Quantifying dune field reactivation potential We ask: "how can we predict reactivation on the Great Plains?"

1. What is 'reactivation'?



 Active dune fields: no vegetation, low economic value, expensive to build, mostly inhabitable.



- Stable dune fields: high economic value, lower environmental value, habitable.
- Reactivation is a change from stable to active.





2. Why study reactivation?

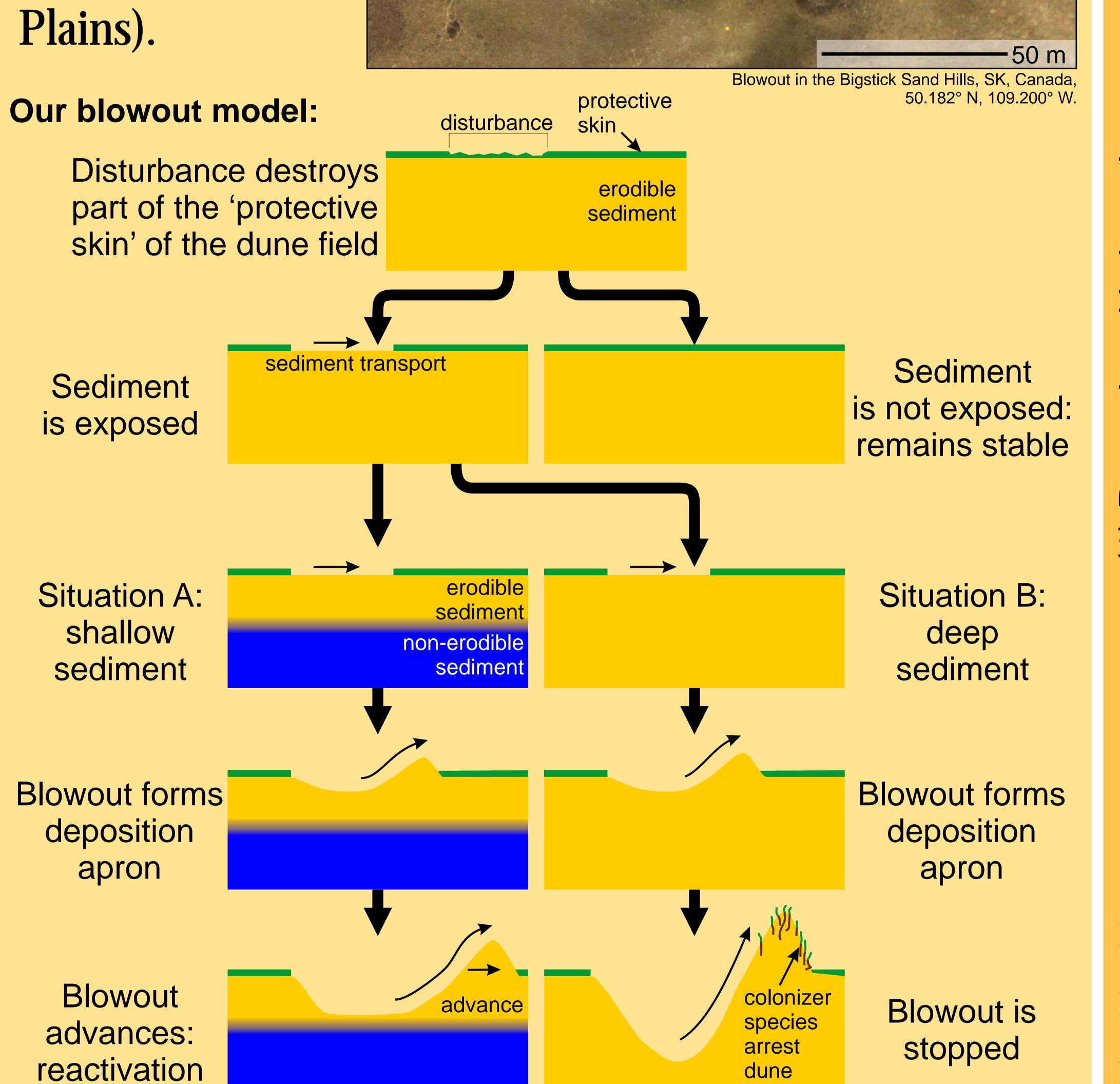
- Climate change will reactivate dune fields this has large economic, environmental, and societal implications.
- Reactivation is difficult to predict.



idence of previous efforts to control the dunes.

3. Blowouts and reactivation

• Blowouts are the first phase of reactivation in unidirectional 'supply-limited' dune fields (most of the Great



Vegetation has two roles:

- (1) resist disturbance (as part of the 'protective skin').
- (2) arrest blowout dunes (colonizer species).

