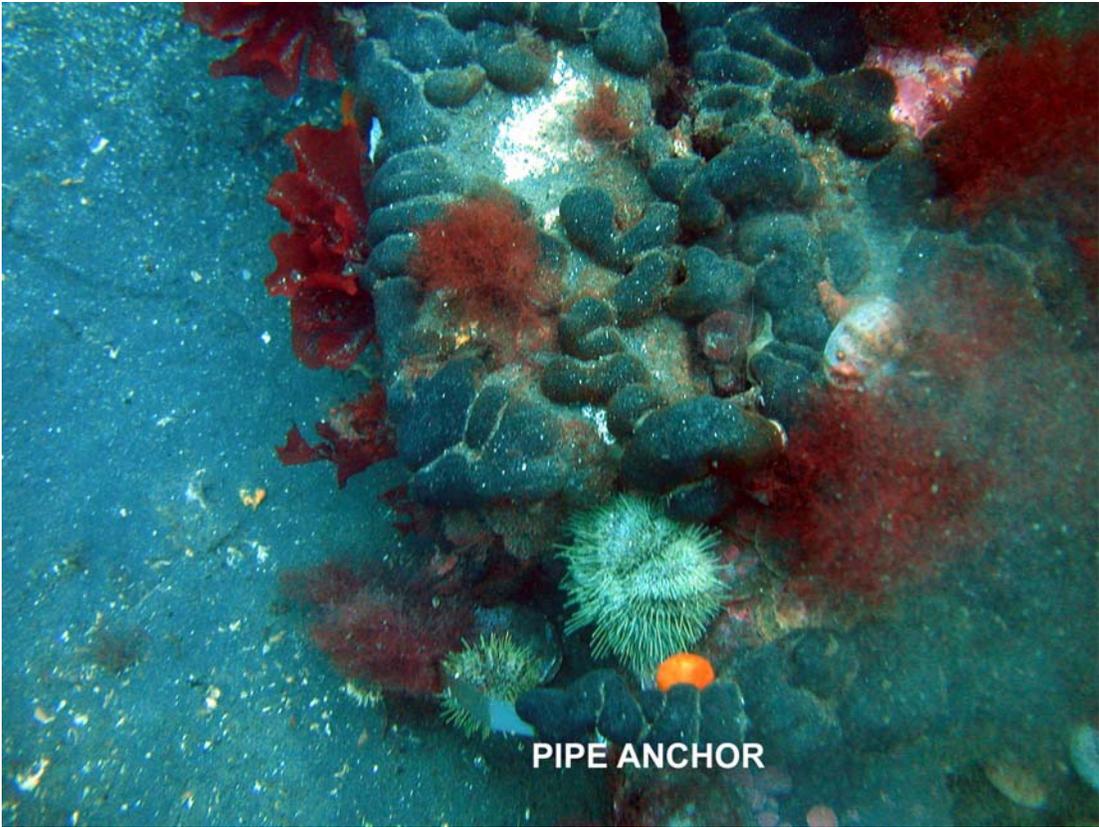


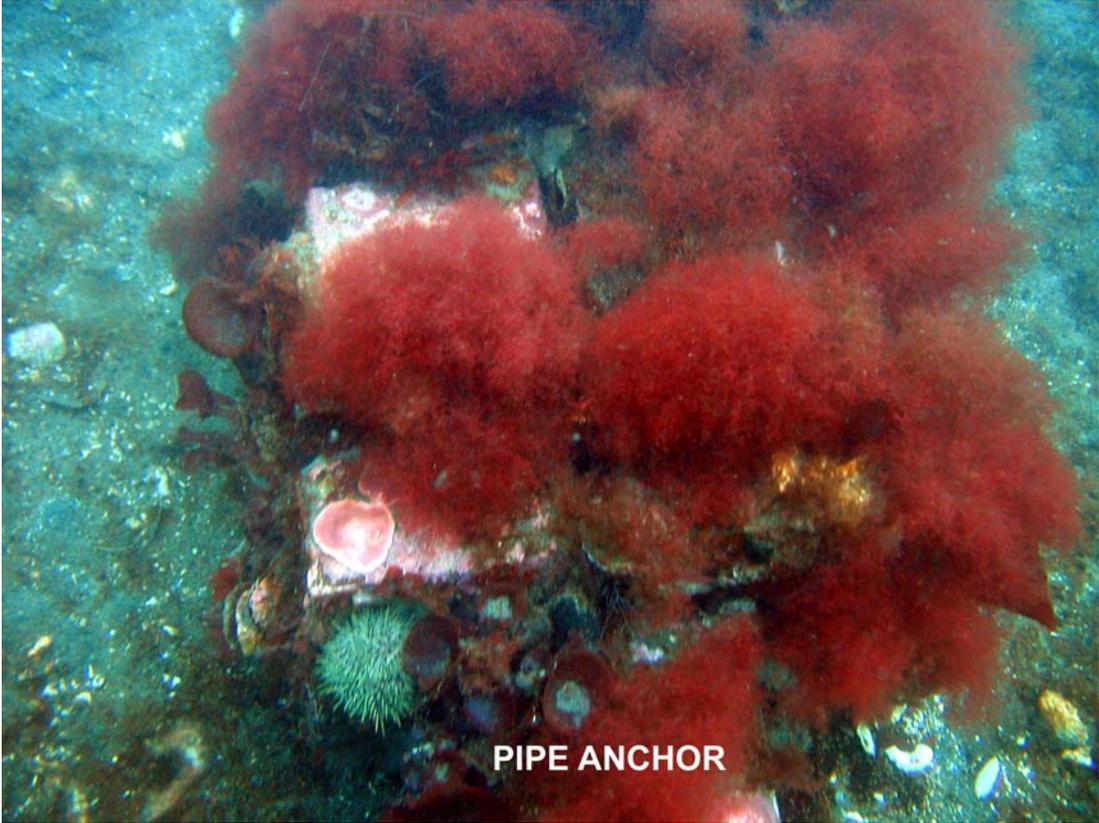


**NORTHERN PIPE TERMINATION**

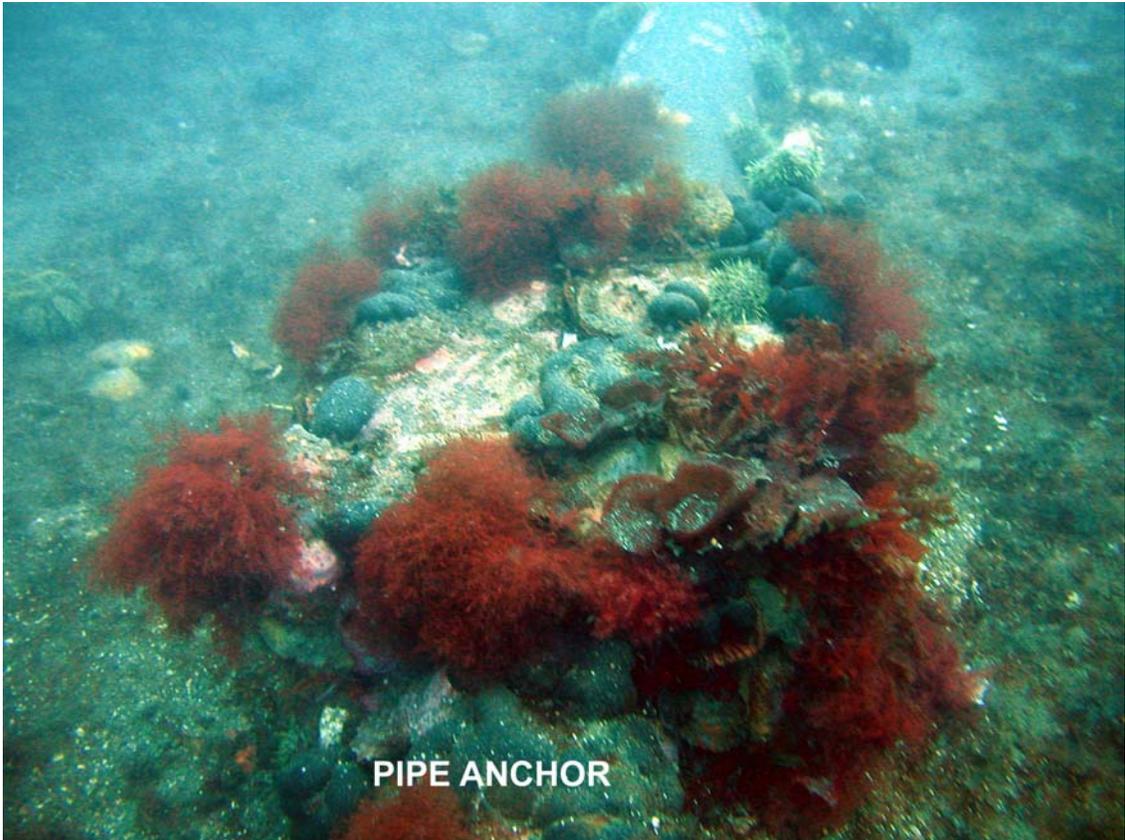




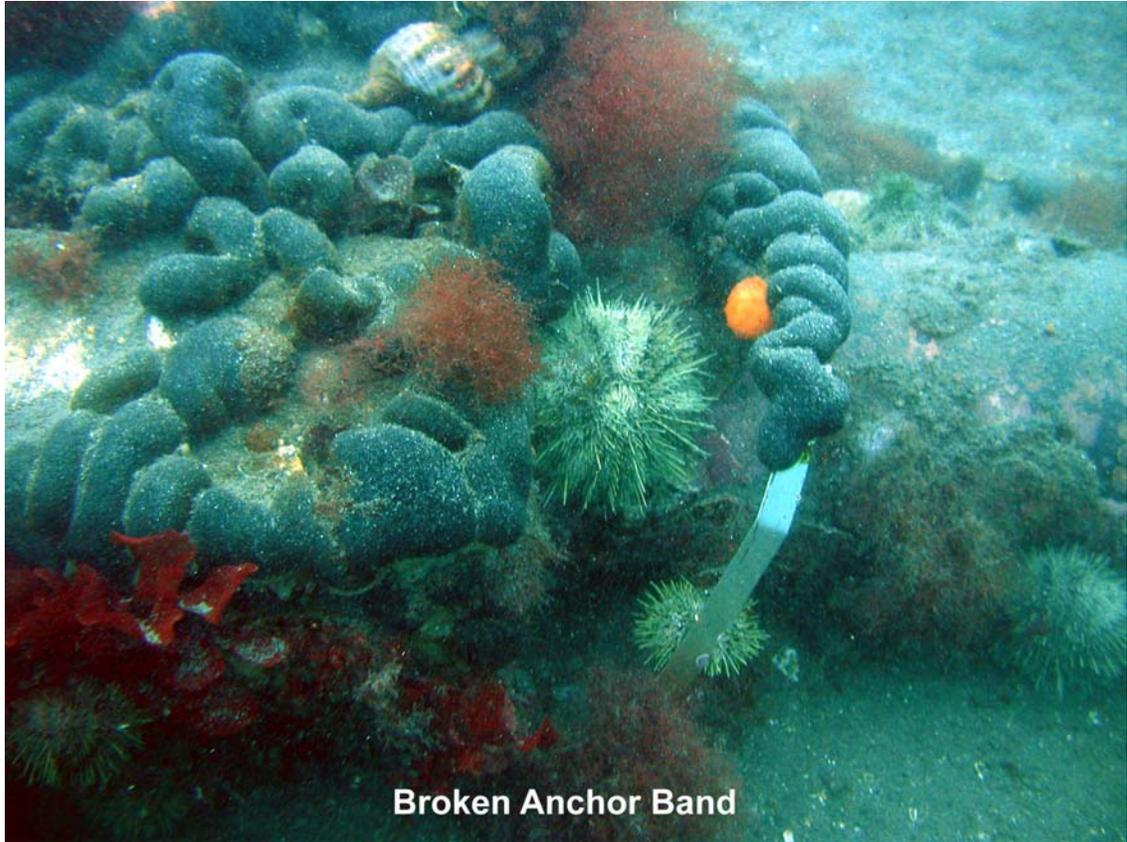




