COASTAL PROTECTIONS

Rocky Intertidal Enforcement

By

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Coastal Protection of Rocky Intertidal

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A capstone presented on the enforcement and access to rocky intertidal coastal systems. This report covers the access limitations, regulations, and enforcement of preserved and open access areas and takes an observational assessment of the health of these environments. Some areas are limited access for humans thus increasing the number of regulations and enforcement actions than those areas that have open access. Using San Clemente Island, Scripps Coastal Reserve, Cabrillo National Monument, and Sunset Cliffs Natural Park for sites of study based on a gradient of access from open access to secured military facilities. The different areas all have unique enforcement requirements and regulations that create a myriad of protections and enforcement agents.
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INTRODUCTION

In order to ensure that ecosystems are protected from human threats numerous conservation laws and regulations have been implemented. The regulations are only paper protections as defined by, "A legally established protected area where experts believe current protection activities are insufficient to halt degradation." (Dudley and Stolton, 1999) and to be successful require enforcement of those regulations and laws.

It is understood that human induced changes to biodiversity are the direct results of exploitation, habitat destruction, and pollution However, strong associations often exist among species (Paine 1980) human disturbances may impact species habitat and composition through secondary influences on species abundances. Species vary greatly in their effect on the ecosystem (Power et al. 1996); indicating that disturbances to key species in strongly linked food chains should be given additional consideration when assessing threats of human activities. Therefore protecting key species and ecosystems can lead to significant conservation of multiple species and habitats.

This study looks at the different levels of protections and enforcement afforded to military reserves i.e. San Clemente Island, other coastal areas to include Cabrillo National Monument, Scripps Coastal Reserve and Sunset Cliffs Natural Park. Each one of these rocky intertidal ecosystems is locally enforced by a different agency. This paper will explain these different enforcement entities and assess the feasibility and success of these groups.
ROCKY INTERTIDAL SYSTEMS

The rocky intertidal is perhaps the most studied area of the marine environment, mainly due to ease of access and the ability to return to the same sites often without incurring large costs like those seen in deep sea and other offshore research. A 30-day expedition cruise costs roughly US$1 million, with an average daily operating cost of about US$30,000. (Ruth, 2006) Rocky intertidal zones have been studied around the world including; Chile (e.g. Castilla and Bustamente 1989; Olivia and Castilla, 1986), Australia (e.g. Kingsford et al., 1991; Porter et. al. 2003), New Zealand (e.g. Schiel, 1999), Sri Lanka (Manage, Ashoka. 2008), and Canada (Smith 2010). A number of studies have investigated human impacts in California (Huff, 2006, 2011; Murray et al., 1999; Engle and Davis, 2003; Ambrose and Smith, 2004; Smith et al. 2008). Substantial research has concentrated on trampling or food harvesting, which proved to be damaging to a large number of species including seaweeds (Schiel and Taylor, 1999), sea grasses (Ambrose and Smith, 2004), barnacles, limpets, sea stars (Ambrose and Smith, 2004: Ramundi et al 2007), crabs (Murray et al., 1999), and mussels (Smith, 2008). (OCMPAC)

Rocky intertidal habitats occur where the ocean meets eroding cliffs or other hard substrate. Rocky intertidal can be easily identified by the vast biological life it supports. The organisms that live in these areas are adapted to periods of inundation and desiccation. The distribution of these organisms varies greatly depending on water and air exposure, erosion, and frequency of tidal cycles between low and high tides. There are distinct zones for rocky intertidal inhabitants the tidal height influences the vertical
zonation of species. It is easy to spot the zonation due to the characteristic bands of organisms that are created along the rocks.

The barnacle zone is the highest zone, the mussel zone is in the middle, various kelp species make up lower zone, and surf grass habitats are usually below the tides. Compared to many terrestrial environments, rocky intertidal habitats support a highly diverse and readily observable grouping of invertebrates and algae. The vast amount of life that occurs in the rocky intertidal provides a link between marine and terrestrial food webs. Limpets, crabs, mussels and small fish from intertidal zones are also a food source for numerous bird species and small mammals. In addition to being an important food source for both marine and terrestrial organisms, rocky intertidal species have historically been extracted for human consumptions.

