

2017 - 21 Strategic Plan

**LEHIGH GAP
NATURE CENTER**



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Renewing our Conservation Commitment
Lehigh Gap Nature Center
Strategic Plan 2017-2021

“Lehigh Gap Nature Center is an environmental marvel and an educational gem.”
—Peter Kern, Palmerton Chamber of Commerce and The Hommer Foundation

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Preface

Lehigh Gap Nature Center's identity is, in part, a function of our remediation of a barren, contaminated wasteland and restoration of vital ecological functions to this landscape along the Kittatinny Ridge near the Lehigh Gap. This is the only such conversion of a federally designated Superfund Site to an environmental education center in our nation's history. *In the process of healing the land, we engaged the community in conservation, education and research. While much environmental news can lead to despair, our hopeful story inspires others to action.*

During the first ten years of our existence (2003-2012) the Lehigh Gap Nature Center (LGNC) was in an **establishment** mode. We purchased and revegetated the land, developed programs and organizational structures, and built our infrastructure, including a trail system and visitor and education center. During that period we received regional, state, and national recognition and were praised for turning one of the region's worst environmental problem into a community asset. This transformation enabled the conversion of the Lehigh Gap area from one of scarred, barren slopes to a popular destination for passive recreation and environmental education. Thousands of people each year now enjoy the natural resources of Lehigh Gap while hiking, bicycling or paddling.

Along the way, our focus progressively shifted from establishment to **sustainability**. Our innovative program development and management of the refuge continued, as we shifted our planning toward ensuring the long-term sustainability of Lehigh Gap Nature Center. In order for LGNC to continue to achieve its mission, we need to groom the next generation of stewards of the refuge, the Lehigh River Watershed, and the Kittatinny Ridge. This goal motivated us to reach out to new audiences and become more inclusive with our conservation messages. Our five-year plan for 2012-2016 embodied those challenges.

We now embark on the next five-year strategic planning cycle with optimism and confidence as we renew our conservation commitment. In this strategic plan, we continue our drive toward sustainability as we **mature and evolve**, professionalizing the operation of the Lehigh Gap Nature Center to meet the challenges of the future. We made great progress in 2015 and 2016 when we hired two staff members, an Associate Director and a Program Specialist. These two new staff members help to meet the demands of a growing membership and expanded mission, and provide stability and redundancy of knowledge and skills with regard to program (education, research, and conservation) and administration (management, communications and development). As we successfully move through this transition the current Executive Director will gradually turn over selected functions and activities to the other staff members, thereby permitting him to focus on strategic issues and programs. However, the ED will also remain involved in certain aspects of the daily operation.

As we navigate the next five years, we recognize the need to integrate new staff personnel and to continue cultivation of volunteers as we invest in the future and plan for eventual succession. This plan provides a solid foundation and map to guide us as we renew our commitment to conservation.



Vision Statement

We envision a future in which communities and individuals achieve, sustain, and support healthy and connected ecosystems at Lehigh Gap, on the Kittatinny Ridge, and throughout the Lehigh River Watershed. This vision remains one of hope: we inspire action by restoring ecological function and beauty where it has been damaged and protecting those places that remain healthy. We envision a growing inclusive community of residents who are deeply connected to nature and support conservation in succeeding generations.

Mission Statement

The mission of Lehigh Gap Nature Center is to protect the wildlife and enhance the habitats of our Refuge, the neighboring Kittatinny Ridge, and the Lehigh River Watershed through conservation, education, research, and outdoor recreation to improve the quality of life of present and future generations.

Core Values

At Lehigh Gap Nature Center, we have built a community of empowered members and volunteers. That community is intertwined with our identity and our work. As much as the land and facilities we operate, this community *is* the organization we call Lehigh Gap Nature Center.

- We believe that protecting the ecological integrity of the Lehigh River Watershed and the Kittatinny Ridge are important to the people of our region.
- We believe in utilizing science to inform all habitat management and natural

resource issues on the refuge and value our academic partners who help us collect and analyze that information.

- We believe it is possible to resolve difficult environmental challenges through observation of natural processes, scientific research collaboration and adaptive management.
- We believe in the power of nature to inspire, nourish, educate, and heal, and that the health of the planet and the physical and spiritual health of humans are inextricably linked
- We believe that our rehabilitation, reuse, and adaptive management of an ecologically devastated site are models for 21st century conservation.
- We believe in inclusion; that connecting people of diverse backgrounds and ages with the outdoors and nature is critical both for cultivating and sustaining support and leadership for conservation and also for supporting healthy lifestyles.
- We believe in the power of volunteers and community to accomplish conservation goals and that individual actions and local efforts for conservation truly matter.
- We believe in the validity and importance of “citizen science” in monitoring the vital signs of nature and carrying out ecological research.
- We believe in the value of collaborative partnerships with K-12 schools, colleges and universities, businesses, government agencies, and other nonprofits to help us accomplish our conservation, education, research, and outdoor recreation objectives.
- We believe in the power of environmental education to instill an appreciation for nature, inspire environmental stewardship, and build conservation leadership
- We believe it is critical to share our conservation story – a story of renewal and collaboration – so that it may inspire others to take on similar challenges.
- We believe that it is our responsibility to provide an excellent return on the time and money investment by individuals and organizations in our center.
- We believe that art has the ability to convey knowledge and elicit emotions in ways science cannot; that art holds the potential to help us tell our story and reach new audiences to promote a conservation ethic.

“Your commitment to your vision has resulted in the creation of an amazing community resource.” —David Shaffer

Definitions

Wildlife Information Center, Inc. – Our incorporated name under which we file tax returns and other important documents.

Lehigh Gap Nature Center (LGNC, the Nature Center) – The registered “doing business as” name for the organization; also used as the name for the land and infrastructure (trails, buildings, facilities); this is the name by which we are best known

Lehigh Gap Wildlife Refuge (the refuge) – the original name for the 756-acre land area we purchased in

2003 to rehabilitate ecologically and create our environmental education center

Research – Careful or diligent search; investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application; systematic inquiry that investigates hypotheses, suggests new interpretations of data or texts, and poses new questions for future research.

Monitoring – The systematic collection of data that provides information on changes in environmental conditions over time; analysis of the data collected can indicate problems and/or progress toward achieving restoration project goals and objectives; long-term monitoring is critical for measuring the ultimate success of management efforts and is the basis for adaptive management;



Sharp-shinned Hawk by Scott Keys

Executive Summary

Lehigh Gap Nature Center is unique. It is the only environmental education center and outdoor recreation area in the country that was developed from a Superfund toxic waste site. Transforming the Kittatinny Ridge (Blue Mountain) in the area of Lehigh Gap from a barren wasteland to valuable habitat for wildlife and a park for people to enjoy nature and outdoor activities has been our signature achievement and we have received state and national recognition for this work. As the U.S. Environmental Protection Agency seeks to move the Superfund program away from merely stabilizing sites and excluding the public towards the economic and ecological re-use of these sites, Lehigh Gap Nature Center stands as a shining example and a model of that ecological reuse potential.

The needs addressed with our programs have not gone away. Conservation of our local and regional natural resources remains crucial to the wellbeing of the people of the Lehigh Valley area. Education about the life-sustaining role of ecosystems to humans is an ongoing need for every generation. Wise land use choices and preservation of habitats become more crucial as population size and development increase.

Protection of the Lehigh River Watershed and the groundwater and headwaters of our streams on the Kittatinny Ridge to ensure a plentiful supply of clean water is more important than ever. Preserving space with outdoor recreational opportunities is vital to the quality of life of area residents. With continued support, Lehigh Gap Nature Center will continue to address these needs for diverse people of all ages.

Our location on the Kittatinny Ridge is strategic and linked to our past. The Wildlife Information Center (Lehigh Gap Nature Center's official name) was born out of the hawk migration research begun by Don Heintzelman in the early 1960s. We recognize the distinct ecological value of the Kittatinny and have incorporated its protection into our mission.

This five-year plan includes:

- A renewed vision, mission, and core values
- An analysis of the opportunities we could pursue with regard to conservation, education, research, and outdoor recreation
- Administrative and sustainability needs and opportunities
- An outline of capital improvement needs and land acquisition opportunities

From these opportunities and needs, we have developed a set of goals for the next five years. We believe these goals represent our mission and core values and are both challenging and difficult to achieve.



2017-21 Goals

1) Conservation/Stewardship

Lehigh Gap Wildlife Refuge

Manage the refuge for maximum biodiversity including:

- Continue involvement with the ecological restoration process in the Lehigh Gap area
- Enhance the varied habitats of the refuge to protect native species, control invasion by detrimental invasive species, and consider novel ecosystem ecology
- Continue Desired Future Conditions planning and adaptive management of the refuge; the current plan divides restoration area into three units – grassland (likely managed with prescribed fire), reforestation areas (currently hosting gray birch succession), and steep slopes (with no current active management beyond monitoring)
- Monitor the impacts of deer on our forest and if necessary manage the deer herd on the refuge

Lehigh River Watershed

- Work toward educating Lehigh Valley residents about watershed issues and protecting the quality of the Lehigh River and its tributaries
- Engage river and trail users at Lehigh Gap with this watershed and water quality conservation message
- Work with the William Penn Foundation's Delaware River Watershed education network to benefit water quality and watershed protection throughout the region

Kittatinny Ridge and Corridor Conservation

Working with others:

- Participate in education about and protection of the vitality of the Kittatinny Ridge and Corridor (forests, groundwater, headwater streams, and other ecological services) in Lehigh, Carbon, Monroe and Northampton Counties

- Advocate for protection of the ridge locally and of the entire ridge throughout PA, NJ, and NY
- Identify land parcels for acquisition and preservation in the Lehigh Gap vicinity

2) Education

Further our efforts toward conservation literacy and appreciation of nature and environmental science, and reach new and diverse audiences in the region of Lehigh Gap and along the Kittatinny Corridor using the following at current or increased levels:

- Conduct formal programs (field trips, in-class, and after school) with area schools and colleges
- Conduct camps, clubs, reading programs, presentations and other non-school educational programs
- Conduct formal programs and events for all, including Speaker Series, interpretive walks, workshops, and other scheduled programs
- Conduct teacher education including development of a teacher training institute
- Continue connecting diverse audiences with nature to build long-term support and sustain conservation as a public value; programs for adults and families from diverse audiences
- Conduct informal education through exhibits, gardens, interpretive signs, brochures, videos, etc.
- Continue and expand the use of art (shows, classes, displays) to convey our conservation story and environmental education message

3) Research

Pursue the following *Research* objectives:

- Continue long-term hawk migration research at Bake Oven Knob and other citizen science research projects, such as the Eastern PA Phenology Project
- Develop a proactive research agenda and list of desired projects that utilizes our project approval process and encourages research that provides critical information for management of the refuge
- Continue our own essential research on our refuge with regard to succession and monitoring to provide data to inform our conservation management
- Continue our partnerships with area academic institutions to accomplish research objectives
- Display, share, disseminate, and otherwise publicize our research findings
- Explore new sources of funding including federal sources such as National Science Foundation



*Photo credit: Jesse Fricker,
"Blackbird's Breath"*

4) Recreation

- Work toward full volunteer staffing to provide consistent access to our visitor center
- Install trail signage to identify allowed uses of each trail and to mark mileage

- Upgrade trail map and continue providing map to visitors
- Emphasize the health benefits of outdoor recreation
- Encourage passive recreational use (e.g. hiking, photography, birding, paddling) and access to natural areas of the refuge to connect people to nature
- Enhance recreational experiences with education

5) Administration: Management and Planning

- Seek to be inclusive at all levels, including staff, boards and committees, program audience, partners, and volunteers as well as on a personal level
- Continue implementing successional plan for eventual transition to new leadership
- Develop funding to meet the proposed budget each year, including a three person staff
- Continue developing the Board of Directors and Advisors with emphasis on board composition and opportunities for additional diversity and expertise; strengthen the Board committee structure and meet annually with each member of the Board of Advisors
- Continuing volunteer management through teams, seek to integrate volunteers into our system effectively, and strengthen the volunteer recognition program with regular events (lunch/dinner, socials, programs)
- Improve communications/marketing including effective use of social media, more regular news releases, better communications with members; re-evaluating *Wildlife Activist* and *Lehigh Gap Update* and supplemental outreach to members; enhancing email notifications with members
- Developing a long-term IT plan for the Center, including hardware and software needs, information sharing, storage, security, back-up, and a more effective and integrated system of managing our information

6) Sustainability

Move the organization closer to sustainability by:

- Working towards our long-term goal of \$2 million in the Endowment Fund by 2021 (short-term goal of \$500,000 and medium-term goal of \$1 million were both surpassed in the previous strategic plan)
- Increasing membership by 3-5% annually

7) Potential capital projects and estimated cost:

- Tannery deck, stairway, doors (\$25,000)
- Solar (PV) Cells (\$50,000)
- East Penn trailhead improvement and access (\$75,000)
- LNE Trail surfacing and improving drainage swale (\$100,000)
- Bobolink Trail reconfiguration for ADA accessibility (\$150,000)
- Land purchase fund for purchasing critical properties such as Strohl or Land's End (\$100,000)
- Funding for long-term repair and replacement of infrastructure (\$100,000)

Introduction

We begin the new strategic plan for 2017-21 with a brief overview of our unique history. A more detailed history of LGNC is found in [Appendix 1](#).

The Lehigh Gap Nature Center grew out of an organization called the Wildlife Information Center (which remains our incorporated name while we conduct business as LGNC). Donald Heintzelman founded the Wildlife Information Center in 1986 to support his conservation work. In 1998, a change of leadership occurred with Heintzelman's departure from the organization, and a greater emphasis was placed on education and on securing land for an environmental education center. The conservation and research emphasis continued with the mission refined to include conservation issues and research related to the Kittatinny Raptor Migration Corridor and the Lehigh Valley area.



John Dickerson and Dan Kunkle

In 2002, we embarked on a bold project to purchase more than 750 acres of private land on the Kittatinny Ridge in and around Lehigh Gap, restore vegetation to the barren portions, open the land to the public as a wildlife refuge, and establish an environmental education center based in the old farmhouse on the southeastern part of the property. A master plan was developed at that time outlining conservation, education, research and outdoor recreation opportunities. Nearly all of the goals of that plan were met in the first decade, including the re-vegetation of the mountain, construction of a visitor and education center, and development a trail system and an environmental education program. This was all accomplished largely with volunteer effort and extensive collaboration with a wide array of

partners. Our success gained us a great deal of credibility for us in the regional community as well as in conservation circles.

In 2011, the LGNC Board of Directors and Executive Director (the sole staff person) developed *Renewing our Vision*, a five-year strategic plan that guided us beyond the establishment phase of Lehigh Gap Nature Center. The mission and vision were re-focused and we concentrated on two key goals in our development: building capacity and long-term sustainability.

