



Conservation: Research, Education, Citizen Science



Citizen Science at the Lab = Public participation
in organized research efforts

The Cornell Lab of Ornithology

Needed for questions at large geographic scales
with most data “where the people are”



The Cornell Lab of Ornithology

yardmap

Citizen Science as crowdsourcing



Engaging Thousands in Science

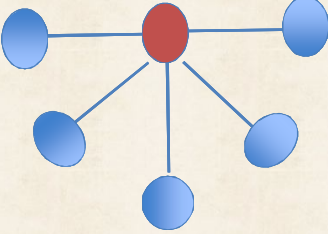
Be on the map.

>300,000 participants annually

www.yardmap.org

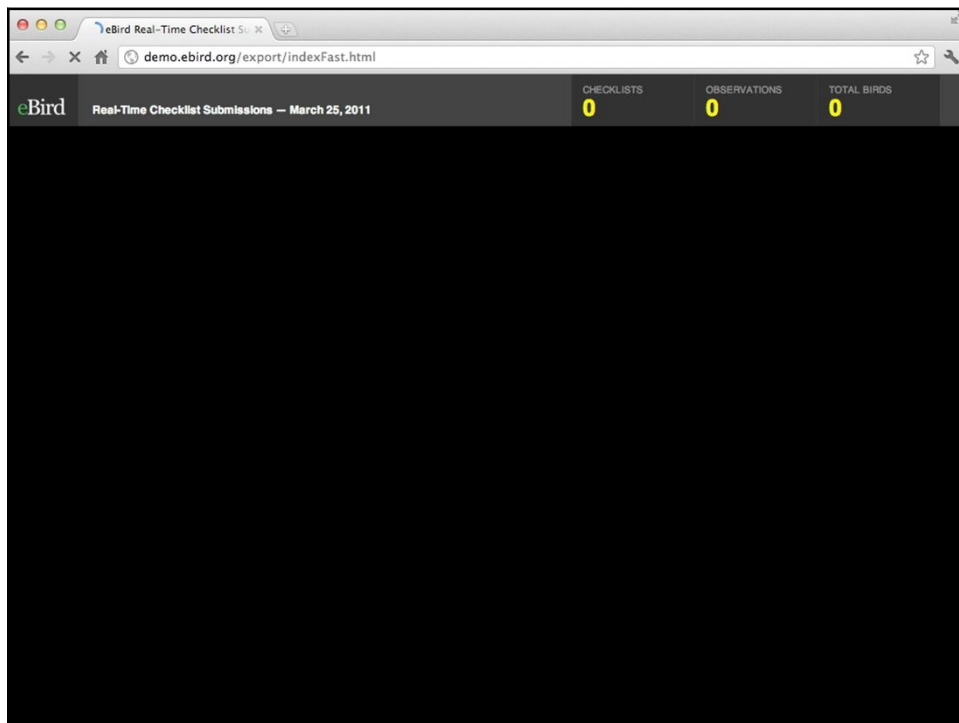
The Cornell Lab of Ornithology yardmap

Crowdsourcing as cooperation with soft institutional governance



www.yardmap.org

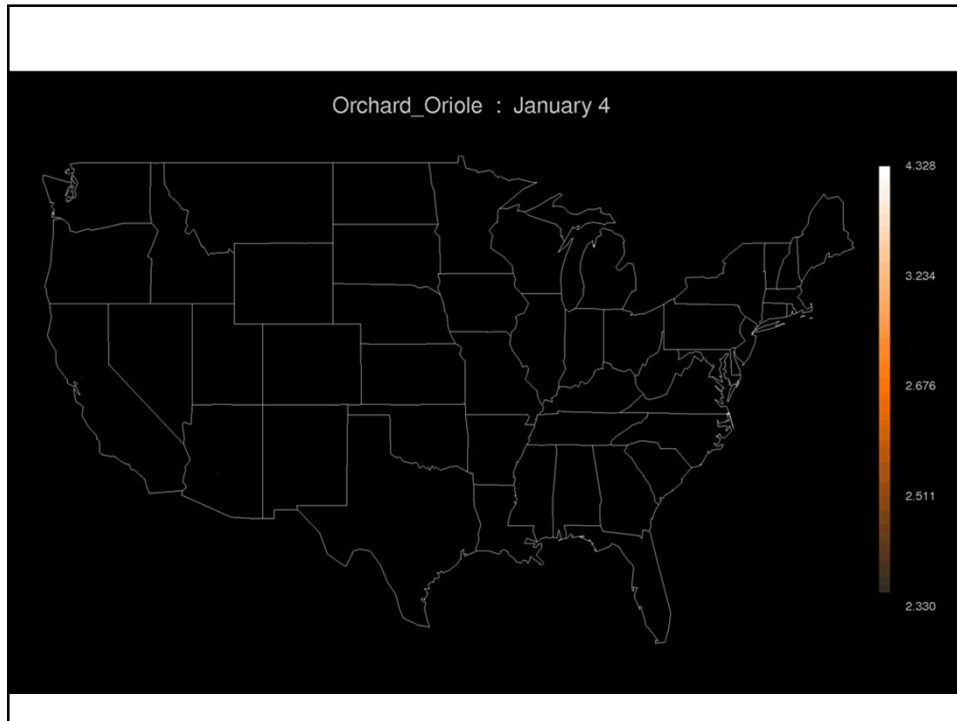
The diagram shows a central red circle connected by lines to five surrounding blue circles, representing a hub-and-spoke network structure. The background is a light beige color with a dark brown, textured border at the bottom.



