

WEST COAST NATIONAL UNDERSEA RESEARCH CENTER

NURP QUICK-LOOK REPORT



By

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West Coast National Undersea Research Center

Project No.: AK-94-04

PI: O'Connell

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Report Date: 6/7/94

Inclusive Dates of Mission: 4/30/94 - 5/7/94

Date of Dives: 5/1/94 - 5/7/94

Mission Number: _____

Dive Numbers: 3241-3268

Title: In-situ studies of DSR and lingcod: using sidescan sonar and direct observation to define the relationship between fish density and habitat complexity.

Principle Investigator: Victoria O'Connell (ADF&G)

Other Participating Investigators: David Carlile (ADF&G), Waldo Wakefield (Rutgers), and H. Gary Greene (MLML).

Summary of Cruise Results:

We made 24 science dives during the cruise: 4 of these dives were specifically made to characterize geology, 15 dives (23 transects) were made for fish density counts, and 4 dives (16 transects) were made for fish counts in conjunction with the fishing down experiment. One day was spent on the Fairweather Ground diving the sidescan sonar track line. The remainder of the dives occurred off Kruzof and Baranof islands. In conjunction with the diving we chartered a longliner for 5 days to conduct a fishing down experiment.

Habitat Characterization

Four different and distinct rockfish mega-habitats were examined during the cruise and their general geological character are defined. These habitats are Kulichof Rock Bank ("6-mile rock"), nineteen fathom pinnacle, Kruzof Lava Field (offshore Edgecumbe lava Field, Cape Edgecumbe) and Fairweather Ground. Each of these mega-habitats are generally described below:

1. Kulichof Rock bank: This mega habitat is a shallow shelf bank flank bordering a fjord. Steeply sloping (45° to the south) flanks are composed of well exposed outcrops of graywacke. Seafloor is irregular with jointed and fractured, well-layered Sitka graywacke. Locally well sorted, poorly packed angular to blocky boulders lie in contiguous pates. Upper southern flank is rounded and glaciated with heavy concentrations of encrusting or sessile organisms. Angular boulders and fractured exposures of bedrock form cracks and crevices and angular boulder fields have high void spaces offering caves and overhangs for fish refugia (see sketch A).

2. Nineteen Fathom Pinnacle: This mega-habitat is a benthic to deep shelf pinnacle (possible volcanic plug) characterized by several different local habitats ranging from debris fields to massive volcanic rock

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faces (outcrop). Flat shelf floor around base of pinnacle is composed of lightly rippled sand that lies adjacent to gently dipping ($> 5^\circ$) slope composed of sand with scattered angular pebbles. Next to this, upslope, a clean pebble to cobble-pebble to cobble pavement forms the lower apron of the pinnacle and slopes approximately $10-20^\circ$. At the base of the pinnacle is a rubble deposit of continuous angular large boulders (10's of m) debris field with nearly 50% void space. massive vertical walls of volcanic rock from the sides of the pinnacle are moderately fractured with deep crevices cracks and small caves. The top of the pinnacle is irregular, highly fractured with rough rounded surface, heavily covered with encrusting organisms and a *metridium* forest. The pavement, boulder field and pinnacle are composed of basalt. Questionable columnar jointing was observed in one place (see sketch B).

3. Kruzof Lava Field: This mega habitat is a deep shelf lava field (160m) dusted with silt and is moderately encrusted. Irregular surface of lows vary from AaAa to PoiPoi type with large (1-2 M) compression ridges and deep (2-5 m) cracks and crevices producing many overhangs and caves. Angular to rounded boulders and cobbles concentrated along base of compressional ridges and occasional depressions. Collapsed lava tubes form long sinuous rugged grooves with angular and broken slab-like boulders continuous within. Much lava is vesicular with medium to large micro-relief of ropey texture and micro-cracks of cm width and depth with many encrusting organisms. Large continuous boulder field composed of sub-rounded to angular large to small boulders poorly packed and having 30% void space. Linear swaths of well-rounded gravel and some sand located in low areas. Lava field of low erodability. Presence of rounded boulders, cobbles, pebbles, and gravel indicate that the lava field spent a short time in the surf zone, possibly during sea level rise or during subsidence, and receives coarse -grained beach material from the island nearby. No pillow basalts present, lava field formed subarially (see sketch C).

