Citizen Science in the Classroom

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Monarch Monitoring Project

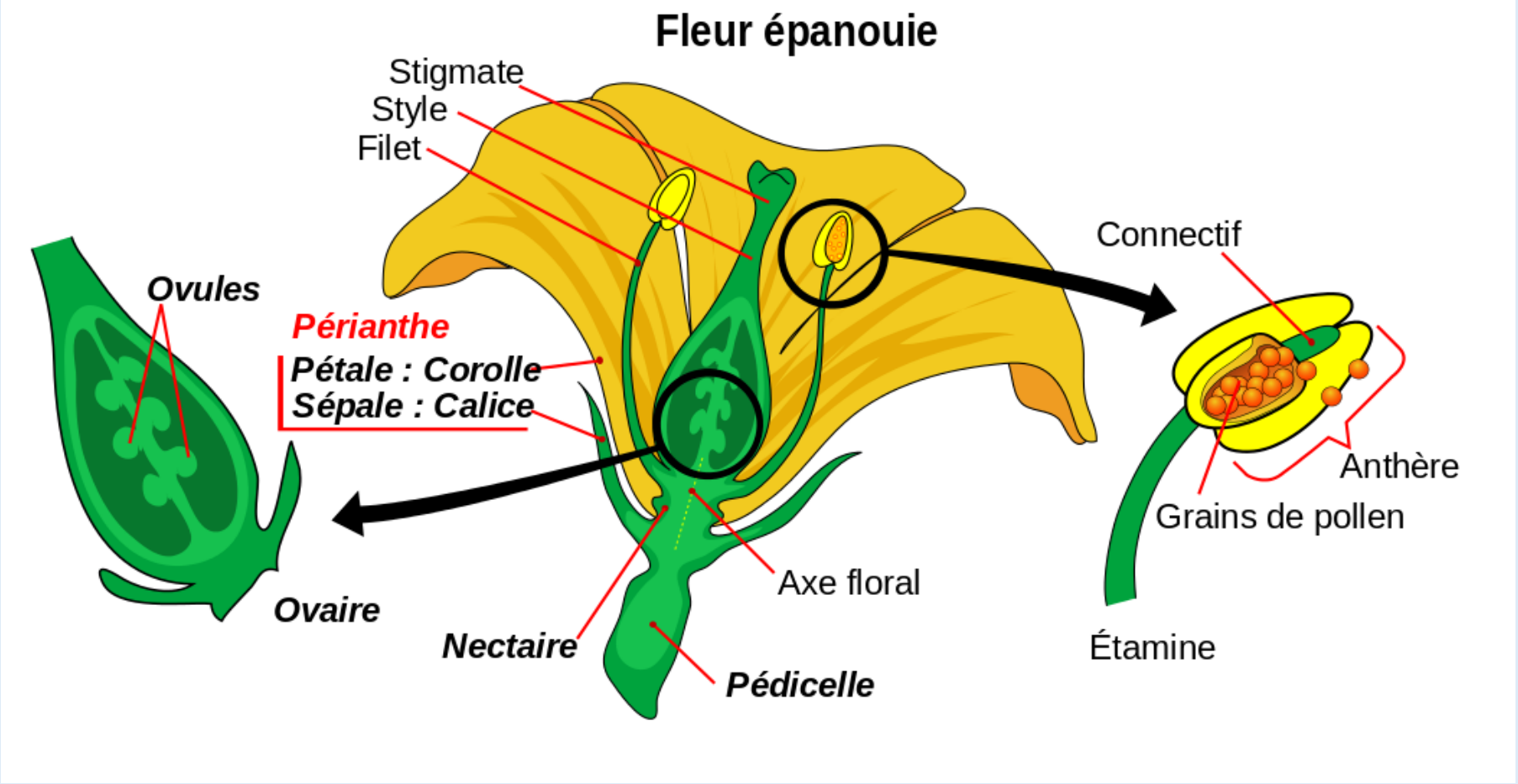
Monarch Butterfly: What is Citizen Science?

