

TORCH Rocky Intertidal Protection Program

TORCH ROCKY INTERTIDAL PROTECTION PROGRAM EDUCATION AND OUTREACH



FINAL REPORT 2011-2014

National Oceanic and
Atmospheric Administration

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Cover Photo

Students and teacher Jennifer Sportsman from Ernest Righetti High School visit the UCSB/ Campus
Point tidepools. See sidebar on page 11 for more information.

Photo: Jessica Altstatt

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CHANNEL ISLANDS



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(insert grant language)

Introduction



Oil coats the intertidal near Point Arguello soon after the Torch Spill, 1997.

On September 28, 1997, a discharge of crude oil occurred from a rupture in a 20-inch pipeline off the coast of Lompoc, CA. This 'Torch Spill' resulted in the contamination of approximately 17 miles of northern Santa Barbara County coastline, including damages to sea life in the rocky intertidal around Point Arguello.

The Torch/Platform Irene Oil Spill Natural Resources Trustee Council designated funding to compensate the public for natural resource injuries resulting from the 1997 Platform Irene spill. Based upon evidence from the spill, the Trustees estimate that black abalone (*Haliotis cracherodii*) suffered a 10-15% loss in the oil spill exposure zone.

The Channel Islands National Marine Sanctuary (CINMS) led the implementation of the Torch Rocky Intertidal Habitat Protection Program from 2009 and extended through 2014. The goals of the program were

to provide local community outreach and education regarding the sensitivities of rocky intertidal habitats and to reduce the impacts from human disturbance on tide pools.

Tidepools and other components of rocky intertidal shores represent a species-rich habitat which attracts a wide array of visitors and collectors. Human disturbance of tidepool areas is of concern and includes trampling of the resources, turnover of rocks, displacement of both living and nonliving resources, and collecting of intertidal species or shells that can provide habitat.

The primary target audience for our program has been Santa Barbara County students, community and visitors to the area's beaches, although



we have expanded our range to include areas to the south as far as San Pedro and north to San Luis Obispo County. This project also includes a citizen-science based monitoring component to evaluate species trends, visitor use patterns and resource impacts at select high-use rocky intertidal locations.

Scope of Work

Task 1. Needs Assessment

Task 1 consisted of two components: an initial Needs Assessment conducted by CINMS, and CINMS' continuing outreach to identify other potential partners within the study region. From January through March 2009, CINMS Education Coordinators conducted a Needs Assessment with education/outreach partners in the study region to determine what programs/products exist and to determine additional needs for development. Collaborating organizations and agencies surveyed in this initial Needs Assessment included: Monterey Bay National Marine Sanctuary, Gulf of the Farallones National Marine Sanctuary, Jalama Beach County Park, Orange County Marine Protected Area Network, Ty Warner Sea Center, Santa Maria Discovery Museum, Hancock Community College, MARINE Network, UC Santa Barbara Marine Science Institute, Coal Oil Point Reserve, and Cabrillo High School Aquarium.

Task 2. Action Plan Development and Implementation

The Action Plan developed by CINMS in 2010 linked to partners described in Task 1 that would work with CINMS to complete educational/outreach components in the SOW. As the Program developed, the Action Plan elements outlined were modified as needed to best fit the new circumstances.

Hire Torch Oil Spill Rocky Intertidal Education Outreach Project Coordinator

This position was filled in 2010 with the hire of Jessica Altstatt, who coordinated with partners identified in the needs assessment to develop the different deliverables. Additionally, she provided administrative support to implement the LiM-PETS program as part of this project.

Development of Interpretive Signs

The interpretive signs were designed for various public locations such as over-



Explore Tidepools With Care sign installed at Beachcomber, Shell Beach.

looks, beaches and other popular ocean-view sites with access to the intertidal. The signs measure 36” wide by 24” tall and ½ inch thick with rounded corners and are fabricated from digital high pressure laminate (DHPL) material. Bases are powder coated aluminum (including 2 posts and a backing panel for each sign) and are installed at an ADA compliant height. Two of the signs were rail mounted.

The design of our rocky intertidal interpretive sign ‘Explore Tidepool With Care’ demanded considerable attention. Working with our designer, we created a sign with compatible messaging that touches on black abalone, the rocky intertidal, species IDs and tidepool etiquette.

The signs also included a QR code that directs to a project website: <http://cis-anctuary.org/tidepools>. This site includes more detailed information on tidepools, a link to our sign evaluation survey, links to download the Tidepool app and to pertinent agencies, and much more. More information on the signs and about the sign evaluation survey can be found in Appendix A.