As the last few months of “Renewing our Vision” unfold, we can report great strides in achieving those goals. In September 2015, we hired a part-time staff person to help with all aspects of the operations at LGNC. That position was originally conceived as a program staff position. As we were able to hire an individual with a master’s degree in non-profit management, the position evolved into a hybrid between program and administrative responsibilities. By 2016, our growth allowed us to add another staff person, this time an all-program environmental education specialist. As a result, we exceeded our capacity building goals for the previous five-year plan and end that period with three staff members along with a part-time staff person dedicated to our conservation landscaping program.

We have also exceeded our second goal of enhancing the sustainability of the organization. The centerpiece of our sustainability plan included building the endowment fund to a level that could provide program support for LGNC. We set a short-term goal of \$500,000 and a medium-term goal of \$1 million. We exceeded the medium-term \$1 million goal by August 2015, a full five years ahead of target. We have now reached a point where some of the income generated by the endowment fund can support our operating budget, likely beginning in 2018. Along with the endowment fund, our sustainability assets include a super-efficient building and heating/cooling system and a large corps of volunteers, who annually provide hours collectively equal to four full-time staff members.

Conservation and research remain cornerstones of the work on our refuge. While the re-vegetation of the mountain is essentially complete, management of the resulting habitat and steering the trajectory of ecological succession on the land are ongoing challenges. As a result of carefully considered planning, we decided to manage for retention of grassland/savanna on part of the refuge. Fire is a key tool in our management plan and a test fire was conducted in 2013. A second took place in late 2016. Follow-up monitoring of the burned areas and succession monitoring in general on the site continue to yield data that inform our decision-making.

Another conservation achievement began when we purchased a two-acre property adjacent to the west end of the refuge. This provided the opportunity to create both a refuge trailhead and a native tree and shrub arboretum. These were established in 2014 and need continued development in the next five years.

With regard to ecological research and monitoring, our approach has evolved and matured. The Superfund process and EPA drove the early research and monitoring. As we developed academic partners, many of them wanted to pursue research interests at LGNC. Eventually,

we realized there could be conflicting projects or projects that were not appropriate, so we developed and implemented an application and approval process for partners who wish to pursue research on our refuge. Our next step in the evolution of our research process is for us to develop a list of projects that we would like completed. These projects will drive the research toward filling gaps in our knowledge and produce results that help inform our management decisions as we assist in training the next generation of scientists.

In July 2016, we convened more than 20 of our advisors in a Desired Future Conditions summit to help us revise our basic management strategy on the remediated area of the refuge. At the prior meeting in 2011, we concluded that maintaining a large area of grassland (probably using prescribed fire) was desirable. After the 2016 summit, we concluded that we would not be able to afford prescribed fire on all of the intended 400 acres. Instead, we will divide the reclaimed area roughly into three equal management zones:

- 1) A grassland area to be maintained as grassland for the foreseeable future
- 2) An area of early successional gray birches that we will attempt to reforest from the edges with desirable native tree species
- 3) A steep slope with many boulder areas seeded with grasses that will be allowed to develop on its own as we monitor its succession.

We will continue to monitor and adaptively manage based on the results of our monitoring and other research. (Appendix 2)

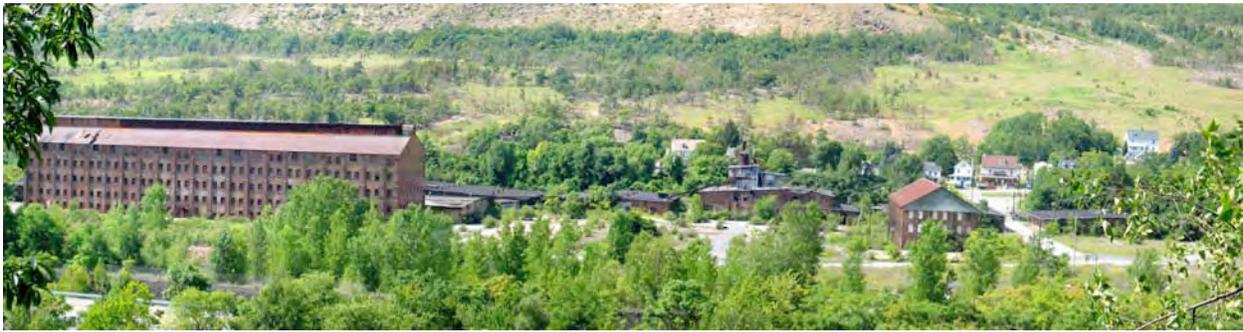
Education remains a fundamentally important activity in which we engage. Conservation of our local and regional natural resources remains crucial to supporting the wellbeing of the people of the Lehigh Valley area. It is an ongoing need that we educate every generation and people of all kinds about the life-sustaining role of ecosystems to humans. As population size and development increase, wise land use choices and preservation of habitats have become more critical. Protection of the Lehigh River Watershed and the groundwater and headwaters of our streams on the Kittatinny Ridge to ensure a plentiful supply of clean water is more important than ever. Maintenance of open space with outdoor recreational opportunities is vital to sustaining the quality of life of area residents. Lehigh Gap Nature Center will continue to address these needs for diverse people of all ages.

In the past five years, *art* has become integrated into our educational and recreational programming, with the potential to become an important part of our conservation and research work as well. As E.O. Wilson says, “Science needs the intuition and metaphorical power of the arts, and the arts need the fresh blood of science.” Art holds the potential to help us tell our stories, to reach new audiences with educational messages, to promote a conservation ethic, and more. Art is sometimes able to reach people in ways that lectures and data cannot. The intersections of art, nature, environmental education, and conservation are deserving of much greater exposure to help us achieve our mission.

In addition to integrating the role of the arts in our mission and programs, we need to broaden our view of art to include static visual arts, as well as literature, video, and perhaps even performance. Music, for example, has added much to several of our

programs. We need to remain open to opportunities to integrate the arts into our programs in meaningful and productive ways.

A final note: According to the U.S. Environmental Protection Agency (EPA) Lehigh Gap Nature Center is the only example in the nation of a Superfund site that has been transformed into an environmental education center. In recognition of that achievement, EPA Region III presented LGNC with its inaugural “Excellence in Site Re-use Award” in September 2014. This is the second time LGNC has won an award at the national level.



View from LGNC of the New Jersey Zinc Company West Plant, after closing/before demolition

A New Five-year Plan: 2017-2021

In order to complete this new strategic plan, the President of the Board of Directors appointed a Strategic Planning Task Force to undertake the information gathering and writing of the plan. After evaluating the previous strategic plan, the task force began the process of creating a new plan. It included meetings with a series of key advisors, a membership survey, Board work sessions and opportunities for input along the way, and task force meetings. We thank the task force members, our Board of Directors, and all the advisors who provided input for this document.

This new plan is based on the previous one in its organization and topics. Its difference from the previous plan can be seen in the changed goals, reflecting our prior growth and our increased capacity and a variety of new emphases and programs. No one envisioned establishing an arboretum as we were writing the previous strategic plan, nor did we foresee our involvement in the William Penn Foundation’s environmental centers network. Likewise, there will be new opportunities in the next five years that today are unseen. Therefore, this plan must be a framework within which the staff and Board make decisions as opportunities and challenges arise. As such, it will be a guiding document that helps keep us true to our vision, mission, and core values.

As the next five years unfold, LGNC must evolve as we adapt to changing conditions and prepare the next generation to care for the planet. We must remain grounded in our mission and build on our success in restoring a functioning ecosystem to a once barren mountain. In addition, we must also respond to the external “natural selection” forces acting upon us and innovate and move forward with new ideas, programs, and projects that help us achieve our vision. As with organisms, organizations that fail to adapt, die out or become ineffective.

It is wise at this point to reflect upon what distinguishes LGNC as unique and different from many other organizations. These characteristics include:

- An environmental education program grounded in a particular place with a unique restoration story
- An environmental education program provided to diverse audiences in our region with financial assistance for economically disadvantaged schools and programs
- The only environmental education center in the nation created by transforming a Superfund site
- A nature center that is interconnected with place, community and story
- A nature center that owes much of its success and ongoing operation to committed volunteers from surrounding communities.
- An environmental education organization that focuses on solving problems rather than assigning blame
- A community-based organization and program that is important to the people of the region, and particularly to the community in the immediate area
- An authenticity and unpretentiousness born of struggle for funding and resources and a passion for making the Lehigh Gap and vicinity an ecological asset for the community
- A research program based on relationships with academic institutions of the region
- A set of publications that inform our members of our purpose and our accomplishments
- An organization that is focused on and driven by its mission

Remaining true to our past and our mission, we embark on our next five years with minds open to innovation.



Chapter 1 – Conservation and Stewardship

Nature is not a place to visit. It is home. —Gary Snyder

Do not let selfish men or greedy interests skin your country of its beauty, its riches, or its romance. —Theodore Roosevelt

*If we wait for science to give us all the answers, it will be too late...What then is the moral response that land conservation must take? I believe it is to re-imagine conservation as the expression and defense of all things worth loving in this world...Conservation is the parable through which [one] hopes for a good and noble conclusion. And the storytellers are everyone who has risked entering into a shared sense of love, a shared sense of evolving and maturing a relationship with the land and all the inhabitants of the land. —Peter Forbes, *The Great Remembering**

Introduction

The story of how a group of volunteer leaders in a local conservation and environmental education organization transformed a Superfund site into Lehigh Gap Nature Center (LGNC) is at the core of our history and existence. We have returned functioning ecosystems to the mountainsides and provided access to these formerly private lands for hiking and wildlife watching as well as for educational programs. Re-vegetating the long-barren slopes of the Kittatinny Ridge around Lehigh Gap has earned us local, state and national recognition. [\(Appendix 3\)](#)

This conservation work inspires our education programs, which inspire generations of people to care about conservation. In partnership with our academic colleagues, as well as “citizen scientist” volunteers, we carry out research and monitoring projects that provide real-world opportunities for undergraduate and graduate college students as we help to train the next generation of scientists at Lehigh Gap. The results of this research contribute to and inform our conservation work and management decisions.

The leaders of Lehigh Gap Nature Center face many challenges in managing the ecosystems on our Refuge:

- Invasive species management
- Managing the trajectory of succession
- Keeping toxic metals in the soil and safely out of food webs
- Raising the funds needed for management not covered by Superfund or after the Superfund process is completed.
- Providing access to the refuge for recreation and research without compromising our goal of managing for maximum biodiversity and quality habitats.

We continue to seek advice from our many partners as we proceed carefully with our conservation and stewardship programs.

Ongoing Conservation Work

Lehigh Gap Wildlife Refuge

From the outset, our endeavor to restore functioning ecosystems to the long-barren slopes of the Kittatinny at Lehigh Gap has been informed by collaboration and advice from a broad array of partners and associates. We began with a meeting with Bill Mineo of the D&L Corridor in 2002 and his introduction of John Dickerson, an expert in restoration with warm-season grasses. We began ongoing collaborations with numerous academic institutions ([Appendix 4](#)). Our partnerships with CBS Operations (the Superfund responsible party), the U.S. Environmental Protection Agency (EPA), and PA Department of Conservation and Natural Resources (DCNR) have been instrumental in our success.



July 2016 Desired Future Conditions summit

Convening scientists, academics and agency representatives has been a repetitive theme. Our Conservation Roundtables and Desired Future Conditions summits allowed a sharing of information and cultivation of relationships critical to our success. Our most recent Desired Future Condition summit in July 2016 brought together 27 experts to offer advice and ideas for future refuge management. The result of the meeting was a new management plan with the following key changes ([Appendix 2](#)):

1. Our former plan of maintaining 400 acres of grassland/savanna is likely unattainable for economic reasons; raising more than \$25,000 annually for the prescribed fires needed for this plan is not feasible.
2. Our new plan involves dividing the restored area into three major sectors – grassland, early successional birch forest, and steep slope areas
3. Each sector will be managed as follows:
 - a. The 100+ acres that remains primarily grassland will be retained as grassland utilizing prescribed fire on a more limited scale than previously imagined.
 - b. The large area of gray birch succession will be re-forested from the edges, utilizing native tree species indigenous to the site and resistant to deer browsing and metal uptake.

- c. The steep slope area will be allowed to follow its own trajectory for the time being and will be monitored to inform us of changes and opportunities to intervene if necessary.

In April 2013, we used prescribed fire to manage gray birch and invasive butterfly bush on a 10-acre plot in the reclaimed grassland area. A burn was conducted in 2016 on another 10-acre parcel. These test burns were carefully monitored by EPA for danger to public health and are being monitored for effectiveness by LGNC. We learned that the smoke contains elevated levels of metals and should not be inhaled by the firefighters or burn staff. We also learned that the metal particles drop out of the smoke plume quickly and do not leave the site and that the fire helped reset the clock on succession and return the burned area to grassland. The fire also devastated the butterfly bush (*Buddleja davidii*), the most prolific invasive species on the site. (See Appendix 5 for list of invasive species)



A test fire in April 2016 was lit and quickly extinguished by fire officials who deemed the conditions too dry to safely burn. The planned prescribed burn was able to take place later that year in the fall.

The success of the test fires encouraged us to continue to use fire to maintain the restoration area as grassland. A 10-year fire plan was drawn up and approved by the state. However the cost of these prescribed burns would be prohibitive for the entire 400 acres. Thus the acreage we plan to burn has been cut to approximately 125 acres.

Because monitoring and research provide us with much-needed information, we decided to be more proactive with our academic partners who perform the research and monitoring. We are developing priorities for research to be shared with these partners to encourage them and their students to perform research projects that provide us with this valuable information.

Acquiring and protecting additional land around the Lehigh Gap Area remains part of our conservation strategy. At the close of 2016, we accepted the donation of a 100-acre parcel on the east side of the Gap, adjacent to the Appalachian Trail. CBS has also signaled its interest in donating the adjacent 600-acre parcel. Other parcels with a

high priority for acquisition that are adjacent to the original refuge include the one-acre Trails End inholding at the Three Ponds and the five-acre Strohl property between the Osprey House and PA 873 (uncontaminated acreage).