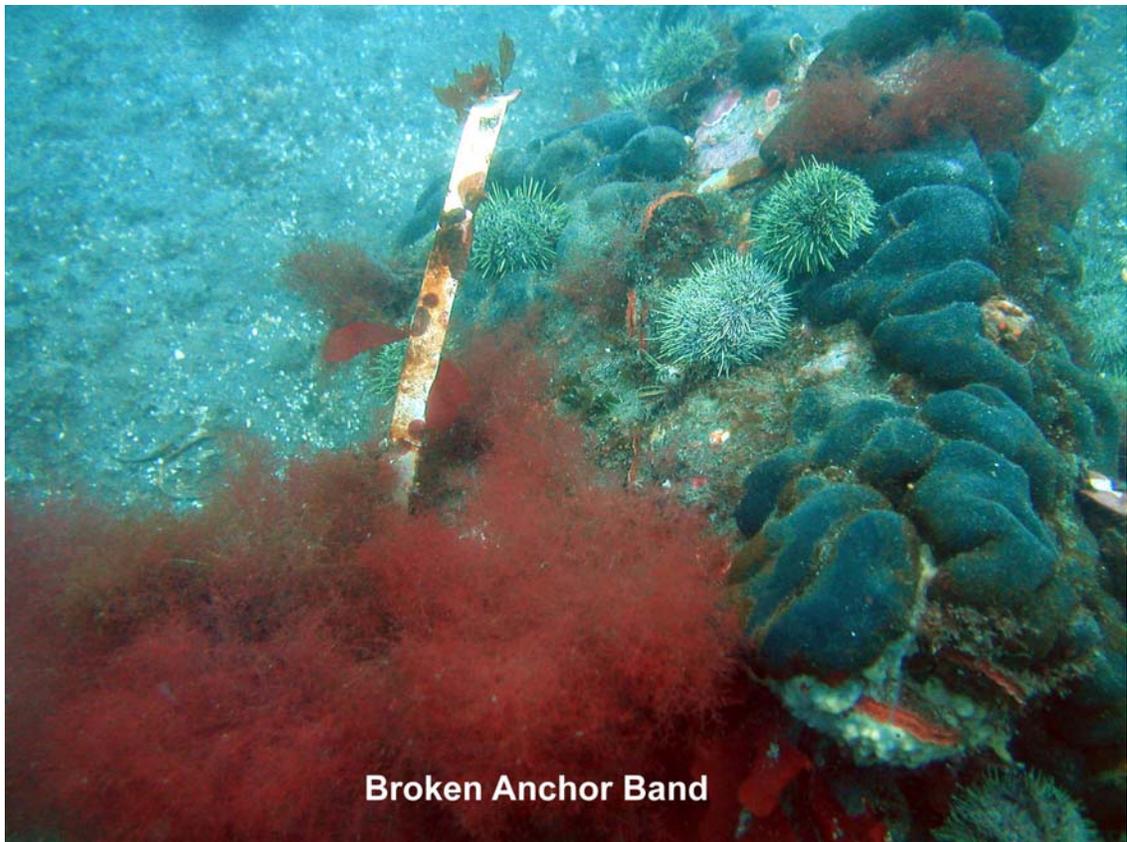
PIPE ANCHOR



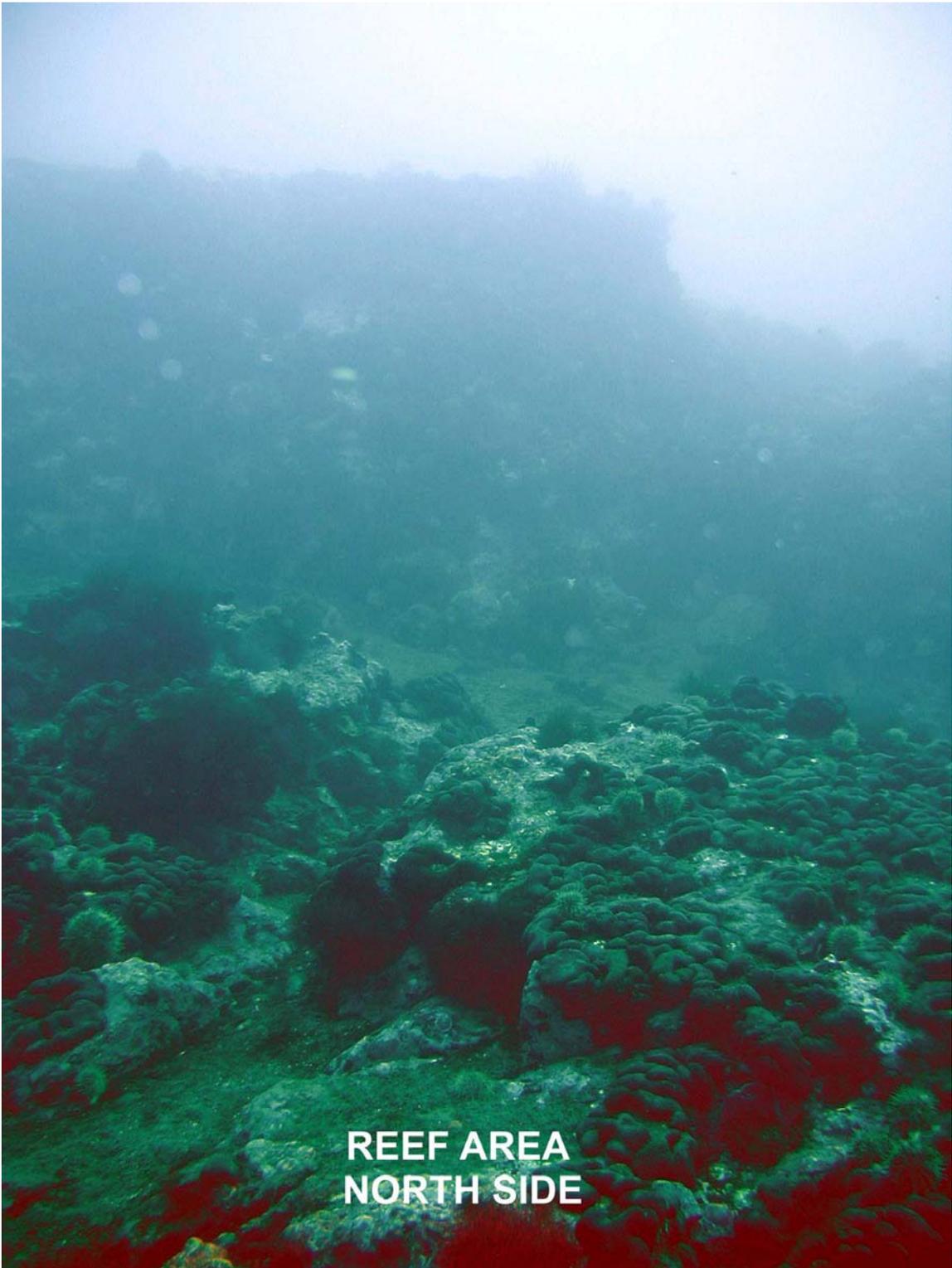
PIPE ANCHOR

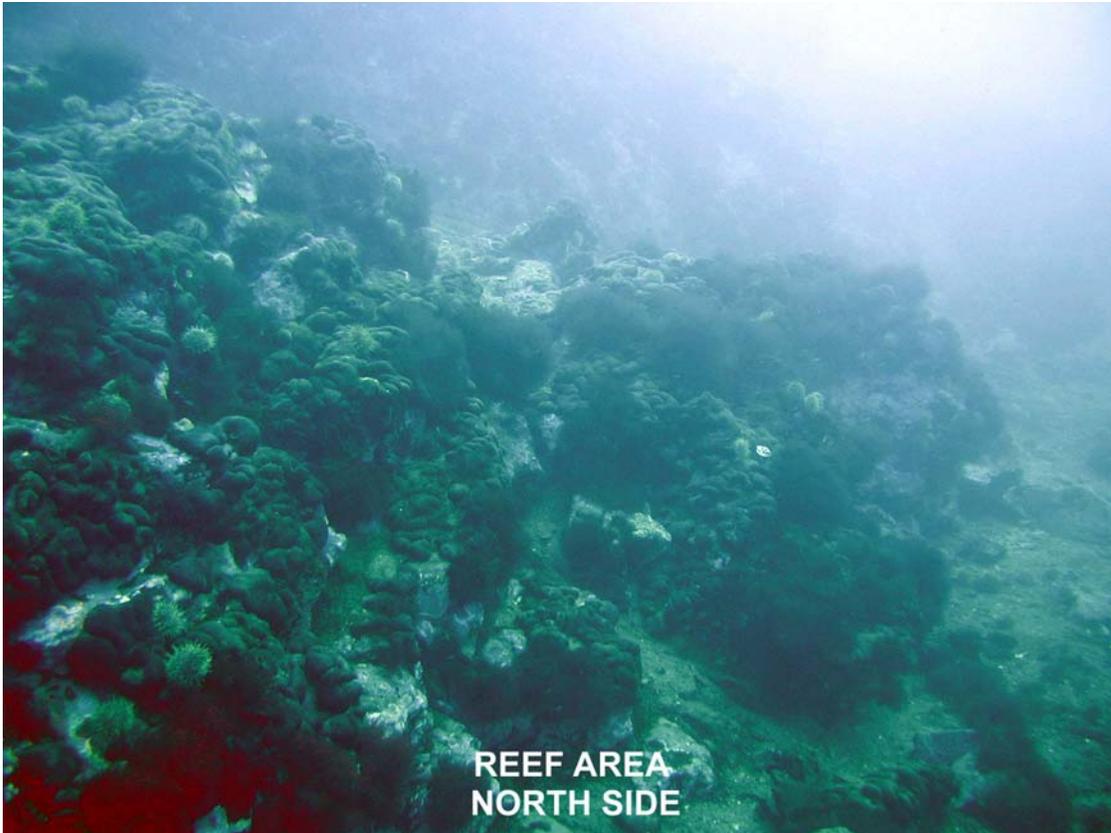
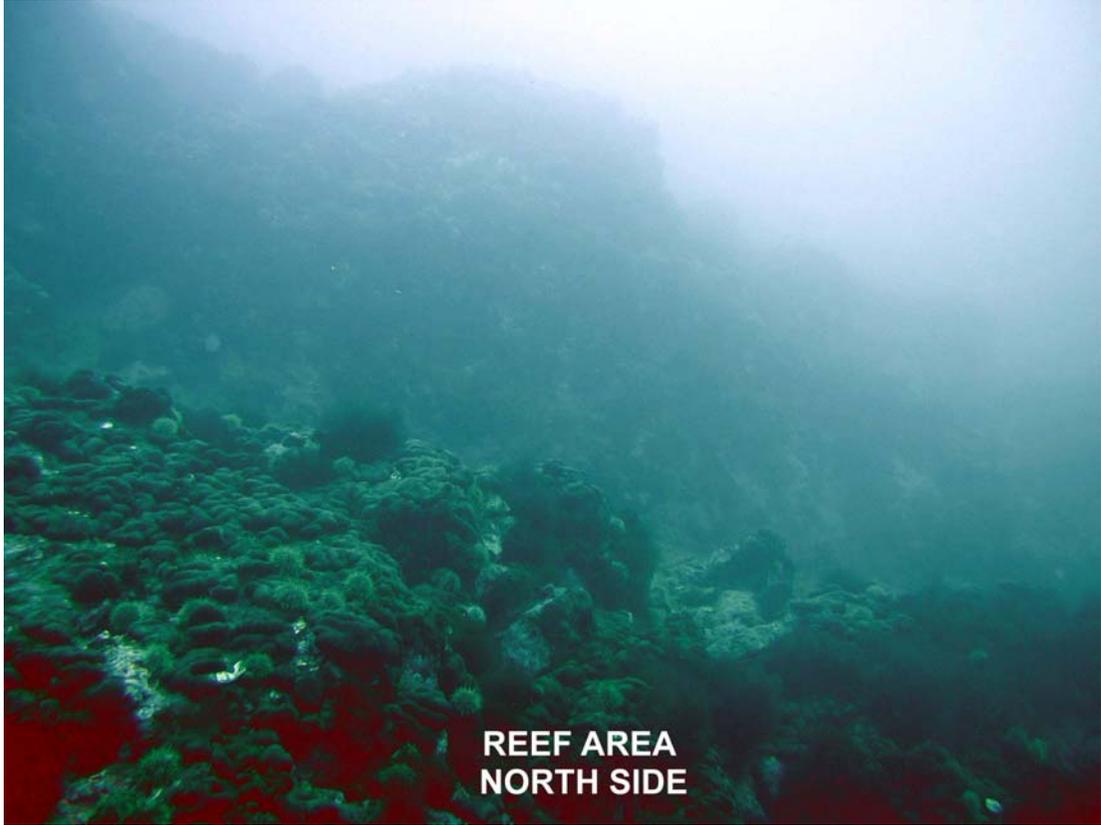


