Table 5-5: Tank 3 water depth measurements in meters.

<table>
<thead>
<tr>
<th>Area of Tank</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bow</td>
<td>2.51</td>
</tr>
<tr>
<td>Starboard bow</td>
<td>2.50</td>
</tr>
<tr>
<td>Starboard</td>
<td>2.53</td>
</tr>
<tr>
<td>Starboard stern</td>
<td>2.43</td>
</tr>
<tr>
<td>Stern</td>
<td>2.39</td>
</tr>
<tr>
<td>Port Stern</td>
<td>2.46</td>
</tr>
<tr>
<td>Port</td>
<td>2.40</td>
</tr>
<tr>
<td>Port bow</td>
<td>2.52</td>
</tr>
</tbody>
</table>

One of the first observations made upon arriving at Tank 3 was the large amount of rubbish, much more than Tanks 1 and 2 (Figure 5-29). Tour boats and “banana boats” frequently passed Tank 3. There were also more jet skis because buoys are set up north of Tank 3 as a racetrack. One individual on a jet ski kept a curious eye on us while we worked. Tank 3 is located near the Saipan World Resort and Saipan Grand Hotel, which explains the increase in tourist traffic around the tank.

Figure 5-29: Accumulated rubbish inside Tank 3. (Flinders University, photo by T. Massey, 2010)
The vegetation halo around Tank 3 is similar to that surrounding Tank 2. Seagrass grows right up to the tracks of the tank, but does not cover as much of the seabed (Table 5-6).

*Table 5-6: The extent of vegetation from the center of Tank 3 on different bearings.*

<table>
<thead>
<tr>
<th>Bearing</th>
<th>Distance from center of Tank 1 to the sand/vegetation interface (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5°</td>
<td>2.90</td>
</tr>
<tr>
<td>40°</td>
<td>3.35</td>
</tr>
<tr>
<td>85°</td>
<td>5.10</td>
</tr>
<tr>
<td>121°</td>
<td>4.85</td>
</tr>
<tr>
<td>158°</td>
<td>4.09</td>
</tr>
<tr>
<td>180°</td>
<td>3.22</td>
</tr>
<tr>
<td>230°</td>
<td>4.82</td>
</tr>
<tr>
<td>315°</td>
<td>3.70</td>
</tr>
<tr>
<td>355°</td>
<td>3.92</td>
</tr>
</tbody>
</table>

Corrosion and visitor activity has taken its toll on Tank 3. Refer to Chapter Six for a more in depth description, specific location, and photographic record of corrosion, damage, and missing components on Tank 3. As was the case with Tank 2, both doors of the commander’s hatch on the turret are still present unlike Tank 1 (Figure 5-32). The 75mm main gun barrel is severely degraded and appears to have broken (Figures 5-30 and 5-31). Not only is the muzzle of the barrel rugged and corroded, but a corroded ferrous cylinder rests near the starboard bow of the M4A3. It is suspected that this cylinder is the end of the barrel from Tank 3, which broke due to corrosion and/or physical stresses. The diameter and material are similar to that of the barrel in the turret supporting the proposal. Despite this evidence, it cannot be verified that the barrel has broken until the initial length of the barrel is determined.

The length of the barrel still fixed to the turret of Tank 3 is 1.82 meters and the cylinder on the seabed is 1.33 meters long giving the gun a proposed total length of 3.15 meters. When compared to the 1.70 meter long 75mm guns on Tanks 1 and 2, 3.15...
meters is long. However, Tank 3 is a different M4 variant than the other two tanks and is equipped with a different turret, which may indicate mean it had a longer barrel. Since the initial barrel length is still in question, whether the barrel has indeed broken cannot be confirmed. Perhaps some interviews should be conducted. Members of the public may remember the barrel being longer or hearing about it breaking by word of mouth.

Tank 3 is also different in that two metal rectangular panels have been located near the Sherman. As of June 2010, the larger panel was located 3.06 meters from the southeast corner of the tank on a bearing of 175° and was 68 centimeters by 168 centimeters. The smaller panel could be found 6.80 meters from the turret centre on a bearing of 225°. It measured 45 centimeters by 97 centimeters. It is suspected that these are the missing engine deck cover and engine cowling. The dimensions are consistent with the measurements taken on the stern of the vessel and support the hypothesis that the panels are indeed the missing cover and cowling.

Figure 5-30: Corrosion and degradation of the 75mm gun on Tank 3. The outer layer of the barrel is flaking. 50 centimeter scale. (Flinders University, photo by T. Massey, 2010)
Figure 5-31: Suspected broken portion of the 75mm gun off Tank 3 as it rests near the starboard bow. 50 centimeter scale. (Flinders University, photo by T. Massey, 2010)

Figure 5-32: Corrosion on the turret of Tank 3. Note that both turret hatch doors are still present. (Flinders University, photo by T. Massey, 2010)
Tides

During fieldwork in June 2010, the water depth surrounding the tank sites was recorded. When coupled with average tidal movement for the Lagoon, it becomes possible to determine the approximate amount each tank is repeatedly inundated by tidal fluctuations. This is significant because the frequent wetting and drying of the tanks’ exposed portions increases the deterioration rate of the vehicle. When wet, chlorides in the saline seawater seep into cracks and faults in the tanks’ hulk. When dry, the chlorides crystallize and expand, further exacerbating the cracks and corrosion. Knowing the portions subjected to seasonal tidal exposure will enable comparative monitoring of corrosion rates underwater, above water, and in the marginal zone.

