

Effects of the Mountain Pine Beetle on Water Quality in Colorado Mountain Streams

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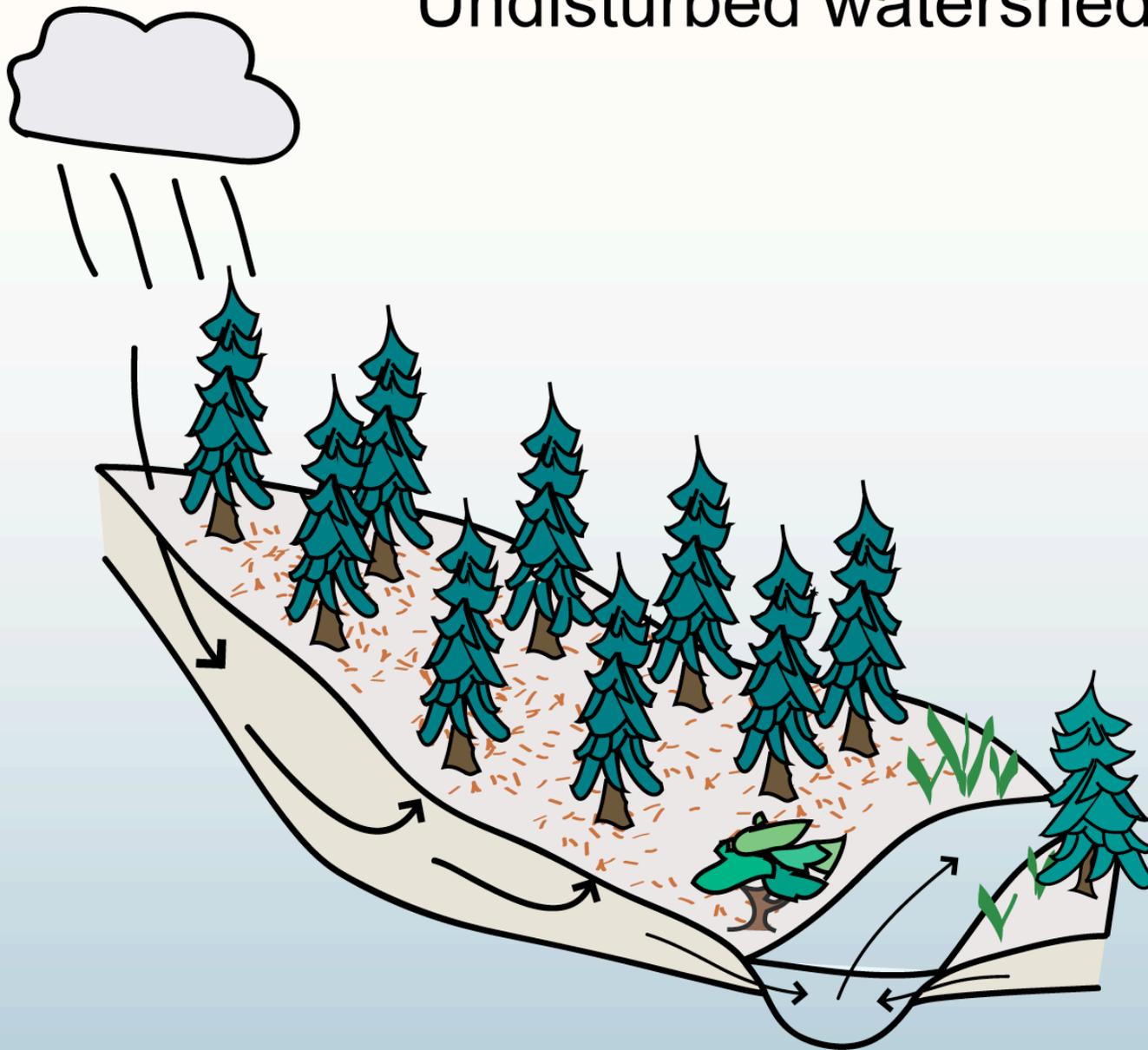