The rocky intertidal is used a recreational destination in San Diego, as well as providing a unique resource for scientific and educational studies. As a result, the majority of the rocky shore habitat in the region is heavily impacted by human use, primarily by trampling, but also by poaching. This interaction of the intertidal has decreased the abundance of valuable intertidal animals, such as abalone, that are now rare in the San Diego region. Rocky intertidal habitat is limited to a few locations in the San Diego region. The most extensive area is found on Point Loma, this habitat extends north to Ocean Beach. Additional rocky intertidal habitat occurs sporadically from Pacific Beach to La Jolla. Some small areas of rocky intertidal occur in Encinitas and Cardiff.
RESEARCH AREAS

The areas used for this study were chosen for their unique levels of access, protection, and varying enforcement mechanisms.

San Clemente Island - The US Navy acquired the island in 1934. It is the Navy’s only remaining ship-to-shore live firing range, and is the center of the integrated air/land/sea San Clemente Island Range Complex covering 2,620 nm². San Clemente Island is the most southern of the Channel Islands of California. It is 21 nautical miles long and contains 56.81 sq. mi. of land. (http://www.scisland.org) The island is officially uninhabited as of 2000 U.S. Census. The approximate number of military and civilian personnel on the island numbers at any given time is 300. This area is protected as a de-facto reserve due to the military presence and access limitations. A de-facto reserve is an area where access or activities are restricted by law for reasons other than conservation or natural resource management. (NOAA) San Clemente Island is considered a de-facto reserve due to the limitations of access which resulted in conservation of resources and the non-designation of critical habitat, which would limit the naval mission on the island. The Navy takes great precaution to enforce this island to prevent accidents that may occur in the bombing areas.

San Clemente Island Sites
Four rocky intertidal sites were selected that capture the diversity of the island’s four distinct Eco regions: West Cove (WSC), Eel Point (EPT), Horse Beach Cove (HBC), and Boy Scout Camp (BSC). They are also located to coincide with offshore kelp forest monitoring areas and MARINe (sic) (Multi-Agency Rocky Intertidal Network) monitoring areas and represent areas that have been selected for biodiversity studies conducted by the Partnerships for Interdisciplinary Studies of Coastal Oceans (PISCO).

**Horse Beach Cove** is on the southern tip of the island within the Shore Bombardment Area (SHOBA) and is accessed by China Point Road. This site is one of the most
protected on the island due to its location within the main bombing area. Access permission must be granted from the island operations to ensure that no range activities are taking place and strict time schedules must be adhered to in order to avoid unintended consequences.

**Boy Scout Camp** is on the eastern side of the island, and sits approximately 800m southeast of Wilson Cove Pier, and is the most accessible area of the island sites. This site is regularly patrolled by base security as it is below the main security outpost for the island. This also makes this one of the most impacted areas by humans. The entire area is surrounded by steep sloping terrain with rugged igneous boulders sitting against a narrow band of offshore rocky reef.

**Eel Point** is located near the midpoint of the western side of the island and is due west of the old SCI airfield. The study site lies below marine terraces and is positioned at the tip of Eel Point. The area is unprotected from offshore swells and heavily exposed to the prevalent WNW winds. Access to this site is not as limited as Horse Beach Cove and is more secluded than Boy Scout Camp making this an ideal area to study.

**West Cove** is at the western point of the Northwestern side of the island, sits approximately 450m from the end of the airfield. This proximity to the airfield affords it a steady flow of personnel monitoring the area but does open it up to human visitors that are exploring the coast while waiting for a flight or not on duty. Benches are composed of
Cabrillo National Monument is located at the tip of Point Loma and overlooks San Diego Bay from one of the highest points on the coast. On October 14, 1913, President Woodrow Wilson established Cabrillo National Monument. Juan Rodriguez Cabrillo, an explorer who many say discovered California had visited the area in 1542. Cabrillo has the distinction of being one of the first National Parks to operate in an urban environment. This area is fully protected by the National Park Service and Park Rangers patrol the areas on a regular basis. It also has limited access and requires a fee for entry. This site has the added protection of being located within the Point Loma Naval Complex which affords it the added protection of military security patrols and numerous access control points. Pressure applied through the public and local officials has repeatedly saved the area from permanent closure and resulted in boundary extensions and continuing appropriations.
**Sunset Cliffs Natural Park**- Dedicated in 1983, Sunset Cliffs Natural Park is a 68-acre park stretching along the Pacific Ocean bordering the western edge of Point Loma. The 18-acre section of the park lies to the west of Sunset Cliffs Blvd. between Adair and Ladera Streets. This park is managed by the City of San Diego.

