Two sides of the same coin...

Translocate  Eradicate

With one hand you giveth, and the other you taketh

John Morton
Kenai National Wildlife Refuge
11,174 non-native species in U.S.
Alaska = 563 / Hawaii = 5870 / Lower 48 = 6553

Alaska is warming 2–3 X faster than Lower 48!

Deer in Alaska

In response to concerns over mule and white-tailed deer entering Alaska, the Board of Game made it possible for hunters to harvest these deer in Units 1, 5, 11-13, 20, and 25 in closed season, no limit, any mule deer or any white-tailed deer. Hunters must contact the nearest ADF&G office prior to harvesting the deer, and must return the entire carcass, including the hide, to ADF&G. Providing the required specimens helps ADF&G learn more about these animals and conduct disease surveillance.

See page 4 for office contact information, or go online to http://hunt.alaska.gov.

More information on mule deer and white-tailed deer is available at http://alaska.gov/odpdyd.

Mule Deer

Does: 110-165 lbs
Bucks: 190-250 lbs
Distinguishing characteristics: bifurcated antlers - each beam forks (bucks); antlers are larger when compared to Sitka black-tailed deer, black tipped tail, and large, male-like ears. Not common in Alaska.

White-tailed Deer

Does: 100-160 lbs
Bucks: 190-225 lbs
Distinguishing characteristics: antlers that have one main beam with individual tines growing off of it (bucks); outside of tail is brown, and underside of tail is bright white and visible when nervous or fleeing. Not common in Alaska.

Sitka Black-tailed Deer

Does: 80 lbs
Bucks: 120-200 lbs
Distinguishing characteristics: bifurcated antlers - each beam forks (bucks); antlers are smaller when compared to mule deer; outside of tail is entirely black or dark brown, and the face is dark brown.


Photo Credit: Bureau of Land Management, U.S. Department of the Interior
Interagency effort to pioneer assessment of climate change effects on biome and species distributions using climate envelope models
How invasive species practitioners tend to think
How climate adaptation practitioners tend to think
By 2100...
...only 25% of Alaska remains biome refugia
So which species will compose novel assemblages in the dynamic systems?

The ones that are there when it's being assembled.
As systems ecologist Howard Odum advised the Biosphere 2 staff...

“shovel the species in, and let extinction sort it out”
By 2100...

- only 25% of Alaska remains as biome refugia
- Western Kenai transforms
- North Slope transforms

2099

Kenai Peninsula

North Slope
Extant species
Departing Alaskan species
Arriving Alaskan species


By 2100, >55% is **CONIFER**
- dry boreal wooded grasslands (28%)
- northern boreal coniferous woodlands (9%)
- mixed boreal forest (46%)

In 2000, 100% is **TUNDRA**
- tundra < 40% shrubs and no trees (23%)
- tundra but sparsely vegetated (35%)
- shrubland with open tundra (30%)

Predicting Future Potential Climate-Biomes for the Yukon, Northwest Territories, and Alaska. 2012. Scenarios Network for Arctic Planning and EWHALE lab, UAF
“Topographically mediated climate poses a strong environmental barrier (i.e., the Brooks Range) to species migration, causing a pronounced time lag \([1,000 \text{ years}]\) in forest expansion...Migration corridors (low mountain passes and river valleys) or \textbf{human introduction of trees} will be critical for successful northward movement of [\textbf{spruce}] forest through the Brooks Range”

— Rupp, Chapin & Starfield 2001

Modeling the influence of topographic barriers on treeline advance at the forest-tundra ecotone in northwestern Alaska. Climatic Change 48: 399–416
The authors welcome comments on whether to protect or pull this likely human-introduced seedling or leave its future to chance.
Arriving Eurasian species

Bird vetch

White sweetclover

Creeping thistle

Narrowleaf hawksbeard
Straw erosion wattles likely vector

Creeping thistle 50 miles north of Atigun Pass
Lessons learned from the leading edge of continental species distributions

• A warming climate, invasive species and humans share two common traits – they know no boundaries and they have similar trajectories

• Extant species are disappearing, new species (native and nonnative) are appearing – but not all

• If we do nothing, we will have novel communities... but not of “native” species and not necessarily diverse
Dramatic changes in last 5 decades in response to warming and drying

- available water declines (62% loss since 1968)
- wetlands dry (6 – 11% per decade), peatlands afforest
- glaciers recede (11% surface area, 21 m elevation)
+ nonglacial salmon streams warm (17 of 48 sublethal in July)
+ afforestation (trees 1 m/yr, shrubs 2.8 m/yr)
+ spruce bark beetle outbreaks (triggered by 2 consecutive warm summers)
\Delta fire regime (lightning, grass, spring, shorter MFRI)
Caribou Hills

Baseline

2090 - 2099

Legend:
- Alpine
- Herbaceous
- Mountain Hemlock
- Anthropogenic
- Ice
- Shrub
- Black Spruce
- Mixed Conifer
- Water
- Deciduous
- Mixed Forest
- White-Sitka Spruce
Spruce Bark Beetle Mortality (1989-2010)
Wildfires (1994–2007)

1994 Windy Point
1996 Crooked Creek
2005 Glacier Creek
2005 Fox Creek
2005 Tracy Avenue
2007 Caribou Hills
2 questions we need to ask ourselves....

What’s the risk of doing nothing?
What’s the risk of doing something wrong?

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Rosa Meehan
10 Feb 2010
> 138 nonnative species of flora (108) and fauna (30) occur on the Kenai Peninsula, poised to fill novel assemblages
The trajectory we’re on: Human-mediated system with an unknown outcome...

- Cluster Fly
- Spruce bark beetle
- Earthworms
- Pheasant
Doing nothing is really doing something…
j ust incoherently and haphazardly

• Kenai Peninsula is already responding to a changing climate and forecasted to continue doing so

• Latitudinal migration is constrained by the isthmus and Kenai Mountains’ rainshadow

• Novel assemblages ≠ simple re-shuffling of native flora and fauna

• Many exotic species already introduced and more enroute

• And we squander our early opportunities to steward outcomes!
Could this novel system be stewarded towards one that is more diverse?
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• In a no-analog human-driven future, there are no optimal choices – just bad decisions
• The Land does not understand human will or intent or our values – it only responds to outcome
We need a reality check on which species are “packing” our changing systems..

11,174 non-native species in U.S.
We need to question our collective ability to manage nonnative species at a landscape scale...

~70,000 seeds (40 families) carried to Antarctica by 40,000 tourists and scientists during one summer

Risk of alien vascular plants establishing in Antarctica

Poa annua (1 of 3 vascular plants)
We need a sophisticated interdisciplinary perspective on managing exotic species...

• The Land is already responding to a warming climate and forecasted to continue doing so – what is native?
• Expect novel assemblages, but appreciate we can influence their composition
• Focus on eradicating novel species (spatial scale)
• Be circumspect about invasive species rankings (temporal scale)
• When in doubt, kill it! We can always introduce it