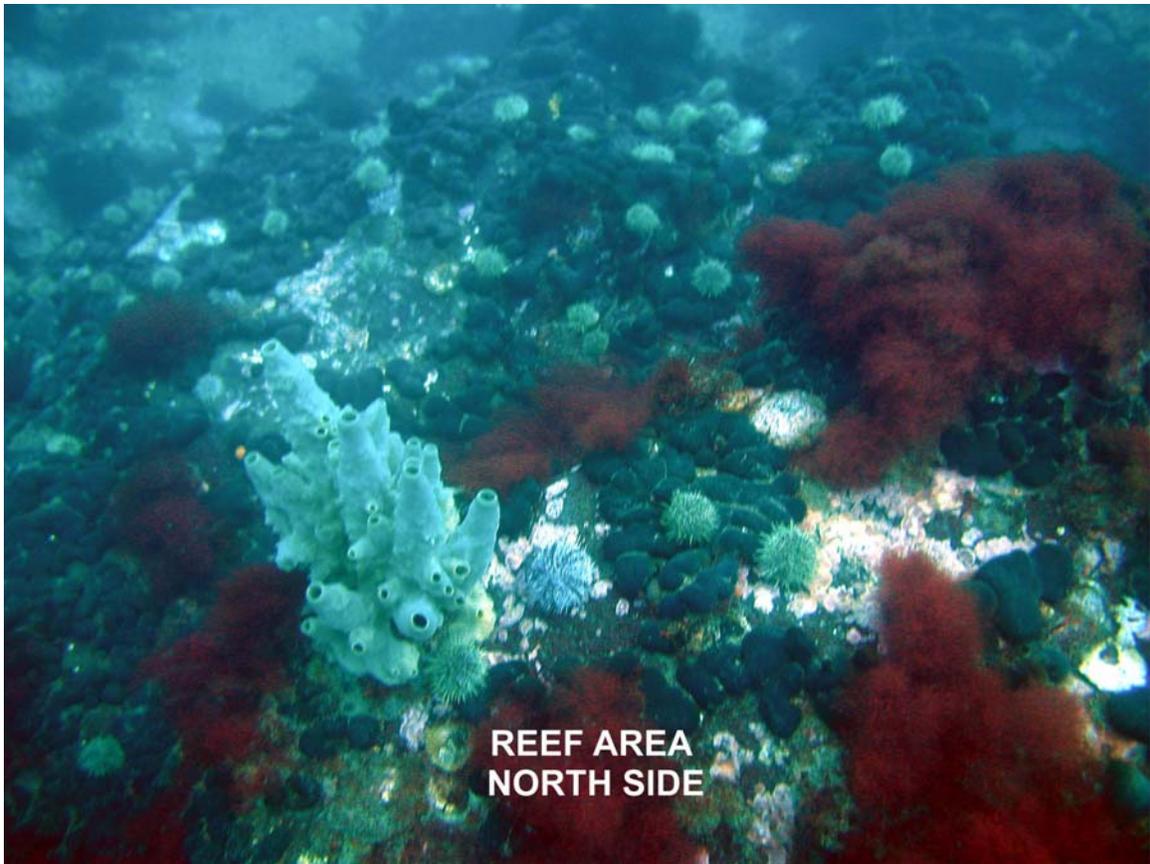
**Broken Anchor Band**

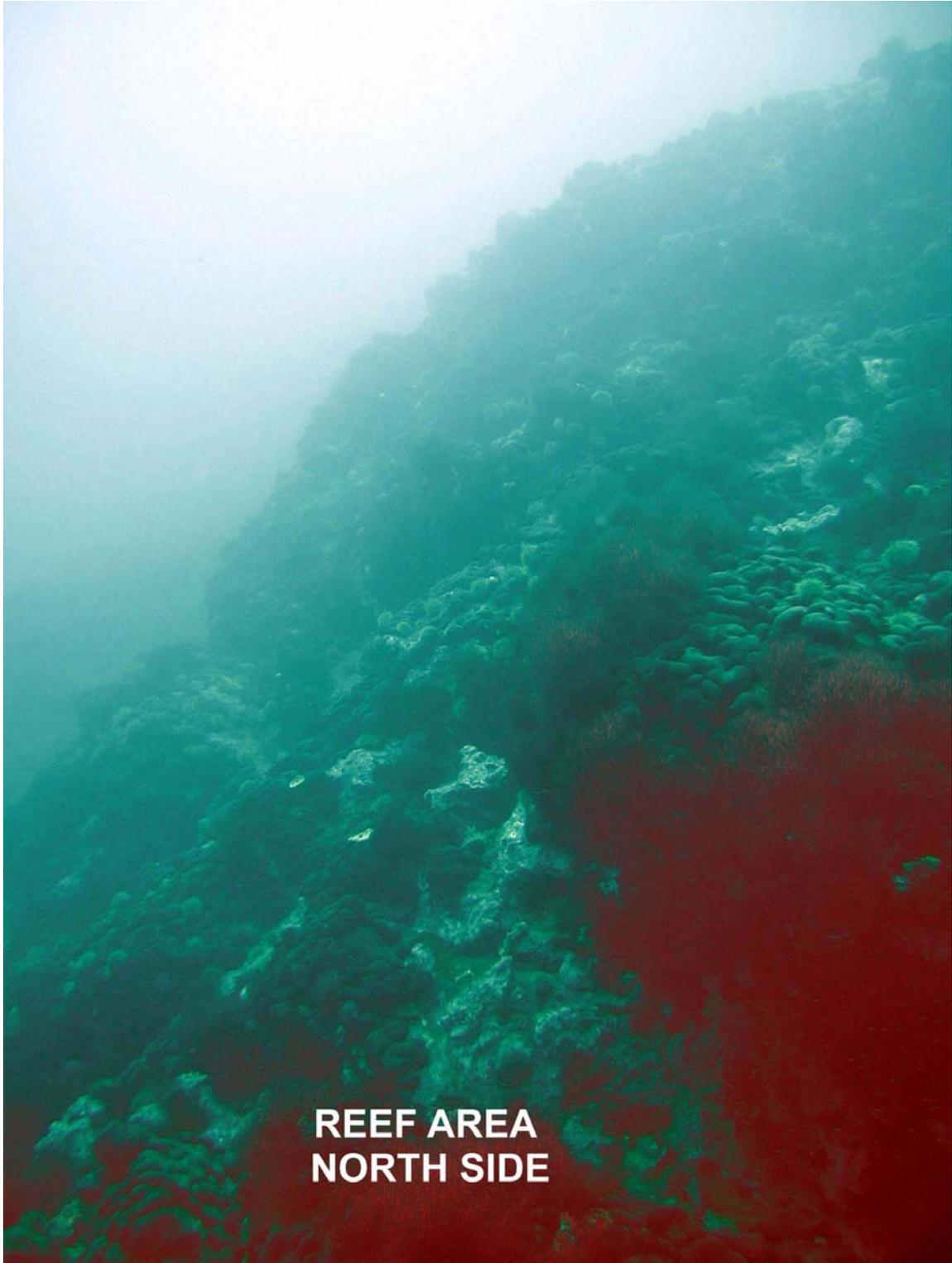


**Broken Anchor Band**











# PIPELINE # 2

## SOUTHERN PIPE

### DIVER OBSERVATIONS

The only visible remains of the southern pipeline are the cast iron pipe just above the water line. This area is a high energy zone exposed to wind and wave action from the Bering Sea.



Divers were able to locate the HDPE section of the outfall line 80 feet to the south and 160 feet to the east of the cast iron pipe in -7 feet MLLW. At the shore side end the flanged end appears to have the remains of a Mag-Lock fitting with its counterpart located a few feet away. This discovery with the broken pieces of cast iron pipe observed between the onshore pipe and this remnant would infer that the previous installation used cast iron water pipe with Mag-lock

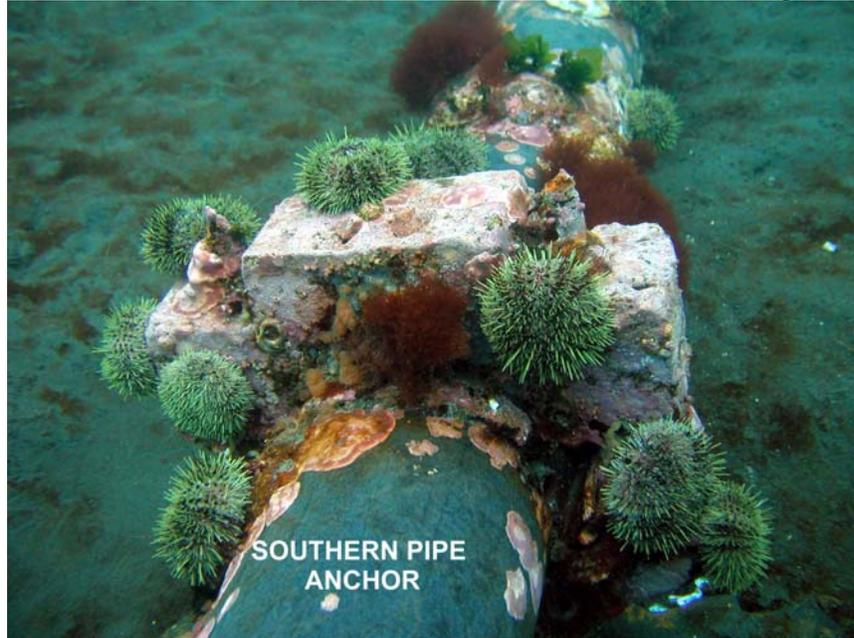
fittings in the shallow water transition zone. The bottom in front of where cast iron pipe daylighted on the shoreline is mostly coarse sand however the area where the outfall was located is rocky inferring that the outfall became separated and was washed to the present location.



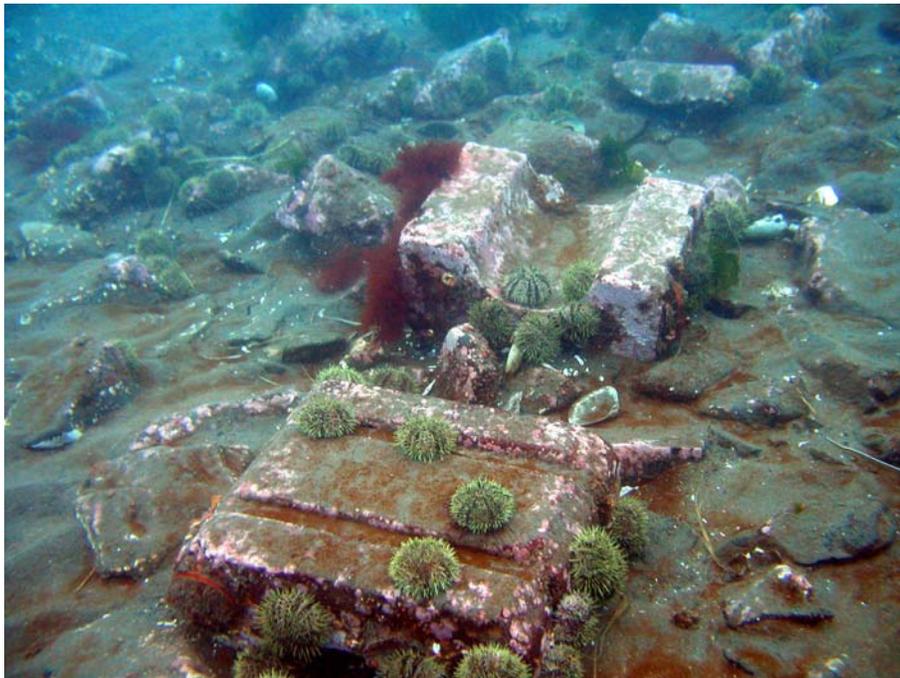
The outfall is HDPE construction with flanged connections at regular intervals. The connections are very corroded and encrusted with marine growth.



The outfall line is anchored with very small concrete narrow two piece saddle anchors secured with two bolts, spaced approximately 40 feet to 60 feet apart. The anchor bolts are corroded and encrusted with marine growth.



Divers also observed sections of large saddle anchors which had separated and were lying in the general vicinity of the line. These anchors appear to have been banded together in a similar manner as the anchors on the north outfall line.



The outfall line extends in an easterly direction for almost 240 feet before heading south for 120 feet and becoming buried by the soft sediment in the area. The majority of the bottom is a soft substrate mixed with small cobble which gives way to a soft silt / mud bottom. The pipeline reemerges from the sediment and travels in a northeast and then a northerly direction before once again heading south and terminating in -32 feet MLLW. The terminus has a pipe fitting that is believed to be the remains of a diffuser.