Citizen Science is the collection of scientific data by individuals who are not professional scientists. Professional biologists from the land management agency prepare the individuals for their work as citizen scientists. These projects are on-going and consist of a network of volunteers. Citizen Science networks are very important. The citizen science monitoring programs would not be the success it is without the participation of citizen scientists. Without these dedicated volunteers, too few data would be collected to accomplish research objectives. Much of what has been learned about the monarch butterfly and its migration is the result of citizen science projects.

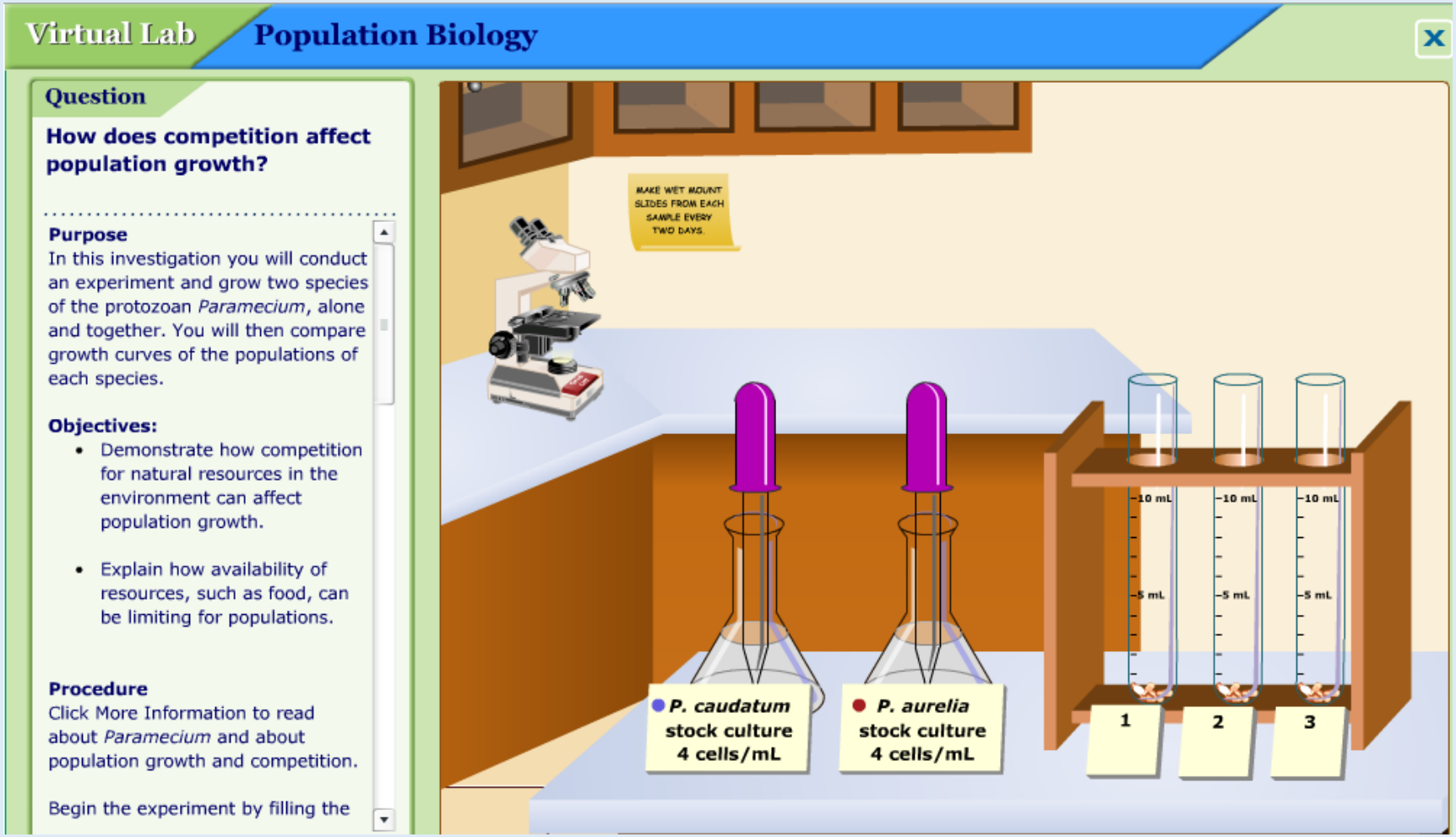
Releasing a tagged Monarch. Photo by Anne Okonek.

