Osprey Nation Report for the 2020 Season

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An adult Osprey carrying nesting material. Photo by Brendan Murtha, 2018.

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Introduction

	2014	2015	2016	2017	2018	2019	2020
Stewards	100	146	224	287	314	342	231
Nests with data	174	322	420	540	603	732	733
Active nests	210	250	337	394	416	501	510
Fledglings	NA	356	490	607	725	650	549/744 observed/estimated
Fledglings per nest		.69	.80	.89	.93	.81	

March 5, 2021 — 2020 was a year like no other, and Osprey Nation's 2020 season was unprecedented as well. After Covid-19 upended our lives in early spring the project suffered significant setbacks. "Unforeseen circumstances led to the departure of our first 2020 coordinator. In the month that followed, reporting progress ground to a halt. Early weeks of data entry and organization, the basis of the project's success, needed to be reevaluated and in some cases reconstructed."

As a citizen-science project, Osprey Nation tries to capture an accurate and representative picture of Osprey nesting in Connecticut each year. The validity of its data depends on the regular and extensive coverage only stewards can provide. No team of researchers could ever monitor the hundreds of Connecticut Osprey nests at once — this is the type of work citizen-science is best suited for.

Of course, such an approach has its drawbacks. Coordinating hundreds of stewards around the same procedures is difficult, especially during a time of crisis. With such a large number of nests, truly exhaustive coverage is near impossible. Project coordinators look to find stewards for as many nests as possible, avoid duplicate coverage, and ensure stewards are monitoring nests convenient to them.

Each of these drawbacks was accentuated by Covid-19. Especially early on, many stewards found themselves unable to get out as frequently or extensively as before. Coupled with the early breakdown in communication, many nests were left uncovered or overly-covered during the early weeks of the 2020 season.

Upon taking the helm in early summer, I knew some amount of lost-time would never be made-up, or holes in the 2020 data filled. But with Ospreys on nest and our remarkably diligent stewards willing to help, the season pressed on.

Despite the complications, Osprey Nation Stewards compiled data on 733 nests, setting a project record (one-upping 2019's 732).

Of these, 510 were active and successful, another record (there were 501 active nests in 2019).

These numbers were produced by an unusually low number of stewards: 231 contributed data, as opposed to 342 in 2019.

This drop-off was undoubtedly due to the temporary lack of communications after the first Osprey Nation coordinator's departure early in the season. A good number of stewards did not return to the project after this period. We hope they return in 2021!

With a lower-than-usual number of stewards monitoring a record number of nests, coverage was irregular. At several points during the season I put out calls for "blitz" coverage. Stewards were asked to send in reports on any nests in their area for which we had no data — nests they were not assigned last season but which had been covered historically.

This proved to be a successful way of filling in holes in the data, and provided insight into nest sites that were otherwise unknown to us. However, it came with a price:

certain nests received only one or two reports over the course of the season, barring the collection of certain types of data.

Confirmation that birds had fledged, and the number of fledglings, were prime examples. We received many mid-season reports from nests with young that were not followed up on later, so the fledging of these young was not documented.

While many Osprey fledge the entirety of their clutch without issue (see Natural History, below), it's also common for some chicks to die before they leave the nest. Therefore we can't assume the number of chicks reported equals the number that fledged. Fledgling has to be explicitly confirmed.

Fledgling count is an important data point tracked year to year. Because of the data reporting issues in 2020, I provide two fledgling numbers:

- **the number of successful fledglings confirmed by stewards: 549.**
- **a "projected" fledgling count — the number of fledglings likely to have been confirmed had all nests been covered regularly: approximately 744.**

The latter was calculated by applying the success rate of regularly monitored nests to those that were known to have chicks but which were missing fledgling data.

While the official fledgling count is lower than previous years, the drop should be taken in the context explained above. The projected fledgling count paints a better picture of the 2020 season's fledgling success. The projection of approximately 744 fledged young would follow the positive trajectory of recent years, and would be the highest fledgling count ever recorded by Osprey Nation.

By all indications, the Osprey population in Connecticut is doing very well. A population recovery that stands as one of the greatest conservation success stories of recent decades continues.

Despite the bumpy road, I am really thrilled with what Osprey Nation was able to accomplish during the 2020 season and extend my most sincere thanks to all our wonderful stewards. They persevered through unprecedented times and were able to salvage so much important data from near-ruin: in a year of few bright spots, this at least can bring us joy.

