Session 2

Biodiversity Conservation

The results of reproductive and genetic research on Okinawa rail (*Gallirallus okinawae*) and its application for a captive breeding program

Manabu ONUMA, DVM, PhD
Ecological Genetics Analysis Section
Center for Environmental Biology and Ecosystem
National Institute for Environmental Studies

Options for wildlife conservation

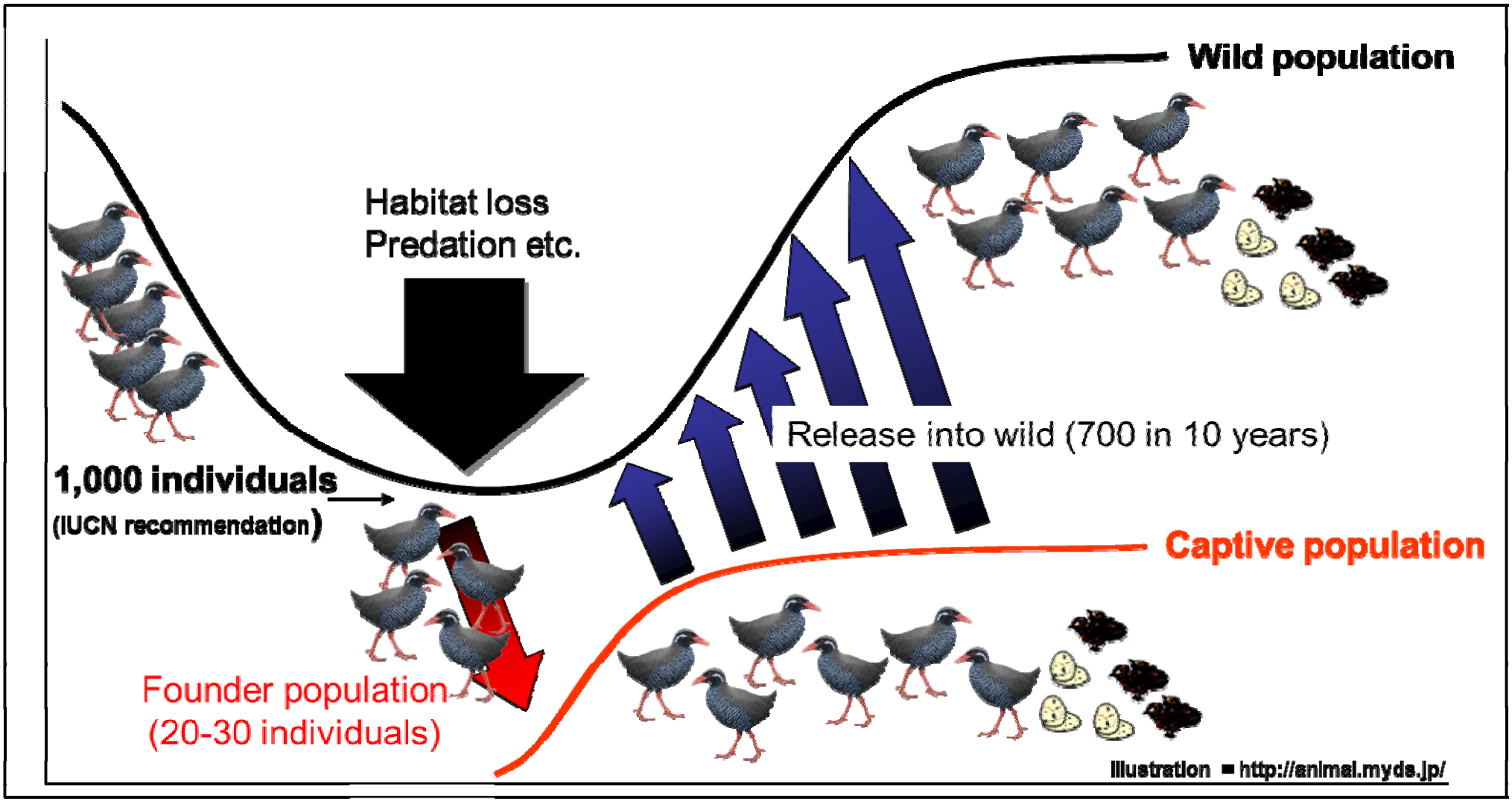
IN-SITU Conservation

EX-SITU Conservation

Wild — Sanctuary in range — Captivity in range — Sanctuary out of range — Captivity out of range — Genetic resource banks