The 50-acre hillside section, a designated multiple species conservation area, links to the 640-acre Point Loma Ecological Reserve. This park is an open access park and has little enforcement from any authority as a city of San Diego park it is mostly left to local law enforcement and resident volunteers to patrol this area.

**Scripps Coastal Reserve**- Originally established in 1965, the Scripps coastal reserve consists of terrestrial area and marine area adjacent to Scripps Institution of Oceanography. The reserve is 844 acres of land. The tide pools are located along the crumbling cliff outcroppings north of Scripps Pier. They are used as educational resources by classes from kindergarten to college.

There is public access to swim, surf, walk, bird watch and explore the tide pools. With the implementation of the San Diego-Scripps Marine Conservation Area on January 1, 2012,
coastal pelagic fish by hook and line is the only take allowed in this area. The staff of the reserve consists of few personnel, an academic coordinator on the campus and a reserve steward. This site also has no enforcement beyond the lifeguards on the south side of the Scripps pier and a camera setup to count visitors.
RESEARCH QUESTIONS

This project required some questions be asked about enforcement and restrictions of local rocky intertidal reserve areas from de-facto reserves to open access coastline. A number of questions must be answered in order to discover the enforcement and management strategies of each area.

1) What are the impacts of rocky intertidal interactions with humans?

2) Which agency is responsible for enforcement of each study area and what are the access restrictions?

3) What contribution do these areas make to the goals of attaining 10% total marine environment conservation?

4) Does the reserve require enforcement agents or will access restriction alone work?

5) Is the magnitude of the violations in the rocky intertidal and is enforcement at each area sufficient to ensure resource protection?

6) What current enforcement and management strategies exist?

7) What solutions can remedy these enforcement problems?
In order to mitigate impacts in conservation areas a level of enforcement is needed on most coastlines. The enforcement of San Diego’s coastal areas is done by numerous agencies. The Military, National Park Service Rangers, Dept. of Fish and Game Wardens, San Diego Police Department (SDPD), and SD Lifeguard Services.

The life guards are trained to keep an eye on the natural resources when they can, but ensuring the safety of the public is their number one priority. SDPD, police officers have legal enforcement backgrounds but are not trained as conservation officers. The Park Rangers and Fish & Game Wardens have significant training and experience in conservation enforcement but they are also limited in number of personnel and budgets. The CADFG is the primary enforcement agency for coastal reserves and areas out to 3 miles offshore. But, with less than 200 Game Wardens in California has the lowest ratio of wardens per capita of all 50 states and provinces of Canada. (http://www.cdfg.org). This lack of personnel has led to other agencies filling the role that fish and game wardens should be fulfilling. During the research it was found that many of the mainland coastal sites have few mechanisms in place to ensure that the resources are being protected. For example, in speaking with the San Diego Police Department (SDPD) which is the primary enforcement agency for Sunset Cliff Park SDPD is the most likely to respond to trespassing calls and disturbing the peace calls. In open access areas such as Sunset Cliff and Scripps Reserve, the police are not the main enforcement agents. The SDPD relies heavily on the lifeguards to handle enforcement of the coastal zones. It was found
out they are not trained to identify species and as long as it is within park hours and the
peace is not being disturbed, the park is a common area that has no natural resource
enforcement.

San Diego Lifeguard services employ 80 permanent life guards in SD County and 150
seasonal guards for the summer season. The 80 full time lifeguards are trained peace
officers and do receive some natural resource training in the way of species identification
and what is acceptable and what is not in certain areas. But at Sunset Cliffs this is not
one of the areas that is highly patrolled and is usually left to SDPD There is no direct
enforcement agent for this area in regards to natural resources.

