

# Marine Larval Dispersal Between the MHI and the PMNM

Nihoa  
(Moku Manu)

Hawaiian Ridge

Middle Bank

Chautauqua Seamount

compiled by the  
**Research Committee of the  
Northwestern Hawaiian Islands  
Coral Reef Ecosystem Reserve  
Advisory Council**  
January 2022

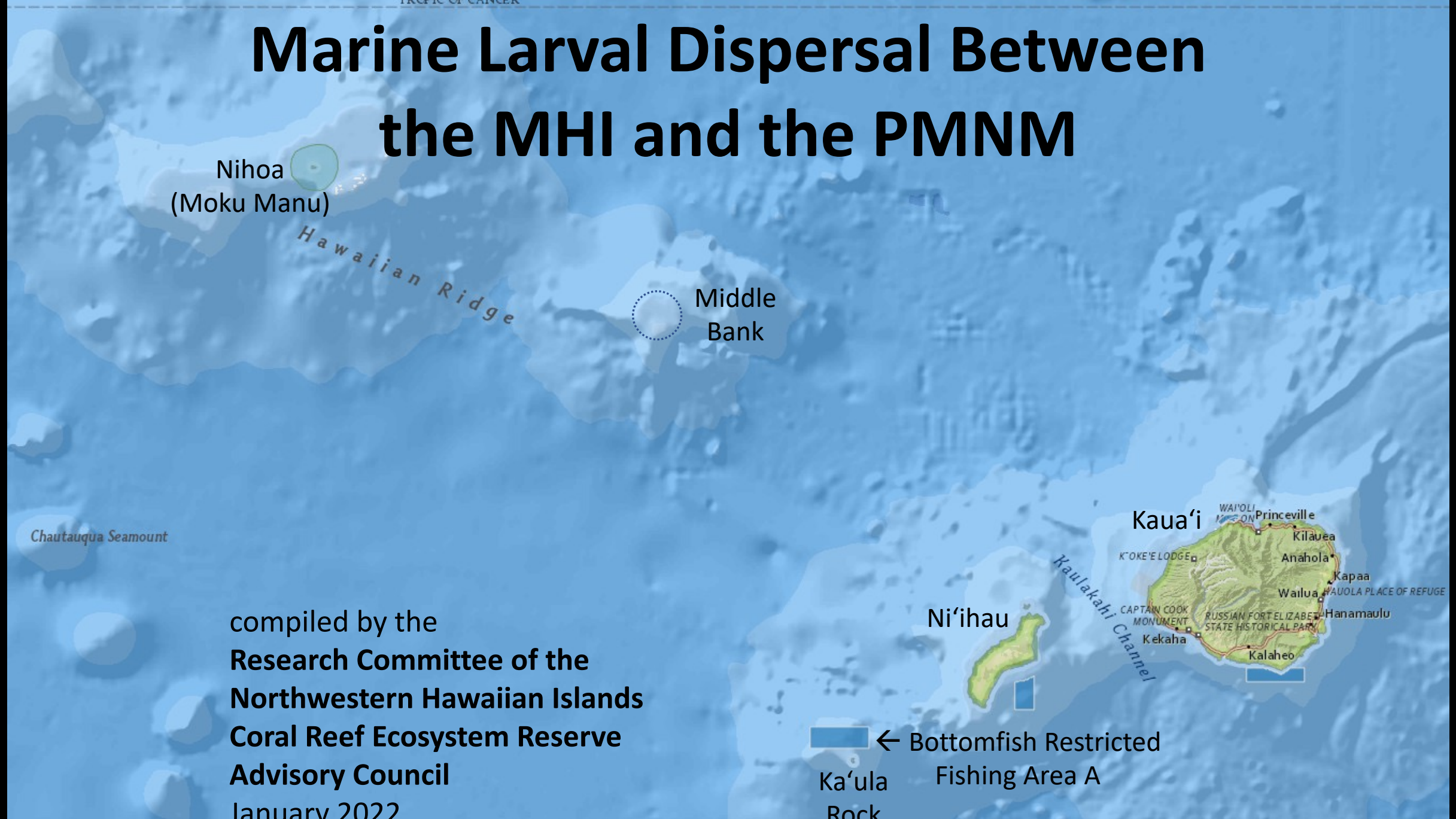
Ni'ihau

Kaua'i

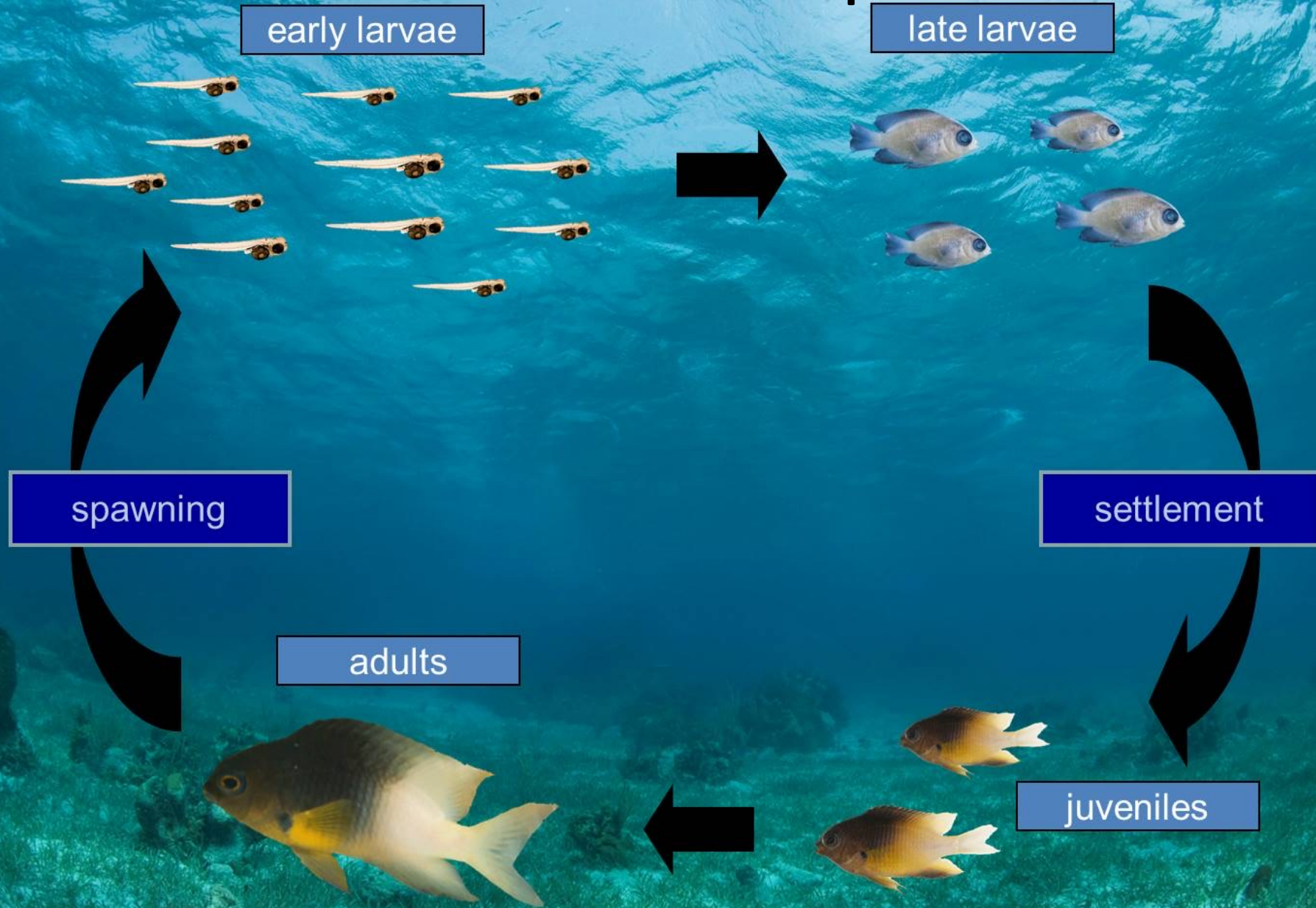
Kaulakahi Channel

← Bottomfish Restricted  
Fishing Area A  
Ka'ula  
Rock

