DUST CONTROL PILOT STUDIES

MARCH 2017

1 IID has implemented several operational field tests, or pilot studies, on the Salton Sea playa. Locations of the Surface Roughening, Vegetation Enhancement, and Field Scale Pilot Studies are shown on the left. Habitat projects on exposed playa are also shown, including the Coachella Valley Water District's (CVWD) Constructed Habitat Project, the Red Hill Bay Project, and the Saline Complex Habitat.

The Imperial Irrigation District (IID) is developing and testing a range of dust control measures tailored to the climate and soil conditions on and around the Salton Sea playa. These measures can be quickly implemented, adequately maintain a stabilized surface and prevent the spread of emissive source areas as playa is exposed. Pilot studies include Surface Roughening, Vegetation Enhancement and Surface Stabilizer (**Figure 1**). In addition, a series of field scale pilot studies are underway to evaluate a mosaic of dust control measures implemented at a larger scale. Study results will provide important guidelines for large scale implementation of dust control measures as the Sea recedes.

SURFACE ROUGHENING

Surface Roughening is recognized around the world as an effective dust control measure on bare, unprotected surfaces. It can also provide quick, waterless, and effective control on exposed playa. Surface Roughening provides dust control by decreasing the wind velocity at the surface and by physically trapping soil particles from upwind sources. Surface Roughening is typically created by a tractor-drawn tillage implement, such as a disk or plow. After installation, roughness levels are monitored and areas are periodically re-tilled to restore roughness that has eroded over time. When necessary, water may be applied to restore soil structure so that re-tilling is more effective. Study results will be used to understand which soils and tillage equipment confer the greatest, most sustainable degree of roughness. **Figures 2, 3, and 4** show monitoring and implementation of Surface Roughening at the Salton Sea.

2 **Surface Roughening.** This image illustrates the ridge height, ridge spacing, and armoring created by Surface Roughening. These parameters are monitored using remote sensing techniques and used to understand the durability and longevity of roughness over time.

VEGETATION ENHANCEMENT

As the Sea recedes, existing plant communities along the shoreline are naturally expanding onto the playa. This occurs most often on historical linear "beach ridges" formed by wave action. After initial establishment by beach ridge species, many other species fill in between the ridges, eventually leading to more continuous vegetation. The central concept of this pilot study is to understand these natural processes and determine the best practices for enhancing and creating vegetated beach ridges. Results will be used to understand the effect of several parameters on vegetation establishment, including shoreline proximity, groundwater depth and quality, the diversity of native species seeded, vegetative cover characteristics, agronomic characteristics of the soil, soil amendments, playa surface and subsurface conditions, and beach ridge orientation and composition. **Figures 5, 6, and 7** show seed collection, germination, and establishment.

3 **Surface Roughening.** Effective dust control can be achieved with one field pass perpendicular to the wind. In some areas, two field passes are necessary to provide dust control from multiple wind directions.

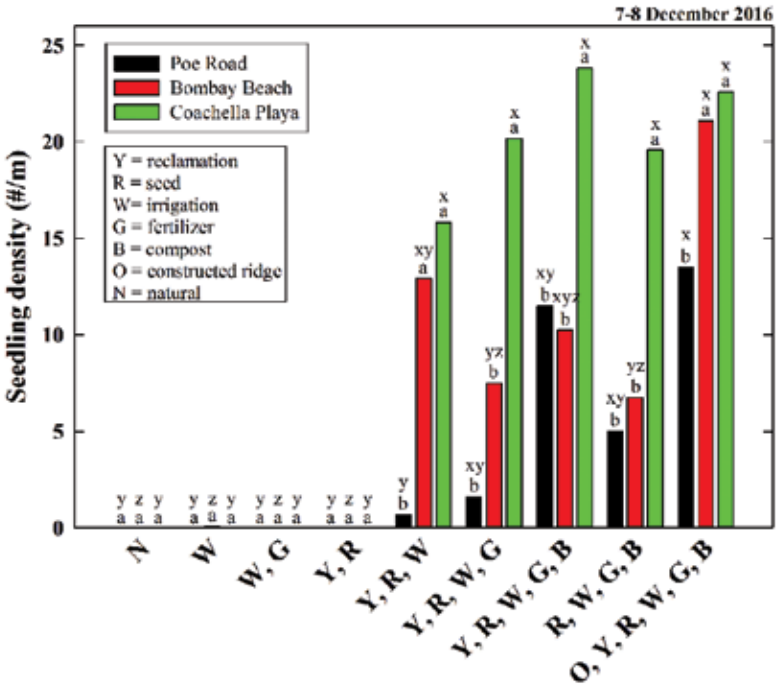
4 **Surface Roughening.** Vegetation is naturally establishing in the furrows due to upwind seed sources. The vegetation provides additional dust control.