Modified from Stanley-Price 1993

Captive breeding program for Okinawa rail

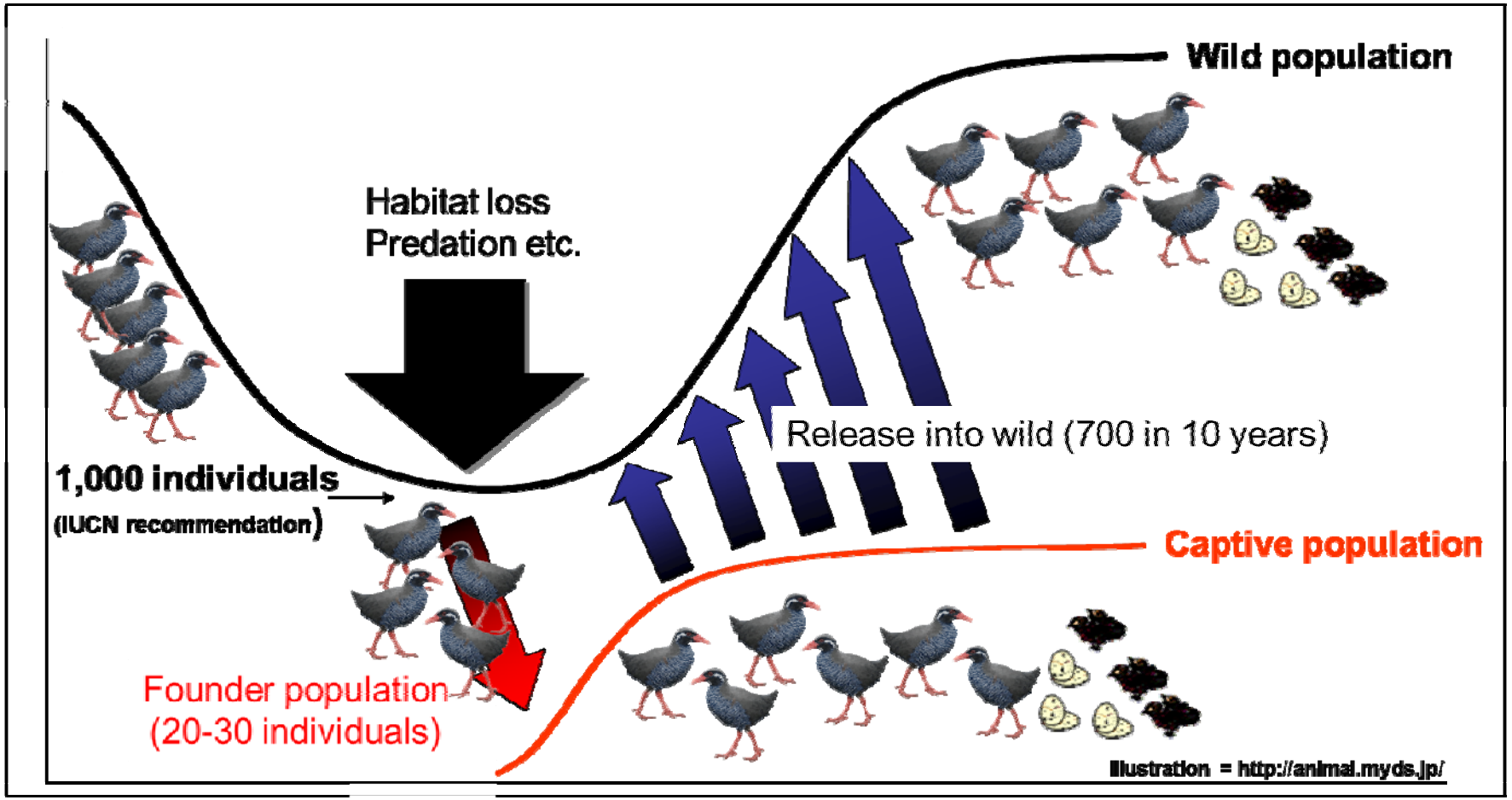


Essential information for successful captive breeding program

1, Efficient and stable reproduction : Breeding season, breeding age

(Onuma et al., 2011)

2, Maintaining genetic diversity : Evaluate genetic diversity



Sample collection

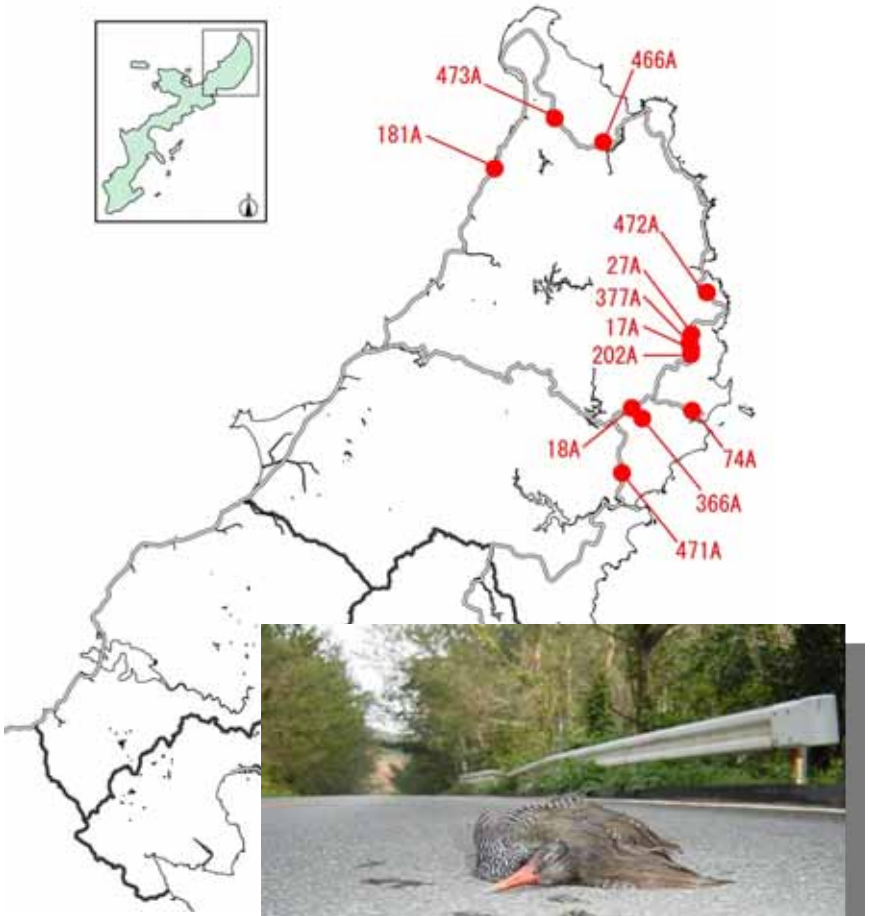


Photo by Ministry of Environment

Time capsule building in NIES

Postmortem examination

Age determination criteria of the Okinawa rail

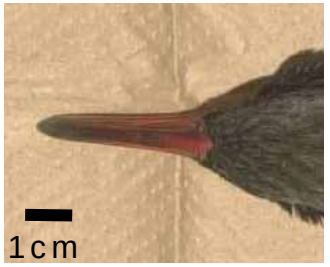
Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep. Oct. Nov. Dec.

Juvenile

Subadult

Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep. Oct. Nov. Dec.