4. Fairweather Ground: This mega-habitat is a benthic deep shelf bank of exposed faulted and folded bedrock. Surface is irregular with exposures of thinly- to massively-bedded sandstone forming large (7-8 m high) bedding faces and cliffs with overhangs and caves. Differential erosion of thinly-bedded sandstone forms ledges, caves, and overhang while fracturing and cracking of massive units forms boulder fields along the base of bedding faces with boulders approaching the size of automobiles. Extensive faulting and fracturing of the rock creates crevices and cracks. Clean, moderately encrusted bedding plains are exposed and exhibit sole marks (ripples, flutes). Several debris channels or chutes cut the bedrock and are composed of cobbles and pebbles with boulders and in some places cobble-pebble pavement exists. Very well sorted, clean, coarse-grained white sands form large period (0.5 m) ripples in debris channels and along the base of bedding scarps. Locally, pot holes are present, often with boulders or gravel within, and suggest a period of erosion near the surf zone. Micro-relief varies from quite smooth on bedding plains to high where cracking and fracturing occurs along the upper edges of bedding scarps (see sketch D).

Eight different meso-scale habitats (A-H) are defined from the side scan sonar data and all but one (C) was examined using Delta. See description of Fairweather Ground macro-habitats in first part of this report, based on interpretation of side scan sonograph.

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General scientific contribution of the cruise:

We will be able to directly compare the Fairweather sidescan records with submersible dive observations to groundtruth habitat types. Several independent estimates of fish density will be calculated based on the submersible line transects and the fishing down experiment. We are also working with Rick Starr to develop standard habitat definitions in order to compare our work with work in Oregon and California.

Operational details:**Weather and water conditions affecting operations:**

Weather was marginal during most of our cruise and greatly affected our ability to accomplish our objectives. We were unable to work on the Fairweather Ground for enough days to conduct our fishing down experiment and therefore shifted the fishing experiment and most of our dives to the area off Kruzof Island. Even so, we had one down day due to weather and had to work one day inside Sitka Sound. As we expressed prior to scheduling, April and May are too transitional to expect to accomplish maximum dives and I do not think WCNURC's objectives were well served by forcing projects to work this early.

Safety problems and concerns:

Again, weather was our biggest safety concern. One day we were retrieving the sub when an unexpected 50 k gale came through. Although we had the sub on deck as the storm hit, we could have easily been in serious trouble had the sub been in the water.

Dive management and personnel cooperation:

The Delta crew was very accommodating and worked hard to accomplish our objectives. Management of video equipment, tapes, and film was far superior to past years. Initially we had difficulty with the trackpoint and fusion system and were unable to download fusion files to disk. This was partially a software problem and partially inexperience with the new system. We strongly recommend that Jeff set up a winter training session regarding all aspects of this system. We also recommend that Jeff include the line length (based on the sum of point to point distances) in his track-point printout.

Logistics and support activities:

The Cavalier crew was also very accommodating. I would recommend this crew highly. We were always on station prior to our scheduled dive time and the crew handled numerous changes in scientific crew easily.