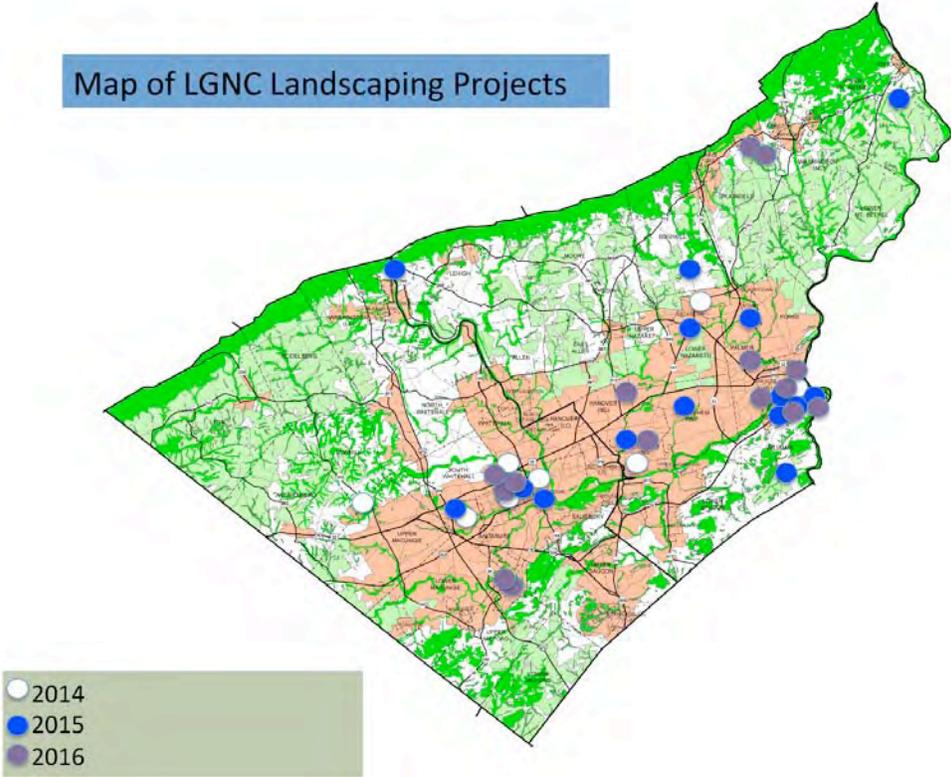
Deer management provides additional challenges. On the forested part of our refuge, a canopy of oak and birch rise over a forest floor that is devoid of most of the native plants expected in our forests. There is a near absence of any seedlings or saplings of oaks and other important tree species. Hay-scented fern (*Dennstaedtia punctilobula*) and rapidly spreading Japanese stiltgrass (*Microstegium vimineum*) are the only species growing under

large swaths of canopy. While the metal concentrations are lower on the forested portions of the refuge than the formerly barren areas, the relative contributions of deer browsing and metal contamination are still in question. However, it is clear that deer browse has contributed substantially to the current conditions. How to manage deer populations going forward is a considerable challenge

Lehigh River Watershed

Our conservation work and leadership has grown to include Lehigh River Watershed protection as part of the larger Delaware River Watershed. This work resulted from LGNC being invited by the William Penn Foundation to join a collective impact network of environmental centers throughout the Delaware River Watershed. The mission of the network is to encourage good stewardship of resources within the watershed and thereby protect water quality. As many Lehigh Valley residents rely on the Lehigh for their drinking water we believe this conservation work is essential

Our Landscaping for Communities and Wildlife program seeks to promote sound landscaping practices throughout the Lehigh Valley. This collaborative project created high-profile publicly accessible gardens at locations throughout Lehigh and Northampton counties. As it enters its fourth of five years in 2017 the emphasis of the program has shifted to residential spaces. The end products of this five-year project are a significant increase in native plant landscaping since the program began and a “how-to” book providing a template and model for other communities that want to transform landscaping in their regions.



Map of public native plant garden projects in Lehigh and Northampton Counties completed by LGNC's Landscaping for Communities and Wildlife program as of 1/2017

Kittatinny Ridge

Our work on the Kittatinny Ridge at Lehigh Gap blends with our mission priority of preserving the entire Kittatinny concentrated on the four counties in eastern Pennsylvania. As part of that work, we participated as a charter member of the Kittatinny Coalition (funded by PA DCNR and led by Audubon PA and the Appalachian Trail Conservancy). Our leadership in the coalition manifested itself in the hosting of three Kittatinny Science Summits in the past four years to identify gaps in our knowledge base and to encourage collaboration among scientists and across disciplines to perform the monitoring, mapping and research that will help fill the gaps we identified.

Conservation Campaigns

Conservation campaigns require large amounts of time and energy (and sometimes money), and these are limited resources at LGNC. *It is therefore imperative that we remain focused on our core mission and refrain from involvement in conservation projects outside of the core conservation areas described in our mission statement.* We can certainly provide letters of support for such projects but cannot devote staff time and resources to them. On the other hand, we must be prepared to become involved with important conservation campaigns that fit within the scope of our core mission.

An example of a campaign with which we became involved in the past few years is the proposed PennEast Pipeline project, which will involve a new corridor across the Kittatinny Ridge, even though co-location possibilities exist. An example of a campaign with which we declined involvement in the past few years is a proposed wind farm on the Bethlehem watershed land in the Poconos that will cause significant forest fragmentation. Because this is not within the geographic scope of our mission, we chose not to become involved.

Conservation and Stewardship Priorities

Adaptive management of the Lehigh Gap Wildlife Refuge involves making decisions based on sound science found in the peer-reviewed literature and using monitoring data collected on the property. As we make management decisions between increased use of the refuge and protection of its natural resources, we should always err on the side of protection. The following are our conservation priorities:

Lehigh Gap Wildlife Refuge

Manage the refuge for maximum biodiversity including:

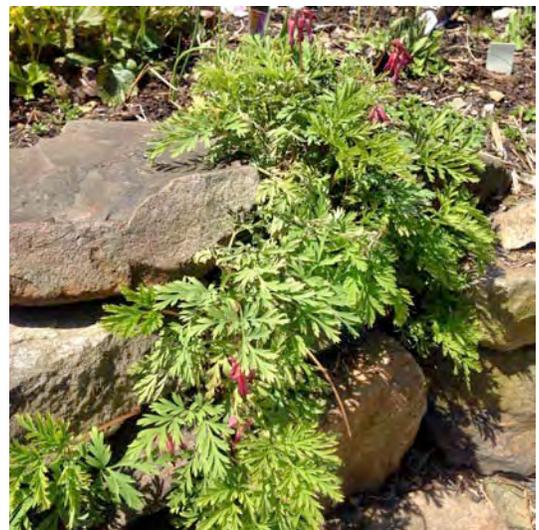
- Continue ecological restoration in the Lehigh Gap area
 - Manage three subunits of the 400-acre remediated area of the refuge into zones with different management plans (grassland, forest, and steep slope areas).
 - Produce accurate GIS maps of the refuge (using ground-truthing where needed) to map vegetation, trails, research plots and points, and other information as needed.
 - Work with U.S. EPA, CBS Operations, and PA Department of Environmental Protection (DEP) to accomplish Superfund remediation objectives, invasive species management, and five-year reviews.

- Enhance the varied habitats of the refuge to protect the community of native species in each and control invasion by detrimental invasive species, and manage at least a portion of the refuge as a diverse grassland community.
 - Continue monitoring of succession and post-fire ecology and use results to inform adaptive management of the grassland and other communities
 - Continually update or perform new taxonomic surveys at the refuge
 - Continue efforts to establish nectar sources and larval host plants for possible Regal Fritillary introduction
 - Use signage at entrance points and trailheads to clearly state what is allowed on LGNC property, install trail signs that prohibit unwanted uses, and post signs in sensitive areas to protect resources
 - Attempt to sign a “right of first refusal” for Trail’s End property our highest priority acquisition target; develop a funding plan as appropriate for this acquisition
 - Work with others (Appalachian Trail Conservancy, National Park Service, D&L Heritage Corridor) to secure easement or purchase of Strohl property
- Use fire and other means to maintain a grassland/savanna on parts of the remediation area; prepare for arson fire as suggested by DCNR fire specialists
- Work toward re-forestation of the gray birch succession areas with other native tree species
- Enhance ponds habitat for turtles with sunning platforms

Lehigh River Watershed

Working with others:

- Through our collaborative “Landscaping for Communities and Wildlife” project, seek to make conservation landscaping mainstream in the Lehigh Valley and create a prototype that can be used elsewhere
- Through our own programs and through the Delaware River Watershed Education Network, provide leadership in education about and protection of water quality in the Lehigh River and its tributaries and by extension, the whole Delaware River Watershed area
- Work with and help lead the Delaware River Watershed Education Network, the Lehigh Valley Greenways group, and other partners to foster greater understanding and increased stewardship action by the region’s population
- Continue participation and leadership in the Lehigh Valley Greenways Conservation Landscape, a collaborative conservation network in the Lehigh Valley funded by PA DCNR and led by D&L Heritage Corridor
- Work with partners, including Wildlands Conservancy, Jacobsburg EEC, Nurture Nature Center, and others to promote conservation values
- Advocate for municipal support of habitat plantings by homeowners; provide model ordinance language to municipalities



Wild Bleeding Heart (Dicentra eximia), an endangered native plant thrives on the Refuge

Kittatinny Ridge and Corridor Conservation

- Continue involvement in the Kittatinny Coalition and other conservation organizations that support conservation of the Kittatinny Ridge.
- Provide education about and protection of the vitality (forests, groundwater, headwater streams, and other ecological services) of the Kittatinny Ridge and Corridor in Lehigh, Carbon, Monroe and Northampton counties
- Support efforts to identify land parcels for acquisition or protection along the Kittatinny Ridge in Pennsylvania
- Continue advocacy for preservation of the Kittatinny Ridge in New York, New Jersey and Pennsylvania as a corridor for climate adaptation, an important watershed area, a large block of continuous forest, a stopover site for migrating songbirds, and a raptor migration corridor

Lehigh Valley Area

- Continue work to promote the use of native plants and habitat gardens while reducing the amount of mowed lawn in residential areas, publicly owned landscapes, and corporate, college, K-12 school, church and other campuses
- Produce materials for residential landscaping of various types to help residents make informed decisions about what to plant; include lists of wildlife-benefitting plants and explaining the benefits of such landscaping for nesting, migrating, and wintering species.

Additional Conservation/Stewardship Opportunities

- Lehigh Gap Wildlife Refuge
 - Continue existing surveys to maintain current databases of all organisms found on the refuge, and consider new surveys for Odonates, fish, and other groups
 - Continue enhancement of the grassland and Prairie Warbler Trail area with flowering forbs
 - Implement efforts with Fort Indiantown Gap staff to increase the availability of violets and nectar plants for potential Regal Fritillary introduction
 - Conserve and restore the historic tannery building
 - Maintain partnerships in local areas to advance conservation in and around the communities surrounding Lehigh Gap and along the Kittatinny Ridge
 - Seek opportunities for American Chestnut (*Castanea dentate*) restoration at Lehigh Gap
 - Provide conservation workshops to train volunteers (e.g. trail building, erosion control, invasive species identification, etc.)
 - Determine potential benefits and risks for introduction of Regal Fritillary to refuge grassland (see Appendix 4)
- Lehigh River Watershed
 - Improve residential and corporate/municipal landscape management to help protect our water resources while creating habitat for wildlife through our Landscaping for Wildlife and Communities program

- Kittatinny Ridge and Corridor
 - Maintain partnerships with others working to protect the Kittatinny Ridge and Corridor in Monroe, Carbon, Lehigh and Northampton counties in eastern Pennsylvania
 - Continue helping partners (Wildlands Conservancy, The Nature Conservancy PA, DCNR and others) to protect parcels with conservation easements and fee simple acquisition in the four eastern PA counties (as we did with the Eldred Township property that was slated to become Alpine Rose Resort and race track)
 - Seek opportunities for partnering and funding for stewardship and conservation of the Kittatinny Corridor in eastern PA
- Lehigh Valley Area
 - Remain a resource for surrounding municipalities, counties, and citizen groups for conservation issues and allow the use of our facilities to support such efforts.
 - Remain active with the two counties and the two municipalities within which our property is located
- General conservation
 - Testify publicly about conservation issues related to mission as time and resources allow



Chapter 2 – Education

“What is the extinction of the condor to someone who has never known a wren?” —Robert Michael Pyle

“When we know our local skipperling, when we see it dart and flutter in the summer fields, when it dances like a marionette above the wildflowers, when it alights with dignity to take nectar from a purple coneflower, we’ve kindled another flame for nature.” —Bryan Pfeiffer

Introduction

Education is central to every part of our mission at Lehigh Gap Nature Center. Our education programming is the aspect of our mission that has attracted a large share of our funding from individuals, government agencies, foundations, and businesses. Most local service clubs that support LGNC also earmark their donations for educational purposes.

The Lehigh Gap Environmental Education Program, our own initiative with area schools, is broad and strong, providing critical content support and expertise for making environmental education effective in these schools. Our participation in networks and coalitions, such as the Lehigh Valley Greenways, the Rider Pool Collective Impact Fellowship, and the William Penn network of environmental centers has brought us opportunities to collaborate, opportunities for funding, and opportunities to provide leadership in the field of environmental education in our region.

In his essay entitled “The Extinction of Experience” ([Appendix 6](#)), Robert Michael Pyle speaks to the importance of preserving nature locally so children can experience it first hand. Comprising over 750 acres of preserved land, the Lehigh Gap Wildlife Refuge is a place that families can explore together and where youth can experience nature’s biodiversity personally. It is therefore important to remember that, although our indoor facilities have been a tremendous asset to LGNC’s education programs, our best classroom is outdoors. The facilities, however, allow us to offer more programs (such as the Speaker Series) during colder months and evenings when it is dark.

The education program at LGNC is based on our unique conservation work. Our site is valuable as an environmental success story. It is also valuable because the ecological damage here completely destroyed the ecosystem present on the site, or at least reduced it in complexity to just a few components. This allows for the study of ecological processes in a way not possible in more complex systems and is a motivational factor in our education programs.

Education permeates LGNC, from our formal education programs and teacher workshops to our informal education of visitors through exhibits, interpretive signage, and Information Specialist volunteers. Here is a brief list of our educational programs and outreach tools:

- Wide variety of school programs for pre-K to graduate students (over 6,000 students in 2016)

- Ecology Camp, Naturalist Club, Conservation Leadership Academy, Wonderful World of Wildlife Reading Program, after-school clubs
- Undergraduate and graduate research opportunities and internships, as well as educational internships
- Teacher in-service programs
- Cooperative environmental education programs with Lehigh Valley partners and with the Delaware River Watershed education network
- Workshops and natural history outings for the community, as well as an educational Speaker Series
- Informal education through indoor and outdoor exhibits and interpretive signage
- Interactive habitat exhibits in the Great Hall
- Our habitat gardens and green building (the Osprey House)
- Interpretive brochures

Education Developments Since our Last Strategic Plan

In our previous strategic plan, we stated, “In the next five years, we plan to continue delivering existing programs, continually developing new programs, and looking for opportunities to better serve diverse audiences of students, teachers and adults of our region.” That intention to be more inclusive led to the development of our highly-regarded “Color of Nature” program, through which we involve individuals from communities of color and other under-represented groups in our environmental education mission. The underlying premise of this initiative is to train a team of environmental educators *from* these communities to deliver programs within and beyond their communities. Color of Nature leaders are paid to lead the programs.



