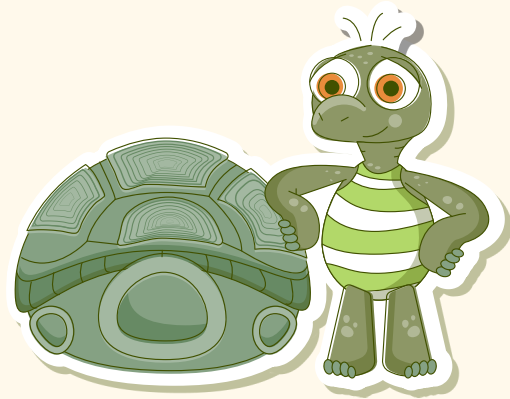


# Assessing Vitamin A Deficiency in Captive vs. Wild Turtles Through Eyelid Observations

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Research Question: How do eyelid thickness and coloration correlate with vitamin A levels in wild vs. captive freshwater turtle populations?

- Monitoring turtle health for conservation purposes
- Non-invasive diagnostic tool for assessing turtle health
- Insight into the health differences between captive and wild turtles

Impact on Turtle Conservation:

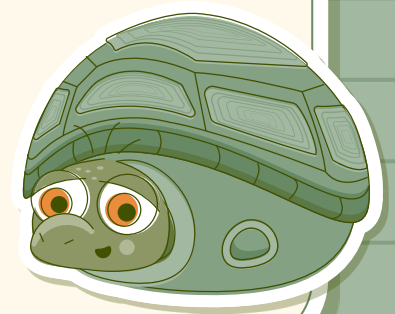
- Understanding the health status of turtle populations
- Identifying potential vitamin A deficiencies in captive turtles
- Informing conservation efforts and management strategies



# Hypothesis

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**Wild turtles will, on average, exhibit healthier eyelid characteristics and higher vitamin A levels compared to captive turtles.**



# TYPES OF TURTLES

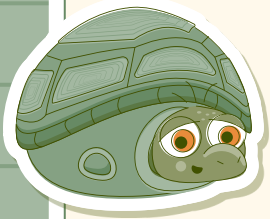


**Red-eared Slider turtles**  
(*Trachemys scripta elegans*)  
were selected as the study  
subjects.

- Rationale for Choosing Red-eared Sliders:
  - a. Widely distributed and commonly kept as pets.
  - b. Availability of captive and wild populations for comparison.
  - c. Well-studied species with existing knowledge on their dietary requirements and health issues.



# Turtle Environments



## Wild turtles

- Included Red-eared Sliders from natural habitats such as ponds, lakes, or wetlands.
- Subject to natural environmental conditions and dietary diversity.

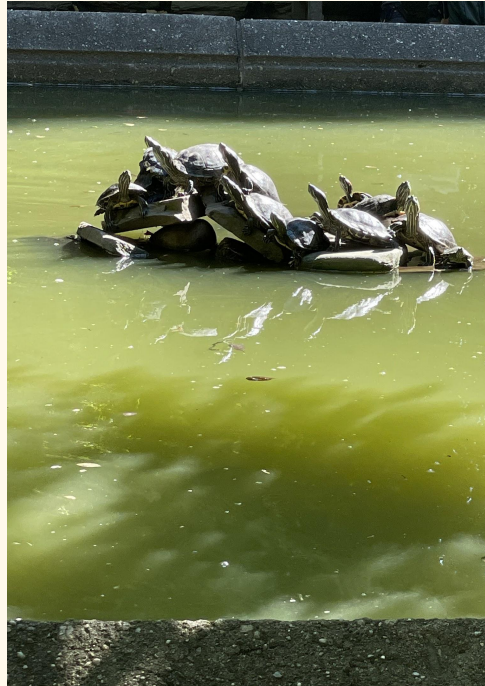


## Captive turtles

- Included Red-eared Sliders housed in controlled environments (e.g., aquariums, terrariums).
- Fed commercial turtle diets commonly used for captive turtles.