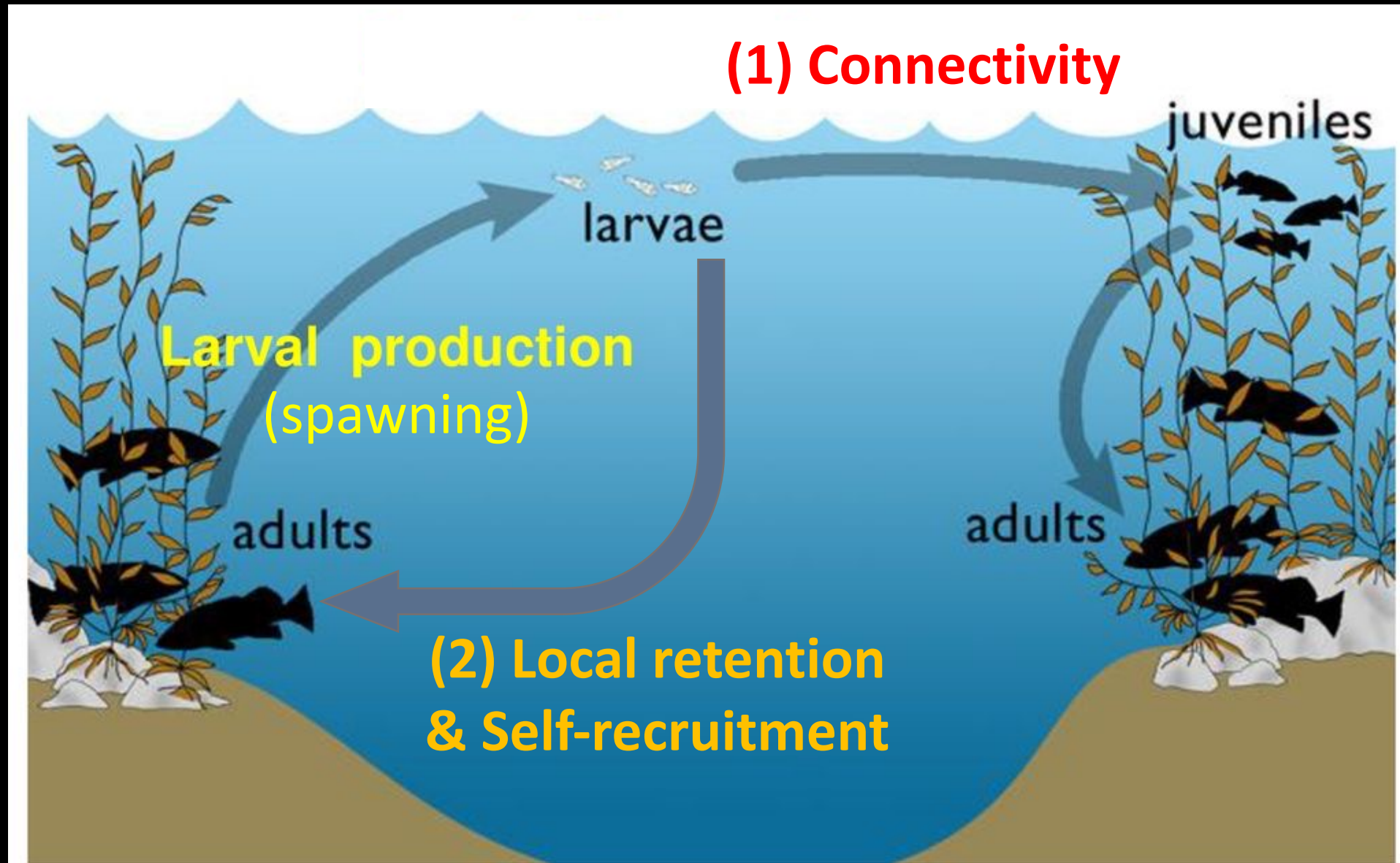
WAI'OLI MONUMENT  
Princeville  
Kilauea  
Anahola  
Kapaa  
Wailua  
HAUOLA PLACE OF REFUGE  
Hanamaulu  
Kalaheo  
RUSSIAN FORT ELIZABETH STATE HISTORICAL PARK  
Kekaha  
CAPTAIN COOK MONUMENT




