Report on Oil/Diesel leaking from shipwrecks in Chuuk Lagoon

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by Dr Bill Jeffery

An Earthwatch funded project was implemented on the submerged World War II sites in Chuuk Lagoon from July 28 to August 9, 2008, (known as Earthwatch Team 1, 2008). This was the third of a three year program funded by the Earthwatch to document the cultural and natural values and health of the submerged sites. The project is a collaborative one, conducted with the involvement and assistance of the Chuuk Department of Marine Resources, the Chuuk Historic Preservation Office and eight Earthwatch volunteers led by three researchers, Dr Bill Jeffery (Maritime Archaeologist, Project Principal Investigator), Dr Ian Macleod (Corrosion Scientist, Co-Principal Investigator), and Dr Maria Beger (Marine Biologist, Co-Principal Investigator).

This is a brief report on one aspect of the Team 1, 2008 project work, being a report on the oil/diesel seen to be leaking from two sites, *Hoyo Maru* and *Rio de Janeiro Maru.* A more comprehensive report on all Team 1, 2008 outcomes will be produced and provided to the Chuuk Department of Marine Resources and the Chuuk Historic Preservation Office.

Project Aims

Currently, the World War II underwater sites are viewed and managed primarily as diving tourism sites with little or no understanding that the sites contain any great natural or cultural value. This project will help to change that view. It is the first of its type to be implemented in Chuuk and it will assist in the development of sustainable management practices and enable the conservation of the artificial and natural reefs as important biological and cultural sites. The submerged sites are also vulnerable to corrosion, storms and human impacts. Some sites are exploited by dynamite fishers stripping valuable protective layers of the natural and cultural fabric and killing most animals in the impacted areas. A significant effect of these impacts is that they will help to destabilise the integrity of the sites, possibly leading to their collapse and release of oil. This would have a devastating effect on the marine environment, subsistence living in the vicinity and the Chuuk tourism industry.

Earthwatch volunteers assist the three PIs to conduct surveys of the sites. Detailed archaeological examinations of some of the wrecked aircraft and ships are implemented in conjunction with marine flora

and fauna surveys and *in-situ* corrosion surveys to determine their past and current rates of decay. After a review of the biological, chemical and corrosion micro-environmental data, reports and recommendations are made to the Chuukese government from which appropriate management strategies can be developed that will benefit long term preservation of the range of values of the sites and address any associated issues.

Summary of findings regarding oil/diesel leaking

Of the estimated 52 submerged World War II sites located in Chuuk Lagoon, a sample of sites is selected to help consider the project aims. Requests from the Chuuk Department of Marine Resources and the Chuuk Historic Preservation Office are also considered in deciding on which sites should be investigated. The Chuuk Department of Marine Resources requested that sites known to be associated with leaking oil/diesel should be investigated. The *Kiyosumi Maru* and the *Hoyo Maru* (located between Fefan and Tonoas) were two of these sites and they were investigated on Thursday, August 31 (Figure 1). No oil/diesel was found to be leaking from *Kiyosumi Maru* but a long slick was seen to the south-west of *Kiyosumi Maru* and when tracked back to its source, was found to be coming from *Hoyo Maru* at Latitude 7.37102; Longitude 151.84422 (see Figures 2 and 3). The slick was being pushed by the wind in a north-west direction and estimated to be over 5 kilometres in length.