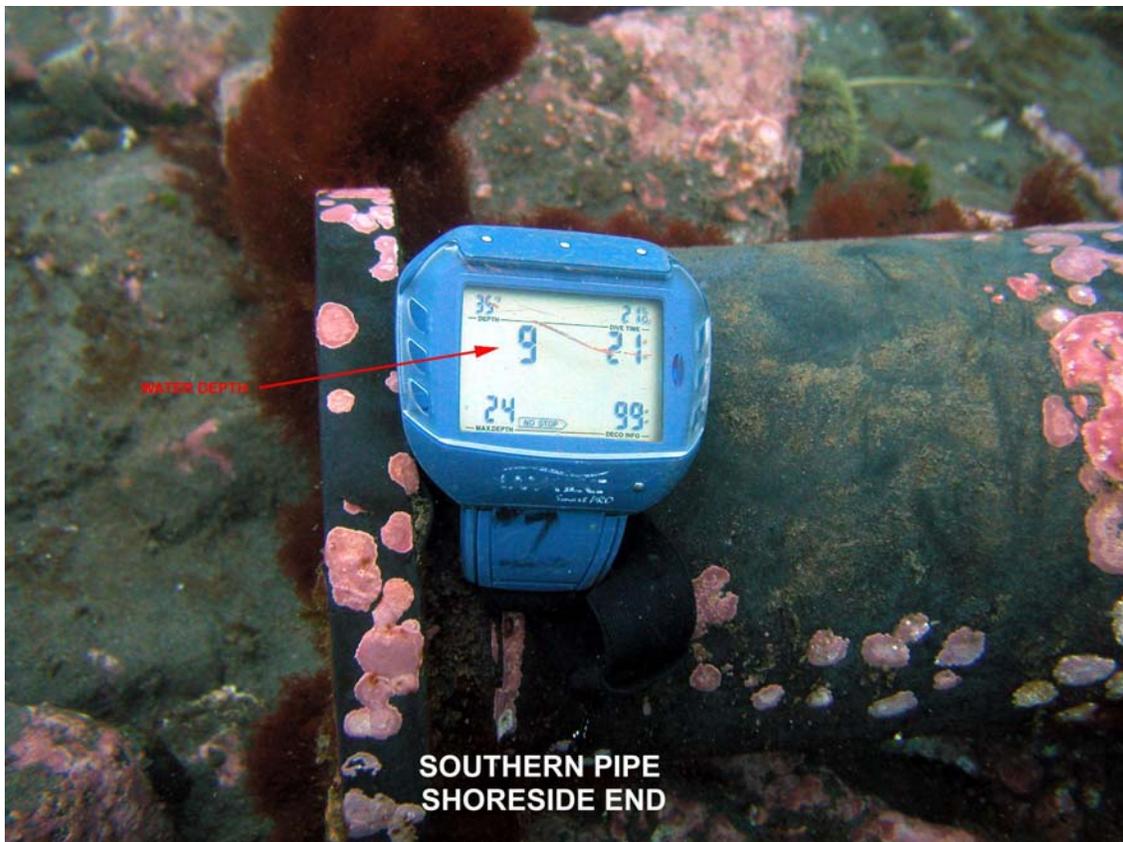
The present layout of the pipe, (roughly S shape) would indicate that at some time the line was fouled by an anchor or some other object. Total pipe length is estimated at 640 feet with no major structural damage to the pipe. There is significant marine growth and sediment in the shallow water end of the pipe.

The bottom substrate directly in front of the onshore pipe transitions from sand in the surf and shallow water area to a soft silt / mud past -10 feet and finally to mud in the deeper area of the survey. Divers examined the area 100 feet to the north and south and over 600 out from the shoreline to -60 feet MLLW and found no major obstruction that would negatively effect reinstallation of the outfall line.

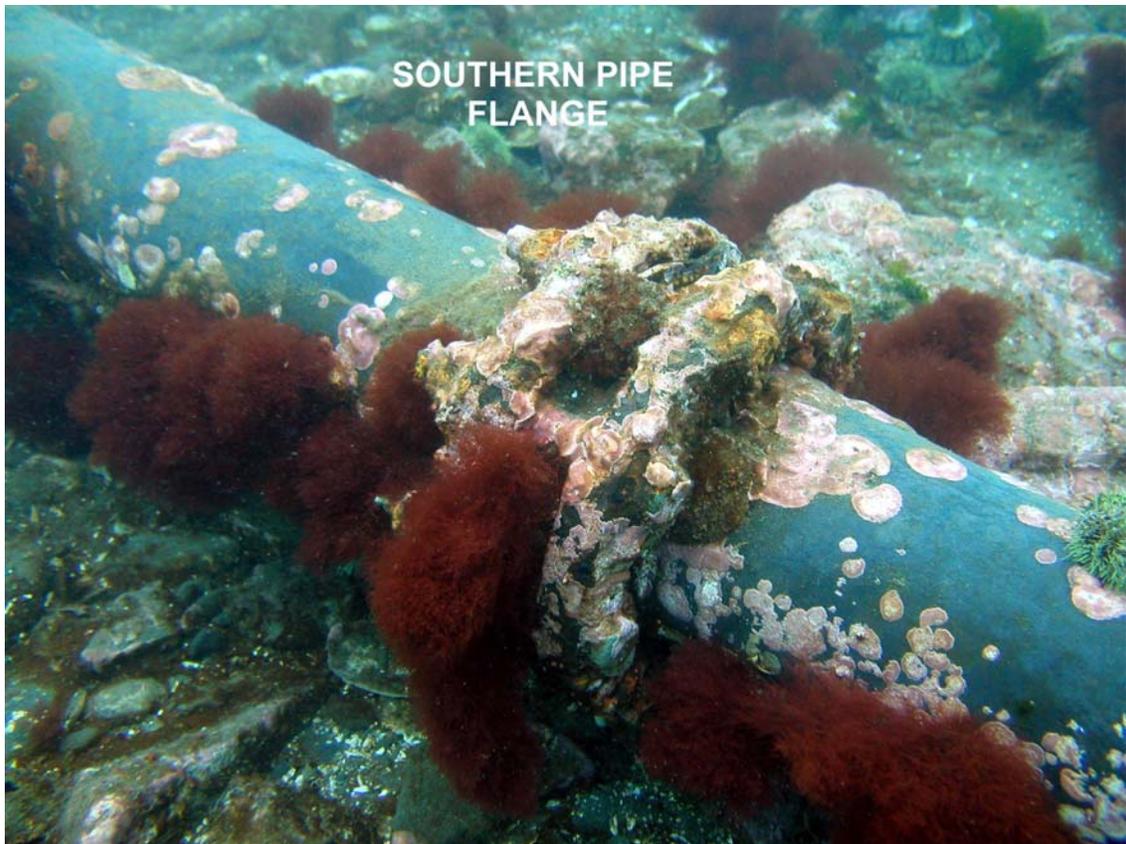
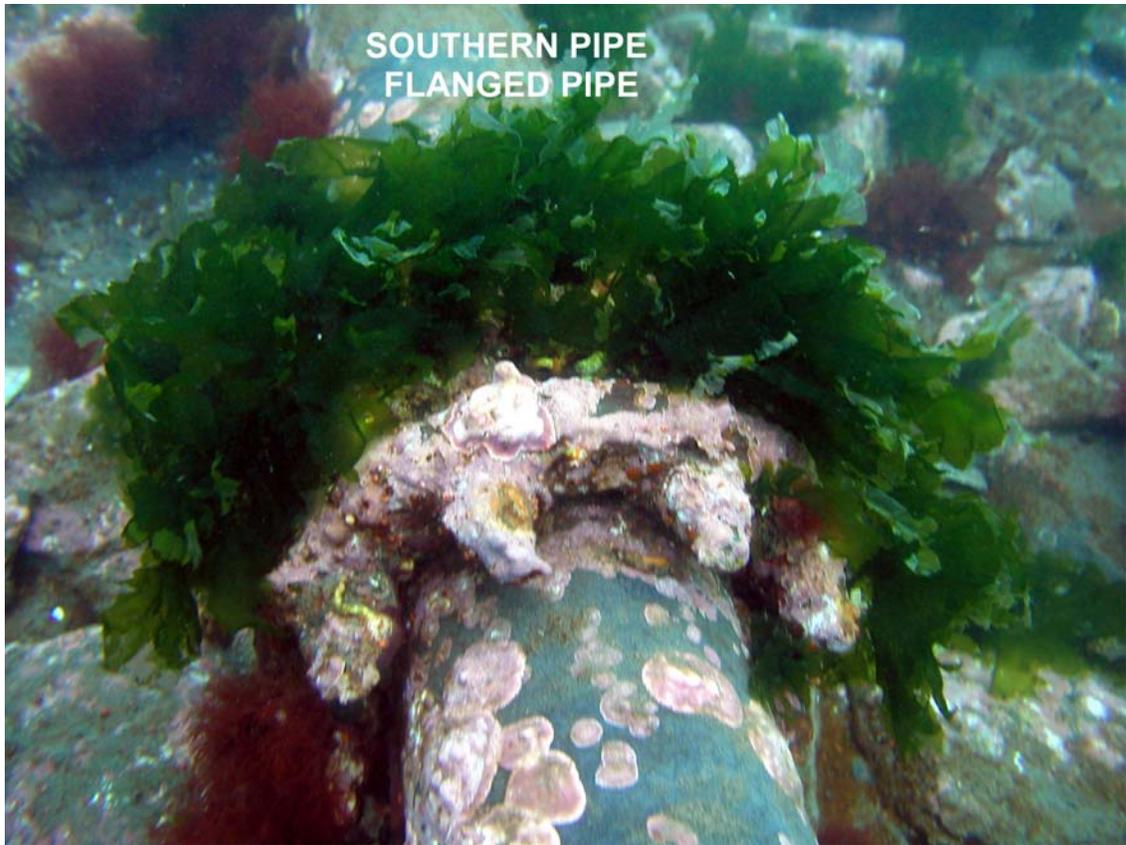
# PHOTOS PIPE # 2

