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Go to:

https://github.com/ianpajohnsonSBU/WISE_computing_heavens

And download today’s files

The World Through a New Lens

Ian Johnson
For SBU HS WISE

From The Brothers Karamazov

Book V Chapter 3: Translated by Pevear and Volokhonsky (highly recommend):

... if God exists and if he indeed created the earth, then, as we know perfectly well, he crested it in accordance with Euclidean geometry, and he created human reason with a conception of only three dimensions of space. At the same time there were and are even now geometers and philosophers, even some of the most outstanding among them, who doubt that the whole universe, or even more broadly, the whole of being, was created purely in accordance with Euclidean geometry; they even dare to dream that two parallel lines, which according to Euclid cannot possibly meet on earth, may perhaps meet somewhere in infinity.

What is Ivan Karamazov Saying?

Euclidean Postulates

Let the following be postulated:

1. To draw a straight line from any point to any point.
2. To produce (extend) a finite straight line continuously in a straight line.
3. To describe a circle with any centre and distance (radius).
4. That all right angles are equal to one another.
5. [The parallel postulate]: That, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which the angles are less than two right angles.

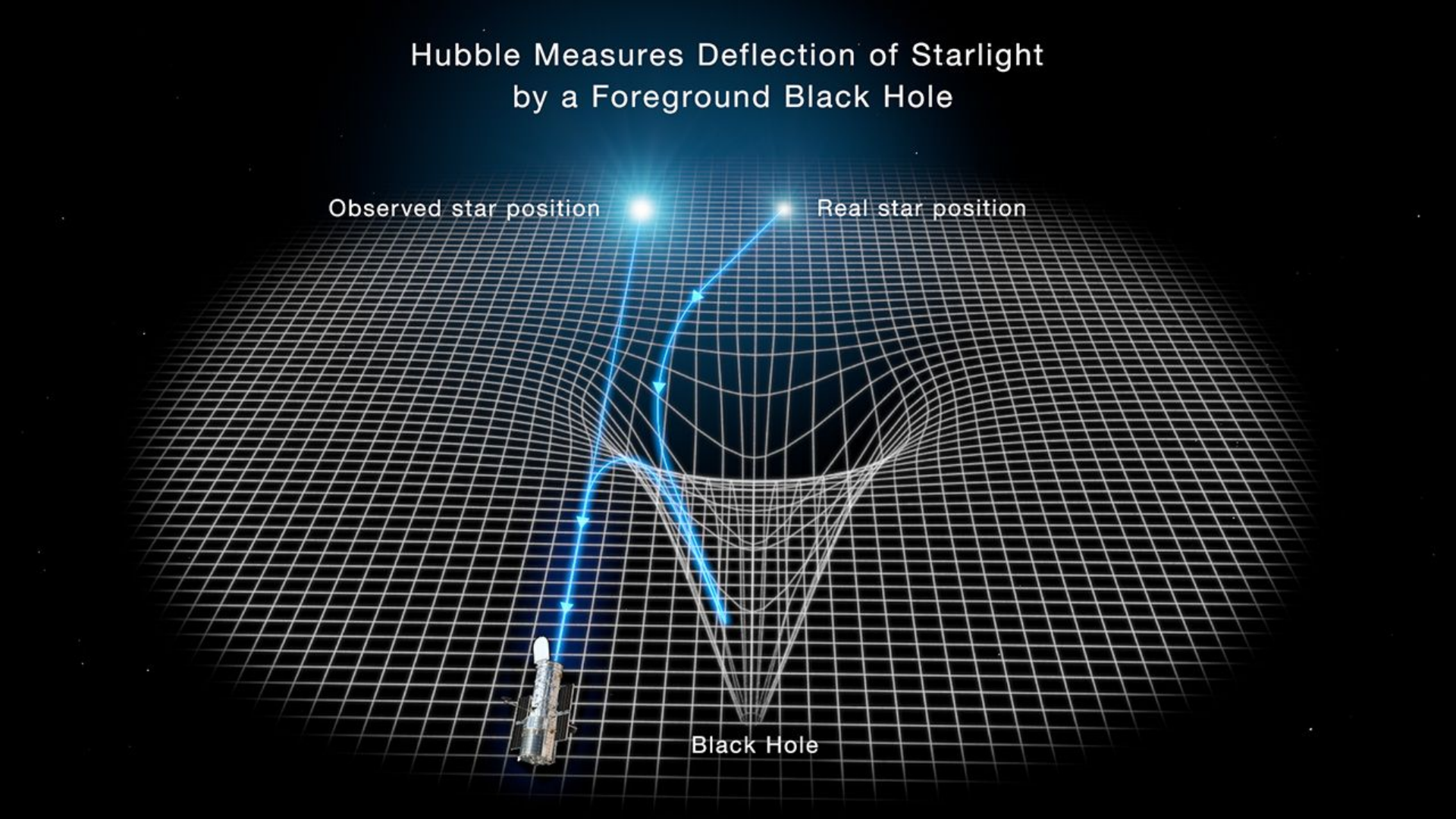
Translated by Thomas Heath

What is up with the fifth postulate?

