

Translocation of Confiscated Yellow-Margined Box Turtles (*Cuora flavomarginata*): Release and Disease Monitoring

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Cuora flavomarginata (Yellow-margined box turtle)

- *C. flavomarginata*
 - terrestrial
 - omnivorous



Smuggled problem of the box turtles

- Severe issues on poaching and smuggling
 - for animal farming in China
- In 2015, 500 confiscated turtles were submitted to Taipei Zoo



Year	Smuggled Yellow-margined box turtles
2013	163
2013	1446
2013	1358
2013	125
2013	380
2015	2289
2015	578
2016	1149
2017	298

(Data from NCHU Systematics and Vertebrate Morphology Lab)

Animal Rescue Center for Wildlife in Taipei Zoo

- 1281 animals (July 2019)
- > 95% reptiles
- From
 - illegal trading
 - illegal holding
 - abandoned by owners



Translocation of Confiscated Yellow-Margined Box Turtles (*Cuora flavomarginata*)

Release Steps



2. Health assessment
(weight, diseases tests...)

4. Monitor

- ✓ radio tracking per month
- ✓ disease and weight quarterly



1. Semi-natural enclosures



3. Soft-release



Disease risk

- No translocated organisms can be entirely free of infection
- The **management of disease** and known pathogen transfer is important (Guidelines for Reintroductions and Other Conservation Translocations, 2013)
- 3 pathogens :
 - Herpesvirus
 - Ranavirus
 - Mycoplasma



Herpesvirus

- Infections reported among turtles
 - In sea turtles, it causes Fibropapillomatosis tumor.
 - In tortoise, it correlates with respiratory tract and digestive diseases
 - In a rare case, an eastern box turtle (*Terrapene carolina*) in Florida was presented to the facility with papillomatous growths behind both rear legs caused by co-infection with herpesvirus and trematodes (*Spirorchis sp.*).
- Remain as permanent carrier once infected.
- **Some tortoises died of herpesvirus in Taipei zoo.**
- **High prevalence in yellow-margined box turtle, but no evidence of causing diseases.**

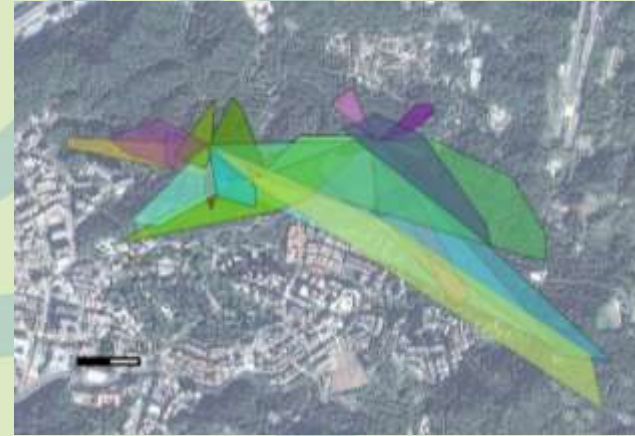


Monitoring herpesvirus in tortoises is critical

- Tortoises with latent viruses infection have no symptoms.
- These tortoises may have begun to show signs of disease under
 - transport stress
 - environmental change
- Infected tortoises may have passed on the pathogen to others. (Y. UNE., et al)
- Healthy tortoises become more susceptible to infect during stress.
- Molecular-based techniques could help to define the causative agent and to better manage infected tortoises. (María Salinas et al., 2011)