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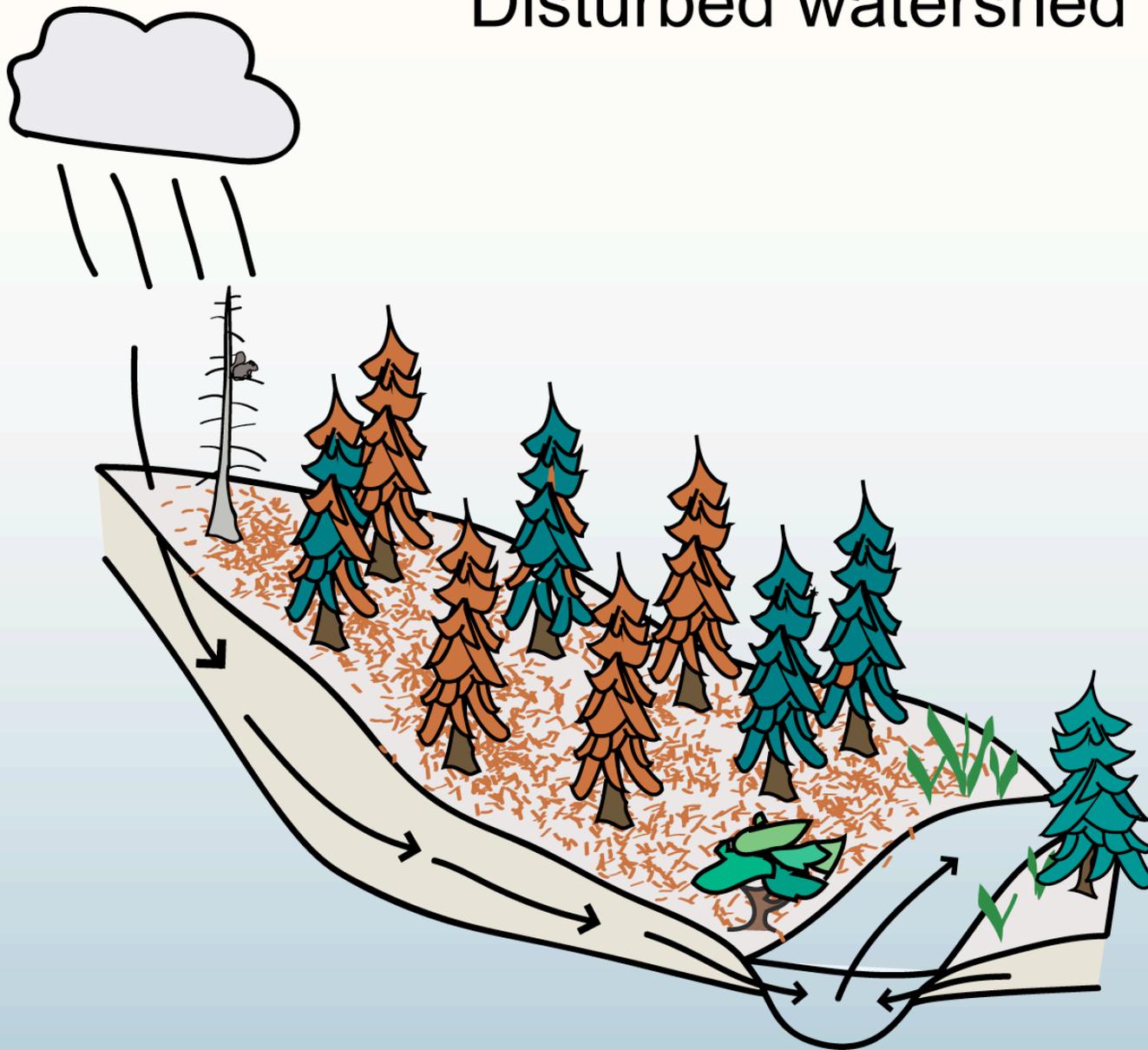
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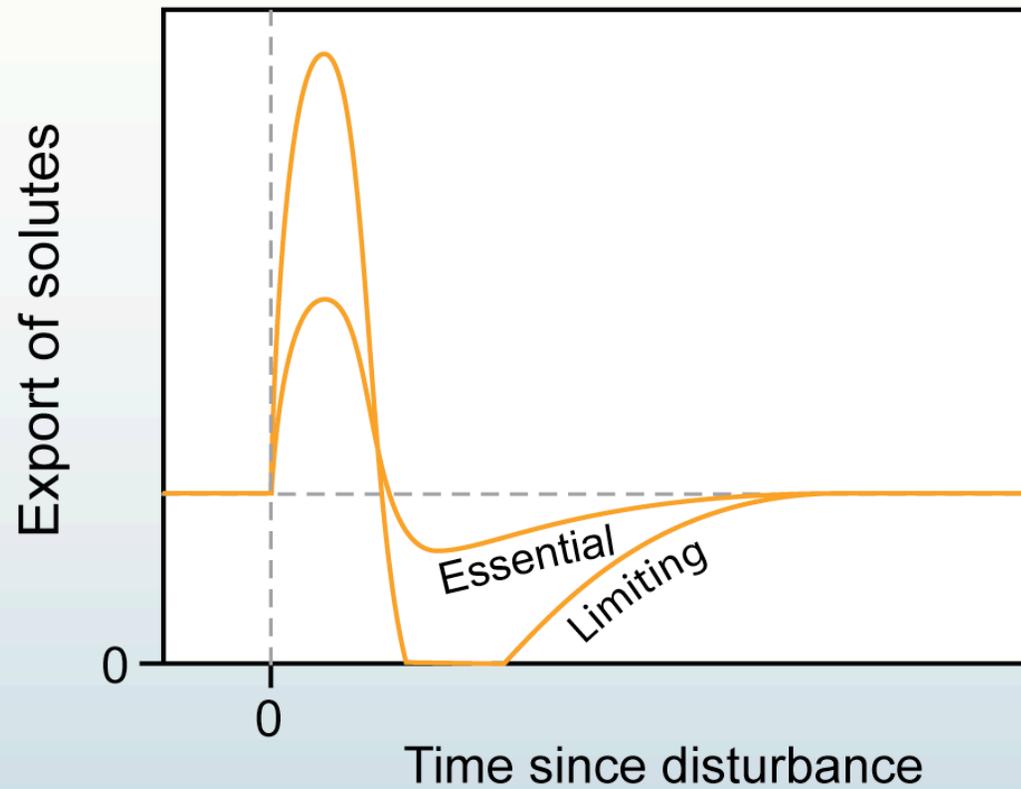
Undisturbed watershed



