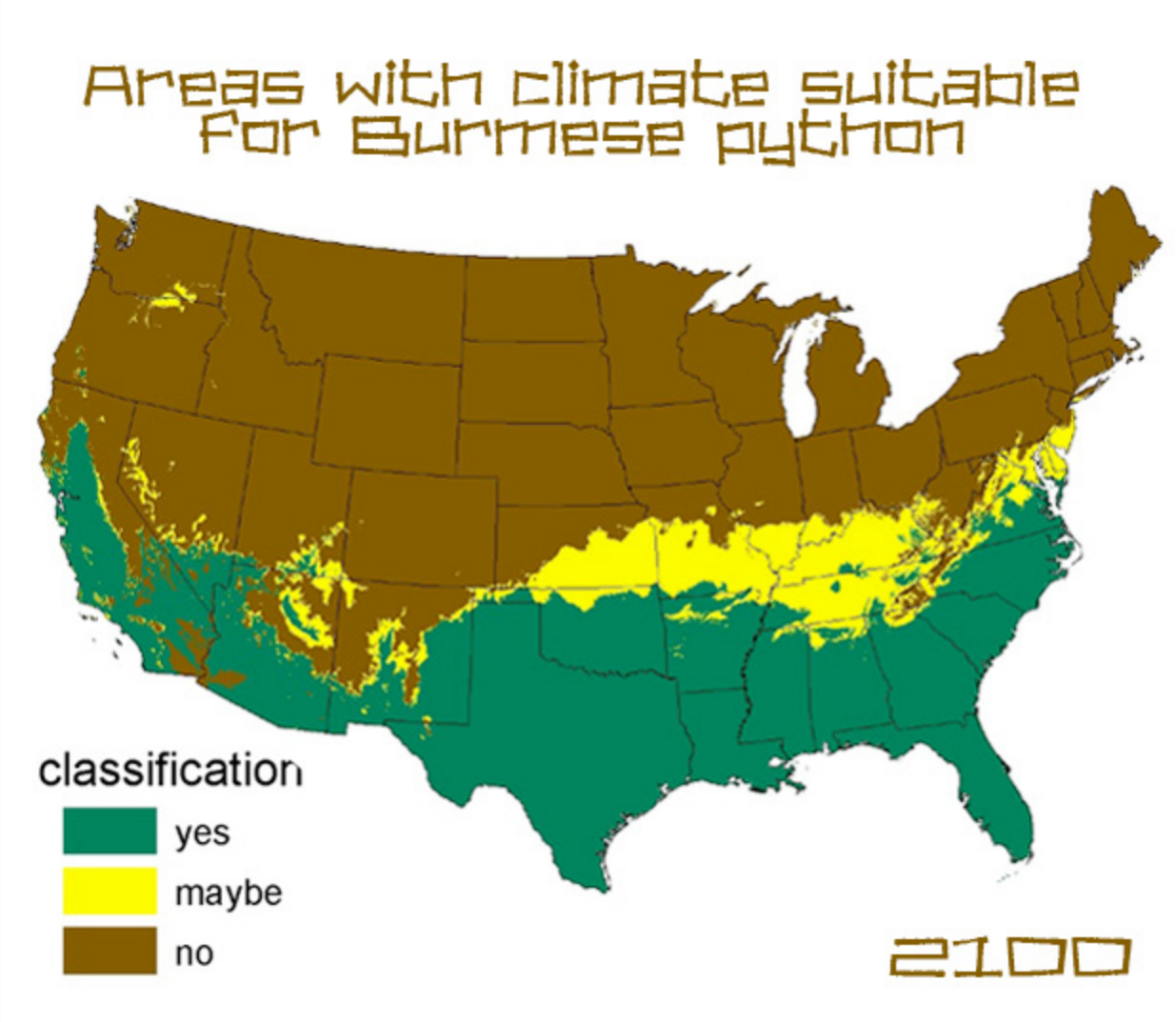
Burmese pythons and other large constrictors