Adult

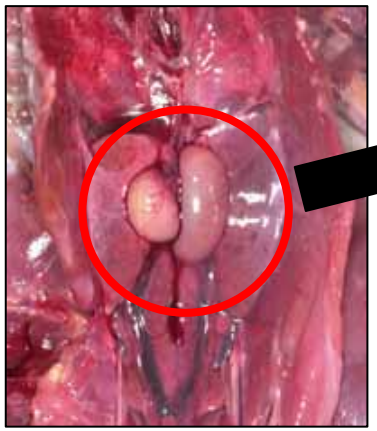


Adult born a year before (blackish beak)

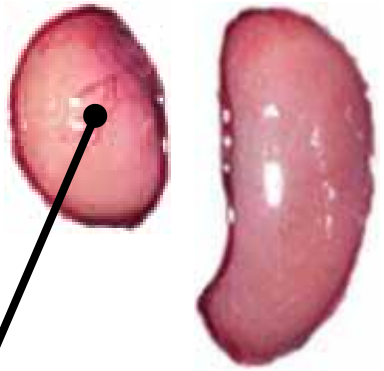
Full adult

Methods (Testis observation)

Testis isolation from 30 males
(2005-2010)

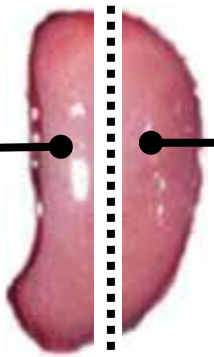


Right Left



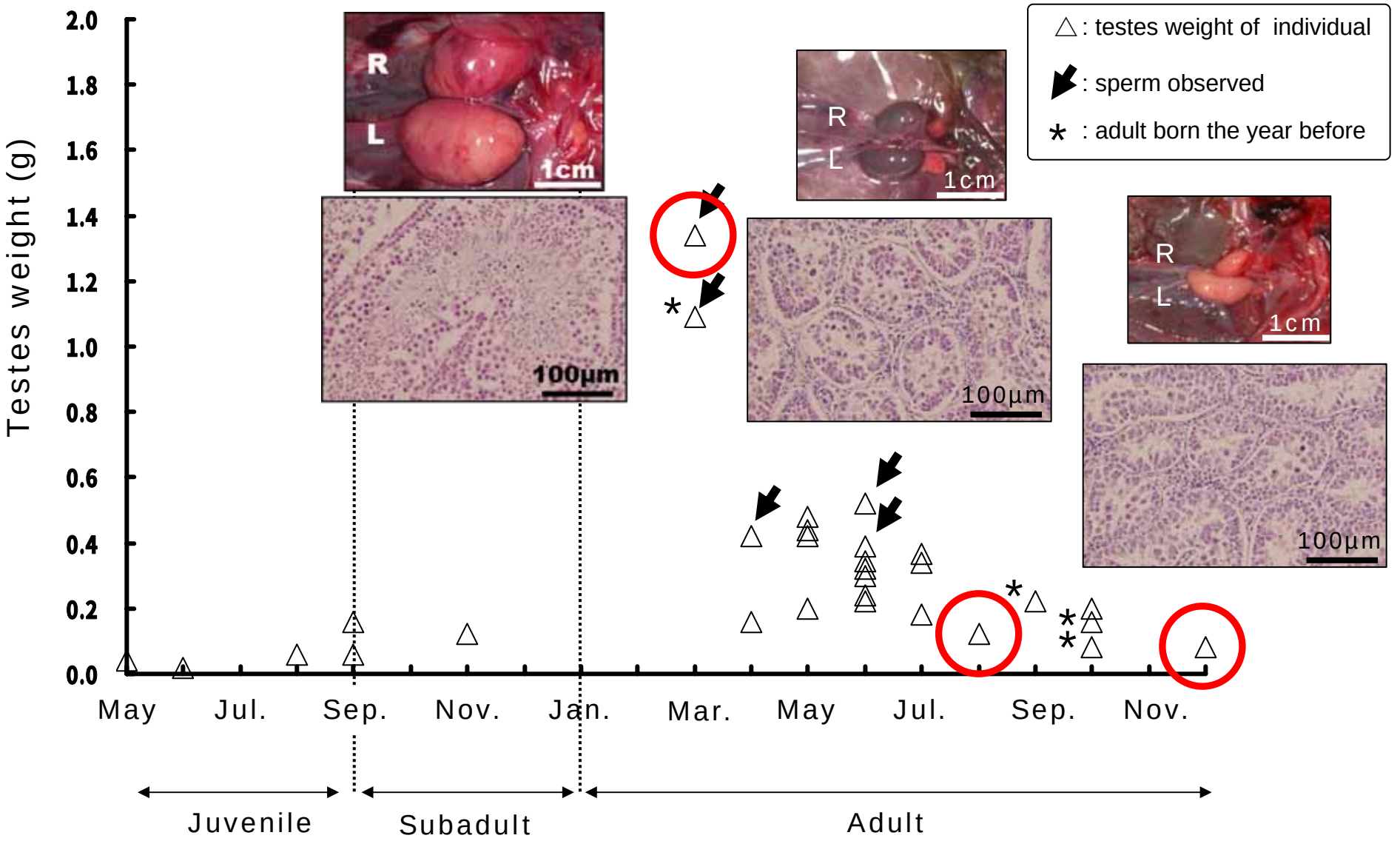
Measuring weight

Cryopriservation

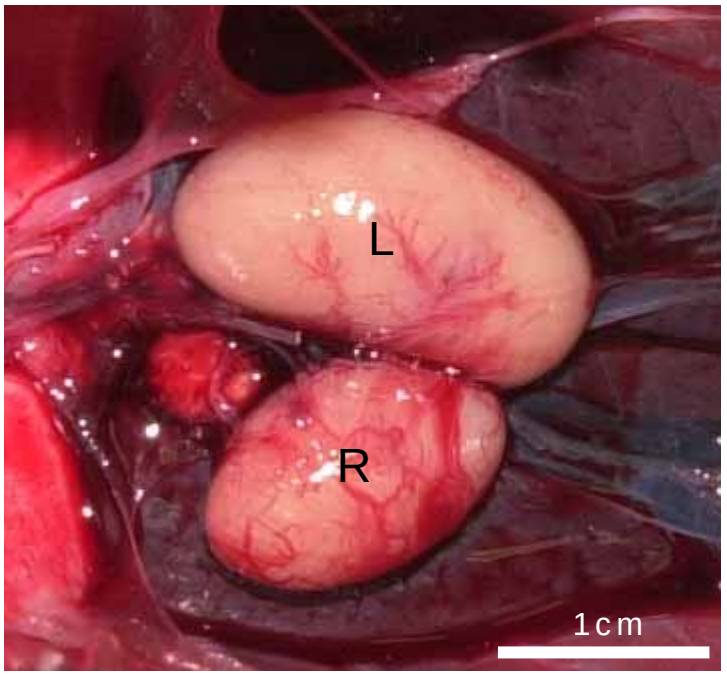


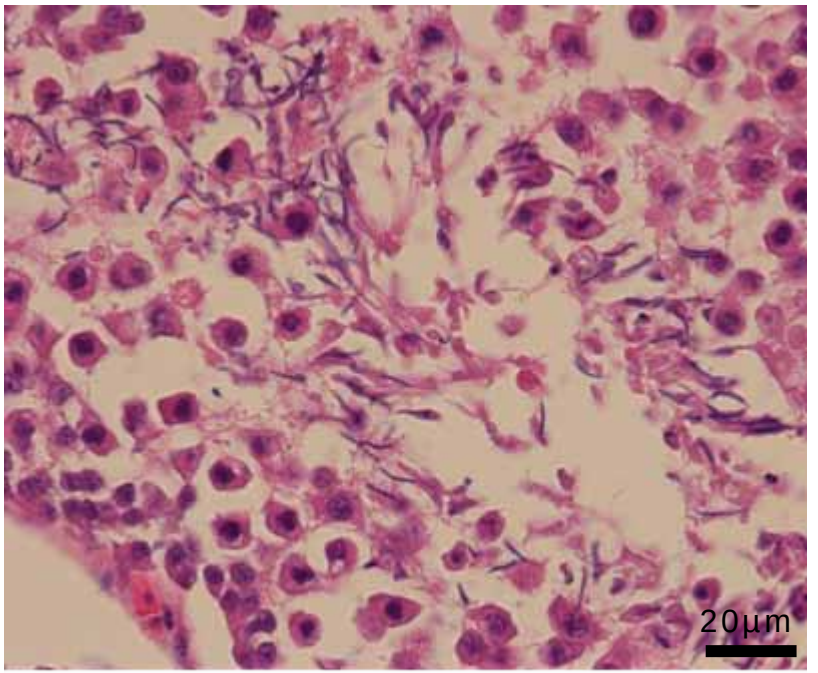
Histological observation

Temporal changes in testis weight of Okinawa rail



Gross and histrogical observation of testis in the first breeding season





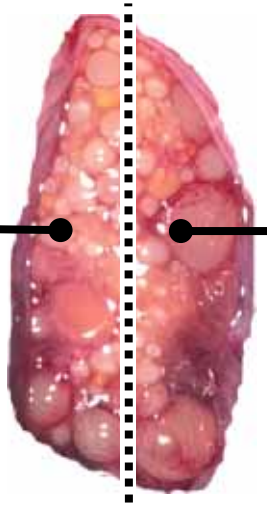
Semen collection of Okinawa rail

Methods (Ovary observation)

Ovary isolation from 20 females
(2005-2010)