Disturbed watershed

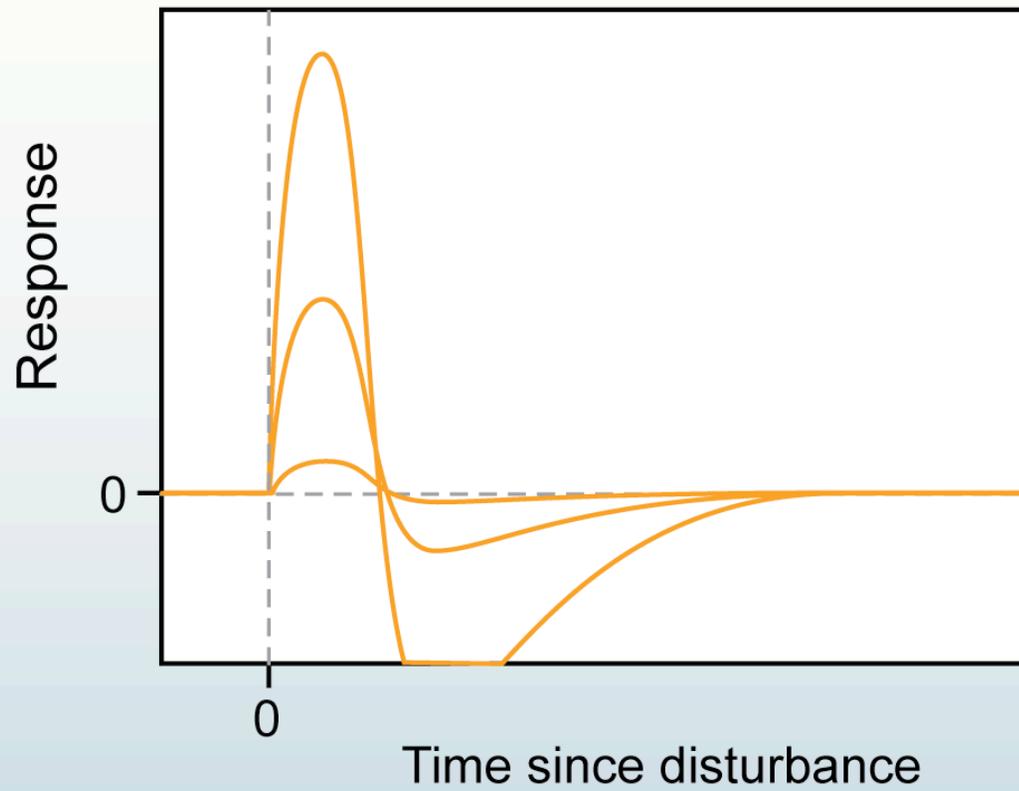


Effects of disturbance on solute export



After Vitousek and Reiners 1975.
Bioscience 25: 376-381.

Magnitude of response



Shape of the response curve



Approaches

1. Long-term monitoring records, frequent sampling
2. Shorter monitoring records, frequent sampling
3. Synoptic surveys, seasonal sampling
4. Mechanistic studies

