DUST KINGDOM

Landscape Architecture in the Sonoran Desert

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WHY SHOULD LANDSCAPE ARCHITECTURE BE PART OF THE DUST CONVERSATION?

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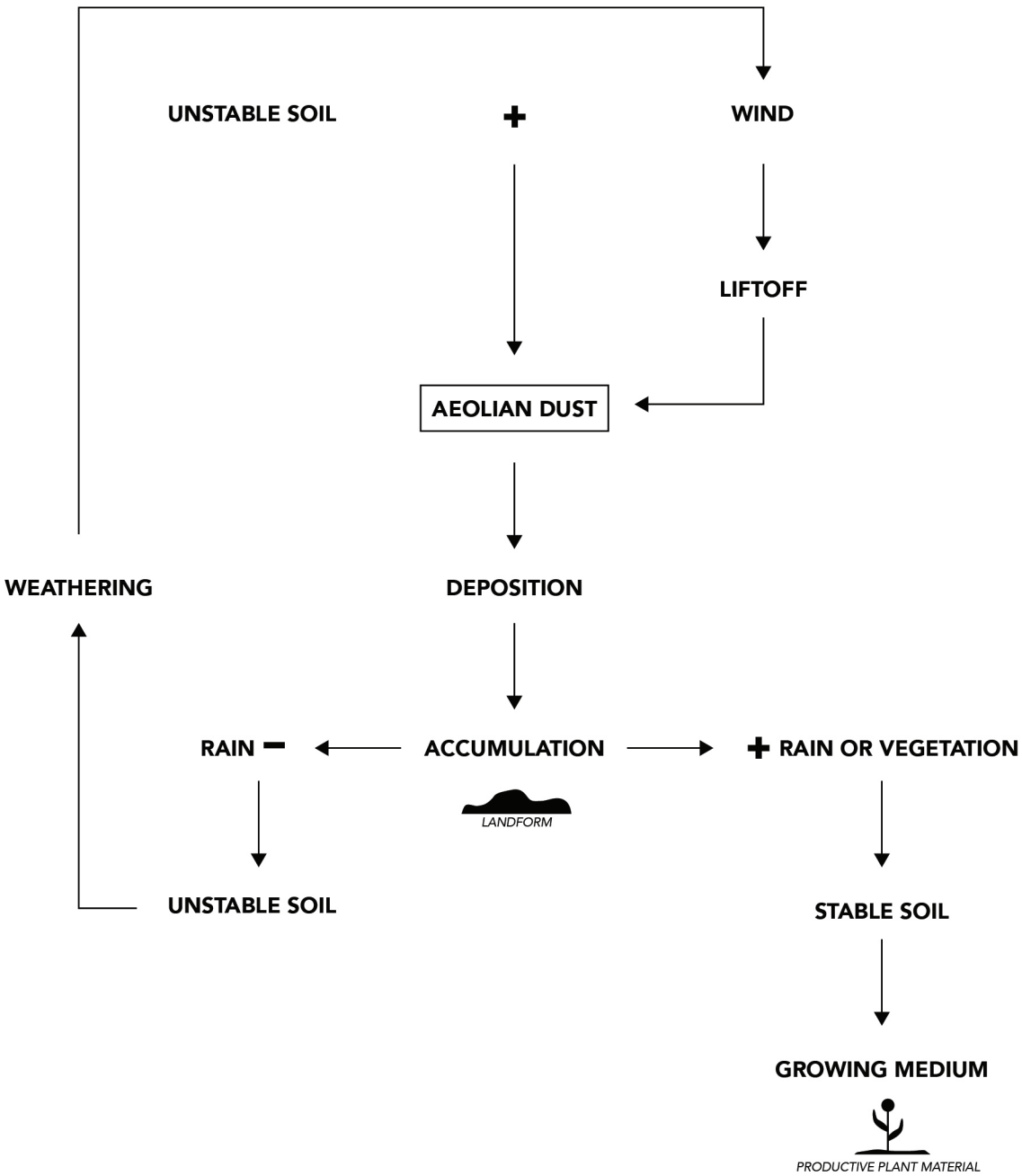