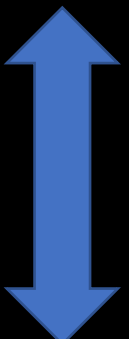

# What is larval dispersal?



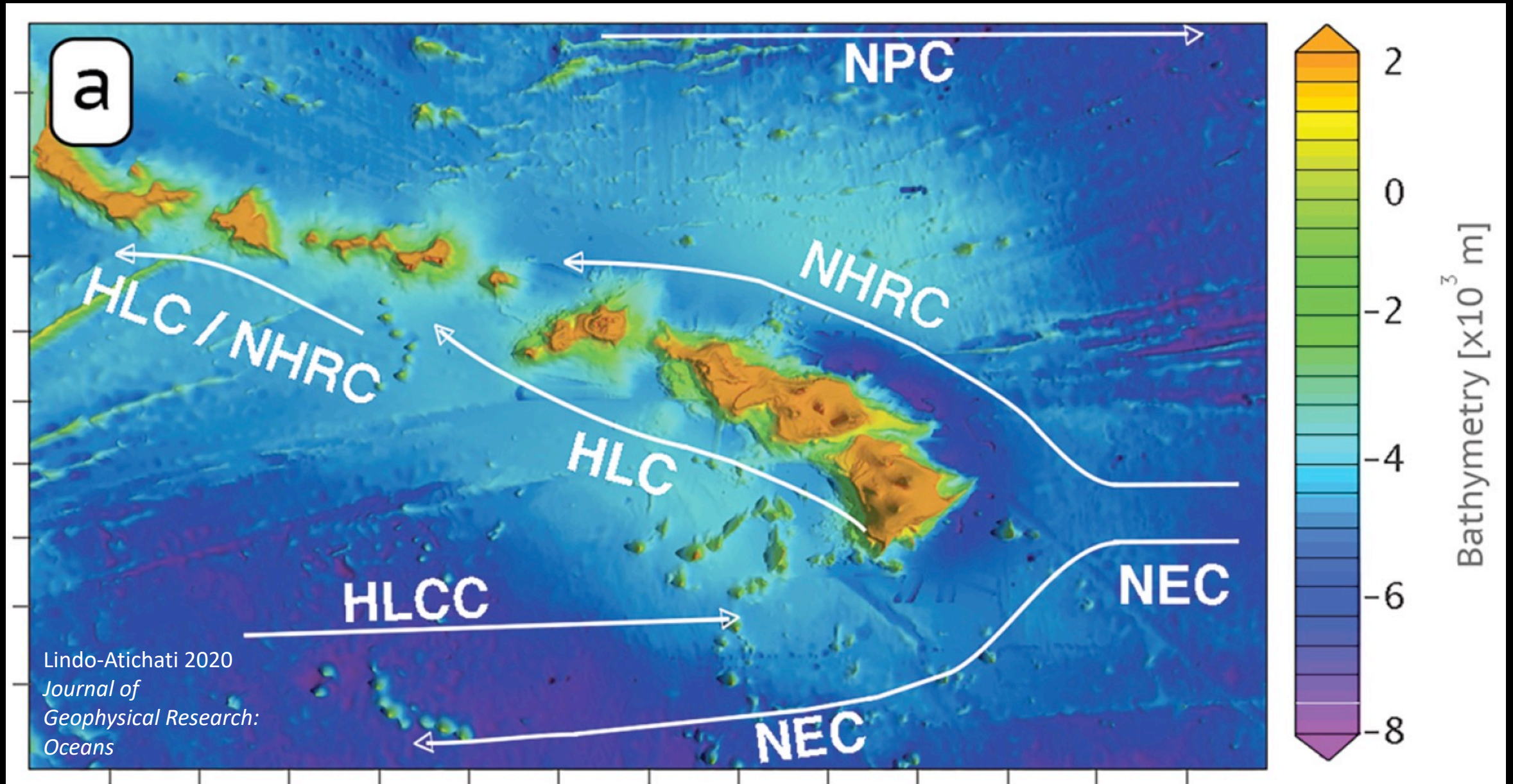
# What are possible patterns of larval dispersal?



# How is larval dispersal mapped?

	<u>availability</u>	<u>accuracy</u>
✓ biophysical models:	high	low
✓ gene flow studies:		
✗ parentage analysis:	low	high
	 <i>much needed!</i>	

# (1) Main ocean currents flow from MHI to PMNM.



## (2) By far, most larval dispersal is from MHI to PMNM.

### modeling studies:

3 larval durations (3, 6, 12 mo) modeled: Kobayashi & Polovina 2006 *Atoll Research Bulletin*

Opakapaka or Pink Snapper (*Pristipomoides filamentosus*) modeled: Vaz 2012 PhD dissertation University of Hawai'i

1 larval duration (45 d) modeled: Wren et al. 2016 *PLoS One*

### gene flow studies:

27 invertebrate & fish species: Toonen et al. 2011 *Journal of Marine Biology*

#### ***invertebrates:***

loli or sea cucumber (*Holothuria atra*): Skillings et al. 2011 *Journal of Marine Biology*

opihi or limpets (*Cellana* spp.): Bird et al. 2007 *Molecular Ecology*

#### ***fishes:***

'Alo'iloa or Hawaiian Dascyllus (*Dascyllus albisella*): Ramon et al. 2008 *Marine Biology*