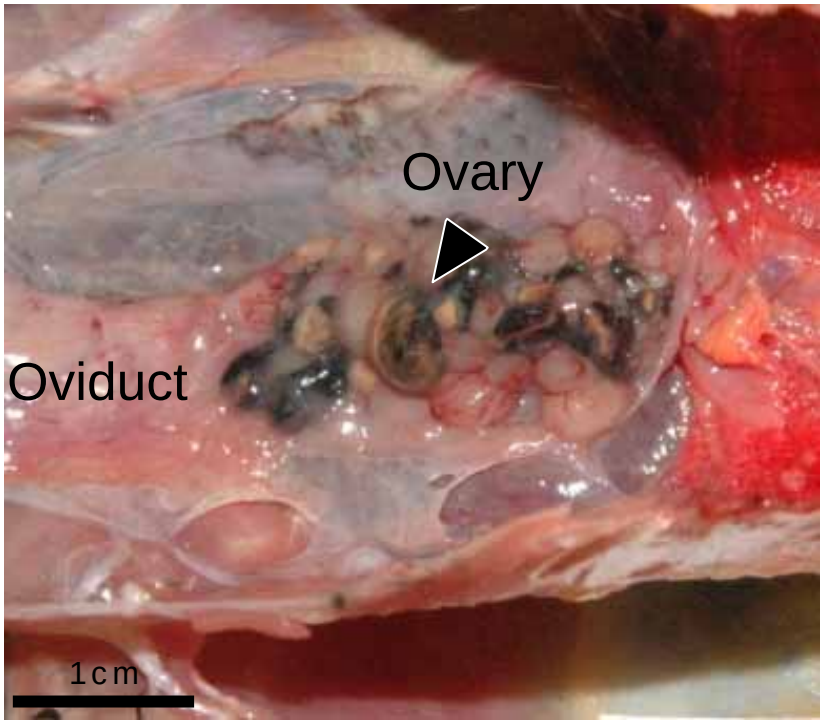
Measuring weight

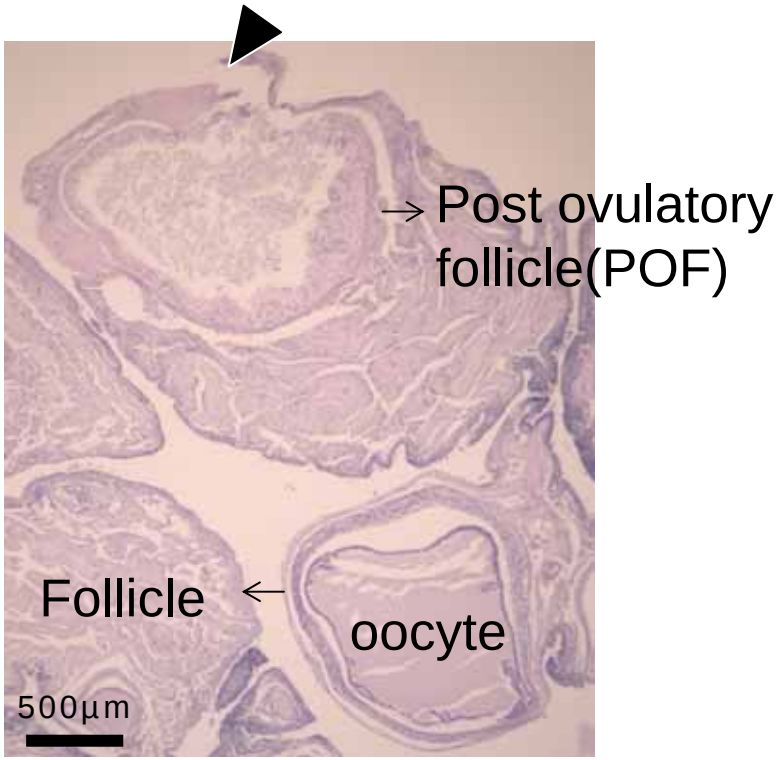
Cryopriservation



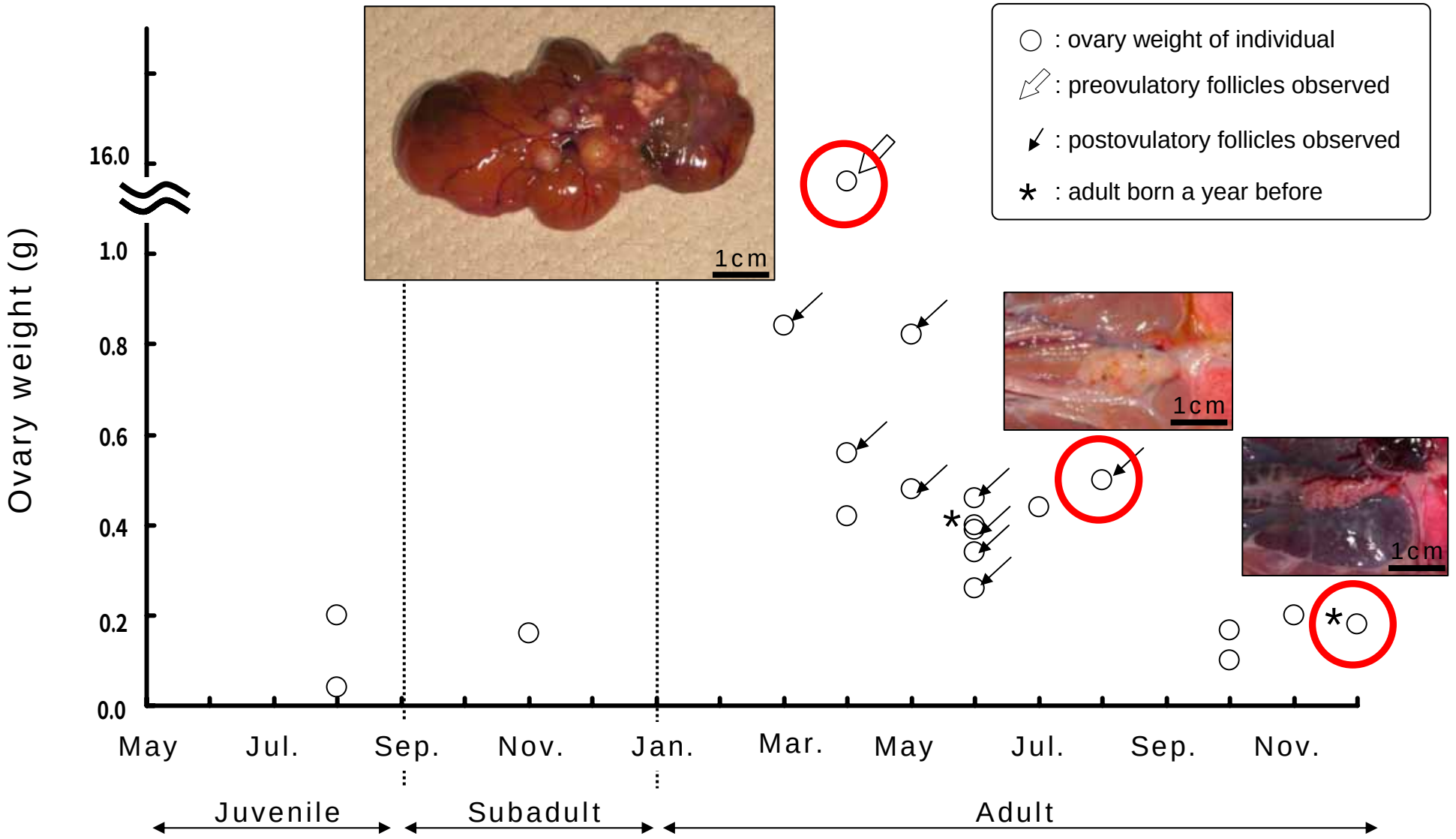
Histological observation

