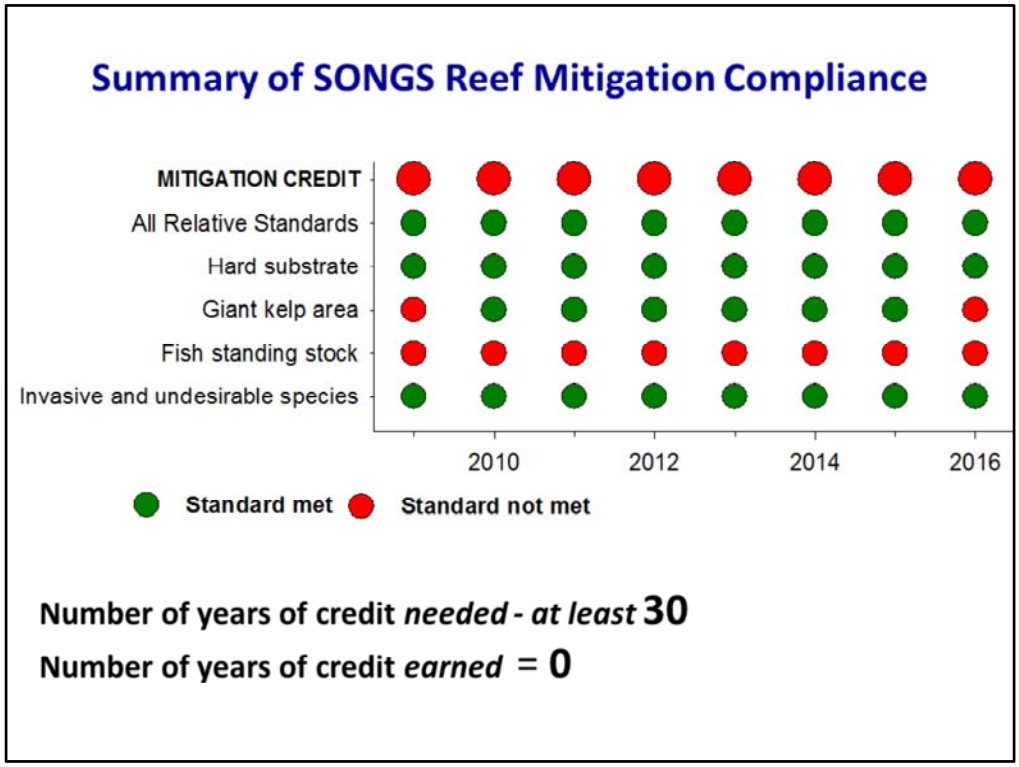
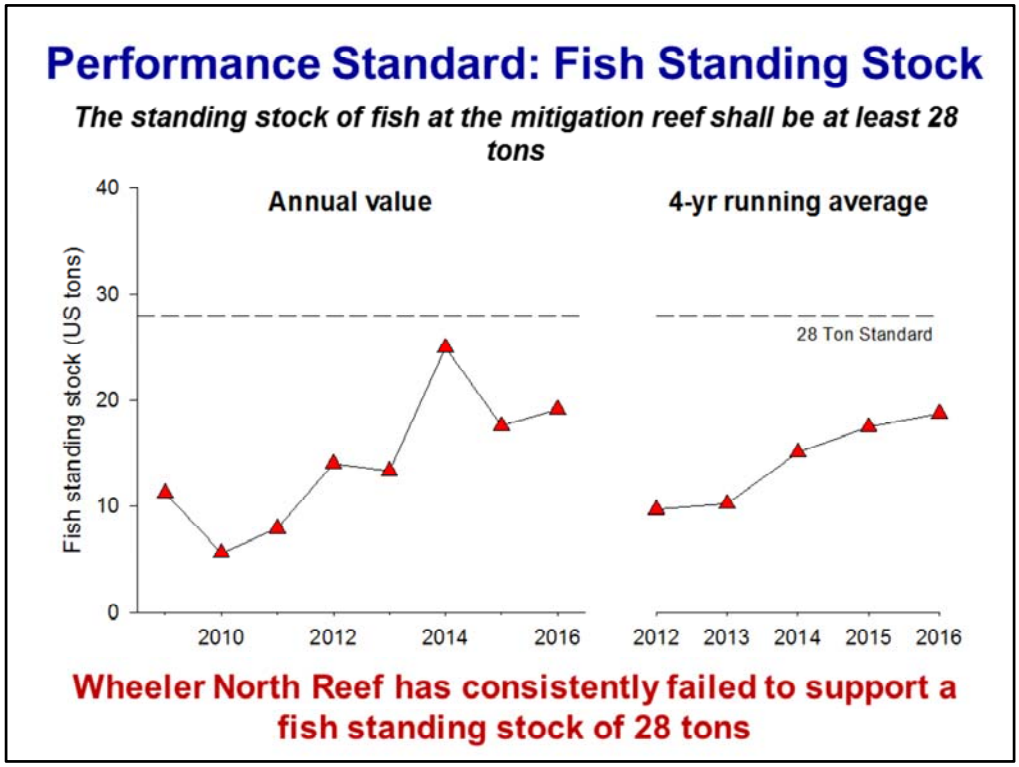
Remediating Wheeler North Reef