*2016-17 Color of Nature leaders:
(L to R) Darien Rivera, Antonio Martinez, Jose Reyes, Anais Martinez, and Ariel Bonilla*

To date, the programs led by the Color of Nature leaders include:

- Bilingual walks in Allentown parks
- Conservation Leadership Academy
- Residential internships at LGNC for the Color of Nature leaders
- Programs in Allentown inner-city schools
- After-school programs in Allentown
- Mini-camps for Allentown day care centers
- Allentown summer parks programs with Wildlands Conservancy

We continue to receive funding to operate this successful program. We need to sustain a long-term commitment to this program in order to develop leaders and role models and also to integrate communities of color into the conservation mainstream.

In addition to our organizational effort to be inclusive, our staff, board, and volunteers must be personally committed to inclusiveness. While the organization is making strides in this direction, the personal touch is critical and the most effective tool for outreach to diverse people. Each of us must remain alert for opportunities to engage with others that are not in our usual circles of acquaintance.

A major new opportunity arose in 2015 – an invitation to join a network of environmental centers throughout the Delaware River Watershed with the goal of enhancing water quality and quantity in the waterways of the region. LGNC was invited to both participate and take part in the leadership of the network. This has led to tangible benefits for LGNC in the form of funding and networking. Participation in this network complements our other educational efforts and we expect it to be a critical collaboration for LGNC in the next five years.



Program Specialist Chad Schwartz teaching a group of University of Pennsylvania students

As 2016 drew to a close, we hired a Program Specialist to help with educational programs. This allows us to concentrate our efforts on existing programs, earlier programs that were resource constrained, and new programs such as additional summer camps. In keeping with advice from the Board of Directors and our advisors to make sure everything we do is done well before we add new programs, we will make shoring up existing programs the priority before adding others.

Since his employment in September 2016, the new Program Specialist has been working to energize our clubs and after-school programs. With this dedicated staff support for

education, we expect significant growth and development of our education programs in the next five years.

Looking Ahead to the Next Five Years

Connecting children with nature at a young age is critical. Richard Louv (*Last Child in the Woods*) and others have presented compelling evidence that engaging youth with nature is essential to their wellbeing and to developing the next generation of scientists, conservationists, and environmental problem solvers. LGNC seeks to expose youth to nature to avoid their developing what Louv calls “nature deficit disorder,” and to familiarize them with nature in their backyards and local areas.

Thus, among our priorities for program enhancement are more programs for younger students. This includes a Junior Naturalist Club, which we have had difficulty establishing because of competing activities in family schedules. The 4B (bees, birds, blooms and butterflies) walks for younger children were a big success during the summer and provide a springboard to re-launch the Junior Naturalists Club. The Program Specialist is currently recruiting new members and organizing meetings for the Junior Naturalist Club (for students in grades 2-6) and Naturalist Club (grade 7-12). The goal of these programs is to foster a lifelong appreciation for nature and science among youth through hands-on field and lab experiences, as well as other year-round activities.

While having facilities for programs on rainy days and throughout the year, our best classroom remains the 750-acre refuge. It is important for us to get people of all ages outdoors as much as possible.

One deficiency revealed with the renewed interest in these clubs and other programming – we lack a vehicle for transporting club members or others on group field trips. While it may be possible to raise funds for purchase of a van with relative ease, the ongoing costs (fuel, maintenance, insurance) are an obstacle. It would be helpful if we could raise the funds for the purchase of the van and the funds for its operation for perhaps 10 years.

Remaining true to our mission, ensuring the high quality of existing programs, and concentrating on the uniqueness of LGNC will lead to continued high regard and success for our programs. Ensuring that all programs are excellent and sustainable before adding additional ones will serve our participants well.



Young Ecologists campers hiking the Refuge

Education Priorities

Our major educational objectives continue to be conservation literacy and appreciation of nature and environmental science among the people of our region using the following:

- Formal education programs through schools for students of all ages
 - Use grant funding and program fees to make our education program and staff sustainable
 - Concentrate field trip and in-school programs on schools within a 30-35 minute drive of LGNC, i.e. local schools that surround LGNC (Lehighon, Palmerton, Northern Lehigh, Northampton) plus Allentown School District center city schools
 - Promote existing and develop new in-school programs for use during winter months
 - Include inquiry methods where possible (in which students have to investigate and solve problems rather than just listen) in field trip and in-school lessons
 - Use outreach to involve more secondary school classes in field trips, programs, or projects at LGNC; revitalize the interscholastic E-7 club
 - Continue our outreach and relationships with colleges in the region, as field trips to LGNC from these colleges often result in internships, research projects, and other benefits beyond our conservation literacy objective
 - Make better use of our website with interactive pre/post trip activities and the ability to upload photos and data from field work to web
 - Continue to recruit and cultivate volunteer education staff members; we must make sure we do not over-reach and outstrip our capacity or take advantage of volunteers
 - Do whatever we do well – The quality and impact of our programs is more important than sheer numbers

- Teacher continuing education, including the development of a teacher training institute
 - Work with William Penn network or Lehigh Valley Greenways partners to develop the institute
 - Expand the group of teachers reached by our workshops with better marketing



Teachers learn about nature journaling as part of a training held at LGNC in March 2017

- Internships, camps, clubs, reading programs, presentations and other non-school educational programs and resources
 - Consider instituting educational Internships -- while internships are more fully discussed under the Research section, there is a great deal of overlap between research and education in internship experiences
 - Sustain the Color of Nature program – obtain funding, support existing programs, and continually seek new partners and new opportunities for programs
 - Continue our successful Young Ecologists Summer Camp and develop additional day camps or weekly interest/age groups as staff time allows
 - Provide consistent support for the Naturalist Club and revitalize the Junior Naturalist Club, possibly using Naturalists as mentors for the younger kids
 - Maintain and market the library as an educational resource and make its resources more available online; consider allowing borrowing books as a benefit of membership
 - Promote the Junior Ranger program for completion of Ranger Badge
- Programs and workshops for adults and families
 - Market these programs better to attract new and diverse participants, and develop off-site programs in Lehigh Valley urban communities with Color of Nature leaders
 - Promote our festivals as family-friendly learning opportunities
 - Continue Speaker Series
- Interpretation (working with Communications Team)
 - Publications. Our publications are as unique as our conservation activities. Our main membership publication, *Wildlife Activist*, was reduced to twice a year due to time constraints on staff. Two *Lehigh Gap Updates* and one *American Hawkwatcher* are published annually, as well.
 - Continue all publications on the current schedule
 - Continue to expand the contributors to the publications to increase quality and diversity
 - Consider other means of communications for members between issues of *Wildlife Activist*
 - Continue book reviews and renew efforts to secure review copies of desirable books to continue building library
 - Consider upgrading *American Hawkwatcher* as a research journal
 - Educate visitors about our green building features through signage and/or in a brochure
 - Install an interpretive wayside sign explaining charcoal making along the Charcoal Trail
 - Develop educational and interpretive guides for the arboretum
 - Create a traveling exhibit on LGNC that can be taken to events and talks; consider the addition of skulls, turtle shells, bee exhibit, live animals, and interactive game or activity for children at the event
 - Speaker Series – continue fundraising effort and better promote these lectures/programs



Clare and Michal Kubik share their reptiles at Migration Fest

- Festivals – National Trails Day, Migration Fest, Pollinator Week, and other events provide opportunities to engage new audiences with our conservation message; promote educational activities at these festivals
- Workshops for the public. These events have been well received and have generated good will, a sense of value for members, and have helped us recruit new members. Continued natural history workshops can include:
 - Identification workshops (birds, butterflies, herps, trees, etc.)
 - Ecology workshops (stream macroinvertebrates, ponds, etc.)
 - Habitat gardening
 - Bioblitzes
- Internet presence
 - Maintain website and continually update and upgrade it
 - Maintain a presence on social media as the platforms evolve; currently Facebook, Twitter, and Instagram are currently used
- Connect people to nature through recreation, education, and access to natural areas of the refuge
 - Use brochures and other guides and technology to encourage visitors to explore the natural areas of the refuge
 - Make regular trail maintenance; including trimming grass/brush and maintaining trail signs/markers and amenities along trails, a priority for volunteers and the caretaker.

Note: see Staff section in Chapter 5 for more on the role of the caretaker.

- Evaluate benefits and costs of owning a van to transport program participants

Additional Educational Opportunities

- Schools
 - Develop contracts or agreements with local districts to provide programs and field trips integrated with the curriculum so that these programs remain consistent through the years as teachers change; work with districts on grant opportunities for funding these trips
 - Promote our expertise in curriculum development with area school districts by serving as consultants; work cooperatively with districts on grant opportunities for curriculum development
 - Work with area schools to develop schoolyard habitats for environmental studies and hands-on conservation activities; develop educational materials for use in our own gardens and arboretum
 - Build a consortium of colleges to use the Lehigh Gap Wildlife Refuge (LGWR) as a teaching site. Continue and expand networking with area college and university professors to promote visits to our site, in-class presentations, and research opportunities for students; create opportunities for teaching courses at LGNC or in cooperation with area institutions
 - Host regional associations of ecology/environmental science teachers at two levels, elementary and secondary, to share curricular ideas and collaborate on projects with their classes via the internet
 - Promote the Center's facilities and programs with alternative educational organizations, such as cyber schools, charter schools, private schools, and with home school organizations
- Non-school Educational Programs
 - Consider purchasing a multi-passenger van for clubs, field trips and other programming
 - Consider reinstating the Student Ecologist Award program to recognize area students who are dedicated to conservation and environmental stewardship
 - Research Library. The LGNC library holdings and archives are catalogued, organized and upgraded with help from a volunteer librarian. However, the library is an underused resource and one that needs to be kept up-to-date. Consider the following:
 - Promote the use of the library with members
 - Promote the use of the library with area school students and academic institutions
 - Cultivate volunteers to staff the library so we can have open library hours, even if only open once a week
 - Consider implementing limited circulation for members with the help of volunteer librarians
 - Consider designating a library fund within the Center's Endowment Fund
 - Create and maintain up-to-date and searchable online catalogs of books, journals and archival items in LGNC library

- Continue to promote donations to the library
 - Promote the children's lending library located in the Great Hall; consider putting together thematic kits for members to check out. These would be tubs containing approx. 10-15 mixed-media items related to topics such as bugs and butterflies, birds, geology, climate change, etc. Each kit would contain a mix of books, cds, dvds, puppets, tools (magnifying glass, binoculars, net, collecting jars, etc.) for children and parents to explore a topic together at home.
 - Consider a winter library reading program for pre-school and/or elementary students
- Consider reinstating the Naturalist Fellowship program as funding allows (providing small grants for supervised research or conservation projects by individuals or clubs)
- Continue the Wonderful World of Wildlife reading program with Slatington Public Library. Enlist other teachers to expand the program to other libraries in Palmerton, Lehigh, Northwestern Lehigh, Whitehall-Coplay, and Northampton districts
- Consider using QR codes or other mechanisms for access to audio or text information by cell phone
- Develop brochures specific to Lehigh Gap for topics including the following:
 - Habitats
 - Birding at LGNC
 - Mammals
 - Amphibians and Reptiles
 - Trees of LGNC
 - Bees
 - Native Plants
- Develop additional wayside interpretive signs to interpret the following:
 - Prairie grasses
 - Prescribed fire as an ecological tool
 - Raptor Migration along the Kittatinny
 - Other (local history regarding impact on LGWR)
- Include additional indoor exhibits could include the following:
 - Water cycle exhibit specific to LGNC
 - Geothermal heating and cooling exhibit
 - Solar PV exhibit
 - Green building features of the Osprey House
 - Watershed exhibit (Delaware/Lehigh)
- Create demonstration habitat areas at various parts of the refuge to exhibit unique habitats for educational purposes. The Prairie Warbler Trail area is one such demonstration habitat for scrub.
- Consider holding symposia at LGNC to showcase our research and conservation work
- Offer courses on research for teachers, students, and members

Chapter 3 – Research and Monitoring

“All I’m armed with is research.” —Mike Wallace



George Yasko and students from Lehigh University

Introduction

A great deal of research and monitoring has been conducted on our refuge since we purchased the land in 2003. To this point, monitoring has been focused on understanding the success of the revegetation and habitat restoration. These adaptive management efforts were informed by prior research at the site, including that of Marilyn Jordan, who is now serving on our Board of Directors. Along the way, we learned much about ecological restoration in contaminated sites.

One of our first efforts was to commission an ecological assessment¹ (Appendix 11) to establish baselines early in the restoration effort. We quickly developed a group of academic partners interested in having undergraduate and/or graduate students conduct research projects at our site. We were helping to train the next generation of scientists and at the same time gaining basic ecological knowledge about our land.

While all of that research was of interest to us, we came to the realization that it could be far more useful if it were focused on our management information needs. At the same time, we found that there were times when the research projects were in conflict with each

¹ <http://lgnc.org/resources/lgwr-ecological-assessment/>

other. We therefore created a Research Committee, which developed a research policy that includes a proposal application and requires a fee from the supporting school (Appendix 7). The Research Committee reviews and approves these applications.

As we move forward, we need to refine our process and focus research projects on information needed for science-based ecological management of our refuge. Developing lists of research questions for which we need answers is a necessary first step. It is important that we communicate with our academic and other partners about our research needs.

In addition to academic research, we have also convened a number of meetings to help us gather input and advice on habitat management on our refuge from a variety of professionals in ecology or related fields. Some of those meetings included Research Roundtables, designed to share research results and conclusions, while we also convened two “Desired Future Conditions” meetings in the past five years to help us envision the most ecologically useful future landscape(s) at Lehigh Gap.

The meetings and research results have provided excellent information by which to plan our management strategies. With good information and advice at hand, we developed and implemented our plans. With the help of CBS and their ecological consultant, Cardinal Directions, and our academic partners, we then monitored how the habitat responds to management. As necessary, we then revised our management strategies and continued monitoring. Monitoring is a vital component of adaptive management, and it is often neglected. We will continue to use research and monitoring results to guide conservation. Research at our site has been of interest to our academic partners due to the following:

- The history of pollution at the site and its listing in 1983 as a Superfund site on the National Priorities list of EPA
- The degraded condition of the site prior to establishment of the refuge
- The opportunity to study succession at the site with baselines for comparison
- The innovative ecological revitalization work carried out by LGNC
- The large size of the site and its varied habitats
- The location of the site on the Kittatinny Ridge and adjacent to the Lehigh River
- The visibility of the site from surrounding communities and highways
- The science-based initiatives carried out at our refuge and the strong baseline data gathered during the ecological assessment work
- The importance of the Kittatinny Ridge in climate change adaptation and interest in how this unique site will adapt

Our academic research partners include Moravian College, Lehigh University, University of Pennsylvania, Muhlenberg College and Cornell University, while U.S. EPA, PA DEP and U.S. Forest Service have also been strong research partners. These partners have assisted a great deal in the second phase of our ecological assessment and in our research concerning the impact and efficacy of prescribed fire as a management tool.



