MULTIFAN-CL

- Longevity
- Valuable features for tuna dynamics

Longevity of MULTIFAN-CL

- December 2021, Dave Fournier retired, since project focus is to:
  - consolidate recent new features
  - undertake enhancements of existing features, and
  - complete documentation
- Support ongoing requirements of OFP stock assessments as they explore alternative model configurations and for projection simulations for MSE
- Reasonably regular and comprehensive testing of development versions is done preceding merges to the repository "master" branch
- Can continue this through a smooth transition phase to using the next assessment platform (3-4 years ?)

1. Space partition

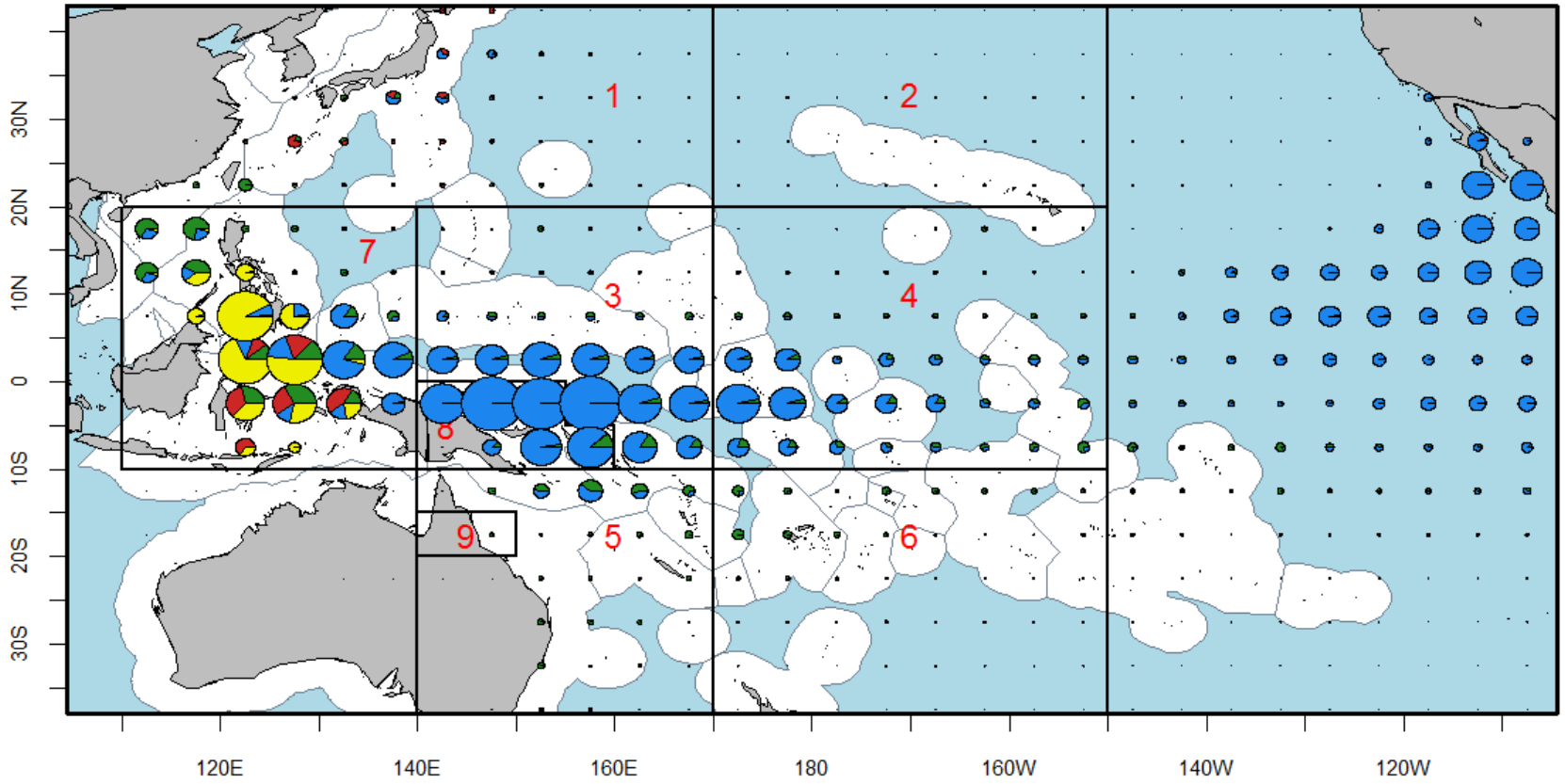
Rationale:

- to explicitly describe spatial processes that lead to heterogeneity within the fish stock
- to account for heterogeneity in fleet structure or management measures

In summary - to explicitly describe the variable effects of fishing mortality on the stock by area

Spatial complexity in WCPO

Heterogeneity:
- fisheries
- biology



Movement parameterisation

Temporal:

- Flexibility for number of movements per year (e.g. each quarter)
- Flexibility for grouping (shared) movements for particular time periods, e.g. 1 2 2 1 rather than 1 2 3 4

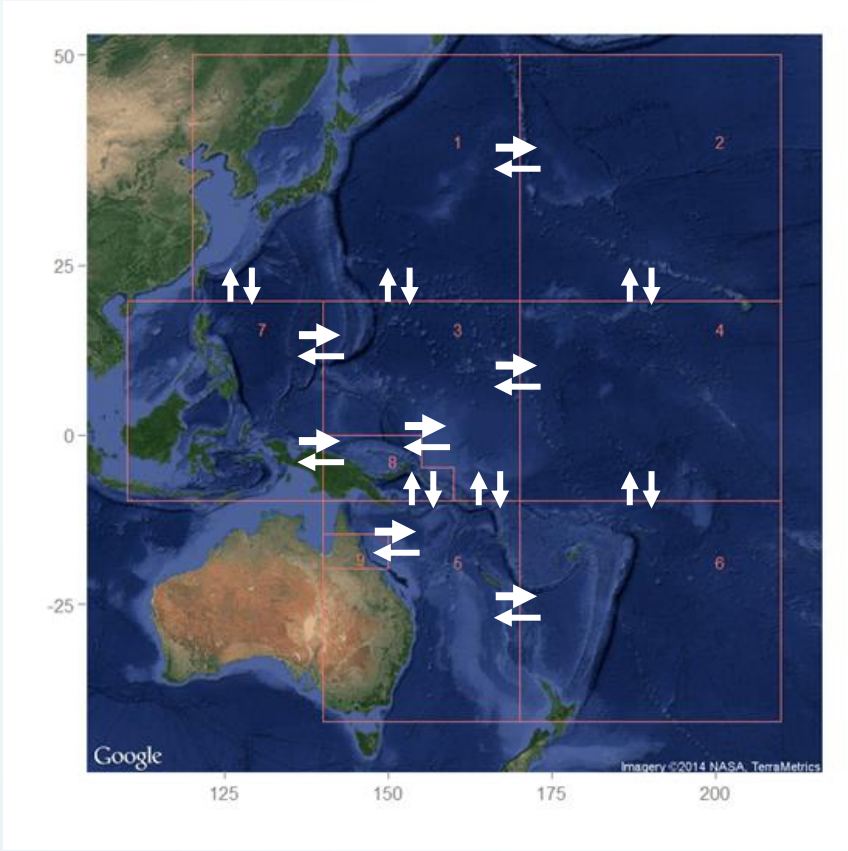
Spatial:

- coefficients estimated are region boundary-specific, so flexibility for:
  - number of regions
  - adjacent regions

Movement processes in MULTIFAN-CL cont.