Gross and histological observation of ovary



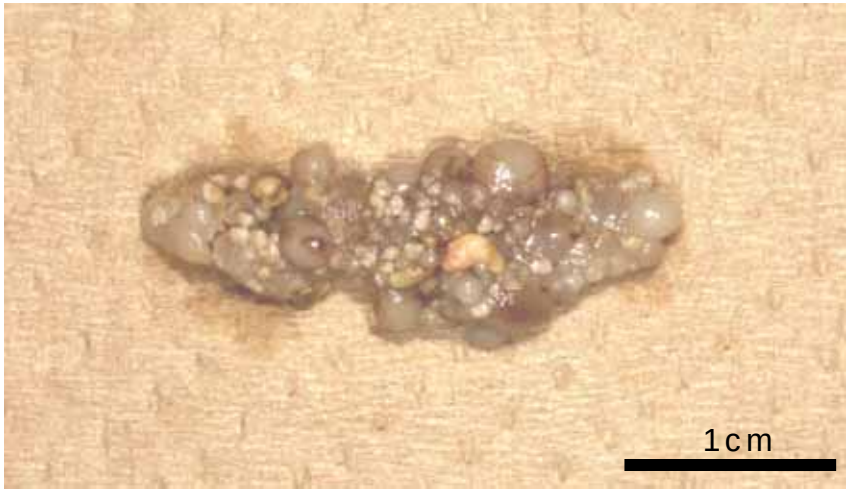


Temporal changes in ovary weight of Okinawa rail

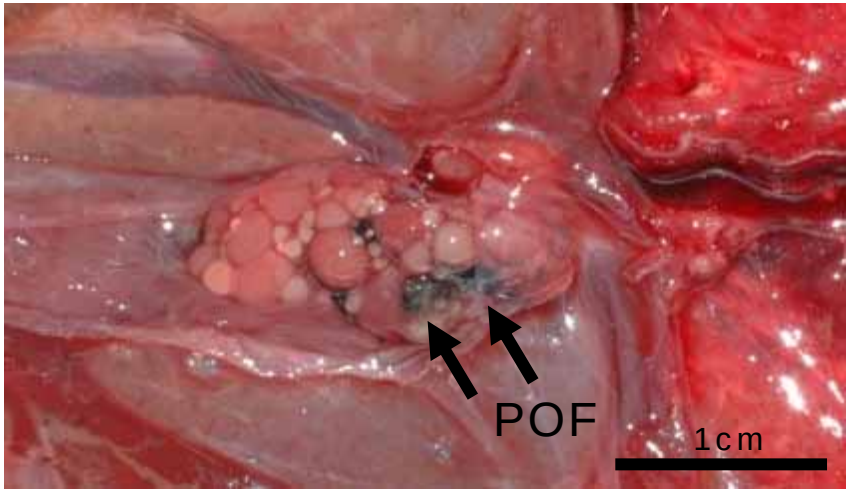


Gross observation of ovary in June

