Genetic Diversity in Morro Bay Eelgrass: A System in Collapse

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Introduction

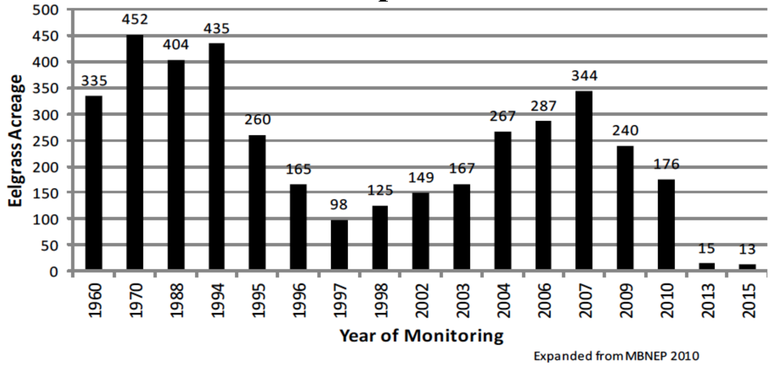
- Eelgrass, *Zostera marina*, is a keystone species: purifies water and stabilizes sediment (Short & Wyllie-Echeverria, 1996), and is a nursery environment for invertebrates and fish (Hemminga & Daurte, 2000)
- Morro Bay has lost 95% of its eelgrass population in the last 8 years. Only 7 beds of eelgrass remain (S of Bay, 2014)
- All restoration efforts have failed (over 22,000 plants in 115 unique plots) (Merkel, 2015)
- Genetic diversity has not been assessed in Morro Bay
- Numerous studies have shown that genetic diversity affects eelgrass health and ecosystem function (Hughes and Stachowicz, 2009)

Hypothesis

H1: Each of the 7 beds in Morro Bay is genetically distinct
Ho: There is no genetic differentiation among the 7 beds

Overall, we expect genetic diversity in Morro Bay eelgrass to be low due to the recent population bottleneck.

Historic Population Trends



Expanded from MBNEP 2010

Methods

- Collected 20-50 samples from each of the remaining 7 beds in Morro Bay
- Extracted DNA from 86 individuals
- Ran PCR using 11 microsatellite primers to assess fragment size differences among individuals
- Scored microsatellite peaks with software program "Geneious"
- Used software "STRUCTURE" to estimate number of genetic lineages and population structure in Morro Bay

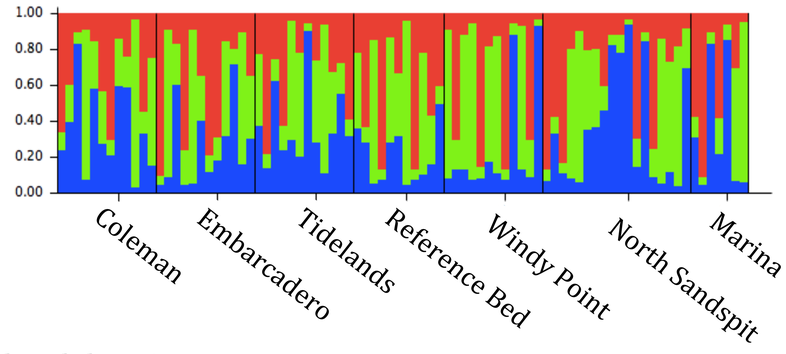
Figure 1: Diversity values calculated using diveRsity package in R.

Locus population size (N)	79.36
Allele number (A)	52.00
Allelic richness (Ar)	4.12
Observed Heterozygosity (Ho)	0.54
Expected Heterozygosity (He)	0.52
Test for HWE (p-values from chi^2)	0.659

Results and Discussion

- Diversity values were higher than expected (Fig. 1)
- No population structure was found, indicating high connectivity throughout the bay (Fig. 2)
- Next, we will analyze data from Bodega Bay eelgrass to compare diversity levels, and to determine if Morro Bay is genetically isolated
- While there is homogeneity among Morro Bay plants, we don't know yet how this compares to other eelgrass populations on the West Coast
- These results suggest that any existing eelgrass bed can be used for future restoration efforts and it will contain all of the diversity found within the bay
- These results will be used for future outplanting efforts in 2017-2018

Figure 2: STRUCTURE output across 7 sampled populations revealed that there were three distinct genetic lineages and no population structure.



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