CKMR Simulation Proposal

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Objectives

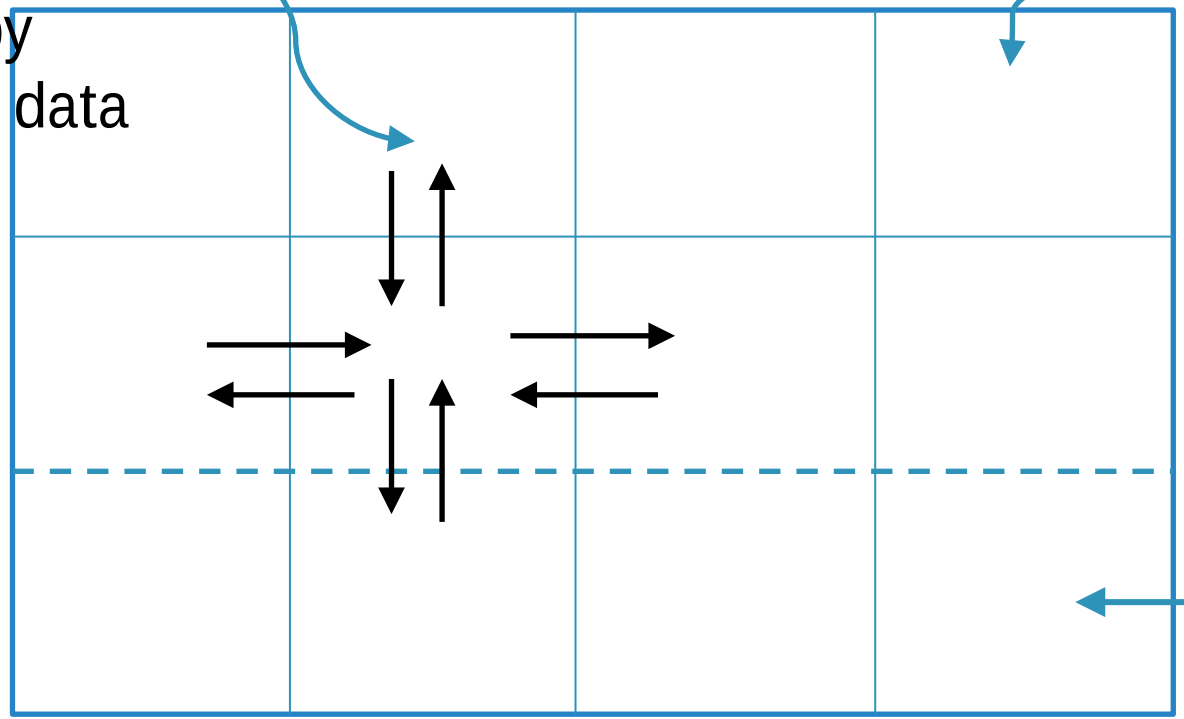
- Develop a simulation framework for reasonably realistic CKMR samples from EPO dolphin species of interest
- Develop custom CKMR estimation models
- Apply CKMR models to simulated data
- Use results to inform CKMR decision / design

Simulation Model

- Individual-based model (because we have some funky population biology)
- Requires plausible range of
  - Life history variables
  - Movement dynamics
  - Sampling dynamics
- Likely possible with canned existing packages

