Plants of Concern: Standardized Rare Plant Monitoring Using Trained Volunteers

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Final Report to

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with comparative discussion from 2001

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TABLE OF CONTENTS

Concept and Objectives 1
Summary: Monitoring Results 2001-2010 2
The Volunteer Component 3
Level 1 Monitoring Data Analysis 5
Level 2 Demographic Monitoring Update 12
Program Evaluation 12
Plants of Concern's Public Face: Communication and Outreach 15
Conclusion and Future Directions 18
Attachments 19

PLANTS OF CONCERN: CONCEPT AND OBJECTIVES

This document is a report for the second year of the two-year contract period which covers from July 1, 2009 to June 30, 2011. An interim report was submitted in July 2010 that covered the grant's first year. The period covered in this report is therefore July 1, 2010 to June 30, 2011. It includes an analysis of the 2010 season in relation to previous seasons, as well as an account of the initial stages of the 2011 season. Final 2011 numbers are not yet available.

Plants of Concern (POC) was launched in 2001. This long-term rare plant monitoring initiative is unique to the region in its use of standardized monitoring protocols used by trained citizen scientists. The program has now completed ten years of monitoring and has accumulated a substantial base for analyzing long-term data on a significant number of species and Element Occurrences (EOs).

Species monitored by POC were initially selected largely from the 1999 *Chicago Wilderness Biodiversity Recovery Plan's* species priority list, because they are state endangered or threatened and are considered by regional land managers and ecologists to be rare and significant within the CW region. In subsequent years, POC staff and landowners have decided, on a case-by-case basis, that any listed plant was eligible to be included in the program. The non-listed species monitored by POC are "species of concern" that represent individual landowners' choices of rare, high quality species that they wish to track at the county level. Through 2010, POC monitored 118 listed species and 108 rare species.

The primary geographic area covered by POC from 2001-2006 included the six counties of northeast Illinois, with one site in Kankakee County. In 2009, four sites from Kendall County, IL were added. Because of POC's Chicago Wilderness affiliation, three sites in northwest Indiana were added in 2007, and four sites were added in southeast Wisconsin in 2007(see GIS Map, Attachment 1). This report will focus on Illinois counties and species.

POC incorporates the following interrelated elements, all equally important to its success and recognition as a unique and valuable long-term monitoring program:

- Monitoring rare plants, particularly state-listed species, over time using a standardized census protocol to gain uniform data (plant numbers, population area, GPS coordinates, invasive and other threats, and management activities) on populations on a regional basis (Level 1 Monitoring Form, Attachment 2). Select species are targeted for more intensive demographic monitoring (Level 2) that supports projects coordinated by CBG researchers assisted by volunteers.
- Monitoring rare species in relation to management activities as reported by both monitors and land managers to form a feedback loop for short- and long-term adaptive management responses (Attachments 3 and 4).
- Training volunteers as citizen scientists to leverage agency resources for monitoring rare species and to create an informed conservation constituency.
- Working in partnership with public and private landowners, land managers, and agencies, through an Advisory Group (Attachment 5*),* to generate a shared approach to regional monitoring.

Two staff members, a Coordinator and Research Assistant, manage the overall POC program. Another nine-month Research Assistant works exclusively at Midewin National Tallgrass Prairie on a POC-based monitoring program while an intern is assigned to the Openlands Lakeshore Preserve monitoring program. Reports on the listed species monitored through these programs are included in the reports to the Illinois Natural Heritage Database.

SUMMARY: CUMULATIVE MONITORING RESULTS 2001 – 2010

In 2010, POC's tenth year, the number of landowners engaged and the number of species and sites monitored were comparable to those in 2008 and 2009. There was a slight decrease in both EOs and in the number of volunteers, due in part to the absence of reports from one large Wisconsin site. Subpopulation numbers increased significantly suggesting that fewer overall monitors completed a larger amount of work. Retention of EOs was high, with 66.6% of listed and non-listed EOs monitored in previous years also monitored in 2010. Many EOs are monitored in alternate years. In 2010, 76 new EOs were monitored. POC monitors 85% of the 982 EOs and 70% of the 169 listed species in seven northeast Illinois counties, as recorded by the Natural Heritage Database (July 2011). It is important to note, however, that the percentage given for EOs monitored is slightly higher than in actual fact, because a single EO in the State Database may include several sites, whereas POC EOs are site specific.

