

## Provisional REPORT (10 September 2006)

# Rapid Assessment of submerged Coral Reefs at South-East Guimaras

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## Introduction

The objective of the rapid assessment was to determine the nature and extent of damage on subtidal coral reefs in affected areas in the Province of Guimaras as basis for the formulation of rehabilitation and contingency plan.

Under the coordination of the BFAR a team of 4-5 SCUBA divers were employed on volunteer basis. The experienced divers were requested from SEAFDEC and from the CRM team of the DED (German Development Service, a government agency of Germany). This report summarizes the most important results, conclusions and recommendations. A more detailed analysis will follow in a later report. The main questions were if indications can be observed for a mass mortality or stress of fish, invertebrates and corals in affected shallow-water reefs (ca 3 m).

## Time of assessment

The rapid assessment was carried out between 1st and 5th September 2006

## Locations

The following report is limited to the area of South-east Guimaras that was heavily polluted by the oil spill caused by SOLAR I after 11th August 2006. Five different stations with a total of 12 transects were surveyed. The geographic positions of start- and endpoints of the transects were recorded by GPS device. Visibility and water temperature were measured (see appendix, table 1).

### Stations:

1. Guiuanon Island. (3 transects)
2. Panobolon/Yeto Islands (3 transects)
3. Nauayan/Nagarao Islands (3 transects)
4. Toyo Reef, Marine Protected Area (1 transect)
5. Unisan Island (2 transects)

## Methods

Four methods as follows were applied in the target area:

### 1. Point Intercept Transect for Corals

The Point intercept transect method was applied for soft corals and hard corals, principally according to Uychiaoco et al. 2001. At each 0.25 m intercept of a 50 m long transect lines corals were identified down to genera (or species level if possible) and type of growth form (e.g. branching, massive, encrusting, mushroom, columnar, table-shaped, and foliose). Soft corals (Gorgonaria, Alcyonaria, Antipatharia), Stolonifera, Blue corals (Helioporacea), Actinaria, Corallimorphia and fire corals (Milleporidae) were recorded separately as well as tunicates or other obvious sessile organisms. Hard corals (Scleractinia) were also surveyed for stress indicators such as tissue swelling, mucus production and bleaching. Uncovered areas were classified as dead corals (covered by algae or debris), sand/mud, coral rubble etc. Identification of organisms according to Gosliner et al. (1996), Erhardt & Knopp (2005) and Veron (2000). For the provisional report only coral coverage and stress indicators are reported.

### 2. Belt Transect for Invertebrates

The Belt transect method was applied for invertebrates, according to Uychiaoco et al. 2001. A five m broad belt (2.5 m at each side of the transect line) along the 50 m transect line (a total surface 250 square-meter per transect) was surveyed by one diver. Mobile and semi-sessile macro-invertebrates were determined

down to species level if possible or larger taxonomic group, counted and recorded on underwater-slates. Featherstars (crienoids) were included since they may indicate stress (suspension feeders!). Identification of organisms according to Gosliner et al. (1996).

### 3. Fish Visual Census

The Fish Visual Census (FVC) was conducted according to Uychiaoco et al. 2001. A five m broad belt (height up to the surface) along the 50 m transect line (a total surface 250 square-meter per transect) was surveyed by one or two divers at shallow depth of 1-3 m. Fishes were determined down to species (if possible) or taxonomic family, abundance (number) and size categories (four categories: 1-10 cm, 11-20 cm, 21-30 cm, > 30 cm) and recorded on underwater-slates. Surveying along the 50 m line was always started by fish observers to minimize disturbance to fish. Identification of fish was carried out according to Allen et al. (2003). A total of 12 fish visual census along a 50 meter transect were conducted in 5 stations (see chart). Also, a species count was conducted except for the last 2 stations.

### 4. Visual Documentation (UV-stills/video)

The corals and fish along the transects as well as diver's activities were documented by Underwater still photography (Canon powershot) and digital video shots (Sony system).