# Brooklyn College Lily Pond Habitat





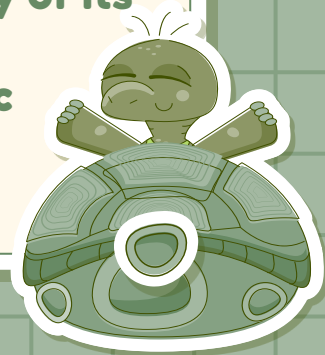
More pictures from Brooklyn College pond





## Background Information

- Hypovitaminosis A, or vitamin A deficiency is the most common cause of red puffy eyes or inability to open eyes in red eared slider turtles.
- The body requires vitamin A to maintain healthy skin and organ functions.
- Lack of vitamin A causes abnormal growth of skin cells, which disrupts normal organ function.
- Good sources of vitamin A for turtles include leafy greens, plants such as dandelions, and vegetables containing carotene such as carrots.
- The amount of vitamin A in a turtle's diet can reflect the quality of its environment.
- Most name brand turtle pellets used to feed captive or domestic turtles contain a sufficient amount of vitamin A.

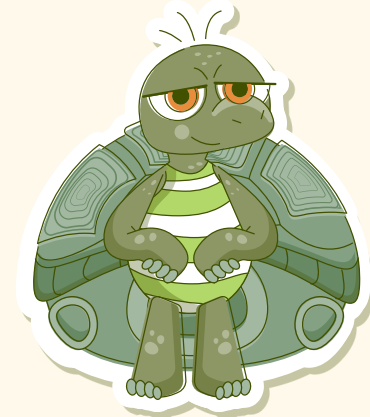




# Methods

## Data Collection Methods:

- **Utilized photographs from iNaturalist:**
  - Accessed a database of publicly available photographs of turtles on iNaturalist.
  - Searched for Red-eared Slider turtle sightings to gather a diverse range of images.
- **In-person observations at Brooklyn College pond:**
  - Conducted field observations of Red-eared Slider turtles in their natural habitat.
  - Visually assessed the eyelid characteristics of individual turtles.
  - Recorded data on eyelid thickness and coloration
- **Interviewed Specialist who maintains turtle pond in Brooklyn College**



# Methods Cont.

- **Eyelid Assessment:**

- Eyelid Thickness:**

- Analyzed the relative swelling and size of the eyelids as compared to a healthy turtle
    - Analyzed multiple images per turtle to account for variation.

- Eyelid Coloration:**

- Assessed the color of the eyelids on a subjective scale (e.g., pale, normal, dark).
    - Avoided disturbance to the turtles during observations to minimize stress.

