Establishing Native Plants in Crested Wheatgrass Stands Using Successional Management

EOARC
A Vision for Rangeland & Pasture Research

USDA ARS

Crested Wheatgrass

- Introduced to North America in 1898
  - Used to
    - Stabilize soils
    - Livestock forage
    - Prevent weed invasion
- Currently occupies more than 5 million hectares

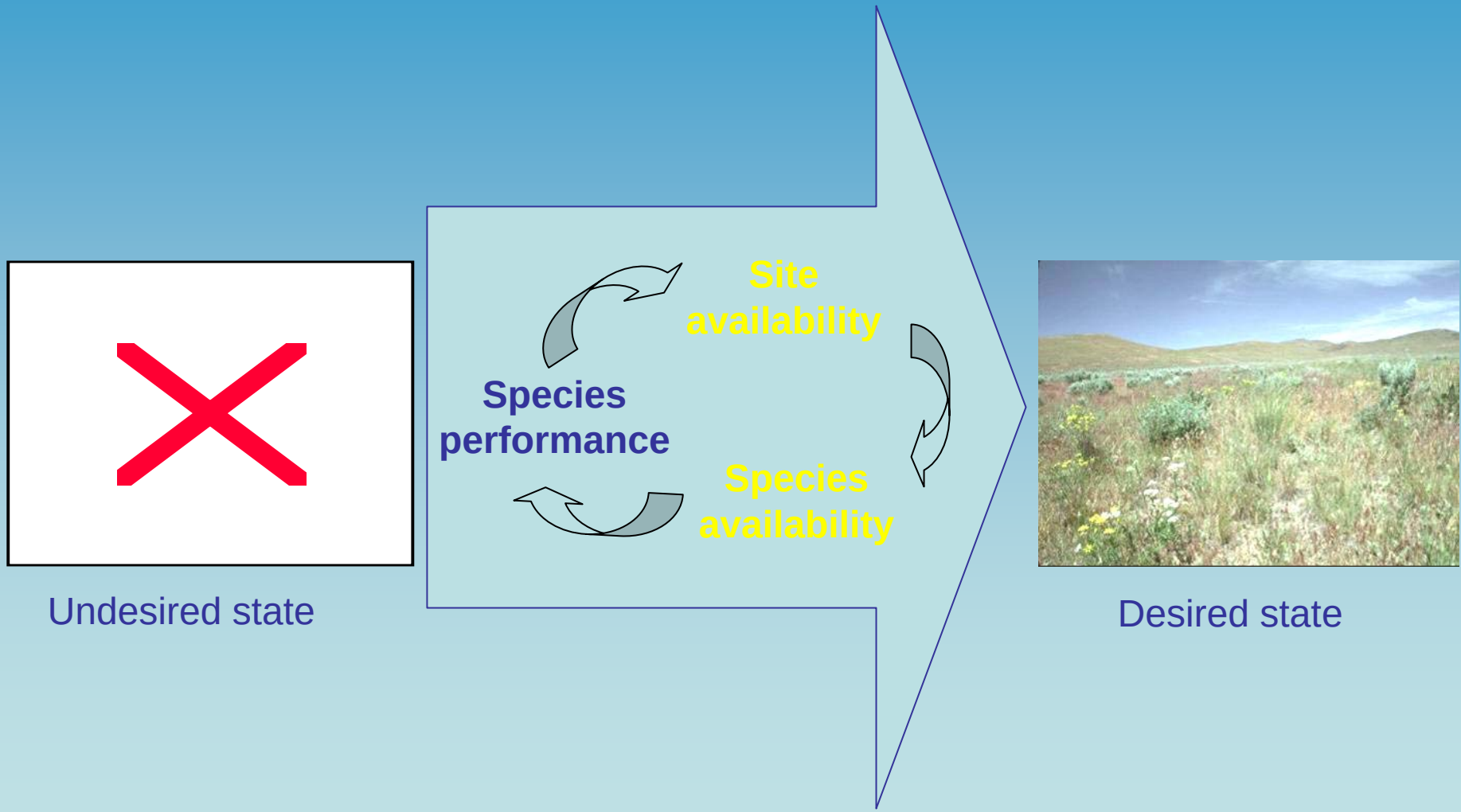
So what's the problem?

