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Protecting the next
generation: do marine
reserves and size limits
supplement recruitment
of coral trout

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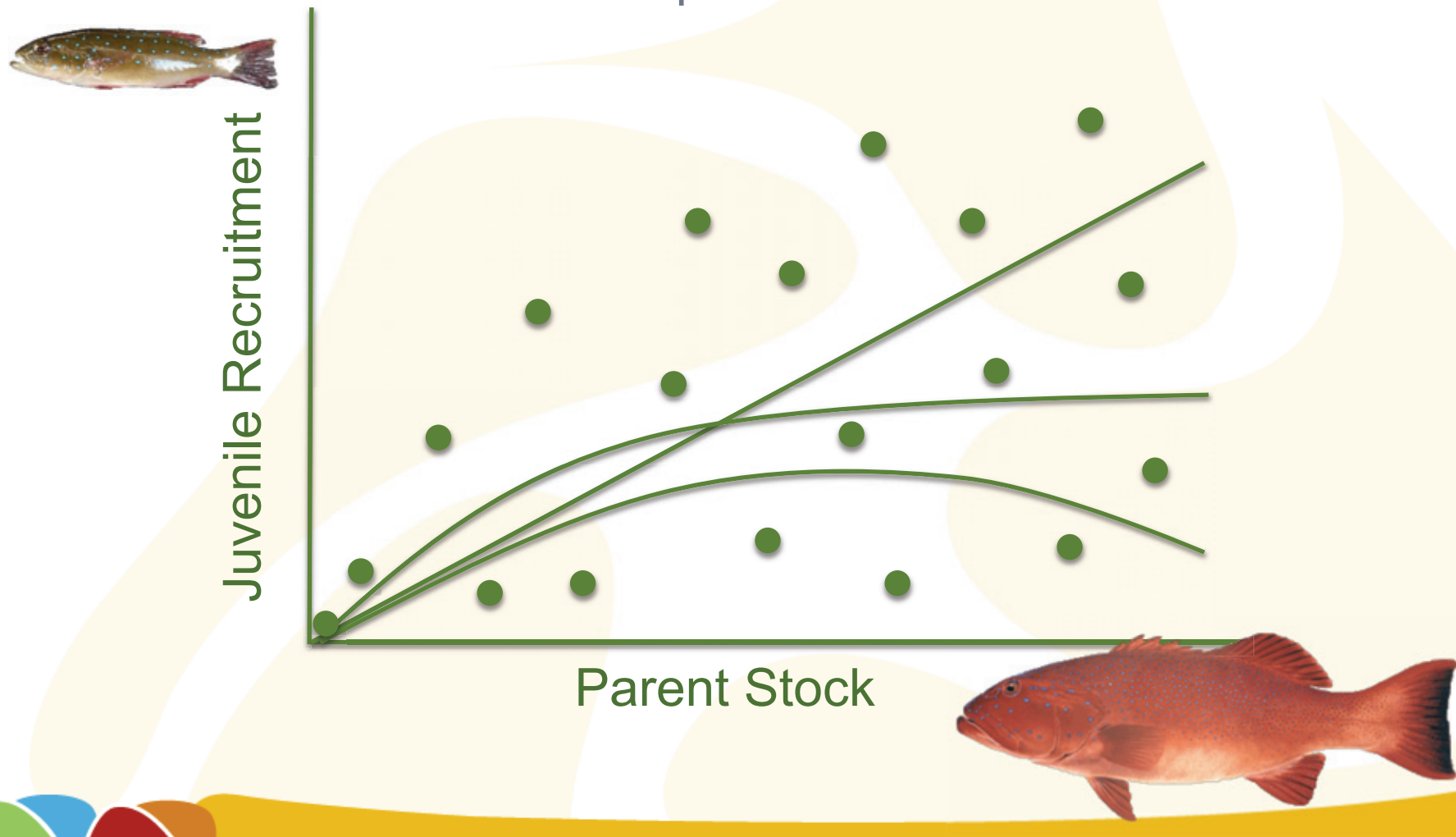
Relationship between parent stock and juvenile recruitment In theory...





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Relationship between parent stock and juvenile recruitment In practice...