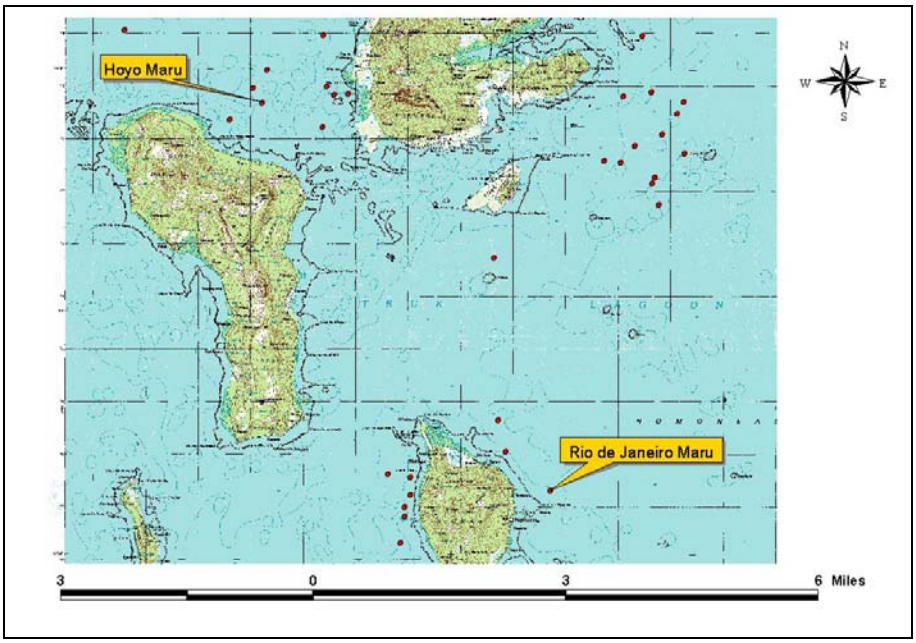

Figure 1: Location of Hoyo Maru and Rio de Janeiro Maru

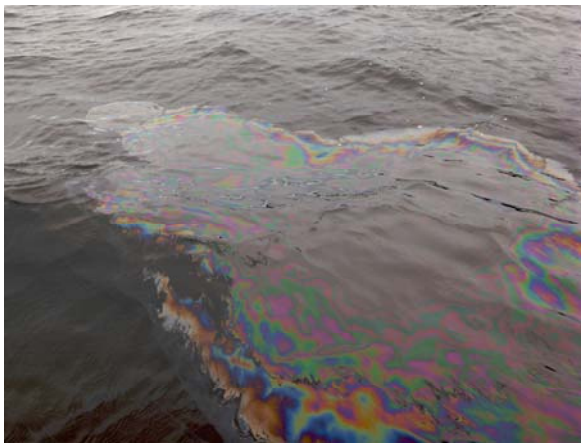

Figure 2: Oil/diesel bubbling to the surface

Figure 3: The slick on the surface, looking back to its origin—the south-east

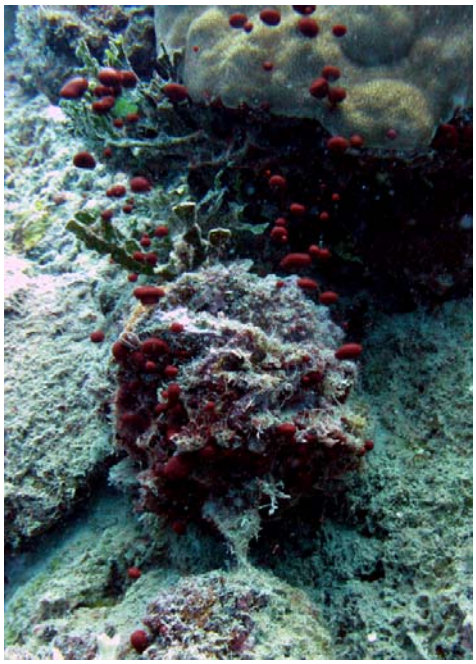

Figure 4: Oil/diesel seen bubbling out of the shipwreck

Figure 5: Oil/diesel rising from shipwreck (Photographs by Tammy Chan, Project Dive Master)

Divers investigated the source of the oil/diesel and it was found to be a small area on the port side of the vessel, possibly at a junction of hull plates, and only a few metres above the keel (Figures 4 and 5). The ship is lying upside down on the seabed and the hull is broken at about the start of the bridge; the leaking is a further 12 metres back along the length of the vessel (see Figure 6).

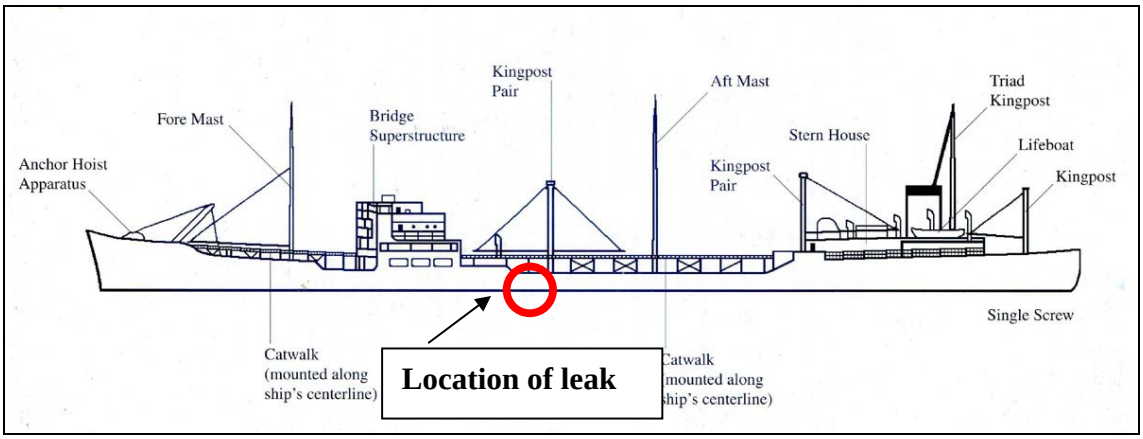

Figure 6: Side view of *Hoyo Maru* showing the approximate location of the leak

Hoyo Maru is powered by a single diesel engine and used as an oil tanker with a carrying capacity of 95,000 barrels (3,990,000 gallons) of oil (Bailey 2000: 356). The engine of the *Hoyo Maru* is well aft of the leak but fuel tanks for the engine could be in this vicinity, although it is more likely that this is the where the oil was stored. Plans of the ship or similar ships should be consulted to confirm what type of oil/fuel is stored in this location.