## Results

1. Guiuanon Island. (3 transects)
2. Panobolon/Yeto Islands (3 transects)
3. Nauayan/Nagarao Islands (3 transects)
4. Toyo Reef, Marine Protected Area (1 transect)
5. Unisan Island (2 transects)

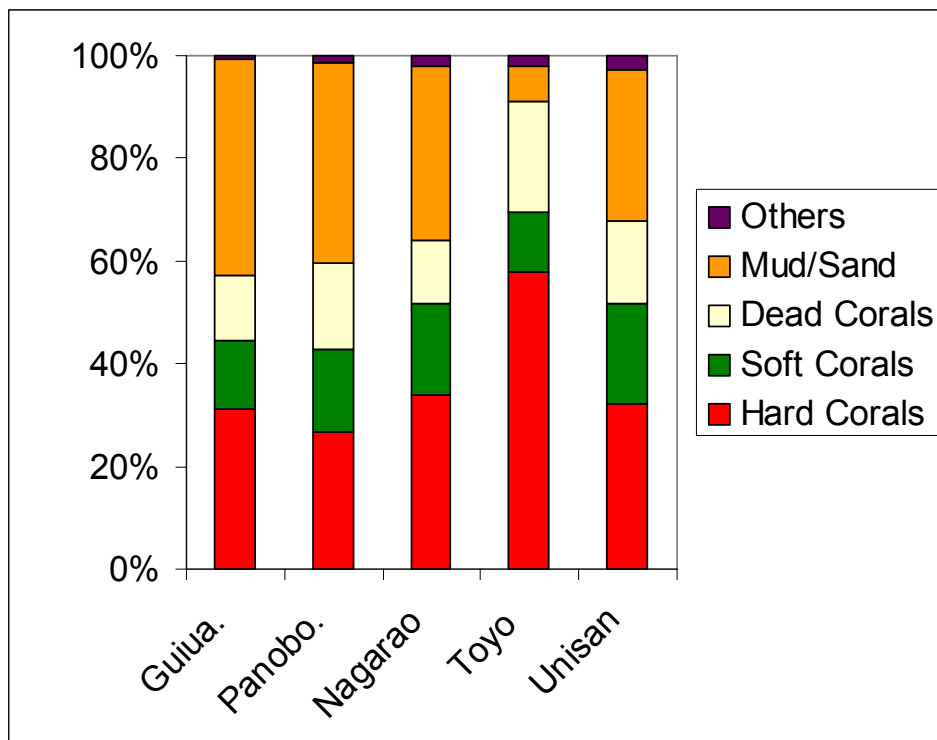


Figure 1. Coral coverage in the target area.

Hard coral coverage in the target area ranges between 22 and 56 %. Coverage with dead corals were mostly under 20 %, except for Toyo, where impact of disturbance by boats were clearly visible. Dead corals were completely covered with debris, only in few cases by algae. Near shore reefs showed a high turbidity as indicated by low visibility (cf. appendix, table 1). All reefs, including the offshore reefs at Toyo and Unisan island showed abnormal high coverage with mucus and debris trapped by mucus. Invertebrates were still quite abundant in all reefs, there were no indication of mortality as compared to intertidal reefs.