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Recruitment overfishing...

taking so many parents that there are not enough juveniles to sustain the population



Juvenile Recruitment



Parent Stock





Options for fisheries management

1. Catch quotas or harvest limits
2. Spatial closures or marine reserves
3. Seasonal closures
4. Minimum legal size limit



Problem! we don't know if the particular adults we protect
are contributing to juvenile recruitment

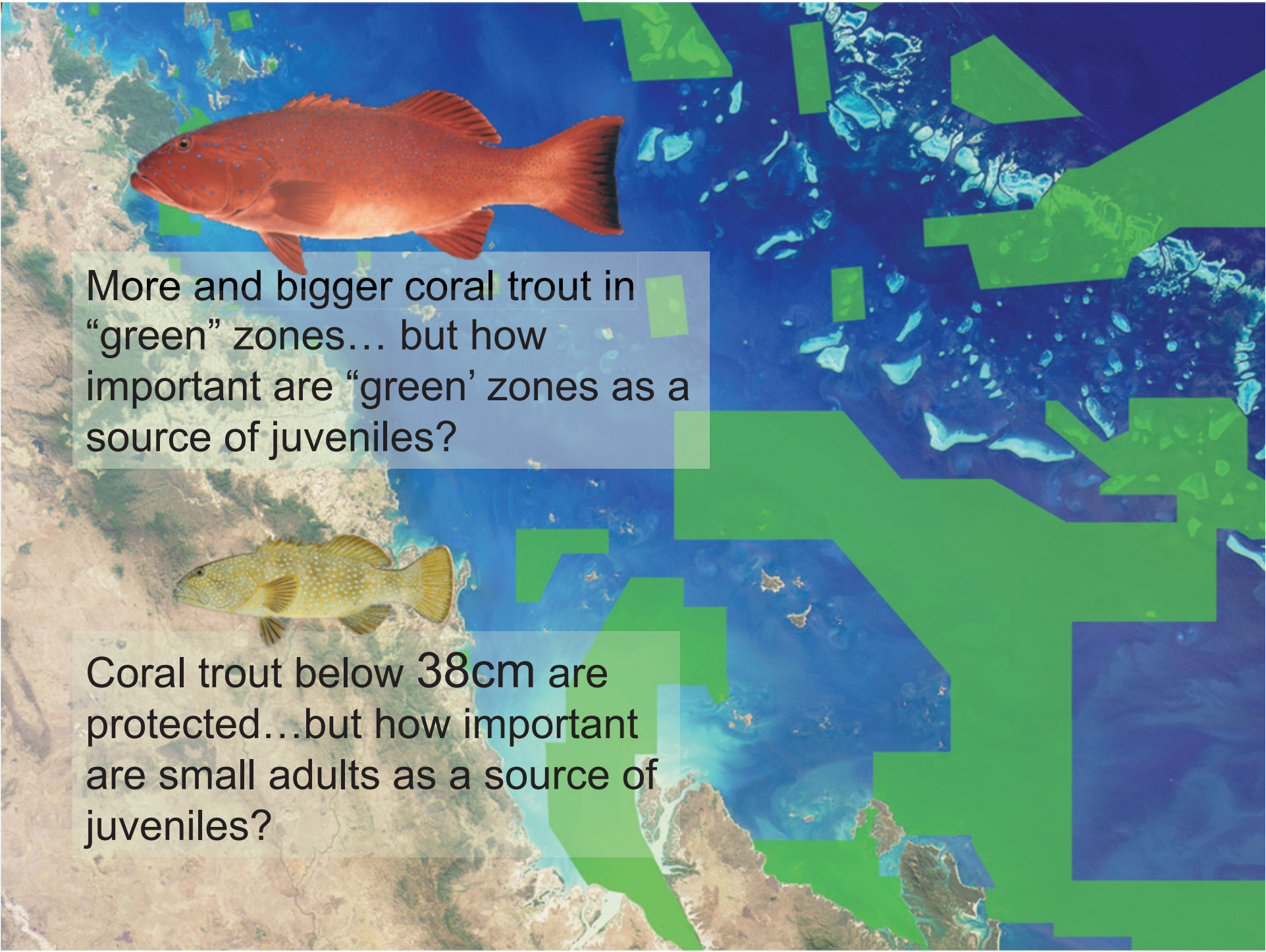


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SPECIES – CORAL TROUT (*PLECTROPOMUS* SPP)

- Ecologically important fish
- Economically important fishery
 - Commercial catch ~800t
 - Recreational catch ~80t
 - ICON for GBR \$\$??
- Currently protected by
 - No-take areas or green zones (32% of the Great Barrier Reef Marine Park)
 - Minimum legal size limit (38cm)
 - Recreational fishery bag limit – 5 fish; Commercial fishery TAC
 - Seasonal spawning closures





More and bigger coral trout in “green” zones... but how important are “green” zones as a source of juveniles?