Hāpu'u or Hawaiian Grouper (*Epinephelus quernus*): Rivera et al. 2011 *Journal of Marine Biology*

Kole or Goldring Bristletooth (*Ctenochaetus strigosus*): Eble et al. 2009 *Marine Biology*

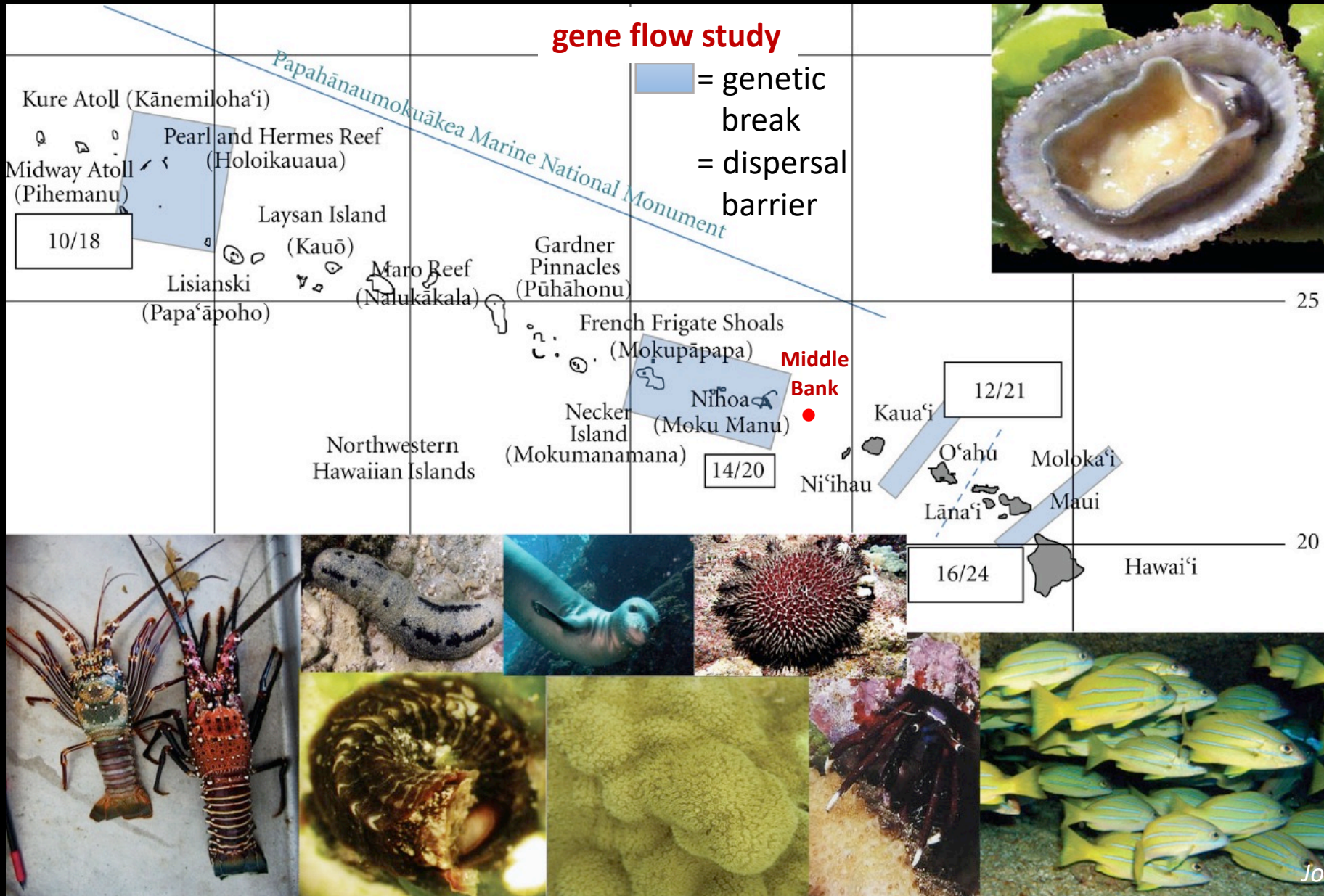
Lau'īpala or Yellow Tang (*Zebrasoma flavescens*): Eble et al. 2011 *Marine Ecology Progress Series*