- Once established, crested wheatgrass quickly dominates the seed bank and limits growth of native species
- Without seeding native species, chances for recruitment in crested wheatgrass stands are extremely low
- To re-establish diversity:
  - Deliberate introduction of desired species is required
  - Crested wheatgrass plants and propagules must be destroyed

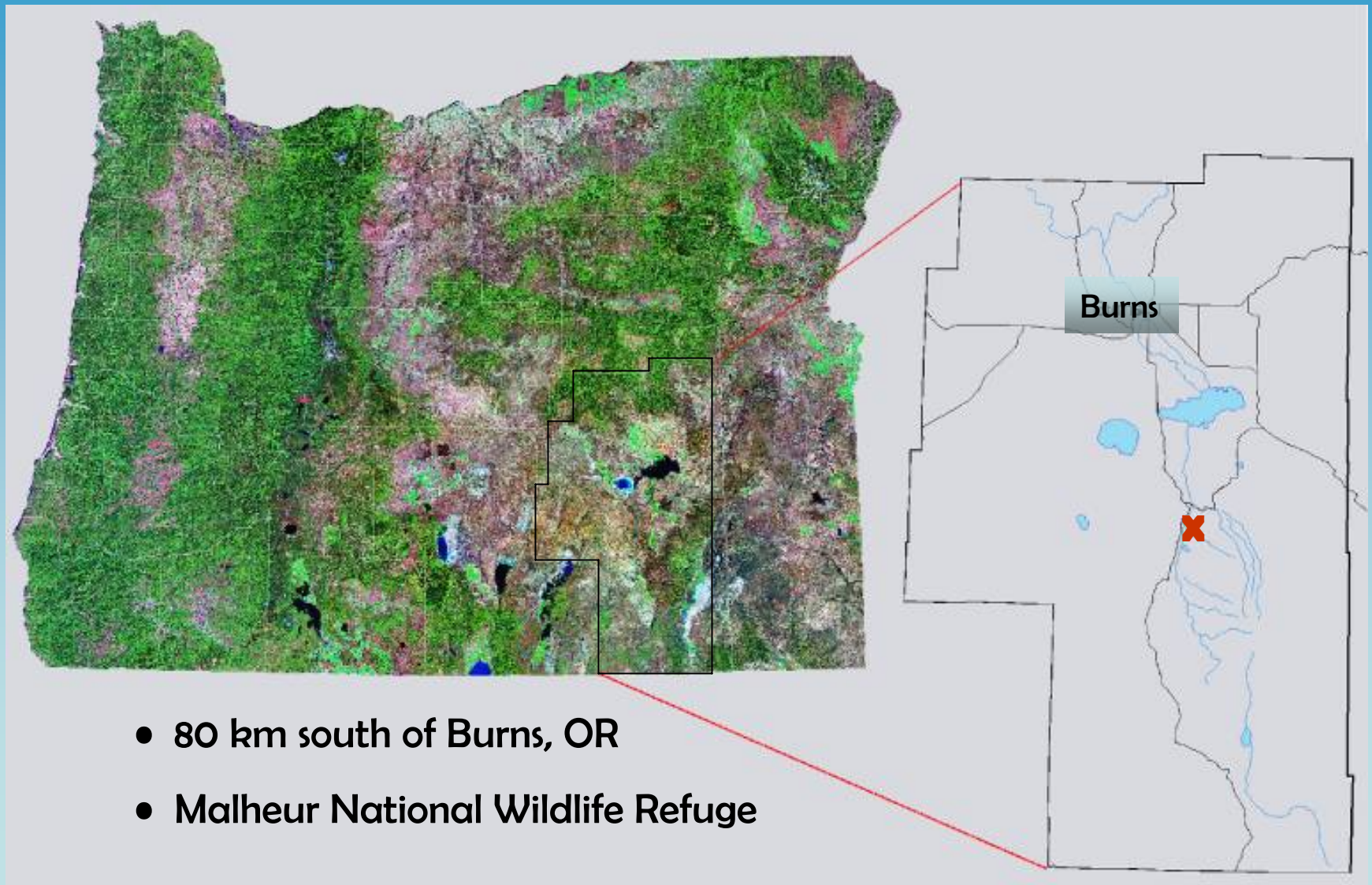
Why increase diversity?

