Eelgrass wrack on the beach after the November high tides near Mad River Beach

Dunes Climate Ready Quarterly Update

August-October 2017

Summer 2017 Survey

The summer 2017 survey wrapped up successfully, data has been cleaned and entered, and graphs of results from the first two years of the study have been sent to landowners and managers.

Lanphere Adaptation Site

Arizona State University Professor Ian Walker and Laboratory Coordinator Craig Turner returned in October and carried out a scan of the adaptation site. Kite aerial mapping was completed at the end of September by RA Candace Reynolds and refuge staff member Ryan Aresenault. *Ammophila* resprouts during this period were sparse, and were pulled by refuge staff. ASU will be carrying out the analysis of changes to the geomorphology of the site that have occurred since the conclusion of Alana Rader's thesis, and will return in May for another scan.

Eel River Adaptation Site

The Coastal Conservancy will be funding an augmentation of the Climate Ready grant to cover an additional project at the Eel River adaptation site. Based on the poor performance of passive methods of foredune rebuilding, an experimental foredune building project will take place to evaluate the potential for this method to increase resiliency. The Wildlands Conservancy is leading this project and has been carrying out CEQA and permitting steps. Baseline monitoring of the site will be conducted in May by ASU and will consist of Terrestrial LiDAR scanning. In addition, RAs will carry out kite or pole aerial mapping in November. Heavy equipment will be used to move sand from the existing washover fan to rebuild the foredune. Pre-project monitoring of sand grain size distribution is

The foredune breach and overwash, site of the proposed foredune rebuilding at Eel River

being carried out by Humboldt State University student Steven LaPointe through an internship with Friends of the Dunes. The project will also utilize large wood and sand fencing to anchor the foredune and reduce sand movement on the new foredune in the first summer. Scattered dune mat species (especially *Ambrosia chamissonis*) now growing on the washover fan will be scraped prior to grading, then the seed and vegetative debris will be spread over the surface of the new foredune to promote native vegetation growth. Heavy equipment work is scheduled for spring 2018.

HSU students Elizabeth Nguyen, Sean Thull, and Steven LaPointe wrapped up the field and greenhouse studies of *Elymus mollis* they carried out under the direction of HSU Botany professor Erik Jules. The students measured growth of *Elymus* harvested from the Lanphere Dunes and transplanted to the Eel River overwash site as well as to the Ma-le'l Dunes. In addition they grew *Elymus* transplants in the greenhouse planted in sand from both sites. The goal of the study was to determine whether sand from the Eel River site might be limiting growth of Elymus, given that transplants to the adaptation site performed so poorly. The students found that in the field, the plants had fewer but longer leaves at the Ma-le'l site. In the greenhouse, plants grew better on Eel River sand, exhibiting greater total dry weight, above-ground weight, and below ground weight. Together these results suggest that plants are not limited by substrate at the Eel River site. Observations of herbivory and the leaf number/length response support a conclusion that herbivory is the most limiting factor at the Eel River site. A similar herbivory response was observed at the first *Elymus* propagation site at the Friends of the Dunes property, which was surrounded on three sides by *Ammophila*. Dense *Ammophila* provides protective cover for herbivores, and the small areas planted at the Eel River site and Friends of the Dunes site may have concentrated herbivore pressure. This level of herbivory has not been seen when *Elymus* was planted in the past at the Lanphere and Ma-le'l Dunes, which have less *Ammophila* and large areas of *Elymus.* Mortality and severe pressure from herbivory was not observed even when *Elymus* was planted directly adjacent to unrestored *Ammophila* dunes at the new BLM propagation site. In this case, the *Elymus* was planted at the south end of an extensive existing stand, suggesting that a larger planting might dilute the effects of herbivory.

Experimental *Elymus* transplants at Eel River (left, mostly dead) and Ma-le'l (right) at end of summer

BLM *Elymus* Propagation Site
The BLM propagation site was monitored for survival by refuge staff in September. Additional planting is scheduled to occur this winter.

Historic Shoreline Mapping
The report for the northern portion of the littoral cell was finalized by Research Associate Kelsey McDonald and has been transmitted to collaborators. The analysis concluded that most of the sandy shorelines around then northern littoral cell (Little River to Table Bluff) are stable to prograding (advancing towards the ocean), with the exception of the North Jetty area. The beach at the North Jetty has been eroding rapidly since 1939 at a rate of approximately 2 m/year. The North Spit from Samoa to Mad River Beach has been stable to gradually accreting with rates of less than 1m/year. The Clam Beach to Little River shoreline stretch has shown high accretion (2.6 m/year), while the South Spit has shown moderate accretion of approximately 1.3 m/year. The analysis of the south portion of the littoral cell has been completed by GHD, and is currently undergoing review.

Vulnerability assessment
Work on the vulnerability assessment has begun and is currently in the data gathering stage. We will be using an approach modeled after USGS protocols. The assessment will include sensitive cultural and ecological resources as well as infrastructure.

Although the Coastal Conservancy funded portion of the Dunes Climate Ready project is near completion, work continues through the BLM match. We will continue to provide quarterly updates through Friends of the Dunes.


South Spit from Table Bluff showing restored dunes