Coral trout below 38cm are protected...but how important are small adults as a source of juveniles?



AIMS

Apply new genetic tools to determine whether “protected” adult coral trout are successfully contributing to the next generation

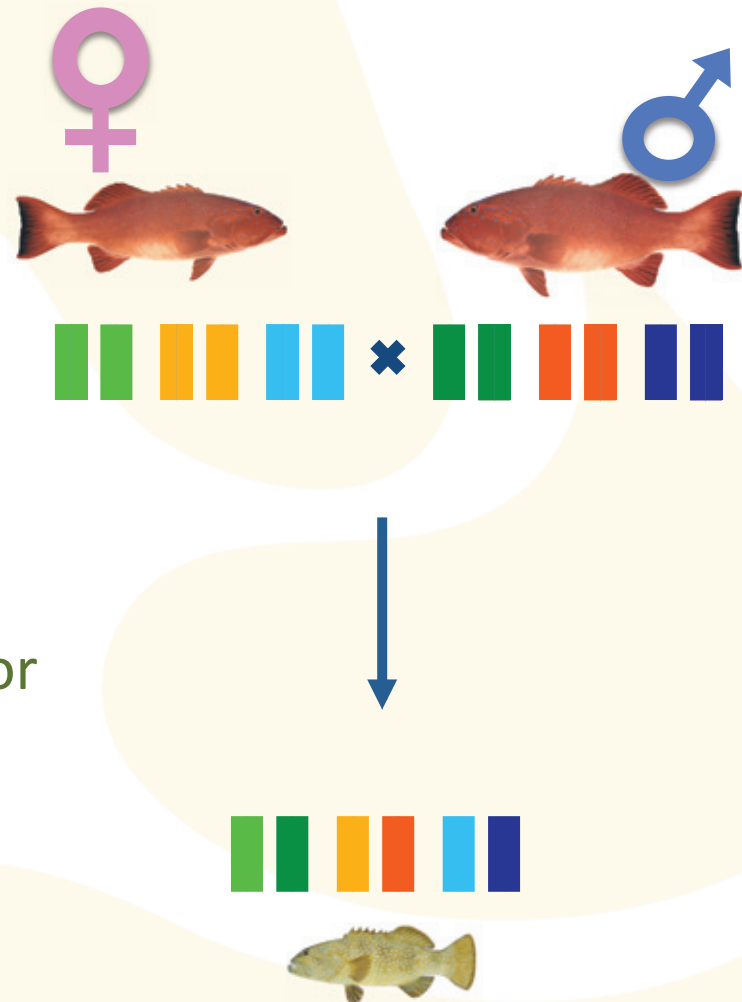
- Provide estimates of juvenile recruitment subsidies from green zones for coral trout (*Plectropomus* spp.) on the southern GBR.
 - Do reserves supply juveniles to fished areas?
 - Do reserve populations protecting the next generation?
- Examine the effects of body size on the contribution to the next generation
 - Is bigger better?
 - Do fish below legal size limit contribute?



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METHOD—GENETIC PARENTAGE ANALYSIS

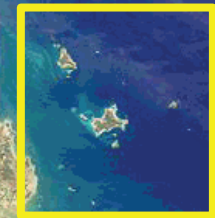
- Matching juvenile DNA profile to parents
- Provides individual dispersal vectors
- Need to sample a large proportion of adults for DNA
- Need a large sample of juveniles for DNA
- Need to sequence a large amount of DNA (~ 20 microsatellites)