- Improves resource capture and cycling
- Increases resilience and resistance to disturbance
- Provides better wildlife habitat (esp. sagebrush obligate species)
  - Sage-grouse
  - Pygmy rabbit
- More options for livestock grazing

Successional Management



Study Site



- 80 km south of Burns, OR
- Malheur National Wildlife Refuge

6/23/05

Controlling Crested Wheatgrass (Site Availability)

- Herbicidal
  - 1.2 L ha^{-1} (10 oz ac^{-1}) glyphosate (partial control--PCH)
  - 4.8 L ha^{-1} (44 oz ac^{-1}) glyphosate (full control--FCH)
- Mechanical
  - One pass with disk (partial control--PCM)
  - Two passes with disk (full control--FCM)
- Undisturbed (UD)

Introducing Native Species (Species Availability)

- Seeded plots Oct. 31-Nov. 1, 2005 and 2006, with Truax Rough Rider no-till drill

Native Seed Mix

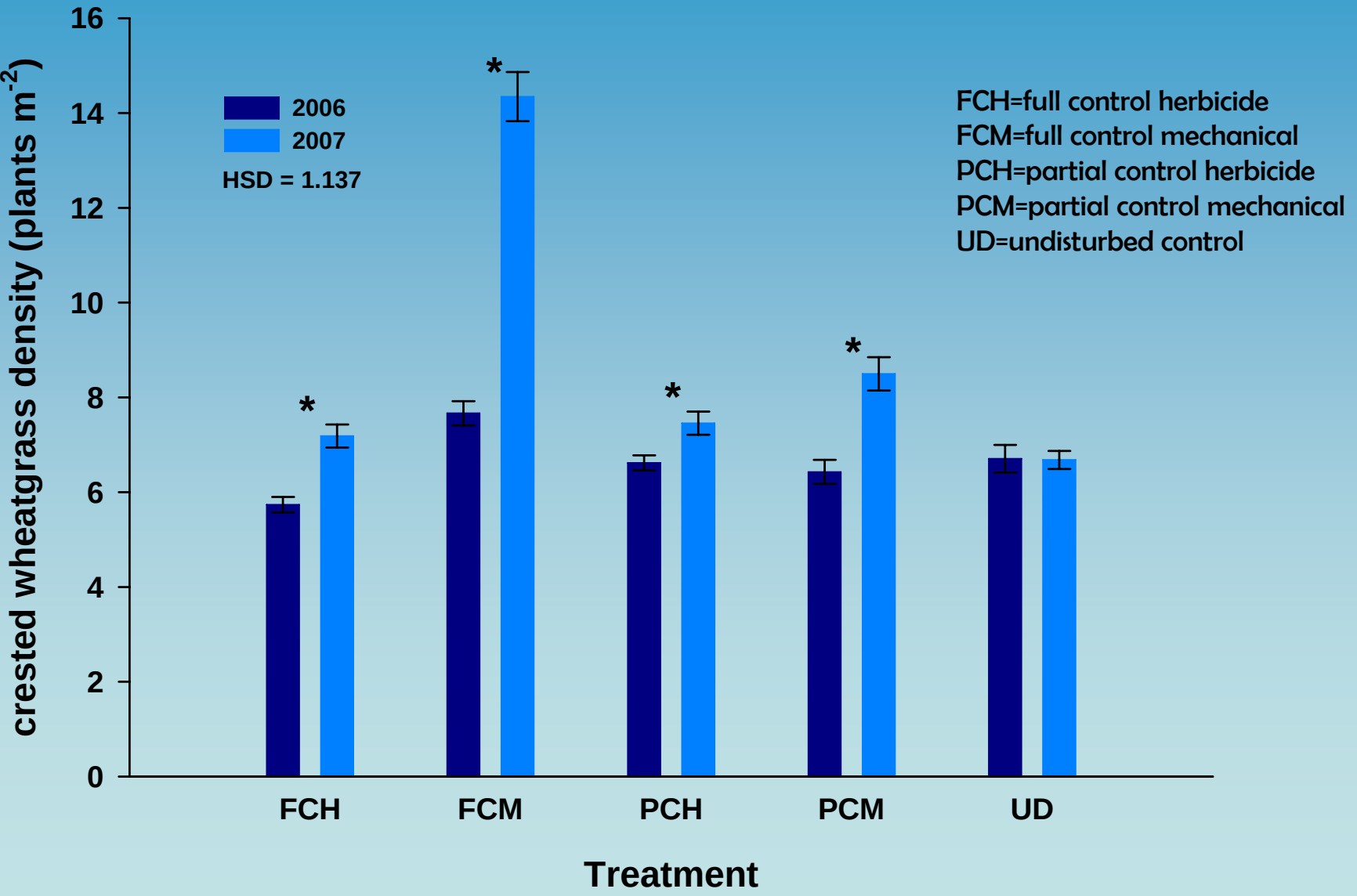
- 4 grasses
  - bluebunch wheatgrass
  - Sandberg's bluegrass
  - Indian ricegrass
  - squirreltail
- 3 forbs
  - western yarrow
  - Lewis flax
  - Munro globemallow
- 3 shrubs
  - Wyoming big sagebrush
  - four-wing saltbush
  - white-stemmed rabbitbrush