May 10, 2017
SONGS Mitigation Monitoring Project
Kate Huckelbridge, California Coastal Commission



- Shown here is a summary of project compliance for the SONGS reef mitigation project
- As described in the previous slide project compliance requires that the Wheeler North Reef meet all 4 absolute standards and the collective group of relative standards in a given year for that year to count towards mitigation credit
- Although it has met the relative standards in all years. the Wheeler North Reef has failed to meet the performance standard for fish standing stock in every year and thus has not accrued any mitigation credit to date



- The performance standard for fish standing stock requires the Wheeler North Reef to sustain 28 tons of reef fish
- This value is based on the estimated reduction in the standing stock of fish in the San Onofre kelp forest that was attributed to SONGS' operations in the impact assessment studies overseen by the Marine Review Committee
- The Wheeler North Reef has never met this performance standard during the eight years of its existence

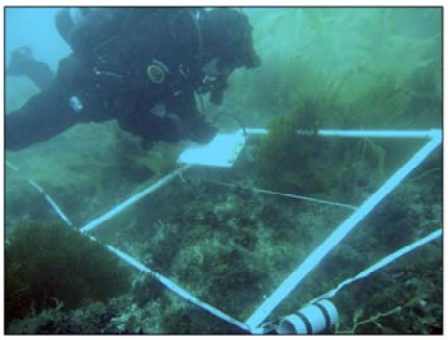
SONGS Coastal Development Permit

Requires independent studies be done to:

1. Determine why the performance standards are not being met
2. Develop recommendations for appropriate remedial measures

In addition to requiring independent studies to determine why the performance standards are not being met, the SONGS coastal development permit also requires independent studies be done to develop recommendations for appropriate remedial measures

SONGS Independent Studies

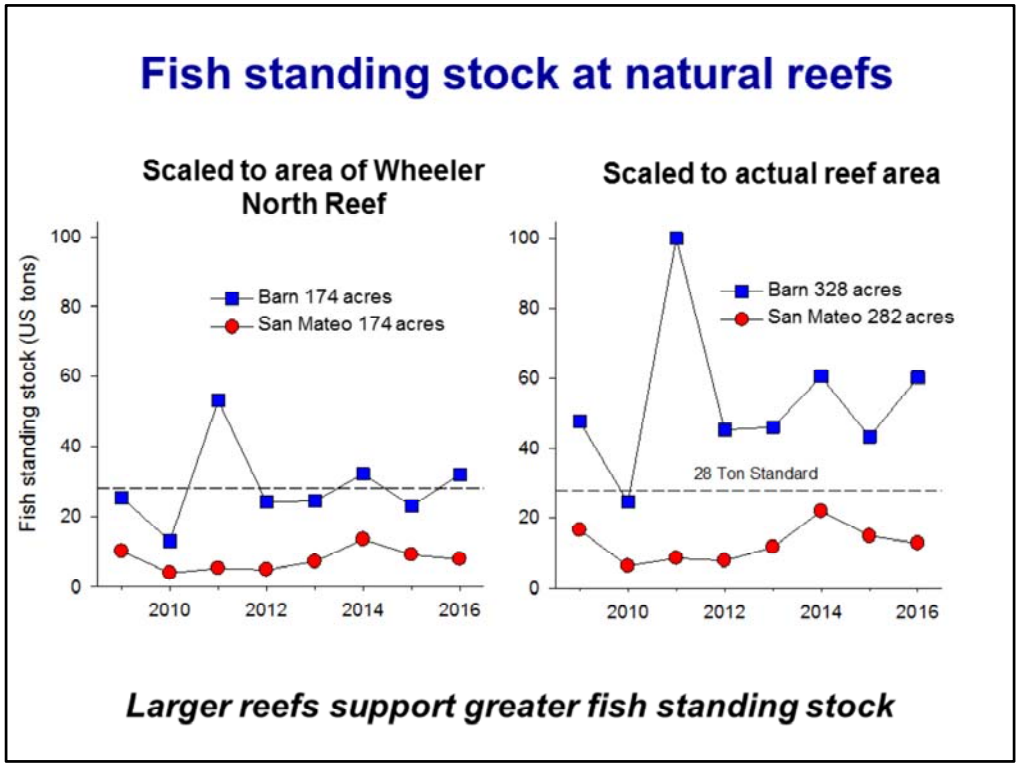


Monitoring data were used to:

1. Investigate the reason(s) for Wheeler North Reef's failure to meet the performance standard for fish standing stock
2. Develop potential solutions for ensuring that this standard is met in the future

As per the SONGS coastal development permit we used monitoring data to:

1. Investigate the reason(s) why the Wheeler North Reef has consistently failed to meet the performance standard for fish standing stock
2. Develop potential solutions for ensuring that this performance standard is met in the future



- Plotted here are annual values of fish standing stock for the natural reefs at San Mateo and Barn since 2009
- Both reefs are generally low relief (< 1 m tall) and their rock coverages of 52% and 47% are very similar to that of Wheeler North Reef (48% rock cover)
- In the graph on the left standing stock is scaled to 174 acres, which is the area of the Wheeler North Reef while standing stock in the right graph is scaled to the actual are of Barn and San Mateo which is 328 acres and 282 acres, respectively
- Not surprisingly, a larger area of reef supports a greater fish standing stock

Conclusions from Independent Studies

★The present configuration of Wheeler North Reef (*174 acres of low relief reef with 48% rock coverage*) *is not sufficient* to consistently meet the performance standard for fish standing stock

How much additional acreage is needed?

Approach for estimating area of additional reef for different reef designs

Combine the expected future standing stock of the existing 174 acre Wheeler North Reef with the expected future standing stock of fish supported by new acreage of various reef designs

- Data collected from the Phase 1 Reef from 2000 - 2015 were used to predict how many tons of fish will be supported by the existing 174 acre Wheeler North Reef in the future (e.g., 95% confidence = **13.5 US tons**)
- The same data were used to predict the number of additional acres needed to sustain 28 tons in the future
- The calculations for additional acres were done for:
  - ✓ low relief (< 1 m tall) reef designs with low (41%) , medium (63%) and high (81%) rock coverage
  - ✓ high relief (2.5 m tall) reef design with 100% rock cover

- To estimate the area of additional reef needed for Wheeler North Reef to sustain a fish standing stock of 28 tons we:
  1. Combined the expected future fish standing stock of the existing 174 acre Wheeler North Reef with the expected future standing stock of fish supported by additional new acreage of reef
  2. We did this for different reef designs for the additional new acreage
- Data from the rock modules of the Phase 1 Reef collected from 2000 – 2015 is the longest time series available and it covers a relatively wide range in environmental conditions
  1. We first used these data to predict the number of tons of fish that will be supported by the existing 174 acre Wheeler North Reef in the future with a 95% probability. This turned out to be 13.5 US tons
  2. We then used these data to predict the number of additional acres needed to sustain a fish standing stock of 28 tons in the future

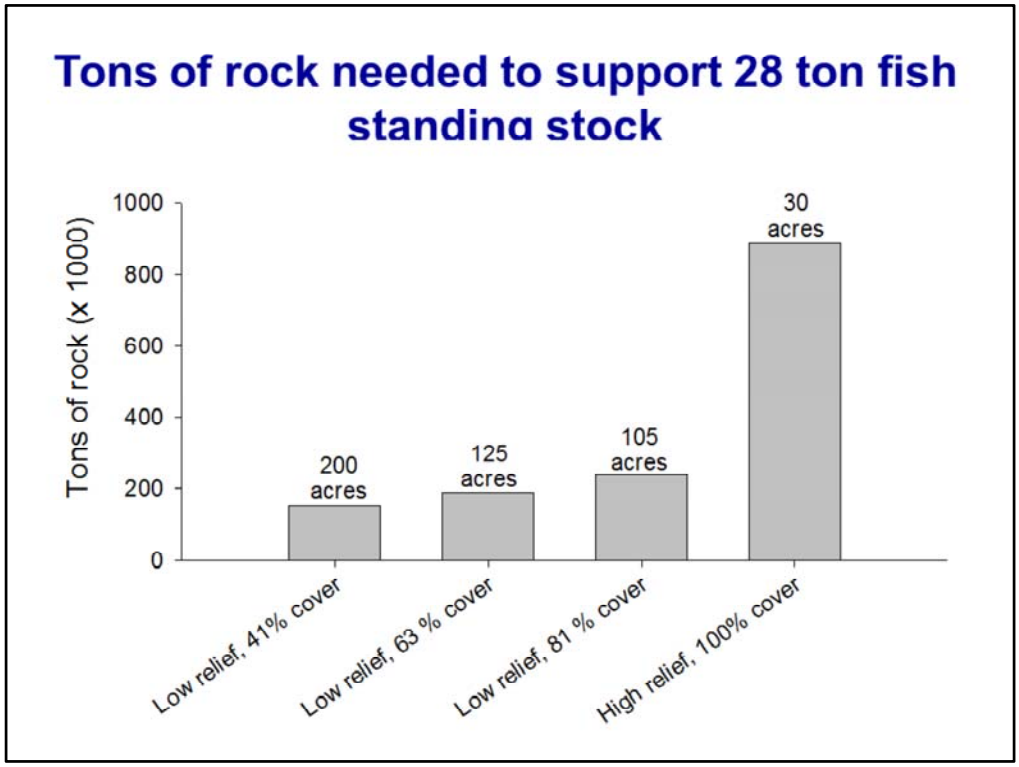
- We chose a 95% as the level of confidence in our predictions because we wanted a high assurance in our estimates of the amount of new additional acres needed
- Increasing the confidence above 95% would result in more additional acres needed to sustain 28 tons of fish while decreasing the confidence below 95% would result in fewer additional acres needed