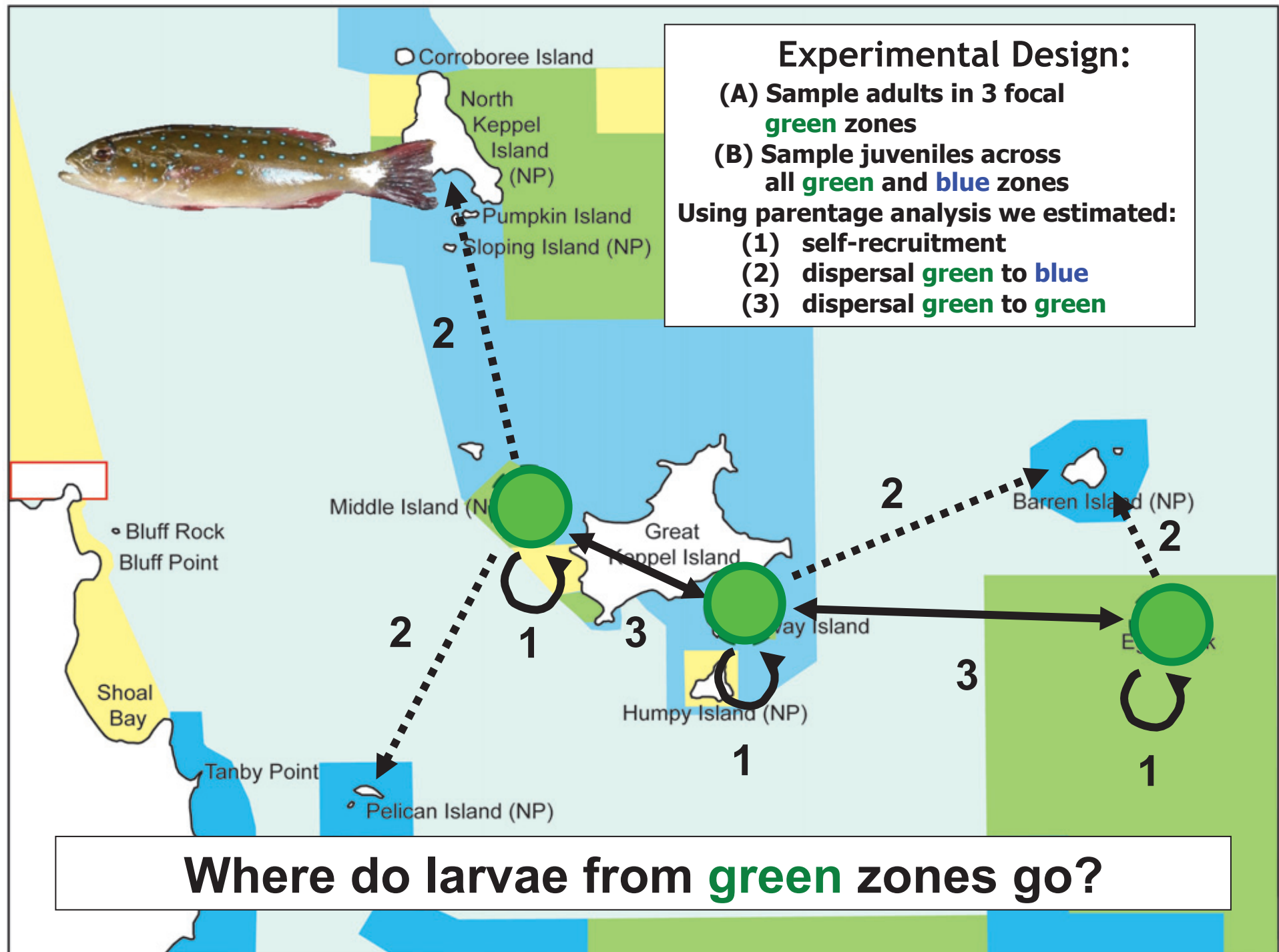


Study Area



Keppel Islands

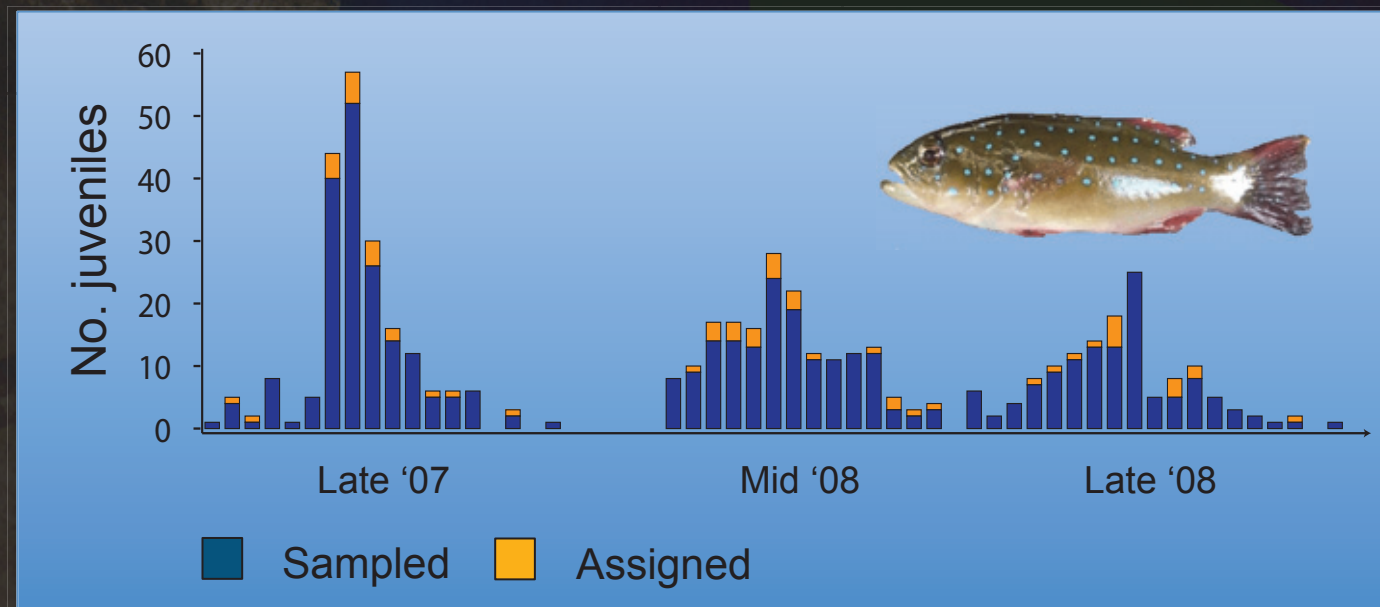