Our two-part ecological assessment provides broad-ranging baseline data on the ecological conditions of the refuge in the first decade of the 21st Century. The wealth of other studies and information from the Superfund era has been collected in the Palmerton Library as well as the LGNC library and archives, and was catalogued in a bibliography by Moravian College student Meredith Wright in 2009, supported by Moravian's SOAR program. This is a valuable resource for future research, and it is critical that it be kept up-to-date.

More than two-dozen undergraduate and graduate research projects have been completed at the refuge. One of the best examples of an intern research project that informs our management decisions is the project done by Laura McBride in 2015-16, another Moravian College student. In order to help us quantify and understand the impacts of metals on plant growth and the food web, Laura analyzed metal uptake in various forbs and woody shrubs to quantify potential impact of metals on herbivores and bees accessing pollen and nectar from the flowers.

Research is a pillar of our mission here at LGNC. We have a strong foundation on which to build a vigorous research program in the future with our academic and agency partnerships. These partnerships are critical because we lack the funds and resources to carry out this research on our own. The results of this research are crucial to our conservation work and management of the refuge, as well as to our education program. With this network of academic partners, our baseline studies and wealth of Superfund research, opportunities exist to seek out new sources of external funding from national sources such as the National Science Foundation and the EPA and from private foundations.

LGNC also conducts our own research and monitoring projects on the refuge and elsewhere. Examples of these projects include:

- **The Bake Oven Knob Autumn Hawk Count.** This raptor migration-monitoring project was begun in 1961 by Don Heintzelman, the founder of Wildlife Information Center, which later became Lehigh Gap Nature Center. Each year since 1999, we have employed a research intern, typically a recent college graduate, to provide full coverage for the count days during the week, while depending on volunteers for the weekend coverage. We completed the 56th year of this long-term research project in autumn 2016.
- **Kittatinny Ridge protection.** In order to support the important landscape feature we call the Kittatinny Ridge, we participate in the Kittatinny Coalition. The coalition's role is to advocate for protection of the ridge and its corridor, an Important Bird Area and leading line that diverts and concentrates migrating

raptors. In addition to participating as a leading member of the coalition, we also collaborated with academic partners to produce a comprehensive bibliography of the ridge, conducted bird and habitat research, and conducted post-wildfire research on the ridge.

- **USGS Native Bee monitoring site.** In collaboration with Sam Droege of the United States Geological Survey, LGNC has been a native bee-monitoring site for the past decade. Anita Collins leads this project, with a great deal of help from the Naturalist Club members.
- **Citizen Science Projects.** In 2015, John Holdren², Assistant to the President for Science and Technology and Director of the Office of Science and Technology Policy wrote a memorandum discussing the value of citizen science in addressing societal and scientific challenges in this country. LGNC embraces the value of citizen science contributions on a number of research projects and believes it is a valuable way to educate people of all ages about ecology and environmental issues. Volunteers are involved with our hawk count and native bee monitoring projects. In addition, LGNC sponsors the following additional citizen science initiatives:
 - **Feeder Watch.** Volunteers within a 15-mile radius of Lehigh Gap monitor backyard feeders during the second weekend in February to track bird numbers in this long-term study.
 - **Winter Bird Survey.** Teams of birders drive in a rectangular geographic area around Bake Oven Knob to count all birds seen on the third Saturday of January.
 - **Eastern PA Phenology Project.** This monitoring effort led by Diane Husic monitors phenological (seasonal) events over a 13-county area in eastern Pennsylvania to attempt to detect changes of timing and synchronicity of seasonal changes, such as first flowering or leaf emergence or migrant arrival.
 - **Monarch Butterfly Tagging.** This project, begun by our Naturalists Club includes an annual effort to catch and tag migrating monarch butterflies to help with the study of their migration. Monarch Watch from the University of Kansas is the project with which we cooperate.
 - **Bioblitz.** Another potential citizen science tool in which groups of people along with available experts survey all the species in a given area during spring or summer. We have not instituted this activity but have considered it.
- **Superfund Site.** Lehigh Gap Nature Center is part of a larger Superfund site, so designated by the U.S. Environmental Protection Agency in 1983. Many studies, papers, work plans, and other kinds of reports have been generated and stored in the Palmerton public library. However, they were stored en masse with no cataloguing. As mentioned above a Moravian College intern spent her summer with us organizing and cataloguing the Superfund archives and creating an annotated bibliography of the Superfund site.

While we have been adept at engaging partners to help accomplish our research objectives, we have not published much of it. An exception is the ecological assessment, which we

² https://www.whitehouse.gov/sites/default/files/microsites/ostp/holdren_citizen_science_memo_092915_0.pdf

published in two parts over four years. It is important for us to publish our research findings in scientific journals, popular sources, and in our own publications. In addition to helping promote continued research and synthesizing our work, publication will also position us for potential larger grants for research. It will also help us tell our story, which is vital to our continued growth and development. Perhaps most importantly, it will make what we have learned available to other practitioners.

As we move forward, it is important that we maintain our research priorities list and communicate it to our partners, as well as continue to use our research approval process that includes an application process and waiver. Compiling a catalog and map of past research and maintaining a list of research goals and potential projects, which will yield the results in which we have an interest, will help guide researchers and help us make sure that research projects conducted at the refuge are consistent with our mission and goals.

While not a high priority, a goal we have maintained since founding the refuge is to create an ecological field station where collaborators from Lehigh Valley-area colleges and universities could teach ecological field courses. Such field courses could be conducted partly in classrooms and labs, and partly in the field. Research interns could be housed at the Osprey House. We envision cross registration of any courses from a group of cooperating institutions such as LVAIC (Lehigh Valley Association of Independent Colleges).



Broad-winged Hawk over Bake Oven Knob by Scott Keys

Research and Monitoring Priorities

We will continue to facilitate research by cooperating with scientists, students, and citizen science partners. The following are the research priorities for the next five years:

- Continue to focus research and monitoring efforts on issues that will provide us with data needed to inform our conservation management (e.g. vegetation succession).
- Develop and maintain a list of research and monitoring projects which would provide us with data and information needed for management of our refuge; this list can include research projects appropriate for various ages and backgrounds, not only for college students
- Continue use of research approval process for all projects partners
- Continue long-term research and monitoring projects using interns and volunteers including:
 - Bake Oven Knob Autumn Hawk Count
 - USGS native bee monitoring project
 - Eastern PA Phenology Project
 - Bake Oven Knob Winter Bird Survey
 - Feeder Watch

- Display, share, disseminate, and publicize our research findings
- Determine any gaps in Ecological Assessments I and II³ and attempt to fill those gaps (e.g. amphibians and fish)
- Continue microclimate research, including the potential for adding an additional microclimate station on the south side of the ridge; emphasize climate change studies on the ridge



Aerial view of Three Ponds area

- Continue Research Roundtables and Desired Future Conditions meetings
- Monitor succession on the steep slope areas to alert us to the need for habitat management
- Monitor forested deer exclosures and other ecological evidence and where necessary and possible, manage the deer herd on the refuge to prevent ecological damage from an overabundance of deer browsing; implement twig browse monitoring protocol in forested areas of the refuge

Additional Research Opportunities

- Develop an ecological field station at the Three Ponds area in conjunction with area colleges and universities
- Explore opportunities to teach courses on site in conjunction with academic institutions or to present workshops or short courses on our own
- Engage the public more as researchers in citizen science projects; teach them the principles of research and involve them in field research, data collection/entry, and work involving computers and lab equipment; analyze data for results and implications
- Utilize the refuge as a site for climate adaptation research including range changes and invasions by native and alien species
- Publish results of cumulative research and evaluate potential for funding from external national sources (e.g. NSF, EPA, foundations)
- Develop model for reclamation of other Superfund sites for ecological values; investigate the potential for using our methods on abandoned mine lands and other degraded sites
- Develop a web interface for data entry by citizen science research participants and display of these data for others
- Use bioblitzes as a tool for gathering valuable information while engaging citizen scientists in meaningful data gathering on the refuge
- Monitor effects of climate change on the ridge, especially comparing differences on north and south slopes

³ <http://lgnc.org/resources/lgwr-ecological-assessment/>

Chapter 4 – Recreation

“The bow cannot always stand bent, nor can human frailty subsist without some lawful recreation.” —Miguel de Cervantes

“People who cannot find time for recreation are obliged sooner or later to find time for illness.” —John Wanamaker

Introduction

We have made significant progress in achieving recreational goals in the past five years. Some of those achievements include:

Connecting children and families to the outdoors, partly through our educational programs with children coming back to visit with parents, through Color of Nature, and through programs for families, all at no cost to participants

- Connecting children and families to the outdoors, partly through our educational programs with children coming back to visit with parents, through Color of Nature, and through programs for families, all at no cost to participants
- Conducting off-site programming primarily in Allentown to reach a broad diversity of audiences with outdoor recreational opportunities; this outreach can lead to conservation awareness and support from new audiences
- Adding the River Trail at the Osprey House, a short trail suitable for families with young children or for less mobile adults
- Creating the Kittatinny Trailhead at the Arboretum to provide easy access to the western end of the refuge, especially convenient for Carbon County residents and points north
- Installing two bridges along Three Ponds Trail to replace collapsing structures (both Eagle Scout projects)
- Conducting our Annual Trail Run, open to the public
- Brochures were added including Butterflies, Dragonflies and Damselflies, Bird Checklist, and Habitat Gardens
- Conducting the Nature in Art Show begun in 2013
- Conducting the Nature in Photographs Show begun in 2014

While many of us at LGNC feel that preservation of natural resources for their own intrinsic value is enough reason for being active in conservation projects, it can be difficult to garner support for this kind of conservation activity from the general public. For many, it is experiencing the resources first hand that motivates them to support conservation. Therefore, passive recreation can help build support for conservation. Also, art (in all its forms) can help deepen our bonds with nature. Our two annual shows (photography and other visual arts) and the use of live music at certain events and celebrations have added much to our appeal.

Recreation

Outdoors recreation on the refuge must avoid causing significant impact on our natural resources. Our policies allow day-use only, non-motorized forms of travel on our trails. No smoking, fires, hunting, or collecting are allowed at this time. Fishing is allowed and

encouraged in the Lehigh River, but not allowed in the ponds, vernal pools and wetlands of the Three Ponds area. Firearms are prohibited on the refuge. Horses and bicycles are restricted to the former rail beds (LNE and D&L Trails) and the Bobolink Trail in the Carbon County portion of the refuge.

We encourage walking, hiking and bicycling on designated trails, birding, wildlife watching and photography, botanizing, and fishing in the Lehigh River. Accommodations for handicapped individuals provide access to the D&L and LNE Trails with personal electric carts or electric golf carts, including one owned by LGNC.

The recreational opportunities available in the Lehigh Gap area (our trails and programs, Appalachian Trail, Northern Lehigh Slate Trail, Lehigh River access, etc.) provide significant improvements to quality of life and desirability of living in the Lehigh Gap region. Many daily visitors live in the surrounding municipalities, and many other users come from throughout the Lehigh Valley region. We also host visitors from more than a 100-mile radius who come to Lehigh Gap primarily for hiking on the complex of trails and for bicycling on the D&L Trail. We encounter numerous visitors who are staying in area hotels, spending ecotourism dollars that aid the local economy.

One obvious deficiency noted when observing our visitors is a lack of diversity. We must reach out to the communities in the Lehigh Valley and provide leadership in our region in bringing people of all colors, beliefs, and backgrounds into the conservation community. One way to be more welcoming to diverse audiences is to add some signage in Spanish or in a bilingual format. In addition, a movement for outdoor recreation and accessing parks for health reasons is growing and we should consider engagement with the medical community to encourage and promote this.



Nature in Photographs People's Choice winner "Crystal Balls" by Rhiannah Funk (a 10th grade Lehighton H.S. student)

To keep abreast of visitor and community attitudes, periodic surveys or focus groups can be used with hikers and other users to assess attitudes and desires of visitors. This is also an opportunity to dispel myths about our funding sources (many people think we are state or county funded) and encourage more visitors to support LGNC. One of our volunteers created Lorax cartoon signs and posted them in the restrooms explaining that we are not government-supported and depend on members and donors, resulting in many new memberships or donations.

One aspect of recreation – the enjoyment of the arts – has been added to our palette of experiences at Lehigh Gap. Annual Nature in Art & Nature in Photographs shows provide an opportunity for artists to share their nature-related art with us and have given visitors an opportunity to connect with nature by enjoying this art. These two shows have become important programs at the Osprey House and led to hosting additional shows by renting

space to a local art league. We also encourage artists and photographers to create images and other art on our refuge. Photographers must use ethical methods, including avoiding disturbing wildlife subjects.

One of the deficiencies noted in our previous strategic plan is a lack of directional signage, which would also make us more visible to the community. Signage on nearby roads would be helpful, but this is a complicated process because of PennDOT regulations. We have installed a sign at the entrance to Paint Mill Road and added signs along the D&L Trail to entice visitors to visit the Osprey House where they can access restrooms, cold drinking water, snacks, and information.

Finally, it is imperative that the Osprey House be open as much as possible during times when visitors are likely to arrive, especially true on weekends. We need to continue to cultivate our staff of Information Specialists, who staff the information desk at the Osprey House, and to recruit more volunteers to open the Osprey House more often.