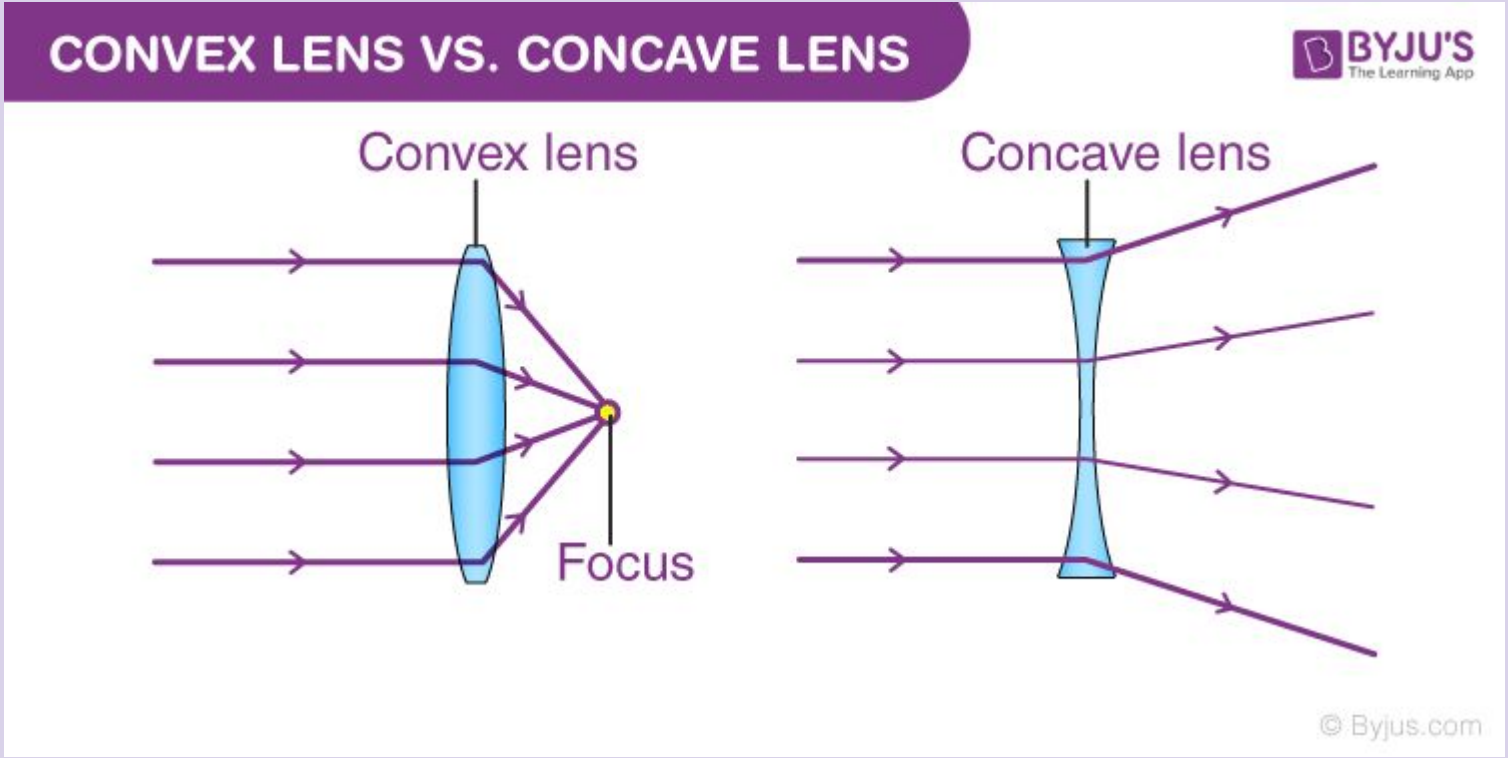
5. [The parallel postulate]: That, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which the angles are less than two right angles.