This has led to identifying a set of inconsistencies that have the capacity to nullify the
conservation goals of these reserves and parks. The enforcement strategies in place now
will not be a sustainable if budgets do not account for enforcement or even the simple
infrastructure needed to inform the public of these reserve areas, i.e. the buoys that
should dictate the edges of the Scripps MPA. It has been numerous years of planning
and millions of dollars spent to set up these areas. (CDFG, 2008)
With this amount of money spent so set up and manage these MPAs it should also include more money for enforcement. This increase in enforcement would ensure the reserves are being monitored for poaching. However, if the common citizen is unaware of the boundaries because there are no signs and buoy markers, we have essentially wasted a lot of time and money drawing lines on a map and it will be impossible to ensure that conservation goals are met. Granted, ignorance of the law is not an excuse but with new regulations and boundaries comes a period of time to adhere to the new paradigm before enforcement will be useful.
IMPACTS

Human disturbance along the Southern California coast is prevalent due to the number of recreational activities and dense human population near the coastline, can be exceedingly high throughout the year, with usage at some high traffic sites yielding over 1400 persons at approximately a 500m length of the coast within a single afternoon low tide (Murray et. al. 1999) and over 50,000 visitors on a 100m shoreline in a year (Ambrose and Smith 2005). San Diego counties estimated population is at 3.1mil people with an increase to 4.5 million people to be residing in the county by 2050 (Final 309 Assessment and Strategy, NOAA, 2010). This increase of people will put further stress on the coast and its resources. With the inevitable sea level rise that has been projected by the Intergovernmental Panel on Climate Change, (IPCC) the coast of all states and nations are in danger. In order to ensure that the coastal reserves and Marine Protected Area are protected from human interference and climate change enforcement and regulations must be tightened with an error of caution in mind.

For each study area, a timed search and personal observations allowed assessment of the intertidal zones at each site for signs of human impact. In order to assess the entire intertidal zone from low to high in the limited amounts of time, (due to tides, access and other restrictions), 30 min. was allotted for searches for sea stars and shore crabs. The sea stars are usually found in the lower part of the intertidal along the mussel bands and the crabs are found throughout with a majority found in the upper regions of the intertidal under rocks and in between cracks in the rocks.
<table>
<thead>
<tr>
<th>Site</th>
<th>Date</th>
<th>Ochre</th>
<th>Bat</th>
<th>Spiny</th>
<th>Crabs</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boy Scout Camp</td>
<td>03-07-12</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>closest to people</td>
</tr>
<tr>
<td>West Cove</td>
<td>03-04-12</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>26</td>
<td>one black abalone and 2 lobsters</td>
</tr>
<tr>
<td>Horse Beach Cove</td>
<td>03-05-12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>38</td>
<td>Lots of birds and crab parts</td>
</tr>
<tr>
<td>Eel Point</td>
<td>03-03-12</td>
<td>48</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>crabs very small 5-7cm largest 10cm</td>
</tr>
<tr>
<td>Cabrillo Zone 1</td>
<td>05-09-12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>103</td>
<td>2 Cancer crabs// lrg keyhole limpets (6)</td>
</tr>
<tr>
<td>Cabrillo Zone 2</td>
<td>05-09-12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>137</td>
<td>larger crabs// Keyhole limpets (5)</td>
</tr>
<tr>
<td>Sunset Cliffs 1</td>
<td>05-08-12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>41</td>
<td>No stars/ more trash than anywhere</td>
</tr>
<tr>
<td>Sunset Cliffs 2</td>
<td>05-08-12</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>23</td>
<td>Significant Trash</td>
</tr>
<tr>
<td>Scripps Reserve</td>
<td>05-10-12</td>
<td>37</td>
<td>0</td>
<td>0</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td>87</td>
<td>3</td>
<td>0</td>
<td>455</td>
<td></td>
</tr>
</tbody>
</table>

While the counts of sea stars and crabs did not give conclusive results of the health of each study area it allowed for a quick assessment of human impacts. The most common thing noticed was the amount of trash found within each intertidal area. The island sites where not immune from this while most of the trash was marine related debris such as floats, buoys, and large balls of fishing line. There were still the ever present plastic bottles and other floating trash. Sunset Cliffs was among the worst of the study sites with numerous bottles, and a myriad of other plastics and clothing articles. The health of the sites was acceptable in all areas with Boy Scout Camp and Sunset Cliffs being in the worst shape according to observations. While these two areas are smaller than most of the others the traditional regimes of intertidal biodiversity was lacking greatly. During field time at all the sites there was no approach by any person to see what was going on. There was no one watching to ensure the rules were being followed. This included Cabrillo National Monument but actions were recorded and monitored by camera. This was to ensure that the restricted Zone 3, was not entered, access was limited due to the limitations of research permit to Zones 1 and 2.
CONSERVATION CONTRIBUTIONS

