



Removing Exotic Annual Grasses From Coastal Dunes: Effects on Native Solitary Ground-nesting Bees

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A coastal landscape with sand dunes, a beach, and the ocean under a cloudy sky. The dunes are covered in sparse, dry vegetation. The beach is a mix of sand and dark seaweed. The ocean has white-capped waves breaking onto the shore. In the distance, a range of blue mountains is visible under a sky filled with soft, grey clouds.

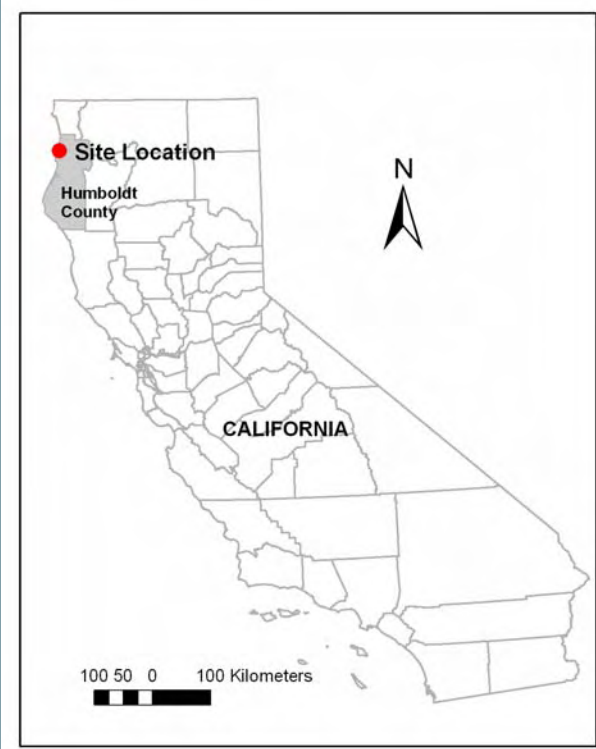
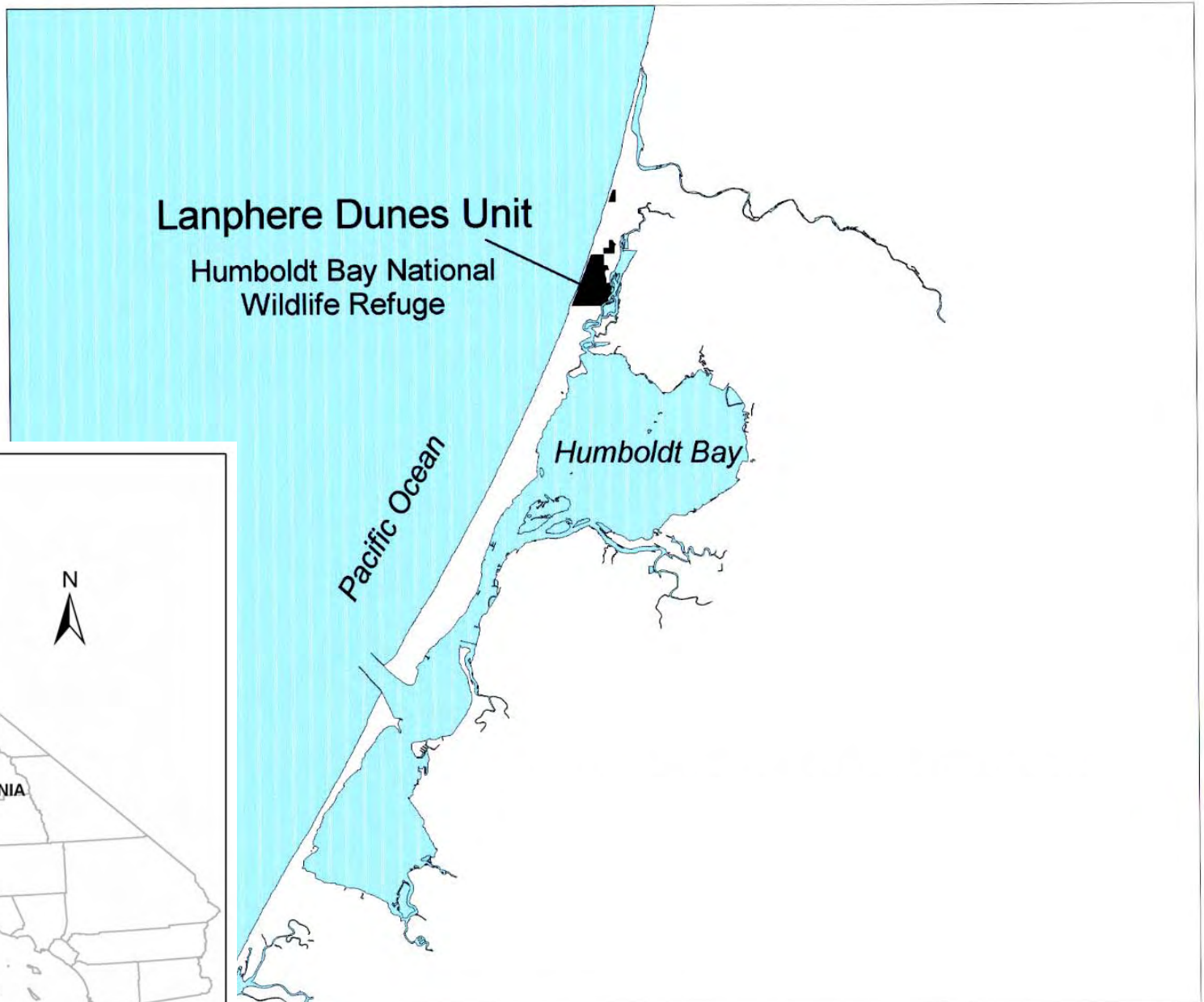
Presentation Outline