## SOUTHERN PIPE



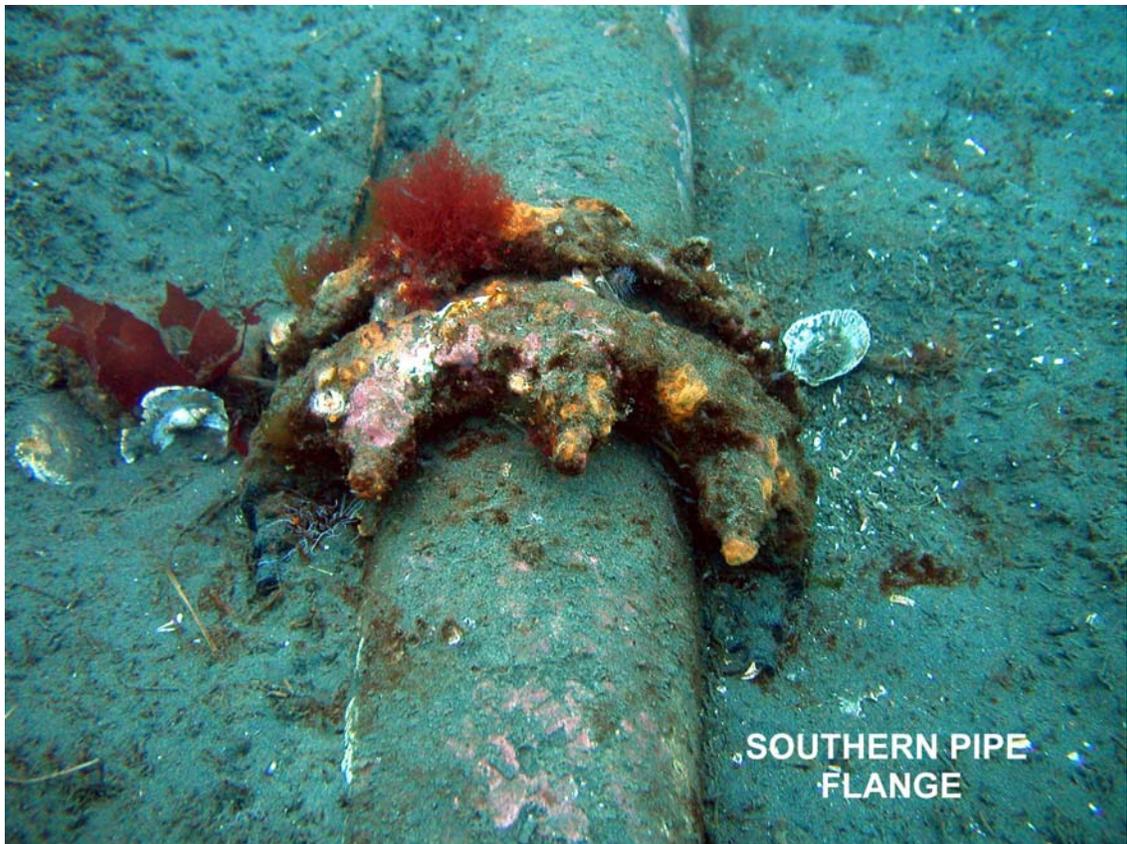




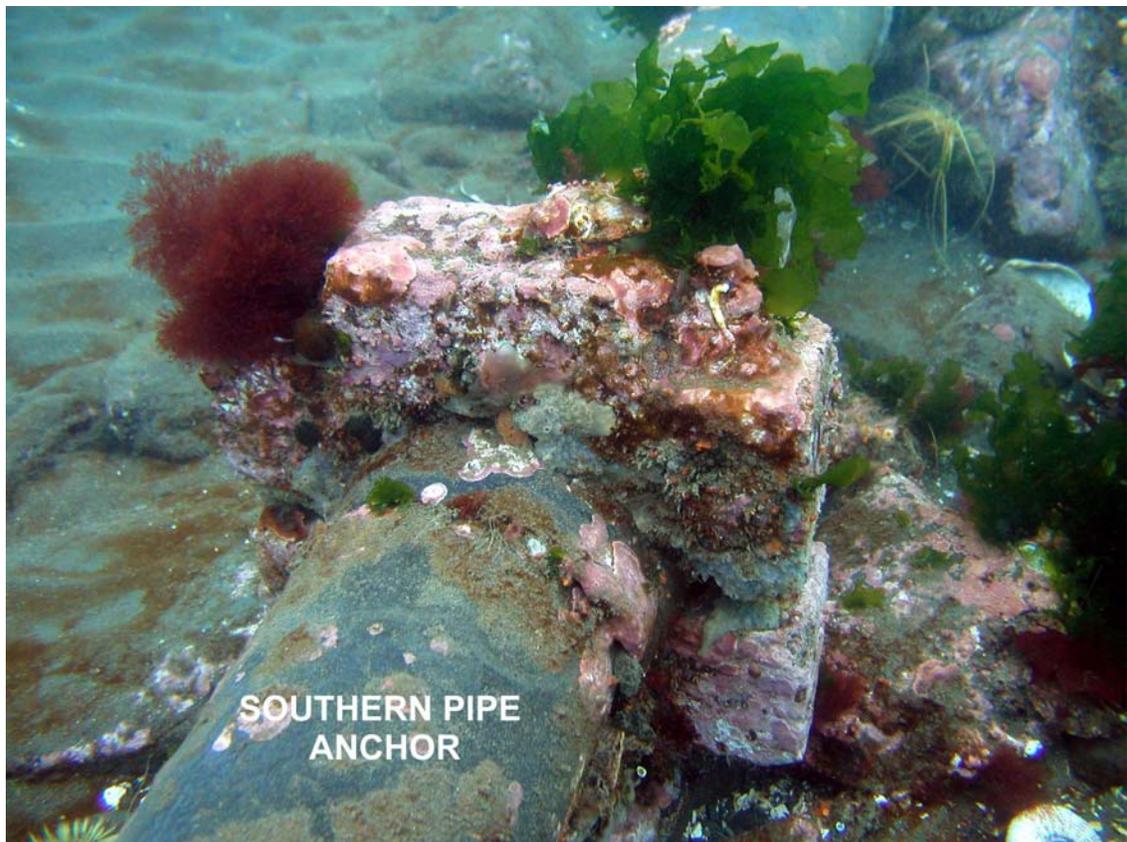
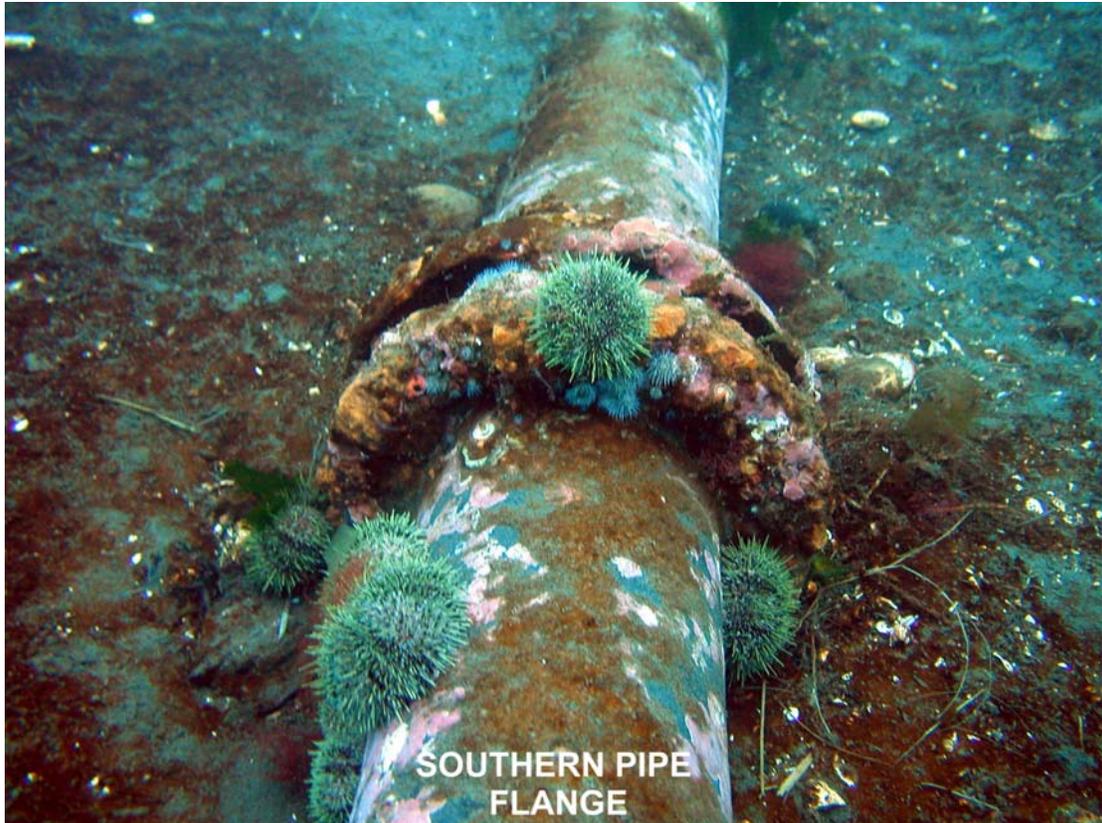




