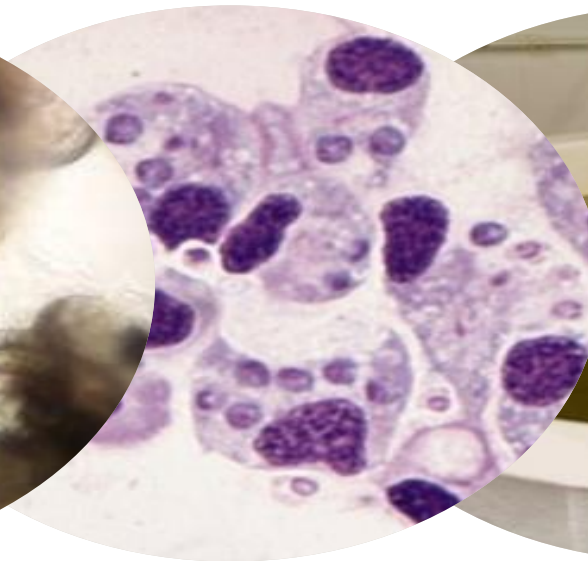
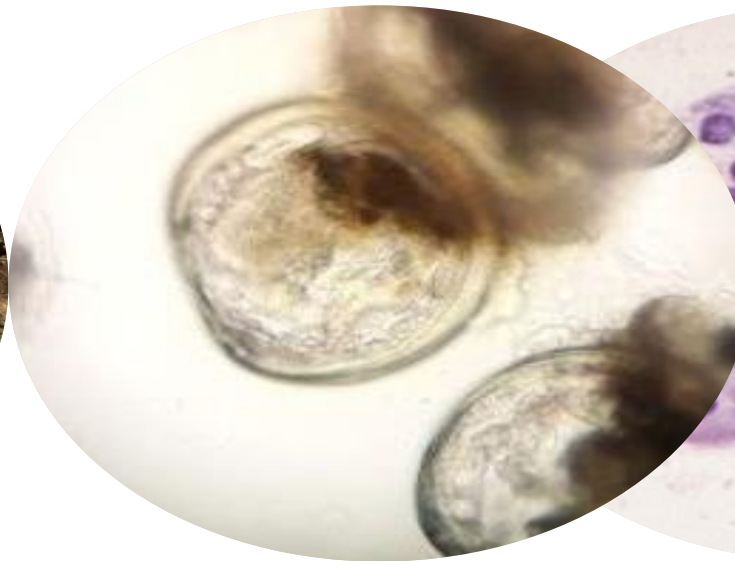