Introduction

Research Objective & Hypothesis

Methods

Results and Discussion





Lanphere Dunes



Photo: A. Pickart



European hairgrass
(*Aira praecox*)



Silver hairgrass
(*Aira caryophyllea*)



Squirreltail fescue
(*Vulpia bromoides*)

Propane Torch





Leafcutter Bee

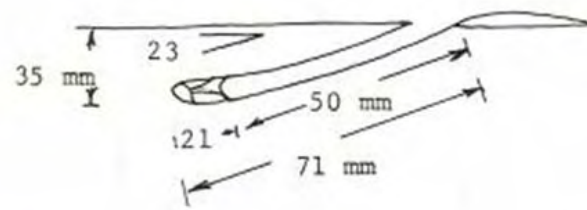
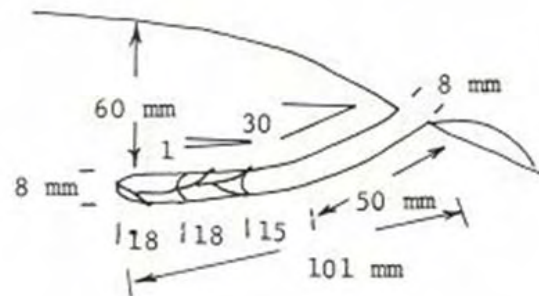
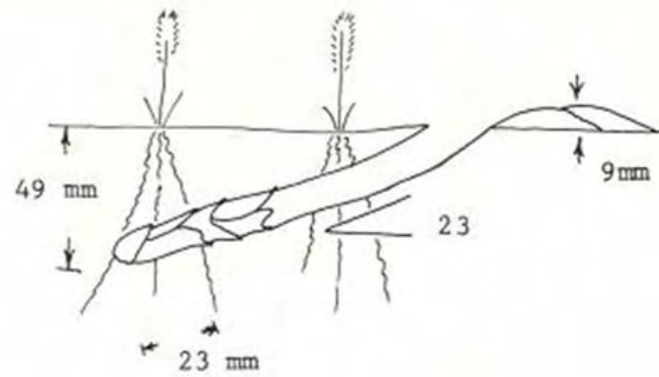
(*Megachile wheeleri*)





Photo: A. Pickart





Fom Gordon 1984



June

July

Aug

Sept

Oct

Nov

Dec

Jan

Feb

Mar

April

May

June

July

Aug

Sept

EGG

LARVA

PREPUPA

PUPA

ADULT

Heat Treatment



The Concern

- Bees nest in invaded areas.
- Bees are important native pollinators.
- To restore a fully functioning ecosystem, must maintain important native pollinators.
- Are we doing more harm than good?