The spring tidal measurements at Tanapag Harbor on Saipan in June 2010 read 0.45 meters mean range and 0.41 meters mean tide level. Depth measurements were taken around Tanks 1 and 2 on 16 June 2010. On that day, high tide was 0.57 meters at 9:18 am and low tide registered at -0.11 meters at 4:37 pm. Since both sets of depth measurements were taken between high and low tides, a rise of 0.23 meters above the mean tide level will split the difference. With M4A2 and M4A3 tanks being 2.74 meters tall, Tanks 1, 2, and 3 stand proud of the water’s surface even at high tides. The average depth around Tank 1 was 1.51 meters and 1.76 meters around Tank 2 (Figures 5-1 and 5-3). Subtracting the rise of 0.23 meters from these average depths leaves the bottom 1.28 meters of Tank 1 submerged and the lower 1.53 meters of Tank 2 underwater at the mean spring tide level. If the mean spring range of 0.45 meters is taken into account, then it can be added to and subtracted from 1.28 meters and 1.53 meters to ascertain the approximate proportion of each tank exposed with tidal fluctuations. At the lowest tide within the mean range, 0.83 meters of Tank 1 and 1.08 meters of Tank 2 would be submerged. The highest tide within the mean range inundates 1.73 meters of Tank 1 and 1.98 meters of Tank 2. The difference between the two levels indicates that a portion of Tanks 1 and 2 0.90 meters in height is exposed during spring tides.

Depth measurements for Tank 3 were taken on 17 June 2010 when low tide was 0.33 meters at 5:33 am and high tide was 0.53 meters at 10:21 am. The measurements were taken between the low and high tides, meaning a rise of 0.43 meters can be assumed. The average depth around Tank 3 was much higher at 2.46 meters (Figure 5-5). After subtracting the tidal rise 0.43 meters, the bottom 2.03 meters of Tank 3 would
be submerged at the mean spring tide level. Finally, when taking the mean spring range of 0.45 meters into account, 0.45 can be added to and subtracted from 2.03 meters to determine the approximate proportion of the Sherman cyclically exposed. An extreme low tide leaves 1.58 meters of the M4A3 submerged, while an extreme high tide will leave 2.48 meters underwater. Therefore, the difference indicates that a section of Tank 3 0.90 meters in height is routinely exposed during spring tides. Additional depth measurements are necessary to determine what proportion is exposed during different tides and seasons.

**High Nickel Content Welds**

There is one facet of the tanks that seems to have stood the test of time and harsh environmental factors. The welds used to fashion the armor plating on the M4s are still free from corrosion and marine growth after more than 60 years in a marine environment (Figure 5-33). Information about these welds was found through posting on a welding blog (Harvey pers. comm., 2010). According to the feedback, to fix armor plate on high carbon steels, such as those used in World War II-era tanks, manufacturers often welded with high nickel content rods as they joined without cracking (Welding Web 2010). In the early 1940s, it was accidentally discovered that water was the reason high carbon steels cracked. After some experimentation, they found that moisture (it was later discovered that the problem was the hydrogen in water molecules) was the culprit. This information was so innovative it was kept classified until the end of the War (Welding Web 2010). To this day nickel rods are often used in armor plate welding.
Figure 5-33: High nickel content weld runs on the bow of Tank 2. The circular fixture on the right would have once held a .30-06 anti-personnel machinegun. (Flinders University, photo by A. Legra, 2010)

Tank Comparison

Located off the western coast of Saipan, the three Sherman tanks share a common coastal environment. The tanks’ current conditions are similar in that they are unstable, yet they are at dissimilar stages of deterioration as a result of numerous individual factors. Natural processes affiliated with coastal marine environments play a major role in the corrosion potential and accelerating the deterioration of ferrous metals. Chlorides in the saltwater, exposure to ultraviolet radiation, oxygenated water, colonizing marine growths, and even cyclical wetting and drying of tank components result in active corrosion. All three tanks display damage due to corrosion; components both above and below the waterline have swollen, cracked, and fallen apart. This is a natural process, sometimes aided by human activity, which will continue.

Each tank is also subjected to variable conditions dependent upon the Sherman’s distance from shore, visitor traffic, and water depth. Therefore, one can expect to observe differences in the condition of each site. Distance from shore and visitor traffic
share an inversely proportional relationship, in that the greater the distance the fewer the
visitors. Tank 2, being nearly 450 meters offshore, showed noticeably less active
corrosion and contained less rubbish than the M4 Sherman nearer to the beach. The high
nickel content welds on Tank 2 appeared fresh, with a polished luster absent on Tanks 1
and 3.

**Historic Preservation Policies and Practice**

As discussed in Chapter Three, it is the responsibility of HPO to administer and
uphold legislation as it applies to Saipan’s cultural heritage. The primary legislation
enforced by HPO includes the Commonwealth Public Law 3-39, Abandoned Shipwreck
Act of 1987, Sunken Military Craft Act, Section 106 of the National Historic
Preservation Act of 1966, and the associated 36 CFR Part 800. The office is also
responsible for maintaining the United States National Register of Historic Places in
addition to identifying, evaluating, surveying, and interpreting significant sites.

To develop and implement a sustainable monitoring plan, communication and
collaboration with the Commonwealth authority responsible for overseeing the plan is
integral. Discussions were held with Ronnie Rogers and John Palacios of the Historic
Preservation Office about legislation, current views, management challenges, and the
office’s future objectives regarding the submerged cultural resources in the Mariana
Islands. As Rogers, Palacios, and their colleagues live and work on Saipan as heritage
managers, it was both practical and professional to gain their insight into management
matters. This will also ensure that the monitoring plan shaped and formed as a result of
this research will be applicable to Saipan’s underwater cultural heritage needs.

**Management Challenges**

As is the case in most heritage management agencies, the HPO faces a number
of challenges in regard to interpreting and preserving Saipan’s cultural resources. The
following is a discussion of the chief struggles as identified by Rogers and Palacios.
Perhaps the most troublesome obstacle is inadequate funding. Fundamentally, funds for
historic preservation must be generated either internally or externally for a program to
be successful. The first requires “a population with disposable income” and the second
requires “external fund providers” (O’Neill and Spennemann 2001: 46). Saipan, like
most Micronesian nation-states, has little of the former and has had trouble securing the latter.

