



LANDSCAPE PERFORMANCE SERIES

Black Rock Sanctuary – Phoenixville, PA Methodology for Landscape Performance Benefits

Environmental

Tripled bird counts from 262 in 2004 to 907 in 2011. Over the same seven year period, species variety increased from 63 to 100 species observed.

Observations for Black Rock Sanctuary have been collected since 2003 by birders and entered into eBird, a program launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society. We decided to use 2004 as the “start” year because it was the first year for which all 12 months of observation were recorded. Bird observations in 2004 totaled 262 and have steadily increased to a total of 907 birds in 2011. Observations are maintained by local partner conservation organizations.

$$\text{Increase in Bird Counts: } (907-262)/262 = 2.46 = 246\%$$

Species present in 2011 that were not present in 2004 include the following:

Acadian Flycatcher	Fish Crow	Rock Pigeon
American Black Duck	Fox Sparrow	Ruby-crowned Kinglet
American Redstart	Golden-crowned Kinglet	Ruby-throated Hummingbird
Bald Eagle	Hairy Woodpecker	Rusty Blackbird
Black-throated Blue Warbler	Hermit Thrush	Scarlet Tanager
Blue-gray Gnatcatcher	Louisiana Waterthrush	Snow Goose
Brown Creeper	Magnolia Warbler	Spotted Sandpiper
Brown Thrasher	Nashville Warbler	Swamp Sparrow
Canada Warbler	Northern Parula	Tundra Swan
Chipping Sparrow	Osprey	Wood Duck
Common Nighthawk	Pileated Woodpecker	Yellow-billed Cuckoo
Eastern Phoebe	Pine Warbler	
Eastern Wood-Pewee	Ring-necked Duck	

Background on ebird methodology:

eBird is a program that allows birders to enter observations into an online computer software program. Data gathered includes bird species, date of observation and location of observation. Volunteers are educated in the methodology behind the program prior to using it. The goal of the creators is to help develop baseline data related to birds in order to develop predictions which could help shape landscape use. Their aim is to “develop spatially and temporally explicit models of species occurrence by relating environmental features that are important to a species (e.g., habitat, climate, elevation) to observational data. Once related, statistical models can make predictions at unsampled locations and times. (Sullivan, et.al. 2011).” Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. *Biological Conservation* 142: 2282-2292. Lukyanenko, et.al. (2011) point out that one of the possible problems of citizen science (such as ebird) is that birders might have problems with identification and the wrong bird might be entered into the data system. They suggest a change in the way data is collected to avoid this pitfall. “Participants should be given the option to report a sighting in terms of observed attributes, eliminating the need to force a (possibly incorrect) classification. For example, allowing someone to report a bird as oil-covered may be more valuable than asking them to guess what the species is. For such data to be used effectively, they need to be stored in a way that supports attributes rather than fixed, predetermined classes (Lukyanenko, et.al., 2011).

Improved the ecological integrity of 10 acres of the site by 17 times by creating new upland meadow habitat. Ecological integrity is measured by the Plant Stewardship Index, an assessment of native biodiversity based on a site's plant list.

The project created 10 acres of new upland meadow habitat, by removing invasive species and planting with a seedmix donated by Pheasants Forever Organization to provide meadow habitat for ground nesting birds. The upland meadow now comprises over 8% of the total site area.

$$10 \text{ (Upland Meadow Acreage)} / 120 \text{ (Total Site Acreage)} = .0833 = 8.33\%$$

The Plant Stewardship Index was used to calculate the ecological integrity of the meadow. A free calculator from Bowman's Hill Wildflower Preserve, New Hope, PA was used for the calculation (www.bhwp.org.psi). The PSI was based exclusively on the seed mix used. No field observations were conducted. Previous site conditions consisted of ailanthus and other invasive plant species, from which a PSI score of 0 can be assumed.