The screenshot shows a web browser window with the URL `demo.ebird.org/export/indexFast.html`. The page header includes the eBird logo and the text "Real-Time Checklist Submissions - March 25, 2011". A summary table displays the following data:

CHECKLISTS	OBSERVATIONS	TOTAL BIRDS
0	0	0

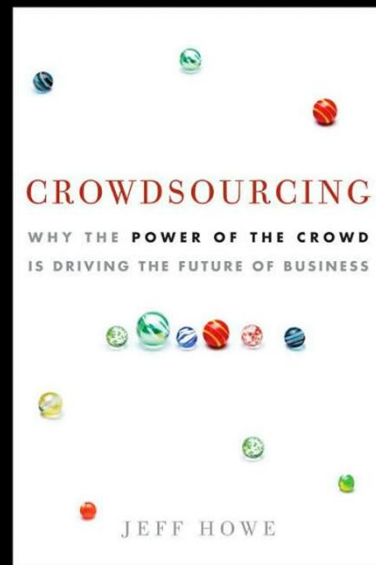
The main content area of the page is currently blank.



TheCornellLab of Ornithology

yardmap

“ If stock photography is the first industry to be transformed by crowdsourcing, then ornithology is the first academic discipline to undergo the same process. ”



The Cornell Lab of Ornithology yardmap

Networked Crowdsourcing

The diagram shows two separate networks of nodes connected by a single line. The left network consists of a central red node connected to five blue nodes. The right network consists of a central red node connected to six blue nodes. The two networks are connected by a single blue line extending from the top right of the right network towards the top left of the left network.

www.yardmap.org

The Cornell Lab of Ornithology yardmap

46 million birders and 90 million gardeners

The illustration depicts a cross-section of a garden. On the left, there is a white house with a red roof and a driveway. A black trash can sits on the driveway. The garden features a green lawn, a flower bed with orange flowers, and a person mowing the lawn. A flock of birds is flying in the sky above the lawn. The garden is shown as a raised platform with soil and roots visible underneath.

www.yardmap.org

The Cornell Lab of Ornithology yardmap

46 million birders and 90 million gardeners



www.yardmap.org

The Cornell Lab of Ornithology yardmap



www.yardmap.org

The Cornell Lab of Ornithology **yardmap**

already a member? [sign in](#)

Explore your habitat; Map your yard!

YardMap uses new web technology to let you construct beautiful landscape maps using real satellite images of your back yard.

a free, interactive, citizen science mapping project about habitat creation and low-impact land use

[Sign Up!](#)

Share 4361 | Tweet 539 | Email 2058

What's a yardmap?

YardMap is a citizen science project designed to cultivate a richer understanding of bird habitat, for both professional scientists and people concerned with their local environments.

[PLAY VIDEO](#)

The YardMap is funded by the National Science Foundation Informal Science

Be on the map.

Map for Birds, Science, and Your Yard!

- 8048 maps drawn and counting
- 75% of threatened and endangered species occur on private lands.
- 1.2 Million Acres of non-native lawns cover the U.S. That's 8 times the size of New Jersey.

[www.yardmap.org](#)

The Cornell Lab of Ornithology **yardmap**

already a member? [sign in](#) | [welcome, \[username\]](#) | [Show Quick Steps](#) | [Signout](#)

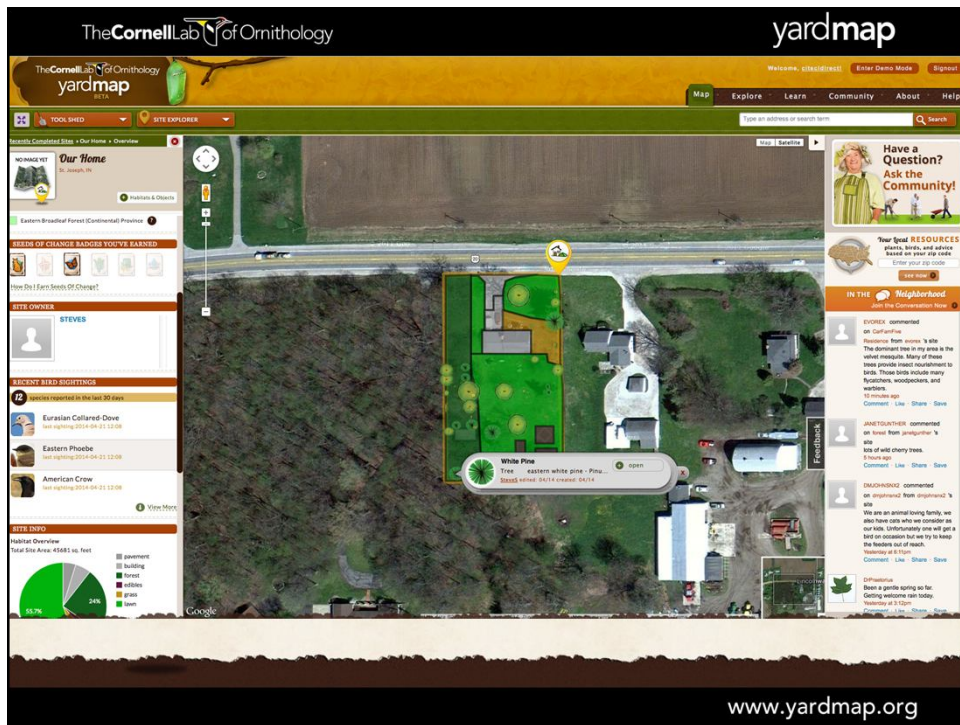
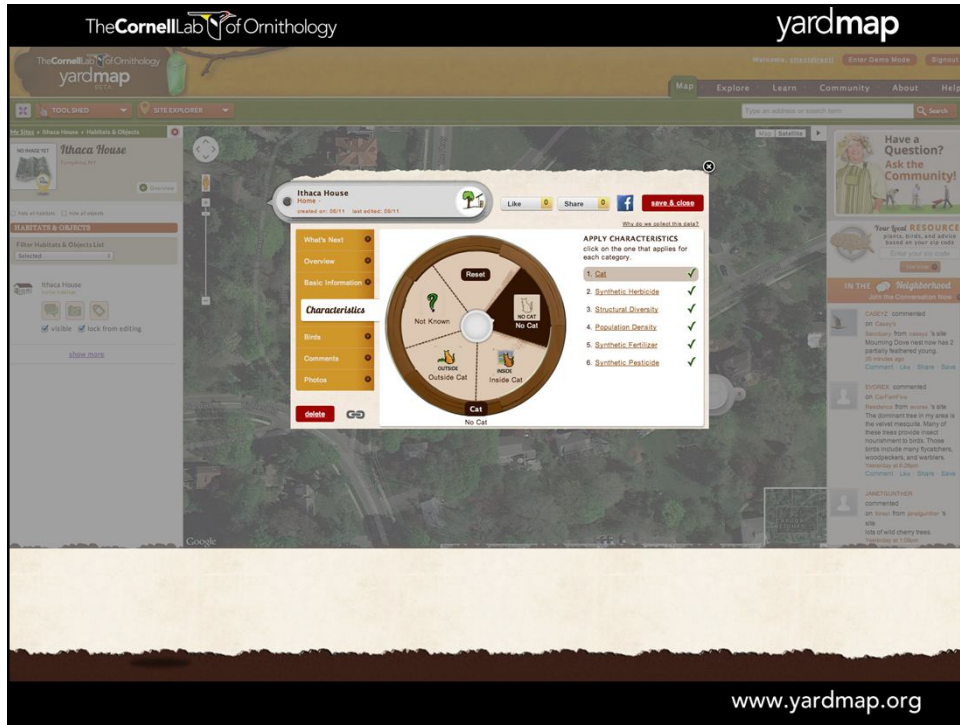
Map | My Profile | Explore | Learn | About | Help