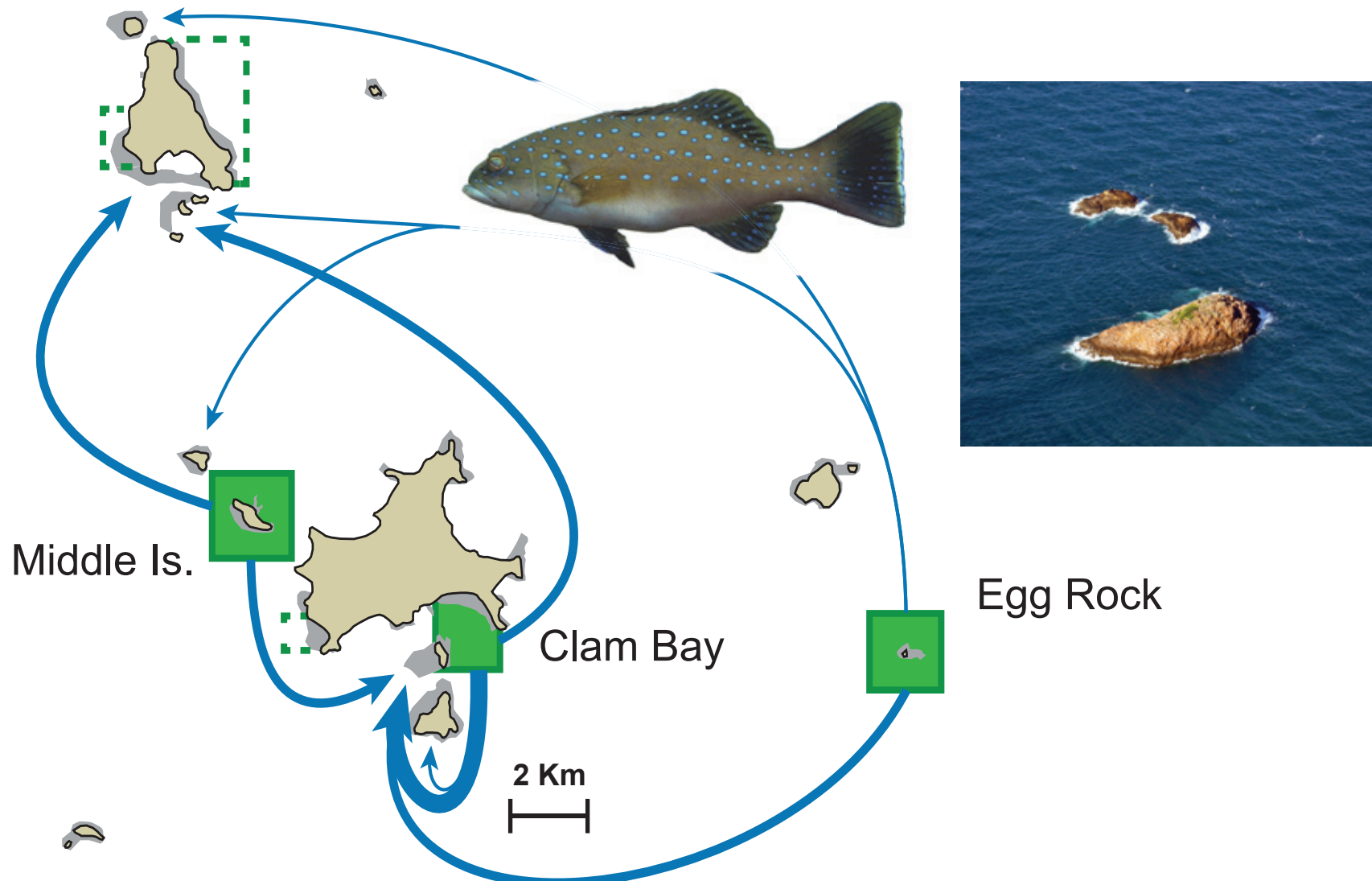
A large number of juveniles were progeny of adults in reserves