Figure 1.

Explore Tidepools With Care sign locations. Ten signs are installed (shown in yellow) and two sites are permitted for new signs through the CREF program (shown in red).

Three signs are installed in San Luis Obispo County and seven are installed in Santa Barbara County. The two future signs are also within Santa Barbara County.

As of June 1, 2014, ten Interpretive Signs have been delivered and installed. Sign locations are shown in Figure 1, and a table including GPS locations is presented in Appendix 1.

We also were awarded a small grant from the Santa Barbara County Coastal Resource Enhancement Fund, for fabrication of two additional signs for placement in southern (Arroyo Burro Beach) and northern (Ocean Park) Santa Barbara County.

Development of Outreach Materials

A wide variety of outreach materials have been developed to highlight the importance of tidepools, including black abalone. Program components included the design, fabrication and installation of interpretive signage and exhibit panels about rocky intertidal habitats.

Black Abalone Models

Economical abalone models were created by a local retired abalone fisherman. These models along with curated abalone shells were used for education and outreach purposes for some of the ~20,000 visitors to the Marine Science Institute’s REEF.



Black abalone educational models

Interior Graphic Panels

These materials were designed for indoor use at learning and visitor centers. The mounted panels reflect the look and feel developed for the exterior wayside signs, and provide the viewer with additional information. The four panels are each 12” x 48”, printed in full color, and are titled “Tidepools-Between Land and Sea”, “Explore Tidepools with Care”, “Species in Danger: Focus on Abalone”, and “Intertidal Zonation- Life Under Constant Change”. They work together as

a set, or as an individual stand-alone panel, and are wall-mounted. The digital files were screenprinted





Torch graphic panel at Righetti High School

in full color onto 3M 180-10 Controltac material, laminated with 5ml matte polycarbonate laminate and mounted onto 6mm PVC board.

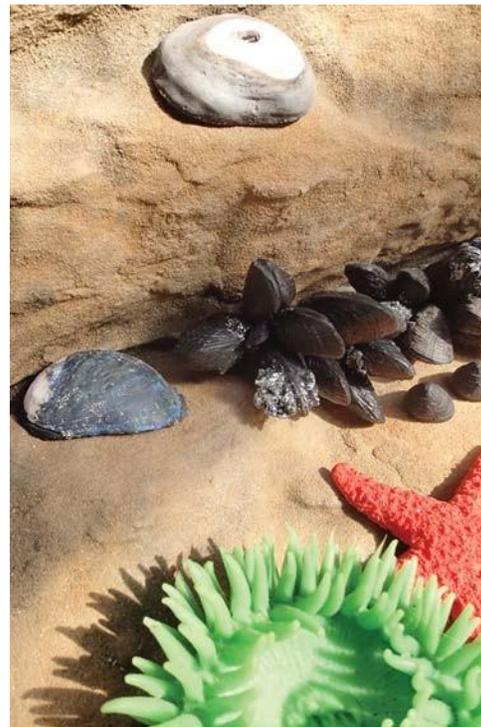
Panels were designed and printed in early 2013 and delivered to the Cabrillo High School Aquarium and to the Santa Maria Discovery Museum in 2013. In April 2014 a full set was fabricated for the Central

Coast Aquarium, in Avila Beach (San Luis Obispo County) and two panels were delivered for classroom use at Ernest Righetti High School, in Orcutt. A set has also been made available to the REEF at UCSB/MSI. The files can easily be accessed as the need (and funds) to print another set, or individual panel, arises.

Interior Habitat Models

The intertidal interactive habitat model was designed and constructed by a museum display fabricator. The dimensions are approx. 3' x 5', the weight around 30 lbs and the model sits on locking castors for mobility. The model features common intertidal species, including black abalone, and patterns of zonation. Additional lifelike models of common intertidal species were either made in-house or purchased. The model is to be housed at Cabrillo High School Aquarium but can be easily transported for other outreach events