Estimated area of additional reef for remediation

Reef Design	Additional acres needed*
Low relief (< 1 m), low rock cover (41%)	200
Low relief (< 1 m), medium rock cover (63%)	125
Low relief (< 1 m), high rock cover (81%)	105
High relief (2.5 m, 100% rock cover)	30

Number of additional acres needed for Wheeler North Reef to sustain a fish standing stock of at least 28 tons with 95 % confidence

- Shown here is a summary table with estimates of the number of additional acres of various reef designs that are needed for Wheeler North Reef to sustain a fish standing stock of at least 28 tons
- As you can see the amount of addition acreage varies greatly depending on its rock coverage and vertical relief
- If new additional acres were designed like the existing Wheeler North Reef (i.e., low relief with low rock coverage), then 200 additional acres would be needed, which would more than double its current size
- It would take approximately half of this area (i.e., 105 acres) if the additional acres were low relief with high rock coverage
- By contrast, if the additional acreage consisted of reef that averaged 2.5 m tall and was 100% rock, then only 30 additional acres would be needed

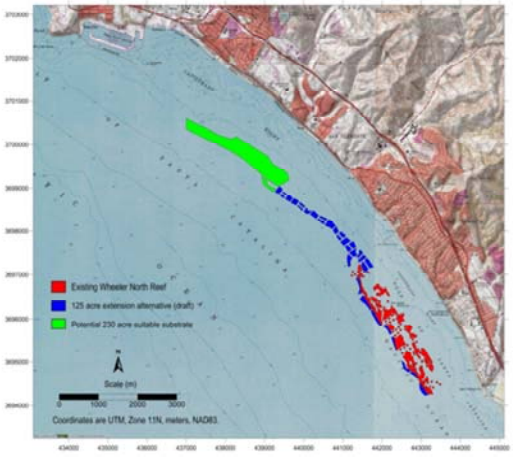


- This plot shows the tonnage of rock needed to construct 4 different reef designs, which when added to the existing Wheeler North Reef are expected to support a fish standing stock of 28 tons with 95% level of confidence
- The numbers above each bar are the number of acres of additional reef needed for each reef design
- A remediation reef designed with low relief and 41% cover rock requires the least amount of rock that is ~ 80% of that of a low relief 63% cover rock and ~ 63% of that of a low relief 81% cover rock
- By contrast, a high relief reef with 100% cover of rock requires nearly 6 times more rock to support the same fish standing stock than a low relief 41% cover reef even though it is encompasses < 1/6 the area (i.e., 30 acres for high relief 100% cover vs. 200 acres of low relief 41% cover)

Requirement to Remediate

Based on the results of independent studies, the CCC Executive Director required SCE to remediate WNR (5/24/2016)

- July 2016 – SCE submits Draft Remediation Plan of Action
- Sept – Dec 2016 – Discussions between CCC and SCE re: remediation design and site constraints



Tentative Remediation Timeline

- March 2017 – SCE submitted lease amendment application to SLC, begins underwater habitat surveys
- August 2017 (*est.*) - RFP for reef construction
- December 2017 (*est.*) - SLC reviews and acts on lease amendment application and appropriate CEQA action
- Spring 2018 (*est.*) - CCC, ESACE, RWQCB and other permits
- Summer 2018 (*est.*) - Begin reef construction

Questions?

For more information go to: http://marinemitigation.msi.ucsb.edu/