Procedures

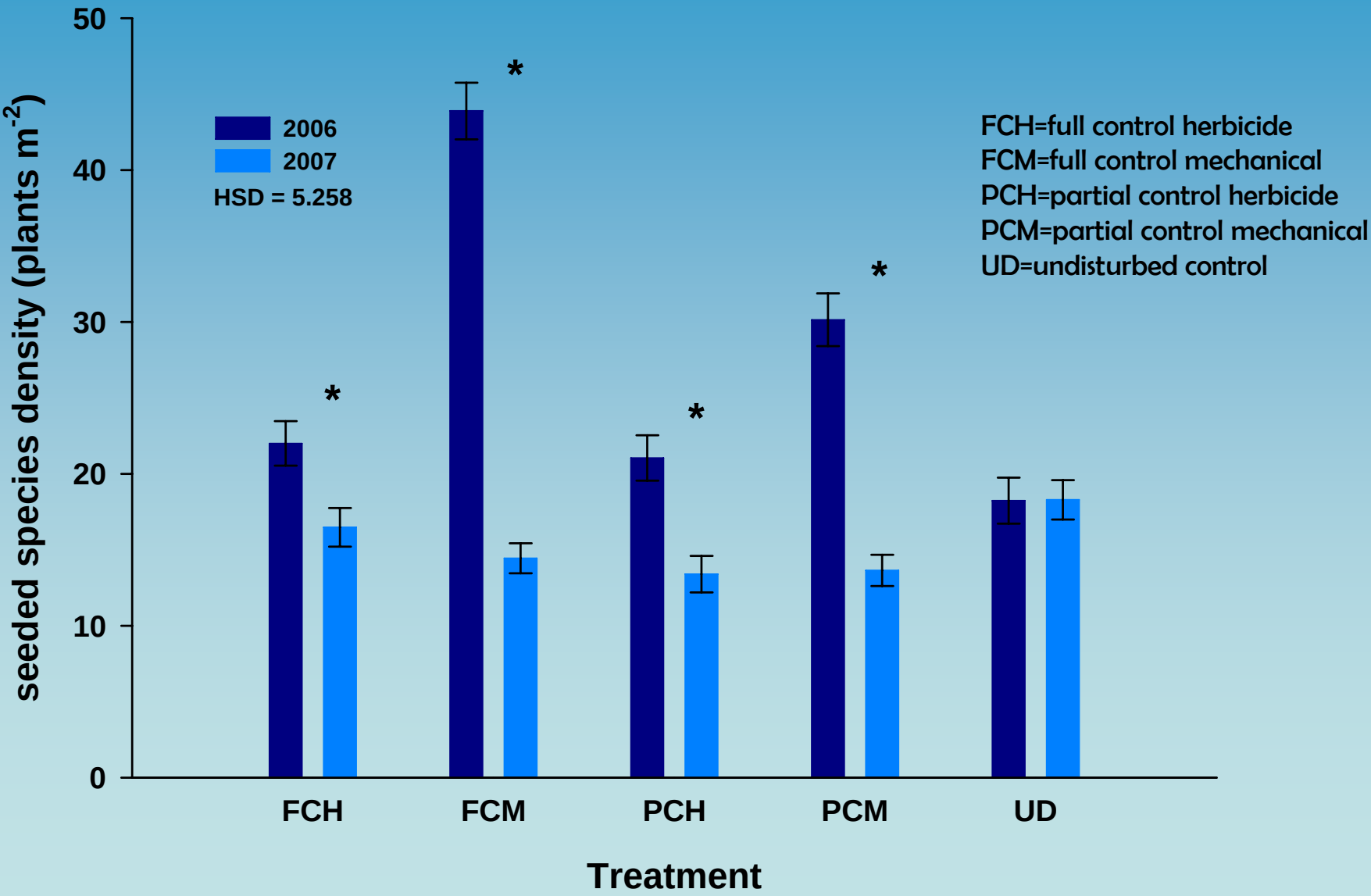
- Treated/seeded set of plots in 2005
  - Sampled 2006 and 2007
- Treated/seeded set of plots in 2006
  - Sampled 2007