A Better Way?

The Radiant Heater



<http://www.pesticide.org/radiant.html>



Research Objective & Hypothesis

- Compare the propane torch method to the radiant heater method in their effect on Leafcutter bees.
- Prediction: Propane torch will increase mortality, radiant heater will not.



Methods



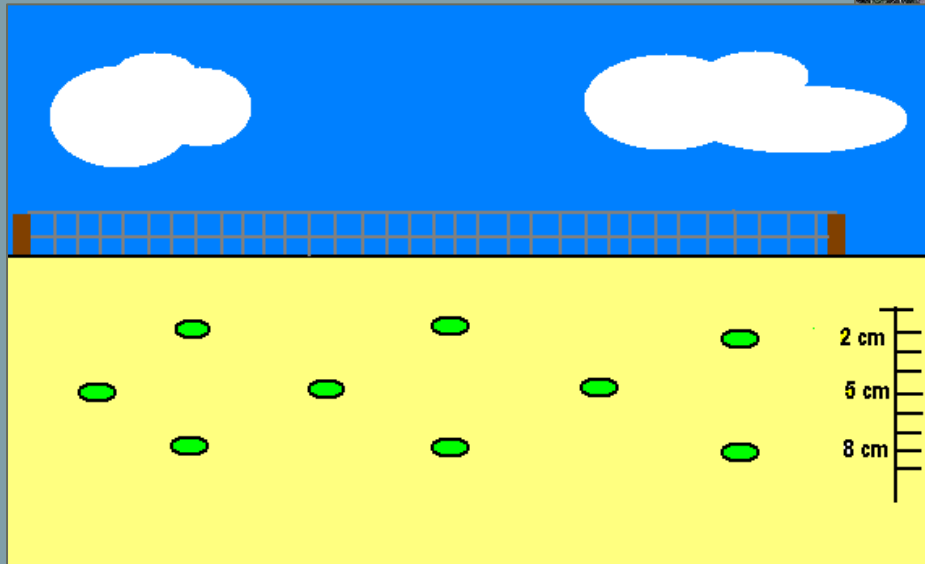


Methods

15 1-m² plots

3 depths

9 nest cells per plot





Methods

Propane treatment





Methods

Radiant heat treatment





Methods

Control





Methods

Temperature loggers
to measure heat
penetration





Results & Discussion

Low Emergence Rates (Mortality 75.8%)

Treatment	Total # of Nest Cells	Total # Emerged Bees	Emergence Rate
Propane	45	12	26.7%
Heater	38	8	21.0%
Control	45	11	24.4%
Overall	128	31	24.2%



Results & Discussion

Mean = 25.6%

Standard deviation = 19.0

Plot #	Treatment	Total # Nest Cells	Total # Emerged Bees	Emergence Rate
1	Propane	9	0	0%
2	Control	9	0	0%
3	Propane	9	2	22%
4	Propane	9	2	22%
5	Heater	9	3	33%
6	Control	9	2	22%
7	Heater	9	2	22%
8	Heater	9	1	11%
9	Control	9	1	11%
10	Propane	9	2	22%
11	Heater	9	1	11%
12	Propane	9	6	67%
13	Control	9	4	44%
14	Control	9	4	44%
15	Heater	2	1	50%