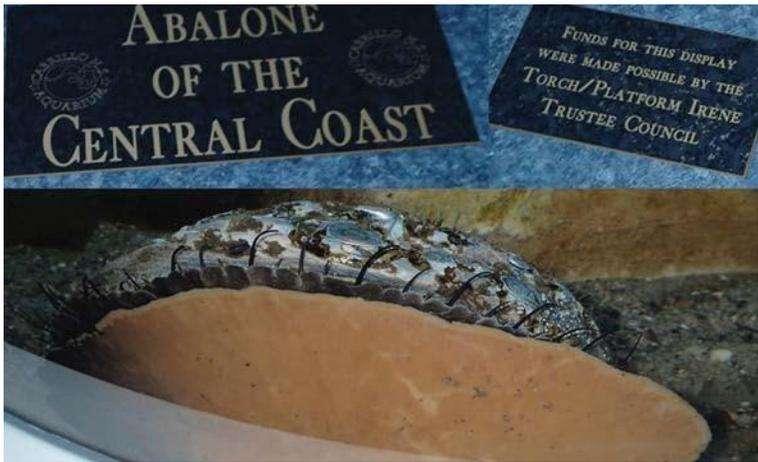
Picture cards to accompany models have been developed and are being tested at Cabrillo High School Aquarium and in classrooms.



Black Abalone Aquaria

UC Santa Barbara REEF

Funds were allotted for the design and development of endangered species



Abalone exhibit tank at Cabrillo High School Aquarium

exhibit aquaria to house and display black abalone held at UCSB's Marine Science Institute teaching aquarium (REEF). A pump and sundry plumbing supplies for abalone aquarium life support were purchased with the majority of the funds. The black abalone are held in

a secure area, along with the endangered white abalone and are part of regular MSI Education and Outreach programming. This is also enhanced by the addition of a Tidepool Etiquette Display panel located adjacent to the REEF for education and interpretation along with recent MPA content.

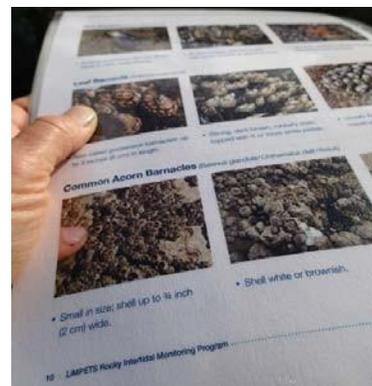
Cabrillo High School Aquarium

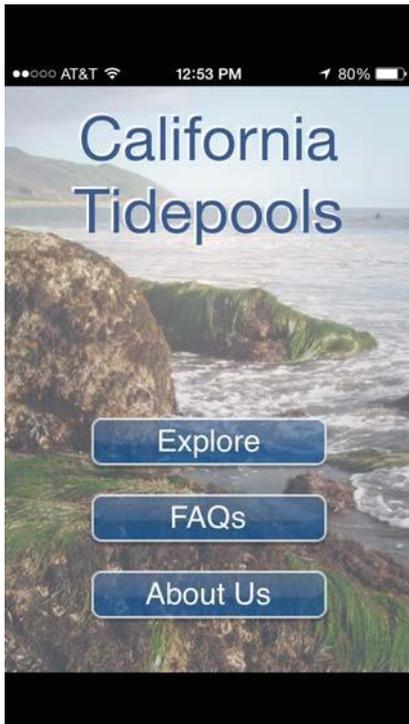
Materials to support an abalone exhibit at the high school student-run aquarium, including lighting, pumps, seawater filters and signage were purchased during 2012-2013. By April 2013, the Abalone tank was up and running, and stocked with one dozen abalone from The Cultured Abalone Farm. The Farm also donated to the school a large male red abalone that was recently retired from the breeding program. The tank has signage acknowledging that funding came from the Torch Trustee Council (as do all of our signs). There are also black abalone info and picture cards that accompany the tank, for use by general public and in training student docents. To celebrate the tank, the Cabrillo High School Aquarium May 2013 newsletter featured the Abalone Tank and the Torch Outreach and Education program.

Other Outreach Tools

Species Identification Guides

Species photo identification cards for training and use in the field were developed, and a draft form was first used at Boathouse in 2011. These forms were shared with the rest of the LiMPETS network coordinators, which led to the revamping of the





species ID guide for the entire LiMPETS program in 2012.

California Tidepools App

We also partnered with UC Santa Barbara in development of the California Tidepools app for Apple and Android devices. The App can be downloaded for free at both the iTunes store and Google Play store.

Link to download the app for Apple:

<http://itunes.apple.com/us/app/california-tidepools/id497631839?mt=8>

Link to download the app for Android:

<https://play.google.com/store/apps/details?id=org.californiatidepools>

California Tidepools Website

We also created a dedicated project website, which houses additional information on black abalone and the rocky intertidal with links to agencies and more. The website is accessible via the QR code found on the interpretive signs, and also featured a link to our sign survey.