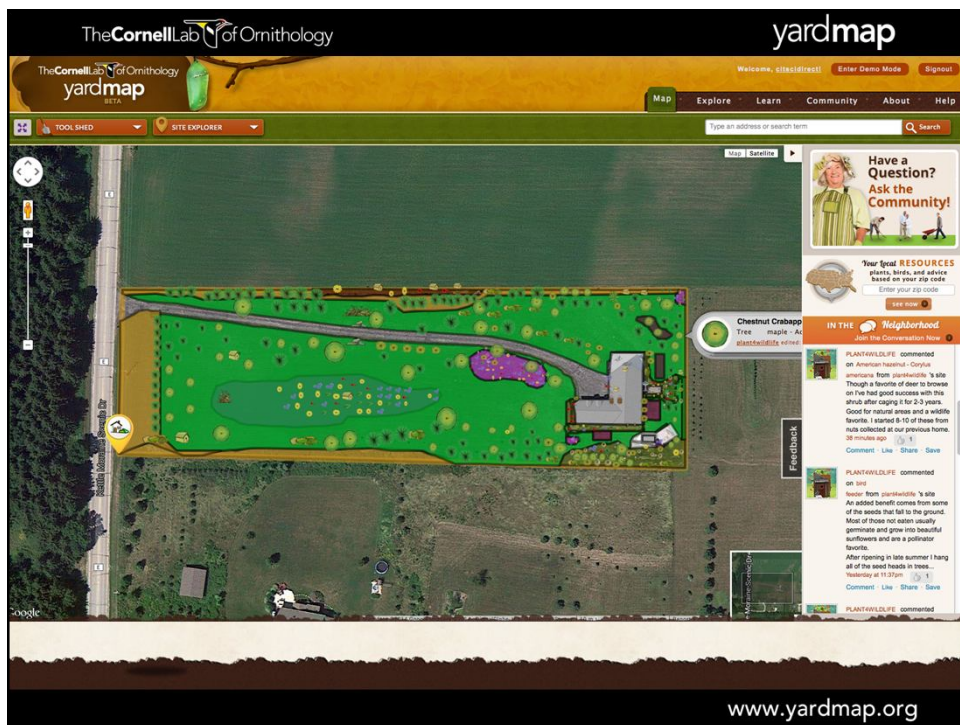
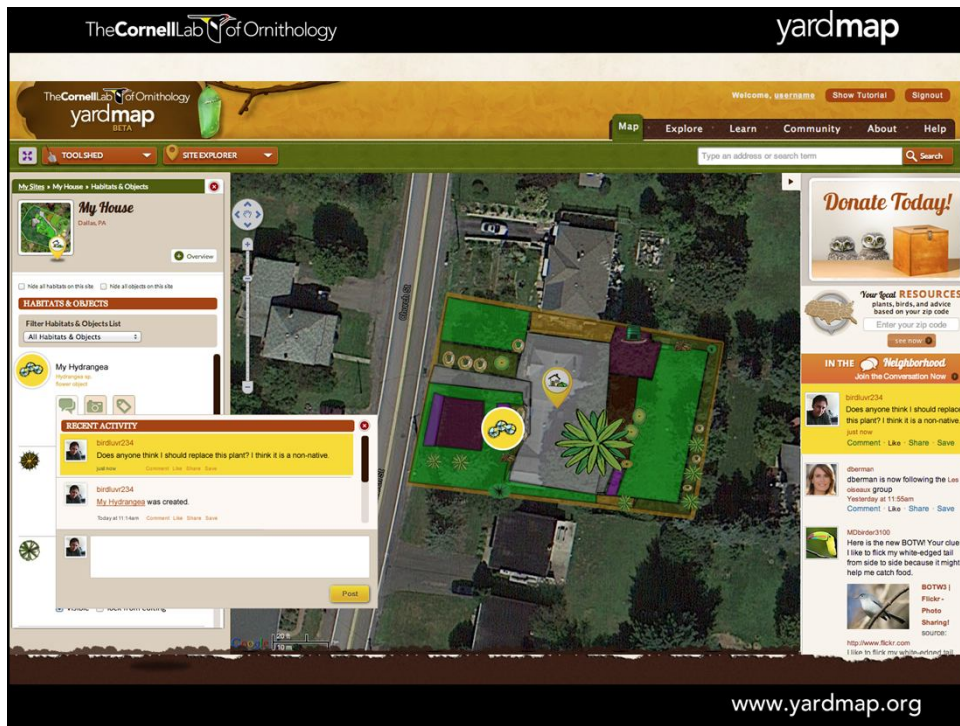
[Tool Shed](#) | [Saved Sites](#) | [Search](#) | [Full Screen Mode](#) | [Show the tutorial menu](#)