Synoptic survey: 19 August 2009



List of analyses

Nitrogen

- Nitrate, nitrite
- Ammonia
- Dissolved organic N
- Particulate organic N

Phosphorus

- Total dissolved P
- Particulate P

Carbon

- Dissolved organic C
- Particulate organic C

Major anions

- Sulfate
- Chloride

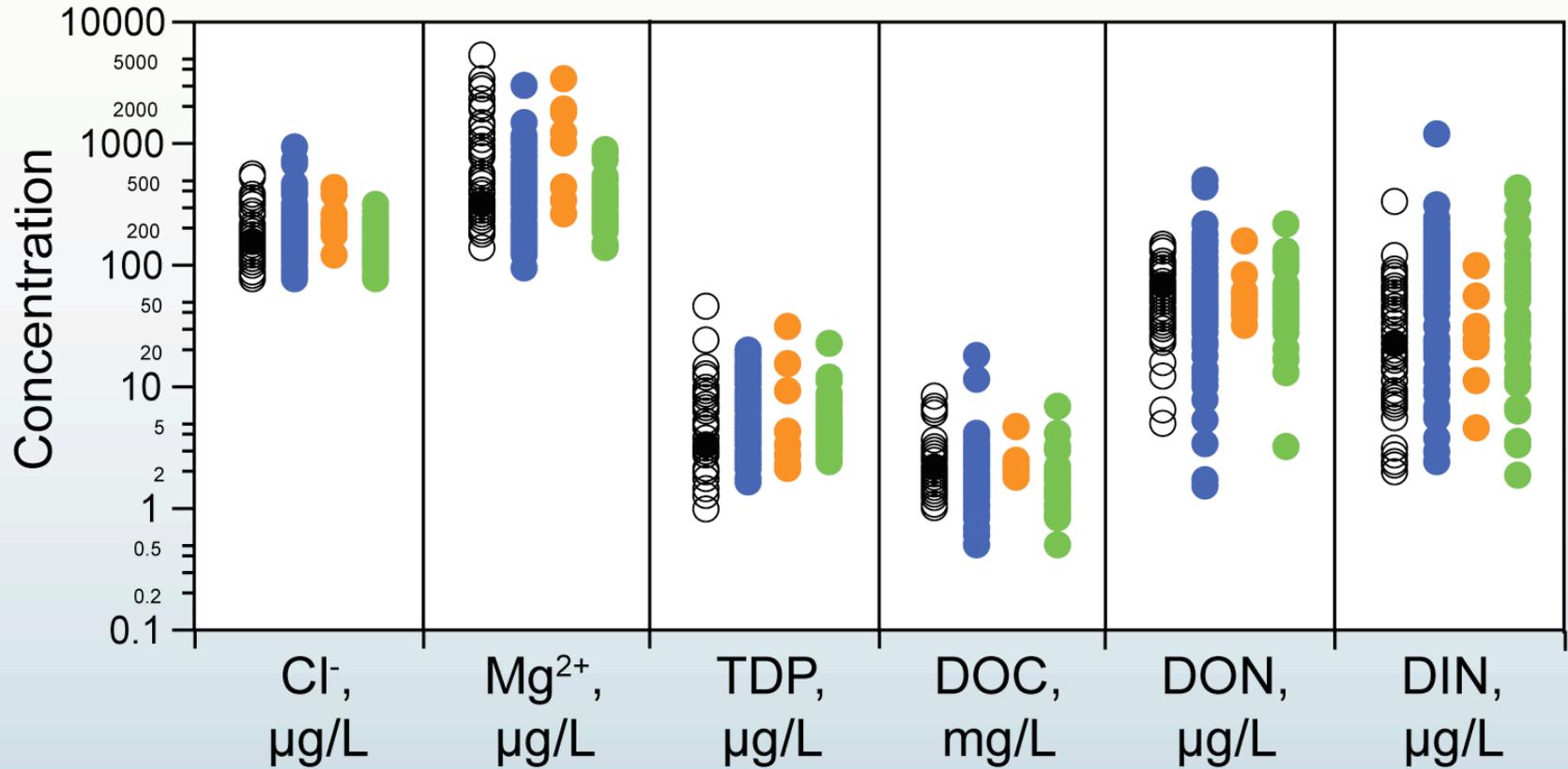
Major cations

- Calcium
- Magnesium
- Sodium
- Potassium

Other analyses

- pH
- Specific conductance
- Pesticides

Ranges of concentration for selected solutes



○ Colorado River

● Big Thompson

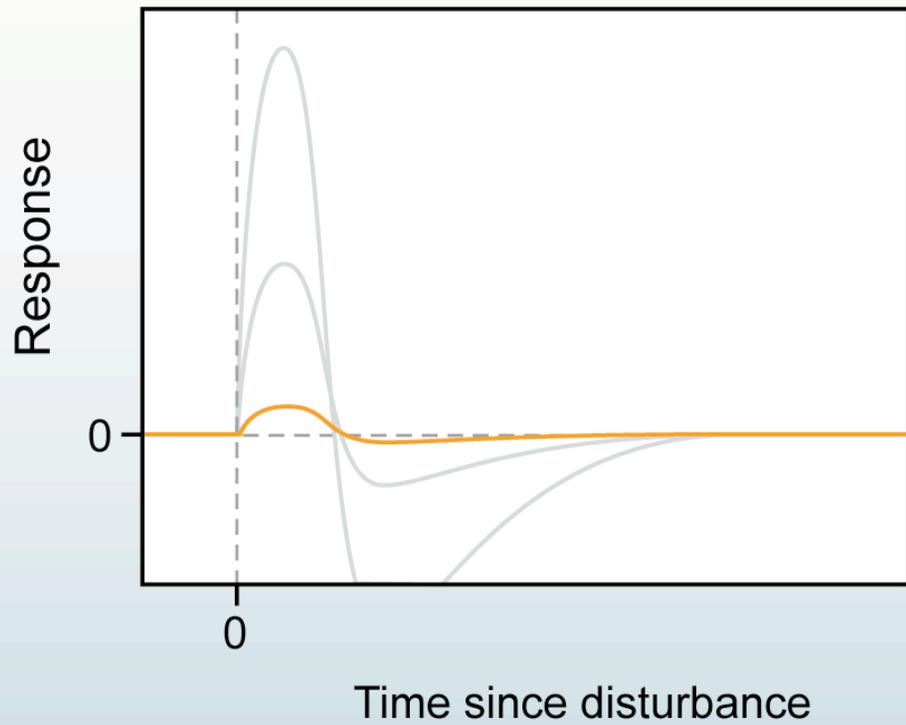
● Cache la Poudre

● North St. Vrain

Results of stepwise multiple regressions

Solute	Direction of effect	Fraction of var. explained by tree mortality	Significance level
Chloride	---	---	NS
Magnesium	Increase	0.041	$p < 0.001$
Total dissolved P	---	---	NS
Dissolved organic C	Increase	0.011	$p < 0.05$
Dissolved organic N	---	---	NS
Dissolved inorganic N	---	---	NS

Conclusions



Riparian buffers



Messages to stakeholders

1. Effects on water quality appear to be modest
2. Greatest effects probably are limited to small watersheds
3. Significant effects only at highest levels of tree mortality?
4. Data analyses are not yet complete

Acknowledgements