Miccosukee Tribe of Indians of Florida
Fish and Wildlife Dept

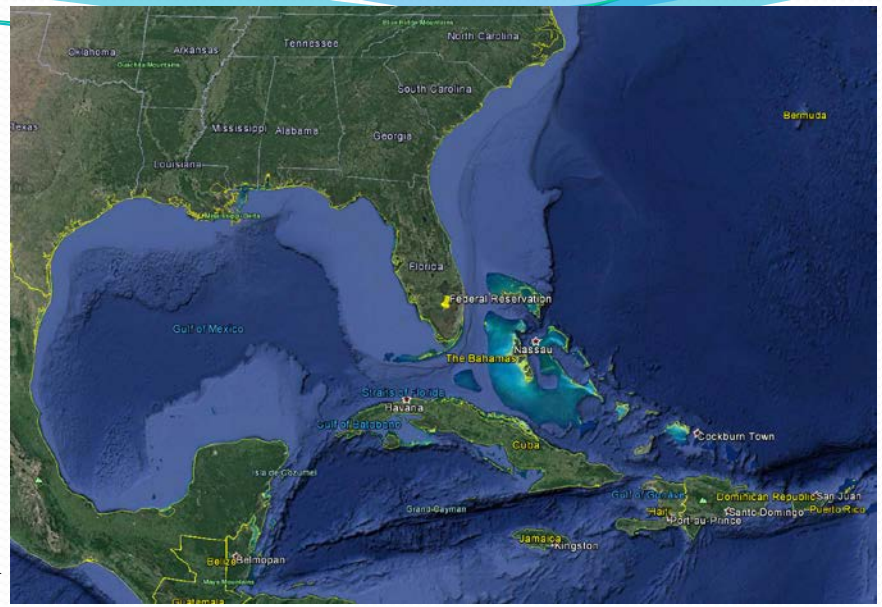


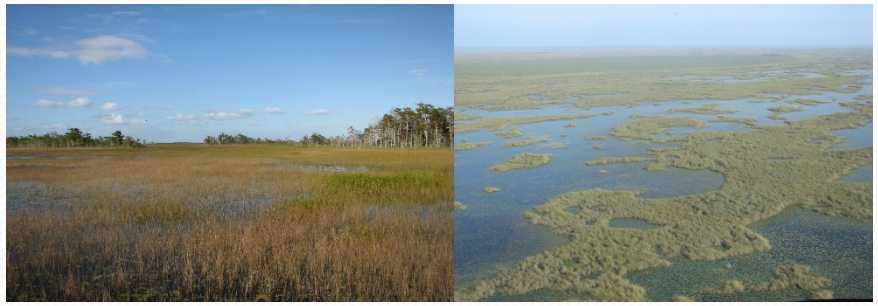


Areas with climate suitable for Burmese python
classification
yes
maybe
no
2100

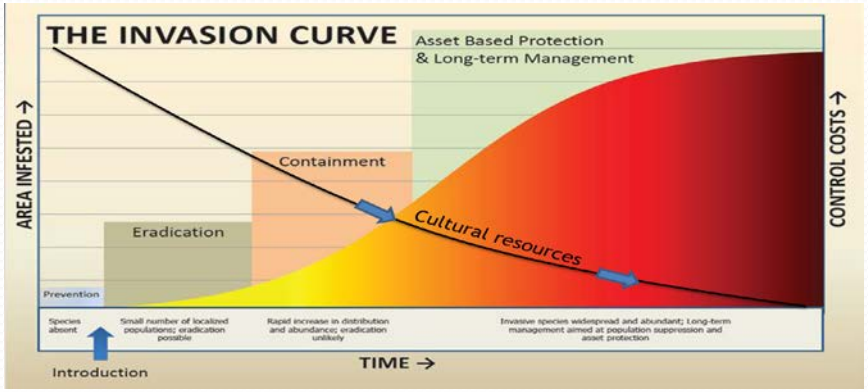
USGS

- **Location and why?**

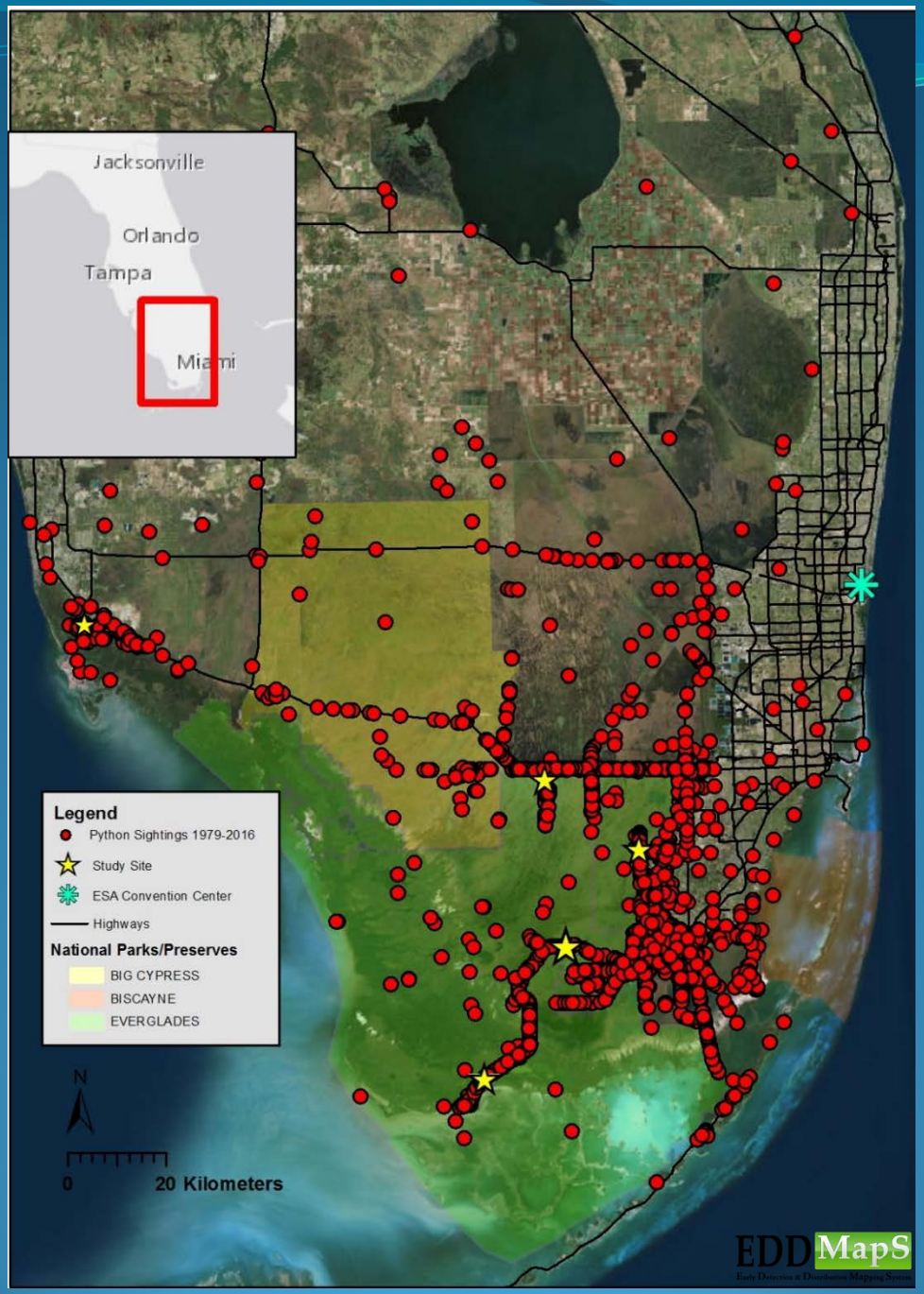
- Majority of large constrictors invasions are in South Florida.
- Established populations reported in Puerto Rico(Pythons and Boas),Unconfirmed reports of Pythons in USVI.
- Florida is a geologically young habitat.
- Florida is the most vulnerable mainland state in the USA for invasive pest introduction and establishment.
- On average Florida receives one new pest every month.
- Tribes are the 2nd largest land managers In the USA.
- Cultural lose due to large constrictors.
- Tribes are at the forefront of the preservation of their resources and culture; feeling that the Federal Government need to do more under the trust responsibilities.