Every two years, HPO is allocated a federal grant of a meager $400,000 to cover historic preservation costs for all sites on all Commonwealth islands, prehistoric and historic, terrestrial and submerged (Rogers and Palacios, pers. comm., 2010). This assistance is provided by the Historic Preservation Fund grant from the U.S. Department of the Interior, National Park Service. One of the conditions in receiving this funding is that HPO is required to hold public meetings to discuss the utilization of the grant. Meetings are held on Saipan, Rota, and Tinian every year to allow local residents to ask questions, give input, and express what they would like to see. Unfortunately, these meetings are seldom attended (Rogers and Palacios, pers. comm., 2010).

The following challenges can be linked to inadequate funding. A shortage of staff at HPO, coupled with a time deficit, often leaves tasks uncompleted. Most U.S. mainland state historical preservation offices boast in excess of twenty-five staff. Saipan’s HPO is made up of ten personnel. Six of these spend time in the field and only one of the six has formal training in maritime archaeology (Rogers and Palacios, pers. comm., 2010). Training, as in many professions, is a perpetual objective. At present, the office owns dive equipment for two divers, but no boat, which is a constant challenge for the CNMI HPO. The team is required by the Commonwealth Scientific Diver Program, managed by Coastal Resource Management (CRM), to maintain proficiency by diving once a month (Rogers and Palacios, pers. comm., 2010). To log these 12 mandatory excursions each year, HPO depends upon CRM for a boat, tanks, and air fills.

The maintenance of Saipan’s 23 interpretive signs is another struggle. Pruning proves onerous as the vegetation, sunlight, and moisture rapidly claim signage in the island’s tropical climate. Additionally, increased tourism and modern development consequently increase the popularity and accessibility of heritage sites. Though excellent for the local economy, increased visitor traffic places pressure on the heritage resources. It is the effect this pressure has on submerged heritage that is of interest to this research.

Finally, the education and participation of the public in heritage is much lower than HPO desires due in part to a widespread lack of public knowledge about their
shared past. The office engages in public outreach and receives news on heritage sites by word of mouth, but is striving to bolster partnerships with local dive shops and tour companies. The livelihoods of dive shop and tour company owners depend upon the preservation of Saipan’s unique underwater cultural resources and one would hope they would not allow visitors to damage or loot heritage sites. With limited personnel, the more eyes and ears HPO has in and on the water, the better.

The success and failure of historic preservation relies heavily upon the attitude, perceptions, and expectations of the community. Spennemann (2003: 51) holds that “the community values its heritage less than it did in the past and that there is a reduced general will to place personal aspirations behind those of the community and ‘the common good.’” According to Spennemann (2003: 50), “historic preservation can function only through the will and support of the community it serves.” Therefore, the solution rests in changing the attitude of the local population. This can be accomplished through public outreach and education programs revealing the potential economic benefits of maintaining heritage sites. Unfortunately, changing the attitudes of a community is a difficult task. Despite the obstacles, however, HPO holds an optimistic outlook on the future of heritage management in the Mariana Islands.

**Future Objectives**

For its struggles, the CNMI HPO has numerous strengths and ambitions. Four of HPO’s ten staff are scuba certified and have participated in Nautical Archaeology Society (NAS) training (Rogers and Palacios, pers. comm., 2010). John Castro is the most advanced diver employed at HPO and has nearly completed Part IV of his NAS training. HPO has worked hard to maintain and streamline a comprehensive database and has plans to upgrade their GIS software. Additionally, they are nurturing working relationships with the U.S. Navy and the National Oceanic and Atmospheric Administration (NOAA).

To develop and take full advantage of these strengths, HPO has created a list of future objectives stemming from those listed in Chapter Three. On that list is the determination to expand the existing funding base. The federal grant every two years is simply not enough to complete the tasks required of HPO. Due to staff shortages, HPO personnel struggle to find time to search for outside grants. Furthermore, the Marianas
suffer from massive delays in internal funding approval, which makes it difficult to maintain a schedule (Rogers and Palacios, pers. comm., 2010). HPO has also set up an internship program to offer work experience to students, but funding delays have plagued this program as well. They are now pursuing local volunteers to search and apply for independent grants.

HPO staff understands the significance of Saipan’s underwater cultural heritage and recognize the vast amount of work that remains to be done. With this in mind, they are emphasizing a desire to create an underwater section within the HPO. The islands’ submerged resources would become the sole responsibility of those appointed to this section, freeing them to focus on monitoring, assessing, and managing underwater cultural heritage (Rogers and Palacios, pers. comm., 2010). Until then, the staff are striving to make certain underwater work is conducted within each budget round.

Bolstering public education, outreach, and awareness programs has been an ongoing goal for HPO. The Division of Historic Preservation (DHP) believes well-developed preservation plans will encourage residents to play a more active role in identifying, preserving, and maintaining historic resources. Ideally, Commonwealth residents will become more motivated to identify and preserve CNMI’s cultural heritage founded on an inherent duty to preserve their islands’ past (Department of Community and Cultural Affairs 2004: 22). Not only do they hope locals will help keep an eye on heritage sites, but that residents will understand and appreciate the significance of their islands’ history and heritage. HPO also encourages the participation of local residents in archaeological and heritage management projects. The office hopes to appoint local dive shop and tour company employees as site stewards because they are on the water almost every day. The maintenance of interpretive signage around Saipan by means of pruning unruly vegetation is another avenue by which the public can become involved. Another desire of HPO is to get local students involved in the work of the office. There are few better for the job than local residents because many have explored the lay of the land and water and are familiar with the Marianas’ regional history. Local students pursuing higher education in cultural heritage management and preservation would be a great addition to the HPO staff.

Additional objectives include identifying and documenting more sites (especially underwater), increasing site interpretation for the public, and developing a
regular monitoring plan for underwater cultural heritage. The latter is one of the major objectives of this research and will be presented in the next Chapter.
CHAPTER SIX
DISCUSSION AND CONCLUSIONS

The purpose of this chapter is to offer a discussion of the research and data presented in Chapter Five in light of the research question and objectives posed in Chapter One. Next, a proposed monitoring plan based on feedback from HPO as well as the archaeological investigation of the three Sherman tanks is presented. The data collected on corrosion, missing components, and battle scars is presented next. The implementation and feasibility of the proposed monitoring plan will then be further deliberated. This is followed by a comparison of the three M4 tanks. The dissociation theories will then be considered in light of the data gathered in June 2010. The final section concludes the thesis by posing suggestions for further research. This portion of the work brings the data into perspective by converting measurements and numbers into a proposed answer to the research question.