Adult born a year before



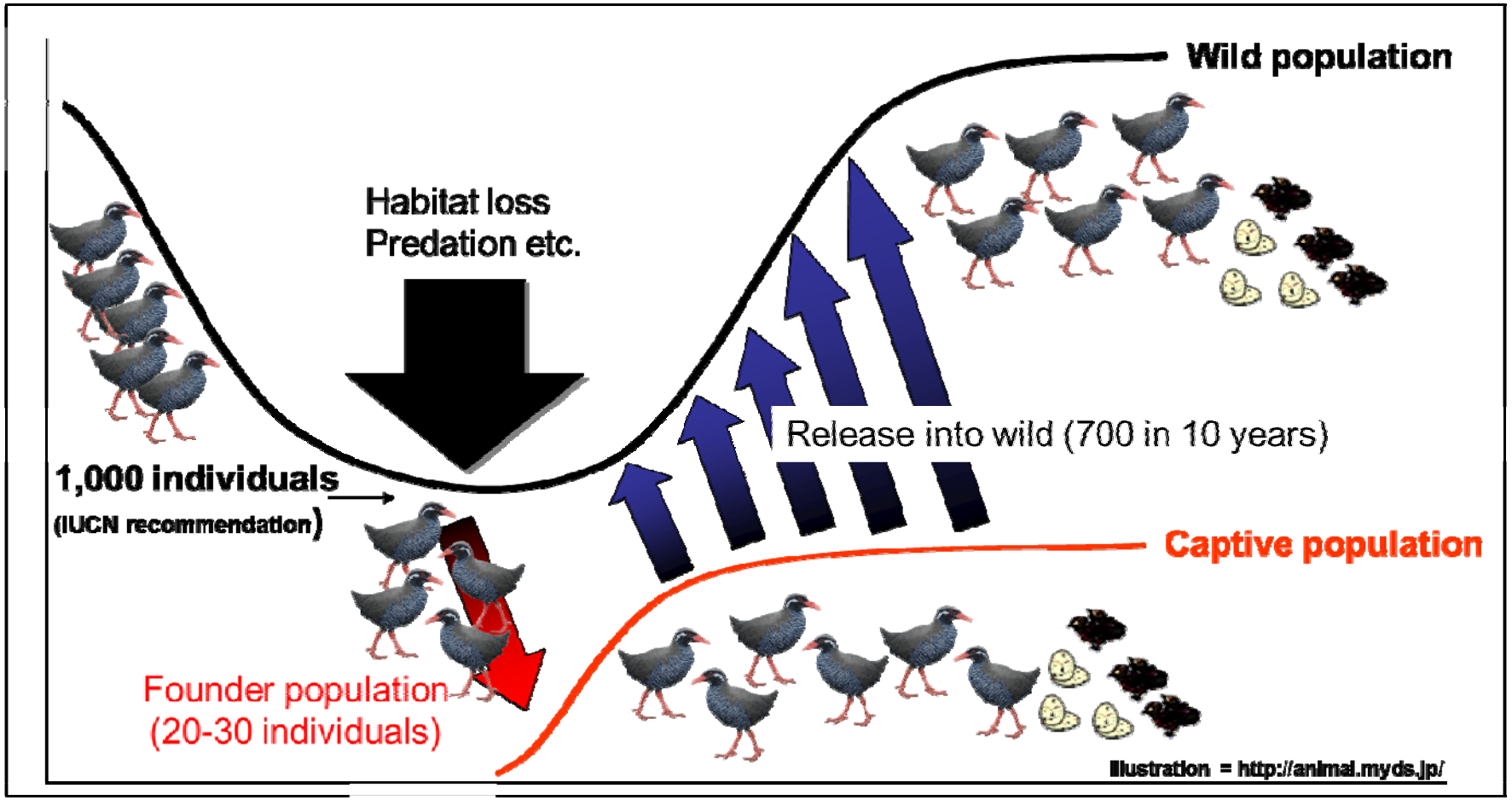
Adult



Essential information for successful captive breeding program

1, Efficient and stable reproduction : Breeding season, breeding age