RESULTS part 2: Belt Transect for Invertebrates

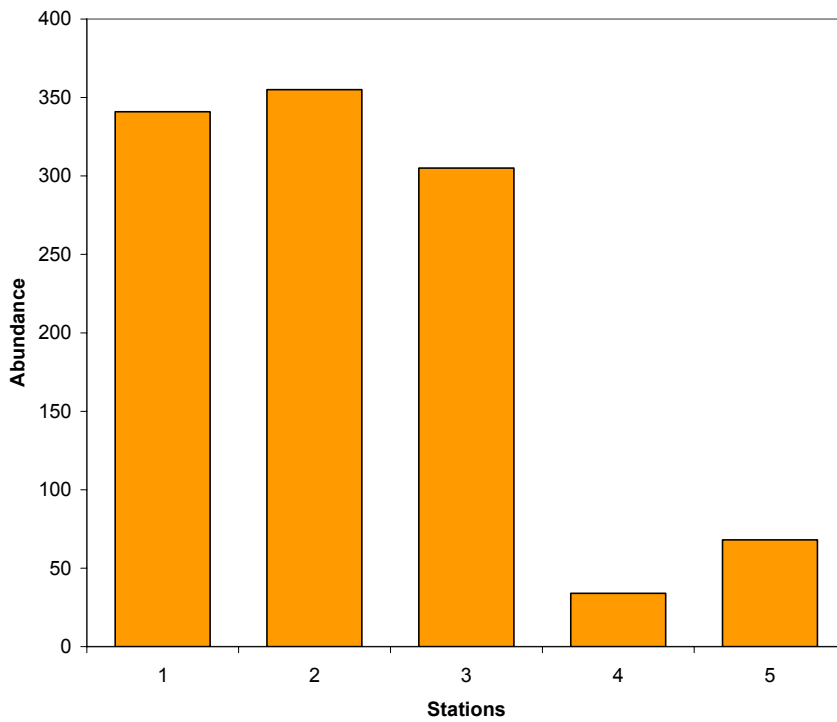


Figure 1. Abundance of macro-invertebrates in the target area.