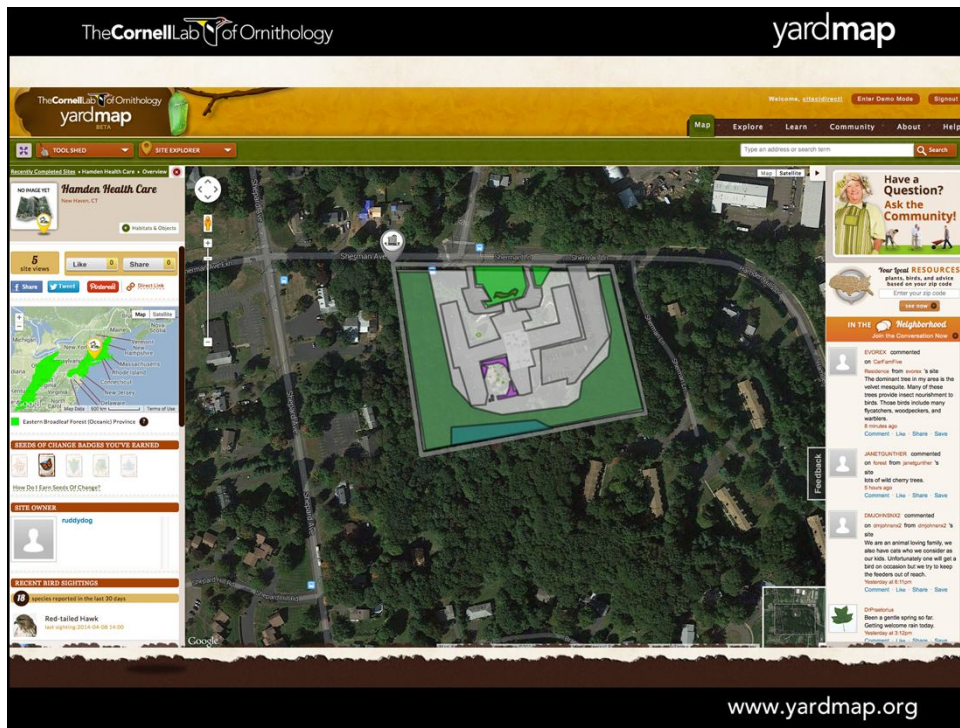
Map | Satellite | [Yump](#)

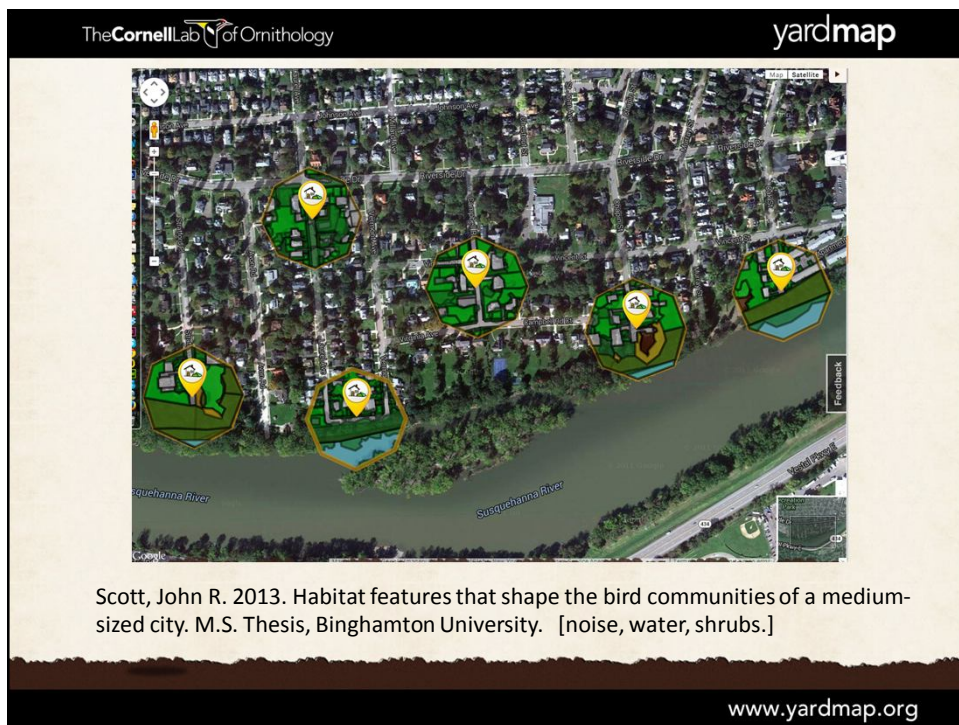
[Feedback](#)

[www.yardmap.org](#)











The screenshot shows the 'yardmap' website interface. At the top, it features the 'The Cornell Lab of Ornithology' logo and the 'yardmap' title. Navigation links include 'Home', 'Explore', 'Learn', 'Community', 'About', and 'Help'. A search bar is located in the top right. The main content area is divided into three sections:

- Recently Completed Sites:** A list of sites on the left, including 'East-Central New York Suburban Yard', 'Hunter's House', '607 Gettysburg Home', 'dmlghana2', 'Our Home', 'Hamden Health Care', and 'Malson'.
- Map:** A central map of Chautauque with numerous yellow location pins indicating various sites.
- Community & Resources:** A right-hand sidebar featuring a 'Have a Question? Ask the Community!' section, a 'Your Local RESOURCE' section, and a 'Neighborhood' section with user comments and photos.

The website URL 'www.yardmap.org' is displayed at the bottom right.