Recreation: Management and Planning Priorities

A major goal at LGNC is management of the refuge with protection of natural resources as the top priority, while allowing outdoor recreation with minimal resource impact for engendering support for LGNC and for conservation in general by connecting people with nature. These priorities include:

- Continue maintenance of trails for public use
- Work toward full coverage of daily shifts for staffing the information desk with volunteers so that access to restrooms and our visitor center is available at all critical times; continue efforts to recruit additional volunteers for these efforts
- Install trail signs for the following purposes:
 - Identifying allowed uses of each trail
 - Providing mileage information to other trail intersections
- Provide LGNC trail maps to visitors; this map should be upgraded to include contour lines, the new River Trail and the Arboretum
- Continue and expand efforts to link health to outdoor recreation; develop more Fit Walk-type programs
- Continue our art shows and work to market them better; create opportunities for artists/photographers to share their work and to create art on our refuge
- Continue our inclusion efforts and encourage people of all backgrounds to enjoy nature at Lehigh Gap, perhaps with transportation assistance; increase off-site programs in Lehigh Valley's urban areas to serve diverse audiences and encourage them to be conservationists through our Color of Nature program
- Use events such as art shows and trail runs to introduce diverse audiences to the refuge
- Enhance recreational experiences with education, such as self-guided trails and creating more guided events
- Seek opportunities to utilize art in its many forms within our programs to help us achieve our mission

Additional Recreational Opportunities

- Trails
 - Capitalize on local trail network throughout our area (AT, D&L Trail, NL Slate Trail, LGNC trails, and the Lehigh River Water Trail)
 - Consider expanding offering of recreational events (such as our More or Less 10K Trail Run) to include:
 - Health walks led by volunteers
 - Hiking clubs for groups (retirees, women, etc.)
 - Bike and Boat events; River club
 - Paddling events in which people use their own kayaks and we shuttle them
- Interpretive signage already enhances recreational experiences; additional sign for charcoal making needed
- Self-guided trails (trees, geology, history, etc.) can enhance recreation; consider a tree ID trail, an arboretum interpretive brochure, or historical trail guides; investigate use of QR codes for providing information to trail users with smartphones.
- Observation decks would provide views without damaging resources at Three Ponds and allow better access to Osprey House Pond
- Education-enhanced recreation provides an opportunity to recruit members and create better outdoor experiences for members and other visitors; continue guided hikes and identification workshops (e.g. Whip-poor-will Hike, bird walks, butterfly walks)
- Better market our current assets and events to increase ecotourism as well as local use of our refuge
- Concessions which rent bicycles or canoes or provide shuttle service should be considered



LGNC's "More or Less" 10K Trail Run

Chapter 5 – Administration

“If your actions inspire others to dream more, learn more, do more, and become more, you are a leader.” —John Quincy Adams

“Management is doing things right; leadership is doing the right things.” —Peter Drucker

Lehigh Gap Nature Center (LGNC) began strategic planning and administrative development in the late 1990s. That process continues as we grow and evolve as an organization. In 2015-16, our Executive Director (ED) participated in a fellowship in which organizational leadership and administration were major emphases. Our administrative efficiency and effectiveness has been recognized by our donors, and in 2016, the William Penn Foundation recruited our ED into the leadership network of environmental centers. These recent activities have expanded the ED’s perspective on future administration possibilities for LGNC.

In the past few years, we have gone from one staff person to four at the Center, including our Program Manager for the Landscaping for Communities and Wildlife project. As of January 2017, our on-site staff includes a full-time (mostly volunteer) Executive Director, a full-time Associate Director (half-time LGNC and half-time for William Penn network), and a full-time Program Specialist. This growth in staff has vastly increased our capacity to deliver programs and operate efficiently. The transition from a one-person staff to a multi-person staff was conducted deliberately to ensure that the staff functions at a highly effective and efficient level.



This management transition is being managed by the Executive Director on a day-to-day basis and monitored by the Board and the Personnel Committee. The Board is focused on effective succession management and recognizes the importance of developing the future leadership of the Lehigh Gap Nature Center. We now have a number of safeguards in place to ensure the continued management of LGNC. These include:

- Additional staff who can step into roles currently occupied by the ED
- An operations manual that includes the LGNC operating procedures
- A redundancy of knowledge, so that at least two people (staff or volunteer) know how to complete most administrative tasks at the Center
- A Personnel Committee and Board of Directors engaged in succession planning and management

Additional progress in this transition must include:

- Developing an integrated system of information and data sharing among staff members
- Developing an IT plan that allows and supports this integration
- Analyzing the gaps in redundancy and filling those gaps by training a second individual in those procedures; this redundancy applies to all areas of leadership, including volunteer leaders.

Staffing and Job Descriptions (Appendix 9)

At LGNC, we have a strong tradition (by necessity) of a lean staff supported by a host of volunteers. The current Executive Director formerly was responsible for every aspect of the operation of the Center. Volunteers have assumed duties related to conducting field trips, retrieving mail, tracking income and expenses, processing donations and membership renewals, depositing the checks, and keeping records of membership and financial transactions.

The Associate Director has been on board since September 2015 and is currently taking responsibility for most of the communications and transitional IT implementation, with plans to become more involved with fundraising and membership development in the future. The Program Specialist is responsible for all aspects of educational programming, including booking programs.

In the late 1990s, our Board decided to maintain a lean staff even as more funds became available. Thanks to the generosity of funders/donors and volunteers, we now have several paid staff members to support the mission of LGNC. In order to maintain this lean staffing structure we intend to continue to engage volunteers and stay lean in our activities. Volunteers remain integral to our operations and we must integrate staff and volunteers in a productive way.



Volunteer Donna Gasser, pictured here with her dog Kelso, serves LGNC's membership coordinator

Ideal/Pragmatic Staffing

We have deliberated and thought strategically about our staffing growth. In this section we outline the ideal staff that we should be able to afford as well as additional positions that would be valuable if funding became available.

Option 1

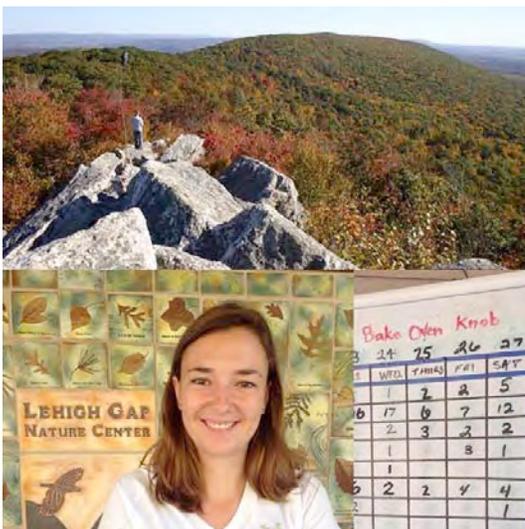
- **Executive Director** – The Executive Director is responsible for daily operations of the organization such as communications, development (membership, grant writing, volunteer recruitment), programs (education, conservation, research), financial

management, infrastructure maintenance, contracts, and staff/volunteer management. The Executive oversees all staff and carries out performance appraisals.

- **Associate Director** – This position is full or part-time depending on availability of funds; as appropriate, the Executive delegates responsibility to the associate, primarily in the areas of communications and development (communications, membership, resources including volunteers)
- **Program/Science Director** – This position should be full time if at all possible; the Executive delegates to this person the responsibility for developing, scheduling, and running all educational programs; overseeing our research program (on and off-site) as well as that of cooperating academics and students; and conservation and land/resource management on the refuge.
- **Caretaker** – The caretaker provides work in exchange for rent (which is taxable income and for which an IRS 1099 is filed); the caretaker is responsible for daily cleaning and maintenance of the Osprey House and grounds, up to an agreed-upon number of hours.

Option 2

- **Executive Director** – The Executive Director is responsible for daily operations of the organization such as communications, development (membership, grant writing, volunteer recruitment), financial management, infrastructure maintenance, contracts, and staff/volunteer management. The Executive oversees all staff and carries out performance appraisals.
- **Program/Science Director** – The Program Director is responsible for developing, scheduling, and running all educational programs; overseeing our research program (on and off-site) as well as that of cooperating academics and students; and directing conservation and land/resource management on the refuge.
- **Administrative Assistant** – Full or part-time position; this individual helps with clerical tasks such as payroll, donation acknowledgement, and mail processing.
- **Caretaker** – The caretaker provides work in exchange for rent (which is taxable income and for which an IRS 1099 is filed); the caretaker is responsible for daily cleaning and maintenance of the Osprey House and grounds up to an agreed-upon number of hours.



LGNC's 2016 Bake Oven Knob Hawkwatch Intern, Erin Voss

In addition to regular staff, **interns** can provide valuable support for certain projects and programs. An intern has been serving us well at the Bake Oven Knob Hawk Count for nearly two decades. Education or administrative interns can help with programming or administrative functions. Interns funded primarily by their institutions have also successfully completed research projects at our refuge under the supervision of their professors, and restoration interns are hired each summer for Superfund-required activities in the field. Interns are also learning and becoming ambassadors for LGNC. Therefore, we

should continue to recruit and utilize interns whenever they benefit the operation of the Center.

In the short-term, we should continue to develop the resources (including ongoing funding and endowment funds) to maintain the current staff level, and/or grow it to the optimum staff level over the next five-ten years. **Volunteers** continue to remain vital to LGNC under any staffing scenario that is reasonable to assume for the future. Volunteer staff members that are currently functioning and should be cultivated to remain active (or strengthened) include:

- Treasurer/Controller
- Membership Coordinator
- Financial Secretary
- Research Coordinator
- Environmental Educators
- Information Specialists (to staff the information desk)
- Gardeners
- Trail crew
- Art and Photo Show crew

In addition to these, we should seek to cultivate the following volunteers:

- Maintenance team – for small repairs and projects beyond the scope of the Caretaker’s responsibilities
- Outreach table team

Additional paid employees we can imagine in the foreseeable future are:

- *Special program/project staff funded by a grant* and with a specified time of employment; when the project funding ends, the position ends; this can include a program director (such as Kate Brandes for the Landscaping program), paid interns or participants in a program such as The Color of Nature.
- *Environmental Educators*. Fees for the programs can be used to pay these teachers for their services. This is a sustainable model in that teachers are part-time and are paid only when they lead a program that is paid for by a requesting group. This may be especially appropriate where the program is short and requires travel (as is the case with regular afterschool programs). We may consider work-study students from local colleges for this work.

A final note: While we have been working hard to diversify the audiences our conservation message reaches, we also need to be inclusive when it comes to our paid and volunteer staff. This will enhance our health and sustainability as an organization.

Staff Management

Good communications will be required between staff people and between ED and Board/Personnel Committee. Staff meetings will need to be conducted for:

- Strategic planning evaluation and analysis of achievement,
- Assessing achievement of last quarter’s goals and setting goals for next quarter along with intermediate milestones,
- Assessing success with intermediate milestones, and

- Setting priorities

In addition, the Executive shall meet with each staff member privately for an annual performance review and the Personnel Committee shall meet with the ED for performance review. The Personnel Committee should also serve as the second level reviewers and resolvers of any grievances among staff members.

Volunteer Development

Volunteers are a critical aspect of LGNC's past, current, and future success. We need to continue monitoring volunteer hours; this is currently carried out through logging hours in a notebook on the information desk, which are then transferred into a spreadsheet on the desk computer. These hours are needed for our annual audit as well as for volunteer recognition. It is essential to expand and cultivate the Center's volunteer base. In order to do so we must do the following:

1. Continue to nurture our volunteer leaders and coordinators. Several people are already serving in these capacities and we should recognize and applaud that service. They include:
 - a. Barb Egerton and Donna Gasser, who coordinate events and outreach tables
 - b. Diane Husic, who as research coordinator assists with research and monitoring efforts
 - c. Kathie Romano and Debbie Hamburger, who coordinate the Habitat Garden volunteers
 - d. Jane Borbe and Anne Zagarella, who coordinate the info desk volunteer schedule
 - e. Jim Gabovitz, who coordinates trail maintenance
 - f. Ed Newcomb, who leads a team to recruit speakers for the Speaker Series
 - g. Bob Hoopes, compiler for the Bake Oven Knob count and Ron Kline, scheduling coordinator for the weekend volunteers at Bake Oven Knob
2. Create official LGNC volunteer name tags and display those tags to recognize our volunteers and exhibit their importance; these name tags may be customized to indicate volunteer title and could also be used to indicate level of service such as years or hours.
3. Continue volunteer cultivation with social gatherings such as volunteer picnics, dinners, or wine and cheese reception. These gatherings can recognize leadership or exceptional service. Volunteer cultivation can also include field trips such as a canoe trip on the Lehigh, a special birding trip, or a visit to Fort Indiantown Gap for a butterfly walk.
4. Continue outreach events in diverse communities to lead to a more diverse volunteer corps.

Collaborations

LGNC is built upon a network of partners in mutually supportive collaborations. As our reputation for competence, efficiency, knowledge and leadership grows, so do the invitations to join a variety of collaborations, coalitions, and collective impact networks.

In preparing this strategic plan, members of the Board of Directors expressed concern about the staff being overwhelmed with work, and that these invitations have the potential to make matters worse. They have instructed the staff to be very selective. For each

invitation, we must consider: Will this collaboration help us to achieve our goals? Is it on mission? Can we afford the staff time to participate? The Board suggests that the staff be cautious to avoid overextension. A good rule of thumb is to ask, “Can the staff person involved do this within his/her allotted hours?” If not, we should not do it.

Communications and Outreach

Communications among the staff are of utmost importance. In addition to constant email and personal communications, regular staff meetings are needed for goal setting among staff members each quarter, along with annual goals. Evaluations must be done at the prescribed intervals as well, with the ED evaluating the other staff members and the Personnel Committee evaluating the ED.

In addition to communications among staff members, staff must also communicate with the Board of Directors. Regular written reports to the Board are a primary vehicle for this communication. In addition, it is important for the Executive Director to communicate with and at times consult with key board members such as the Officers, Finance Chair, or other members with a specific expertise in the issue at hand.



Color of Nature Intern, Antonio Martinez, helping to build the Chimney Swift tower

Communications with partners is a basic administrative function. It is primarily the responsibility of the ED to communicate with these partners unless another staff person has been assigned to a particular project or collaboration. The various partners include but are not limited to:

- Collaborators – these include parties in the Superfund restoration, regional conservation partners, project partners, coalition members, and collective impact partners. Examples of collaborations include Lehigh Valley Greenways, Kittatinny Coalition, Rider Pool Collective Impact Fellowship, and Delaware River Watershed Education Network. For the Superfund work, communication with U.S. EPA, PA DEP, CBS Operations and their ecological consultants, Cardinal Directions.
- Agency and Government Personnel – U.S. EPA and PA DEP are important agency partners in the Superfund collaboration named above; other agency and government partners include Washington Township and East Penn Township road crews, Lehigh County Parks Department, PA Department of Conservation and Natural Resources (DCNR) and their Bureau of Recreation and Conservation; Jacobsburg Environmental Education Center and Beltzville State Park (PA DCNR); and elected officials at the local, county, state, and national level.
- Academic Partners – this includes professors who bring classes to LGNC for field trips and learning experiences as well as those who sponsor or supervise students

doing research projects and/or internships at Lehigh Gap. (See Appendix 4 for a list of college and university partners)

- Grant Funders (Foundations or Businesses) and Philanthropic Supporters – communications with foundation executives/board members and philanthropic supporters should entail regular contact to convey our accomplishments, our needs, and to report on any results of projects funded by the foundation, business or philanthropist. It is important to cultivate relationships to ensure these individuals are fully aware of our vision, mission, and successes as well as our needs.

Information Technology (IT) Plan

The Associate Director has been tasked with developing a comprehensive five-year IT plan that will define our hardware, software and technology development needs. This plan was completed and approved by the Board of Directors along with the Strategic Plan in March 2017. (See Appendix 8)

Visitors

One of the most important aspects of our operations is interaction with visitors, especially first time visitors. A positive first interaction is key to encouraging subsequent visits and eventually membership or donation support. Having the building staffed and open when visitors and groups arrive is crucial for LGNC's reputation and long-term sustainability. All staff, Board members, and volunteers must be cognizant of this to ensure our visitors have positive experiences when they come to the Center.