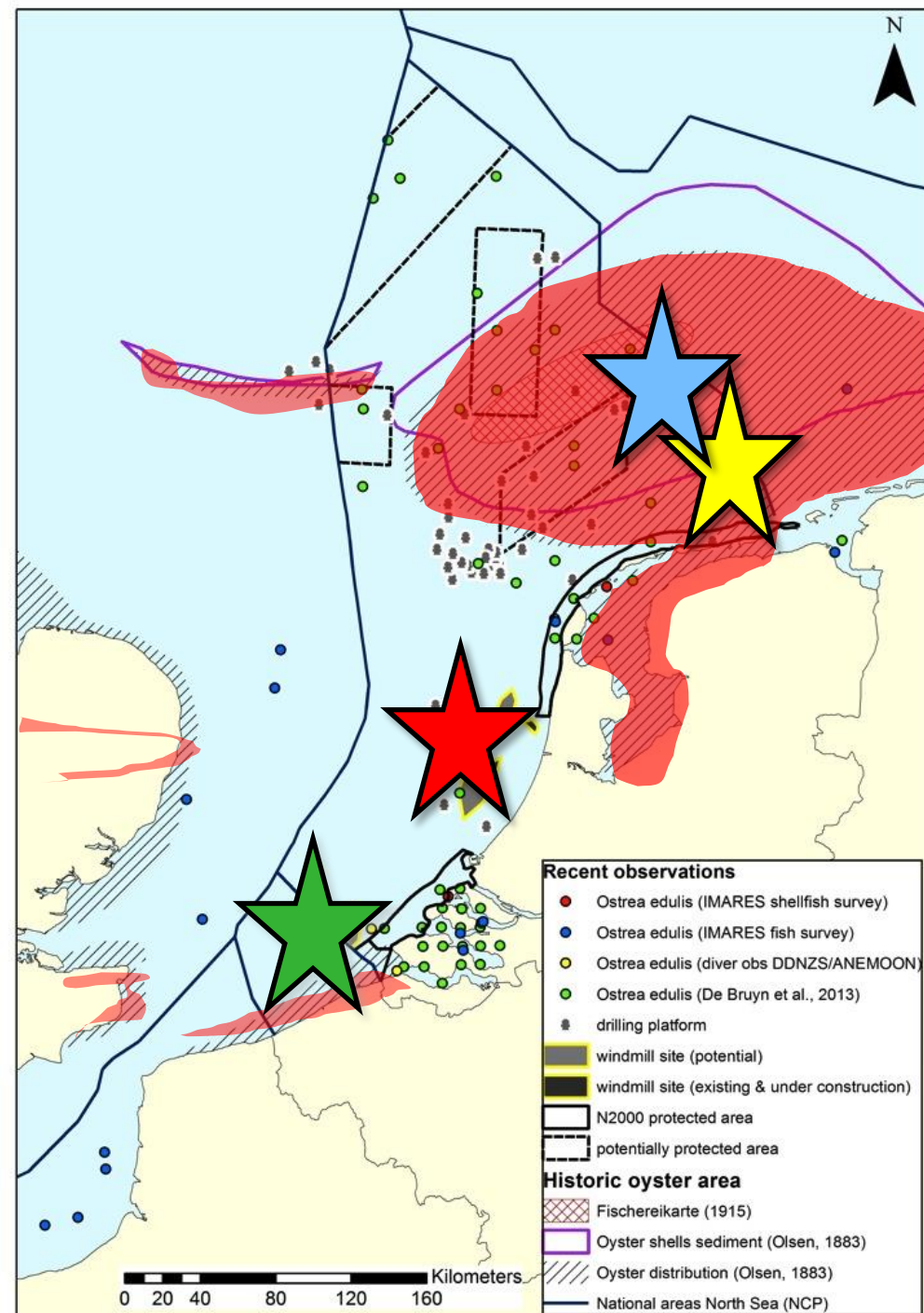
Hatchery production of *Bonamia*-free and -resilient flat oysters (*Ostrea edulis* L.)

Pauline Kamermans, Ainhoa Blanco, Pim van Dalen,
Nienke Bakker, Marc Engelsma, Pascale Jacobs,
Marco Dubbeldam, Manel Vera, Paulino Martinez