This infographic, titled 'Neighborhood Planning Strategies', outlines the vision, goals, and landscape ecology for the Chautauque area. It is presented by 'The Cornell Lab of Ornithology' and 'yardmap'.

VISION STATEMENT: We are a community of neighbors that values the beauty of Chautauque Lake, and its cultural and natural heritage. We envision our common areas and private properties as places that can enhance the water quality of the lake and the biodiversity of our lands, while strengthening our neighborhood character. Together we can operate at the scale of our yards, our neighborhood, and our watershed, and our watershed to be a model for our community and beyond.

SEVEN GOALS:

- ENHANCE LAKE QUALITY:** Chautauque Lake is a part of the community's identity and daily life. As a shoreline community, we have a responsibility to protect this essential resource.
- MAKE SUSTAINABLE DESIGN DECISIONS:** Design that is sensitive to site conditions can reduce erosion, chemical inputs, and frequency of garden maintenance. This can help the environment as well as save time and money.
- RETHINK STORM WATER:** By managing storm water runoff more effectively, we can make our communities more self-sustaining and provide opportunities for greater plant diversity.
- IMPROVE BIRD HABITATS:** Birds contribute to the health of the ecosystem while enhancing our landscape experience. By improving bird habitat quality, we can better enjoy these benefits.
- SUPPORT POLLINATOR SERVICES:** Pollinators are critical for plant reproduction, our food supply, and beautiful landscapes. We can support pollinators to help keep plant communities healthy.
- CONNECT AND EXPAND ECOLOGICAL SYSTEMS:** By working at the scales of our neighborhoods and yards, we can enhance ecological networks for improved biodiversity and habitat quality.
- SPREAD THE WORD:** Our community and our vision can be a model for others. By sharing our story, we can encourage stewardship that benefits the lake and region.

LANDSCAPE ECOLOGY: This section features two diagrams: 'Point Chautauque' and 'Maple Springs'. The Point Chautauque diagram shows 'Habitat friendly yards function as stepping stones, allowing wildlife to access to the lake and through the community.' The Maple Springs diagram shows 'The stream and other canopy corridors link the forest and the lake. Stepping stones can restore the habitat connectivity throughout the community.'

The infographic also includes a 'YardWorks' logo with the tagline 'Naturally Inspired for Bird Friendly Yards' and the website URL 'www.yardmap.org' at the bottom.



The Cornell Lab of Ornithology
yardmap

WHY ARE POLLINATORS IMPORTANT ?

VALUE AND ROLE OF BUTTERFLIES AND BEES

A pollinator is a biotic agent that causes plants to make fruit or seeds. They do this by moving pollen from one part of the flower of a plant to another part. This pollen then fertilizes the plant. Only fertilized plants can make fruit and/or seeds, and without them, the plants cannot reproduce.

Animals pollinate 75% of the crop plants. Bees are the primary pollinator, followed by butterflies and then birds.

1 out of every 3 mouthfuls of food or drink is a result of the presence of a pollinator.

75% of all flowering plants rely on pollinators for fertilization and reproduction.

Pollinators provide benefits to us through crops, medicinal plants and garden plants. We can also improve their living conditions with a variety of design strategies.

MUTUAL BENEFIT SYSTEM

HUMAN BEINGS → Food, Health Care, Biochemistry, Biotechnology, Pharmaceuticals

POLLINATOR → Pollinating Service

PLANT → Nectar, Shelter

WHAT CAN WE DO TO HELP POLLINATORS?

POLLINATOR NEEDS

- HOST PLANT:** A species of plant that a butterfly caterpillar will eat. The female must lay her eggs on or close to it.
- NATURAL NEST SITE:** Bare soil between quality vegetation can be used for ground nesting bees. Bundles of hollow stems, reeds, or stems of reeds, banded grasses can be used for tunnel nesting bees.
- NECTAR SOURCES:** Presence of flowers used for gathering food.
- WATER SOURCE:** A location, however, depending on the size of the pond, that will provide butterflies & bees with their essential requirements.
- SUNNY OPEN SPACE:** Pollinating insects need to see the sky for navigation. Bees also search their instincts before flight to a warm habitat.
- OVER-WINTERING SITE:** Individuals that cluster in their colonies, under leaf litter, in a pile of sticks, etc. share the winter, under leaf litter, bees will spend the winter in the ground and emerge ready to fly on their original nest.

SELECTION CRITERIA

- Plant requirements (sun exposure - soil type)
- Plant vigor (hardiness - native - diverse species)
- Growth habit (overall shape - over-wintering opportunity)
- Flower abundance (bloom succession - color preference)
- Commercially available (local nurseries - mail-order seeds)