The following graph and table are discussed in detail in the remainder of the report and in Attachments 6-8. *(Note: Statistics in the following figures, tables and attachments were derived from the POC database for analysis on several different dates starting 3/17/2011 and may reflect minor discrepancies in numbers. Graphs from previous years may not correspond precisely due to late report submissions, merging of subpopulations and other factors)*

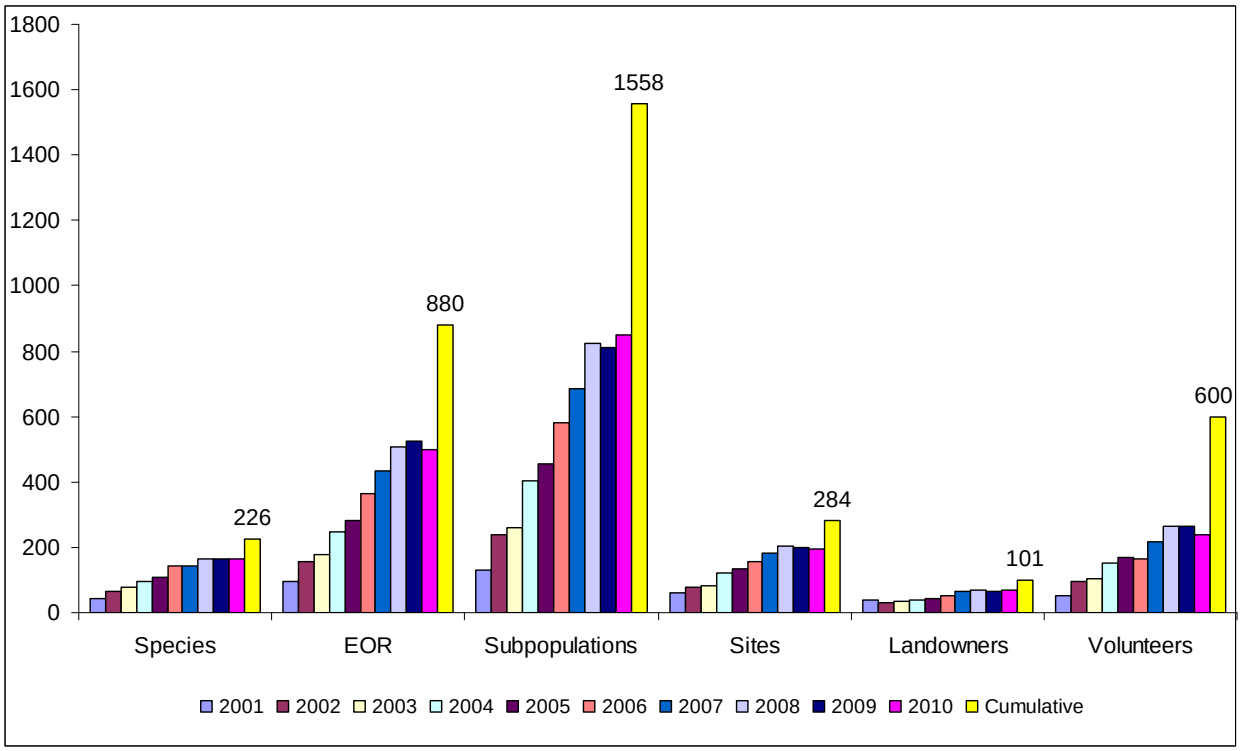


Figure 1. POC accomplishments and participation for all years, 2001-2010. Includes IN and WI.

Table 1. POC accomplishments and participation for all years, 2001-2010, including IN and WI.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Cumulative
Species *	44	66	78	95	108	142	145	164	166	164	226
EOR	97	154	180	246	282	366	432	509	524	497	880
Subpopulations**	128	238	260	404	457	582	685	822	811	852	1558
Sites	59	77	84	120	133	154	184	204	201	194	284
Landowners	37	31	36	39	44	54	63	69	66	69	101
Volunteers	53	96	102	153	171	166	215	265	264	238	600

* Includes 118 (IL) listed and 108 rare, non-listed species (Attachment 6).

**A subpopulation is defined as a grouping of a species within the same EO that is tracked separately because it is located more than 50 meters from another grouping, or because the grouping is within a different management unit or habitat.

Species monitored in multiple counties (see Attachment 6 for a breakdown of listed and non-listed species and the number of EOs monitored for each).