A water sample was taken from the surface slick and will be analysed to see if this provides any evidence as to the nature of the material.

A video was produced of the above water scene (slick) and the oil/diesel bubbles as seen underwater.

Rio de Janeiro Maru

On a subsequent recreational dive by two of the Earthwatch volunteers on *Rio de Janeiro Maru* (located south east of Uman) on August 8, they noticed a small slick of oil/diesel on the sea surface. Tracking the source of the slick to the shipwreck, they found a few bubbles rising from shipwreck (see Figure 7). The ship is lying on its starboard side and a pool of oil/diesel is collecting under the gunwale of the port side

and occasionally spills over as the pool increases in size. *Rio de Janeiro Maru* was converted from a passenger vessel to a submarine tender by the Japanese navy. It was powered by twin diesel engines.

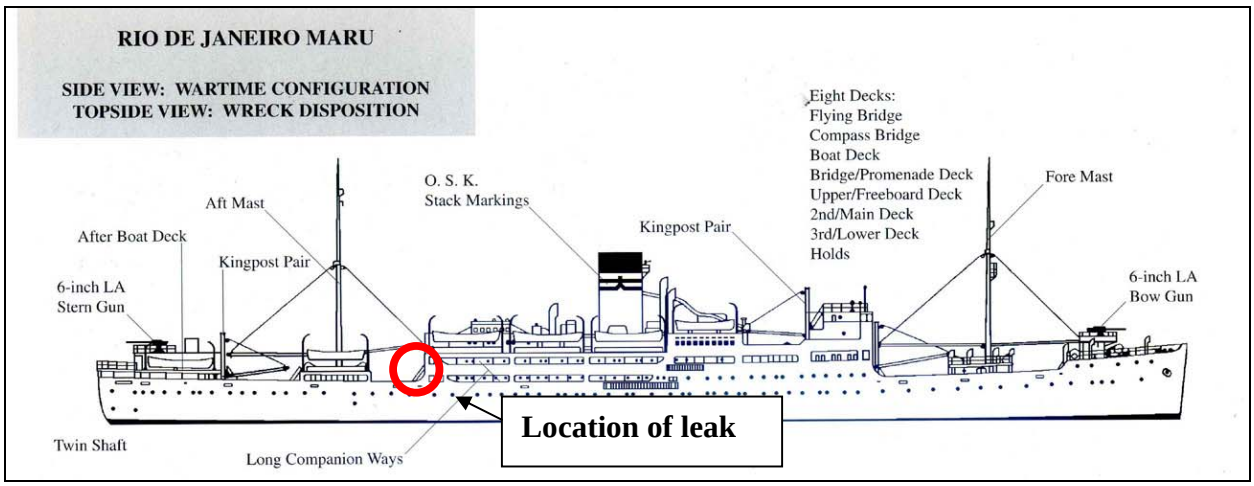

Figure 7: Side view of *Rio de Janeiro Maru* showing approximate location of leak.

Oil/diesel slicks have been reported from *Hoyo Maru* in the past, in addition to other shipwrecks such as *Nippo Maru, Kiyosumi Maru, Hanakawa Maru* and *San Fransico Maru.* Some evidence of this was noted by Earthwatch team members in 2006 and 2007.

Of the 52 shipwrecks located in Chuuk Lagoon, three are oil tankers (*Hoyo Maru*, *Shinkoku Maru* and *Fujisan Maru*) and combined that have the potential to hold up to 32,000 tons of oil (approximately 32,000,000 litres or 7,620,000 gallons). It is unknown if they were full or empty when they were sunk in 1944. Additional research may be able to ascertain this but given Japanese records from World War II are scarce it may not be possible to locate any historical information on this issue. However, historical research and any other type of research should be carried out as it could assist in determining what could remain within the vessels and to possibly minimise costly survey and remedial work. Coupled with an analysis of the water and oil/diesel slick, this would be a very important step toward understanding what is leaking from *Hoyo Maru*.

Dr Ian MacLeod in his initial work on the corrosion of the shipwrecks conducted in 2002, concluded that some shipwrecks could start to collapse in 10-15 years (MacLeod 2003). Subsequent investigations in 2006, 2007 and 2008 have not changed this conclusion. From the corrosion surveys it can be also be seen

that some sites are receiving numerous and ongoing bangs from dynamite fishers. Coupled with impact from boat anchors and storms, the stability of some shipwrecks is precarious. If this included a full oil tanker, it would have major environmental consequences. Further, more detailed corrosion and environmental surveys should also be implemented. The US navy pumped oil from the US Mississenewa in Ulithi Atoll, Yap, so the process is known and capable of being implemented.

References

Bailey, D.E., 2000, *World War II Wrecks of the Truk Lagoon.* North Valley Diver Publications, Redding.

MacLeod, I.D., 2003, Metal Corrosion in Chuuk Lagoon: A survey of iron shipwrecks and aluminium aircraft. Chuuk Historic Preservation Office. Chuuk.