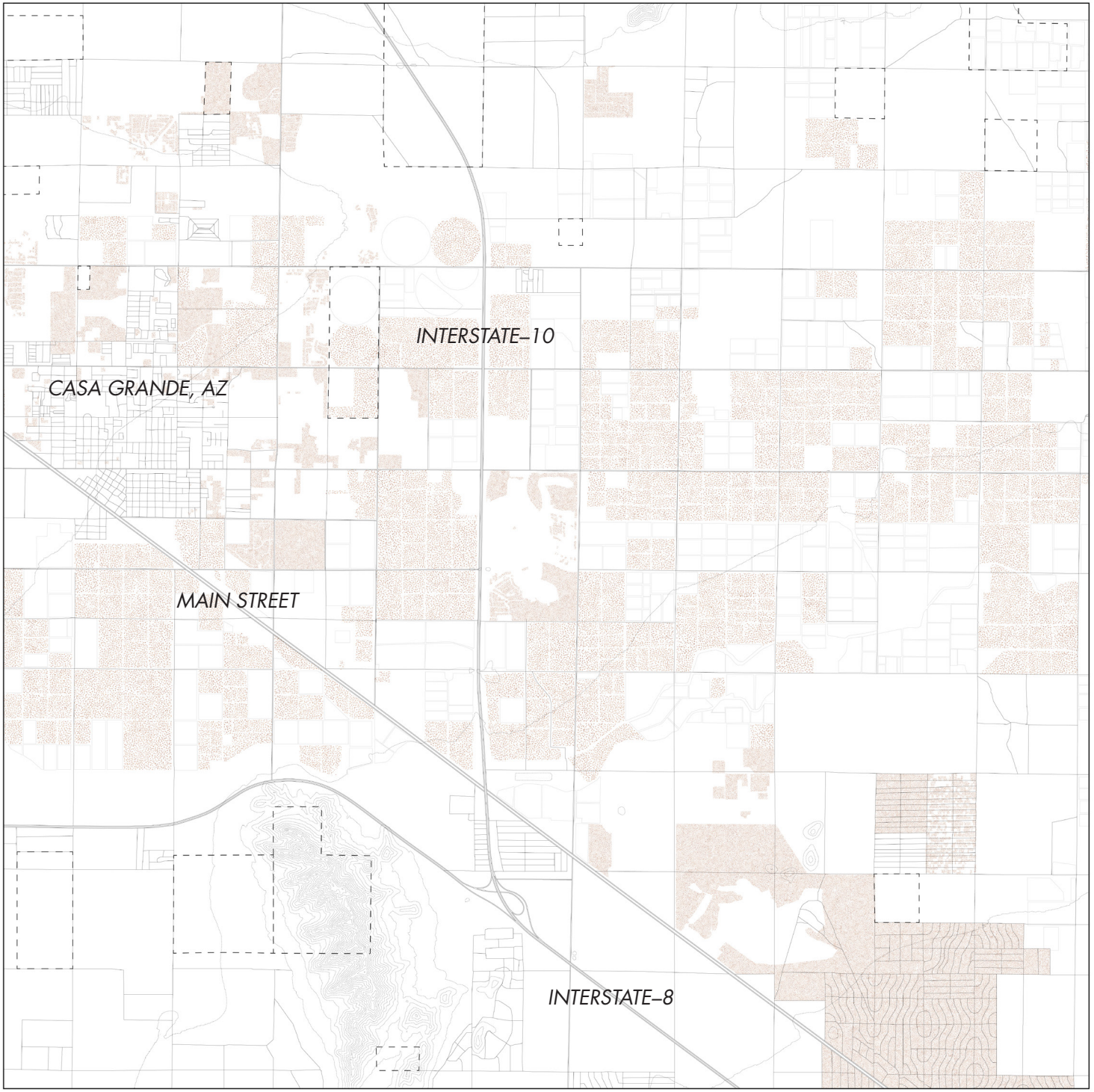
The field of landscape architecture promotes methods to incorporate experiential and aesthetic qualities into already-existing dust mitigation and awareness strategies.