Species (listed and non-listed) monitored across multiple counties are the basis for a regional assessment of species status.

Illinois
1 species in 6 counties
3 species in 5 counties
14 species in 4 counties
25 species in 3 counties
51 species in 2 counties
116 species in 1 county

2001-2010 cumulative EOs monitored (listed and non-listed), by IL county:

Cook County:	207
DuPage County:	163
Kane County:	66
Kendall	10
Kankakee	1
Lake County:	243
McHenry County:	91
Will County:	53
Total:	834

THE VOLUNTEER COMPONENT OF POC

Without volunteers, POC could not function successfully. Both public conservation agencies and private groups recognize the importance of volunteers in greatly leveraging their resources for monitoring and management work. Each major agency has one or two staff, usually a volunteer coordinator and/or ecologist assigned to work with POC in recruitment, training, and field assistance of volunteers.

Volunteer statistics:

Table 2: Number of cumulative volunteers by county: 2001-2010 (some monitors have assignments in more than one county).

Illinois				Wisconsin		Indiana	
Cook	232	Kendall	1	Kenosha	16	Porter	5
DuPage	52	Lake	169	Waukesha	3	Lake	5
Kane	62	Will	74	Walworth	12		
Kankakee	2	McHenry	94				

New volunteers in 2010 (total: 58, 6 monitored in two or more counties)
Cook: 22; DuPage: 1; Kane: 5; Kendall: 1; Lake: 19; McHenry: 13; Will: 5. (IN: 0; WI: 10)
Average: 9.4 new volunteers per Illinois county.

Volunteer retention
Retention from 2009 to 2010: 64.4% (170 of 264) of those who monitored in 2009 were retained in 2010

Retention from 2001 to 2010: 43.3% (23 of 53) of volunteers who monitored in 2001 monitored in 2010

Retention from 2001 to 2010: 68.2% (180 of 264) volunteers who monitored in 2010 also monitored previously

Of interest is that 122 of the 238 volunteers (51.2%) who monitored in 2010 had monitored for three or more preceding years, and 239 of 600 volunteers (39.8%) who monitored at any time in the program did so for three or more years.

Volunteers monitoring for 10 years: 14
Volunteers monitoring for 9 years: 18
Volunteers monitoring for 8 years: 12
Volunteers monitoring for 7 years: 19
Volunteers monitoring for 6 years: 29
Volunteers monitoring for 5 years: 39
Volunteers monitoring for 4 years: 38
Volunteers monitoring for 3 years: 70
Volunteers monitoring for 2 years: 101
Volunteers monitoring for 1 year: 258 (includes 58 new volunteers in 2010)

Note: Volunteer numbers show a decrease in 2010, due in part to Wisconsin reports that have yet to be submitted. All 238 are Illinois volunteers in Illinois.

Volunteer hours

	2010	2009 (for comparison)
Volunteer hours in the field	1990.75	2455
Volunteer hours in workshop training	337	420
Volunteer hours in office support in	627	436.5
Total	2954.75	3209.5

Stewards as monitors
In 2010, 65 of 238 volunteer monitors (27.3% a 5% increase from 2009), were also volunteer stewards. Overall, 97 of 600 (16.2%) of cumulative volunteers have been stewards.

Recruitment
Volunteers are recruited by agency volunteer coordinators and current POC monitors through word of mouth, articles and announcements in stewardship newsletters, such as *The Habitat Herald* and Midewin's T*allgrass Telegraph*, Chicago Environmental Network Website, and staff presentations at regional meetings such as Wild Things in March 2011. The training workshops were listed on the POC website and promoted through stewardship newsletters and an email newsletter to previous, current and prospective POC volunteers.

Training
There were two different formats for volunteer training in 2010: day-long spring workshops and in-field training. POC staff and three volunteer assistants provide ongoing help with additional mentoring in the field. Four workshops were offered, one each in Cook, McHenry and Will Counties, and one in Kenosha County, Wisconsin. Sixty-seven (67) returning and prospective volunteers were introduced to POC program objectives and trained in monitoring techniques for Level 1 protocols. Representatives from county agencies presented information about rare plants monitored in their counties, guided volunteer assignments, and discussed the relationships between monitoring and management and the benefits of POC in relation to their

work. The sensitivity and confidentiality of rare plant locations were stressed in training sessions, and new volunteers were required to sign a Confidentiality Form. In the field, POC program staff, interns, agency ecologists, site stewards, or experienced volunteer monitors provided new monitors with additional field assistance with protocols and orientation to sites and populations.