Three young Osprey prepare to fledge. Photo by Brendan Murtha, 2017.

The Natural History of Osprey

The Osprey, *Pandion haliaetus,* is one of the most widespread and well-known of the world's raptors, and is the only raptor known to "plunge-dive" feet first in pursuit of fish. Their piscivorous diet restricts them to habitats with shallow, fish-rich water, a category that includes most wetlands and coastal areas. In Connecticut Osprey are found around both salt and fresh water, although the bulk of the population is clustered along the coast, where there is an abundance of rich shallows and adequate nest sites. Historically Osprey nested on dead trees, snags, and cliff faces, but many have switched over to man-made structures, a plasticity that's been crucial to their conservation success.

Between the period of 1950-1970, Ospreys suffered widespread and unprecedented declines all across their North American range. Some of the worst losses occurred on the heavily developed, industrialized coastline that stretches between New York and

Boston, including all of the Long Island Sound. Here, ~90% of Osprey pairs disappeared, turning a once abundant raptor into a scarce and imperiled species. Certainly many birders growing up around the Sound during this period did not count Osprey as common nor familiar; an abundance that new birders might today take for granted is still seen as miraculous by those who bore witness to the paucity that came before. The primary driver of the Osprey's historic decline, which was mirrored across many other birds of prey, was pesticide pollution. Organochlorine pesticides such as DDT/DDE were all the rage during the mid 20th century, and their persistence in the ecosystem was subject to intense biomagnification in the systems of top-predators. Small amounts of DDT/DDE contained in the flesh of fish entered Osprey repeatedly, and this prolonged exposure drove chemical build-ups in the birds' system. While this concentration came with a range of adverse health effects, the most severe was eggshell thinning. During the period of steepest declines here in the Northeast, average Osprey eggshell thickness was nearly 20% thinner than pre-DDT levels, and this caused widespread reproductive failure— eggs were broken in the nest and countless chicks lost. Raptors in general were very prone to the reproductive consequences of DDT, and remain susceptible to pollutants today; their position as high-trophic-level predators means that they often accumulate chemicals present in the environment to a dangerous and unparalleled degree.

DDT and other associated pesticides were banned in the US in 1972, and since that time Ospreys and other affected birds have enjoyed swift rebounds in their population size. Trace amounts of the chemical can still be found in certain Osprey populations, especially those in industrial areas, but the magnitude of contamination is comparatively low and is, for the most part, no longer a threat. Ospreys are still of some conservation concern, however, and face a myriad of other threats including collision with man-made structures (a downside to their ability to nest in built-up areas), fishing line entanglement and habitat/food-chain degradation. As with all migratory species, the threats facing Osprey are not constant; dangers differ between breeding and winter territories, as well as en route, and comprehensive management plans for Osprey must take into account the conditions they experience both here on the East Coast and down in northern South America and the West Indies, where they winter.

One core requirement for any management plan is an understanding of population parameters, trends, and distribution. The Osprey Nation project attempts to produce such a holistic picture through annual citizen-science monitoring, and collects a wide range of spatial and temporal data suited to catch any shifts in the status of CT's Osprey population, were they to occur. During the project's now seven-year run, the most notable change observed has been the continued expansion of the Osprey population and range here in CT. How long this expansion can continue is, as of now, unclear (see *2020 Data*).

Osprey Breeding Fact Sheet:

- The first Ospreys arrive back around the Sound during the second week of March, but birds continue to arrive during the following month. In southeastern MA, 25% of the breeding population is back by 4/1, 70% by 4/15, and >95% by 4/30.
- Female Osprey head south earlier than males, who often stick around to feed young after fledging. Around the Sound, median departure date for adult females is 8/19. Median departure date for males is 9/15.
- After migrating south for the first time, young Osprey do not return north until their *second* spring, spending the entirety of their first full year in the tropics. As a result, we do not see "second-year" Ospreys in Connecticut.
- Over 90% of regional Osprey nests are now constructed on man-made nest platforms, and the increasing availability of such platforms is continuously implicated in the birds' population boom.
- About 90% of Osprey nests are reused from previous years, although these old nests may require much maintenance. Nest construction is taxing and it is in the birds' best interest to reuse if possible. Nests tend to survive between years better on man-made platforms than in natural sites, one reason for the platforms' popularity among Osprey.
- Failed breeders will often construct a new nest site later in the season, and use it instead the following year (avoiding construction early in the season). The maintenance of alternate nest sites is, in general, not uncommon for Osprey pairs.
- Around the Sound, egg-laying begins in early April and can go as late as early June. However, the peak of egg-laying occurs in mid-late April.
- Older females tend to lay eggs earlier than younger females. Conversely, pairs that have nested together before produce eggs significantly earlier than new pairs. Early breeding produces, on average, more young and less chick mortality.
- Around the Sound, the average clutch size is ~3 eggs. Clutches may be as small as one and as large as four.
- Both male and female Ospreys incubate, although females do so more often (~70% of the time). Incubation typically lasts 35-40 days, longer than is typical for a bird of this size.
- Hatching typically begins in late May and goes through early June.
- Most young take their first flight 50-55 days after hatching, in late July-early August.
- After fledging, young tend to be fed by parents (mostly the male) for an additional 10-20 days. During this time, they learn to forage on their own.