HABOOB
FOHN
BRICKFIELDER
SIMOOM
HABOOB
CALIMA
SCIROCCO
CHERGUI
KHAMSIN
GHIBLI
SCIROCCO
HABOOB
SIMOOM
HABOOB
HABOOB
KHAMSIN
FOHN
SIMOOM
SHAMAL
KALI ANDHI
ZONDA
FOHN
Atlantic Ocean
GREECE
TURKEY
IRAQ
AFGHANISTAN
PAKISTAN
MALI
NIGERIA
ETHIOPIA
SOMALIA
AUSTRALIA
WIND
rebounding saltating grain
impacting saltating grain
ejecting reptating grain
reptating grain
N
S
60°
30°
0
SUB-POLAR LOW
westerlies
SUB-TROPICAL HIGH
trade winds
NORTH POLE
SOUTH POLE
WIND DEFLECTION TO RIGHT IN NORTHERN HEMISPHERE
EARTH'S ROTATION
300 TAU
60 TAU
DENSITY OF DUST IN ATMOSPHERE
TYPES OF DUST GRAINS MOTION


UNSTABLE SOIL
+
WIND
LIFTOFF
AEOLIAN DUST
WEATHERING
DEPOSITION
RAIN −
ACCUMULATION
+ RAIN OR VEGETATION
LANDFORM
UNSTABLE SOIL
STABLE SOIL
GROWING MEDIUM
PRODUCTIVE PLANT MATERIAL