The Information Specialist (IS) volunteers are the most important personnel involved in this aspect of management. These volunteers provide the first encounter most visitors have at the refuge. Having enough IS volunteers is the first step. A closed sign on the door is not a positive first interaction. In addition, recruiting and training the right kind of IS volunteers is crucial. There is an ongoing need to recruit, train, and retain more IS volunteers to keep the doors open on a regular basis.

Metrics

In order to measure performance and growth against plans and goals, we need to collect and record data with regard to a set of metrics. These performance-based metrics may include, but are not limited to:

1. Number of visitors
2. Number of preK-12 education programs and number of attendees
3. Number of college programs and number of attendees
4. Number of public programs and workshops at LGNC and number of attendees
5. Number of presentations to community groups and number of attendees
6. Number of members
7. Percentage of members renewing annually
8. Number of interns
9. Number of volunteers and of volunteer hours annually
10. Number of research projects completed
11. Percentage of grants approved
12. Total grant funding received
13. Number of collaborations in which LGNC is involved or leading

14. Percentage of core hours that the Center is open to visitors

15. Other...

This information should be collected by the staff and provided to the Board by the Executive on a regular basis.

Administration Priorities

- General Administrative Priorities
 - ED should meet regularly with staff for goal and priority setting and evaluation and for ensuring good two-way staff communication
 - Performance reviews must be completed periodically
- Evaluate collaborations carefully for effectiveness and decide level of involvement based on our mission/vision and the potential for achievement; re-evaluate periodically
- Volunteer management (including citizen scientists)
 - Continue to utilize a volunteer log book to catalog volunteer hours, tasks, and accomplishments
 - Continue working with volunteer group leaders to provide support and ensure success; continually seek to develop new leaders to replace those who retire
 - Expand the Information Specialist corps and/or use staff to provide better coverage and expanded hours of operation of the visitor center
- Seek to attract a diverse array of staff, board members, and volunteers that reflects the diversity (age, gender, race, vocation, avocation, etc.) of our service population
- With regard to communications and outreach
 - Communications among staff members and between staff and Board should be robust and comprehensive
 - Staff meetings and evaluations should be conducted regularly
 - Staff goals should be set regularly and communicated among staff members and with the Board
 - The ED should ensure that there are comprehensive and regular communications with all collaborators, agency partners, and academic partners
 - The ED must communicate regularly with funders/donors and potential funders/donors to cultivate relationships and ensure that these individuals and foundations are fully aware of our vision, mission, accomplishments, and needs
- Develop a comprehensive information technology plan that outlines technology needs and planned solutions for the next five years
- Gather and analyze data annually on the metrics outlined above

Chapter 6 – Sustainability

“Living sustainably is meeting your own needs without diminishing the prospects of future generations to obtain theirs.” —Lester Brown.

“Organizational sustainability is about balancing current needs for resources with long-term effectiveness and resilience.” —Dan Kunkle



View of the Lehigh River looking south from Slatington Bridge by Tejus Shah

Sustainability and *impact* are recurring themes at Lehigh Gap Nature Center. Building capacity (staff and funding) to sustain our programs is an ongoing effort. We must continually recruit and train new volunteers while retaining and sustaining those who currently volunteer. Long-term sustainability also requires broadening our appeal and reaching new and diverse audiences. To be sustainable, we must be inclusive.

Communications and Outreach

Outreach communications have been sparse in the past with a one-person staff. Now with additional resources in terms of staff, this kind of communication should become more frequent and effective. Regular press releases and cultivation of additional media contacts is desirable. In addition, the use of new outreach techniques (especially electronic) is necessary. The website and social media are the major platforms for these communications.

The staff of LGNC communicates with our **members** in a variety of ways, including:

- Membership publications (*Wildlife Activist*, *Lehigh Gap Update*, *American Hawkwatcher*)
- <http://lgnc.org>, our organization's website
- Emails sent every one to two weeks to update subscribers on coming events
- Social media (Facebook, Instagram, and Twitter)
- Mail, for membership renewals

The heart of our communications with members is our unique publication, *Wildlife Activist*. This informative journal chronicles our events and accomplishments, educates our members about natural history, Lehigh Gap, current nature literature, and acknowledges donations and support. It is a major way that our staff and Board president communicate directly with members. It is an important publication that is time consuming and expensive to produce. Recently the Board discussed ideas for streamlining the *Activist* and these should be considered, but the basic publication should continue. Its format may change but its basic purpose remains. We should consider whether or not the name is still relevant and useful as well.

Brochures and interpretive signs are also means of communicating, primarily with visitors. Our trail map is our most popular brochure. It is being redesigned and should be ready for publication in early 2017. Keeping brochures up-to-date is important and we should consider opportunities for outreach with additional brochures.

The website was recently re-designed and it is crucial that it be kept up-to-date. This is a major source of information for users and also an excellent place to access large documents, such as our ecological assessments or bibliographies. There is more potential to use the website for educational purposes with audiences ranging from our school groups to the world at large.

Our periodic emails are simple communications and list coming events and provide other information when necessary. Although we do not currently use a service such as Mailchimp or Constant Contact, this should be considered as long as no privacy concerns exist. We do not sell or trade our email list with anyone.

We entered the arena of social media by opening a Facebook page, plus Instagram, Twitter and LinkedIn accounts. Particularly regarding Facebook, we reach an audience well beyond our membership. This same phenomenon is likely true of other social media platforms. Efforts should continue to use these tools for helping communicate with the public, our members, funders and other organizations. The Associate Director has taken responsibility for social media communications.

We also communicate with members at events such as our programs, members' picnic, and volunteer recognition events.

Finally, a greater effort should be made to make the lines of communication two-way. Input from members can provide valuable insights and guidance for LGNC.

With regard to **non-members**, we communicate with the public in the following ways:

- Traditional news media (newspaper and local TV)
- Website
- Social media
- Presentations
- Events
- Outreach tables



Associate Director Amber Breiner giving a presentation to US Congressmen Paul Tonko and Charlie Dent along with D&L representatives

It is imperative that we tell our story at every opportunity. It is a compelling story that often engenders support. If it entices people to visit our refuge, the chance of garnering support increases dramatically.

Staff members and certain Board members should continue their efforts to make presentations to community groups, service clubs, and others. In addition, representation at community festivals and other outreach events can be an important way to gain exposure to new audiences. However, this is time-intensive for volunteers. In order to be worth that time, we need to create a captivating display that attracts attention. Outreach concerning the watershed is a new way in which we interact with trail users and casual visitors to LGNC. A well-designed and professionally produced display will be very useful in this endeavor as well.

Our story includes the restoration work at Lehigh Gap and programs such as the Color of Nature and Landscaping for Communities and Wildlife programs. Our accomplishments are many and we need to be intentional about preparing and telling our stories.

Finally, we need to communicate what we have done to the larger conservation and scientific community. This can occur through papers published, conference presentations,

courses taught, videos, and perhaps even a book. We must communicate in a broader way, not just with members, donors or potential members/donors.



Volunteer Gerry Madden introducing newts to children on a field trip at LGNC

Volunteers

Volunteers built Lehigh Gap Nature Center and volunteers will always be important to our sustainability. We have developed a system in which volunteers are divided into teams, each with a volunteer leader or co-leaders, and we track volunteer effort in a logbook. We developed a volunteer survey form to gather information about potential new volunteers so that we can assign them to area(s) that best match their interests. We budget for volunteer recognition and plan annual volunteer recognition events.

We maintain a volunteer manual with job descriptions, a volunteer logbook and a volunteer survey form. We do not yet have a volunteer management plan.

Development of that plan should be a priority as we have adequate staff to take on that project. One important objective of

that plan must be to sustain the volunteers and recruit new ones, constantly replenishing the ranks of these valuable groups. Other objectives include developing a system for cataloguing the information about potential volunteers as well as a list of volunteer opportunities.

Volunteer teams that are functioning well at Lehigh Gap Nature Center include:

- Information Specialists Team
- Bake Oven Knob Hawk Count Team
- Garden Group
- Trail Crew
- Education Team
- Speaker Series Team

Other teams that are in need of additional volunteers include:

- Events Team
- Outreach table volunteers

We occasionally set up task forces to tackle short-term jobs. When the job is completed, the task force dissolves. The Strategic Planning Task Force was responsible for this plan. Another potential task force is one that would review our by-laws and policies and bring them up to date as needed.

In addition to these teams and task forces, we also have volunteer workdays, special groups that come out to volunteer for a specific project, and individuals who volunteer on a regular basis. Examples of the individual volunteer model include:

- Donna Gasser, Membership Coordinator, who retrieves and opens mail and processes all memberships/writes and sends thank you notes
- Nancy Kovalchick, our Osprey House cleaner, who has cleaned the Osprey House weekly since it opened in 2010
- Bob Hoopes, an officer of the Board of Directors, serving as the Center’s Treasurer. Unlike a typical treasurer, Bob functions as the LGNC controller, without access to any of the Center’s cash accounts. He maintains all financial records and ensures proper documentation of all expenses. Others in the organization manage the cash accounts. This separation of duties ensures that the individual maintaining the records of cash inflow and outflow is completely separate from those individuals handling the cash.
- Allentown Hiking Club members, who maintain our trail system

Volunteer recognition is important. We host some form of volunteer event annually, such as an ice cream social. This should continue. In addition to seeking other ways to recognize volunteers with awards, we must continue to honor them each time they come out and help. We should also consider unique opportunities for volunteers such as special outings with the staff, open only to our volunteers.



2017 LGNC Board of Directors. 1st Row, L to R: Anita Collins, George Beam, Ron Kline, Diane Husic; 2nd Row, L to R: Frederic “Fritz” Brock, Janet Maurer, Marilyn Jordan, Barb Egerton, Nelson Markley. Missing from photo: Bob Hoopes and Bill Mineo

Boards and Committees

Among the most important group of volunteers are our Board of Director and Board Committees. This structure has been evolving over the past decade. Our Board of Directors is the governing body of Lehigh Gap Nature Center. It sets and oversees policies and the budget, and contributes to efforts to raise funds for the Center. The Board of Advisors serves in a strictly advisory capacity and does not meet as a board. The Executive Director (ED) meets with each Advisor annually to update the advisor on progress and programs

and to seek advice. The ED also calls upon the Advisors as needed for information, advice, or service.

There is also a committee structure, with each committee performing functions on behalf of the Board of Directors and reporting the Board. Currently, the functioning committees include Finance, Personnel, Communications, and Research. Additional committees currently recognized in the by-laws but not functioning at a high level are Development, Infrastructure, and Conservation. (Appendix 10)

While there are provisions for up to 15 Directors, the number of Directors has been 11 or 12 and we function well with that number. We have always recruited our Board members from the ranks of people who have become involved with the Nature Center in a significant way. Some were recruited from the community members who helped us develop our Master Site Plan. Others became involved with a research project or with our Naturalists. We use the Board of Advisors and committees as places to groom future Board members. It is Board policy to recruit Board members who have already shown commitment to and interest in LGNC.

The Board has conducted discussions concerning the following:

- Increasing the diversity of the Board
- Adding celebrity Board members who lend their name to the Board
- Requiring LGNC involvement prior to considering a candidate for an invitation to join the Board of Director

Development

In order to implement our mission, we need sufficient funds to operate our educational programs, continue our conservation and research work, maintain the facilities, and fund the staff needed to support all this work. While we have been successful with development for programs and infrastructure in the past, we now need to expand development to sustain and increase support for volunteers, staff.

In addition to staff time for development, we also need tools that aid that process. While our spreadsheets and the accumulated knowledge of our Executive Director have served us well to this point, sustainability with regard to this information requires additional support in the form of information technology (software) that allows us to track information regarding development. Our rather simple methods are not sufficient as we continue to grow. Getting the right fit for LGNC is crucial.

Membership

During the previous plan period, a major step was taken with regard to membership when Donna Gasser volunteered to take over the role of Membership Coordinator. Donna has been a huge asset for LGNC and we need to continue the role of Membership Coordinator, training additional volunteers to help Donna and/or replace her when the day comes that she is no longer available to us.

Another advancement in the past five-year plan was the introduction of a business membership category to allow local small businesses to provide modest annual membership support in exchange for recognition at our visitor center and in our publications. This has provided us with a small increase in support.

We need to continue growing our membership to help sustain LGNC. This includes continuing the growth in individual and business membership rolls that have been occurring since we moved to Lehigh Gap. The Executive Director and Associate Director should devise a plan for continuing this growth and request help from the Board as needed, most likely by reviving the development committee.



Executive Director Dan Kunkle wrapped up in a lesson on food webs with children on a field trip

Donations and Grants

Donations from individuals and grants/donations from foundations, businesses, and government agencies have been crucial to sustaining our success. Individual donations have helped us with our capital campaign and our endowment fund. Grants from foundations, large businesses, and government agencies have made up a large percentage of our program funding and also support our capital needs. While all of these must continue, we need to continue to diversify our sources of income and to increase the percentage of income from non-grant sources.

The Executive Director did all of the grant writing and development cultivation prior to 2016. The Associate Director is gradually becoming involved with this process. However,

much of the knowledge about funders and donors resides with the ED. This knowledge must be transferred and made accessible to present and future staff members.

Earned Income – Program Fees, Rentals, Gift Shop, Advertising, Art/Photo Shows

Earned income from program fees and rentals has contributed modest amounts of income for operations. We have raised funds to subsidize most of our field trips and camps so that little cost is passed on to consumers of these programs. We have also been fortunate to forgo paying the full cost of carrying out our programs thanks to our volunteers, our ED chief among them. In the future, we need to increase the sustainability of those programs

by charging fees that reflect our costs when grant funding does not support the work. There are times when providing free services is an investment that pays dividends later (such as with a college that later contributes research valuable to our management), but we must be more conscious of our needs.

In addition, our Osprey House has greater potential for rentals than is currently being utilized. Marketing our facility for retreats, meetings, yoga, art shows, weddings, birthday parties and the like could increase our income stream from the facility. Once again, prices must reflect our costs and all prices should be reviewed and adjusted to market levels. Members should receive preferred pricing or be asked to make a donation in lieu of rent for the use of the facility.

Our gift shop makes a modest profit. However, we should review the volunteer effort required to support this profit. It may be beneficial to adjust the format or concept of the current gift shop. In fact, we already have two volunteers who have taken an interest in diversifying the LGNC-branded apparel offerings in the gift shop. In addition, the recent institution of acceptance of credit cards could provide more sales opportunities. Finally, the space could be more efficiently organized. If we expand into sales beyond apparel, we will need to collect sales tax and file regular reports.

A small amount of funding could be obtained by allowing advertising in the Activist. We have done this on occasion but it takes time and we also don't want to overdo this.

Finally, we have developed Art and Photo shows, with the artists donating a percentage of sales. If we can market the shows better to get more attendance, we could sell more pieces.