How does our 2020 data match up?

For the birds monitored by Osprey Nation…

Median arrival date (pair on nest): **April 3rd**

Median egg-laying date (first incubation observed): **April 28th**

Median hatching date (feeding/first chicks appear): **June 12th**

Average number of chicks per nest: **2.19**

Median date of first fledging: **July 30th**

Average number of fledglings per nest: **2.04**

Percentage of young that fledge: **93.1%**

Some things to keep in mind:

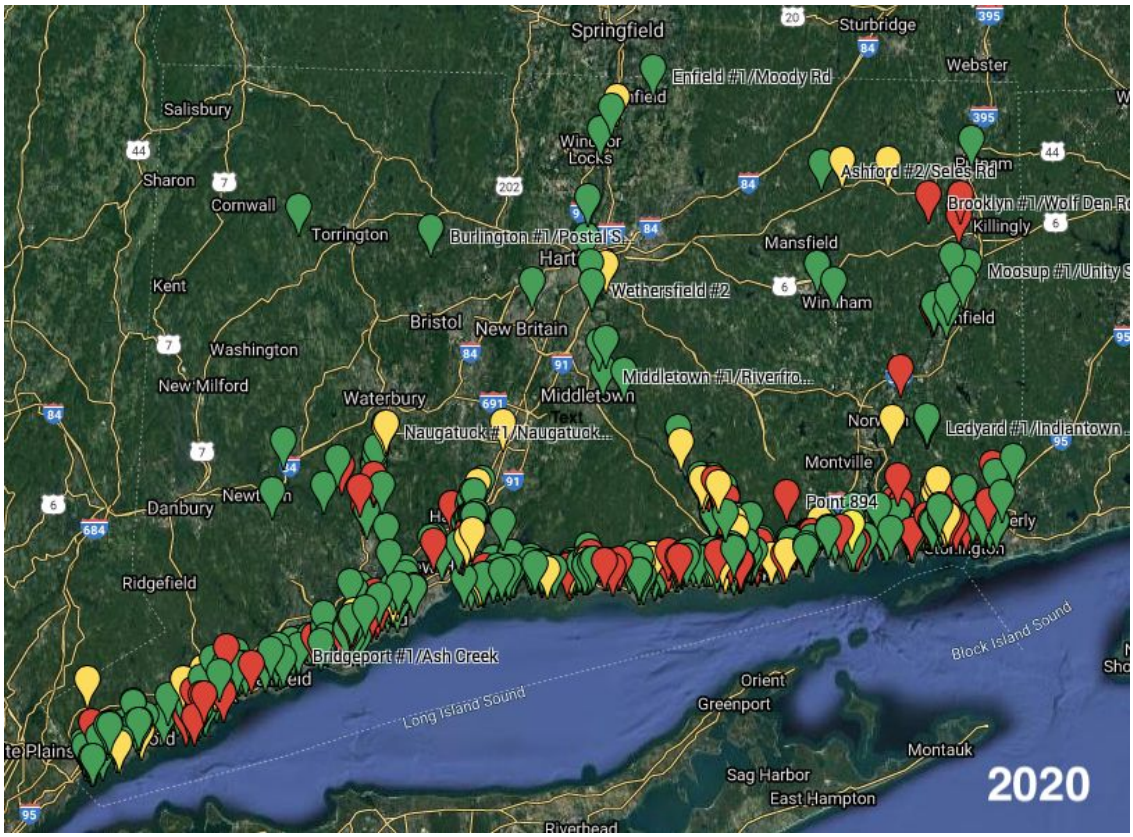
These dates are not exact, as observations by stewards are not daily. We can assume that the actual median for most of these metrics falls at least several days before the date listed.