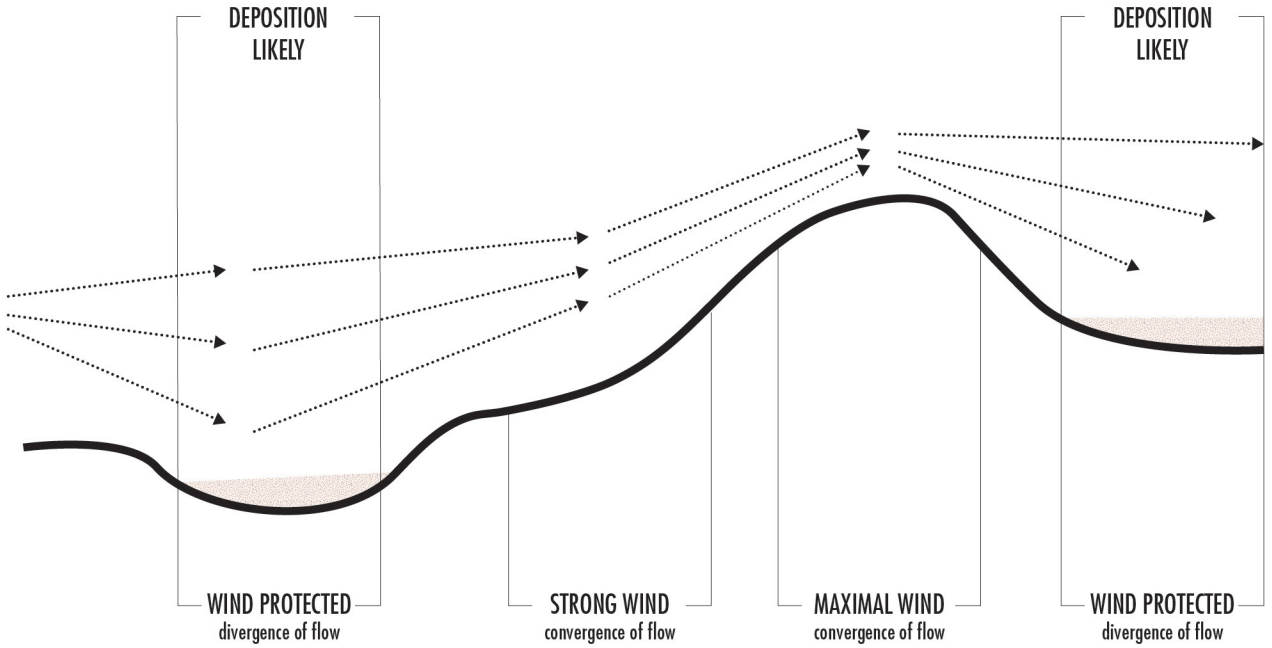

INTERSTATE–10
CASA GRANDE, AZ
MAIN STREET
INTERSTATE–8

DESIGN INTERVENTION

A. encourage dust deposition

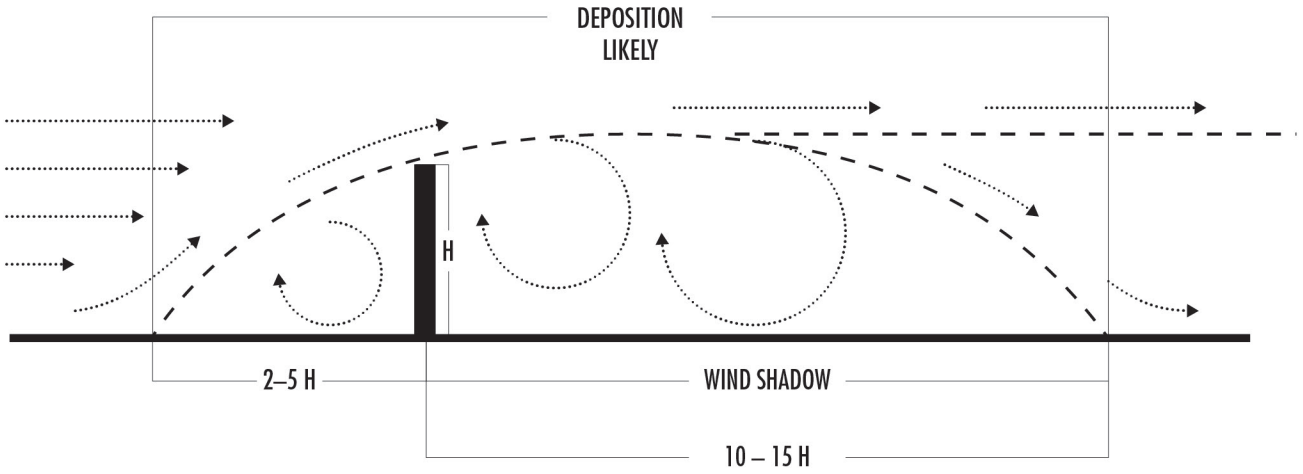
B. stabilize the ground

encourage deposition:
CHANGE TOPOGRAPHY



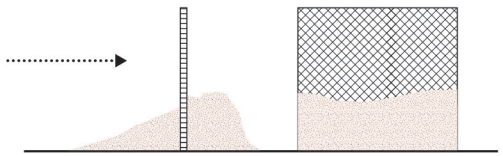
ACCUMULATION of FINE PARTICLES in LEE of OBSTACLE
WHERE VELOCITY is REDUCED

