



# Vegetation Restoration in the Eagle Ford Shale Oil & Gas Play

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## Abstract

Since exploration activities began in the Eagle Ford Shale (EFS) of South Texas in 2008, we have worked with landowners and oil and gas industry members to test restoration techniques and develop guidance for implementation. We have studied the use of various seed sources, available planting techniques, as well as the influences of site handling, weather, ecological sites, and disturbance intensity on revegetation success. Key findings to date are illustrated below. Work to promote and advise native plant restoration activities in the EFS will continue, given exploration activities are expected to continue for the next 50 years, with potential impacts spanning enormous portions of the biologically unique ecosystem of South Texas.

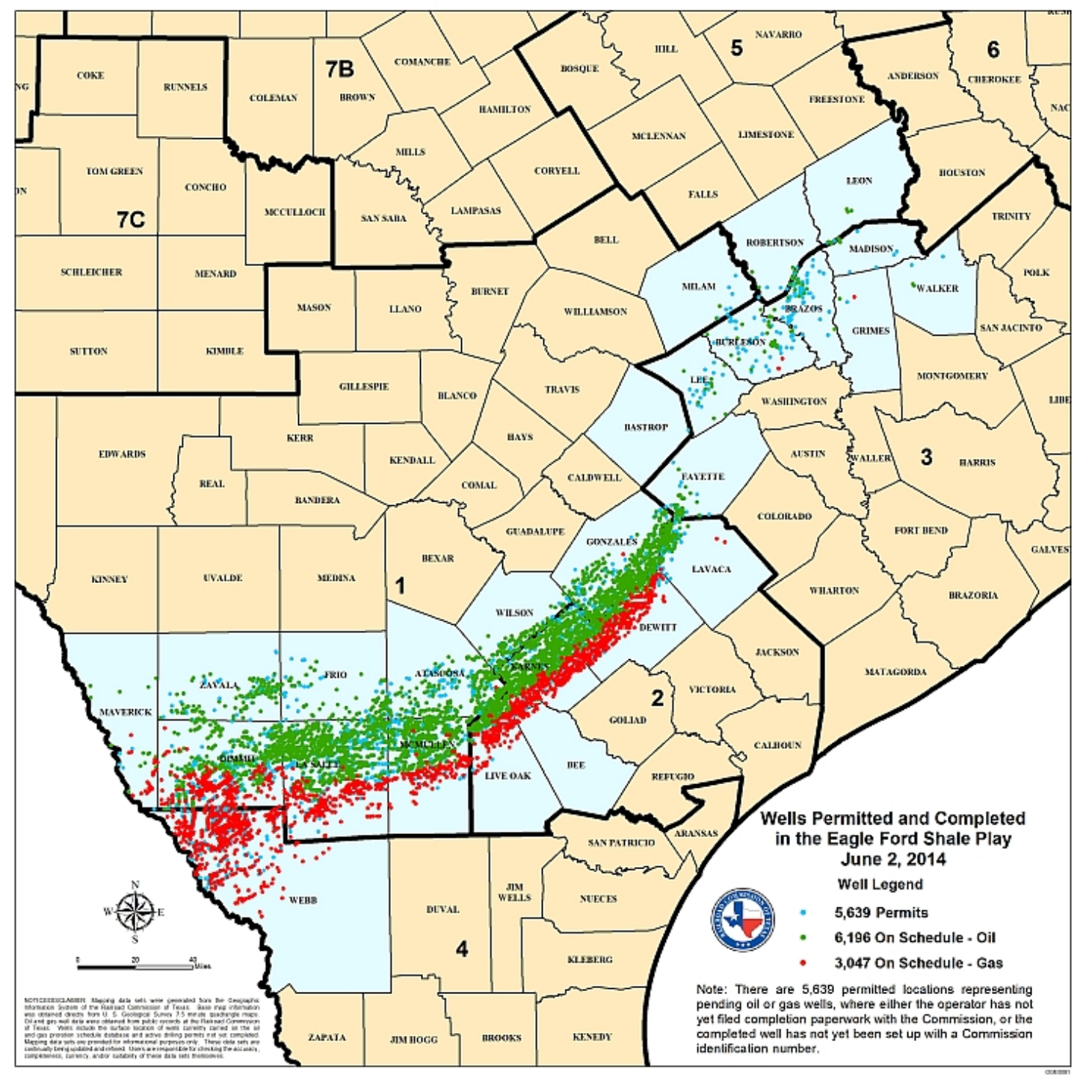
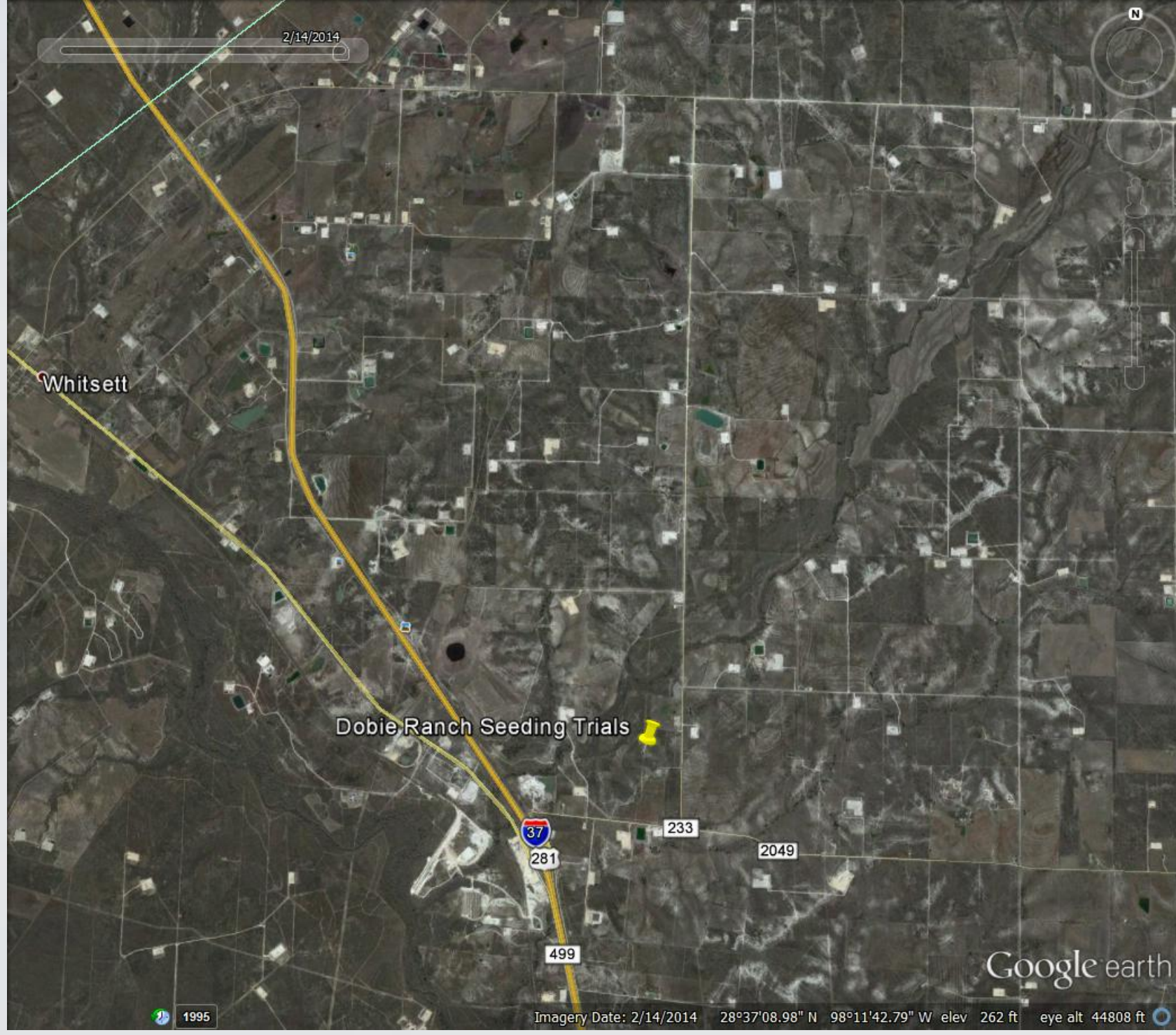
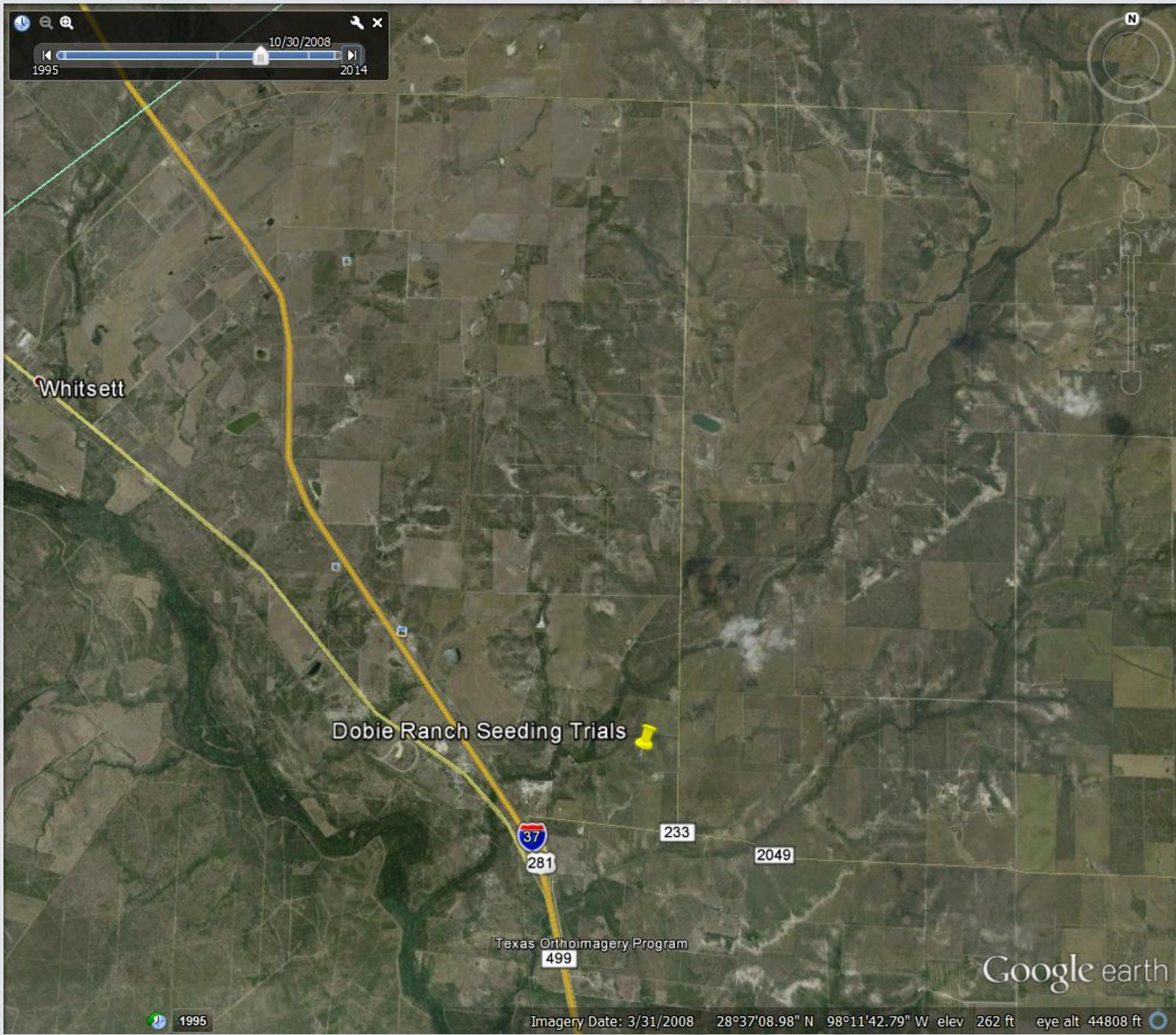