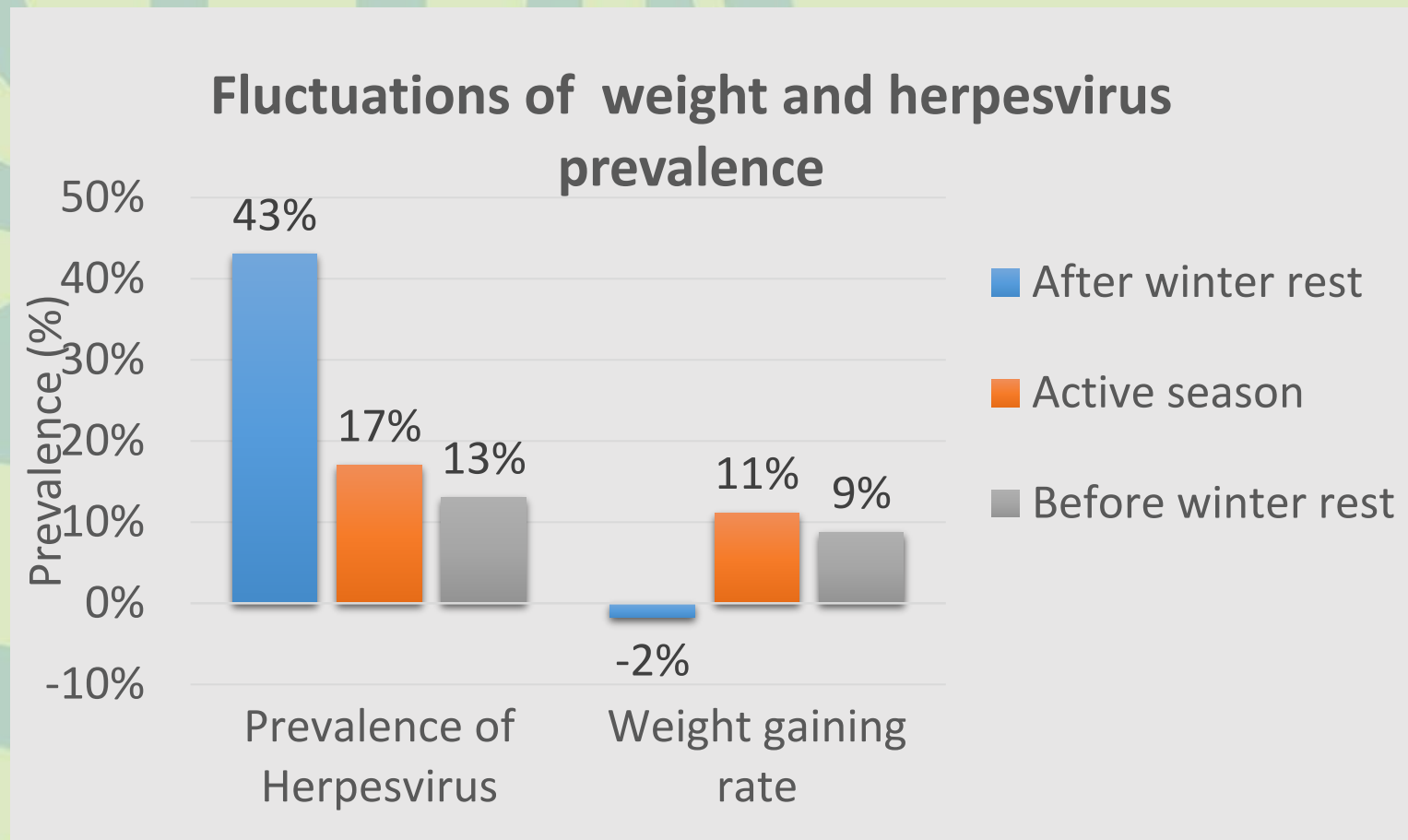
Results of Translocation (Aug 2019)

- Retention rate:
 - After first year: 41.7% (Aug-2018)
 - After second year: 54% (Aug-2019)
 - ✓ Cage trapping
 - ✓ radio-tracking
 - ✓ Sight