Maiko or Blueline Surgeonfish (*Acanthurus nigroris*): Dibattista et al. 2011 *Journal of Marine Biology*

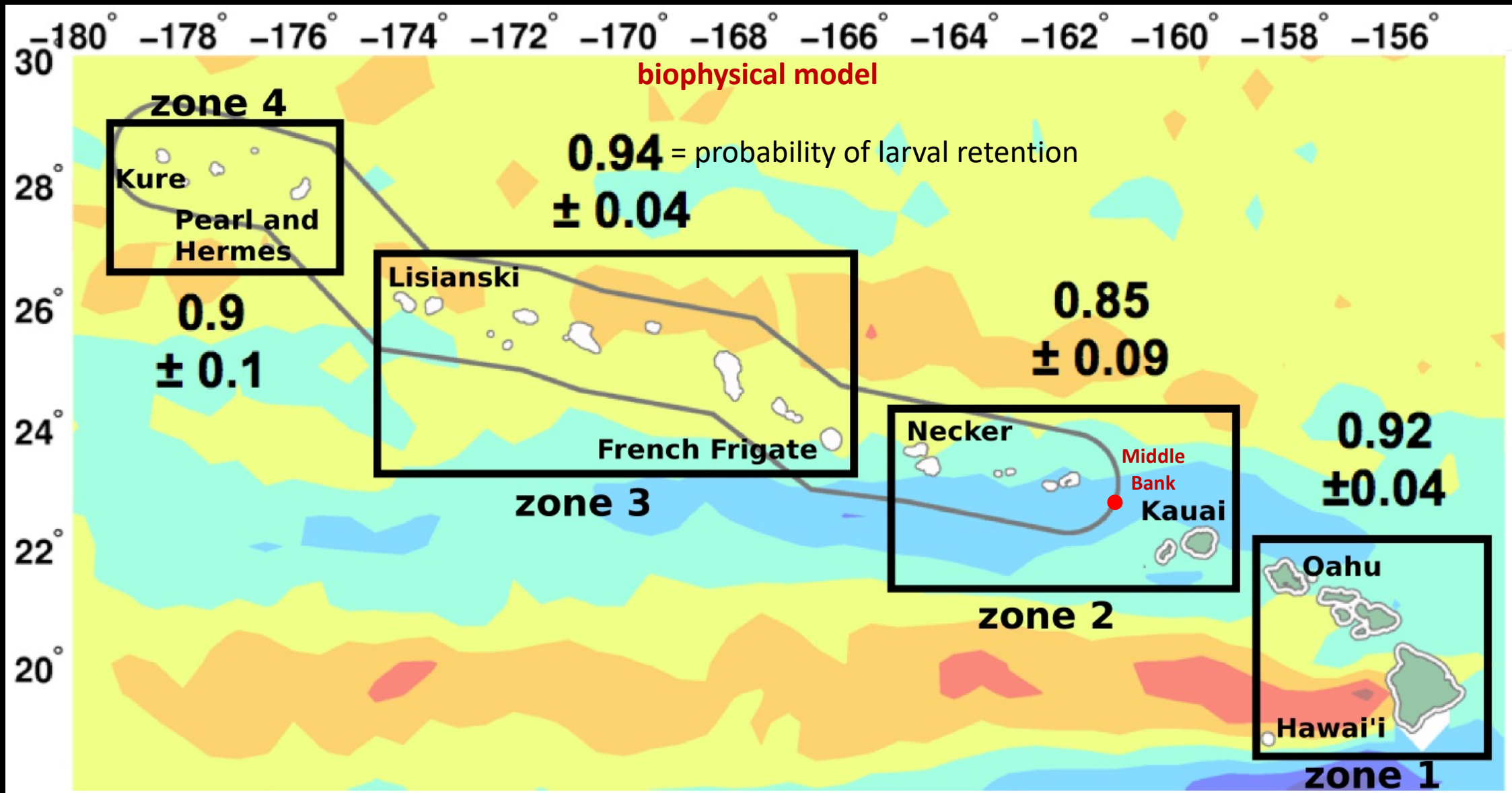
Moano or Manybar Goatfish (*Parupeneus multifasciatus*): Szabó et al. 2014 *Bulletin of Marine Science*

Threespot Chromis (*Chromis verater*): Tenggardjaja et al. 2014 *PLoS One*

# (3) There are zones of local larval retention.



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# (4) possible Middle Bank link between MHI & PMNM



Opakapaka  
or Pink Snapper  
(*Pristipomoides filamentosus*)