Link to the California Tidepools website: <http://cisanctuary.org/tidepools>

Trainings for Community and Volunteers

Volunteers from the local community and students from UC Santa Barbara were recruited and trained to assist with monitoring in the field, and to conduct visitor-use surveys. In 2011 we trained six students at UCSB, and one at Hancock College. Eleven visitor surveys took place during



Class from Pioneer Valley High School during a LiMPETS monitoring field trip to Shell Beach.

the Fall 2011 season (including Campus Point, Coal Oil Point, Shell Beach). In 2012, an additional three interns were trained. 12 surveys took place during the 2012/2013 season at Campus and Coal Oil Points. In 2013-2014, an additional 12 surveys were performed. Results are presented in Appendix E.



New life-size photo quadrat

Expansion Of Long-Term Monitoring And Experiential Training Programs For Teachers And Students (Limpets)

Fabrication Of Limpets Rocky Intertidal Kits

We have created kits and outreach materials that have been distributed to the Cabrillo Marine Aquarium in San Pedro, the UCSB REEF, Ernest Righetti and Cabrillo high schools, and more than a dozen teachers.

To date, 80 copies of the Rocky Intertidal Species ID photo guide have been distributed along with additional training materials. A professional photographer took new high-detail pictures for life-sized photo quadrats for training at schools and education centers. In 2014, students trained with these photos and we have had good feedback from teachers. 10 sets of these photos have been distributed, including a set to MERITO Academy teachers. 50 quadrats were fabricated and distributed to schools and participating teachers. Additional sets of materials are stored at CINMS at UCSB campus. In April of 2014, we developed a new partnership with the Central Coast Aquarium, which received a kit (in addition to interpretive panels).

Conduct Limpets Teacher Trainings

We held our first teacher training in October 2011 at the Cabrillo Marine Aquarium in San Pedro. Twenty-two teachers from Southern California stayed the entire afternoon for the training, which culminated with a hand's-on activity during low tide at Point Fermin. We held our second teacher training event on October 27th 2012 at UCSB. 13 new teachers participated, from school districts ranging from Santa



Maria to Los Angeles. To date, we have supported field work for five of these schools (Righetti, Anacapa School, Fremont, Oak Park, Monroe). A third teacher training for 14 new teachers was held April 2014 at the Central Coast Aquarium in Avila Beach (San Luis Obispo County). The Aquarium would like to become a LiMPETS hub and host trainings and monitoring in the future. Torch funds also partially supported LiMPETS portions of three additional teacher workshops- two organized for B-WET grants in Ventura County in 2013 (~ 20 teachers each), and one multi-day Teaching Environmental Science in a Changing Climate workshop with 24 teachers at UCSB in June 2014.



We have more than met our target of training 10 new teachers. In addition, our teachers from Cabrillo and Ernest Righetti high schools have now participated in the program for three years.



Classes from Ernest Righetti High School at UC Santa Barbara during a LiMPETS monitoring field trip to Campus Point.

MPA Baseline Monitoring



We have developed a collaborative partnership with groups involved with the Marine Protected Area (MPA) baseline monitoring effort within Santa Barbara County. LiMPETS protocols and citizen participation have potential to play a role in the MPA monitoring process. From 2013-2014, we did side-by-side monitoring with researchers from UC Santa Barbara to identify potential needs for protocol modification.



A major result of this effort has been the development of a draft Quality Assurance Project Plan, which describes new training and testing requirements for monitoring participants, as well as in-field tests of precision and accuracy.

Funding To Support Bus Transportation

In the 2011-2012 school year, we provided bus transportation for one class, although we worked with a total of 223 students in the field (whose transportation was already covered by others). In 2012-2013, Torch provided six bus trips for 325 students to Shell Beach, Campus Point and Point Fermin, with additional trips finding other funding to cover their transportation- a total of 498 students overall. In 2014, our final year of student trips, Torch funded seven buses- providing transportation for 245 students to our sites at Point Fermin, Shell Beach and Campus Point, out of 325 that received in-class trainings. Over the period, we provided classroom training and field trips to 1,046 students; 617 were transported to the beach using Torch funds. The

original goal of 10 buses was surpassed, with Torch funding providing a total of 15 buses.