Python Reports



- **Technical difficulties:**

- Recent Lacy Act implementation (2012) and FL State actions CH379(2010).
- Subtropical climate is conducive to the survival and establishment of highly competitive novel invasive tropical species.
- Established populations: Burmese Python (*Python molurus bivittatus*), the Northern African Python (*Python sebae*), and the Boa Constrictor (*Boa constrictor*)
- Python average egg clutch in FL 55 eggs with 80 to 90% survival to hatch.
- Reproductive age attained in 2 to 3 years.
- Estimated introduction as early as 1980.
- Cryptic species.
- Difficult terrain prevents traditional removal tools expensive and/or obsolete. (Python challenge 2500 people x $10/hr x 8 hrs=$200k/100 Pythons=$2000/python x 50,000 pythons=$100 million).
- North American snakes do not have a competitive size.
- Abundant prey base.
- Low predator influence.
- Many pets in captivity without permits.

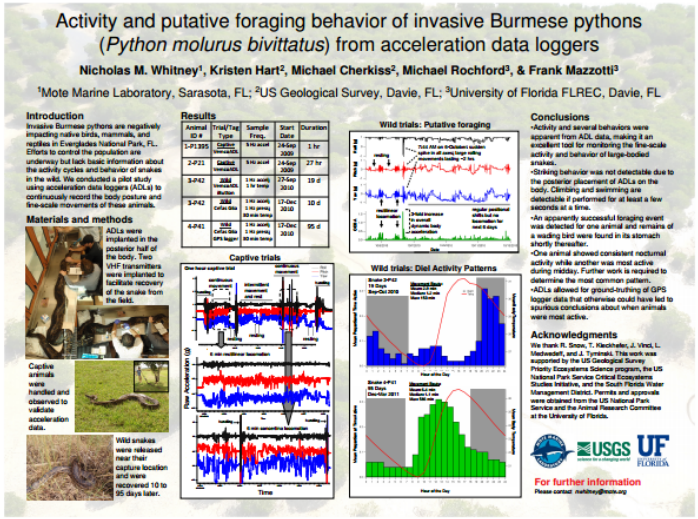
Baseline Research(Biologing):

Refinement of detection techniques have been improved to deal with the detectability and removal efficiency.

Road surveys, alert dogs surveys, day/nigth., etc.

Judas snake removal, 24% effective betrayal events.

Accelerometers to determine intervals between meals and potential prey consumption.



Isotope diet analysis, necropsies to estimate prey numbers and type of prey ingested.

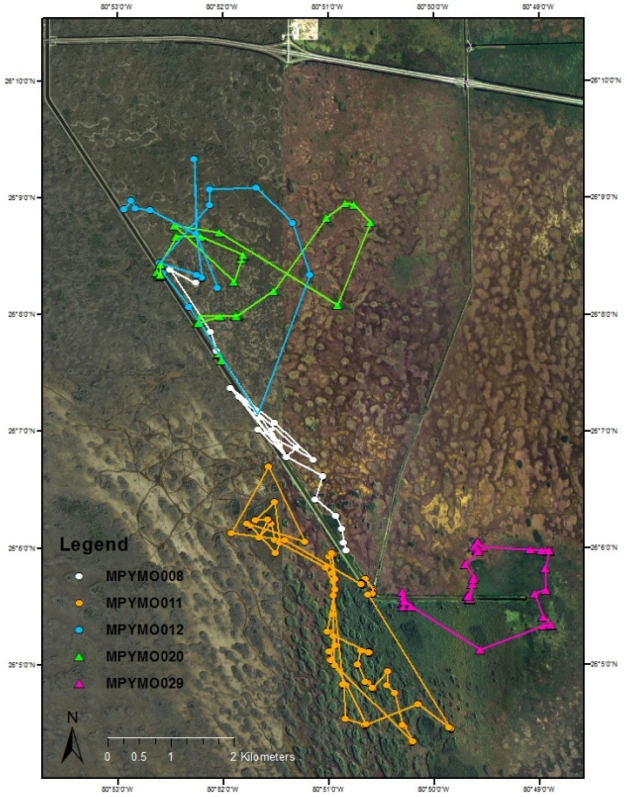
Necropsies

MICCOSUKEE TRIBE OF INDIANS OF FLORIDA

USGS science for a changing world

Baseline Research(Biologing):

Genetic analysis of landscape populations in FL.(Manuscript in progress)
389 snakes sampled, low diversity, 2 distinct source populations and one mix, one dominant haplotype.
Radio telemetry.
Internal GPS tag development and habitat utilization



Baseline Research:

e-DNA landscape study for range distribution and technique refinement for soil e-DNA. (In Progress).