What Issues and Challenges are Involved in the Heritage Management of Submerged Sites in the CNMI Where Public Visitation is Encouraged and How Can These be Addressed in the Development of a Regular Monitoring Program?

In order to address the primary research question, several research aims were developed. The first objective was to discuss the issues heritage managers face when balancing site protection with site interpretation. According to Heritage Preservation Officers Ronnie Rogers and John Palacios of the CNMI HPO, there are a number of challenges managers must confront. These include:

- lack of funding;
- staff shortages;
- time deficits;
- inadequate training and equipment;
- unexploded ordnance;
- maintenance of interpretive signage;
- public support and awareness;
• increased tourism and modern development;

The second research objective was to explore current submerged management practices in Saipan, CNMI and document heritage managers’ views on how underwater cultural heritage sites should be managed, interpreted, and monitored. As presented in Chapter Three, the legislation under which HPO operates as well as a number of documents outlining previous preservation plans were reviewed. Coupled with personal communication with Rogers and Palacios, Saipan’s current submerged resource management practices were examined.

In short, they are almost nonexistent, but to the Office’s credit and determination, they have managed to make great strides in the last several years despite the odds. As described in Chapter Three, the first step was the commissioning of comprehensive remote sensing surveys of Saipan’s west coast by Southeastern Archaeological Research, Inc. in 2008. The resulting data provided a baseline for future work. The second step was Carrell’s (2009) publication, which synthesized the islands’ maritime historical context and past archaeological research. The research conducted for this thesis is one facet of HPO’s third step, the development of a proposed monitoring plan for Saipan’s submerged heritage.

The combination of the challenges listed above and full-time obligations to terrestrial commitments under Section 106 leaves HPO precious little time to get out on the water. However, until time and money become available, HPO has a series of goals and aims they are pursuing. As mentioned in Chapter Five, these include:

• nurturing working relationships with the U.S. Navy and the National Oceanic and Atmospheric Administration (NOAA);
• expanding the existing funding base;
• developing an internship program to offer work experience to students;
• creating an underwater section within the HPO;
• bolstering public education, outreach, and awareness programs;
• encouraging residents to play a more active role in identifying, preserving, and maintaining historic resources;
• nurturing and encouraging cooperative relationships with local dive shops and tour companies;
identifying and documenting more sites;
• increasing site interpretation for the public;
• developing a regular monitoring and management plan for underwater cultural heritage.

The third research objective was to consider the history and location of the M4 Sherman tanks and how these factors may influence visitation based upon brief observations and evidence of visitor behavior. Chapter Two served to lay a historical foundation upon which this research could be constructed. This allowed the tanks to be placed into historical context. The link between the tanks and the pivotal Battle of Saipan lend them historical and archaeological significance from a Western perspective. However, O’Neill and Spennemann have identified a general apathetic view of Micronesian residents of non-Indigenous heritage sites, especially World War II heritage (O’Neill and Spennemann 2001: 46). According to Spennemann (2001: 32), the Indigenous population holds a negative perception of the war because it happened all around them, against them, and forever changed their lives. Such perceptions will undoubtedly influence locals’ views on preserving and protecting the tank sites. While the M4 Sherman tanks are imports and reminders of the destruction and transformation brought to Saipan in 1944 and 1945, they have been a part of the landscape and seascape for 60 years. The idea that World War II heritage does not belong to the Indigenous population and local residents is somewhat a misconception. Every day these tanks are driven by, swam by, navigated by, picnicked by, and part of the lives of the local Indigenous population. Heritage sites are shared resources, belonging to everyone. Public education and outreach programs as well as interpretive signage addressing this misunderstanding may help correct this dilemma and encourage locals to preserve their shared heritage.

Locals are not the only visitors to the sites, however. Tourists travel from around the globe to experience Saipan’s tropical climate and rich history. Though their views on preservation and respect for historic sites may vary, tourists may be influenced by the sentiments conveyed by locals. Interpretive signage along the shore may also inform overseas visitors of the significance of Saipan’s Sherman tanks.

The final research objective entailed the development of a site-specific methodology for recording, assessing, and monitoring visitor impacts on submerged
sites through the archaeological investigation and recording of the three submerged Sherman tanks. The data collected during fieldwork in June 2010 was presented in Chapter Five. The resulting monitoring plan is offered below.

**Proposed Monitoring Plan**

Archaeological sites are generally monitored for three reasons: to find out how sites are formed, to observe and understand the processes affecting the conditions of the sites, and to establish whether or not protection is required (Bowens 2009: 163). If protection is required, monitoring can also aid in determining what methods should be employed. Each of the three points above provides motivation and cause to monitor Saipan’s M4 Shermans tanks. The recording and monitoring of the sites offer data that may lead to answers about how the tanks became stranded where they are today, thus giving insight into site formation processes. Second, the natural processes affecting the tanks are relatively subtle and slow. Although the tanks are somewhat stable, interaction by visitors may cause rapid, dramatic changes, altering the stability of the sites. Observing and measuring changes in a regular monitoring plan will help HPO understand the processes and actions that threaten the preservation of the sites. This understanding can then facilitate predictions regarding the affects of future changes on the tanks and other sites. Lastly, the data gathered in June 2010 allows for more informed monitoring plan development and decision-making. HPO can then identify if, when, and what type of active protection might be required.

Conducting archaeological investigations in the CNMI is a challenge, but the struggles have been described as both a deterrent as well as an asset (Carrell 2009: 521). Limited funding and the remote location of the Northern Marianas make work tough, meaning many of Saipan’s submerged cultural resources remain undiscovered and undocumented. As stated by Carrell (2009: 521), this presents the HPO with an opportunity to develop and implement an elite preservation and protection program for the island’s underwater cultural heritage.