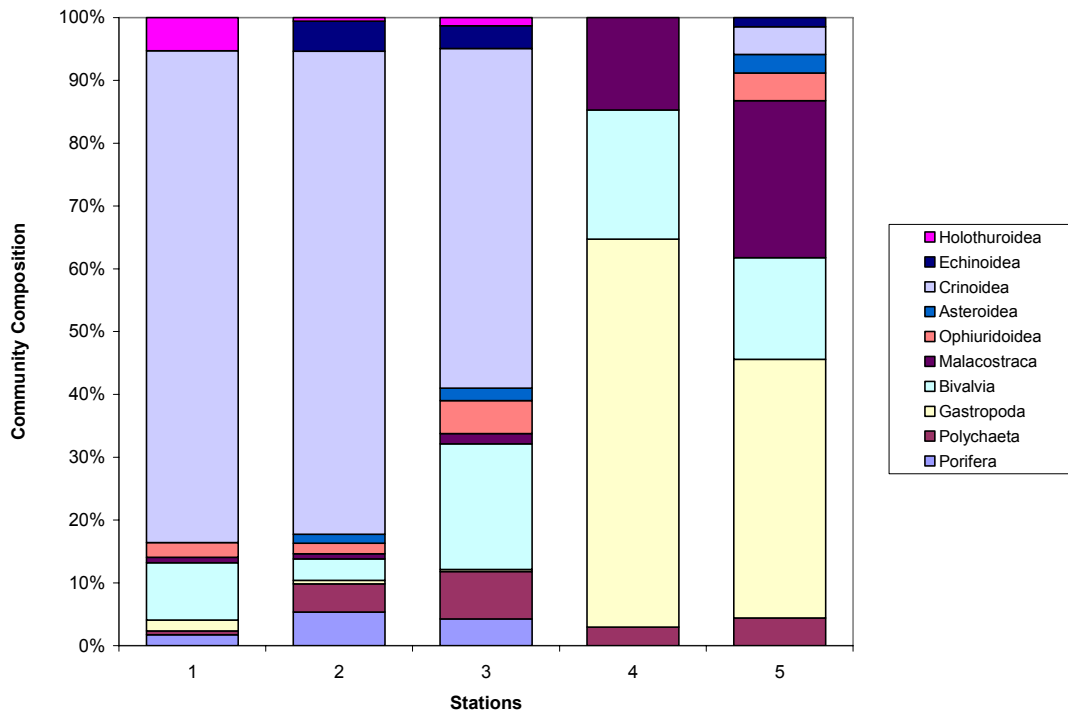
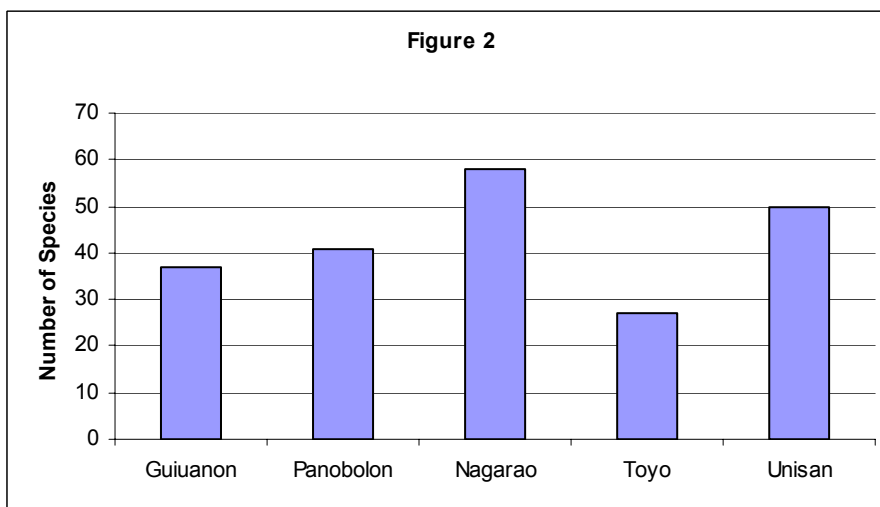
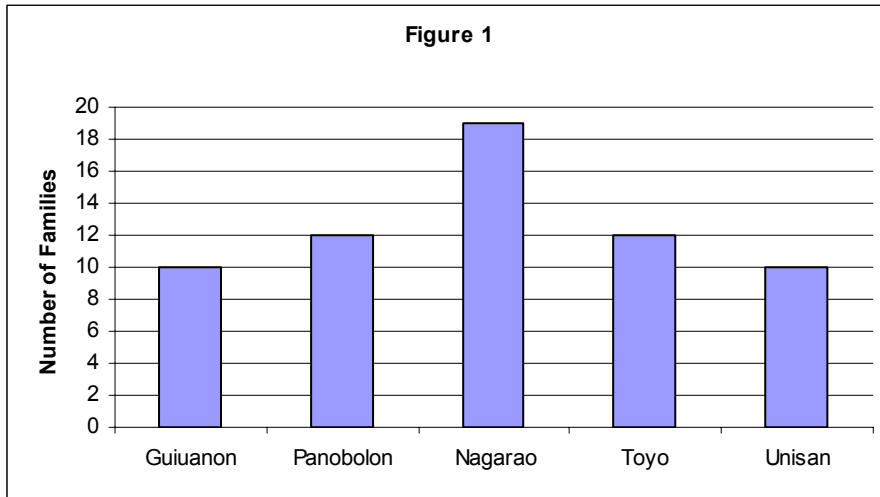


Figure 2. Community composition in the target area.