FOUR-STEP APPROACH TO DEVELOPING A POLLINATOR CONSERVATION STRATEGY

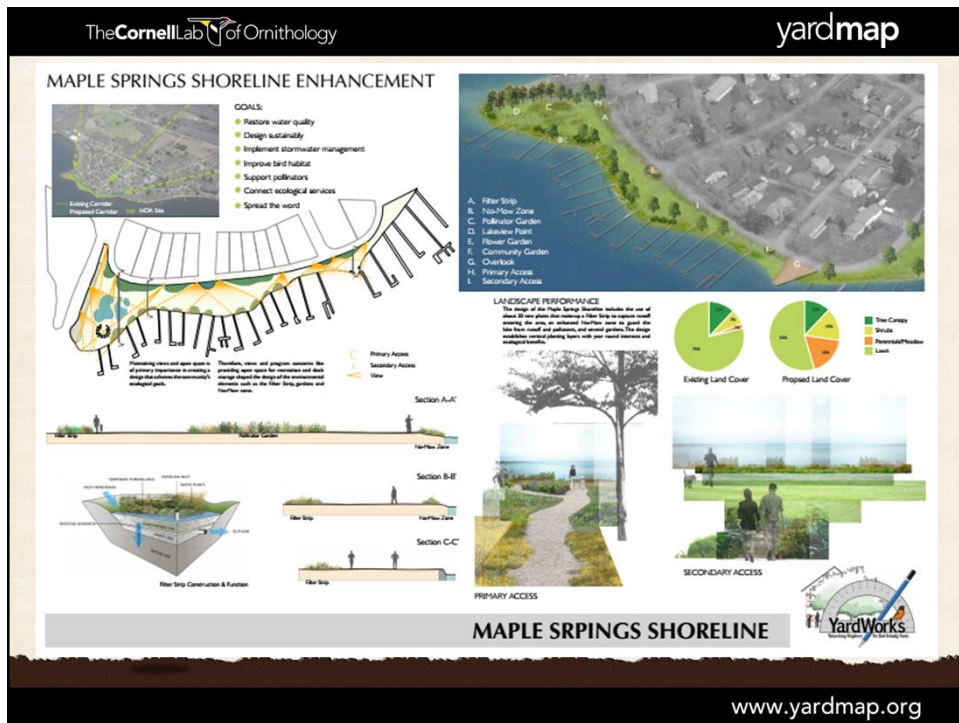
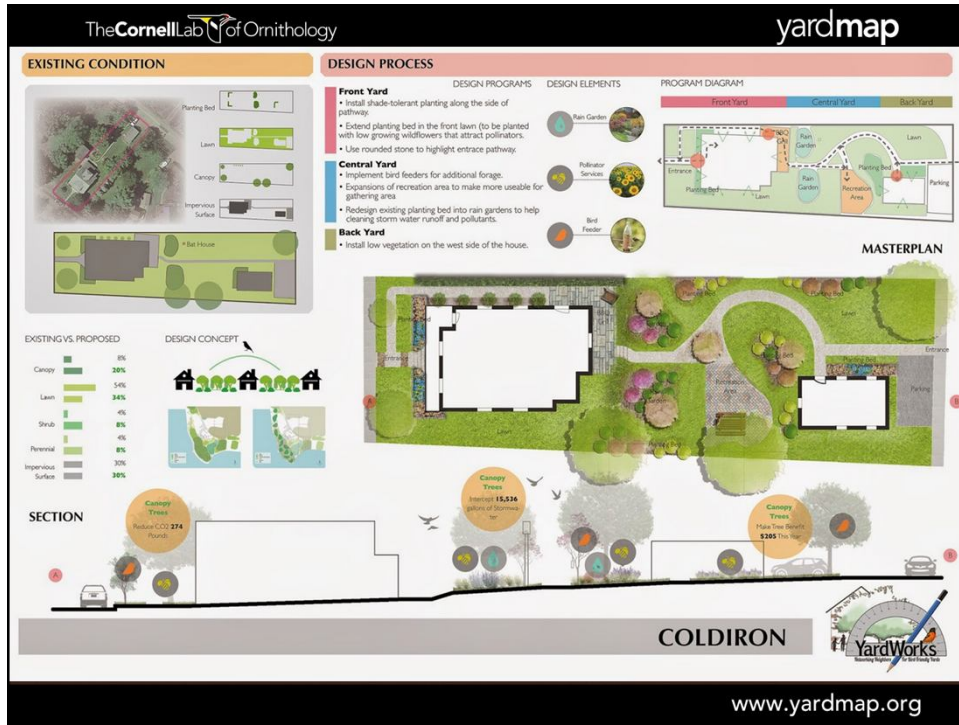
1. Recognize existing pollinator habitat that is already present.
2. Protect that habitat and avoid clearing or disturbing the pollinator already present.
3. Provide new habitat for pollinators.
4. Manage land in a way that maintains the habitat and minimizes disturbance to pollinators.

POLLINATOR

Resources: <http://www.naturesstewardship.org>, <http://www.yardmap.org>, Cornell Center for Changing Gardens with Focus on the American East, Peter Raven, Rutgers University Press, 2010, The Xerxes Society, "Attracting Native Pollinators" (Washington: Society Publishing, 2011).

YardWorks
Measuring Progress for Our Friendly Yards


www.yardmap.org




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yardmap

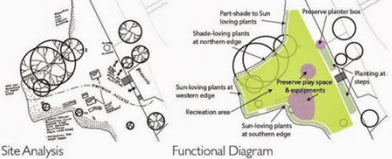
THE POINT



Star plantings reinforce the entryway, beautify the surroundings, and improve pollinator and bird habitat.



- Demonstrate Point Chautauqui commitment to a healthy lake ecosystem
- Preserve open space for gatherings and play
- Maintain lake views
- Provide benches and picnic tables for sitting and eating
- Entry plantings at stairs
- Edge plantings to keep children off the water's edge
- Site Program



Site Analysis **Functional Diagram**

Part shade to Sun loving plants
Shade-loving plants at northern edge
Sun-loving plants at western edge
Recreation area
Sun-loving plants at southern edge
Preserve play space & equipment
Planting at steps

With over 75,000 sq ft of lawn, runoff is a serious problem for the site. But, with the addition of over 800 sq ft of planting, the runoff rate will decrease, and the retention rate will increase by nearly 5%. This will result in less runoff into the lake, which is a contributing factor to the algal blooms. The stormwater that isn't retained will be filtered through plant roots to improve both the quality and quantity of stormwater entering the lake.

The additional shrubs and willflowers will significantly improve and create new habitat and foraging areas for both birds and butterflies. These nesting areas will provide critical habitat for smaller birds, options for food, and provide protection. Creating space for pollinators will improve the biodiversity of the area.

The main program at the Point, is to create an inviting, functional and aesthetically pleasing area for people to enjoy. The social benefits range from being a area for exercise or other physical activities, and providing access to the lake for water activities, all while providing environmental services for the flora and fauna of the area.

Design Benefits **Master Plan**

POINT CHAUTAUQUA

CORNELL UNIVERSITY
DEPARTMENT OF
LANDSCAPE ARCHITECTURE

Chautauqui Lake YardWorks Project
LA 6020 Spring 2014
Ge Yi, Sean Tang, Hayden King, John Crespo

www.yardmap.org

The **Cornell Lab** of Ornithology

yardmap

Community is buying signs to advertize what they are doing

I am a Fall Creek YardWorks Participant!