## Swollen Eyes in Turtles



## Normal Turtle Eyelid



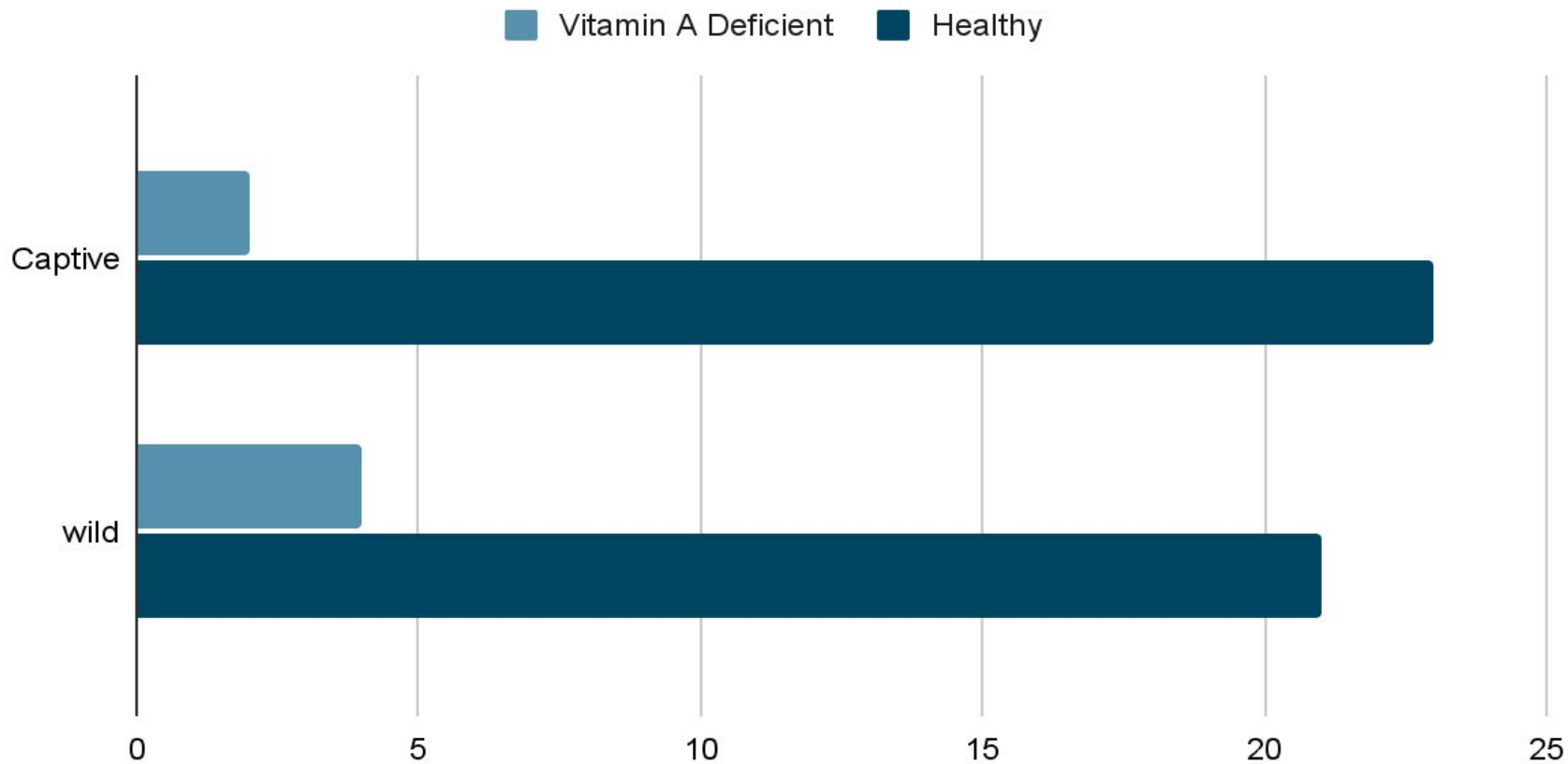
# Data Analysis

	Captive turtles	Wild turtles	Total
Vitamin A deficient	2	4	6
Healthy	23	21	44
Total	25	25	50
% deficiency	8%	16%	12%



# TURTLE HEALTH IN CAPTIVE VS. WILD TURTLES

JOE



# Discussion

- **Data sets compared included 25 captive red-eared slider turtles and 25 wild red-eared slider turtles visually checked for vitamin A deficiency signs**
- **Visual checks looked for eye, abnormalities associated with deficiency**
- **Significant differences found between captive and wild turtles**
- **Captive populations showed 8% Deficiency and Wild turtles showed a 16% deficiency rate**
  - **This refutes our hypothesis that wild turtles would be healthier than captive turtles.**

**Turtles in captivity are fed special food, containing Vitamin A supplements that decrease the risk for this symptom.**
- **Small sample of 25 turtles per population limits definitive conclusions about deficiency rate differences**
- **Visual data indicates a significant difference between captive and wild red-eared slider turtles in rate of vitamin A deficiencies observed**

# Why is this important?

- Controversy: Animals in Captivity vs in the Wild
  - People argue that animals in captivity are unhappy and keeping them in captivity/ zoos is unethical
  - However, caretakers keep a close eye on the health of animals in captivity and ensure that they are healthy
- What is more important? Being healthy or being “happy”?
  - Being kept in captivity can be more beneficial to health, and should be considered in this debate

# Future Research

- Analyzing the data in this research study allows us to study the health of turtles on an external level
  - Eyelid condition is a SIGN for Vitamin A levels, but not a definite indicator of these values
  - Future studies can extract blood/urine/plasma samples from the turtles and analyze certain health markers in the turtles
  - Future studies can analyze additional health factors in the turtles to examine more diseases and poor health signs
    - This will allow to assess the overall health of the turtles and get a better image of their actual health
      - Thus, we can draw conclusions on the captivity vs. wild debate and understand the true effects of captivity on health
  - Using a larger data set can also contribute to a more accurate conclusion and can make analyses based on more turtles

# Sources

Anonymous. (2020). Prevention of Hypovitaminosis A in Turtles. Retrieved from Boro, P. K., Yadav, S. N., & Ahmed, N.