“Average number of chicks” is not synonymous with clutch size— this is data we can not collect, given that most stewards can not see into the nests they monitor. Studies in Massachusetts have documented an average clutch size of 3.3 eggs, and if numbers in Connecticut are similar we can assume dud-eggs or the death of young chicks to be widespread: this seems the best explanation for an average chick number that is lower than the average expected clutch size.

Likewise, the “percentage of young that fledge” number does not account for chick mortality that may have occurred before steward detection — it is surely somewhat inflated on this account. Stewards often can’t get a confirmed chick count for weeks after hatching; chick presence can be initially confirmed by feeding or singular sightings, but it isn’t until the chicks are large and upright that their exact number is known. Infant mortality is therefore easily missed, and the fledging percentage is skewed by chick counts netting only healthy, well-developed individuals.

A family of Osprey in Norwalk. Photo by Hugh McManus.

2020 Season Results

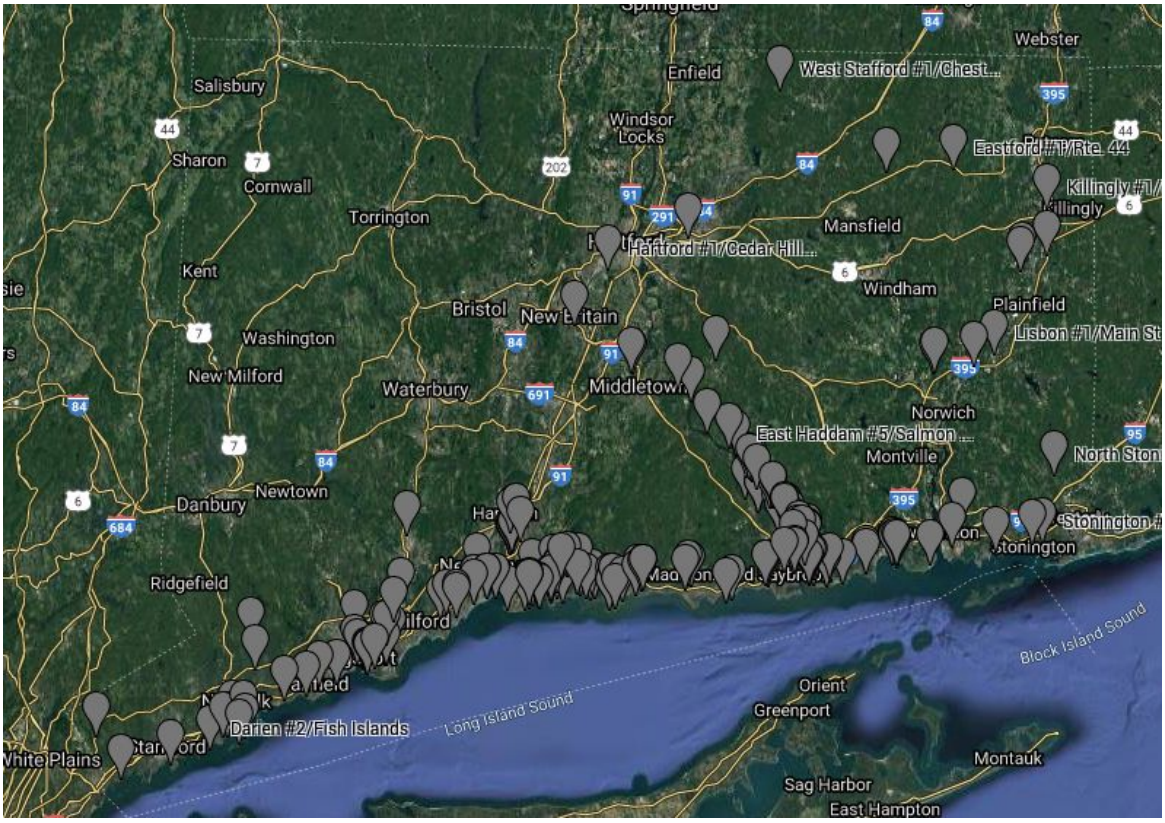


1. Nest Site Maps

The map above shows all nest sites monitored by stewards during the 2020 season.