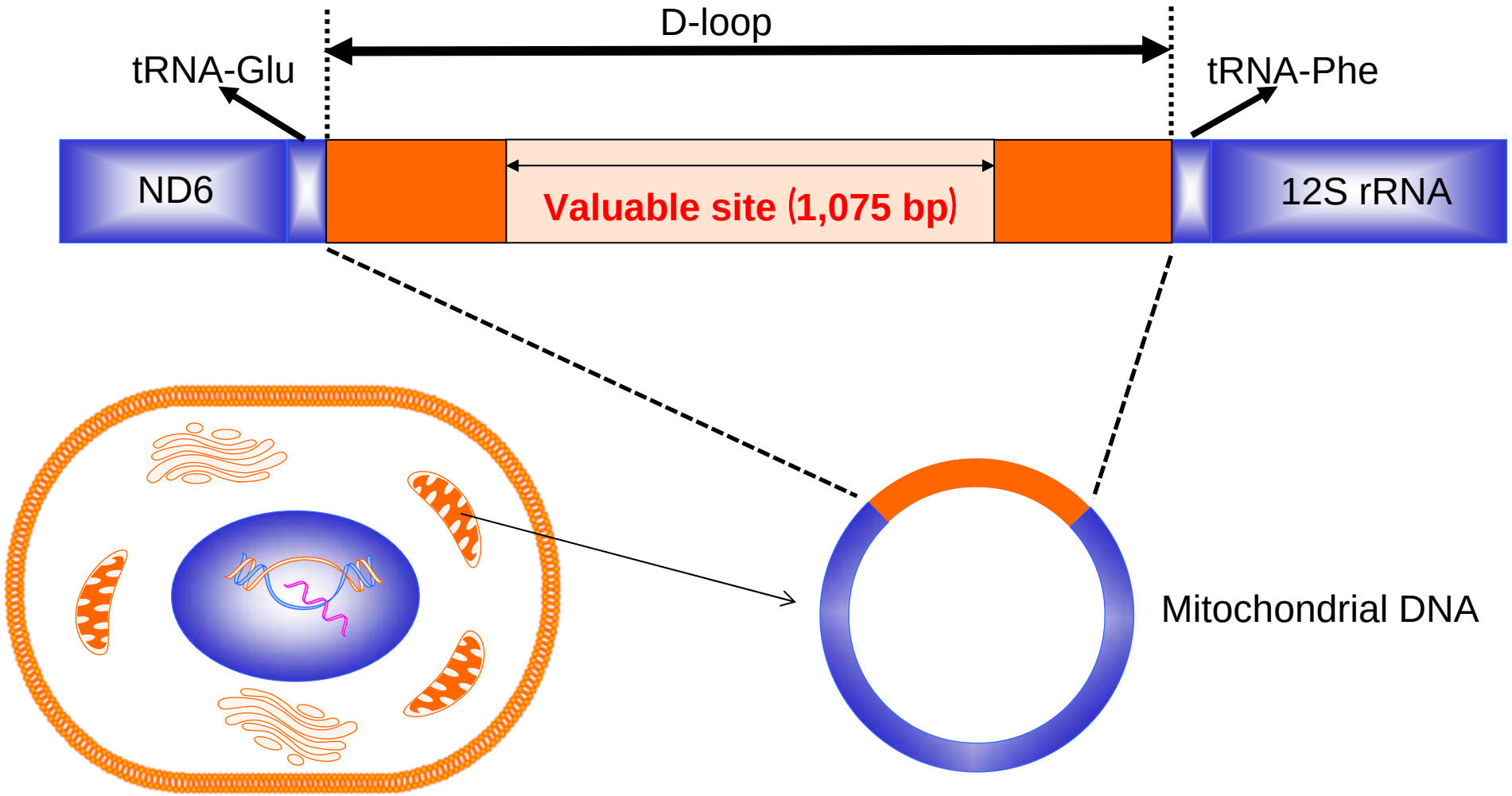
2, Maintaining genetic diversity : Evaluate genetic diversity



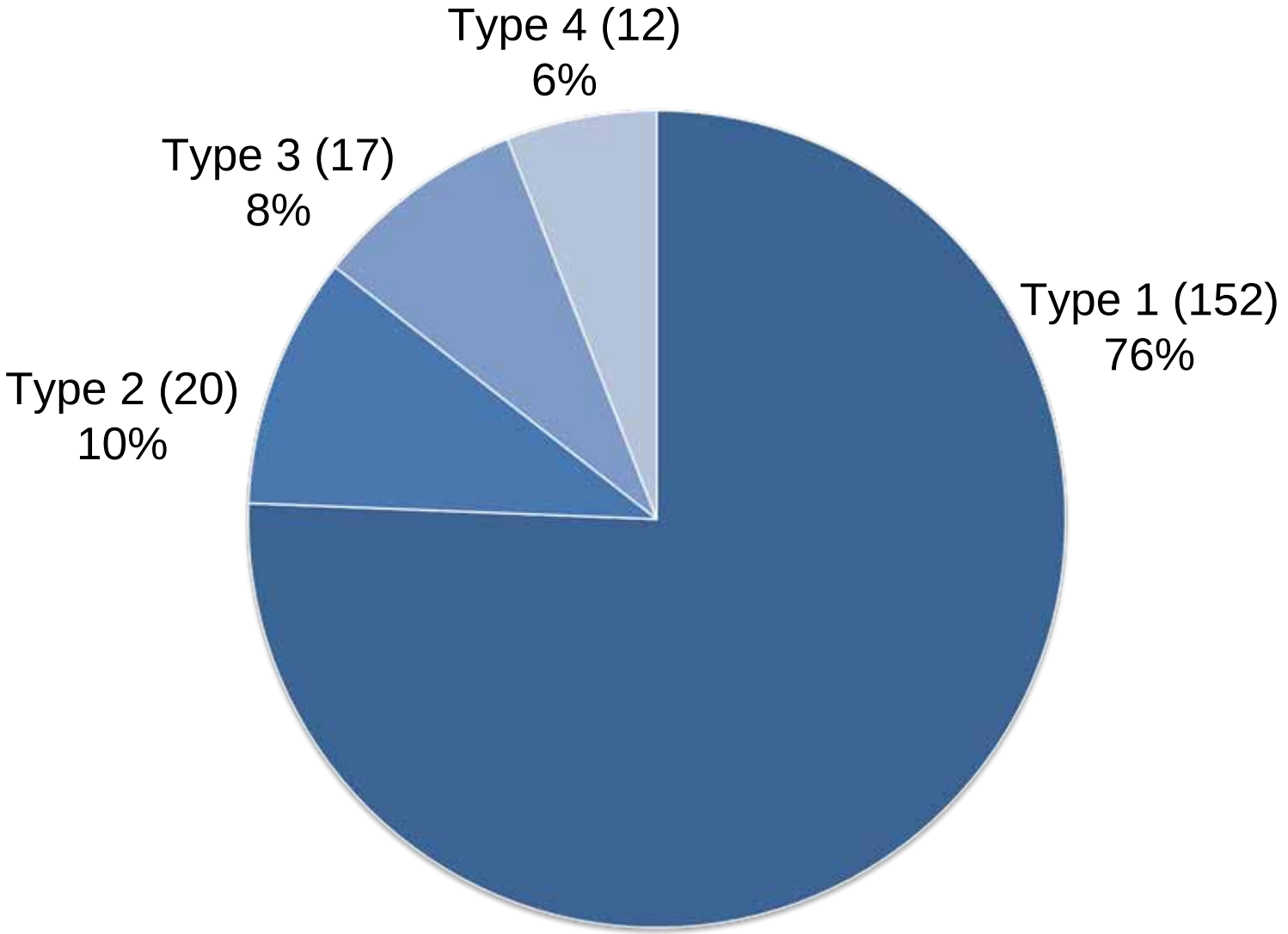
Method (Genetic diversity evaluation)