Beyond Euclid

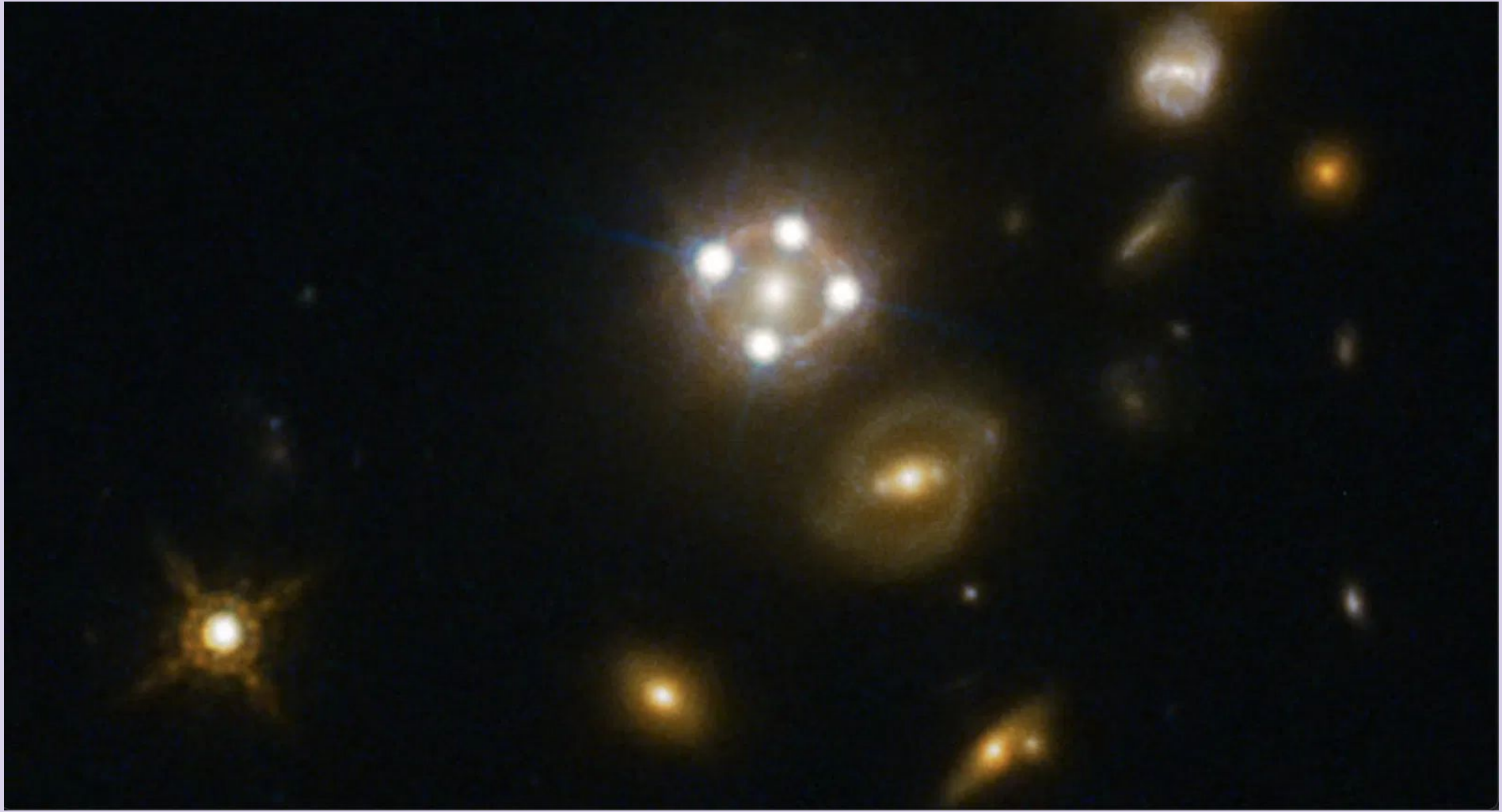
- In 1830, Nikolai Lobachevsky and others go beyond (50 before our excerpt)
- Hyperbolic geometry is discovered