In 2011, 76 volunteers attended four training workshops held, in Cook, McHenry and Will Counties, Illinois, and in Porter County, Indiana.

Volunteer retention is important to ensure continuity of monitoring and consistent application of protocols. Retention rates from year to year have held fairly high, as reported above. The 65 monitors who are stewards represented 27.3% of all volunteer monitors in 2010. These individuals add significantly to continuity of data and familiarity with site management reports. Agency staff members also contribute to program continuity and consistency. Since 2001, POC has worked with many of the same staff from major agencies, and when there has been turnover, a new staff member has been assigned to take on POC responsibilities. It is clear there will continue to be a high level of staff involvement working with volunteers, as each year new volunteers need support in the field. However, as volunteers are trained, they become more self-sufficient and can successfully mentor new recruits.

LEVEL 1 MONITORING DATA

Database, Data Submission, Data Review and Confidentiality

All Level 1 monitoring data is entered into a MySQL database developed and managed by Bianca Rosenbaum, Conservation Information Manager. This is an upgrade from the Access database established in 2001. The "back end" MySQL interfaces with an entirely web-based "front end" coded in PHP. Data is backed up on a daily basis by the host company. Data is entered on-line by volunteers and staff via the password-protected, role-restricted POC website. Volunteers must submit field/paper copies of their monitoring forms, but may also submit reports online. Individual monitors can access only their assigned monitoring reports online and only by means of a password. In 2010, 524 of 852 of forms were submitted online—a 3% increase from 59% in 2009—saving hours of manual data entry by program staff. Monitoring reports are reviewed for accuracy and completeness by POC staff and landowners, who have access to their own site reports. Data entry and review are typically completed in March, and then reports are submitted to the Illinois Natural Heritage Database; to landowners for their sites; and to the Nature Preserves Commission for nature preserves and land and water reserves.

In 2011, a content management system, Joomla, was installed to make it easier for staff to update the website on a regular basis. In addition, the database was also transferred to an SQL server to allow for GIS mapping of all subpopulations in the future. Also, as of June 2011, 17% of all paper-submitted monitoring forms were scanned electronically for archival purposes.

Results and Discussion

The Level 1 analyses below reflect information based on subpopulation reports submitted to date. Many EOs have multiple subpopulations. For each category of analysis, only reports with data in the specified category were included in the percentages given. Forms marked NA or blank for particular fields were excluded from the percentages given in the analysis, but, where possible, the percentages of the total forms that were excluded due to a NA answer are shown in order to provide a perspective on sample size.

It is important to note that in the analyses presented, data for each year is not based on an equivalent set of populations monitored. Each year, new populations/subpopulations are added to the program, and previously monitored populations/subpopulations may not be monitored in that year. Therefore, yearly increases or decreases in values do not reflect a cumulative change for the same group of populations.

The overall value of these data is to reveal general levels of threats, management activity, and plant recruitment throughout POC populations. More direct assessment of change or trends is possible when the analysis is applied to the same group of populations over time; with up to ten years of data on many populations, this analysis can yield robust data. As future resources and funding allow, POC will be able to undertake this more detailed analysis.

Ecological Threats (numbers from 7/17/2011)