Two volunteers record data on a monarch butterfly they recently tagged. Photo by Anne Okonek.

Science education must change to include more process and less content



Testing can frequently make laboratory work appear to be in conflict with the need to cover a large amount of content



Why do laboratories fail so often?

- Small sample sizes and high variance make the data difficult to interpret
- Teachers may lack adequate background and training in the field
- Insufficient time is available to see results.

ID (initials #)	Plant #	# sepals	# carpels	# honey leaves	Length of longest sepal (mm)	Width of sepal (mm)	# sepals with green coloration
KB1	3	6	9	25	33	23	5
KB2	3	5	8	17	30	25	0
LC1	3	7	9	19	23	19	0
LC2	4	5	8	17	27	26	0
SC1	4	5	7	0	36	30	5
SC2	4	5	7	13	41	37	5
BC1	2	5	13	21	28	23	4
BC2	2	6	17	18	36	31	4
WD1	1	8	10	26	31	25	1
WD2	1	7	12	11	36	28	4
EG1	4	5	10	18	30	28	0
EG2	4	5	3	19	32	29	1
OG1	1	5	6	15	25	22	0
OG2	1	5	7	18	24	23	0
RK1	1	5	6	17	23	20	0

Making things still more difficult: established educational goals include a quantitative, inquiry based approach