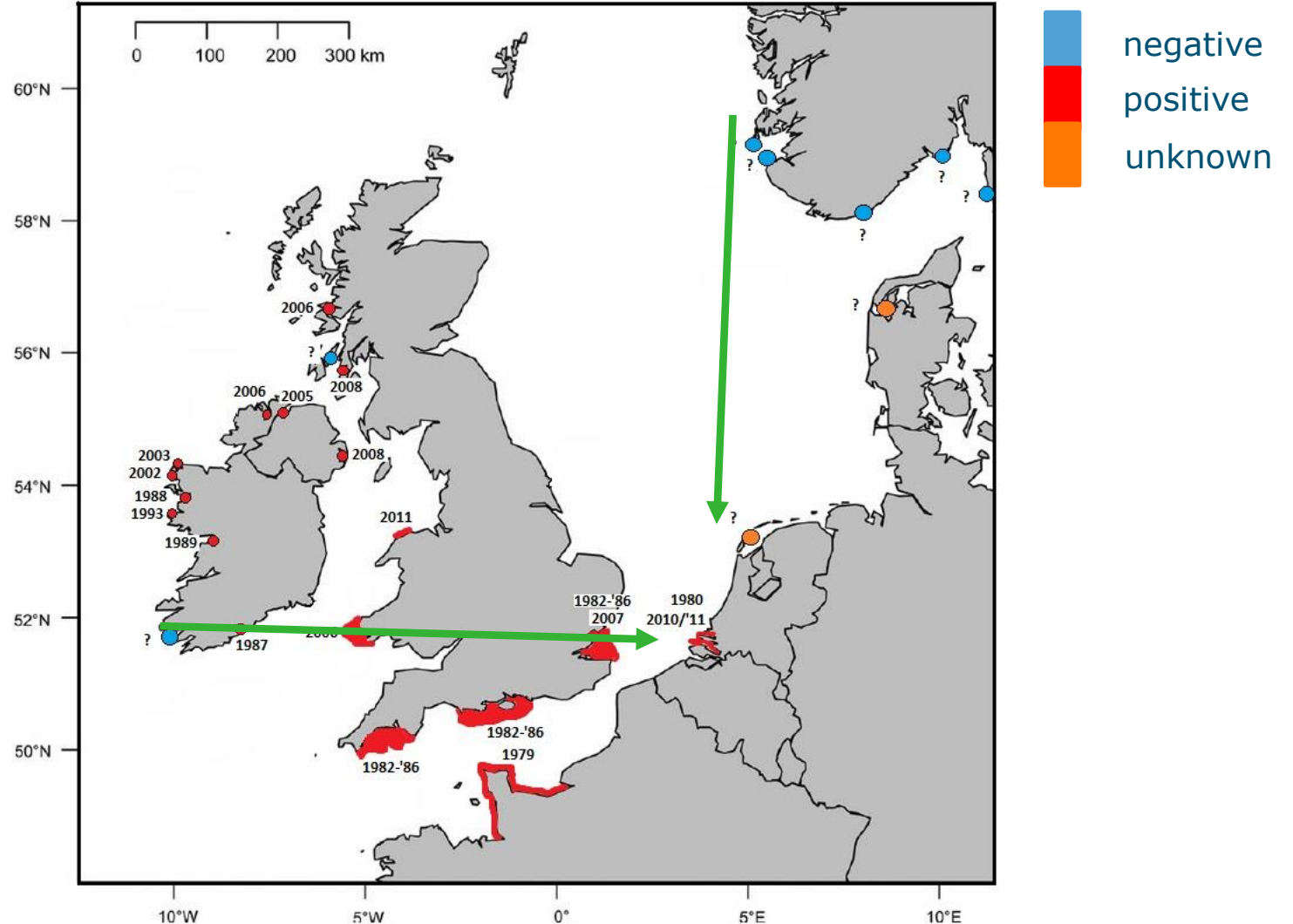
Flat oyster restoration projects in Dutch North Sea

- ❖ Areas *Ostrea edulis* extinct: treat as *Bonamia*-free area
- ❖ Sourced oysters from disease free areas



Bonamia distribution in NW Europe

- ❖ Sourced oysters from Ireland and Norway
- ❖ Oysters from *Bonamia* free areas susceptible to the disease
- ❖ Need for *Bonamia*-free and *Bonamia*-resilient oysters
- ❖ Oysters in SW Netherlands in *Bonamia* infected area



Produce *Bonamia*-free oysters with broodstock from infected area



13000652 Bonamia complex w/HR Poolen Kinnemaar																			
Inhoud: Result				Inhoud: Result				Inhoud: Result				Inhoud: Result							
Volgnr	Sample - code	Inhoud	PCR Bon	Volgnr	Sample - code	Inhoud	PCR Bon	Volgnr	Sample - code	Inhoud	PCR Bon	Volgnr	Sample - code	Inhoud	PCR Bon				
1	Oe19	larven	undet	negatief	2	17A	larven	undet	negatief	3	Oe21	larven	undet	negatief	4	16A	larven	undet	negatief
5	16B	larven	undet	negatief	6	15	larven	undet	negatief	7	Oe21b	larven	undet	negatief	8	14B	larven	undet	negatief
9	17B	larven	undet	negatief	10	14A	larven	undet	negatief	11	18A	larven	undet	negatief	12	28	larven	undet	negatief
13	wk20 spat nieuw	broed	undet	negatief	14	wk20 spat oud	broed	undet	negatief	15	wk20 spat oud	broed	undet	negatief					