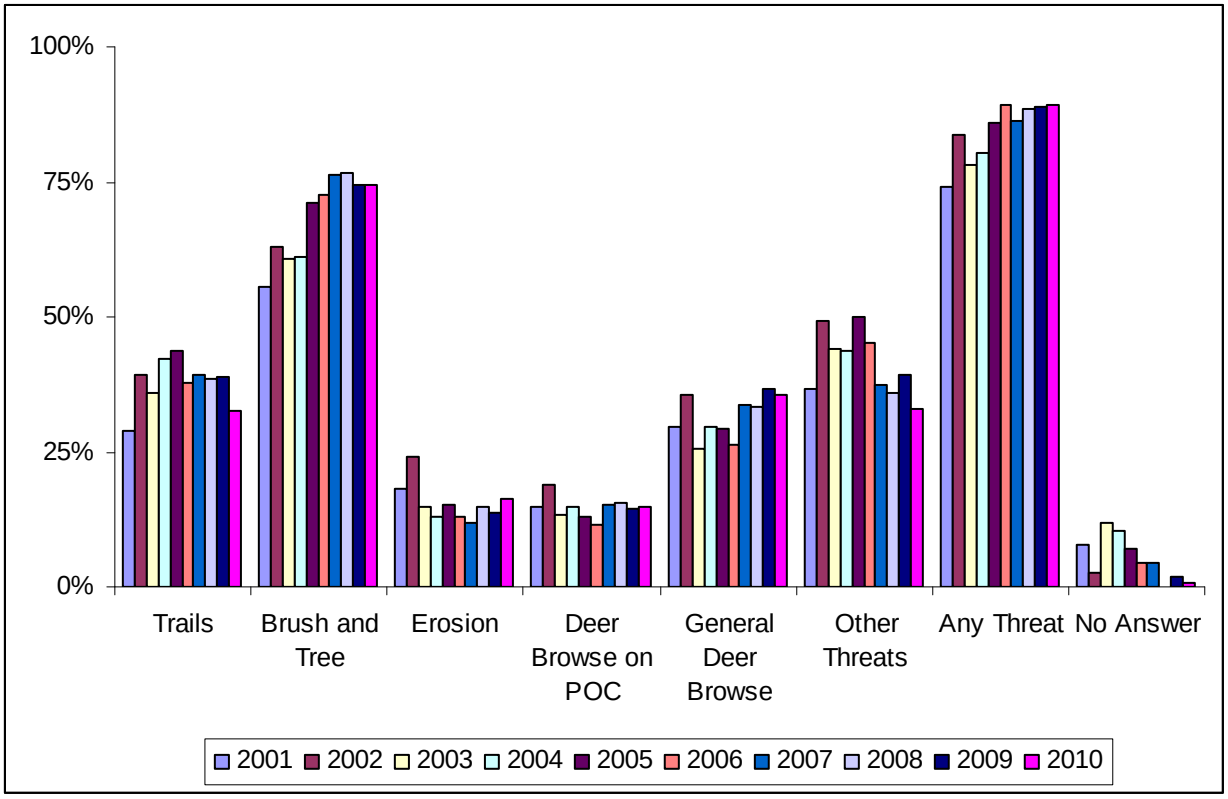


Figure 2. The percent of subpopulations in each year with a given threat present. The analysis of threats presented here does not reflect the percent impact or magnitude of each threat recorded by monitors, only the presence of the threat.

Only unauthorized trails were reported in 2001, so no value indicated for authorized trails in 2001. Authorized and unauthorized trails were lumped into 'total trails' for this analysis. In 2001 and 2002, no distinction was made between brush encroachment of less than or greater than 1 meter in height, so the two categories are combined in the Figure. For most years, separated data is available for the lumped values. The 'No answer' columns indicate the low percent of reports for which no answer was given for this section.

Based on the data in Figure 2, the percentage of subpopulations that were impacted by at least one ecological threat—invasive brush and trees, deer browse, erosion and trails—was between 74% and 89% from 2001-2010. These numbers are fairly consistent from year to year, with a slow increase over time, as the importance of recording threats to populations has been increasingly stressed in POC training.

Brush and tree encroachment, which includes invasive species and aggressive native species, such as *Cornus racemosa*, continues to be the most widespread threat to monitored populations, followed by trails and deer browse on all species within the population area. Overall, considering that the set of monitored occurrences is not the same from year to year, the relative percent of subpopulations impacted by each of the recorded threats appears relatively consistent from year to year.

A prompt to record "other threats" is included on the monitoring form The most common threats added to the list in descending order of prevalence are: trampling (by humans, deer, dogs, etc.), trash, ATV encroachment, mowing, and browse (such as by insects or small mammals). These threats range between 30% and 50% in any given year.