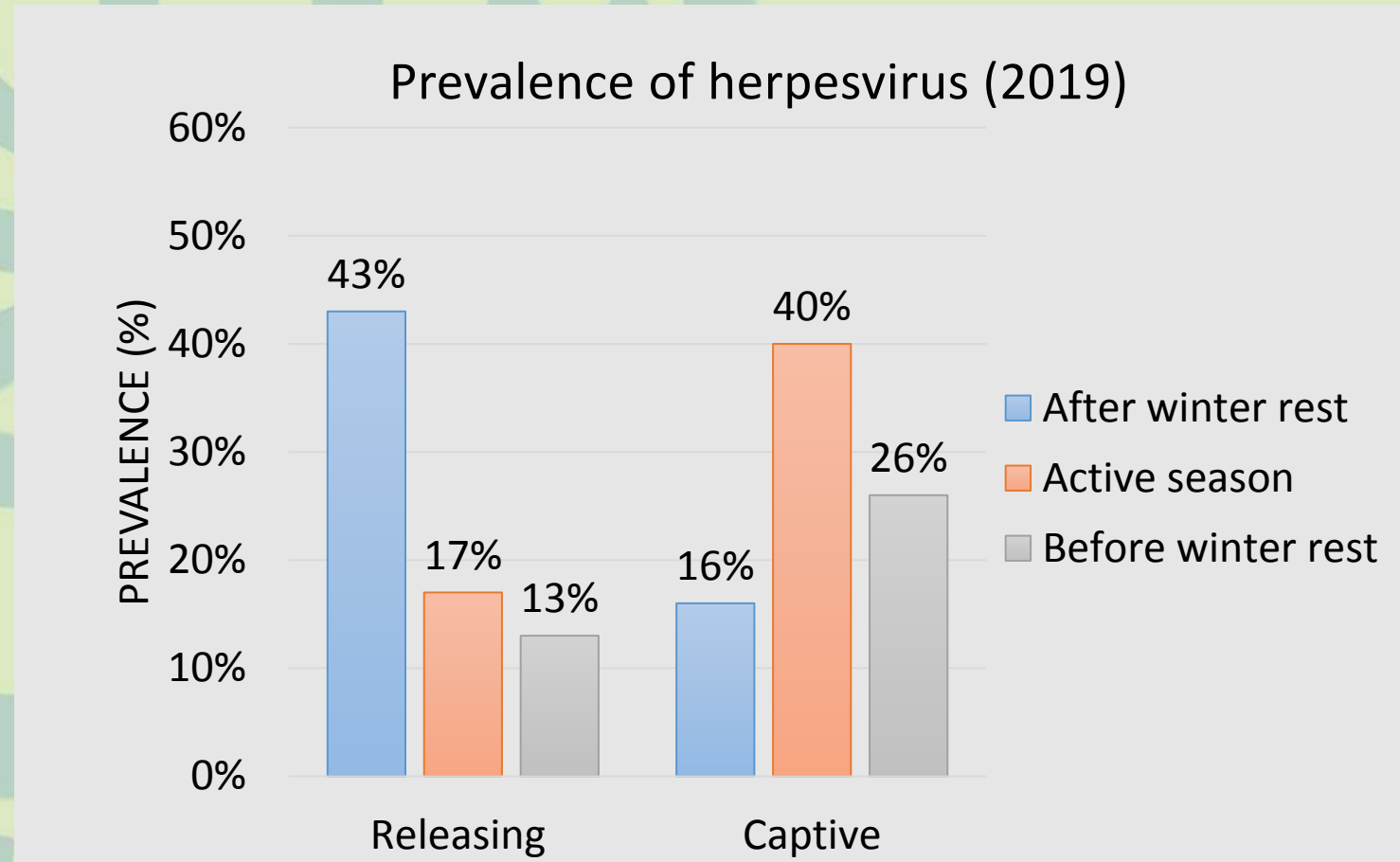
Fluctuations of weight and herpesvirus prevalence of the releasing individuals among seasons

- Fluctuations of weight and herpesvirus are similar in active season and before winter
- Herpesvirus prevalence reached a maximum of 43% and had weight dropped after winter rest



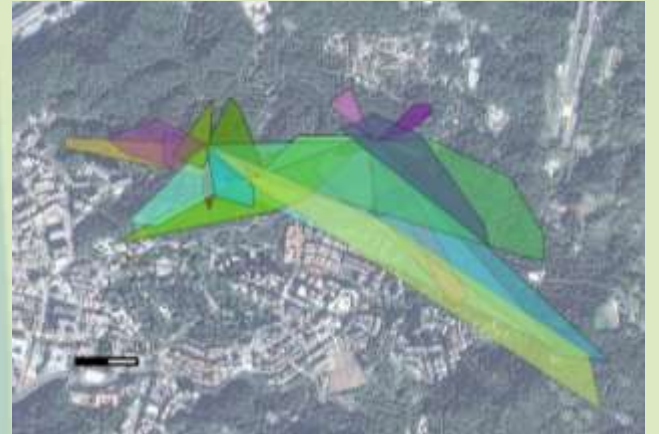
Prevalence of herpesvirus (2019)