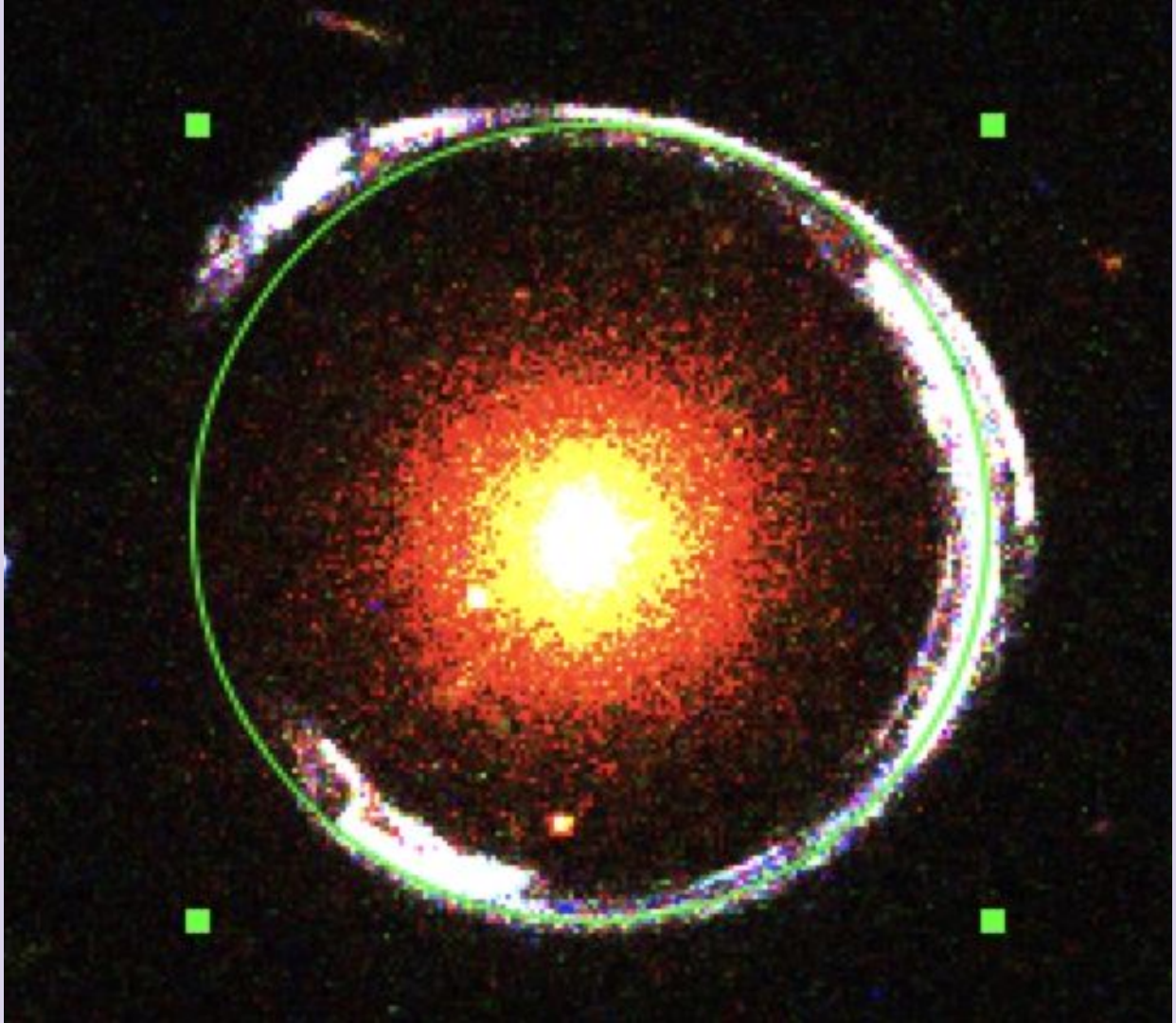

Hubble Measures Deflection of Starlight
by a Foreground Black Hole
Observed star position
Real star position
Black Hole

Analogy to Lenses



How Real Is This Theory?





New Room!

How Was the Lesson?

Questions:

- How could you make an Einstein Ring?
- How big was our lens?
- What happens if our lens is too big or too small?
- Do you think space is flat still?

Questions for me?

Plans for

- Review coding
- Get more comfortable with curved space
- Learn about gravitational waves
- Learn new python packages
- Come up with personal projects
- Make posters and practice presentations
- Visit telescope!

Eastern Suffolk BOCES

Stony Brook University

High School Women in Science & Engineering (WISE): 2025 Symposium

Join us for **Dinner** to celebrate our High School WISE students' hard work that will be on display at the **Poster Session** and celebrated at the **Awards Ceremony**!

Date: Friday, May 8th, 2025

Time: 5:30 – 7:30 PM EST

Location: Zodiac Lobby, Charles B. Wang Center, Stony Brook University

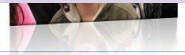
Address: 100 Circle Rd, Stony Brook, NY 11794

RSVP below by Friday, April 11th, 2025

Fill-in the form via this link or scan the QR code!