Cell-to-cell annual transition rates informed by movement data

Mating at grid-cell level



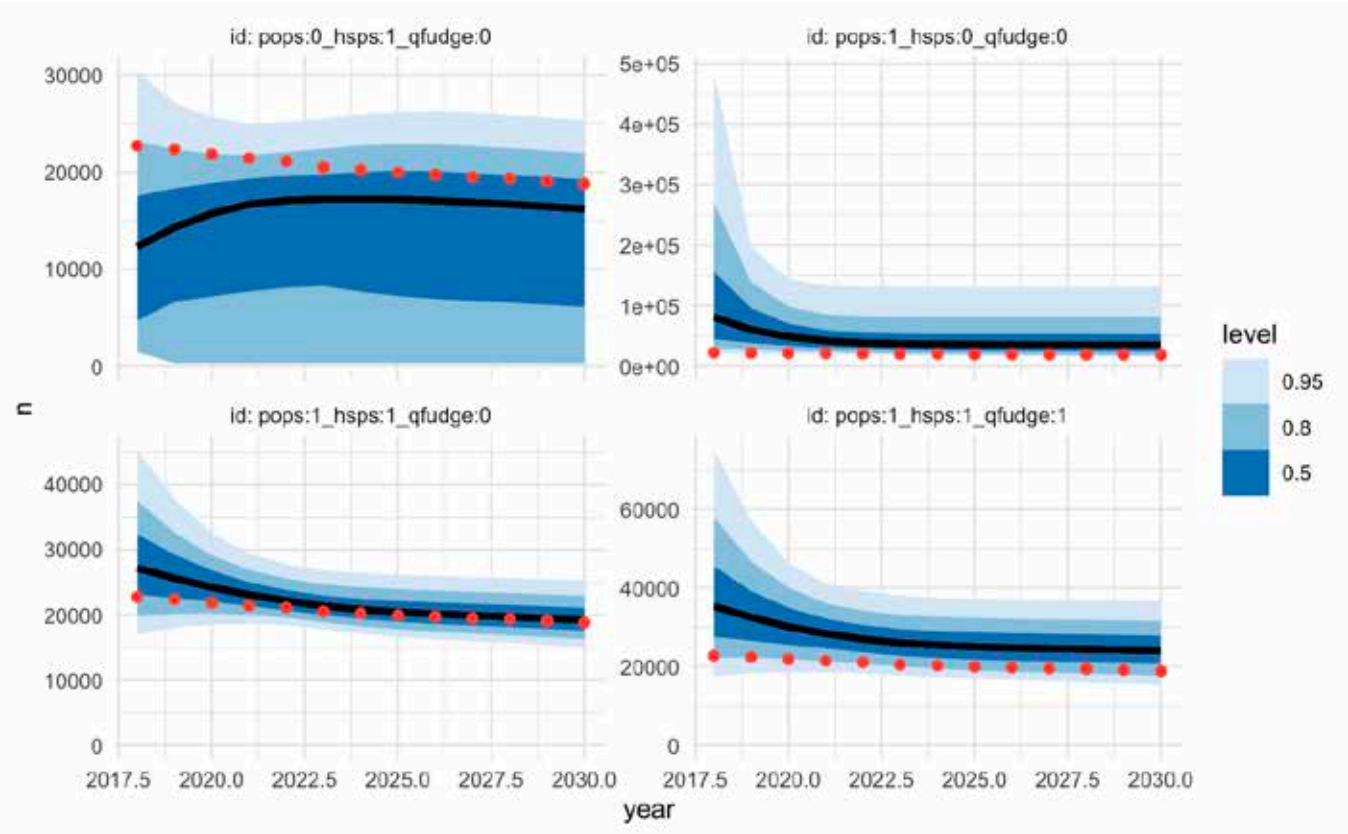
Lower sampling probability in bottom third

Estimation Model

- Given data, we then need to fit a CKMR model
- Likely will require writing custom model given unique attributes of EPO dolphin
  - Stan (if Dan has his pick) / TMB (if needed / Dan outvoted)
- Initial phase of internal model validation
- Conditional on “able to fit to itself”, apply to simulated data

Expected Outcomes

- Estimate of what kinds of data (quality and quantity) enable what can be estimated with what level of precision
- Inform sampling strategy
- Set realistic expectations
  - e.g. is growth rate possible
- Likely year given inevitable unforeseen disasters and finite staff capacity
  - Staff time costs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n
year
level
0.95
0.8
0.5
30000
20000
10000
0
5e+05
4e+05
3e+05
2e+05
1e+05
0e+00
40000
60000
2017.5
2020.0
2022.5
2025.0
2027.5
2030.0