- The high incidence of the disease during the spring and summer months may be due to activation of latent **viruses due to the immunosuppression present after hibernation** (Lawrence and Needhan, 1985)



Conclusions

- Retention rate of second year (54%) is higher than first year (41.7%)
- 28 out of 30 turtles with transmitter attached are ranging regularly within the translocated area
- No mortality is noticed
- Positive herpesvirus results seems to relate to weight loss between seasons in the turtles, but not significant in statistics



Long-term monitoring is needed

- Long-term monitoring is needed to confirm if the translocation is successful (mortality, retention rate, reproduction rate and home range)
- Disease monitoring and management is critical to confirm the health in releasing individuals and captive ones

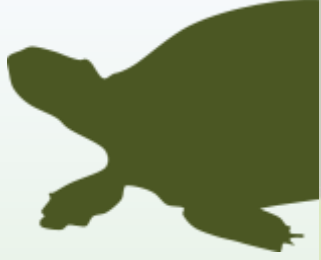


Acknowledge

- Forestry Bureau Council of Agriculture, Executive Yuan
- School of Veterinary Medicine National Taiwan University
 - Yellow-margined box turtle tracking team
 - Summer interns



Thanks for your attention!



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Translocation

- Failure (Germano and Bishop, 2009)
 - Homing behavior
 - Large movements
- Mortality (Hinderle et al., 2015)
 - Poach
 - Roadkill
 - Disease
 - Stray dogs & cats

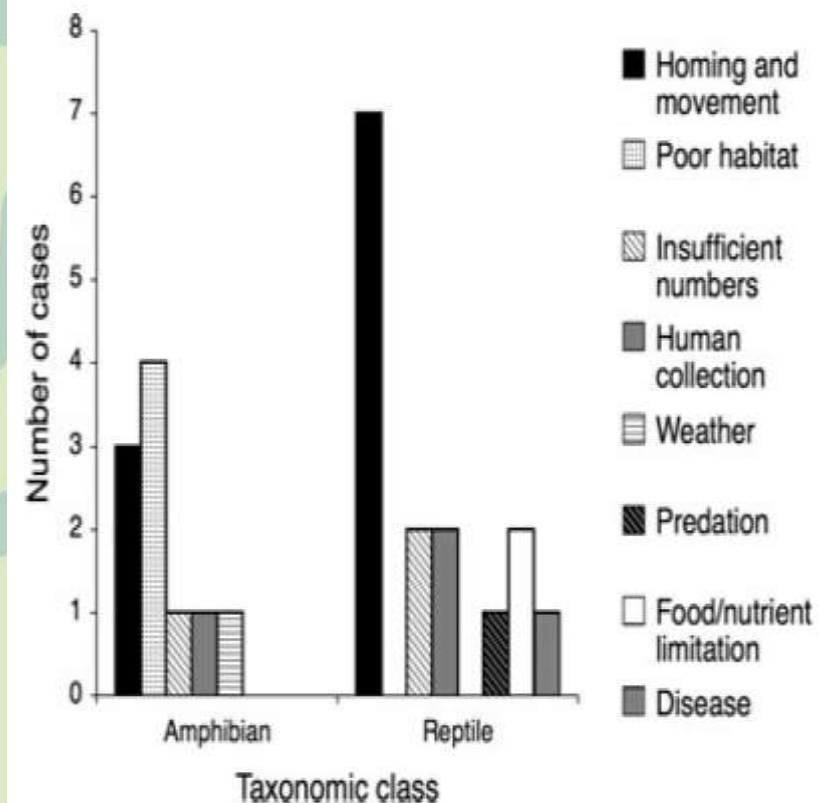


Figure 5. Reported causes of failure of amphibian and reptile translocation projects.

(Germano and Bishop, 2009)