encourage deposition:
BUILD AN OBSTACLE



SOLID FENCE

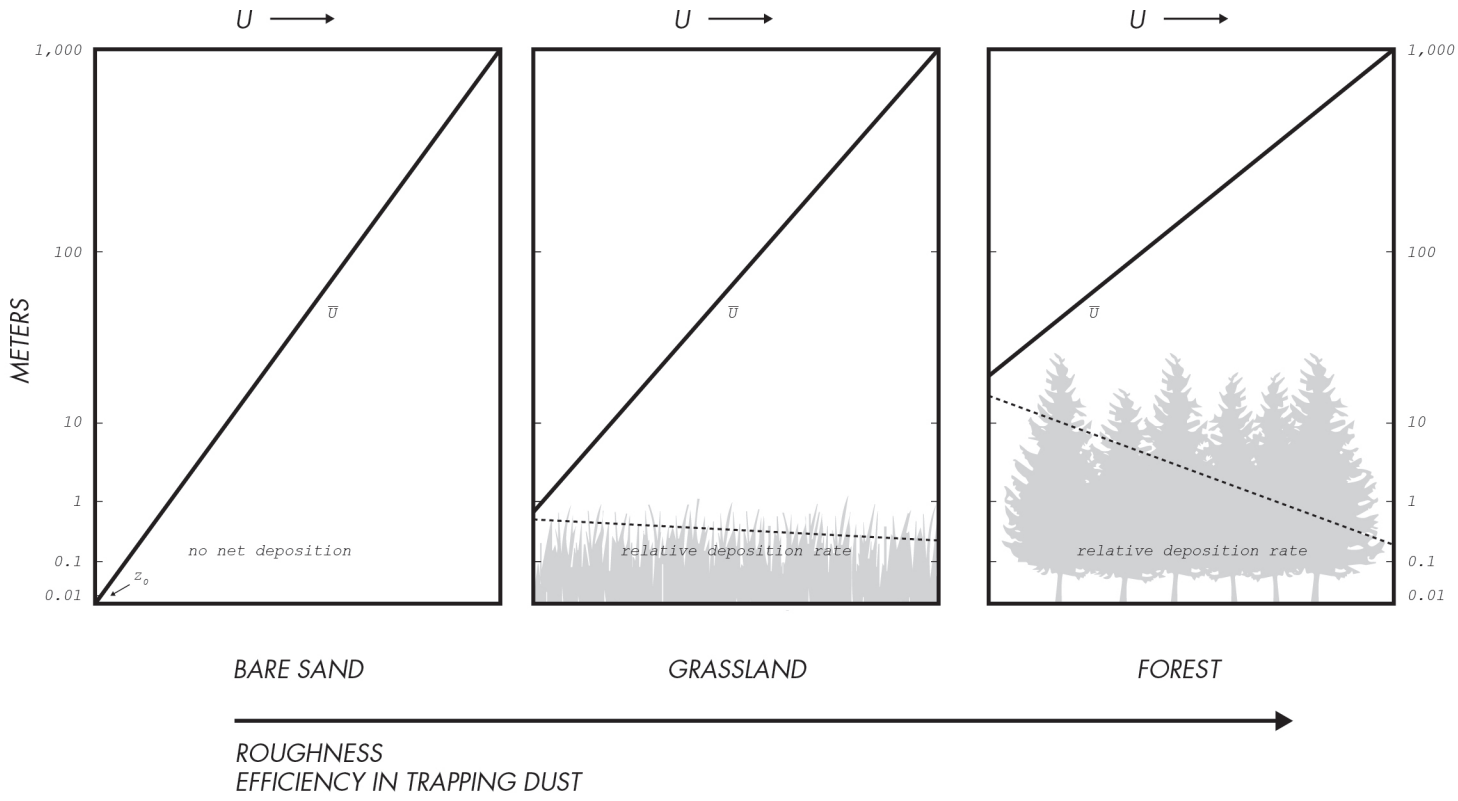
accumulation of material
only on upwind side



POROUS FENCE

accumulation of material
on both sides; more on downwind side

encourage deposition:
CHANGE THE “ROUGHNESS”



stabilize ground:
PERENNIAL PSAMMOPHILES
germinated in response to rainfall > 10mm
reach greater soil depths than other plants

ASTRAGALUS MAGDALENAE VAR. PEIRSONII
Peirson's milkvetch

+ dicot, perennial herb
+ native to Arizona, California, Baja Mexico
+ bloom: December – April (purple)
+ grows at 40 – 250 m elevations



HELIANTHUS NIVEUS SSP. TEPHRODES
Algodones dune sunflower

+ dicot, perennial herb
+ native to Arizona, California, Sonora Mexico
+ bloom: September – May (yellow)
+ grows at 50 – 300 m elevations



PALAFOXIA ARIDA VAR. GIGANTAE
giant Spanish needle

+ dicot, annual / perennial herb
+ native to Arizona, California
+ bloom: February – May (purple, white)
+ grows at 40 – 140 m elevations