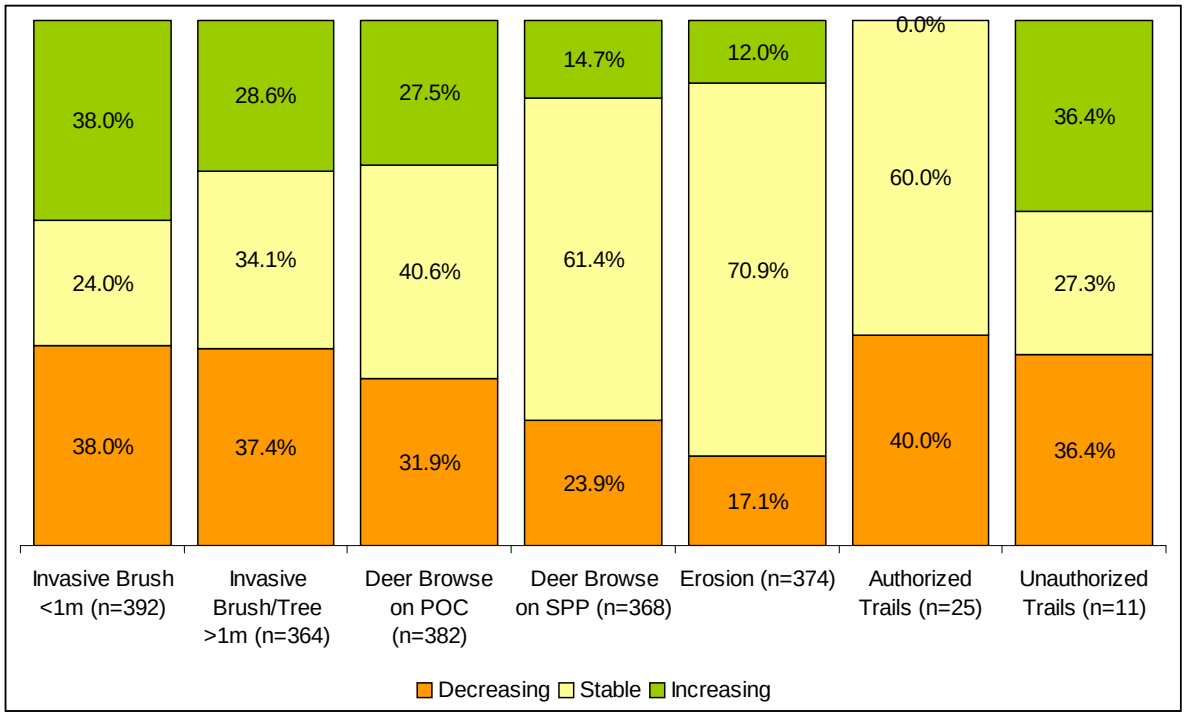


Figure 3. Trends in threat levels for subpopulations with a recorded threat with 5 or more years of data. Based on classes: 0%, 1-25%, 26-50%, 51-75%, 76-100% (trails based on estimated percentage 0-100%.)

Figure 3 shows changing levels of the magnitude of threats in more than 360 subpopulations (except for trails) for which POC has five or more years of data. There is slightly to substantially more decrease in all threats, except for invasive brush and unauthorized trails which show a balance between increase and decrease. A significant portion of populations show no change—between 24% and 70.9%. The greatest changes, with the exception of trails, are seen in invasive brush and tree impact, which is easier to control than deer browse or erosion.

Invasive species

Because of the large threat they pose, we closely examined the effect of aggressive native and non-native invasive species. The invasive analysis presented in Figure 4 below is based on data indicating the presence of the top 10 most reported species each year, rather than on the percent of subpopulations affected.

Invasive species updated (03/17/2011)