SOUTHERN PIPE  
FLANGE

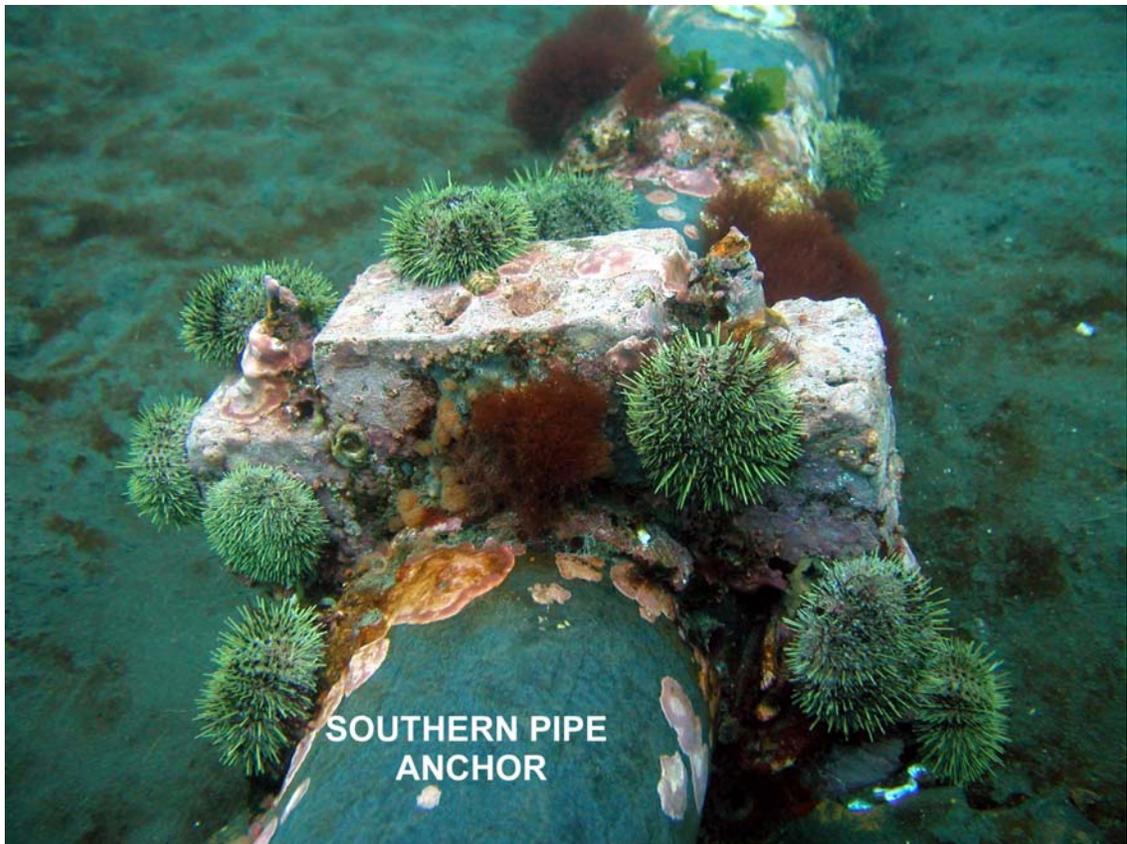


SOUTHERN PIPE  
FLANGE

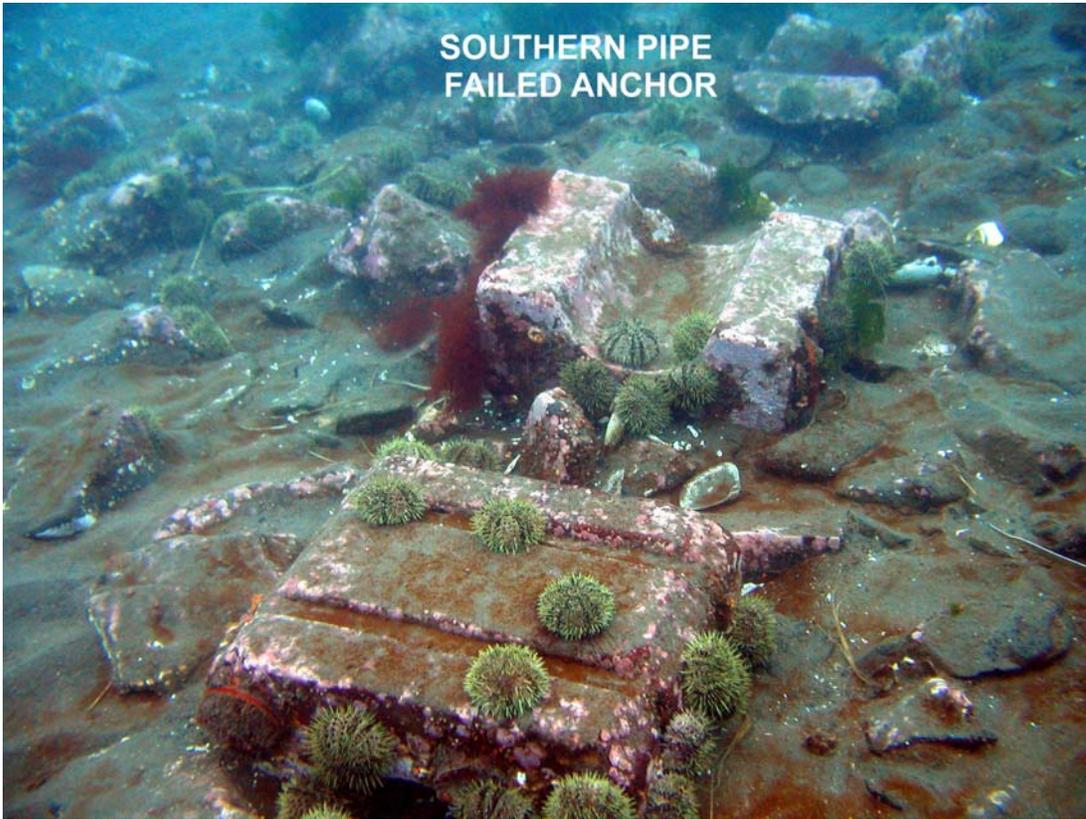


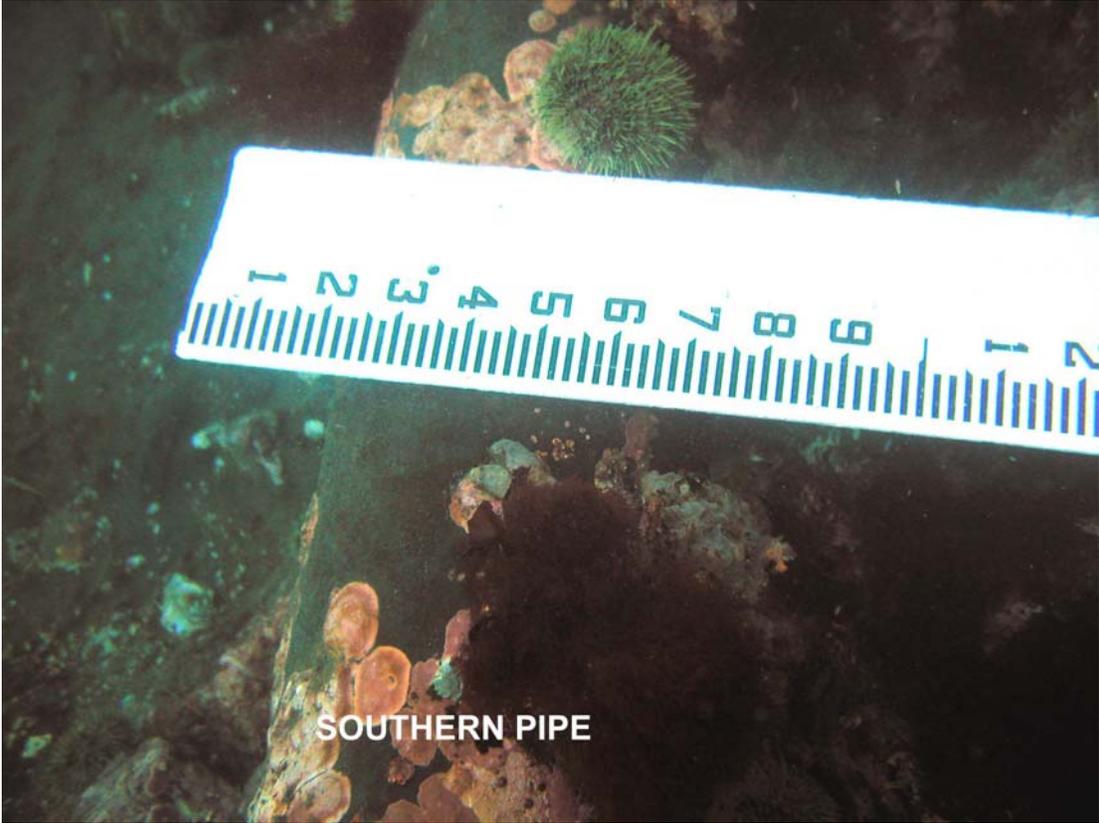


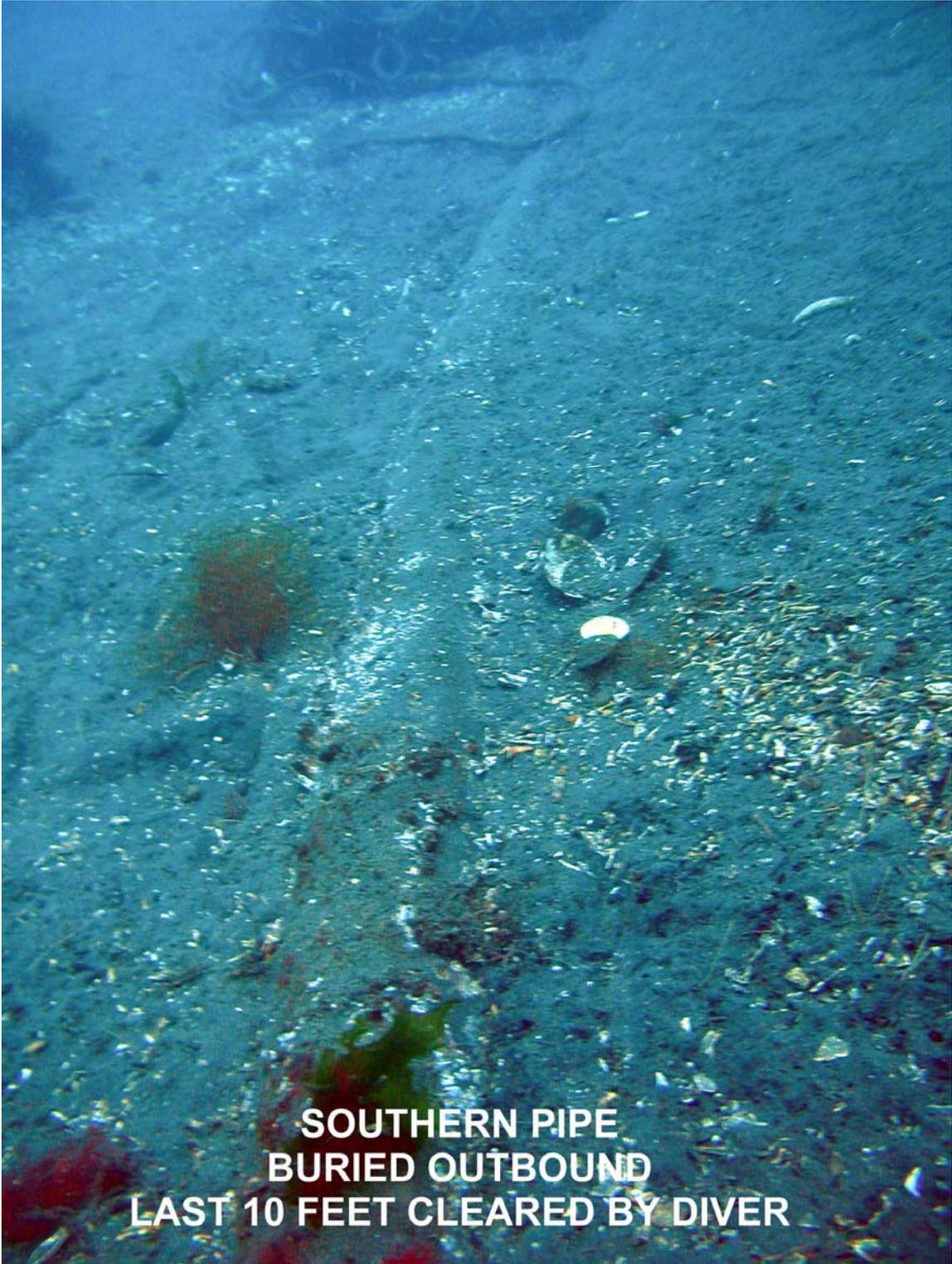
SOUTHERN PIPE  
ANCHOR



SOUTHERN PIPE  
ANCHOR

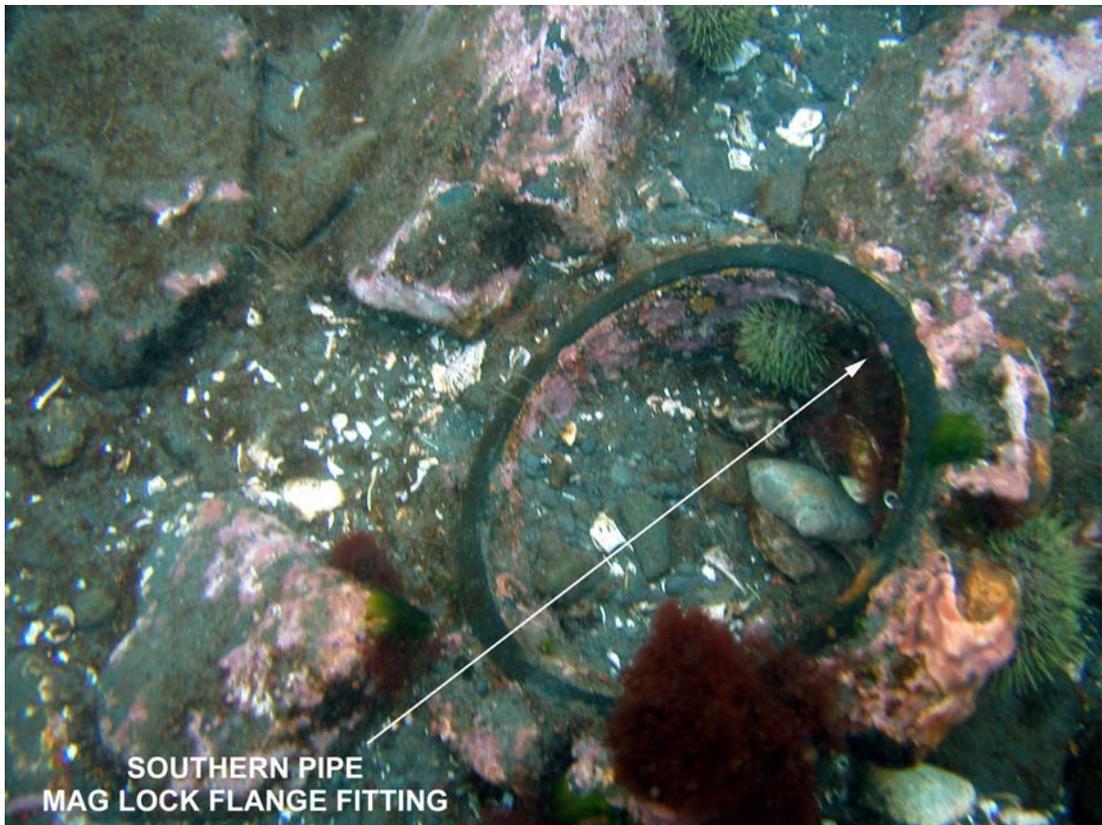








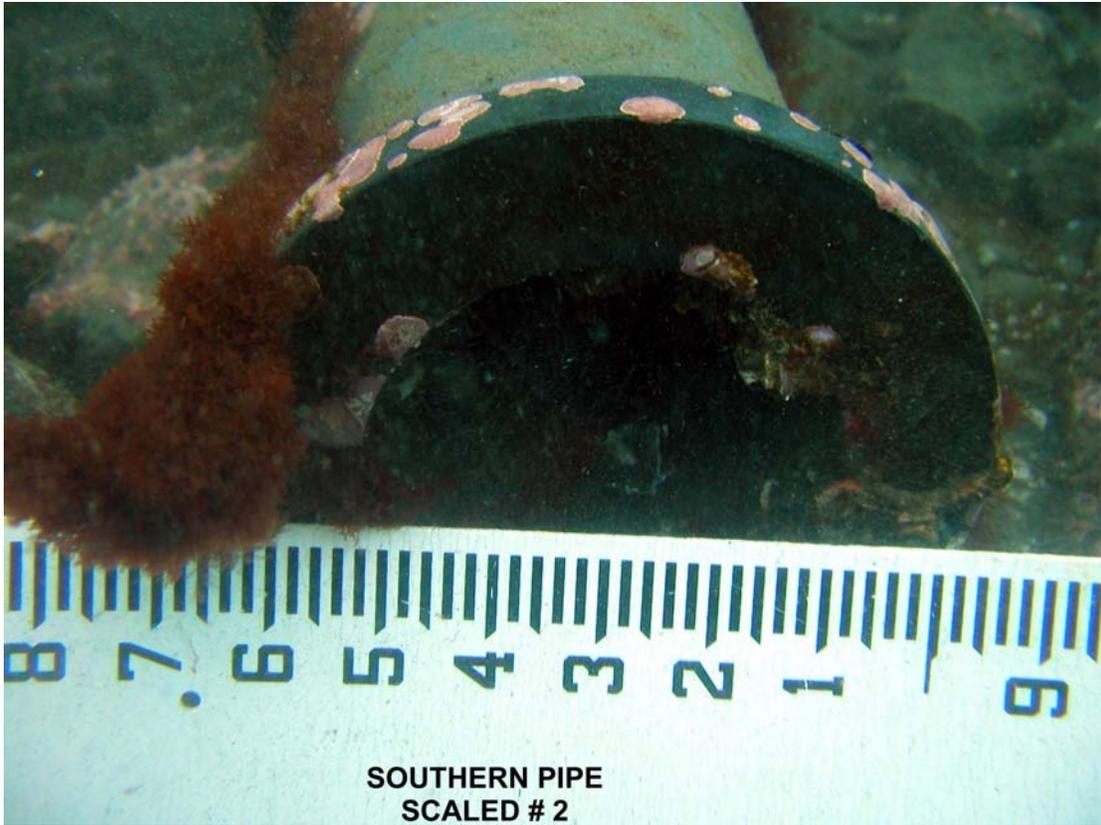
**SOUTHERN PIPE  
BECOMES EXPOSED OFFSHORE**



