iDDC: Generate species-specific expectations for patterns of genetic variation

He, Edwards & Knowles, Evolution 2013

integrative
Distributional
Demographic
Coalescent
modeling

DECRYPT uses a spatially explicit coalescent that is similar in execution (but instead of ABC, implements bpp)

Distributional model
(i.e., ecological niche model) with predictions on probability of occurrence across the landscape

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Demographic model informed by habitat suitabilities

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Spatially-explicit coalescent simulations based on demographic model

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Tests of hypotheses/models using ABC

Habitat suitability scores

40	20	10	5
100	60	20	10
100	100	40	40
80	80	60	60

K(m)

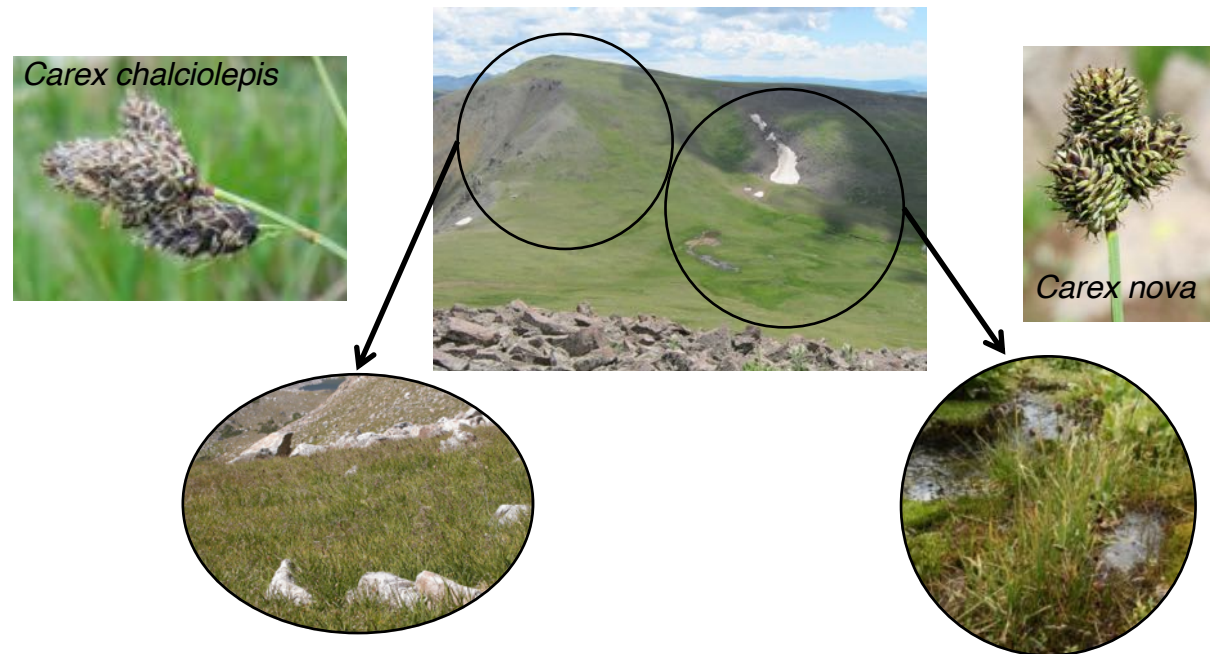| 400 (40)	200 (20)	100 (10)	50 (5)
1000 (100)	600 (60)	200 (20)	100 (10)
1000 (100)	1000 (100)	400 (40)	400 (40)
800 (80)	800 (80)	600 (60)	600 (60)