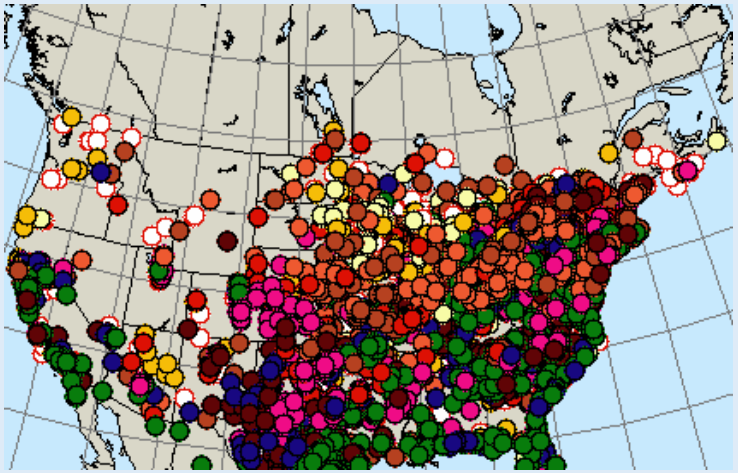
Quantitative Literacy

OBSERVATION_MON	DAY_OF_YEAR	SPECIES_ID	COMMON_N	SCIENTIFIC_	PLANT_GRO	PHENOPHAS	PHENOPHAS	OBSERVATIC	OBSERVATIC	LATITUDE	LONGITUDE	SITE_ID
1	2	7	Apple	Malus pumil	occ_trees	Leaves Unfo	110	Single	Happy New	40.0361	-105.062	106
1	2	7	Apple	Malus pumil	occ_trees	Leaves Cha	120	Single	Happy New	40.0361	-105.062	106
1	2	7	Apple	Malus pumil	occ_trees	Leaves Drop	130	Single	Happy New	40.0361	-105.062	106
1	2	7	Apple	Malus pumil	occ_trees	Flowers (No	140	Single	Happy New	40.0361	-105.062	106
1	2	7	Apple	Malus pumil	occ_trees	Fruit (None)	150	Single	Happy New	40.0361	-105.062	106
1	4	174	Skunk cabb	Symplocarp	wildflowers_	First Flower	21	Regular	not actual fl	41.8234	-124.148	106
1	8	169	Sea rosema	Argusia gna	occ_evergre	Flowers (Mi	412	Single		36.38	-75.8305	106
1	8	169	Sea rosema	Argusia gna	occ_evergre	Fruit (None)	420	Single		36.38	-75.8305	106
1	8	240	American ho	Ilex opaca	occ_evergre	Flowers (No	410	Single	Cedar Waxv	37.1218	-76.4484	106
1	8	240	American ho	Ilex opaca	occ_evergre	Fruit (Middle	422	Single	Cedar Waxv	37.1218	-76.4484	106
1	15	7649	Narrowleaf	Populus ang	occ_trees	Leaves Unfo	110	Single	This entry is	39.8255	-105.13	106
1	15	7649	Narrowleaf	Populus ang	occ_trees	Leaves Cha	120	Single	This entry is	39.8255	-105.13	106
1	15	7649	Narrowleaf	Populus ang	occ_trees	Leaves Drop	130	Single	This entry is	39.8255	-105.13	106
1	15	7649	Narrowleaf	Populus ang	occ_trees	Flowers (No	140	Single	This entry is	39.8255	-105.13	106
1	15	7649	Narrowleaf	Populus ang	occ_trees	Fruit (None)	150	Single	This entry is	39.8255	-105.13	106
1	15	143	Narrowleaf	Typha angu	occ_grasses	Flower Stalk	310	Single	This observa	39.8255	-105.13	106
1	15	143	Narrowleaf	Typha angu	occ_grasses	Pollen (Non	320	Single	This observa	39.8255	-105.13	106
1	15	143	Narrowleaf	Typha angu	occ_grasses	Fruit (Late)	333	Single	This observa	39.8255	-105.13	106
1	16	78	Eastern red	Cercis cana	occ_trees	Leaves Unfo	110	Single	larger buds	35.8108	-78.7151	106
1	16	78	Eastern red	Cercis cana	occ_trees	Leaves Cha	120	Single	larger buds	35.8108	-78.7151	106
1	16	78	Eastern red	Cercis cana	occ_trees	Leaves Drop	133	Single	larger buds	35.8108	-78.7151	106
1	16	78	Eastern red	Cercis cana	occ_trees	Flowers (No	140	Single	larger buds	35.8108	-78.7151	106
1	16	78	Eastern red	Cercis cana	occ_trees	Fruit (None)	150	Single	larger buds	35.8108	-78.7151	106
1	16	50	Eastern ser	Amelanchier	occ_trees	Leaves Unfo	110	Single	larger buds	35.8108	-78.7151	106
1	16	50	Eastern ser	Amelanchier	occ_trees	Leaves Cha	120	Single	larger buds	35.8108	-78.7151	106
1	16	50	Eastern ser	Amelanchier	occ_trees	Leaves Drop	133	Single	larger buds	35.8108	-78.7151	106
1	16	50	Eastern ser	Amelanchier	occ_trees	Flowers (No	140	Single	larger buds	35.8108	-78.7151	106
1	16	50	Eastern ser	Amelanchier	occ_trees	Fruit (None)	150	Single	larger buds	35.8108	-78.7151	106
1	16	52	Flowering d	Cornus flori	occ_trees	Leaves Unfo	110	Single	larger buds	35.8108	-78.7151	106
1	16	52	Flowering d	Cornus flori	occ_trees	Leaves Cha	120	Single	larger buds	35.8108	-78.7151	106
1	16	52	Flowering d	Cornus flori	occ_trees	Leaves Drop	133	Single	larger buds	35.8108	-78.7151	106

Project BudBurst Data

Student Engagement

- Meaningful Work
- Active Inquiry
- Hands-on and Participatory
- Access to experts