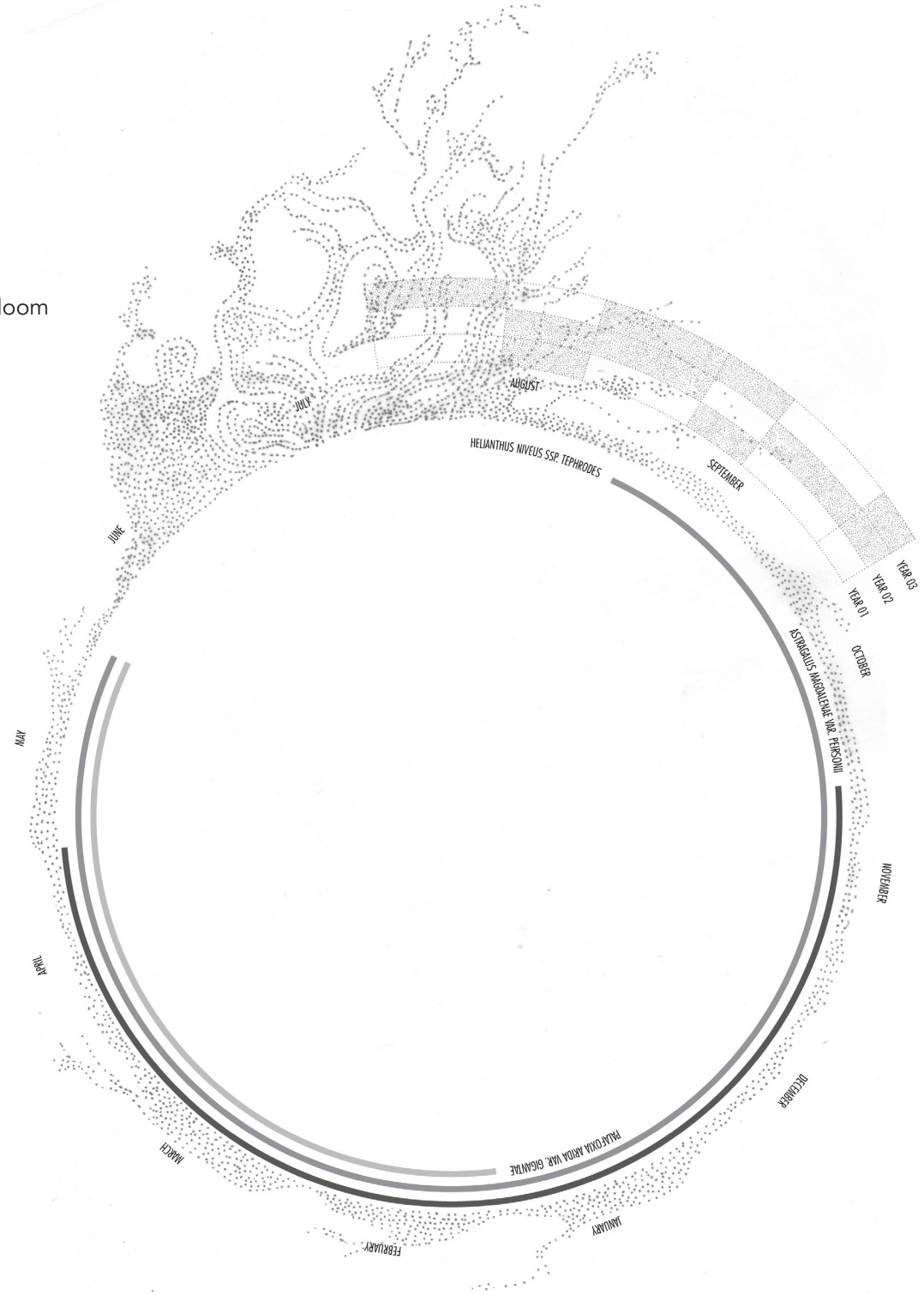


"Seedling Emergence on Sonoran Desert dunes"
Janice E. Bowers
Journal of Arid Environments
Vol 33; Issue 1 (May 1996) 63-72

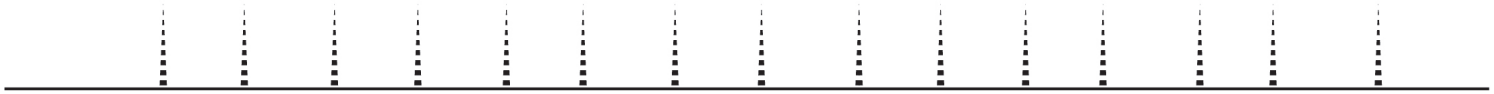
seasonal / yearly rotations

June – August : peak dust storm
September – May : Algodones dune sunflower bloom
December – April: Peirson's milkvetch bloom
February – May : Giant Spanish needle bloom