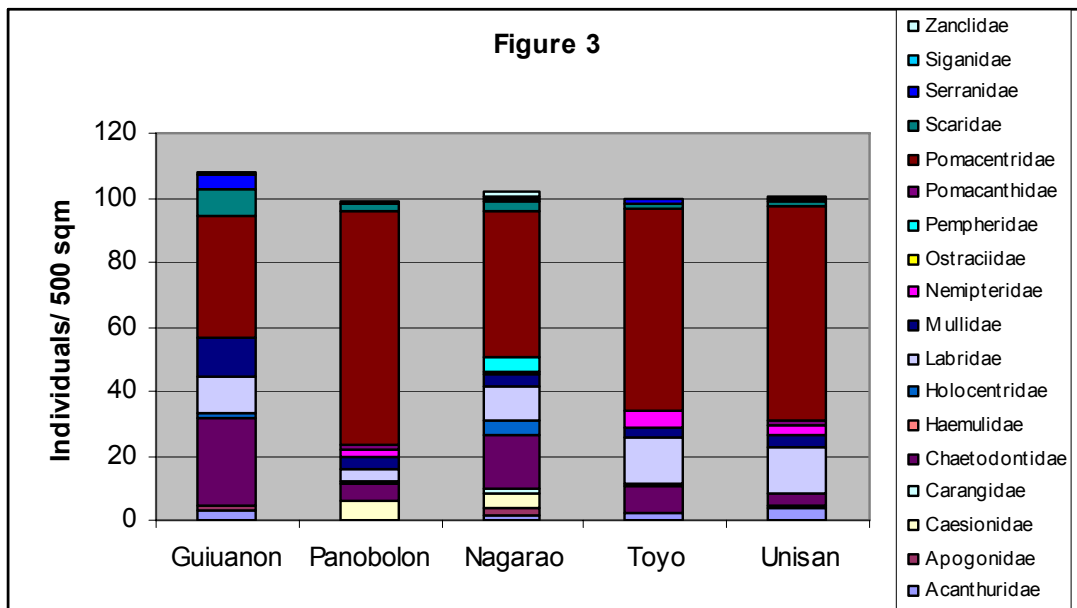
### RESULTS PART 3: FISH VISUAL CENSUS

#### *Diversity of fish*

Figure 1 and 2 show diversity per family and species in the 5 stations. Diversity is relatively low, although results may not be very accurate due to bad visibility (2-3 m horizontal visibility) in stations 1 to 3 (Guiuanon, Panobolon and Nagarao). A species count was also conducted for the stations of Panobolon and Nagarao showing 91 species/ 28 families and 71 species/ 24 families respectively.