Green pins represent active nests that fledged young.
Yellow pins represent failed nests, nests that were occupied early but did not fledge young (either abandoned before chicks or after chick death).
Red pins represent nests that were monitored by stewards but were not occupied at any point during the season.

The color coding of pins this season differed slightly from previous seasons, modified for greater specificity. As opposed to green and red pins indicating monitored/unmonitored nests respectively, I decided to turn all pins the default gray at the beginning of the season and color them as data came in — gray pins, never filled in, thus represent unmonitored nest sites. On the interactive Osprey Nation map, which can be found on the project's website, both colored and uncolored pins are visible together. For this report, however, I have parsed out the categories into two separate maps. The map of unmonitored nest sites is below.



The unmonitored sites are all old nests known from previous seasons, and given that no reports were received on them our knowledge of their status is unclear. Some of these nests may no longer exist. Overall, steward coverage was well spread out this season and few areas were neglected; the distribution of gray pins looks similar to that of the colored ones, and consists of nest sites that simply slipped through the cracks. If one area of sparse coverage had to be singled out, however, it would be the lower Connecticut River, where many nests exist in hard-to-reach locations (some only by boat). Comparing the two maps you'll notice that a discrete break in colored pins along the river is filled in by gray pins; this occurs in the Haddam area and should be a target of coverage in subsequent seasons.

As the maps indicate, the distribution of Connecticut Osprey nests follows our major coastlines, all along the Sound and up the shores of the three major rivers (Housatonic, Connecticut, Thames). There is also an expanded presence of Osprey in inland Connecticut, along certain ponds, lakes, and smaller rivers. The greatest concentration of Osprey nests in the state is on Great Island in Old Lyme, at the mouth of the Connecticut River.