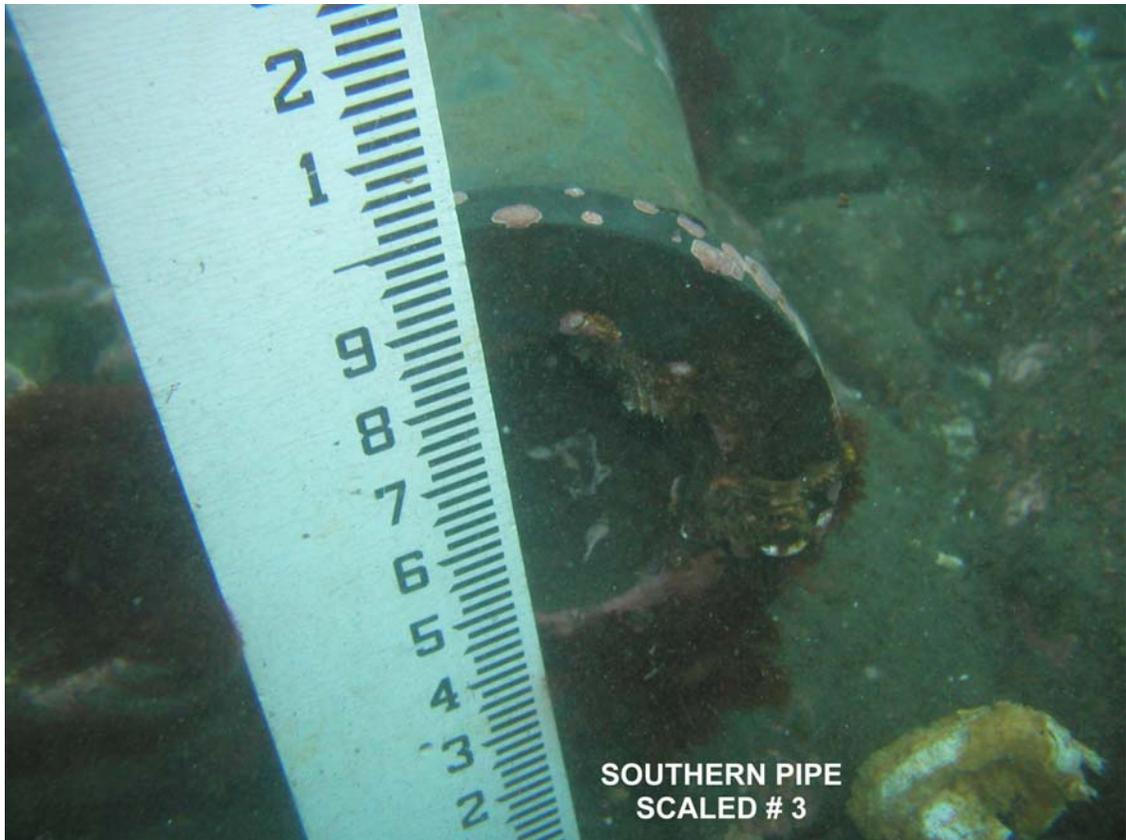
# PIPE # 2

## SCALED PHOTOS

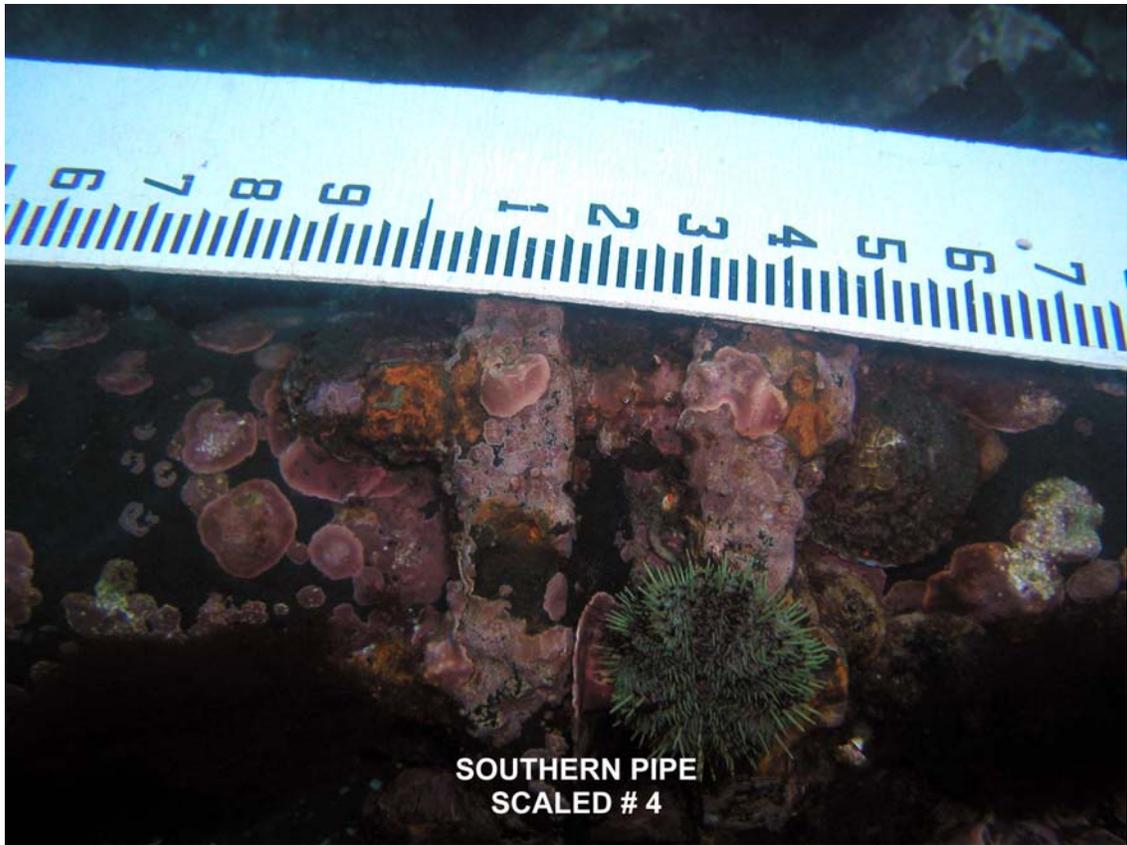




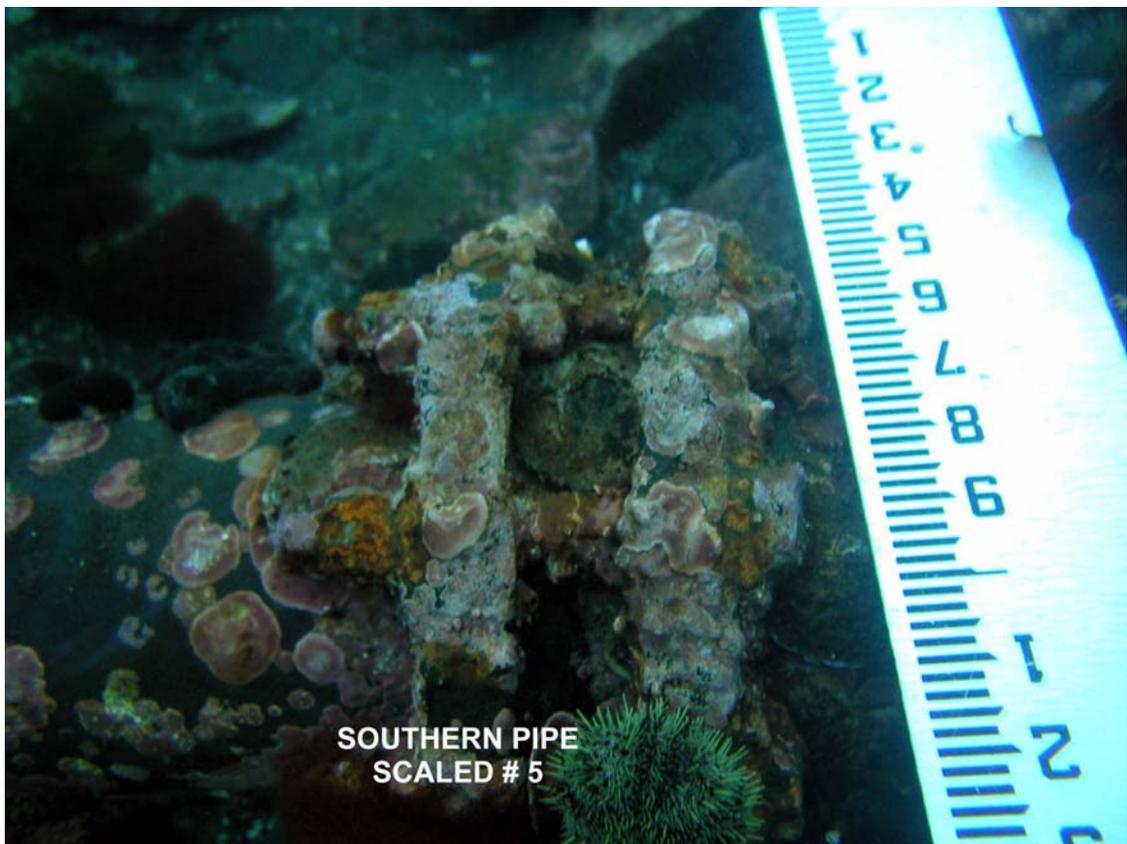
SOUTHERN PIPE  
SCALED # 2



SOUTHERN PIPE  
SCALED # 3



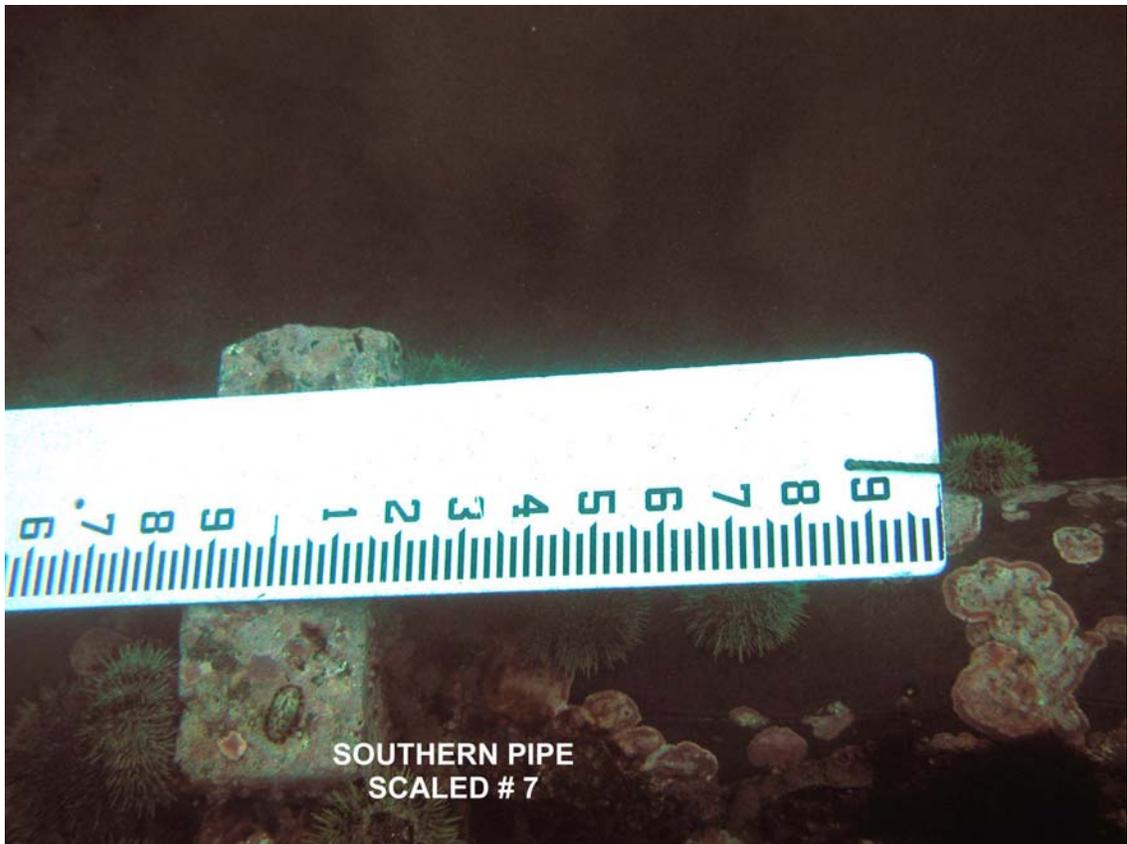
SOUTHERN PIPE  
SCALED # 4



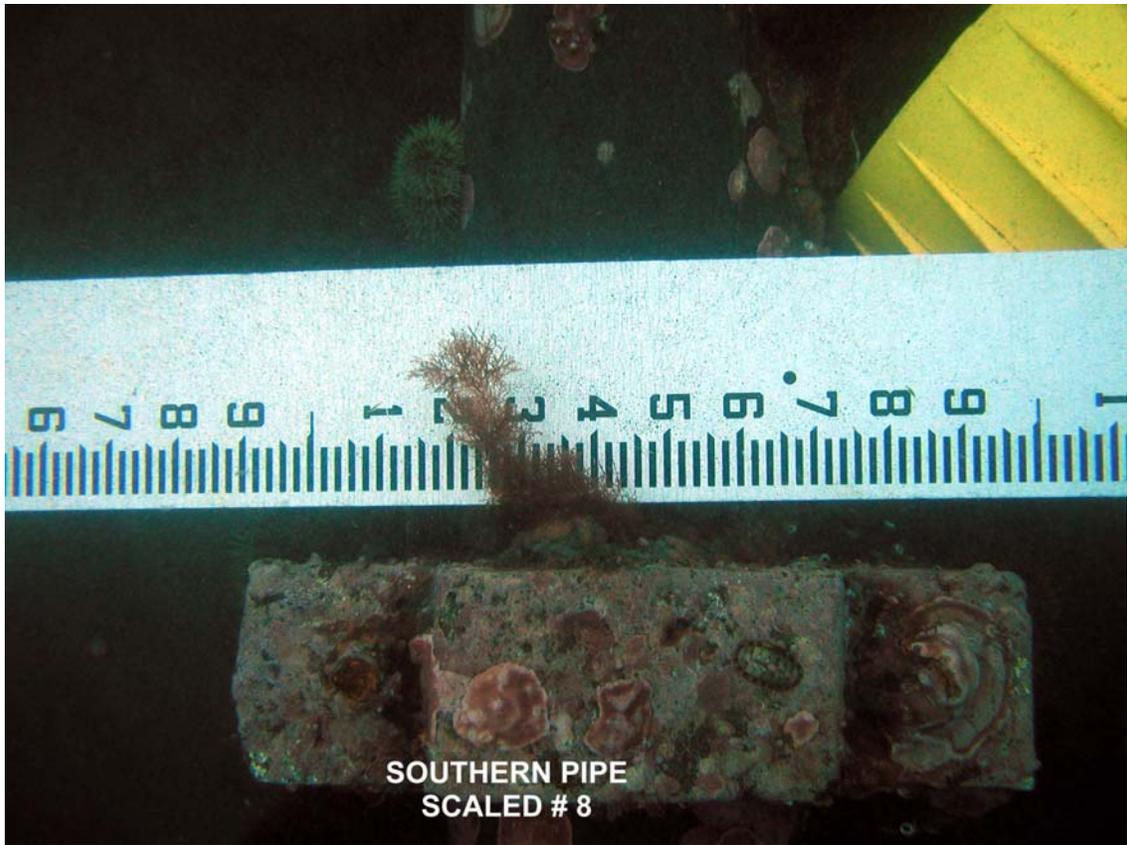
SOUTHERN PIPE  
SCALED # 5



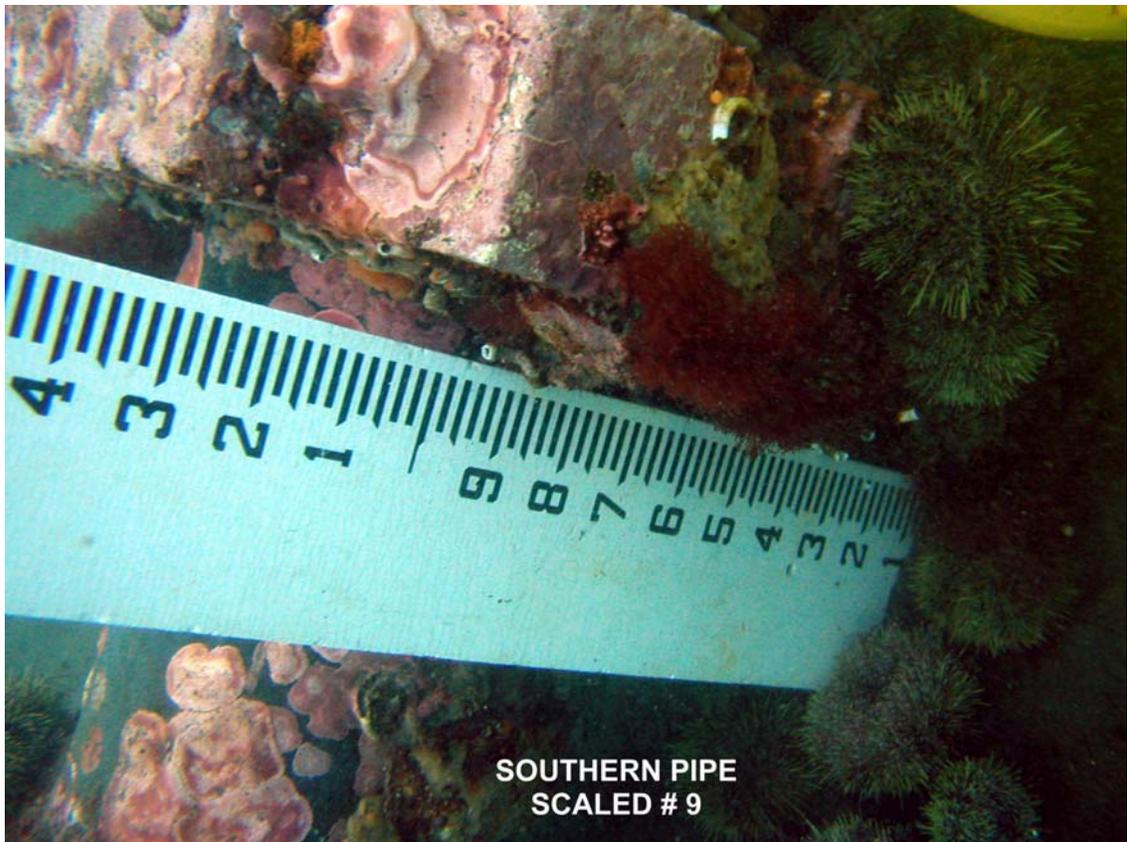
SOUTHERN PIPE  
SCALED # 6



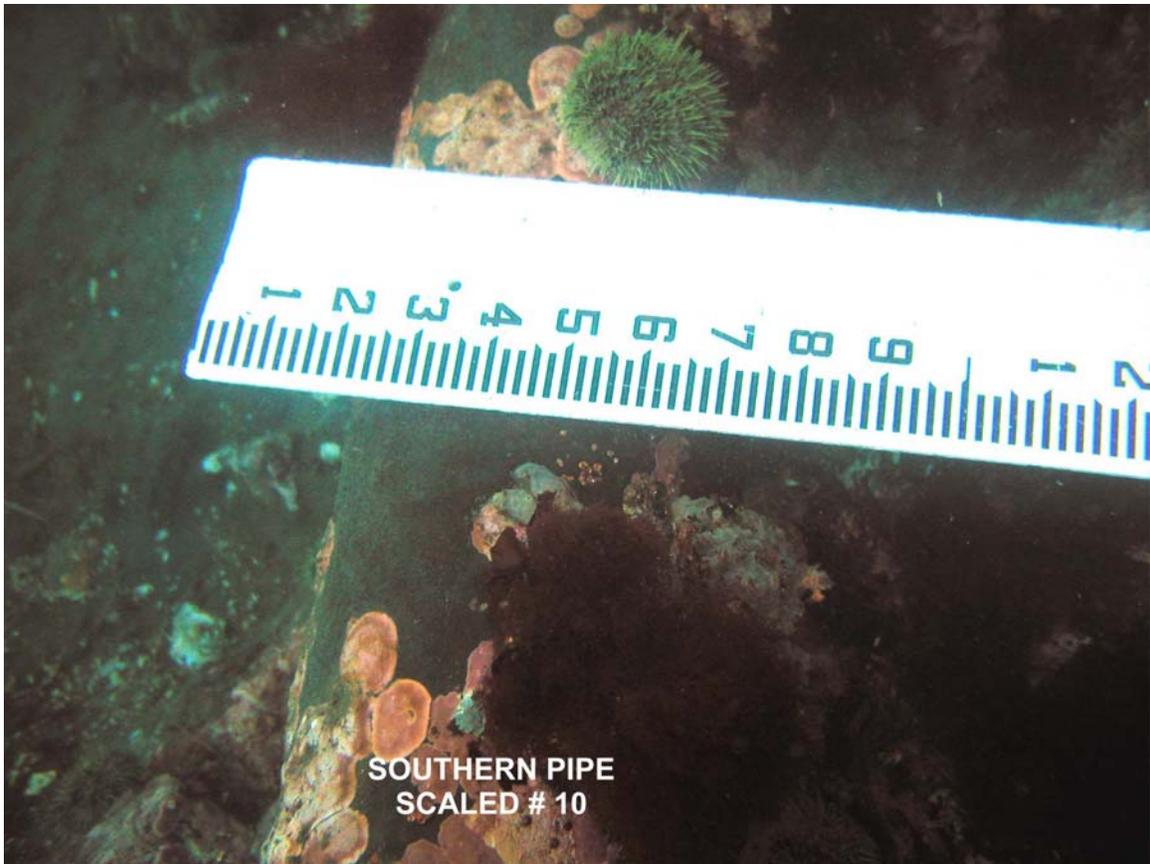
SOUTHERN PIPE  
SCALED # 7



SOUTHERN PIPE  
SCALED # 8



SOUTHERN PIPE  
SCALED # 9



SOUTHERN PIPE  
SCALED # 10

# METHODOLOGY

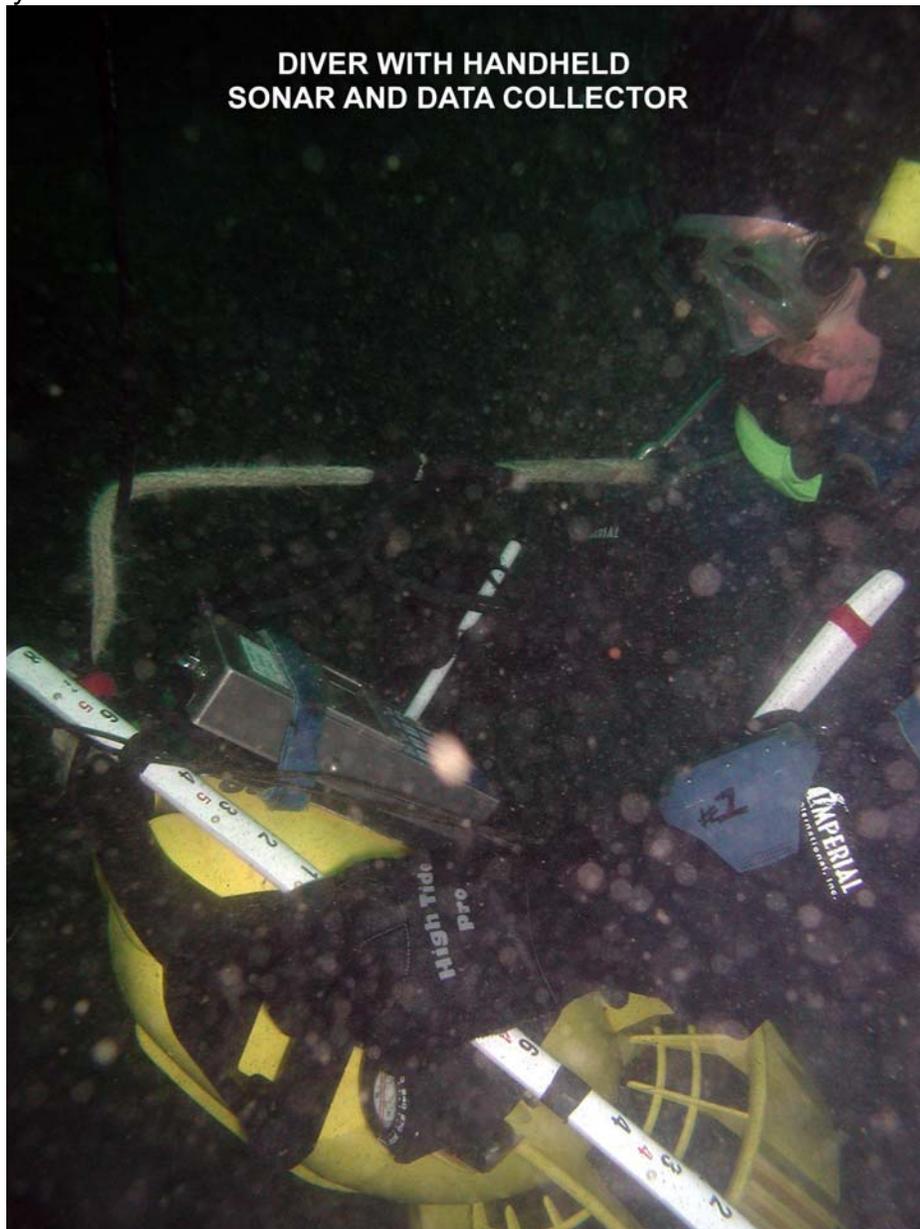
## METHODOLOGY

### **GRID CONSTRUCTION AND DIVE SPECIFICS**

Enviro-Tech Diving, Inc. uses an Ultra Short Baseline Diver Survey System to conduct dive survey operations. The system consists of multiple stationary sonar transducers used in conjunction with a mobile diver sonar unit. The stationary transducers are deployed and secured to an anchor in an area of the grid to provide optimum sonar coverage of the area. Each of the sonar transducers is equipped with a syntactic foam collar that ensures perpendicular mid-water deployment again aiding in complete sonar coverage.



A handheld sonar computer unit is used by the diver to enter data at each location. The diver at each location can enter multiple observations into the computer unit. When present, depth of waste measurements, topographic anomalies and pertinent observations of marine life are recorded. Water depths are automatically taken by the computer and converted to mean lower low water (MLLW) for report purposes. Mud depth is taken with a hollow slotted PVC probe marked every tenth of a foot for measuring purposes. The probes hollow slotted construction ensures the diver can effectively examine the substrate.



Closer additional data points are taken in areas marked by greater topographic anomalies. This is done at the diver's discretion depending on the topography present and the extremity of the irregularity. Upon completion of each dive, divers immediately and extensively debrief on their observations made during a dive. A data point matrix of the bottom topography and water depth is then constructed. This

information is then entered into a PacSoft or Carlson Survey engineering software package producing a T-Net, which is used to generate graphs, maps and waste volume measurements.

Scaled photos were taken at different locations of the discharge line. These photos are located their own section.

Please note that the bottom depths may vary slightly due to the rounding off of tidal range to the nearest foot and the ability of the diver's computer to measure depth to an accuracy of +/- 1.0 foot. These depths may vary from the bathymetric survey depths due to the following conditions:

1. Divers rounded tidal differences to the ¼ hour
2. Divers convert depths off tidal predictions for the Nazan Bay and not the actual tide.
3. Dive computers cannot compensate for swell and wave conditions.
4. Water Depths on data points 3-5 are interpolated to show approximate bottom topography.