Results

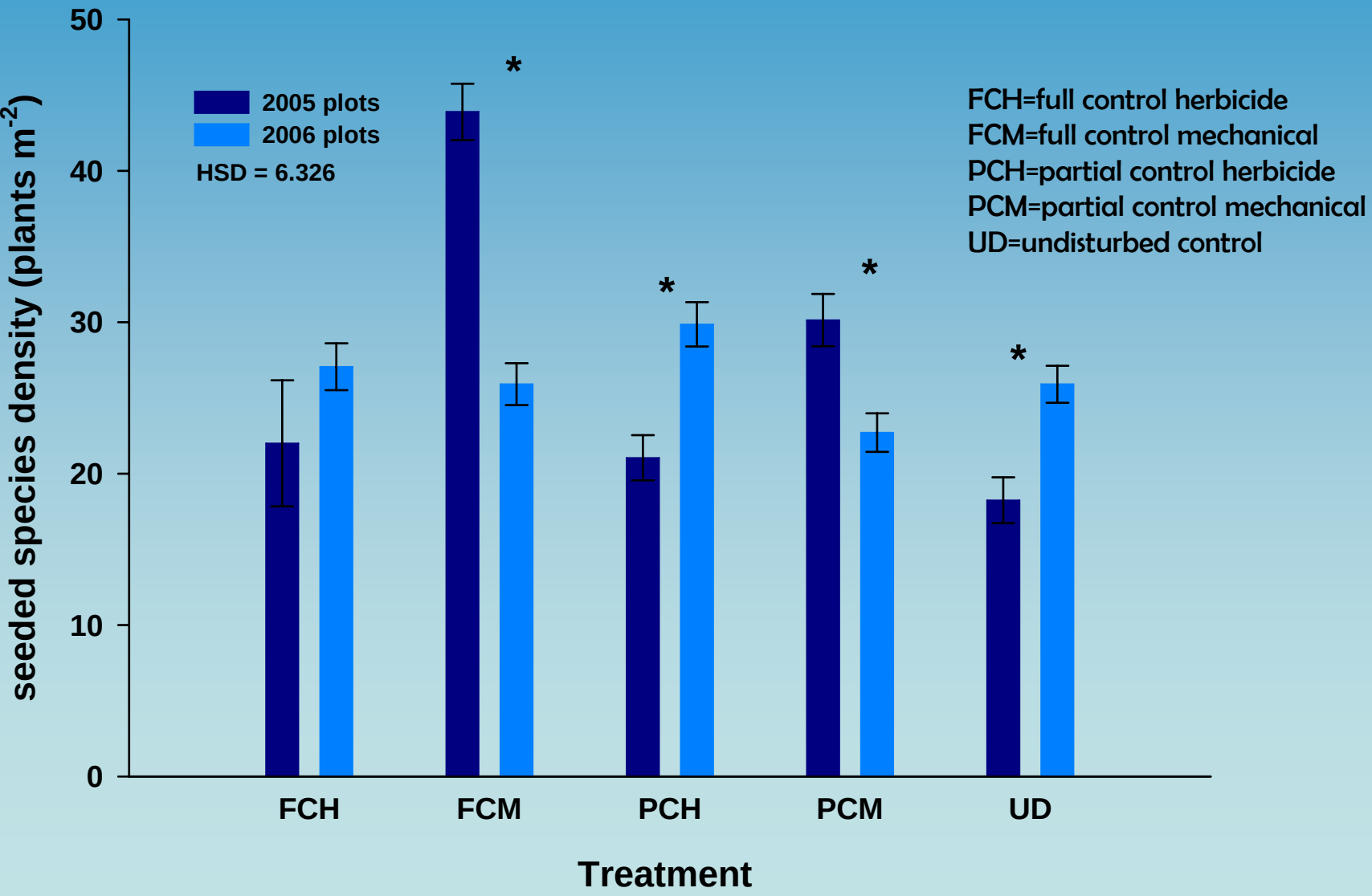
Crested Wheatgrass Density--2005 Plots Compared across Two Growing Years