Bar cheek coral trout
Plectropomus maculatus
58 of 493 (12%) assigned
to parents in 3 green
zones...

Sampled **30%** of adults in
focal green zones
Focal greens made up
50% of the green zone
area



Do **green** zones export larvae to **blue** zones?



48 (83%) exported to fished (**blue** zone) reefs throughout Keppels

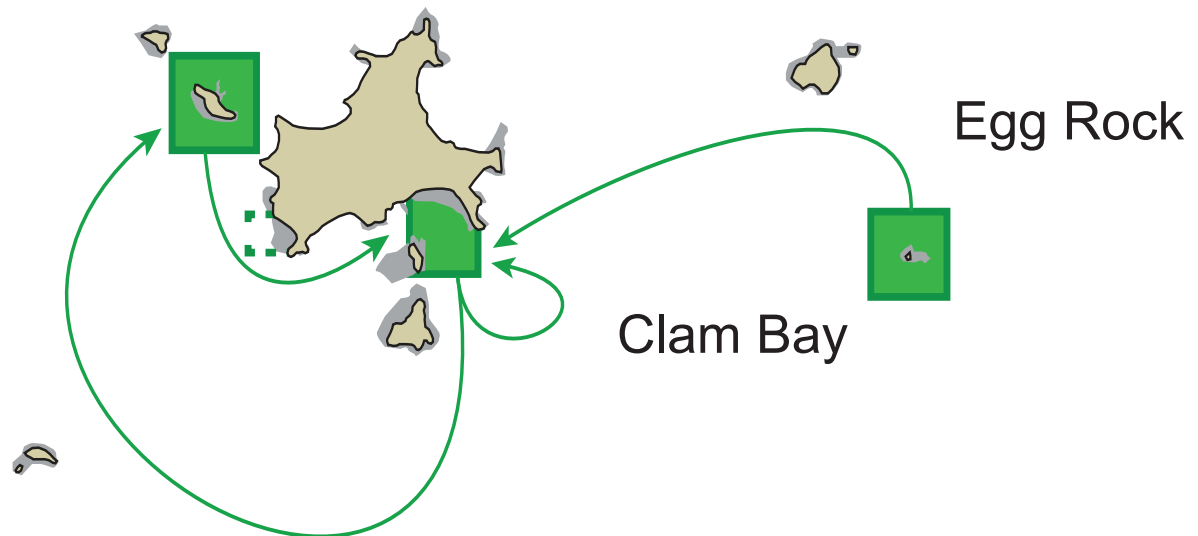
Do **green** zones protect next generation in **green** zones?