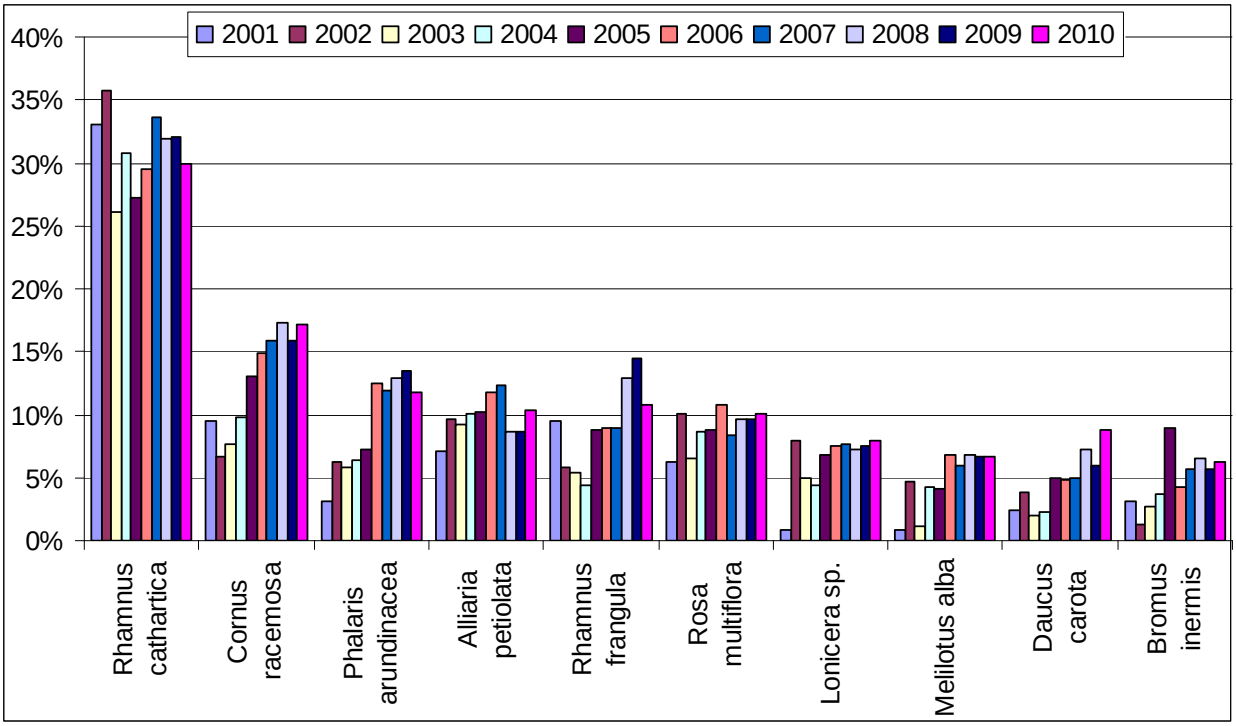


Figure 4. Top 10 most reported invasive plant species documented by POC monitors from all years. Percentages are based on the ratio of reports indicating presence of an invasive species to the total number of subpopulations with reports submitted that year.

Monitors have identified 397 distinct species as invasive plants over ten years, some of them native species and many of them having a minor or contextual presence. 256 invasives were recorded in 2010. Of all monitored subpopulations, 85.5% had at least one invasive species present in 2010 (down from 90% in 2009). As with threats, this analysis does not look at the magnitude of impact on the individual subpopulations, but it focuses on the percent of subpopulations impacted to any degree.

Management within subpopulations (03/22/2011)