Non-lethal screening of broodstock

Use *Bonamia* free individuals (green) as broodstock

LIMSNUMMER : 19010789				
volgnr	sample - code	inhoud	PCR Bon	Ct
1	Oe19	larven	undet	negatief
2	17A	larven	undet	negatief
3	Oe21	larven	undet	negatief
4	16A	larven	undet	negatief
5	16B	larven	undet	negatief
6	15	larven	undet	negatief
7	Oe21b	larven	undet	negatief
8	14B	larven	undet	negatief
9	17B	larven	undet	negatief
10	14A	larven	undet	negatief
11	18A	larven	undet	negatief
12	28	larven	undet	negatief
13	wk20 spat nieuw	broed	undet	negatief
14	wk20 spat oud	broed	undet	negatief
15	wk20 spat oud	broed	undet	negatief

Bonamia-free larvae and spat (green) produced in hatcheries

Are selected *Bonamia*-free oysters also resilient?

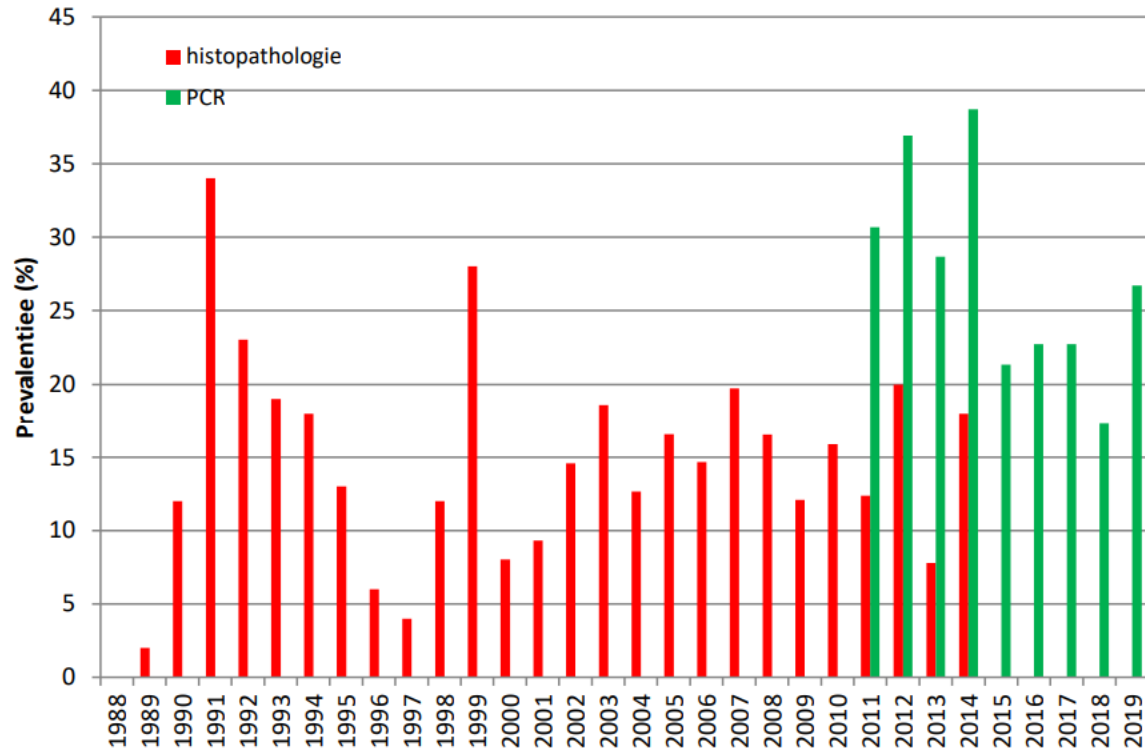
Off spring of two European oyster broodstocks tested for presence of resilient markers:

1. *Bonamia*-free oysters from *Bonamia*-free Oosterschelde broodstock through non-destructive pre-selection
2. *Bonamia*-naïve oysters from broodstock discovered in Wadden Sea where *Bonamia* has not been detected

Oyster type	Resilient markers
Bonamia free (RvY)	25.0 %
Bonamia naïve (NIOZ)	3.7 %

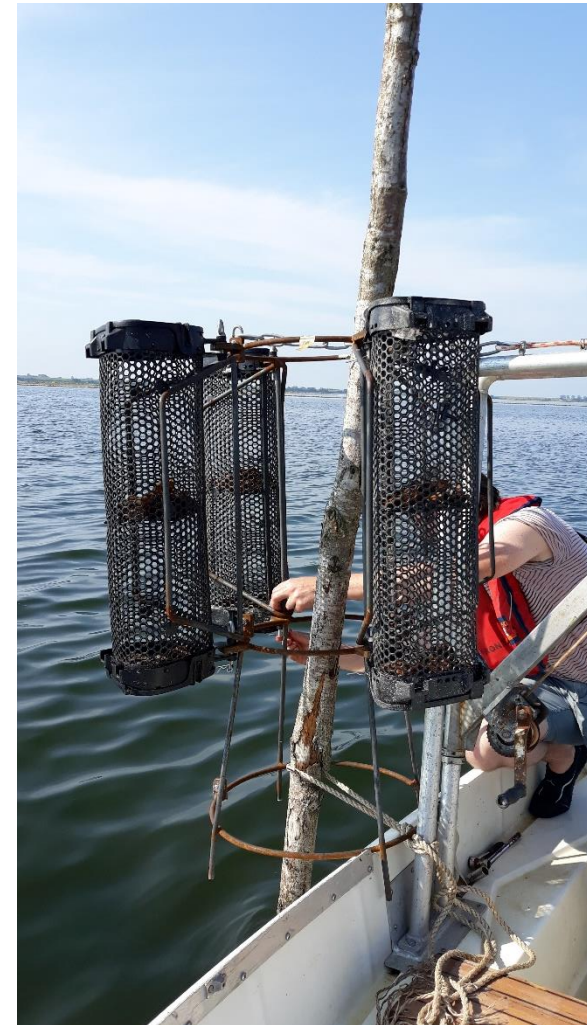


Challenge test with *Bonamia*-free and resilient oysters



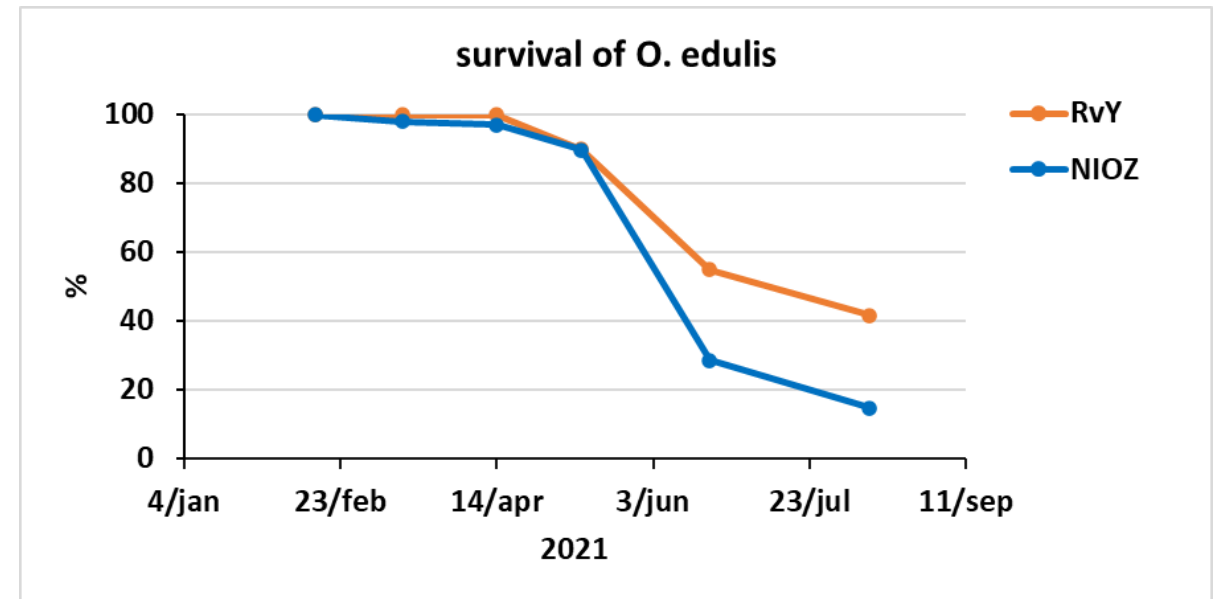
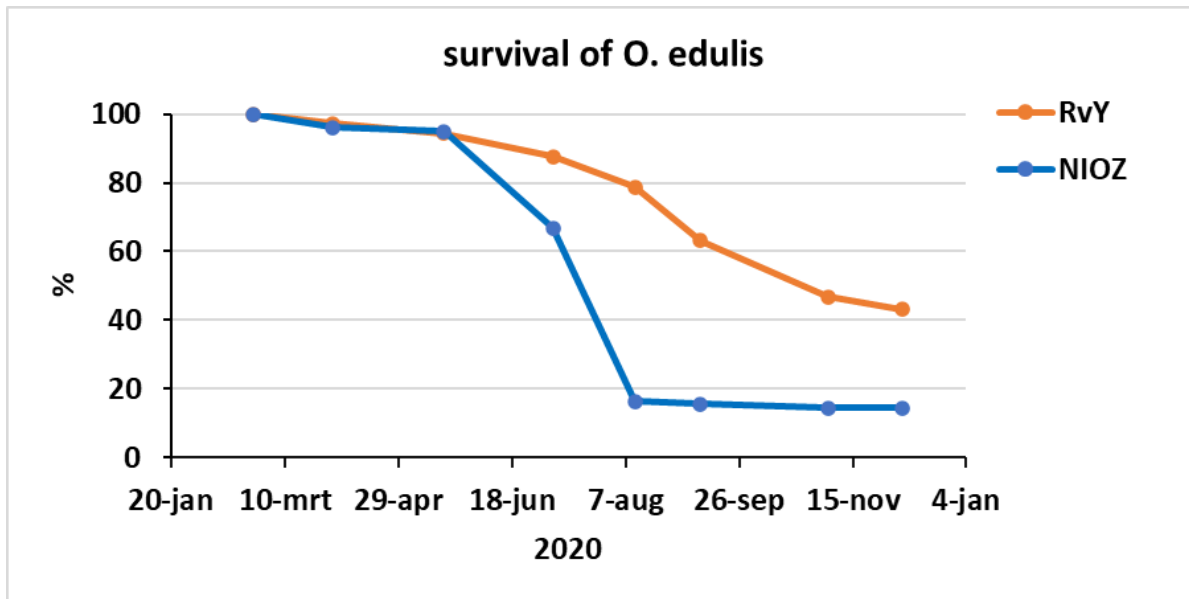
Bonamia in Lake Grevelingen

Haenen & Engelsma (2020)