The significance of sites, limited resources, as well as local and national priorities all influence HPO’s ability to manage Saipan’s cultural heritage. It is simply not possible to regularly monitor all cultural resources on the island. However, it is the opinion of the CNMI HPO that a management plan should be considered for Saipan’s
underwater cultural heritage on account of the sites’ national and international significance, potential instability, and increased visitor pressure. As historic World War II sites, the intrinsic, academic, historic, and sentimental value of the Sherman tanks stem from their location, orientation, and involvement in the Battle of Saipan. For these same reasons, HPO would like to see the tanks nominated for addition to the National Register of Historic Places.

Coupled with HPO’s limited resources, it is undesirable and impractical to recover the vehicles. Therefore, any preservation conducted on the tanks must be done in situ. This makes for a tough decision. The wetting/drying process, ultraviolet radiation exposure, salt deposition, wave action, and other environmental stresses when coupled with human impact will continue to damage the tanks unless a monitoring plan is set in motion to monitor and possibly slow the process. Based upon the research and data collected in June 2010, this thesis has developed a preliminary monitoring plan for Saipan’s tanks to detect signs of both short- and long-term changes.

To ensure the plan is established on a solid foundation and effectively employed, it was integral to obtain a sound understanding of the issues and processes affecting the Shermans. The Nautical Archaeology Society lists the following issues as a guide:

- what material(s) the shipwreck, or tank in this case, is composed of and how it is distributed;
- what the seabed is composed of and how it is likely to be affecting the wreck material;
- the biology of the site;
- the water movement on the site (tides, waves, and/or currents);
- the water itself (e.g. pH and salinity); and
- outside factors, such as human activity, which may be affecting the sites (2009: 164).

The data gathered in June 2010 targeted these issues through visual surveys, video, still photography, and measurements.

Overall, the scale and cost of the work required by the monitoring program will be relatively low. This is desirable, as the plan will be directed by an organization striving to make the most of already stretched resources. It is recommended that a schedule of visual surveys and visits to the sites be established to investigate signs of
natural and human interference and repeat the data collection methodologies discussed in Chapter Four. Ideally, the sites would be visited once every six to 12 months. However, a visual survey every three to five years is more realistic. If equipment were available, an annual comprehensive photographic survey would be desirable.

In addition to scheduled visits by HPO, it is also suggested that relationships with local tour boat companies and dive shops be nurtured. The future economic gain and financial well being of the locals depend upon the preservation of Saipan’s unique submerged cultural heritage. As a common goal is shared, cooperation should be encouraged. Whether this manifests in the encouragement of site stewards who monitor the M4 Shermans and report changes or harmful activity to HPO, increased monitoring by other regulatory agencies, or both, it would be beneficial to the sites. The involvement of the public is integral to the program’s success. HPO has an outstanding history of public education and outreach; it should be strengthened and expanded to include Saipan’s underwater cultural resources.

Since the tanks are vulnerable historic resources, protective measures have been considered. According to the Nautical Archaeology Society guide, protection is “a physical or other in situ intervention that results in the slowing, halting, or reversal of a process that is believed to be having a negative impact on an archaeological site” (2009: 167). These actions are also referred to as site stabilization in some instances. Ideally Saipan’s M4 Sherman tanks would be fitted with sacrificial anodes, which would slow, halt, and may even reverse the corrosive effects of the marine environment by expelling harmful chlorides from the tanks’ ferrous components via electrolysis (Gregory 1999:164). On the downside, the use of aluminum or zinc anodes requires some specialist knowledge, involves a long-term fieldwork commitment, and can be fairly expensive, as exhausted anodes must be replaced. In addition, the pricey equipment will be unprotected near a popular visitor destination under a meager two meters of water which may promote theft of the metals. Unfortunately, protective measures are not a viable option at this juncture. As discussed above, HPO does not have sufficient resources (time, personnel, or money) to set up and maintain protective operations. It is for this same reason that it is undesirable and impractical to recover the vehicles. Post-recovery conservation would be an expensive and time-consuming endeavor. Therefore, \textit{in situ} monitoring is the desired plan of action for the long-term survival of the three
Sherman tanks. As time passes, perhaps resources, staff, and funding will improve to allow for a more active approach to preservation of the sites.

The management plan should provide for the storage of all data, documents, photographs, and video collected during site monitoring operations. The project archive should keep all data in one place, where it can be maintained and easily accessed. It makes sense that the CNMI HPO should curate the archive. The data could also be published and shared with other regulatory agencies and with the public at annual meetings so they are kept informed. The plan presented here has been developed considering both the tanks’ specific conditions and HPO’s limitations and capabilities. It should be subject to future review, as well as amended and augmented to apply to CNMI’s other submerged sites.

**Natural and Cultural Impacts in Detail**

The purpose of this section is to provide a visual representation of data collected on the natural and cultural impacts that have affected and/or are affecting Saipan’s three M4 Sherman tanks. The illustrations and photographs presented below serve as baseline data for status of the tanks as of June 2010. By referring to and interpreting the monitoring data collected in June 2010 and future investigations, HPO will be able to identify missing artifacts, increased corrosion/deterioration, changes in the seabed composition, and any other natural or cultural impacts to the site. Areas of active corrosion, missing components, and suspected battle scars are indicated by a method of color-coding on site plans.

Corrosion/cracks refers to portions of the tanks displaying active corrosion. This was identified on-site by its bright red/orange coloration. All three Sherman tanks show signs of natural deterioration as the ferrous metals react with the marine environment. Some portions, however, are more corroded than others. These areas are colored red on the site plans below and are predominantly located above the water’s surface, on top of the turrets and gun mantlet, and anywhere that may serve as a step or handle to visitors climbing up on the tanks. The main gun barrels and commander’s hatches showed more corrosion, flaking, and cracking than any other portion of the tanks, which may correlate with visitor curiosity and use. During previous research trips to Saipan, archaeologists have witnessed visitors climbing on the tanks and swinging and jumping off the gun
barrels (McKinnon, pers. comm., 2010).