In order to attain the goal of 10% (Toropova, et al. 2010) of marine environments to be preserved or conserved enforcement of the local areas must be at aware of these goals. There are numerous tools that will assist in reaching this 10% goal from MPAs, National Parks, i.e. Cabrillo National Monument, educational reserves/ MPA i.e. Scripps Reserve and de-facto areas like military installations San Clemente Island and Point Loma defunct oil rigs i.e. off coast of Santa Barbara no longer in use and nuclear power plants –San Onofre. In order to achieve the 10% goal all aspects of management must be considered and enforcement ensures that the management plan is met. These study areas all contribute to the overall spatial protection plan. While each of these areas has management plans for conservation and enforcement, there is no standard that ensures continuity among sites. Having a standard program of enforcement and more active prosecution of offenders will place heavier requirements on the enforcement agencies but will lead to increase of compliance. Enforcement policies must involve creating plans that target and penalize frequent, repeat offenders and egregious violations; provide sufficient penalties and educational outlets to discourage random offenders and strengthen the knowledge of local citizens to encourage voluntary compliance and reporting. While many believe that monitoring of these reserves will assist in discovering regulations not being followed or enforced this method is a slow process possibly taking many years to see severe declines in health of the system.
RESERVE GOALS

The goal of any reserved area is to set aside the resources of the entire ecosystem or to protect the habitat of a species of concern. In order to achieve these goals proper management and enforcement protocols must be implemented. National parks and national monuments are set up by presidential or congressional orders strictly for conservation with federal budgets and staff. Many of the reserves in place have no enforcement budgets and a small staff of managers. For example, the Scripps Coastal Reserve staff consists of one academic coordinator and a roving reserve manager that is responsible for three different reserves within the UC system. This leaves the reserve manager with the enormous task of managing resources and enforcing the rules and regulations without assistance. While the Scripps Reserve is monitored on a daily basis by the community and other means i.e. lifeguards and cameras, there are still instances when people do not comply with regulations. This can be in many forms, from taking shells from the shore to picking flowers from the bluffs and includes the carving of one’s name into the sandstone rocks by the shore. You can also see this behavior and destruction in Sunset Cliffs, Scripps Reserve and Cabrillo National Monument. Each of the areas has significant interactions with the public, this leads to increased impacts on an ecosystem. These impacts are due to the lack of knowledge or just disregard for rules and regulations even with direct enforcement like at Cabrillo not every infraction is observed.

The rocky intertidal at San Clemente does not have these same issues due to the seclusion of the island and the strict enforcement of the base. As a bombing range it is
imperative that the people on the island are not in unauthorized areas and accountability of personnel ensures that accidents do not occur that could be life threatening. There are instances of accidents happening in these bombing areas on April 19, 1999 the Navy accidentally dropped two 500lb bombs in the Vieques Island bombing range in the wrong area, a civilian guard on duty, died and four others were injured. These types of training accidents are the examples used for ensuring that people are not in areas of danger and why the military has created more restriction for bases that have live fire exercises. The restrictions of access seem to be key deterrents to ecosystem degradation. An area cannot be impacted by human if humans are not present or are limited in interactions, like those performed during monitoring.
VIOLATIONS

In order to assess the level of enforcement in the Rocky Intertidal coastal zones data was collected from CA Dept. of Fish and Game from their enforcement reports published on their website every year. (http://www.dfg.ca.gov/enforcement/citations/index.aspx) The data obtained was for California as a whole but did designate particular regions, which San Diego falls within the southern region. Of the violations that have been cited, 2005-2010, 17,551 have been reported for the Southern region. This report was only slightly conclusive but did give a good picture of how many people are approached vs. how many people are cited for violations. In a span from 2005-2010, 2,279,667 contacts were made by Fish and Game wardens from these contacts the number of sport fishing violations was 73,118. A total of 88,503 citations written during this time resulted in 82% of all violations coming in the form of recreation fisherman not following the regulations. This could be lack of education, enforcement, or disregard for regulation due to minimal chances of getting caught. In the south coast region of California the number of citations has decreased from 2005-2010. While enforcement budgets have increased the enforcement efforts have not followed the trend of new reserve areas to enforce.
Data from California Department of Fish & Game