[https://www.researchgate.net/profile/Sampurna-Nand-Yadav/publication/365647480\\_Diagnosis\\_of\\_hypovitaminosis\\_A\\_in\\_a\\_red-eared\\_slider\\_turtle\\_Trachemys\\_scripta\\_elegans\\_and\\_its\\_successful\\_therapeutic\\_management/links/63b45187097c7832ca89665d/Diagnosis-of-hypovitaminosis-A-in-a-red-eared-slider-turtle-Trachemys-scripta-elegans-and-its-successful-therapeutic-management.pdf](https://www.researchgate.net/profile/Sampurna-Nand-Yadav/publication/365647480_Diagnosis_of_hypovitaminosis_A_in_a_red-eared_slider_turtle_Trachemys_scripta_elegans_and_its_successful_therapeutic_management/links/63b45187097c7832ca89665d/Diagnosis-of-hypovitaminosis-A-in-a-red-eared-slider-turtle-Trachemys-scripta-elegans-and-its-successful-therapeutic-management.pdf)

(2022). Diagnosis of hypovitaminosis A in a red-eared slider turtle (*Trachemys scripta elegans*) and its successful therapeutic management. *Indian Journal of Animal Health*, 61(2), 398-400.

Howell, H. J., Legere, R. H., Holland, D. S., & Seigel, R. A. (2019). Long-Term Turtle Declines: Protected Is a Verb, Not an Outcome. *Copeia*, 107(3), 493-501.

Lakhimpur College of Veterinary Science. (n.d.).

Brooklyn College Aquatic Research and Environmental Assessment Center.

<https://vcahospitals.com/know-your-pet/turtles-aquatic-diseases>

This article discusses common diseases experienced by red eared slider turtles. It discusses the visible symptoms of each. This can be visually compared to the turtles in the Lily Pond.



# Sources Cont.

Marie, J. (2020). Eye problems with turtles. Retrieved from <https://animals.mom.com/common-diseases-of-pet-snapping-turtles-12338800.html>

This source discusses common health conditions experienced by red eared slider turtles as pets. This article discusses health conditions that the turtles can face when being taken care of, which mirrors the environment of the turtles in the Brooklyn College Lily Pond because they are taken care of and fed on a specific schedule.

New York City Department of Parks and Recreation. (n.d.). Freshwater Turtles and Terrapins. Retrieved from <https://www.nycgovparks.org/learn/wildlife-in-new-york-city/turtles>

Vitamin A deficiency Ocular Edema. (n.d.). Retrieved from [https://go.gale.com/ps/i.do?p=AONE&u=cuny\\_broo39667&id=GALE%7CA509321981&v=2.1&it=r&sid=googleScholar&asid=4447e7a1](https://go.gale.com/ps/i.do?p=AONE&u=cuny_broo39667&id=GALE%7CA509321981&v=2.1&it=r&sid=googleScholar&asid=4447e7a1)

This article focuses on Vitamin A deficiency in turtles. Hypovitaminosis A causes health issues that can be visible in the eyes. An insufficient amount of Vitamin A in the diet can cause swelling around the eye area. We can use this as a baseline of comparison for the turtles in the Lily Pond.

# Inaturalist Sources

<https://www.inaturalist.org/taxa/39782-Trachemys-scripta>

This iNaturalist entry gives background information regarding red eared slider turtles. It can serve as a baseline of what the typical healthy turtle should look like in a pond environment.

<https://www.inaturalist.org/taxa/51271-Trachemys-scripta-elegans>

This iNaturalist entry gives additional information on what is expected of the typical environment in which red eared slider turtles can be found. We can compare this to the environment of the Lily Pond to see which factors differ and how they can impact their health.