Missing components from the tanks are represented in blue. These include portions that were either part of the tanks’ body (i.e. lift hooks, hatches, and tow brackets) or crucial to the tanks’ operation (i.e. radio aerials, driving lights, and sirens) that have been lost due to salvage or corrosion. Parts such as dust skirts and tools like sledge hammers and an idler adjusting wrench were not included as there is no way to know if the M4 tanks were equipped with them before engaging in the Battle of Saipan. The auxiliary machineguns are not indicated in blue as their absence was discussed in the text of this work.

Suspected battle scars and cultural damage are indicated in green. These areas were identified by team members as depressions or dents in the tanks’ armor with rough edges. Often these scars are associated with accelerated corrosion. Unsurprisingly, the turret and forward armor seem to display the more suspected battle scars. The presence of these scars may suggest the tanks off Saipan had seen battle before June 1944 or they were damaged in the Battle of Saipan. Data on the approximate area of the scars is included where available. Due to the rotation of teams during fieldwork, different individuals recorded disparate amounts of data. This is a limitation that should be noted and accounted for in future monitoring and data collection.

The following set of figures (Figures 6-1 to 6-18) include individual plan view and profile view site plans for each tank. A representative sample of photographs of specific features identified follow the site plans. Due to the lack of available space, photographs of every feature were not included. This section can be used as a reference for future monitoring to identify changes in corrosion rates, missing components, or other cultural impacts. In the future, it would be beneficial to add a biological facet to the plans presented below.
Chapter 6 Discussion and Conclusions

Figure 6-1. Plan view of Tank 1 displaying corrosion and battle scars and identifying missing components. (Flinders University, site plan by M. Hanks, 2010)

Figure 6-2. Starboard profile of Tank 2 displaying corrosion and battle scars and identifying missing components. (Flinders University, site plan by M. Hanks, 2010)
Figure 6-3. Corrosion around the commander’s hatch and a battle scar on top of the turret of Tank 1 (Flinders University, photo by T. Massey, 2010)

Figure 6-4. Missing engine cowling and engine deck cover at the stern of Tank 1. (Flinders University, photo by T. Massey, 2010)
Figure 6.5. Corrosion on the bow ventilator of Tank 1. The tank ventilators appear to be used as a step by site visitors. (Flinders University, photo by T. Massey, 2010)

Figure 6.6. Battle scar on the starboard side of Tank 1. Ten centimeter scale. (Flinders University, photo by T. Massey, 2010)
Figure 6-7. Plan view of Tank 3 displaying corrosion and battle scars and identifying missing components. (Flinders University, site plan by M. Hanks, 2010)

Figure 6-8. Starboard profile of Tank 2 displaying corrosion and identifying missing components. (Flinders University, site plan by M. Hanks, 2010)
Figure 6-9. Corrosion on the track shoes of Tank 2. (Flinders University, photo by J. McKinnon, 2010)

Figure 6-10. Corrosion and cracks on the underside of the commander’s hatch on Tank 2. 50 centimeter scale. (Flinders University, photo by K. Gauvin, 2010)
Figure 6-11. Corrosion and cracks on the turret, gun mantlet, and barrel of Tank 2. 50 centimeter scale. (Flinders University, photo by K. Gauvin, 2010)

Figure 6-12. Missing fuel filler caps, engine cowlings, and engine deck cover of Tank 2. 50 centimeter scale. (Flinders University, photo by K. Gauvin, 2010)
Figure 6-13. Plan view of Tank 3 displaying corrosion and battle scars and identifying missing components. (Flinders University, site plan by M. Hanks, 2010)

Figure 6-14. Starboard profile of Tank 3 displaying corrosion and identifying missing components. (Flinders University, site plan by M. Hanks, 2010)
Figure 6-15. Corrosion and cracks on and around the commander’s hatch of Tank 3. 50 centimeter scale. (Flinders University, photo by S. Bell, 2010)

Figure 6-16. Corrosion and cracks on the turret, gun mantlet, and barrel of Tank 3. 8 centimeter scale. (Flinders University, photo by M. Hanks, 2010)
Figure 6-17. Corrosion, cracks, and flaking on the main 75mm gun barrel of Tank 3. 50 centimeter scale. (Flinders University, photo by T. Massey, 2010)

Figure 6-18. Missing engine cowling and engine deck cover. (Flinders University, photo by T. Massey, 2010)
Implementation of Proposed Monitoring Plan

To best implement the proposed management and monitoring plan, the CNMI HPO may need to take a step back and reassess existing programs. With resources being stretched as they are, it may be necessary to adapt the current state of affairs to allow for additional monitoring. The course of action suggested in this research is not time or personnel intensive, nor is it expensive. A flexible range of options has been developed with HPO’s situation in mind and should not overburden the staff or resources.

The small-scale management work takes the form of visual surveys and monitoring. These visits can be further supplemented by nurturing relationships with local tour boat companies and dive shops. This will also open lines of communication and encourage cooperation between the DHP and the community. The creation and maintenance of interpretative signage about the monitoring program along the shore overlooking the M4 Sherman tanks would be a step in informing visitors of the sites’ significance and history. Hopefully this will encourage visitors to care for the tanks by removing rubbish and aiding HPO in their effort to preserve Saipan’s cultural heritage.

The proximity of the M4 Sherman tanks to the shore facilitates public involvement in monitoring and recording. As previously stated, HPO has done a great job organizing public education and outreach programs concerning Indigenous heritage; more could be done to facilitate an understanding of the underwater cultural resources. Community understanding of the significance of these sites is integral to obtaining residents’ interest and involvement in projects and activities.

Of course, to accomplish these goals, funding is needed. Due to time and staff limitations, HPO struggles to seek, attract, and apply for outside sources of funding. Volunteers in the community can be sought to fill this void. Once again, reaching out to the community on Saipan is a method of obtaining support and help in completing tasks HPO cannot accomplish itself. Nominating the Sherman tanks, and/or other submerged historic resources, to the National Register of Historic Places may be another method to attract funding to the Marianas.