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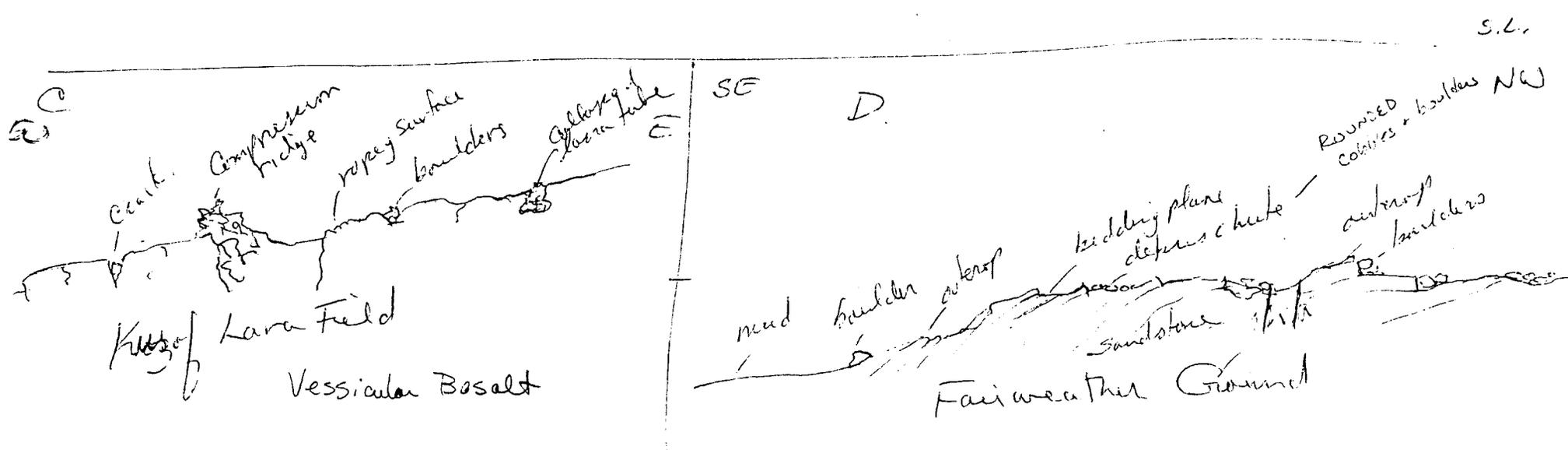
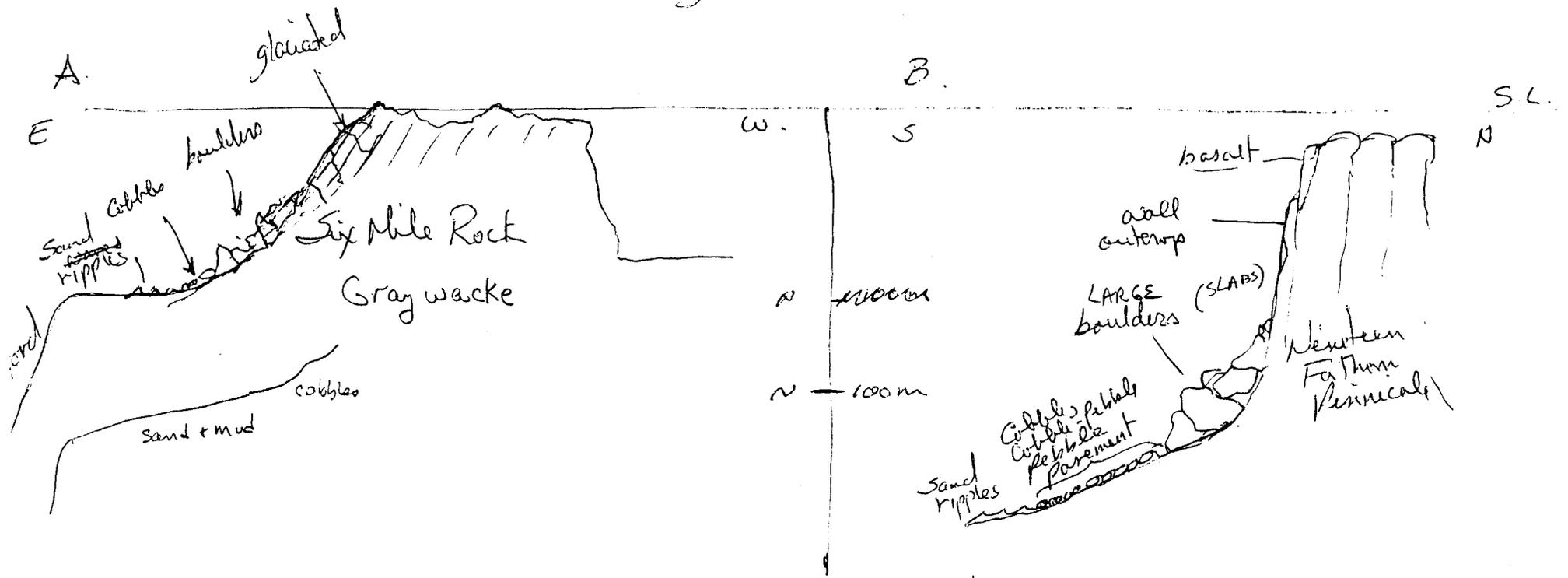
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The vessel needs a larger anchor. We spent alot of time running to anchorages because of the boat's limited capacity to anchor. Surge protectors should be available for all electronic gear. We had to buy these ourselves (not only for our own equipment but also for NURC's) which was an unexpected expense. Also, the next contract should specify that a new, inflated zodiac by on board and ready to deploy. The skiff that they have is not sea worthy for sea transfers and offshore work.

Victoria M O'Connell
Signature, Principal Investigator

6/8/94
Date

Megahakitsats



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