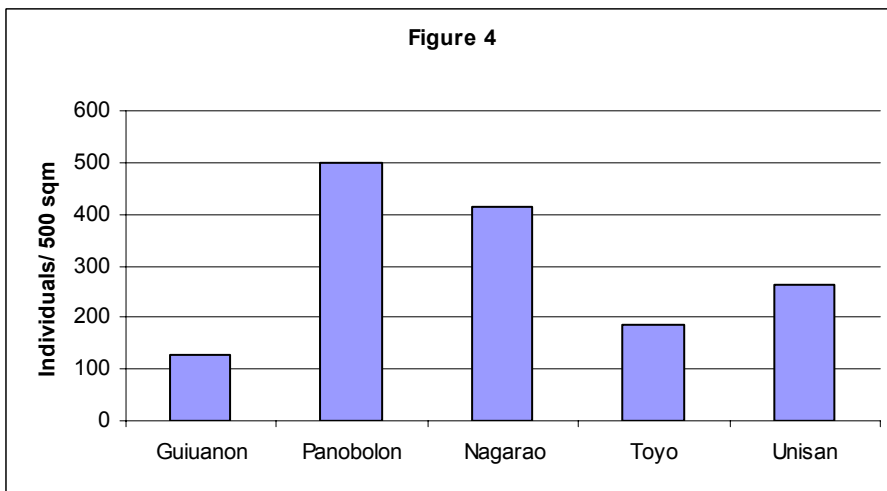


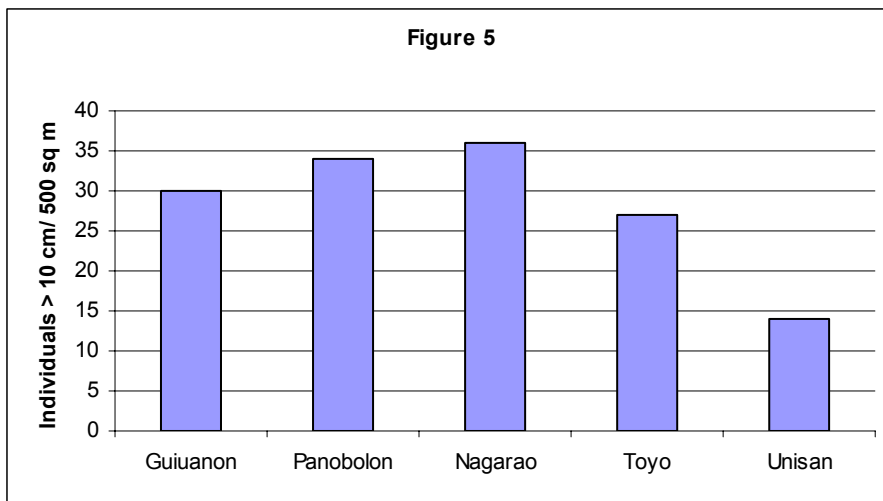
Damselfishes (Pomacentridae), butterflyfishes (Chaetodontidae) and wrasses (Labridae) were dominant in all stations as shown in figure 3.



*Abundance of fish*

Figure 4 shows the average abundance per station. Abundance was generally low. Figure 5 shows percent fishes with sizes bigger than 10 cm (TL). Fishes larger than 30 cm were extremely scarce and only a couple of parrotfishes (Scaridae) and sweetlips (Haemulidae) of that size were observed.





Overfishing in the area of study is clearly shown by the results. In all stations, top predators are missed and even big herbivores like parrotfishes are very scarce. Only some groupers (Serranidae) and snappers (Lutjanidae) and jacks (Carangidae) were observed. Although the percentage of fish larger than 10 cm was relatively high, most of it was Damselfishes (Pomacentridae) and butterflyfishes (Chaetodontidae) which are generally not considered as target species. The diversity of butterflyfishes is quite high, even in the extremely silted stations of Guiuanon and Panobolon that may be associated with the relatively high hard coral cover in the area.

### General Conclusions

**Corals:** Hard coral coverage is consistent with former investigations. Many corals were covered by a layer of mucus and silt.

**Fish:** Reef fish stocks are in a relatively good condition although in all stations top predators are missed. Only some groupers, snappers and jacks were observed. Damselfishes are dominant in all stations. The diversity of butterflyfishes is quite high, even in the extremely silted stations of Guiuanon and Panobolon.

**Invertebrates:** Low number of invertebrates is consistent with former investigations. Feather stars dominated invertebrate community in most stations.

**Comparison with former surveys in the same area:** Babaran & Ingles (1996) investigated the coastal habitats around Guimaras. Our observations are on coral coverage and fish abundance were consistent to even slightly higher than compared to their findings.

**Discussion and possible prospects:** Most documents about the impacts of oil spill on coral reefs (see references) report relative low impacts of drifting oil slicks on submerged corals. The survival appeared to be dependent of the duration of direct contact and kind of oil. Stress indicators are tissue swelling and enhanced production of mucus, secondary mortality might be indicated by bleaching. Chronic effects through long-lasting contact to oil are growth depression and lower reproduction. Massive corals seemed to be more resistant than branched corals. Through the use of detergents emulated oil is transported by wave currents down to 10 m depth. The Genus *Siderastrea* is most vulnerable and showed patches of high mortality one year after the oil spill. At one heavily oiled reef in Central America, total coral cover decreased by 76 percent in the 0.5-3 m depth range and by 56 percent in the >3-6 m range (Guzmán et al., 1991). From investigations of oil spill in the Arabian Gulf it was concluded that healthy reef corals can tolerate brief (1 to 5-day) exposures to floating oil with no observable effect (LeGore et al., 1989). In respect to the survival chances of coral reefs in the target area of southern Guimaras, only a later survey can be conclusive. At the moment, it can be assumed that the survival of the submerged coral reefs will be high if no further massive contamination or chronically contamination will take place.