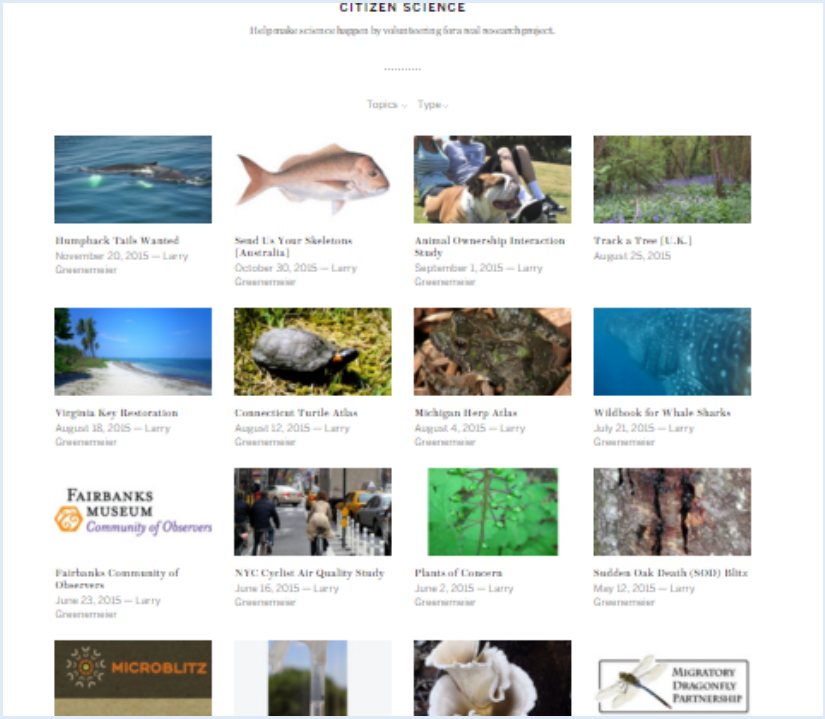


ANNENBERG LEARNER

Photo courtesy of Conserve Wildlife Foundation of New Jersey

Inclusion of math and computer science skill instruction into the project

An (over)abundance of opportunities



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The challenges – why isn't everyone doing this?

Recognition of the need to incorporate learning goals into Citizen Science Projects

- Identify the fundamental research questions being addressed, phrased in terms that make the science that underlies them clear
- Identify classes and age groups best served by the project
- Link the quantitative skills required for the analysis with the content presented and provide background in these analytical techniques
- Identify the content-standards met by the prepared material
- Include still more resources that will provide adequate background and instruction for easy integration.

Effectiveness of the approach has yet to fully demonstrated

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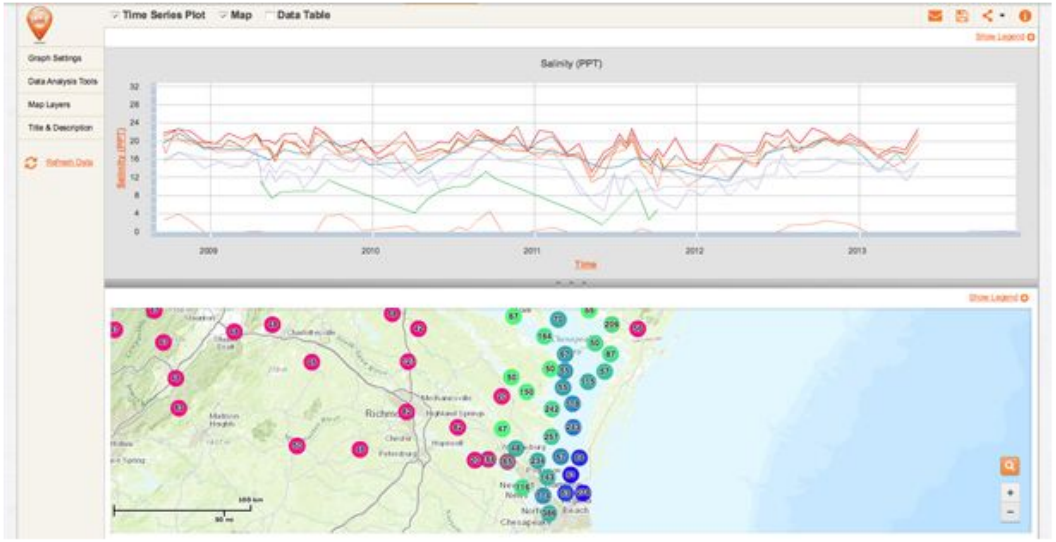
Students

FieldScope

Online Mapping for Citizen Science Investigation



FieldScope Projects

Browse and Find Projects

Check out FieldScope projects that you can join and explore.

Video Tutorials

An introduction to National Geographic's platform for citizen science collaboration and visualization.

Benefits to those setting up the projects

- Training costs are shared with the teachers who frequently have experience training data collectors
- Data submitted will likely get a good first review
- Many students will be motivated (albeit for varying reasons)

Challenges and Opportunities