Upon speaking with the Park Biologists and Park Rangers at Cabrillo there are approximately 197,000 visitors to the park though not all of these visitors are in the rocky intertidal areas it represents a huge number of human interactions and stresses on the resources of the park. Park Rangers at Cabrillo stated that there is an average of one contact per day with visitors that have violated some rule within the park. Most often these contacts end with a warning and bit of education of park rules and natural resources but there are approximately 12 serious violations per year that require a citation or further actions. (Pers.com)

The Scripps Reserve as the next case study, the lifeguards have been the primary enforcement agents to ensure no take of invertebrates is followed but this is not their responsibility because the reserve is considered UCSD/ SIO property out to 1000ft. off
shore. There are numerous times each year that the lifeguard service has to step into the role of enforcement agent for the reserve. This includes informing visitors that they cannot take shells, to ensuring that the myriad of educational organizations are aware that collecting anything from the reserve is unauthorized. The lifeguards explained that the enforcement agent for the Scripps reserve is UCPD and that they often are not in the areas to handle enforcement issues as they occur. The Lifeguards write approx. 25 citations a summer for egregious violations usually having to do with poaching of mussels or other collection or fishing violations that are then reported to fish and game. (Pers. Com)
MANAGEMENT PRACTICES

The Sikes Act mandates natural resource law enforcement be provided on military installations and the DOD has developed law general enforcement policies in DOD Directive 4715.3. (DODI 4715.03) However, comprehensive DOD law enforcement policy is lacking and each military service has historically addressed the subject individually on an installation-by-installation basis. (DOD Biodiversity, 2009) This has included a range of law enforcement options ranging from employment of civilian game wardens, military police, or combining efforts of both. In 2003, the U.S. Marine Corps developed a standard law enforcement policy described in Marine Corps Order 5090.1, Conservation Law Enforcement Program. The Marine Corps policy provides standardized job descriptions, prescribes training requirements, and sets staffing levels for all Marine Corps installations. (DOD Biodiversity, 2009)

Public access to military lands for recreational purposes has always been a requirement of the Sikes Act. However, policy has always stated that the local military commander has the authority limit the extent of public access to the installation, based on security and safety concerns. Following the events of September 11, 2001, public access has been significantly reduced to most military installations. No DOD formal policy exists for public access to military bases and ranges, and public access is handled mainly on a case-by-case basis at individual installations. (DOD Biodiversity, 2009)

While the military has better enforcement of some of its natural assets it does this by extremely strict access requirements. During the research for this report access was
gained to San Clemente Island a naval bombing range off the Southern California coast. This island receives numerous visitors each year but they are there for a particular reason and are generally restricted in where they can go. While the island has had some environmental missteps i.e. the San Clemente fox and numerous bird species, the Navy has taken actions to conserve the resources by setting up monitoring protocols for the rocky intertidal and rehabilitating the native species and removing the invasive species. The rocky intertidal while they have different bio compositions and geologic compositions are functioning quite well and the long term monitoring program on San Clemente is still in its infancy only two years old. The access limitations and restrictions of the island have made it an ideal conservation area. The military is required to conserve the lands it occupies and it develops Integrated Natural Resource Management Plans (INRMP). This plan covers all of the environmental requirements of each base and includes endangered species stewardship and pollution prevention measures. The INRMP is used to manage the resources and often has plans for endangered species that takes the place of critical habitat designated requirements.

The Department of Defense is generally subject to the same state and federal environmental laws as any other entity. In addition, there are several sets of regulations specific to DOD facilities. A general list of these requirements includes:

- National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 et seq., and its implementing regulations 40 C.F.R. Parts 1500-1517, along with Executive Order 11514. NEPA requires federal agencies to study the environmental impacts of proposed “major” activities prior to undertaking action.
• "Superfund" (more precisely known as the "Comprehensive Environmental Response, Compensation, and Liability Act of 1980" or "CERCLA," 42 U.S.C. § 9601 et seq.). Section § 120 is the basis for the requirement that bases must be found "suitable for transfer" prior to transfer to non-DOD hands. A "Finding of Suitability to Transfer" ("FOST") is the result of this analysis.

• Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6901 et seq. RCRA is the law that governs "hazardous waste" facilities to provide for "cradle to grave" regulation of hazardous waste.

• Clean Water Act (33 U.S.C. § 1251 et seq.), Clean Air Act (42 U.S.C. § 7401 et seq.), and Toxic Substances Control Act (15 U.S.C. § 2601 et seq.). These are the various statutes (and there are numerous others) that govern media and chemical-specific requirements for facilities. For military bases, one of the most fundamental aspects of the Clean Water Act will occur in connection with regulations of wetlands and hydrology management within the installation.


• Finally, there is vast list of Executive Orders and DOD Directives, which interpret and guide DOD’s implementation of environmental requirements. (http://www.dodbiodiversity.org/ch3/index.html)

With the environmental regulations that must be adhered to for military installations the budgets must account for environmental conservation according to DOD Directive 4715.3. (DODI 4715.03) According to its Fiscal Year 2006 report to Congress, the DOD in that year obligated $4.1 billion for environmental activities at more than 425 military installations. The breakdown for environmental expenditures:
• $1.5 billion for compliance with applicable federal, state, and local environmental rules
• $1.4 billion for environmental restoration at active and formerly active military sites
• $568.2 million for activities required by the Base Realignment and Closure Act
• $261.3 million for environmental technology
• $204.1 million for conservation (natural and cultural resources programs)
• $125.2 million for pollution prevention

(DEP, 2006)

The DOD budget for environmental requirements has increased annually to ensure that laws and stewardship needs are met. In 2010, the costs were $4.5 billion with more to be spent every year.

While nothing in this budget directly accounts for enforcement the military takes that role as part of its everyday duties of securing its installations and it is not accounted for in the environmental budgetary planning and reporting.
restricted and closed. Several rangers actively monitor public activities during daylight hours. Because park access is through a military base, the park is able to limit visitation to the hours rangers are present. Their enforcement strategy strictly limiting visitation except when enforcement is available appears to be working.

Monitoring these areas contribute to management practices that will show indications of human impacts. The monitoring of the rocky intertidal has been standardized by the Bureau of Ocean Management (BOEM) with the MARINe(Multi-Agency Rocky Intertidal Network) protocol monitoring program for the Rocky intertidal for the west coast and starting on the east coast this year. (MARINe Workshop, Mar. 2012) While monitoring the health of the ecosystem does give clear results of possible degradation. Most monitoring sites are visited twice a year and little enforcement is in place to prevent issues before they can impair the ecosystem. When declines in health are discovered it is often after the system has suffered a baseline shift. Additional studies will need to be completed and new management policies implemented to counter these impacts and this can take time to complete.

It is clear that dedicated personnel charged with the task of enforcing the regulations and are able to correct infractions as they are occurring will have long reaching results while still allowing the public to visit areas of natural biological diversity without causing harm. While every infraction is impossible to prevent or witness having increased enforcement shall lessen the damage done by few infractions.
While the military bases restrict access for reasons of national security, the National Park Service welcomes visitors and these areas have been setup primarily for the purpose of human use and conservation to coexist. The park service has had enforcement in the form of rangers since 1880. Horace Albright, second director of the National Park Service, called Harry Yount, gamekeeper of Yellowstone National Park, the "father of the ranger service, the first national park ranger". (NPSA, 2006) Yount suggested to the superintendent of Yellowstone, "...the game and natural curiosities of the park be protected by officers stationed at different points of the park with authority to enforce observance of laws of the park maintenance and trails." Yount pointed out that it was nearly impossible for one person to protect the game properly over the park's vast expanse. This led to the Park Ranger Service that steward our National Parks.