SCAN ME

(Names and Faces Cropped for Privacy)



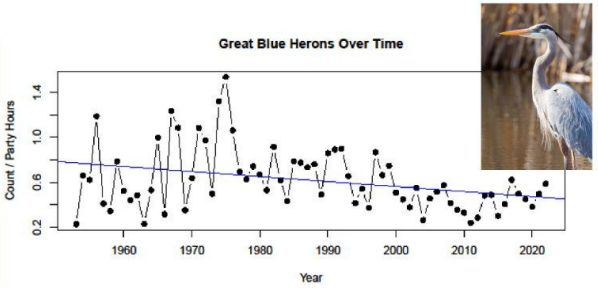
Introduction

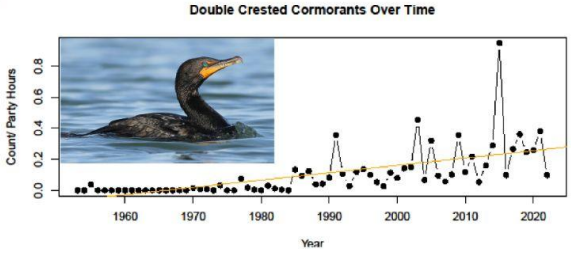
The *Audubon Christmas Bird Count* is an annual birding event that has been held around Christmas for more than 100 years globally, where birders document bird populations they count in appointed circles. We were interested in using this data, as it demonstrates fluctuations in population numbers. Through this, we analyzed the populations of local wetland birds in correlation with the increase of residential land use in the Suffolk County area from 1953 to 2022, hypothesizing that all populations would decrease alongside residential increase.

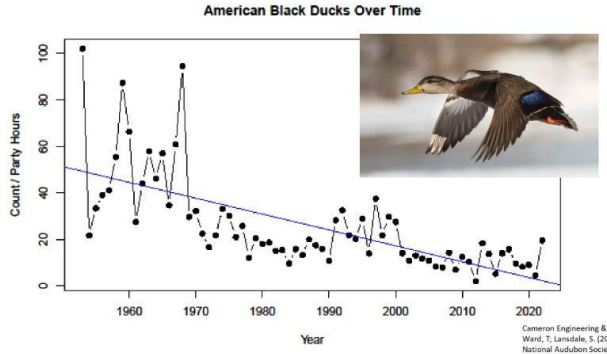
Great South Bay Wetlands

Methods

- Performed linear regression on the data of 3 wetland birds from 1953-2022
  - Based on the number of birds seen divided by the total number of hours people observed in a circle
  - The great blue heron, the American black duck, and double crested cormorant
- Looked at estuary trends from 1974 to 2008
- Looked at residential trends from 1966 to 2016
  - Although the data timeframes are different, they are close enough in length and general timeframe to contribute to our conclusion

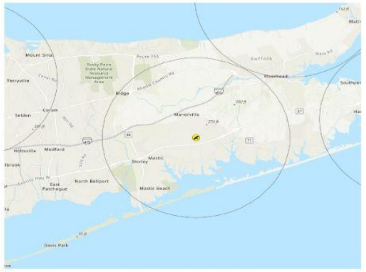






Results

- Saw a slight decreasing trend in great blue herons (slope = -0.004468, R^2 = 0.1069)
- Saw a moderate increasing trend in double crested cormorants (slope = 0.0047215, R^2 = 0.3964)
- Saw a decreasing trend in American black ducks (slope = -0.68242 , R^2 = 0.4623)
- +141% increase in residential acreage from 1966-2016 (129,079 acres)
- 11.3% decrease in total vegetated area/marshland within the South Shore Estuary



Central Suffolk County Circle In the Audubon Christmas Bird Count

Discussion

Our hypothesis was confirmed in the case of the American black duck and the great blue heron, but was rejected with the double crested cormorant. Although the trends cannot be confirmed as a direct result of the increase in residential acreage, we see a strong correlation between the three wetland bird datasets and the two residential datasets, justifying the hypothesized population decrease.

Cameron Engineering & Associates, LLP. (2015). Long Island Tidal Wetlands Trends Analysis. New England Interstate Water Pollution Control Commission.
Ward, T; Lansdale, S. (2018). 2016 Land Use Suffolk County. Suffolk County Department of Economic Development & Planning, Division of Planning & Environment.
National Audubon Society (2024). The Christmas Bird Count Historical Results [Online]. Available http://www.christmasbirdcount.org [01 April 2024]