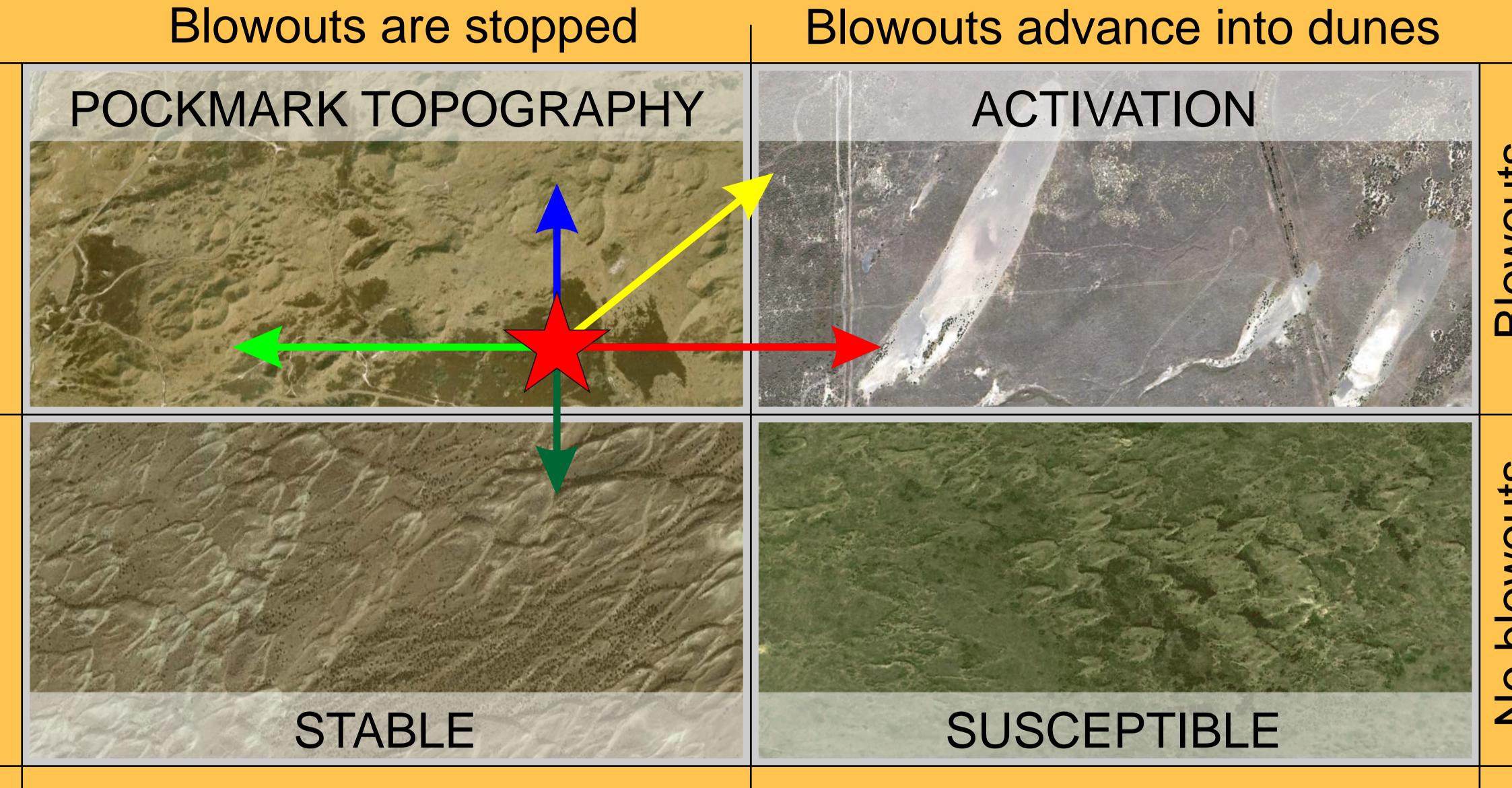
increase transport increase disturbance increase colonizer species vitality increase aridity increase toughness of protective skin

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4. Quantifying the 'reactivation potential' Two independent variables can be isolated:

(1) The area of sediment exposed by disturbance (defined by protective skin toughness and disturbance).

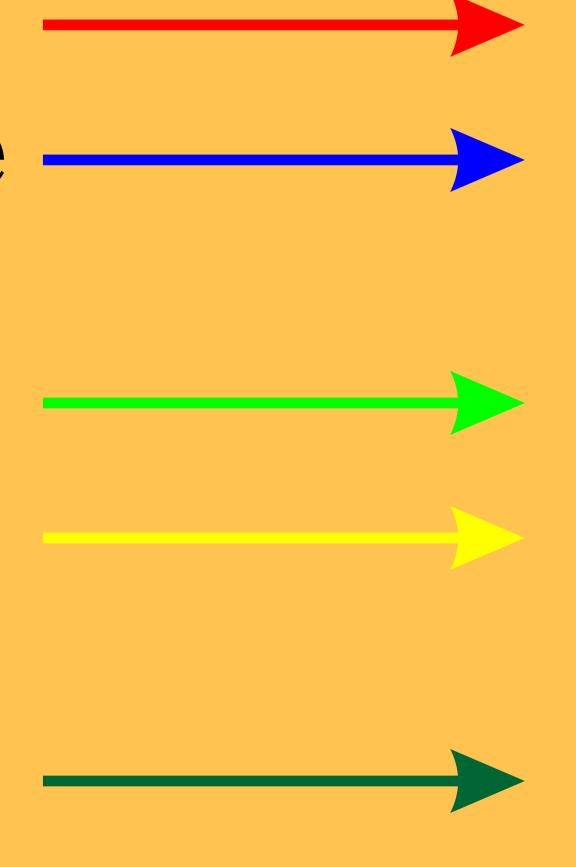
(2) The ability for colonizer species to stop blowouts (defined by sediment transport rate, blowout size, and colonizer species deposition tolerance).



(2) Ability for colonizer species to stop blowouts (apron deposition rate / vegetation deposition tolerance)

Example: Bigstick Sand Hills, SK, Canada

Present: dominantly stable, isolated blowouts that stabilize.





Bigstick Sand Hills SK Canada (50 182° N 109 200°

131-3 190

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5. Experiments We tried to artificially reactivate dunes in the Middle Sand Hills, AB, Canada

a) Artificial blowout

- Results:
- quickly vegetated from deposition apron.
- disturbance insufficiently large?



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June 2012





• only a small part of the protective skin burned.

> Middle Sand Hills, AB, Canada 50.626° N, 110.344° W Photos: D. Bender