Movement matrix in respect of regions

e.g. yellowfin tuna



Destination region
R2 R3 R4 R5 R6 R7 R8 R9

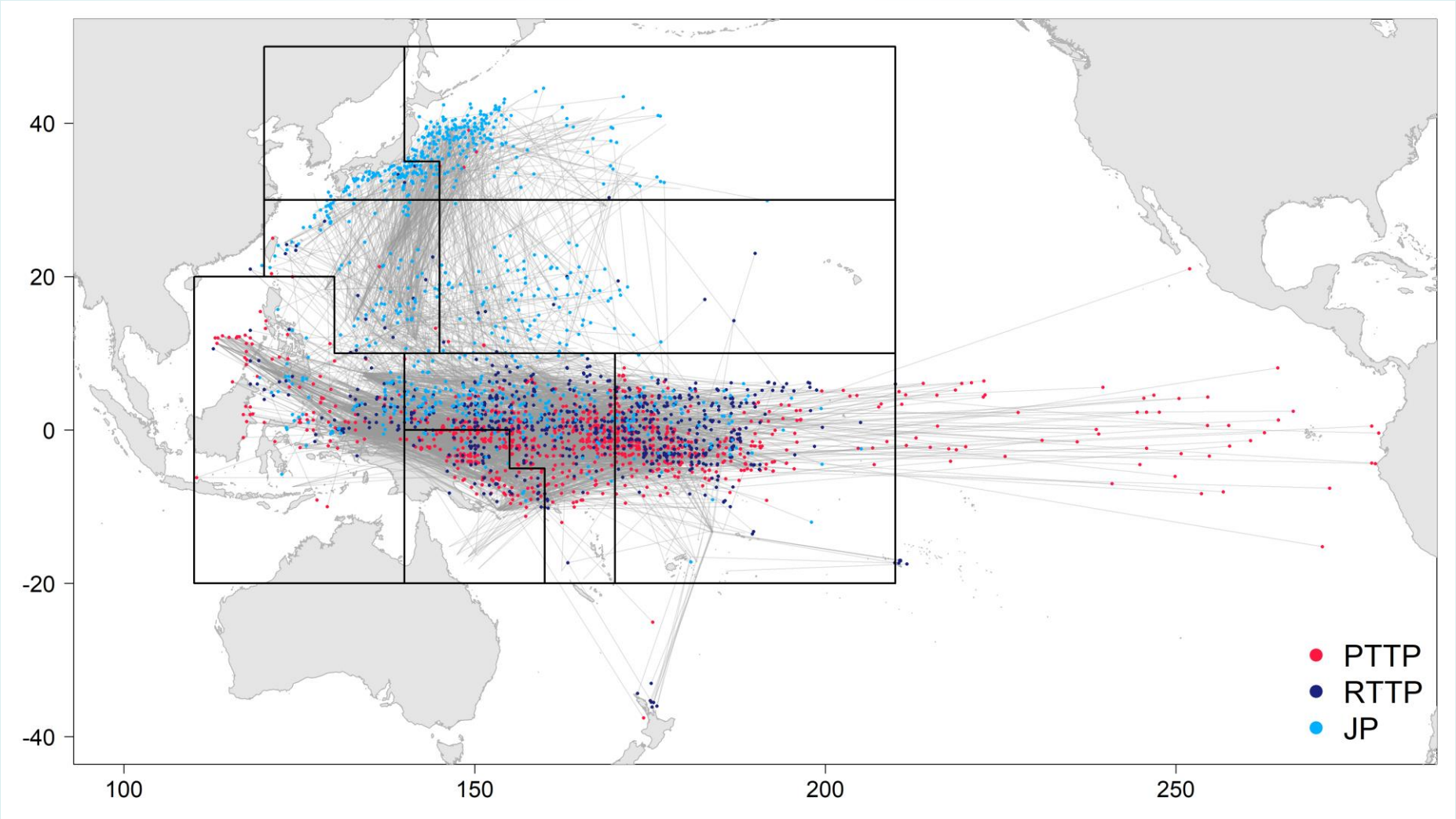
Region of origin	# Incidence matrix							
R1----------	**1**	**1**	0	0	0	**1**	0	0
R2----------		0	**1**	0	0	0	0	0
R3----------			**1**	**1**	0	**1**	**1**	0
R4----------				0	**1**	0	0	0
R5----------					**1**	0	**1**	**1**
R6----------						0	0	0
R7----------							**1**	0
R8----------								0

2. Tag partition

Tagged population model

- MULTIFAN-CL is age-structured. Tag releases are **length-specific** – transformed to be **age-specific** via the estimated growth function
- A **mixing period** is specified for assumed random mixing of tagged population
- Grouping of recaptures: specified fisheries for which recaptures can be aggregated
- The reporting rate from each fishery can be fixed and/or estimated

Tag movements - SKJ



269 release groups 329,811 releases 56,092 recaptures