

Evaluating Coastal Protection Services Associated with Restoration Management of an Endangered Shorebird in Oregon, USA

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- *Ammophila arenaria* has increased coastal protections by building foredunes higher and wider than native dune grass.
- Lowering foredunes by removing *ammophila* increases the likelihood of wave over topping many fold.
- Habitat conversions can sometimes have unintended consequences for other coastal protection services.
- Maximizing coastal protection becomes increasingly important given the predictions of sea level rise and increased storm events.
- Costs associated with replacing “soft defenses” (vegetation) with hard structures (rock) is extremely expensive.
- Establishment of Habitat Restoration Areas (HRAs) has led to some concerns about their influence on other native species.
- Lowering of foredunes increased HRAs vulnerability to flooding and dune retreat.
- Prograding (growing seaward) *ammophila* shorelines have lower vulnerability than shorelines moving inland.
- Spits with estuaries immediately behind them limit the migration of open habitat inland.
- Management activities need to consider long term implications of climate change and increased storm effects to coastal protection services.
- Economic and environmental impacts could be considerable.