2. 2020 Data

Fig 1. Steward Number by Year

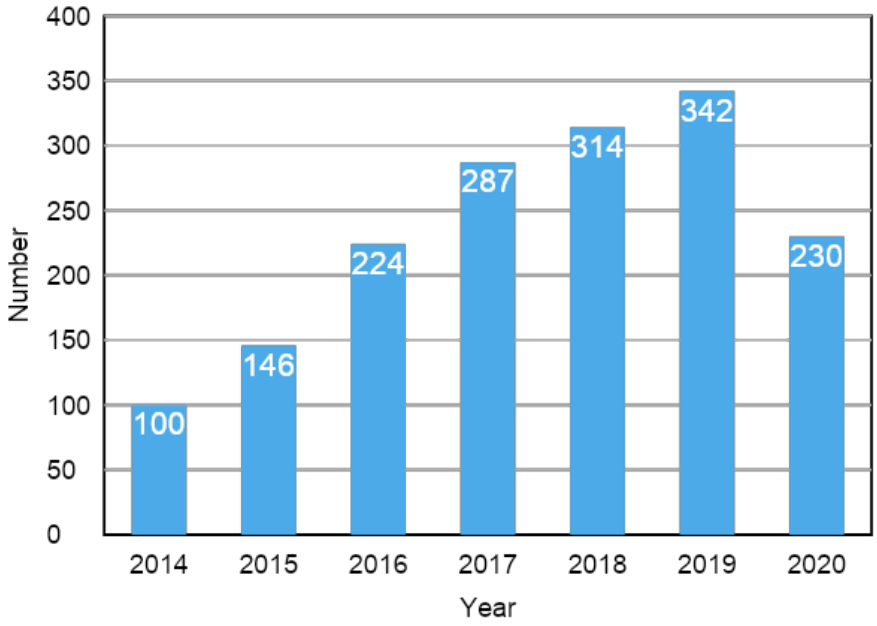


Fig 2. Monitored Nests by Year

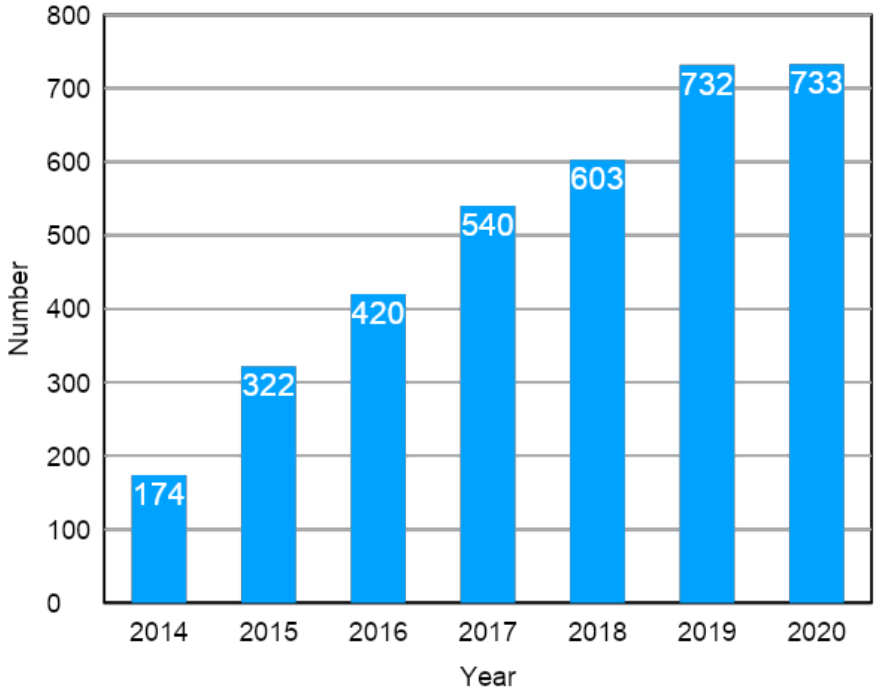