YardWorks
Networking Neighbors For Bird-Friendly Yards



YardWorks is a collaboration between:
Cornell University's Landscape Architecture Department
YardMap, by The **Cornell Lab** of Ornithology
Tompkins County Cornell Cooperative Extension

Visit our website at yardworksoithaca.wordpress.com

www.yardmap.org

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How do we move from 3 communities in New York
to the national or global scale?

www.yardmap.org

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Development of an online planning tool



Farmville

80,000,000 players

Pay for premium content



www.yardmap.org

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Crowdsourced planning



Networked to landscape architecture and urban planning classes at universities

www.yardmap.org

The Cornell Lab of Ornithology

Partner clone for research and outreach!

already a member? [sign in](#)

Habitat Network

powered by yardmap

Let's Keep Habitat. Together.

Team up with The Nature Conservancy and The Cornell Lab and householders worldwide to study and support conservation right in your backyard.

What is the Habitat Network?

a free, social, interactive, citizen science mapping project about habitat creation and low-impact land use

[Sign Up Now](#)

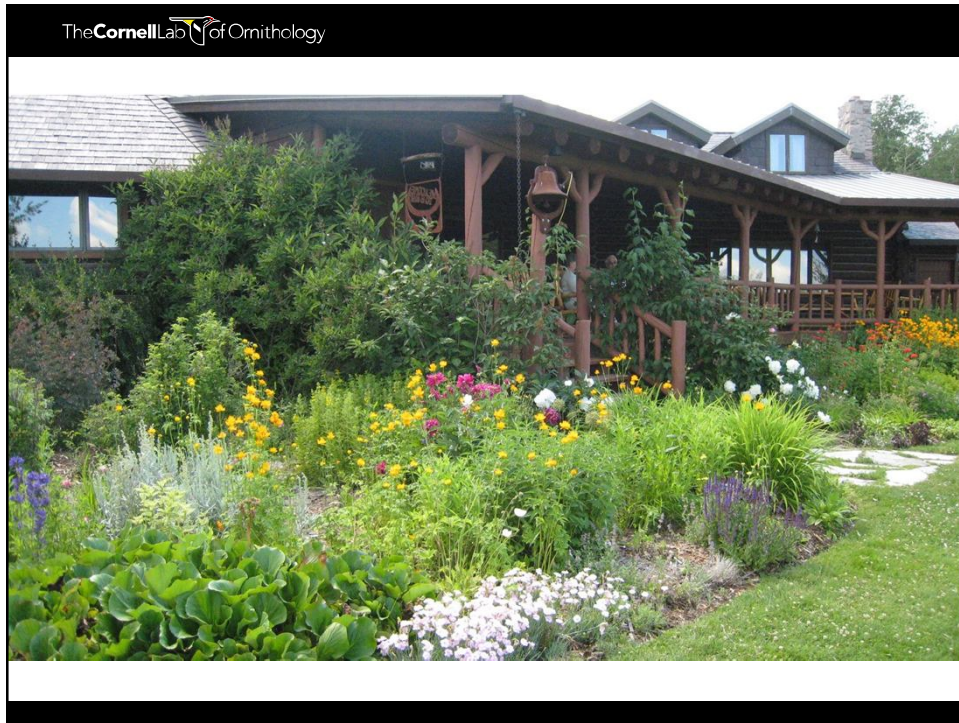
[Share](#) 3616 [Tweet](#) 529 [Email](#) 2012

The Habitat Network in action

The goals of the Habitat Network are to increase ecological function and resilience in residential landscapes, and to generate personal commitment to, and public support for, conservation through back yard action.

Be on the map.

Map for Birds, Science, and Your Yard!



The Cornell Lab of Ornithology yardmap

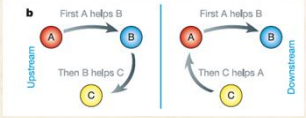
Theoretical treatments of cooperation and competition

www.yardmap.org


The Cornell Lab of Ornithology yardmap

Resolving social dilemmas

Elinor Ostrom – Nobel prize 2009, died 2012



(Sigmund & Nowak 1993)



Public goods games, Models of structured populations with social rewards and punishment

(Hauert 2005, 2006)

Reputational effects

Conditional cooperation Small group sizes

Image scoring **Partner choice**

Pay to reward for cooperation

Pay to punish for noncooperation

Between group competition

www.yardmap.org

The Cornell Lab of Ornithology yardmap

Can socially networked citizen science make it easier to be green?

What *mechanisms* support increased conservation effort in YardMap?

Deliver two versions of the application

A/B design experiments

www.yardmap.org

The screenshot shows the 'yardmap' website interface. At the top, it features the Cornell Lab of Ornithology logo and the 'yardmap' brand name. A navigation bar includes links for 'Map', 'Explore', 'Learn', 'Community', 'About', and 'Help'. Below this, there are sections for 'Activity' and 'Discover', along with a 'My Stream' indicator and a search bar for 'Find a Stream'.