Interagency collaboration with organizations such as NOAA and other state historic preservation offices can prove to ease the workload at the CNMI HPO. Larger, federal agencies likely have more funding at their disposal that may be used to fund collaborative projects in the CNMI. Universities are also a keen source of volunteer
help. Nurturing relationships with educational institutions in the form of research partnerships and internships can attract willing students. HPO’s partnership with Flinders University is a prime example.

The purpose of the Sherman tank monitoring program is to share the tanks’ role in the Battle of Saipan with the public in hopes of contributing to a wider understanding of the conflict. Regular monitoring of the sites will allow for a record of natural and cultural impacts on the Shermans to be kept for reference by HPO. It is understood that this goal is long-term in nature and may not immediately come to fruition. However, a timeframe can be set in place to reach short-term goals. As they are accomplished, further objectives can be developed to achieve the end goal. Objectives can also be developed and incorporated to address unforeseen challenges as they arise such as disaster preparedness and disaster management plans. This plan is intended to be flexible and may require future revision.

**Dissociation Theories**

There are several theories as to how these tanks came to be dissociated from their units and remain where they are today. The first hypothesis holds that the tides were misjudged and the Shermans, without amphibious Duplex Drive modifications simply flooded when deployed into deep water. The second hypothesis is that the landing craft tank (LCT) transporting the tanks became disabled before reaching waters shallow enough for successful deployment. Rather than forgo the battle, the tank crews started their engines and attempted to make the beach, but flooded in high water. The third and final hypothesis posits that the Shermans took accurate enemy fire and were disabled before making landfall and/or fell into mortar or artillery pits and flooded (Macksey 1971: 166).

Having not found historical records or military reports chronicling the specific fate of Tanks 1, 2, and 3, it is difficult say with any certainty which of the theories holds true. This is why archaeological investigations are integral to understanding the past. Realistically, one must also consider a multitude of variables. Complex machines such as tanks are made up of thousands of components, any of which could have failed and potentially immobilized the vehicles. Other factors, such as human error, may also have contributed to the tanks’ demise. Due to the distances between each tank, it is highly
likely that more than one theory is correct.

The first theory, that the tides had been misjudged and the Shermans were deployed into deep water, seems unlikely. A mistake of this magnitude, although possible, does not fit the meticulous planning befitting a large-scale military invasion. If in doubt, the water depth could have been gauged by eyesight, vehicles already in the water, or other means. Furthermore, had this been the case, it seems more invading Shermans would have flooded. According to Goldberg (2007: 83), the heavy tanks were deployed well after the initial invasion on 15 June 1944 and most made it ashore in good shape.

The second theory, that the LCT became disabled before reaching suitably shallow waters, is slightly unlikely. The western shore of Saipan hosts a shallow fringing reef, inside which the three Shermans rest. Being of a deeper draft, the large landing ship tanks (LST) would not have been able to ferry the tanks anywhere near where they are located today. Therefore, LSTs would have remained well outside the reef and thus out of range of Japanese artillery while LCTs transported the M4 tanks to the reef and the beach. This theory loses credibility because the Shermans did not participate in the initial invasion when Japanese artillery fire was the most intense. Although it is possible for the LCTs to have been knocked out, most enemy fire would have eased by the afternoon of 15 June as U.S. troops pushed inland pulling the focus of Japanese defenders away from the coast.

The water depth and vegetation rings around the Shermans may offer clues as to the fate of the tanks. The fact that the Battle of Saipan took place 66 years ago and environmental indicators are somewhat unreliable because they are subject to change due to natural processes including storms and tides. However, the archaeological data collected in June 2010 must be thoroughly analyzed if answered are to be found.

Tank 1 stands apart from Tanks 2 and 3 in that the lower half of its roller assembly and suspension system is buried in sandy sediment. Tanks 2 and 3 clearly rest on top of the seabed. Tank 1 also has no vegetation directly adjacent to the vehicle, but is surrounded by a halo of sand. Seagrass appears between 3.5 and 5.5 meters from the centre of the Sherman’s turret. The vegetation halo surrounding Tanks 2 and 3 is opposite to that around Tank 1. This means, the Shermans are encompassed by vegetation all the way up to their tracks rather than resting in a barren sand flat like
Tank 1. The buried track and sand halo around Tank 1 may indicate that the M4A2 fell into an artillery crater. A theory that needs to be tested is whether shrapnel and explosive residue hinders the growth of marine vegetation. Nevertheless, Tank 1 is nearest to shore and rests in the shallowest water of the three tanks, which may also account for disparities in vegetation.

The third theory, that the Shermans took enemy fire and/or fell into artillery craters, thus appears to be most likely. Japanese defenders had strategically positioned flags off the coast so they could determine when enemy vehicles entered the range of their guns. The barrage of well-aimed fire may have put the tanks out of commission as they crossed the reef. However, as stated above, enemy fire would have likely eased by the time the Shermans were deployed as U.S. troops had taken many of the Japanese coastal guns. This reduces the chances of this dissociation theory. Bomb craters left by U.S. air strikes prior to the land invasion would have very likely been located in this area, particularly due to the location a nearby Japanese airstrip. These depressions would have been a significant and ubiquitous threat that tank crews would have had difficulty identifying and avoiding in the heat of battle. Thus the possibility exists that an artillery or bomb crater could have taken the tanks out of action. The question then asked is: Why were they abandoned and not salvaged?