Fig 3. Active Nests by Year

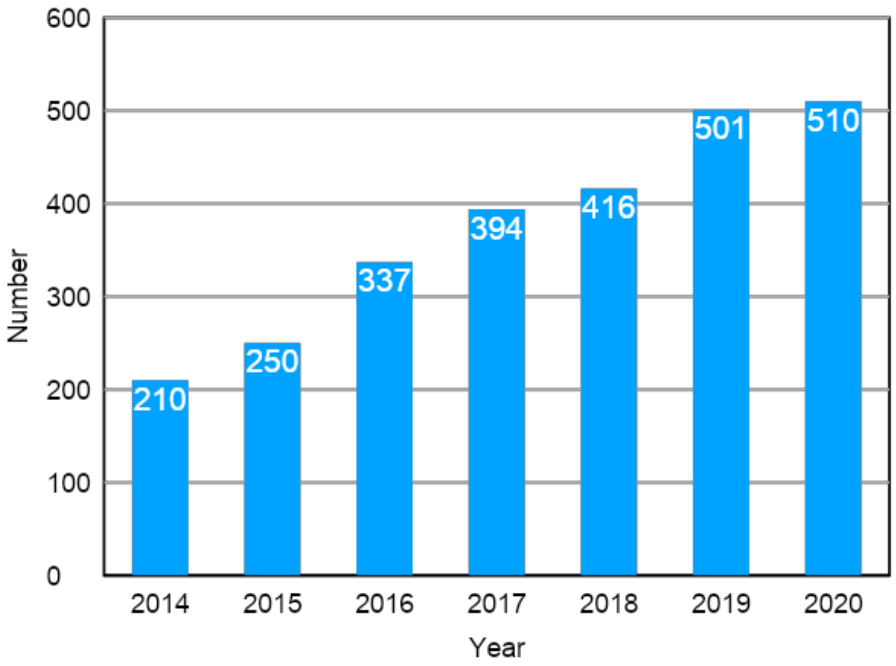
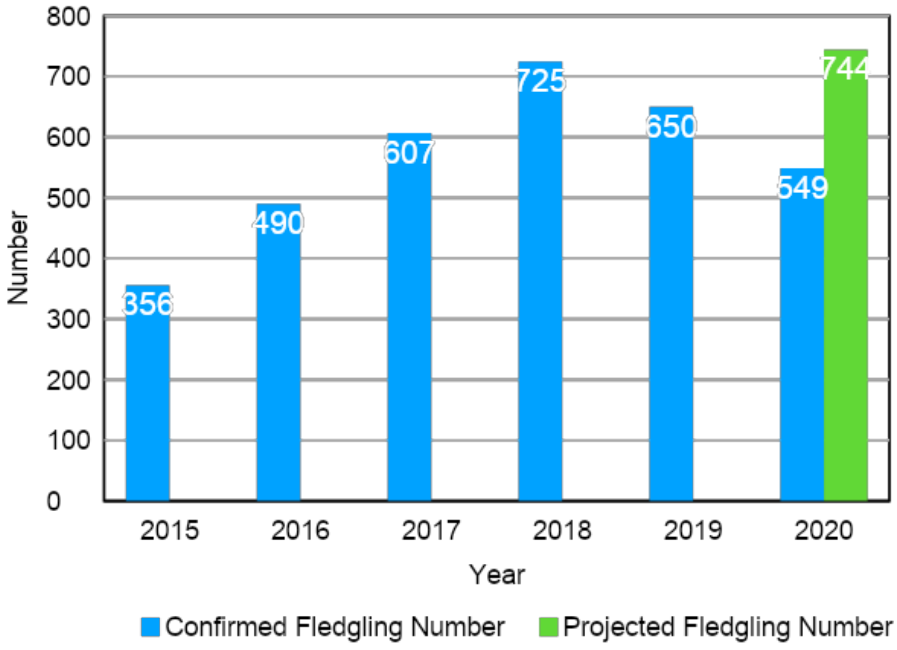
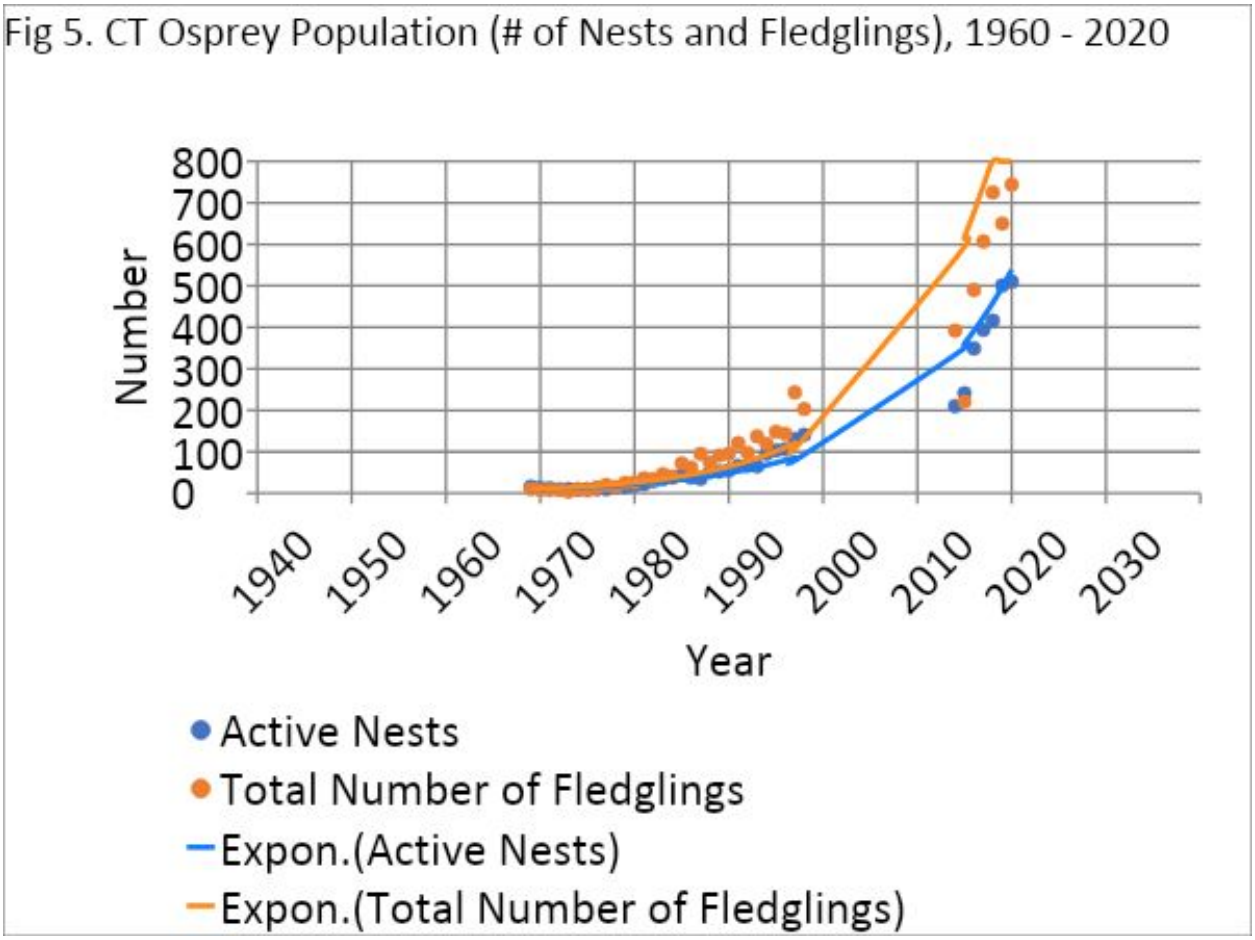