Middle Is.

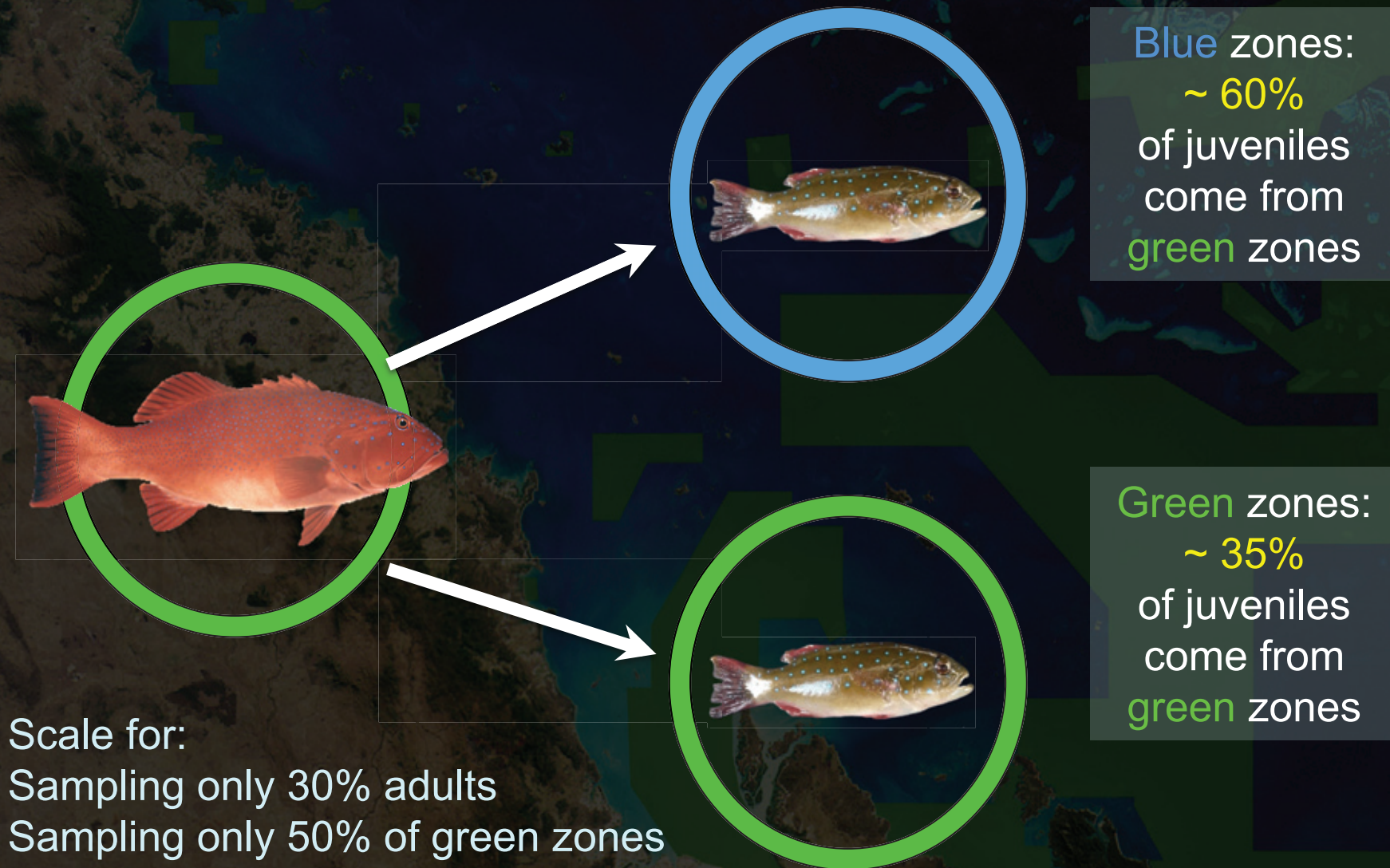


2 Km
|-----|



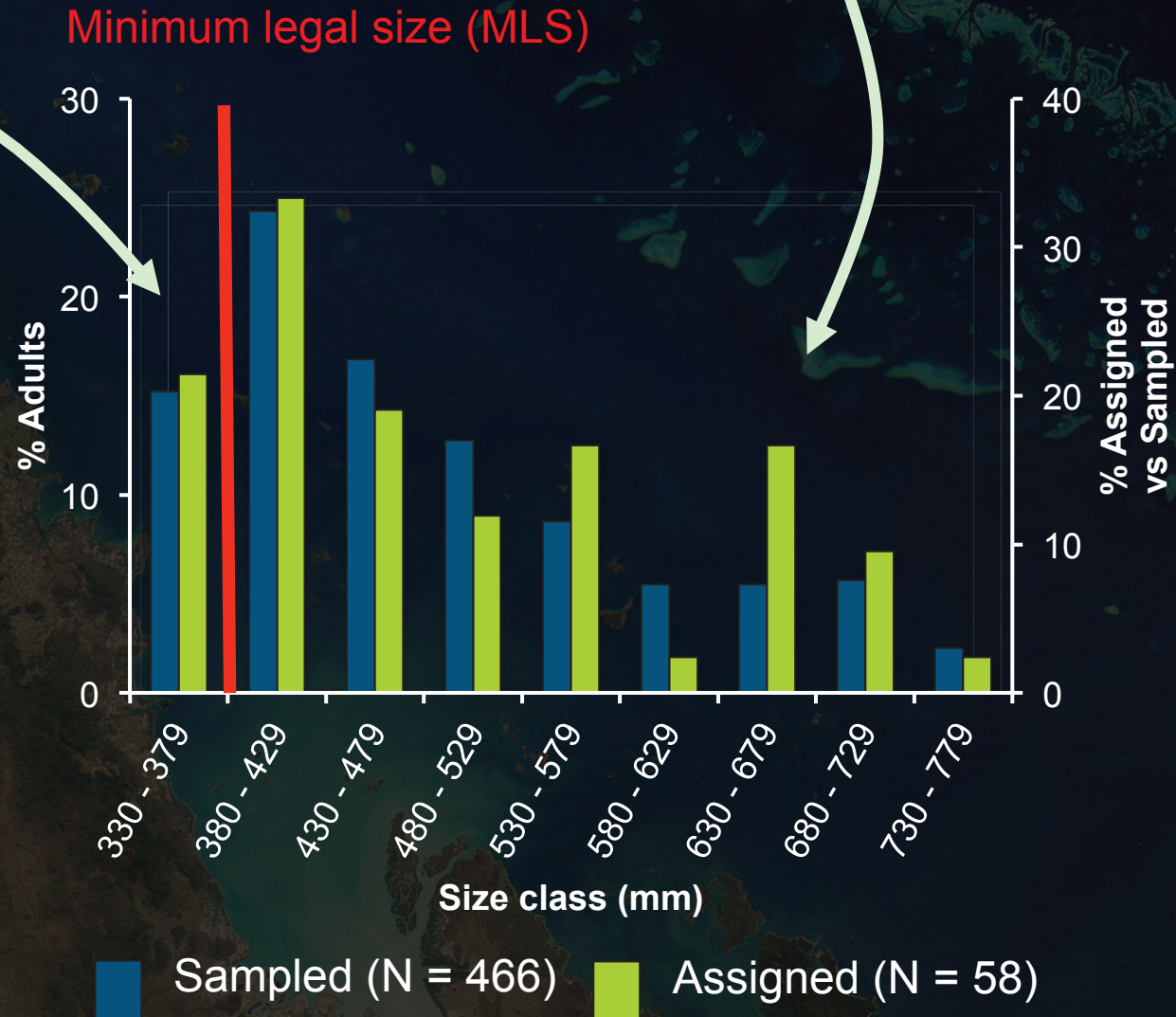
10 (17%) retained in natal **green** zones or exchanged among **green** zones

Reserves can prevent recruitment overfishing



Big fish in reserves are the most valuable source of juveniles

However, all adults contribute including fish below minimum legal size



Protecting the next generation

- 1 Reserves **can** prevent recruitment overfishing... they ensure of significant supply of juveniles to fished areas each generation.
- 2 Reserves **can** protect the next generation... significant numbers of juveniles return to protected areas.
- 3 Size limits **work!** Mature fish below the legal size limit contribute to juvenile recruitment.





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THANK YOU



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