The Park Service is the main conservation enforcement agency for federally designated lands while game wardens are employed by each state through the Departments of Fish and Game for the purpose of protecting state resources. Cabrillo National Monument falls under the National Park Service and employs three park rangers tasked with enforcement and a host of natural resource rangers to ensure the continued protection of this park. While they have full time rangers it is still an enormous task to watch the entire area and ensure that no damage or take occurs. When intertidal zone was opened to access in the early 90's, the Park initiated a long term monitoring program to examine the potential impacts from trampling and collecting activities on the natural resources. (Helix et. al, 2007). After seeing ecological declines, they established three management zones for the rocky intertidal. Public access to the rocky intertidal is now only at one end of this area. This allowed for additional points of entry to the other management areas to be
SOLUTIONS

Hope is not lost on conservation enforcement, while the key factor to enforcing the goals of conserving MPAs is mainly money it is a factor that is not easily circumvented. It takes funding to pay for boats and cameras and all the other gear needed to ensure proper law enforcement is occurring and that the perpetrators receive due process. It costs money to designate these MPAs, Parks and Reserve areas and it costs even more to ensure that the goals of conservation are met. This may mean just monitoring the areas for signs of ecosystem decline and solving or discovering the physical issues like runoff, disease, rising water temperature, and rising sea levels but the most destructive factor to any environment is the human presence. With the systems of due process required by the Constitution, it will take drastic actions to find new funding sources or transfer the role of enforcement to a private entity. While this method is not unheard of, it is unorthodox having significant barriers to be a feasible solution in the U.S. There are now private companies and NGOs that have gotten into the game of enforcing the conservation laws. A long time example is the Sea Shepard Organization, well known for their controversial battles with illegal whaling, they also support smaller countries like Ecuador and the Galapagos Island MPA by donating vessels and paying for the salary of the parks enforcement agents. Also there are others like MPA Enforcement International which is a group that will create an enforcement plan and assess the MPAs enforcement needs (for a fee) and this group is led by a former NOAA enforcement agent. This group employs scientists and law enforcement professionals to ensure that the goals of the MPA are met and that poaching and illegal use are stopped and prevented.
Community engagement is a key way to encourage compliance in resource protection but even with community support it will still need an enforcement agent that is able to pursue prosecution of violators. This comes in the form of peace officers with proper training and authority. Without these agencies receiving increased funding there will be minimal enforcement effort to handle the amount of area in California let alone those San Diego.
CONCLUSION

In order to ensure the continued conservations of these ecosystems and the services they provide whether it be a food source or just ascetic values. It is the responsibility of all who visit rocky intertidal to take the initiative to learn about the ecosystem. There are numerous sources of literature, community, education organizations, and private entities such as Birch Aquarium, which can educate the masses. Funding must be allocated to assuring enforcement and management strategies are present at locations visited by the public. Access policies need to be developed locally and examined to ensure enforcement and resource management protections are consistent with the overall goals of conservation areas. If not, consideration must be made to restricting access until standardization and enforcement practices are in line with regional goals and standards.

Having overlapping enforcement measures are paramount and educating the myriad of enforcement agents on the conservation matters of their local ecosystems will assist in easing the pressure of the few Fish and Game Wardens and Park Rangers. Having patrols of sensitive areas and expanding training to local law enforcement, not currently receiving natural resource training, will fill gaps in resource conservation. There are significant budget restrictions against hiring of more enforcement personnel, but ensuring current personnel are aware of environmental issues will close the gaps. The next part of the puzzle would be finding additional sources of funding to hire and train agents, one idea that could work and has worked in other areas i.e. Cabrillo, is charging fees. These fees could come in the form of parking fees at Sunset Cliffs; also the funding could come

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from local communities that take an active role in the preservation of resources much like Friends of Sunset Cliff which organize trash cleanup operations throughout the year. Additionally, taking resources already spent by state and federal government for veterans' employment could be redirected allowing fish and game to hire qualified personnel with minimal retraining costs. Another management tool that has been employed at Hanauma Bay in Hawaii is requiring park visitors to watch a video on the coral reef ecosystem and inform them of the hazard of breaking the no touch rules before snorkeling or diving. This supportive restriction still allows for access to the reserve but ensure that ignorance is not bliss and will continue to assist in the preservation of the coral reef below the surface.

Today, people are genuinely interested in conservation but it has turned to a game of dollars and by combining all available enforcement options into one sound plan it can ensure that conservation goals are met. These actions can prevent further destruction of few remaining natural coastal landscapes and biodiversity. As one of the first places that most children are exposed to marine creatures and habitats it is imperative that these areas remain functional not only for biodiversity but to continue to educate and inform the public of our greatest resources.

To limit or restrict people is not a welcome idea to most, especially in the land of the free, but it is a necessary action in order to meet conservation goals. Conservation of resources requires enforcement and will provide a future generation areas to enjoy.
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