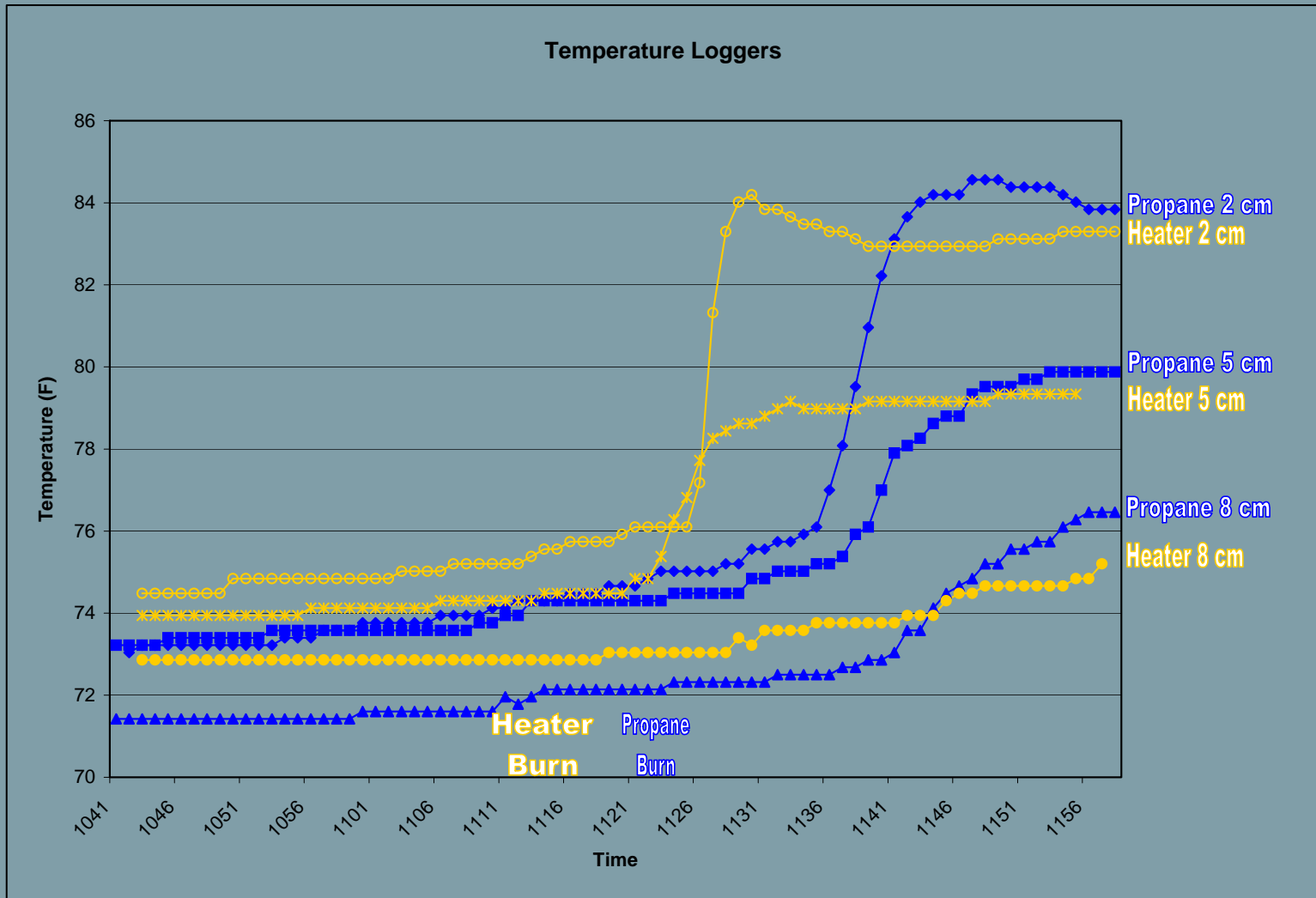


Results & Discussion

No Treatment Effect

	Emerged	Not Emerged
Propane	12	33
Heater	8	30
Control	11	34
$X^2 = 0.355724$ d.f. = 2 p-value = 0.8371		

Results & Discussion





Conclusions

- Good news for Lanphere Dunes
- Holistic ecosystem management



Thank You

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- Andrea Pickart, Patti Clifford, Lanphere Dunes
- Department of Biological Sciences, HSU
- Eryn Pimentel

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Questions?



Photo: A. Pickart