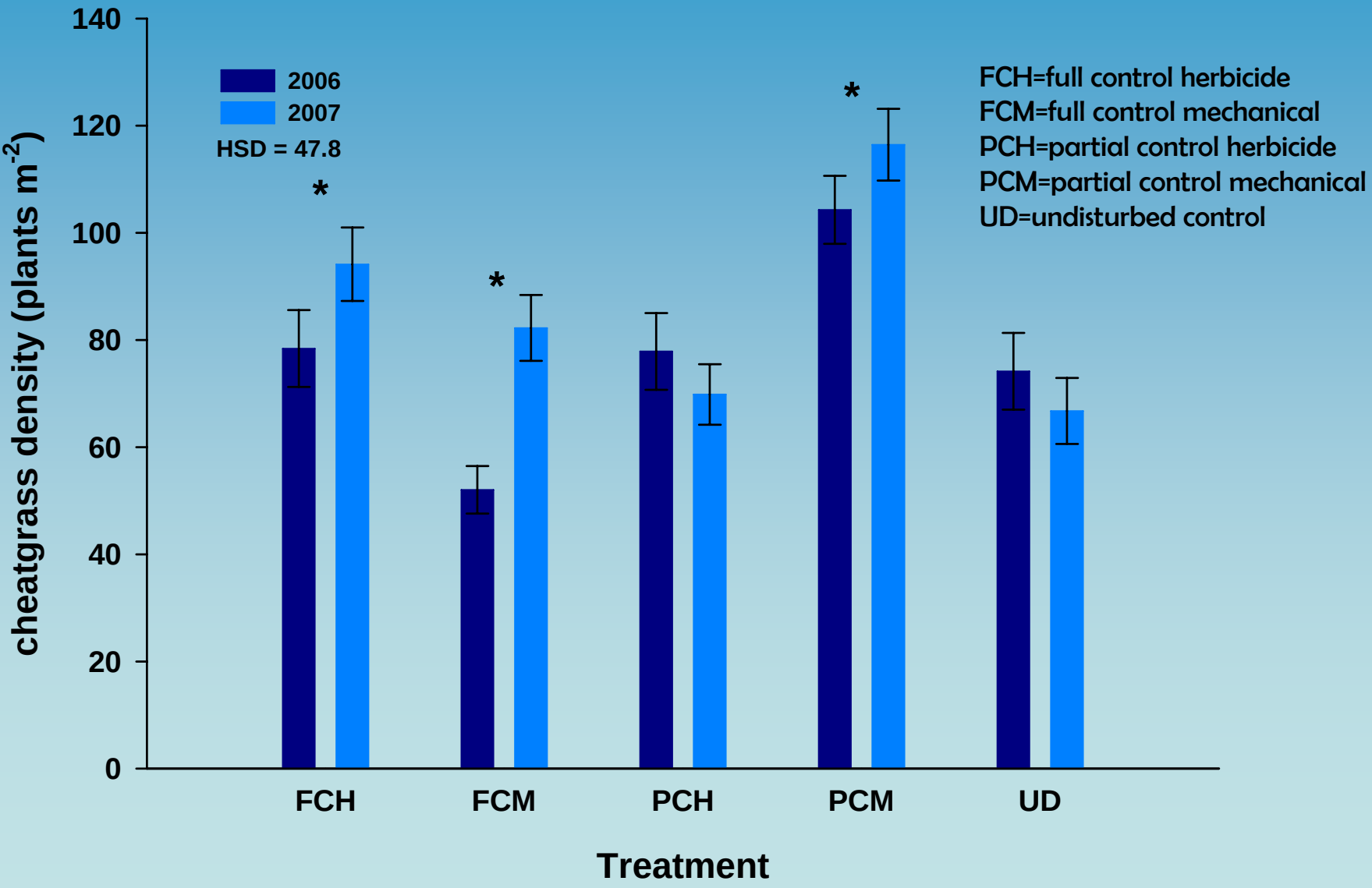
Seeded Species Density--2005 Plots Compared across Two Growing Years