Leaderboards

MAPS MORE THAN 90% COMPLETE
Add categories, tag, and add photos for all your objects and habitats to earn map completeness

YOU	johnnypubic	
	bananabreath	
	spongebob	
	birdluvr14	
	edgar123	
	jenny56	
	tommywarblers	
	cardinal8987	
	wren475897	
	puffinhugger	
	kefirmaker798	
	thunderpangs	
	norsec3254	

SEEDS OF CHANGE POINTS
Earn points by making changes in your yard and updating object and habitat characteristics

56	birdluvr14	45
57	bananabreath	45
58	spongebob	44
59	jenny56	44
60	edgar123	44
YOU	61 johnnypubic	43
62	tommywarblers	42
63	cardinal8987	42
64	wren475897	42
65	puffinhugger	41
66	kefirmaker798	41
67	thunderpangs	40
68	norsec3254	39

The illustrations are arranged in a 2x2 grid:

- Top Left:** Three stylized figures standing on a green field. One figure is holding a yellow flower. Below the illustration is the text "BETWEEN GROUP COMPETITION".
- Top Right:** A group of stylized figures standing on a green field with wind turbines in the background. Below the illustration is the text "GROUP EFFICACY".
- Bottom Left:** Three stylized figures. One is wearing a red shirt labeled "ENERGY SIB" and another is wearing a green shirt labeled "ENERGY SAVERS". Below the illustration is the text "SOCIAL IDENTITY & REPUTATION".
- Bottom Right:** A stylized figure standing next to a large green tree. A legend box shows "Top Sustainability Practices", "Average", "Below Average", and "Sustainable". Below the illustration is the text "BENCHMARKING & SOCIAL NORMS" and "A new normal".

Dickinson et al. 2013. Can deliberate design of online social networks make it easier to be green? *Trends in Ecology and Evolution* **28**: 561-569

www.yardmap.org

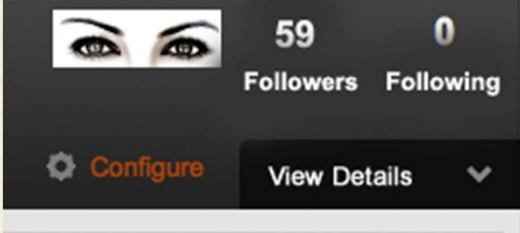
The Cornell Lab of Ornithology yardmap

How important is reputation?

H: Pro-environmental behavior (PEB) increases with observer number and sense of being observed

P: Experimentally doubling the number of followers increases PEB.

P: Placing eyespots next to the number of followers increases PEB.



www.yardmap.org

The Cornell Lab of Ornithology yardmap

Shifting social norms



www.yardmap.org

The Cornell Lab of Ornithology yardmap

Descriptive social norms

Describe what is commonly done in a situation (Cialdini et al. 1990)

Making norms salient influences levels of cooperation!

Referent group matters – closer to home, more effective!

www.yardmap.org

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The problem with descriptive social norms

Average

Schultz et al. (2007)

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Adding social approval

Last Month Neighborhood Comparison | Last month you used **15% LESS** electricity than your efficient neighbors.

YOU	<div style="background-color: #808080; height: 15px; width: 45%;"></div>	504 kWh*
EFFICIENT NEIGHBORS	<div style="background-color: #32CD32; height: 15px; width: 55%;"></div>	596
ALL NEIGHBORS	<div style="background-color: #FF4500; height: 15px; width: 100%;"></div>	1,092

*kWh: A 100-Watt bulb burning for 10 hours uses 1 kilowatt-hour.

YOUR EFFICIENCY STANDING

GREAT 😊😊

GOOD 😊

BELOW AVERAGE 😞

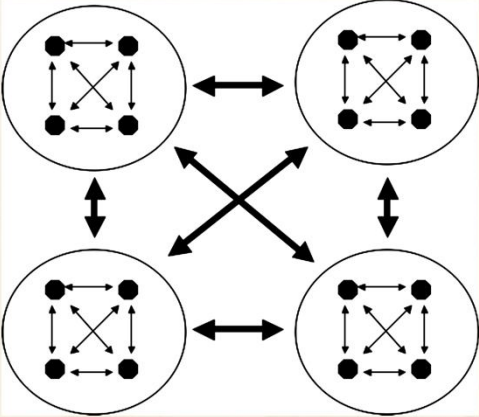
Fig. 1. Home energy reports: social comparison module.

Schultz et al. (2007)

www.yardmap.org

The Cornell Lab of Ornithology yardmap

Can socially networked Web environments enable us to behave like a super-organism?



The diagram illustrates four groups of four individuals (represented by black dots) arranged in a 2x2 grid. Each group has internal connections between its members. The groups are also interconnected with each other, forming a larger network structure. Arrows indicate the direction of interaction between groups.

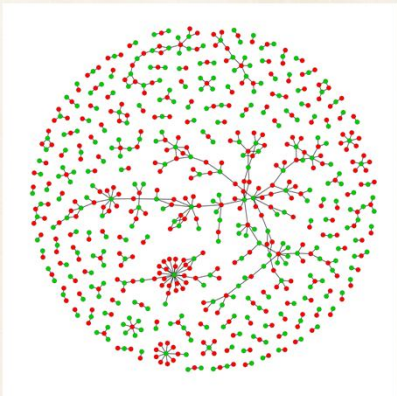
2015: Enable group formation and summaries of data by group; Test effect of competitions.

Reeve, H.K. and B. Holldobler. 2007. The emergence of a superorganism through intergroup competition. *PNAS* 104: 9736-9740.

www.yardmap.org

The Cornell Lab of Ornithology yardmap

Social network effects



A/B testing now

Influence

Diffusion of innovation

www.yardmap.org

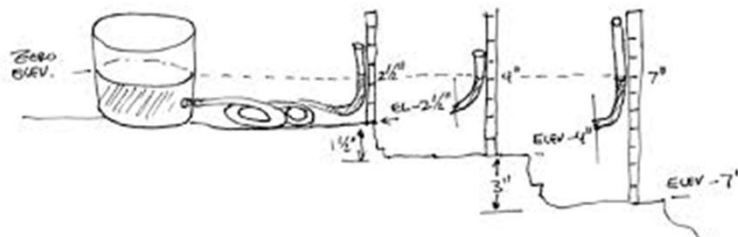
The Cornell Lab of Ornithology yardmap

YardMap as a collaboration space:

1. Big data
2. Emergent activities
3. Innovation
1. Collective project solving

www.yardmap.org

Might the level of detail provided in YardMap be useful or Bernard's models?



Citizen scientists + tinkerers + online platform + sensors
Who is your audience and what do you want to know?
What do your participants want to know?