Limpets Symposium

The LiMPETS Coordinator and Teacher Symposium was held at UC Santa Barbara February 2, 2013. We had 25 participants for this all-day event. There were presentations by marine scientists from UC Santa Barbara's Marine Science Institute,

UC Santa Cruz and the National Park Service. We provided an overview on the history of the Torch spill and restoration efforts including the Education and Outreach Program. Also participating were Central and Northern California LiMPETS coordinators and teachers from Santa Barbara, Ventura and Los Angeles coun-

ties. Discussion topics included Facilitating Student Projects, How to Spark Students' Interests, and Being a Role Model For a Career in Science. There was also an opportunity to practice species IDs at UCSB's REEF in the afternoon.



Black abalone found during a student trip to Leo Carrillo.

Task 3. Class Trips, Monitoring Surveys And Evaluations

Class Trips And Surveys

During the 2011-2012 school year, we led classroom visits to Campus Point (Lancaster HS, Anacapa School), Coal Oil Point (Santa Barbara City College), Boat-house (Cabrillo HS), Shell Beach (Hancock College, Santa Maria) and Frenchy's Cove (Reseda HS), for a total of 223 students.

During the 2012-2013 school year, we expanded our reach to 17 classes (498 students) surveying Shell Beach (Righetti HS), Campus Point (Righetti HS, Cabrillo HS), Carpinteria (Fremont Intermediate School), Frenchy's (Reseda HS, Park View Elementary), Point Fermin (Monroe HS), Deer Creek (Oak Park HS). In addition, our volunteers surveyed Coal Oil Point, Campus Point, Deer Creek and Carpinteria.

During the 2013-2014 school year, we worked with 12 classes (325 students)



surveying Shell Beach (Pioneer Valley HS, Righetti HS), Campus Point (Righetti HS, Cabrillo HS), Carpinteria (Cal State Northridge), Frenchy's (Reseda HS, Park View Elementary),

C. Teacher Workshop and Symposium evaluations

These were different from the student evaluations as they focused in more on teacher knowledge and comfort level teaching field monitoring protocols and in-class materials.

D. Visitor Use Surveys

The Visitor Use Surveys were observational only, and no contact was made with study targets. The purpose was to quantify human activities in the intertidal, using a protocol similar to that used by Ambrose and Smith (2004) and Murray et al. (1999) in Los Angeles and Orange counties. Intensity of visitation was determined, observed individuals classified into one of eight categories, and focal surveys were conducted to assess the activity patterns of individual users. Survey results are detailed in Appendix E.

E. Testimonials and Press

This appendix is a compilation of the various thank-yous, compliments and other feedback that we have received.

We constantly use (the graphic panels) when the public visits the aquarium. I mainly see adults reading them when a docent is busy talking with other visitors. They are a wonderful conversation starter and reference for a conversation.

For our school programs we offer a course just on the rocky intertidal. During that lesson we point out the panels and explain the information embedded in the panels. They offer wonderful information about the varying tides we have on the central coast with great corresponding photos of a low and high tide. My favorite panel is the tide pool etiquette guide, which provides tide pooling tips on how to go tide pooling without making a negative impact on the habitat!

Lesley Stein, Program Director and Aquarist, Central Coast Aquarium



Torch Program Coordinator Jessie Altstatt with panels installed at Central Coast Aquarium.



Students during a field trip to Coal Oil Point found two stars that survived Seastar Wasting Disease.

Challenges and Conclusions

The Rocky Intertidal Education and Outreach Program evolved over time. The operational landscape had shifted from when the needs assessment was completed to when project implementation began. Changes included key personnel at partnership organizations, those partners' operational and strategic plans and matching funding for shared projects. Consequently, our activities and deliverables were adapted to best fit the new conditions.

Torch funds committed an investment in outreach and education materials to foster community awareness and protection of rocky intertidal resources. The resulting network of interpretive signs and graphic panels will continue to provide resources for visitors into the future.

Torch funds also invested in strengthening relationships with key teachers in Northern Santa Barbara County. The teachers, and schools, have longevity within their community, which results in a longer-term commitment to the marine environment and the rocky intertidal in particular.

Recommendations and Future Work

Re-visit locations of interpretive signs

Most signs are placed in the best spot for the particular site, but at least one, at Coal Oil Point, could be re-located. The Coal Oil Point sign is located on the bluff overlooking the tidepools instead of at the most heavily-used beach access point, the stairs at the end of Camino Corto in Isla Vista, a half-mile away. We made this decision due to concerns over vandalism in addition to potential timing and complexity of Coastal Commission permitting at the stairway location (adherence

to unincorporated Santa Barbara County Local Coastal Plan).

