ES of exploited GDEs:

- clean water supply
  - irrigation
  - municipal supply
- economic gain

[*loss of unexploited ES*]

Ecosystem Services of unexploited GDEs:

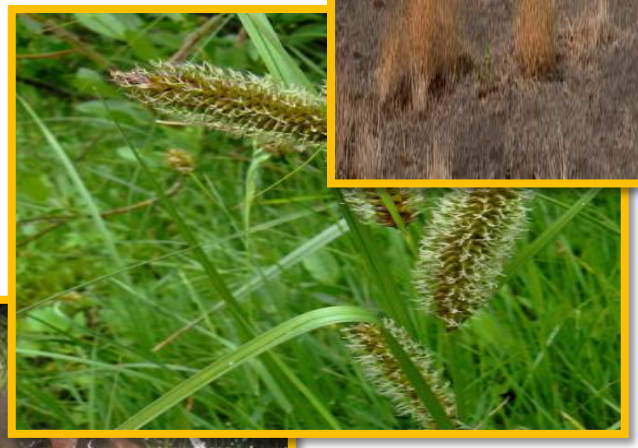
- habitat for rare & endemic species
- headwater regulators
  - hydrology
  - sediments
- carbon stores

from Springer and Stevens 2008

Increasing groundwater pumping

ecosystem drying
and degradation

loss of structural species



peat drying and oxidation

loss of sensitive species

species & ecosystem intact

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Balancing the Ecosystem Services of exploited and unexploited GDEs

<u>Environmental flows and levels</u> describe the quantity, quality, timing and range of variability of water flows and levels required to sustain or restore freshwater and estuarine ecosystems and the functions and services they provide

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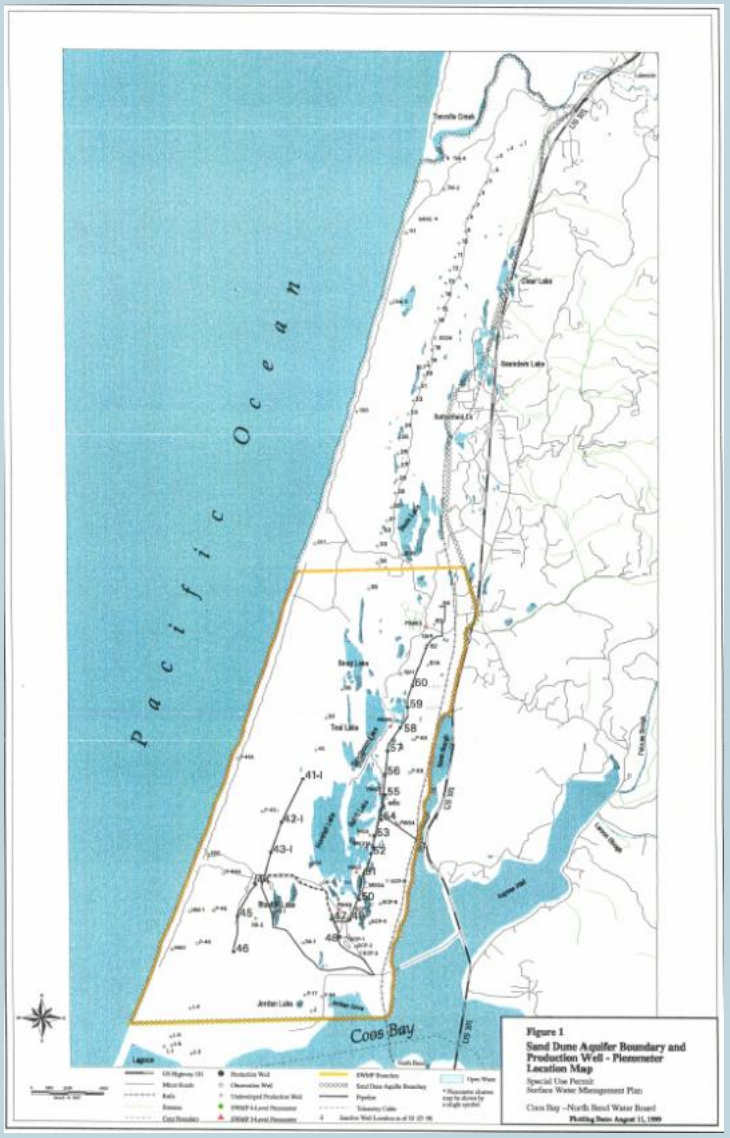
Interdunal wetlands in the OR Dunes NRA Siuslaw National Forest



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Challenges of EFL

1. Easier to quantify ecosystem services of exploited GDEs than protected GDEs
2. Quantifying thresholds of change is difficult, especially for poorly-understood GDEs; thresholds may be site-specific
3. What is an acceptable level of change?
4. EFL projects can be time and resource-intensive