None of these ideas alone can contribute much to the budget, but together, they could be significant.

Most other organizations have annual dinners with auctions of sorts to raise operating funds. We have avoided using such events to raise funds (on the advice of a particular donor), but we should reconsider this decision as we move forward.

Endowment Fund and Strategic Reserves

In our previous strategic plan, building the Endowment Fund to support Center operations and programs was a high priority. We set goals of \$500,000 (short-term), \$1,000,000 (medium-term), and \$2,000,000 (long-term). We reached the short-term goal in early 2015, and then achieved our medium-term goal later in 2015. During the current strategic plan, we expect to begin using the Endowment Fund income as needed to support the budget. We expect significant progress toward reaching the long-term goal by 2021.

Through a motion by the Finance Committee, the Board approved the following schedule for using Endowment Fund income. When the trailing three-year average balance for the fund exceeds \$500,000, we can use 3% of the assets annually for the operating budget. At the \$1 million three-year average balance level, we can use 4% and at \$2 million, 5%. In 2016, the trailing average balance exceeded \$500,000 for the first time. We decided to defer tapping into these funds until 2018, as we seemed to have sufficient funds without it.

Contributions are added to the Endowment Fund in several ways:

- Any windfall contribution (unexpected, unsolicited, and undesignated) is deposited in the Endowment Fund.
- Any undesignated memorial contributions and bequests are deposited in the Endowment Fund.
- Special fundraising events designated for Endowment Fund support (such as the quilt raffle and the leaf tile sponsorships)

The Endowment Fund consists of the main body (Sustaining Fund) plus two designated sub-funds:

- Internship Fund, to support internships for research
- Arboretum and Garden Fund, to support our native plant gardens and arboretum

These sub-funds have an appeal to certain donors, and others should be considered, however, we need to ensure the Sustaining portion of the endowment fund is fully supported as well. We should develop plans for potential large donations that would endow a certain project or staff position. While we are comfortable with the current set of sub-funds, we should prepare for opportunities to endow a certain program or position.

Finally, we need to continue to raise funds for potential future land acquisitions or other capital expenses.

Reserve fund

We invested 90% of our large windfall donation in 2015 in the Endowment Fund and placed the remainder in our reserve fund. That fund exceeds \$100,000 as of December 2016 and can be used for emergencies or employee retention according to a policy recommended by the Finance Committee and set by the Board of Directors. We have added \$1,000 to this fund annually since 1998 and will continue to do so in the 2017 budget and beyond.



Sustainability Priorities

Enhance the sustainability with regard to the following:

- Communications and outreach
 - Continue the level of excellence in our publications while finding ways to streamline the production process
 - Continually update website to keep it current
 - Continue the use of weekly/bi-weekly emails to keep members informed of coming events; consider using an email service for this
 - More fully utilize social media (blogs, Facebook, etc.) in addition to traditional methods (publications and email) to communicate with members
 - Continue efforts to reach out to community groups by staff or volunteer speakers attending events and meetings
 - Develop a professional, engaging display for use with an outreach table at community events and festivals
 - One staff member must take responsibility for publicity/media outreach
 - Engage river and trail users as well as our visitors with our conservation message
- Recruitment and cultivation of a diverse corps of volunteers, including Board members
 - Develop a sound volunteer management plan including a list of volunteer opportunities
 - Develop a program of special events for volunteers such as field trips with the Executive Director
 - Recruit help for Membership Coordinator to develop a team that handles the tasks, providing redundancy, back-up, and eventually succession of personnel in this very important volunteer role
 - Examine all roles performed at LGNC to determine where we need to recruit volunteers to provide redundancy
- Activate additional committees such as Development and create a task force to review by-laws and policies
- Development of a plan by the staff to sustain our membership and increase it at a regular rate.
- The Executive Director must “come out of the kitchen”
- Review program fee and rental fee schedules and adjust as needed
- Work toward utilizing our facilities to earn income through more rentals
- Remain focused on mission of LGNC with just enough staff to achieve the vision with the help of volunteers
- Develop a fundraising plan to diversify income sources, including plans for growing the Endowment Fund
- Develop case statements for various specific endowment purposes and special projects/investments to accommodate donors with a specific purpose in mind
- Continue Board-directed emphasis on growing the endowment to help ensure a sustainable future

Chapter 7 – Facilities, Infrastructure, and Land Acquisition

“The building is not the nature center. It is a tool – a very important one – to help accomplish the goals of the Lehigh Gap Nature Center.” Dan Kunkle

“I think having land and not ruining it is the most beautiful art that anybody could ever want to own.” Andy Warhol

Capital Improvements and Projects

Since purchasing the 750-acres to create the Lehigh Gap Wildlife Refuge, home of Lehigh Gap Nature Center, we made numerous capital improvements, especially in the area of the original Osprey House, including:

- Building a large addition onto the original Osprey House to serve as our visitor and education center as well as our offices
- Gutting and remodeling the original Osprey House and integrated the upper two floors into the new structure, while creating a caretaker apartment in the ground floor of that building and intern quarters on the main floor
- Installing a stream discharge sewage treatment plant, drilling a water well and installing a geothermal heating and cooling system with five 270-foot bore holes in the parking area
- Building a one-way loop road around the Osprey House, creating parking areas, and building a living wall (retaining wall for the road/parking area)
- Planting extensive habitat gardens around the building
- Replacing the deteriorating spring house slate roof with a living roof
- Replacing the roof on the Tannery building
- Installing storage shed and a pavilion with picnic tables
- Creating a new trailhead and arboretum on the west end of our property
- Receiving a donation of 103 acres of property in the “Ecoloam” area of the mountain east of Lehigh Gap in Lower Towamensing Township, just south of Palmerton.



Garden Volunteer Coordinator, Kathie Romano, works hard to keep LGNC's native plant gardens beautiful

All of these improvements are major assets for LGNC, and we must work to maintain them to ensure the longest life possible for these structures. This includes regular maintenance

and adequate insurance to cover any losses as well as liability on our property. At LGNC, we provide an excellent return on the investment of donor funds and volunteer time, and we also protect and care for our infrastructure in which we have already invested.

Our major facility needs have been met. However, there are some facility and infrastructure improvements that are still desirable should funds become available. These are not high-priority items and they should only be pursued if a special, dedicated funding source is located. These opportunities include:

- Repairing the Osprey House pond, which is an educational asset that is currently leaking and unable to retain its full volume of water
- Installing an array of Photovoltaic Cells on the old Osprey House roof for electric generation, sustainability and educational value; third party installers could make this feasible, however, the benefits would then flow to the third party
- Installing a new deck/stairway to replace the unstable one on the Tannery
- Constructing an observation deck at Wood Duck Pond accessible from the D&L Trail
- Creating demonstration habitat areas (such as limestone savanna)
- Developing a field lab at Kittatinny Ponds
- Expanding parking options



In addition we should:

- Explore the feasibility of creating a small camping area for members only on the refuge
- Consider the following upgrades to the Tannery
 - Replace ground floor doorway
 - Re-point the building masonry

(Note that the Tannery could be used for educational displays or programs if the deck and stairway are replaced. However, considering the historic nature of the building and the underpinning needed on the southern foundation, renovations of this structure will be very expensive.)

Land Acquisition

Purchasing three private properties totaling approximately 750 acres was the first step in our Lehigh Gap Restoration Project. It also prompted us to register a second name with the state of Pennsylvania – Lehigh Gap Nature Center. The purchase of a 1.6-acre property at the west end of the refuge resulted in the establishment of a new trailhead and arboretum.

Acquisition of other pieces of land is not crucial to our mission and functioning, however, several parcels would greatly enhance our operations and/or our conservation work. Other parcels are important for conservation purposes, and we hope to interest land trusts in acquiring those as we did with the Daniel Hauser property, a 172-acre parcel on the north slope of the Kittatinny adjacent to our western boundary. The currently known properties of conservation interest are listed below. Others may become available and we need to be able to react to such events at that time.

- Trail's End. Gary and Darlene Van Norman, from whom we purchased the 300 acres surrounding this one-acre property with a bungalow and outhouse, currently own the Trail's End property. Trail's End, an inholding next to Kingfisher and Mallard Ponds, is a one-acre rectangle completely surrounded by our property. Access is via Joseph Lane in Kittatinny. Acquiring this property is crucial to conservation at the ponds, and its bungalow would be an ideal site for a remote classroom/field laboratory. The sale of this property to another individual could potentially create conservation problems. We have spoken to the Van Normans and have a good relationship with them. That relationship should be cultivated, and we should pursue a legal "right of first refusal" agreement.
- Strohl property. Our neighbors to the south, Miriam and Hailer "Barney" Strohl are an elderly couple in their 90s. Their property is between the main highway, PA 873 and ours and could provide an additional access to the refuge. More importantly, it could provide intern housing or additional space for exhibits, displays, etc. The land is also adjacent to the Appalachian Trail (AT) parking lot and access point and abuts the D&L Trail. We should pursue talks with the National Park Service (NPS), the D&L Corridor, the conservancies, Lehigh County, and Washington Township about being ready to purchase this property should it come on the market. Preferably, a conservancy could negotiate a lifetime right of residence on a purchase of the property.
- Ecoloom area, part B. This 600-acre property on the north slope of the Kittatinny in Lower Towamensing Township (east of Lehigh Gap) between Lehigh Gap and Little Gap was the subject of the first revegetation effort at the Palmerton Superfund site. Approximately 60 miles of switch-backed roads were bulldozed into the mountainside and a mixture of sewage sludge and fly ash was used to create artificial soil on the entire site. Grasses and trees were then planted. While the area is vegetated, the roads remain an erosion problem and there is a serious infestation of invasive species. One hundred acres of this property were donated to LGNC in late 2016 by Megan Burkit. A possibility exists that the additional 600-acre piece could be donated to the LGNC by CBS, who would retain the liability for any Superfund work on the site. This is a large, important piece of land, since it abuts the NPS land along the AT and is visible from the town of Palmerton. Access is limited, however, by the presence of the Zinc Company East Plant, the cinder bank, and Aquashicola Creek. It would be wise to have a small endowment fund donated along with the property to ensure that we have funds to manage the site. These properties could be useful for research purposes, as experimental sites for various restoration treatments, or possible as sites for land swaps for strategic properties adjacent to our current refuge.

- Joe Hauser tract. This 200+ acre tract is just west of the Daniel Hauser tract on the north slope of the Kittatinny. It is another valuable piece of property for conservation of the Corridor. We should meet with the owner and discuss the future of his property.
- Kittatinny properties. The village of Kittatinny lies to the west of the refuge on the bottomlands along the Lehigh River at the base of the Kittatinny Ridge. Some of the properties were cut out of the original parcel, which Van Norman sold to us. Some of these homes and properties could have value to us as caretaker residences or for additional facilities on the less accessible west end of the refuge near Three Ponds. When we have the financial ability and resources to begin raising funds for such purchases, they should be considered. In addition, we should watch for Sheriff's sale opportunities.



To respond to the sudden availability of one of these high priority parcels, we need to increase the amount of money accumulated for land purchase so that we do not lose the opportunity. As of December 2016, about \$22,900 has been accumulated in a capital fund for land purchase and other capital needs. This needs to be increased. In addition, we must continue talks with Appalachian Trail Conservancy, D&L Corridor, National Park Service, Wildlands Conservancy, and others concerning the Strohl property.

Priorities, Goal 7: Facilities and Infrastructure Capital Projects

- Repair the Osprey House pond for use in educational programs as well as for enjoyment of visitors (\$10,000)
- Install Solar (PV) cells to Osprey House roof (\$30,000)
- Repair Tannery deck, stairway, and door replacement (\$15,000)
- Improve East Penn LNE trailhead and access (\$75,000)
- Surface and swale on LNE Trail (\$75,000)
- Re-configure Bobolink trails for ADA accessibility (\$150,000)
- Improve and expand the Arboretum (\$20,000)
- Install observation deck at Kittatinny Ponds (\$15,000)
- Obtain a right of first refusal on Trails End property
- Increase the value of the fund for land purchases (top priority, Trail's End property at ponds (\$75,000)
- Continue talks with other interested parties about purchase of the Strohl property
- Secure tax exemption status for Burkit property and any other acquisitions

Epilogue by Diane Husic, Ph.D.

International conversations are increasingly focused on adaptation in the face of climate change. Until recently, efforts focused on how ecosystems will respond have been distinct from the discussions of how people and communities will adapt, but the intersections between community-based adaptation and ecosystem-based adaptation are starting to be recognized. While most of this work is centered on developing nations, there is relevance to our work at the Lehigh Gap. Contaminated areas tend to be around areas of poverty and/or towns left to decay after the industry faded away. But if damaged landscapes can be repaired, perhaps the communities too can be revitalized. This is the case with the restoration of the mountainside at the Lehigh Gap and the neighboring community of Palmerton – the home of the former zinc smelter operations.

Restoration can be considered a form of adaptation – taking barren or damaged landscapes and working to rejuvenate them – e.g. restoring the ecosystem functions (including carbon sequestration). The work at the Lehigh Gap can serve as a model for other degraded places and for people to see how a community can come together to enhance resilience (of landscapes and people) with the pending risks associated with climate change.

As we worked to restore a highly contaminated site in a rural area, we kept in mind the people of the nearby town, which saw major economic downturn after the zinc smelter that operated there and polluted the landscape shut down. Generations within the same family lost their jobs, their pride, or their hope for the future, and they had to daily look at the scars of the industrial pollution. As we went forward, we understood that the residents felt deep loyalty to what had been a good company in terms of how it treated its workers. We chose to emphasize, “fixing the problem.” We engaged the community in decisions about restoration. We constantly do outreach to talk about the changes and success. Now, the local residents have a sense of pride in the LGNC and are regular volunteers and visitors to the only Superfund site in the U.S. that has been successfully converted to a wildlife refuge and environmental education center open to the public for recreation and educational opportunities.

In the book *Ecological Restoration: Principles, Values, and Structure of an Emerging Profession* by Andre Clewell and James Aronson, the authors point out two important aspects of restoration that we find quite relevant to the work of LGNC and this new focus on the interface between ecosystem- and community-based adaptation. First, restoration projects *strengthen our communities*. The obvious example of this is at contaminated sites where work is done to decrease the health and safety risks, thereby making the community where the site exists and the people that live there safer. In addition, another point the authors make, that is relevant to *our* site, is that the restoration process is a communal process – where people join together and through joint participation in a common pursuit, – help to “fix” the problem. In other words, there is a cultural aspect to restoration in addition to ecological and conservation-based goals. Second, the authors also note that the restoration process *reconnects us*, as individuals involved in the project, *to the rest of Nature* (a personal restoration, if you will). Without a doubt, those of us that have worked at the Lehigh Gap Nature Center and on the restoration efforts are deeply connected to the organization and the landscape.