5 **Vegetation Enhancement.** Seed from 10 native species was collected from numerous locations around the Sea to capture adaptive genetic diversity.

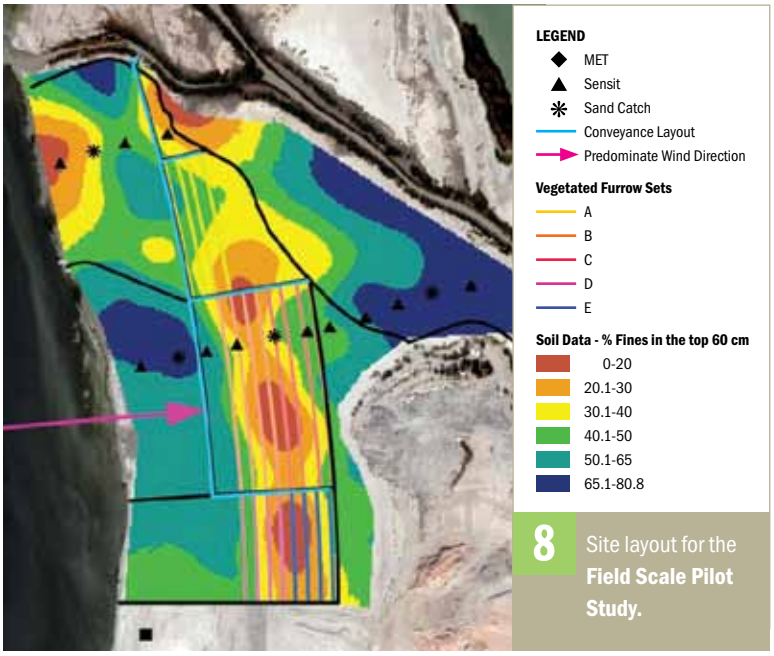
6 **Vegetation Enhancement.** Upon sowing on the beach ridge, nine of the 10 species germinated. Germination density was highest on the constructed ridges with all amendments, but was also very high on the natural beach ridges with all amendments. Continued monthly monitoring will verify the observed trends and provide guidelines for which amendments most benefit seedling growth.

SURFACE STABILIZER

This pilot project evaluated a salt-based surface stabilizer, magnesium chloride (MgCl2). Magnesium chloride is a widely available and relatively inexpensive product that can absorb and retain moisture from the air and soil subsurface, thus reducing erosion. The project evaluated a range of MgCl2 application rates on several playa surfaces. Results demonstrated MgCl2 is a suitable dust control measure for the Salton Sea playa. It will be particularly useful in isolated areas prone to emissions and in areas that require minimal dust control infrastructure due to alternative land uses (e.g., geothermal). In addition, it can provide quick, effective control to prevent the spread of dust source areas while more permanent dust control measures are planned.



7 **Vegetation Enhancement.** Seedling density at 52-55 days after sowing (3-4 January 2017) in each treatment at each site. Based on 3-way ANOVA there is not a significant treatment x site interaction (P=0.386). The effects of the treatments are similar at all three sites. Significant differences (P < 0.001) among treatments are indicated with different letters.



8 Site layout for the **Field Scale Pilot Study.**

FIELD SCALE PILOT STUDY

Field scale pilot studies provide experience scaling, adapting, and combining dust control measures at a larger scale. In early 2017, a series of field scale pilot studies will be implemented on approximately 800 acres around the Sea. Sites were selected based on known, priority dust source areas identified during the 2015/2016 dust season. The site design is based on emissions, soils, and topographic data. Surface roughening will occur in finer soils and vegetation will be seeded in coarser soils. Erosion modeling results informed the spacing for each vegetated furrow set (**Figure 8**). Topographic data informed design of the irrigation system, which is necessary to reclaim the soils and support vegetation establishment. Sand motion monitoring equipment will include sand catches and Sensits.

FUTURE PILOT STUDIES

Planning is underway for several additional field scale pilot studies in 2017-2018. Currently anticipated studies include the following:

- **Vegetation Enhancement.** This study will expand the existing study on more natural beach ridges and engineered beach ridges around the Sea.
- **Vail Drain.** This study will evaluate how to maximize the amount of stabilized playa per direct drain by establishing native hedge rows.
- **Salton City (Tule) Wash.** This study will evaluate different type of barriers and cover to minimize sand motion and migration onto the playa.
- **Surface Surfactant.** This study will evaluate a variety of surface stabilizers to quantify their effectiveness in controlling wind-blown dust.

For more information on IID's Salton Sea Air Quality Mitigation Program, please visit www.iid.com/airquality.

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