Animal: 201 individuals (male:107, female:94)

Genetic marker: Mitochondrial DNA D-loop region



D-loop variations of Okinawa rail



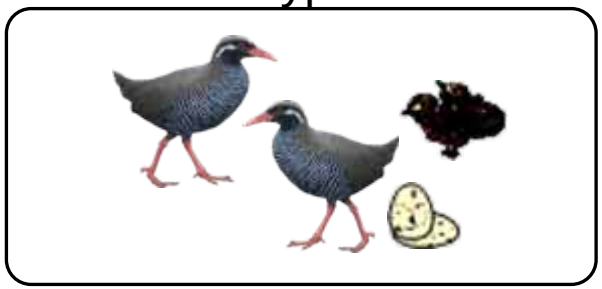
Conclusions

- **Efficient and stable reproduction**
  Breeding season: March to June (Seasonal breeder)
  Male: mature in the first breeding season
  Female: mature in the second breeding season

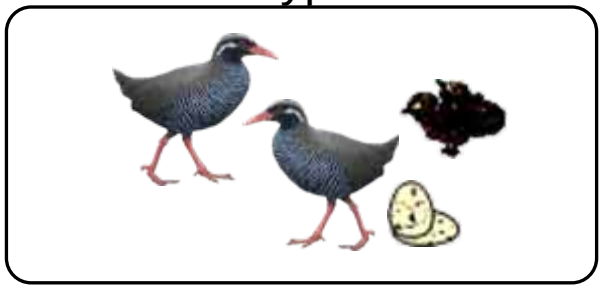
- **Maintaining genetic diversity**
  Maintaining 4 haplotypes

Photo by
Conservation & Animal Welfare Trust

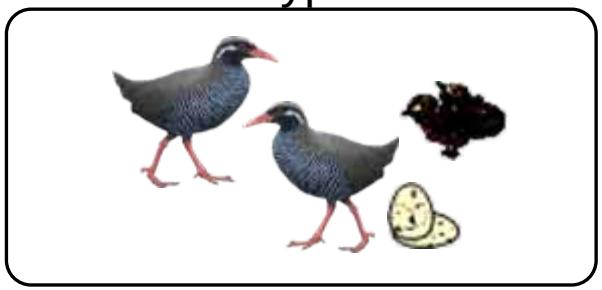
Type1



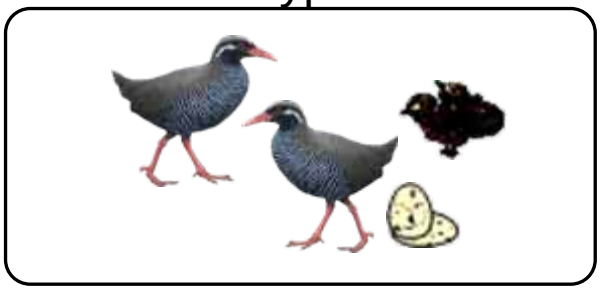
Type2



Type3

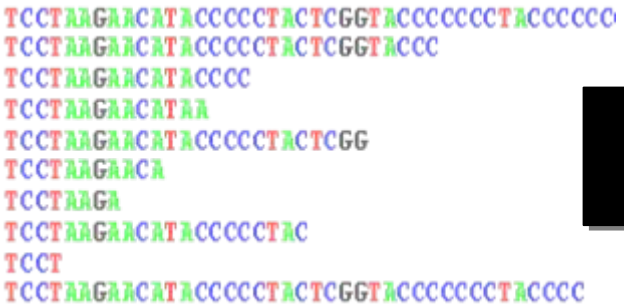


Type4

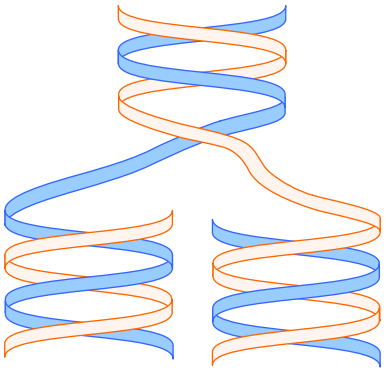


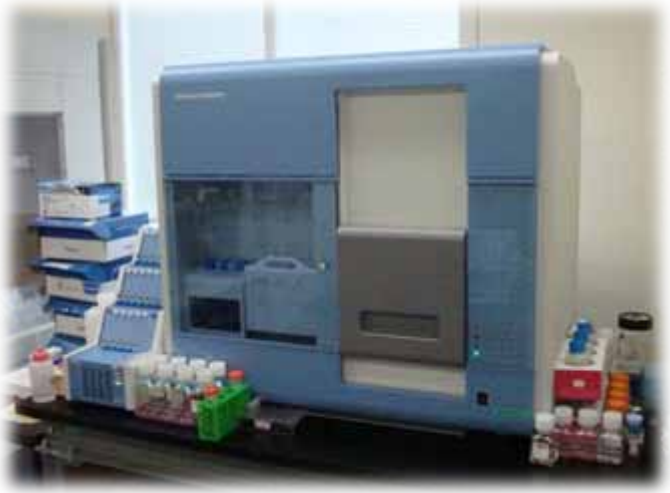
Whole genome sequencing of Okinawa rail in progress

High-throughput sequencing (32GB)



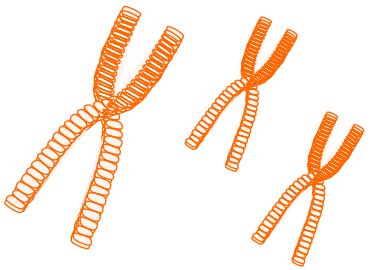
Sequence assembly





1,000 gene sequences will be identified by the end of 2011.

Draft genome sequence and chromosome mapping will complete by 2015.



ACKNOWLEDGMENTS

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