Figure 1. The Eagle Ford Shale oil and gas play of Texas.



Figures 2 and 3. Sample of change in the landscape as a result of Eagle Ford Shale exploration and production activities from 45,000'ft. aerial perspective. White pads are drilling sites, and white lines represent new roads. Linear disturbances are pipeline rights of way.



Figures 4-7. Examples of native habitats impacted by Eagle Ford Shale activities.



Figures 8-11. Examples of native habitat disturbance in the Eagle Ford Shale. Clockwise from top left, pipeline right of way, frac pond, seismic road, and drilling/processing facility location.

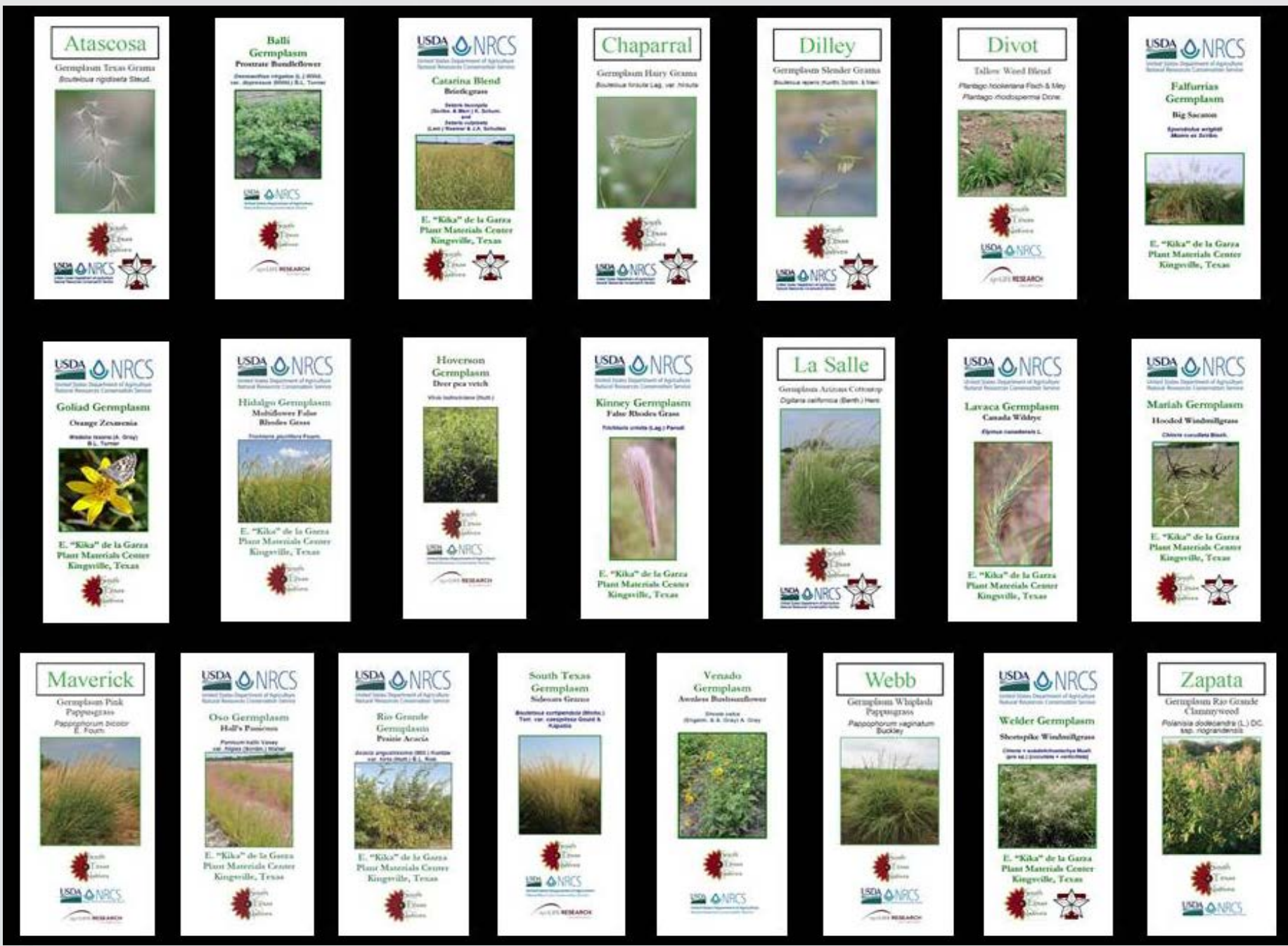


Figure 12. Ecotypic native seed sources selected by the *South Texas Natives* Program and USDA NRCS E. "Kika" de la Garza Plant Materials Center that are commercially available for use in restoration activities in Eagle Ford Shale of South Texas.



Figure 13. Restoration success using ecotypic native seeds (left) out-performed the use of non-ecotypic native seeds (right).



Figure 14. Drought has had little impact on >3 yr. restoration success using appropriate ecotypic native seeds.



Figure 15. Ecological site did influence relative restoration success, whereas some sites are easier to reclaim than others.



Figure 16. Planting method had no effect on successful revegetation-drill, broadcast, and hydro seeding are effective.



Figure 17. Previous use of sites for fracking has had little impact on our ability to successfully restore native plants.



Figure 18. Historic pad sites (>30 years since drilling) were easily restored to natives.



Figure 19. Grazing by livestock had no effect on >3 yr. restoration success of native plants to small pad sites in large pastures.



Figure 20. On recent fracking sites, up to 22 species of native plants were successfully established with no difficulty.



Figure 21. Hydro mulching sped up revegetation of saline sites.



Figure 22. 25 species seed mixes outperformed 10 species mixes.



Figure 23. Seed mix richness correlated with restoration success.



Figure 24. Hydroseeding was very effective for frac tank revegetation.

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