Scores for Black Rock Sanctuary meadow seed mix:
Plant Stewardship Index (adjusted FQI): 17.32
Total Mean C: 5
Native Mean C: 5.42

Background on PSI methodology:

PSI is based on a series of calculations related to coefficients of conservatism (CC) numbers assigned by leading botanists and ecologists in the Pennsylvania/New Jersey Delaware Valley Region – Ann Rhoads, Jack Holt, Janet Ebert, Bill Rawlyk, Emile Devito, Mary Leck, Leslie Jones Sauer and others, used their collective knowledge to develop the CC's used for this calculation. (https://www.ser.org/midatl/pdf/Miles_Arnott.pdf) There is not yet a PSI for the state of New York, but we chose to use the calculator because it is a bordering state.

Social

Increased annual average visitation by over 200% from an estimated 10,000 visitors in 2009 to 34,414 visitors in 2011. A 16% increase is projected for 2012.

Prior to 2010, visitation numbers are estimated to have been between 9,500 and 10,200 visitors annually based on staff observations. Visitation dramatically increased following the completion of Phase III work in 2010, which included the installation of field binoculars, and improved boardwalk, new kiosk signs, and an interactive watershed map.

In late summer of 2010, traffic counters were installed in the Black Rock Sanctuary parking lot. In 2011, these counters recorded 34,414 vehicles entering the lot. Parking lot traffic in 2012 is projected to be over 40,000 vehicles. Here, we take a conservative approach and assume that one vehicle is equivalent to one visitor (only one visitor per car). This is likely an underestimate because the data is a recording of vehicular traffic only and does not account for visitation of pedestrians from the nearby neighborhoods.

$$\text{Increase in Visitation 2009-2011: } (34,414 - 10,000) / 10,000 = 2.4414 * 100 = 244\%$$

$$\text{Projected increase in Visitation 2011-2012: } (40,000 - 34,414) / 34,414 = 0.1623 * 100 = 16\%$$

Supports 8 new educational programs and a school field trip each year, attracting 160 annual participants.

Glenn Nelson, Naturalist for Chester County Park System provided information on educational programs offered. Natural and Cultural programs average 16 participants with about 8 programs per year. These programs are published in the Nature of Things newsletter which is distributed twice a year. Included in these programs are:

Salamander Sleuth - Children learn about the lifestyle of "mole" salamanders as they search for the amphibians with the hope of experiencing a once-a-year phenomena as the creatures migrate to lay eggs in vernal ponds.

Weirs & Whys of Black Rock - Allows participants to explore Black Rock Sanctuary's little known birding spot while teaching them about the history of the Phoenix Iron Canal and the 1940's Schuylkill River Project, which was one of the first environmental clean-ups in our nation's history.

Birding at Black Rock - Visitors take part in a morning bird walk to explore the meadows and wetlands of this unique site along the Atlantic Flyway. Participants learn techniques used to identify birds such as birding by color, shape, song and habitat.

Spring-Ford School District takes part in a field trip to Black Rock Sanctuary once a year in which 32 students participate. On this field trip, students are led through a series of activities where they: model energy flows, find camouflaged items, explore rock outcrops, listen to frog calls, look for frogs and salamanders, explore various wetland plants, learn four bird calls. Students will also be introduced to the HIPPO acronym: Habitat loss, Introduced species, Pollution, Population growth, Over consumption.

Number of participants in educational programs per year: $(16 \times 8) + 32 = 160$ participants

Methodology for Cost Comparison

Over 12,000 cubic yards of coal silt were removed from the site. Selling this silt at \$2/cubic yard generated \$24,000 which was used to help construct the project. Coal silt can be used as fuel for power plants or manufactured into consumer products like charcoal briquettes.

$12,000 \text{ CY coal silt} \times (\$2/1 \text{ CY coal silt}) = \$24,000$

References

Fink, Daniel, Iliff, Marshall, Kelling, Steve, Sullivan, Brian and Chris Wood. 2011. "eBird: engaging birders in science and conservation" PLoS Biology. 9.12 (Dec. 2011). <http://dx.doi.org/10.1371/journal.pbio.1001220>

Lukyanenko, Roman, Jeffrey Parsons, and Yolanda Wiersma. "Easier citizen science is better." Nature 471.7336 (2011): 37. General OneFile. Web. 12 July 2012.

http://go.galegroup.com/ps/i.do?id=GALE%7CA251459169&v=2.1&u=temple_main&it=r&p=ITOF&sw=w