

Presentation 3:
Multispecies Integrated Species Distribution Modeling in
PointedSDMs
'ISEC 2024 – Swansea'

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 - ▶ Improved bias estimation
 - ▶ Improved estimates (especially for rare species)

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- ▶ Species-specific covariate effects
- ▶ Dataset bias field

Multispecies: Spatial field structure

► Initialise model

```
speciesModel <- startSpecies(SetohagaData,  
  Boundary = PA, Projection = proj,  
  Mesh = mesh, responsePA = "NPres",  
  trialsPA = "Trials",  
  spatialCovariates = covariates,  
  speciesName = "Species_name",  
  pointsSpatial = NULL,  
  speciesSpatial = ...)
```

1. Shared both hyperparameters & field across species
► speciesSpatial = "share"
2. Shared hyperparameters & independent field (intSDM default)
► speciesSpatial = "replicate"
3. Independent hyperparameters & field
► speciesSpatial = "copy"

Species-Specific Covariate Effects

- ▶ Effect of covariate is specified uniquely across species
 - ▶ A covariate is applicable to some species
 - ▶ Test competing models hypothesis
 - ▶ Reduce overfitting

```
# View components  
# in current model  
speciesModelConif$changeComponents()  
# Remove specified  
# components  
speciesModelConif$changeComponents(removeComponent = "Setop")
```

Bias Correction in Multispecies Models

- ▶ Leverage information across species for improved bias estimation

```
speciesModel$addBias(datasetNames = "eBird")
```

Model Prediction

- ▶ Predicting only spatial effect

```
predict(..., spatial = TRUE)
```

- ▶ Predicting only covariate effect

```
predict(..., spatial = FALSE,  
        covariates = model$spatCovs$name)
```

- ▶ Predicting covariate & spatial effects

```
predict(..., predictor = TRUE)
```

- ▶ Predicting bias field

```
predict(..., bias = TRUE)
```

Supplementary activities

- ▶ Compare various covariate prediction
- ▶ Explore relationship between resolution/structure of covariates and INLA mesh