Pattern recognition trapping. To release non targeted species. (In progress)

Pheromone attractant development for python passive trap (in progress)

Past experiences with passive trapping had a few drawbacks:

- Bait was to abundant outside the cage that capture rate was very low.
- Bait was not specific and non target were captured.
- Poor trapping design.
- Pheromone trail was not created to guide animals to the trap.
- Funding was exhausted before trails.

Current genetic work and partnerships to lead to establish specific guidance to locate specific sites and answer the question of interplay between genetics and temperature and the id of sex determining genes.
CRISP application as funding becomes available.

Passive python trap:
Image selector for no target exclusion

Color Alone Isn't Always Sufficient

Prototype

Lessons Learned:

Genetics: populations with low diversity than in their natural range. 2 distinct source populations, 1 mixed. Natural range has 5 distinct source populations. Encouraging for genetic control.

Detectability: Dogs increase detectability and need to finish ongoing evaluation to have cheaper sources of technology application,
Trained hunters are more effective than numbers of hunters (Python challenge: close to 10 hunters capture 90% of the snakes), aprox capture costs of $100 per snake (if $10/hr is employed per 3 days/wk for 4 wks with only the best 10 hunters).

GPS: Pythons show limited preference in habitat utilization as a highly adaptable (generalist) species and return to favorable breeding grounds in the winter months. ID of breeding grounds for targeted removal and passive trapping deployment.

Necropsies: Majority of the diet are rodents and mid size mammals. Prey consumption can be as short as 48 hrs for snakes 8 to 11 ft.

Lessons Learned:

Judas snake: less effective than road cruising but has potential for capturing breeding populations in tree islands and other places where road access is not available. Also it captures more large reproductive females than road cruising and can be used during the summer months that road cruising survey yield lower results.

Population of Northen Africal Python (*Python sebae*) was controlled in a multy agency effort and is at very low levels.