In an attempt to lend strength to this theory, a 1945 aerial photograph and 2010 Google Earth image of the invasion beaches were investigated for the presence of artillery craters (Figures 6-1 and 6-2). Possible craters appear as light spots in the dark vegetation depicted in the 1945 photograph. However, the Sherman tanks are located closer inshore of the vegetation. Artillery craters could have existed in the sand, but it is difficult to determine without the contrasting vegetation. Unfortunately, there is a notable shoreward shift in vegetation evident in the 2010 image, which makes it difficult to determine the presence of modern remnants of craters.
Figure 6-19: Aerial photograph of Susupe Beach and Chalan Kanoa taken in 1945. (Anon. Susupe, Chalan Kanoa 1945 Aerial Photograph. Photograph on file at CNMI HPO.)
Further Research

In the future, it is suggested that further testing be undertaken on the three M4 Sherman sites. Active corrosion, water pH, water salinity, and dissolved oxygen levels

Figure 6-20: Google Earth image of the same area on Saipan’s western shore taken in 2010. Note the differences in vegetation distribution. (Europa Technologies 2010, Photograph taken 2 Nov 2010 on Google Earth)
can all be quantified. These procedures have been carried out on numerous other sites including the Duart Point wreck in Scotland, and should be conducted in Saipan (Gregory 1999). Perhaps the best method of achieving this is to attract conservation specialists, equipment, and funding from outside CNMI, as the necessary equipment can be expensive. Data gathered by these means will allow specialists to determine the extent of deterioration and estimate how long the tanks will last in their current condition. Data should be added to any tank monitoring records and archived at HPO.

A second recommendation for further research is an extended time to observe visitors to the M4 Shermans to better grasp the range of activities and impacts made on the sites. As most swimmers escape the afternoon heat and pass their lunch breaks in the water, late morning to early afternoon observations would be ideal for discerning typical visitor activities.

Additional investigations are necessary on a couple of unresolved questions: How did the M4 tanks come to be dissociated from their units? Has the main gun barrel on Tank 3 broken? The answers to both may be found through more historical research and interviews with local informants. Historical research may lead to an account of the events that took place as the M4 Sherman tanks advanced toward the shore, either supporting or refuting the dissociation theories. Research on the barrel of Tank 3 may uncover the information needed to determine how long the barrel was in 1944 allowing a determination to be made about the ferrous cylinder resting on the seabed. Interviews with locals may also provide useful information, as stories are shared between family and friends.

Lastly, it is suggested that further research be conducted to understand locals’ perceptions of the sites. Any data gathered will be useful to HPO and other regulatory agencies in formulating monitoring programs and interpretive signage initiatives.

**Conclusion**

Saipan holds a lot of potential. The climate, culture, and heritage attractions create bountiful opportunities for the development of heritage tourism on the island. In spite of a number of challenges, the staff at CNMI HPO work hard to embrace these opportunities in balancing heritage site interpretation, public education, and site preservation. The work described here is but a fraction of what can be learned and
shared about the Battle of Saipan, but perhaps it can help HPO as they work by filling in some blanks and leading to more collaborative work.

In closing, Saipan possesses a rich collection of World War II cultural heritage both on land and underwater. It came a cost, however, as Saipan’s Indigenous population struggled to survive a war that had come to their home and many lost their lives on both sides of the battle. Despite the wonders of Saipan’s submerged heritage, there are many factors that make Saipan a difficult place to practice heritage management. The primary goal of this work was to aid HPO in monitoring, assessing, interpreting, and sharing Saipan’s cultural resources with the public for years to come. What better way to honor those who died than to tell their story.
APPENDIX I

Permission for reproduction.

Figure 1.
REFERENCES


Preserving Our Past for the Future Pamphlet 2009, Division of Historic Preservation, Department of Community and Cultural Affairs, Saipan CNMI.


## APPENDIX II

*Table 1*: The scientific and common names of fish species found on Tank 1. (Fowler pers. comm., 2010)

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Abudefduf sexfasciatus</em></td>
<td>Scissor-tail Sergeant</td>
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<tr>
<td><em>Ctenochaetus striatus</em></td>
<td>Lined Bristletooth</td>
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<tr>
<td><em>Stegastes fasciolatus</em></td>
<td>Pacific Gregory</td>
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<tr>
<td><em>Pomacentrus vaiuli</em></td>
<td>Princess Damsel</td>
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<td><em>Stegastes nigricans</em></td>
<td>Dusky Gregory</td>
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<td><em>Dascyllus aruanus</em></td>
<td>Humbug Damsel</td>
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<td><em>Chromis viridis</em></td>
<td>Blue-green Chromis</td>
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<td><em>Pomacentrus pavo</em></td>
<td>Sapphire Damsel</td>
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<td><em>Zebrasoma flavescens</em></td>
<td>Yellow Tang</td>
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<td><em>Mulloidies flavolineatus</em></td>
<td>Yellowstripe Goatfish</td>
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<td><em>Stethojulis bandanensis</em></td>
<td>Blue-lined Wrasse</td>
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<td><em>Acanthurus nigricauda</em></td>
<td>Blackstreak Surgeonfish</td>
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*Table 2*: The scientific and common names of fish species found on Tank 2. (Fowler pers. comm., 2010)

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<td><em>Halichoeres trimaculatus</em></td>
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<td><em>Zanclus cornutus</em></td>
<td>Moorish Idol</td>
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<td><em>Zebrasoma flavescens</em></td>
<td>Yellow Tang</td>
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<tr>
<td><em>Myripistis spp.</em></td>
<td>Soldierfish</td>
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<td><em>Stethojulis bandanensis</em></td>
<td>Blue-lined Wrasse</td>
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<tr>
<td><em>Neoniphon sammarra</em></td>
<td>Spotfin Squirrelfish</td>
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Table 3: The scientific and common names of fish species found on Tank 3. (Fowler pers. comm., 2010)

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<thead>
<tr>
<th>Scientific Name</th>
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<tbody>
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<td>Halichoeres trimaculatus</td>
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<td>Abudefduf sexfasciatus</td>
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<td>Stegastes fasciolatus</td>
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<td>Dascyllus aruanus</td>
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<td>Chaetodon auriga</td>
<td>Threadfin Butterflyfish</td>
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<td>Manybar Goatfish, Banded Goatfish</td>
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<td>Soldierfish</td>
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<td>Solander’s Toby</td>
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<tr>
<td>Stethojulis bandanensis</td>
<td>Bluelined Wrasse</td>
</tr>
<tr>
<td>Acanthurus nigricauda</td>
<td>Blackstreak Surgeonfish</td>
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</table>