Both south coast State Park signs have been placed and then moved at least twice by park personnel. What seemed like the best location to meet our objectives (maximize reach with visitors) was not a perfect fit with the park's existing operational plan. Additional constraints on siting included biological and cultural resources, existing infrastructure and future projects.

Re-consider how student-generated data can be appropriate for long-term monitoring

Over the course of the program, we became concerned that student-generated data may not be an appropriate tool for detecting change. The goal of maximizing student experience and participation does not mesh well with the detailed training and assessment required in order to produce quality survey data.

There was no uniform baseline of knowledge across the students we worked with. Grade level was not a consistent indicator of how quickly the students would grasp the concepts and methodology required for monitoring. We found that most students require far more training than received in the standard 1-2 classroom visits in order to dependably and correctly use the LiMPETS methods in the field. Thus, the outcomes of this program component were unable to meet the initial goals. However, acknowledging that dependable data collection is a major goal of citizen participation (citizen science) programs, we began to look for ways to modify the existing LiMPETS protocols.

Field Exercise and Conclusions

In 2013, we underwent a series of field exercises along side scientists from UC Santa Barbara, in order to see how data collected with the LiMPETS proto-

col (presence/absence #s of squares) compare to estimates of percent cover used by other monitoring groups (i.e. MARINE partners).



- There was not an obvious way to calculate comparable % cover from # of squares.
- LiMPETS over-estimates abundance when compared to point contact method *when using #s of squares as a proxy for % cover.*
- The range of over-estimation

varied depending on the distribution of the taxa scored.

- Data collected by LiMPETS (#s of squares) cannot be directly compared with estimations of percent cover generated from data collected by point-contact method (i.e. that collected by MARINE partners).



From an educational goal perspective, it is a benefit of the program to be able to reach and engage as many students each school year as possible. For many classes, a LiMPETS field trip is their first visit to the seashore. This experience can be a pivotal moment in their education and spur interest and a career in science. However, to meet the goal of producing high quality data, the transience of LiMPETS participants is a major obstacle to overcome. Each new group of participants requires the same training and stewardship by LiMPETS coordinators. There is currently no set way to scale the monitoring activity by student ability. There is a wide degree of variation between those classes of experienced older students that learn quickly and master all four

protocols, and those that find it difficult to focus during their first field trip. It could be unfair to novices to force in-depth data collection when the student might be better served by spending their time exploring or performing a simpler task like size measurements or total organism counts. There might be some methods in use now by LiMPETS participants that meet some goals (stewardship, education) but are not capable of producing high quality data without increased training requirements. For more inexperienced and young samplers, collecting data from a simpler protocol like total organism count (for Ochre stars and sea anemones) is more achievable. Experienced older students would be better suited to conduct sampling using all LiMPETS protocols. Note that not meeting the most stringent requirements does not in any way nullify the value of the student experience.

Potential Solutions

Our experience with leading student monitoring trips has shown that the majority of error that students make while scoring quadrats is due to misidentification of species. This is not surprising given the introductory level of exposure to training



materials most student participants are given in class.

A potential solution may be to match participant expertise with sampling complexity, to accommodate samplers with different skills/training levels. The simplest tier would include most general science education; and serve as an introduction to basic data collection in rocky habitats for students and the public. The intermediate level would include more experienced teachers/participants, who could develop a time series for internal (classroom) use. The highest level would be limited to a fully trained group of samplers that collect certain types of data that could be used in monitoring. This level maximizes precision and accuracy.

Need For Quality Control

In 2014, we developed a draft Quality Assurance Project Plan for the LiMPETS program. A summary of recommendations found within this document are:

- Increase training requirements. Ramp up training and documentation requirements (online study tools and modules requiring 100% completion, in-class calibration between participant and Coordinator/teacher, quizzes on methods, zones and species before sampling, in-field calibration between participant and Coordinator.
- Reduce complexity of methods (Tiered Approach or abbreviated species list).

For Quadrat sampling, adopt Tiered Approach to maximize assurance of data quality, while providing for education experiences for those participants unable to complete the most rigorous training.

- Introduce error-checking practices for data entry and database. Data entry and checking by experienced leaders/LiMPETS coordinators only.
- Create ability to flag data in the field, when being entered into database and while error checking.

We will continue to build upon the milestones accomplished from 2010-2014 by the Torch Rocky Intertidal Education and Outreach Program. The tools, signs, displays, materials and program refinements are an investment both for future community education and protection of intertidal resources. The program content will inspire a new generation of ocean stewards for years to come.