Seeded Species Density--2005 and 2006 Plots Compared across Growing Year



Cheatgrass Density—2005 Plots Compared across Two Growing Years

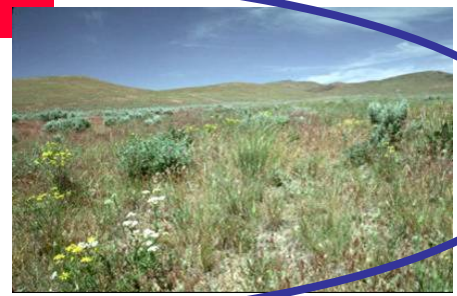


Summary of Results

- Crested wheatgrass
  - ↑ 2006 to 2007 except in UD (6-8 plants m^{-2})
  - mechanical control resulted in the highest densities
  - higher density in 2006 plots (~10 plants m^{-2}) than 2005 plots; disturbance treatments ineffective
- Seeded species
  - ↓ 2006 to 2007 except in UD
  - disturbance treatments initially increased seeded species density compared to UD, but after 2 growing years all treatments resulted in similar densities (15-18 plants m^{-2})
  - no difference in treatments in 2006 plots (~26 plants m^{-2})
- Cheatgrass
  - ↑ 2006 to 2007 except in PCH and UD
  - by 2007 PCM resulted in higher density than UD; all other treatments similar to UD
  - lower density in 2006 plots (~29 plants m^{-2}) compared to 2005 plots (~77 plants m^{-2})

- Establishing natives in crested wheatgrass is possible
- Site availability appeared adequate (~20% BG)
- Depleted seed bank--Must address species availability!!
- Potential increase in cheatgrass





"assisted succession" (Cox and Anderson 2004)

Cooperators

- USDA-Agricultural Research Service
- USDA-FS-Rocky Mountain Research Station
- USFWS-Malheur National Wildlife Refuge
- USDA-NRCS
- GBNPSIP

Questions/Comments