Carrying capacity: k_i

Gene coalescence across the landscape

SPLATCHE2

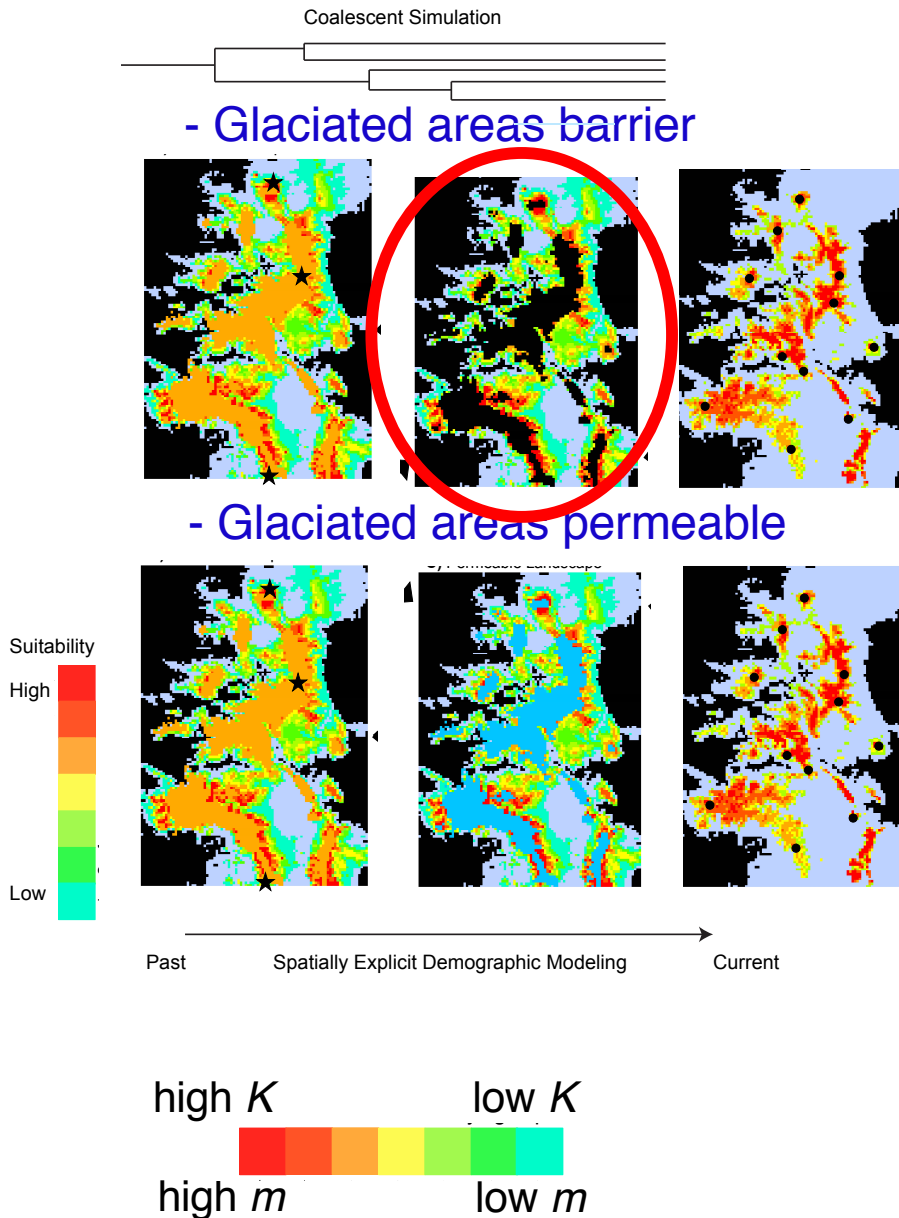**iDDC:** Generate species-specific expectations for patterns of genetic variation

Carex chalciolepis

Carex nova

H: species-specific responses to climate change

- Glaciated areas act as barriers, but only in wetland specialist

iDDC modeling:

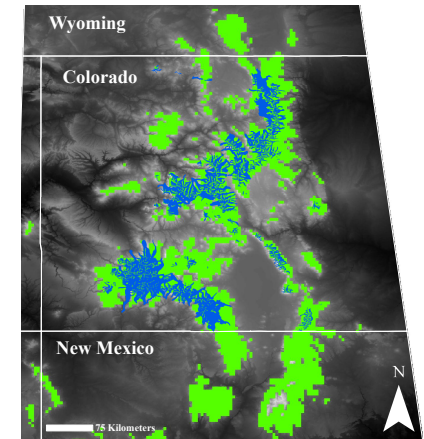Coalescent Simulation

Glaciers shown in blue

- Glaciated areas barrier

- Glaciated areas permeable

Suitability

High

Low

Past   Spatially Explicit Demographic Modeling   Current

high K low K

high m low m

Generate lots of simulated data sets under each model

We identify sets of parameters for the models that produce simulated data that match the empirical data.

Model Selection using Approximate Bayesian Computation (ABC)

Massatti & Knowles (2016) Mol. Ecol.