Fig 4. Fledgling Number by Year



These graphs show, with some modulation, a continued increase in the number of Connecticut Osprey pairs observed during the duration of Osprey Nation. However, this increase may be a result of increased coverage over the years, and it's therefore useful to plot these data alongside similar data collected by the CT DEEP between 1969 - 1998, a period of known Osprey population growth. Such an illustration makes



it evident that the increase documented by Osprey Nation is real, and is in line with the known Osprey population recovery that has occurred all across the United States.

The trend lines shown on the graph above were produced by the exponential model best-fitted to the Osprey data collected between 1969 - 2020. They illustrate a continuing population boom and recovery that had already begun in the state by the late 80s – early 90s. Of course, this model is merely a "best-fit" for the *current* data, and we can not expect Osprey population growth to stay on an exponential trajectory forever. As with all population dynamics, exponential growth must eventually level out around a system's *carrying capacity,* the maximum number of a species an area can

support. This season, certain stewards remarked on how their areas seemed saturated with Osprey— no nest-platforms were unused, and new pairs were constructing nests in sub-optimal locations. Rather than being food that determines our Osprey carrying capacity (there are enough Menhaden to go around) it seems that nest-site availability is the limiting resource that will determine at what level the Osprey population eventually stabilizes. Of course, with the construction of man-made nest platforms, natural limits on nest-site availability are circumvented— it thus remains to be seen how long the upward trajectory can hold and whether new limiting factors will present themselves as time goes on. As always it is long-term, citizen-science projects like Osprey Nation that are best suited to answer these questions.

One thing to note from the graph above is that, in the early years of Osprey Nation, the number of active nests detected by the project was much lower than the model would predict. This seems to be a good illustration of how coverage bias can skew a data-set. In those early seasons, with few stewards working, low nest counts were surely a result of inadequate coverage, as opposed to actual drop-offs in nest numbers. The increase seen during Osprey Nation's run (Fig. 2 and 3) is therefore exaggerated, and is better understood in the context of long-term population growth (Fig. 5). Even now, the population models we run are mediated by coverage: the better and more consistent our coverage is between years, the better suited our population models will be to hold water in a scientific arena. Good data depends on replicability and control of outside variables. Only through the continued efforts of Osprey Nation Stewards will truly informative population models be produced— the stakes are high, but the reward is higher!

It seems that, throughout all we humans dealt with this year, Ospreys at least had a good season. Here's to many more!

Acknowledgements

Considering that this season was tumultuous, many thanks are in order— the project could not have run if it weren't for the tireless efforts of our stewards, collaborators, and Connecticut Audubon Staff.

First and foremost, I extend a huge thank you to Tony Eason for his help sifting through and inputting data during the summer. Tony made my life much easier, and the project simply could not have progressed as much without his time and energy. Thank you also to the team at Connecticut Audubon for all your guidance and input over Zoom

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As always, thank you to the Connecticut Department of Energy and Environmental Protection for supporting the project, and to the rehabbers at A Place Called Hope in Killingworth who once again provided excellent care for several injured Osprey found and rescued over the course of the season.

Last but certainly not least, A huge thanks to all 2020 stewards who monitored nests this 2020 season. This type of project could never exist without you. In alphabetical order:

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Anne Semmes
Ayal Kaffman
Barbara DiRienzo
Barbara Landau
Barbara Ryden
Ben Philbrick
Bennett Pudlin
Bert Harma
Betty Hadlock
Betty Slanetz
Beverly Propen
Bill Aletzhauser
Bill Chantrell
Bob Singer
Jen Singer
Bob Myers
Bonnie Castellani
Brenda Rich
Brian Roach
Carol Dunn
Carolyn Doan
Cathy DeMeo
Cathy Malin
Charles Palardy
Charlotte Weston
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Christine Sweeney
Chuck Fitzgerald
Craig Healy
Cynthia Ehlinger
Cynthia Lee
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Kathy O'Brien
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Diana Whitelaw
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Tab Carter
Tanya Patten
Ted Norris
Gayle Norris
Tom Andersen
Tom Pfeifer
Tom Thompson
Valerie Koif
William Chantrell

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