** Dust source : Cleared lands + croplands
seasonal & yearly rotations

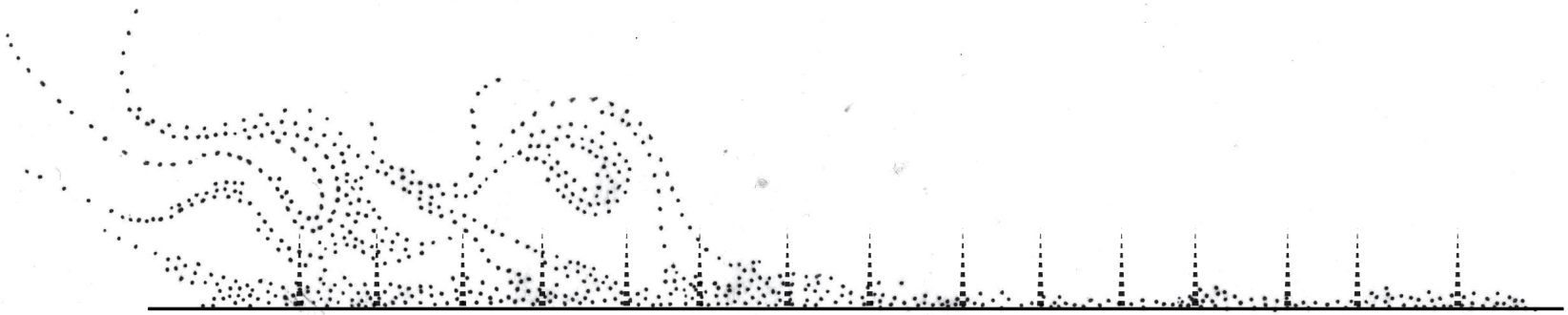


staged design intervention
synced with rotations



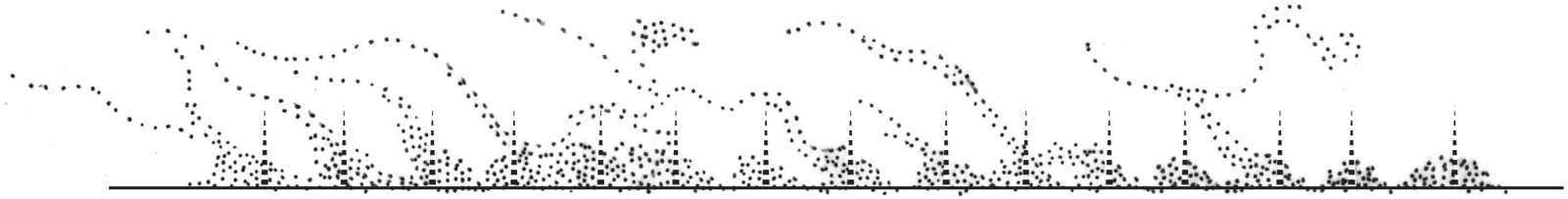
SEEDED FIELD OF PSAMMOPHILE PERENNIALS

staged design intervention
synced with rotations



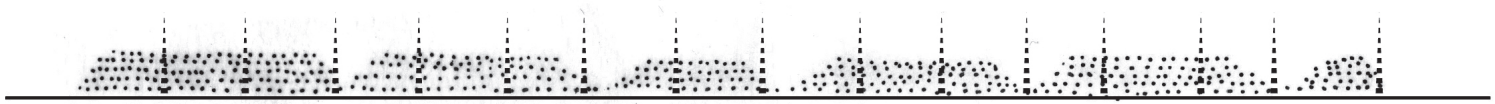
DUST SINK

staged design intervention
synced with rotations



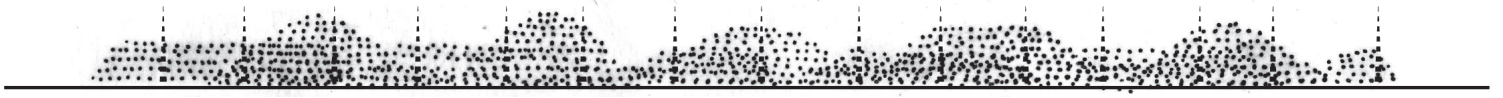
SEEDED FIELD ACCUMULATES DEPOSITION

staged design intervention
synced with rotations



STAGE 01: STABILIZED DUNE

staged design intervention
synced with rotations



STAGE 02: STABILIZED DUNE, INCREASED SIZE / QUANTITY

STABILIZED DUNE SYSTEMS:

A. create a new topographic identity for the region and thus, slows the wind and decreases the strength of the storm (MITIGATION)

B. register the phenomenon of dust storms in the Sonoran Desert and thus, a new experience moving through the region (AESTHETIC)

C. become a didactic tool, bringing awareness to the dust storm and the movement of material through the region