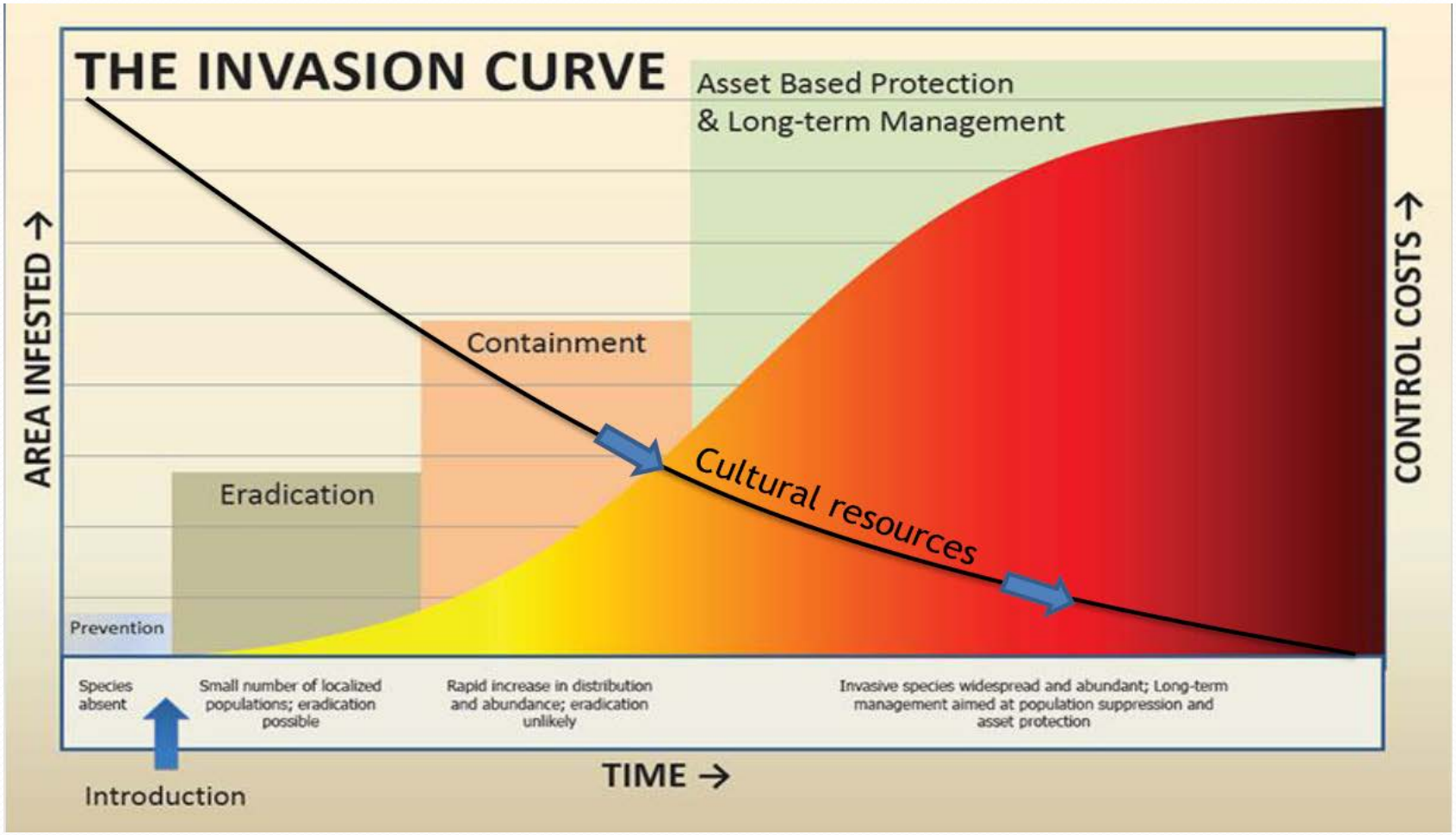
Going Forward:

Current management of large constrictors for the established species is very difficult as we lack effective tools for population control and most of the research goes in to traditional baseline data and ecological studies.

New technologies allow us to create a simple, effective, specific, humane and non pollutant tool to move forward with optimism.

Completion of the invasion curve so the delivery of a complete plan can be presented. (Investors want to see a plan with an endgame).

Going Forward:



Going Forward:

Current technologies in genetics allow for new approaches that were not possible in the past.

Prevention:
Genetic sterility for all pets sold to the public; breeder licenses expedited with a current genetic marker.

- Creates accountability and traceability.
- Avoids establishment of invasive populations.
- Creates a potential trade barrier that could interest the pet industry
- Creates manufacturing jobs in USA.
- Genetic manipulation capacity creates the potential for new products that don't exist in nature (patentable) and with sterility there is no risk of release to the wild making it an environmentally conscious product.

Going Forward:

Control and eradication:

- Design of engineered organisms by means of CRISPR-Cas 9 allows for a surgical approach to eradication.
- All the advantages of the invader are used against himself.
- Tool development is contained and Tribes can be engaged for a path to a streamlined decision process that respects self determination.
- Permitting is for the most part only needed for release.
- Many safeguards can be used to address many concerns.
- Need to ID sex determining genes and thermoregulation sites that intervene in sex determination.

Success requires adequate investment
We have an incomplete toolbox
We have to play offense and defense at the same time and yet…
Our offense is weak, but we have the science to make it strong.
We have to force ourselves to prioritize
Our leaders and the public want to help, we have to tell them how they can and educate them in how WE CAN.

Contact Info

Gintautas Zavadzkas
Fish and Wildlife Dept
Miccosukee Tribe of Indians of Florida
O: 305 2238380 ext 2217
gintasz@miccosukeetribe.com

Nature is mother to us all FIGHT FOR HER