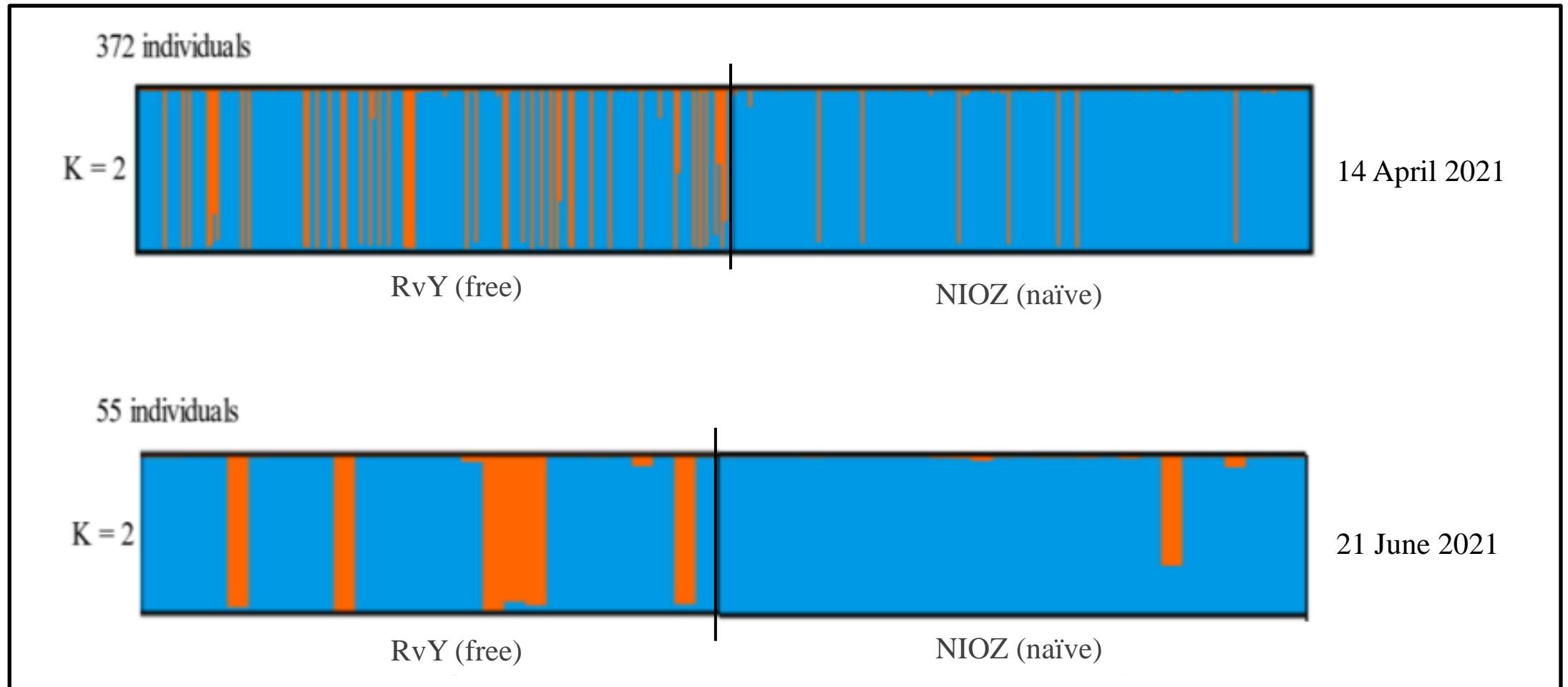
Challenge test with *Bonamia*-free and resilient oysters (orange) better than *Bonamia*-naïve and not resilient oysters (blue)

Survival of *Bonamia*-free and resilient oysters (orange) better than *Bonamia*-naïve and not resilient oysters (blue)



Do better surviving oysters also have resilient markers?

More resilient (orange) in RvY group and more not resilient oysters (blue) in NIOZ group



Bonamia-free and resilient oysters conclusions

❖ Developed method to screen broodstock from *Bonamia* area and produce *Bonamia*-free oysters



❖ *Bonamia*-free oysters contain more resilient markers and show more survival in *Bonamia* area than naïve individuals



❖ No *Bonamia* detected in *Bonamia*-free or *Bonamia*-naïve oysters

❖ Why was this not detected (no *Bonamia* present)?

❖ Why did naïve oysters show more mortality (not adjusted to new environment)?

❖ Other explanations???



Thanks you for
your attention

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