## Recommendations:

- Observed enhanced mucus production by corals could be caused by oil exposure or siltation. Oil uptake into food web can be accelerated or enhanced by the use of detergent in proximity to shore line. Assumption of bioaccumulation in edible coral reef fish and shellfish species has to be verified. Therefore, chemical analysis of oil traces in POM (particular organic matter), debris (as trapped by mucus) and in suspension-feeders (clams) should be conducted.
- In order to study possible chronic toxicity or secondary mortality of slightly stressed corals that were not detectable by single rapid assessment methods, we recommend further studies in 3-6 months and later in the target area.

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**Appendix: Table 1.** Positions, visibility and water temperature at the 12 transect areas.

Date: 9/2/06 Site: Guiwanon Island (east), Nueva Valencia, Guimaras Time: 12:03pm Depth: 6ft water temp: 30C water visibility:2m TRANS1 COORDINATES START END N 10° 23.531 N10° 23.552 E 122° 37.41 E122° 37.396	Date: 9/2/06 Site: Guiwanon Island (east), Nueva Valencia, Guimaras Time: 2:00pm Depth: 6ft water temp: 30C water visibility:3m TRANS2 COORDINATES START END N 10° 23.835' N 10° 23.858' E 122° 37.14E 122° 37.127'
Date: 9/3/06 Site: Guiwanon Island (east), Nueva Valencia, Guimaras Time: 1000am Depth: 15ft water temp: 30C water visibility:3m TRANS3 COORDINATES START END N10°23.987' 10°23.987 E122°36.886' 122°36.858'	Date: 9/3/06 Site: Panobolon Is. (east), Nueva Valencia, Guimaras Time:1115am Depth: 10ft water temp: 30C water visibility:2m TRANS4 COORDINATES START END N10°24.143' 10°24.135' E122°35.179' 122°35.162'
Date: 9/3/06 Site: Panobolon Is. (westt), Nueva Valencia, Guimaras Time: 306pm Depth: 12ft water visibility:4m water temp: 30C TRANS5 COORDINATES START END N10°24.737' 10°24.715' E122°33.194' 122°33.186'	Date: 9/3/06 Site: Yato Is. (westt), Nueva Valencia, Guimaras Time: 413pm Depth: 15ft water visibility:5m water temp: 30C TRANS6 COORDINATES START END N10°24.628' 10°24.628' E122°33.069' 122°33.054'
Date: 9/4/06 Site: Nauayan Is. (northeast), Nueva Valencia, Guimaras Time: 1255pm Depth: 15ft water visibility:5m water temp: 30C TRANS7 COORDINATES START END N10°26.023' 10°26.001' E122°39.851' 122°39.867'	Date: 9/4/06 Site: Nauayan Is. (northeast), Nueva Valencia, Guimaras Time: 215pm Depth: 10ft water visibility:5m water temp: 30C TRANS8 COORDINATES START END N10°26.061' 10°26.080' E122°39.824' 122°39.806'
Date: 9/4/06 Site: Nagarao Is. (south), Nueva Valencia, Guimaras Time: 352pm Depth: 8ft water temp: 30C water visibility:5m TRANS9 COORDINATES START END N10°26.344' 10°26.357' E122°39.112' 122°39.090'	Date: 9/5/06 Site: Toyo Reef Marine Sancturay Nueva Valencia, Guimaras Time: 1000 am Depth: 3 ft water temp: 29C water visibility:20 m TRANS10 COORDINATES START END N10°21' 36.6" 10°21'32.1" E122°34' 27.7 122°39'29.3"
Date: 9/5/06 Site: Unisan Is., East Coast, Nueva Valencia, Guimaras Time: 1130 am Depth: 7 ft water visibility:15 m water temp: 29C TRANS11 COORDINATES START END N10°19'57.4" 10°19'59.2" E122°35'20.7' 122°35'22.4	Date: 9/5/06 Site: Unisan Is., East Coast, Nueva Valencia, Guimaras Time: 1300 Depth: 7 ft water visibility:12 m water temp: 30C TRANS12 COORDINATES START END N10°20'01.1" 10°20'2.5" E122°35'22.7' 122°35'23.3"