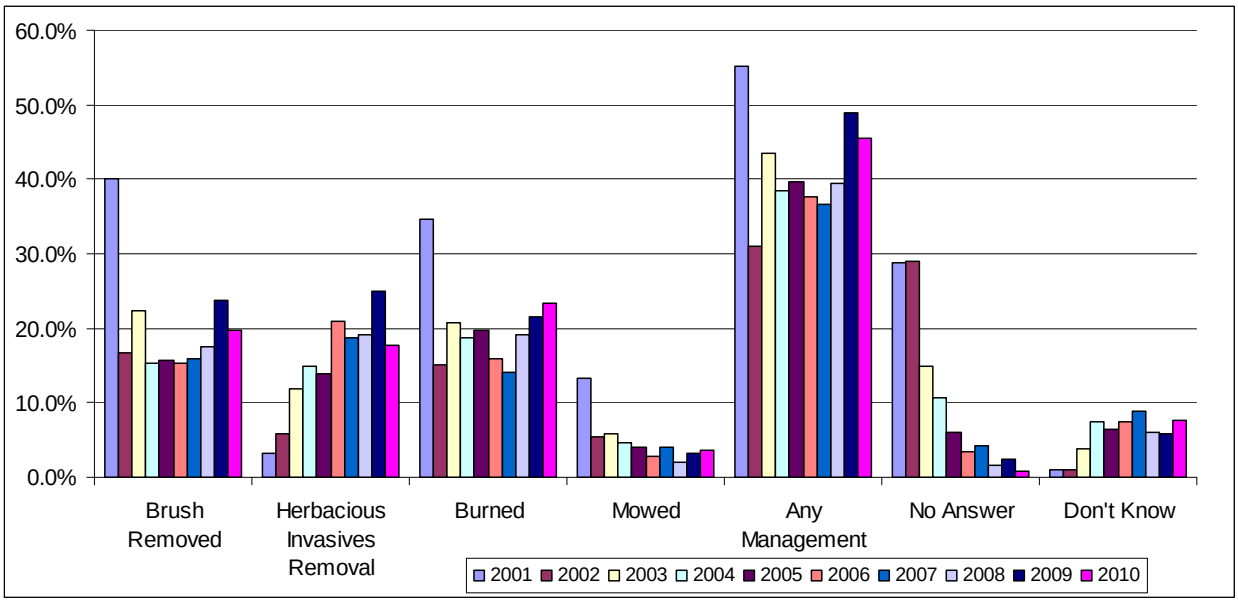
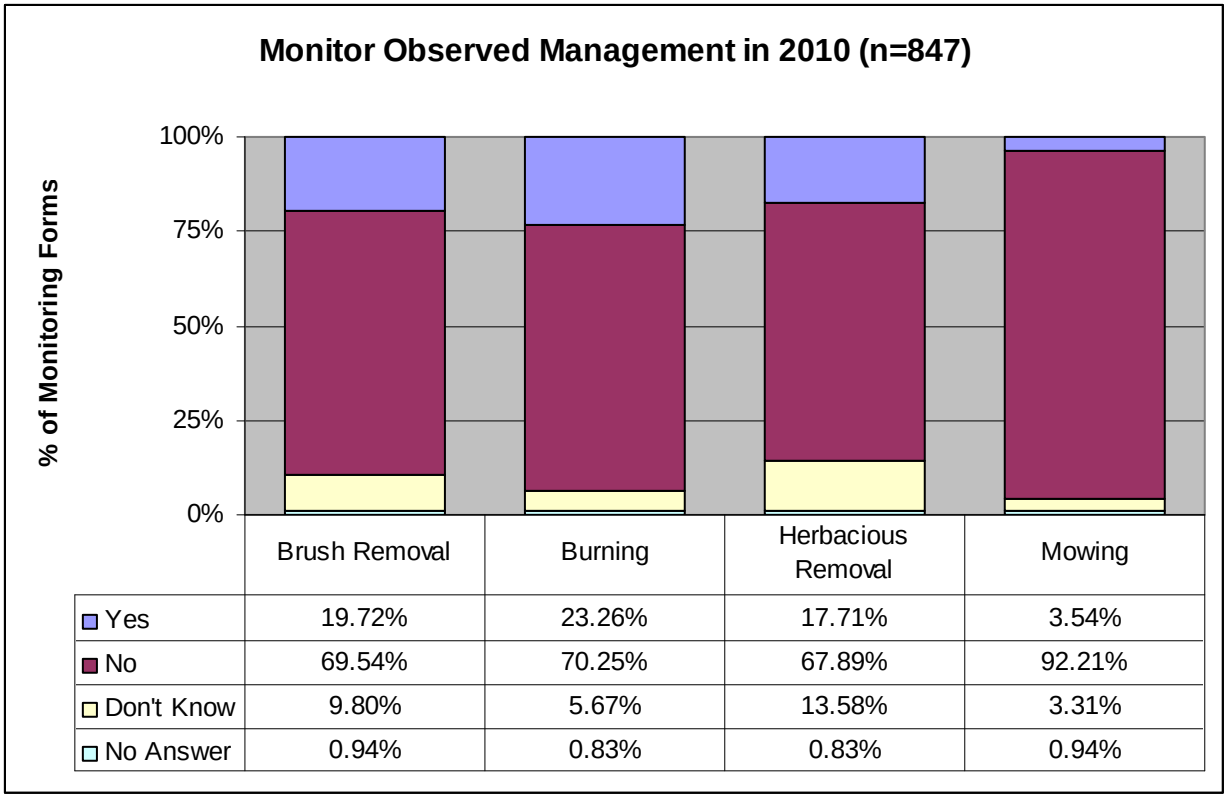


Figure 5. Management observed by monitors for all years. Percentages for individual management techniques are based on only those reports for which a "yes" or "no" answer was given for each management activity (as observed or known by the monitor). The percent of reports with blanks or a "don't know" response are shown separately. Herbaceous invasive removal was not recorded in a field in 2001.



	Brush Removal	Burning	Herbacious Removal	Mowing
Yes	19.72%	23.26%	17.71%	3.54%
No	69.54%	70.25%	67.89%	92.21%
Don't Know	9.80%	5.67%	13.58%	3.31%
No Answer	0.94%	0.83%	0.83%	0.94%

Figure 6. Monitor-observed management for 2010 (07/14/2011)

Evidence of Management
Based on 847 reports submitted through March of 2011, monitors observed that 45.6% of POC populations showed evidence of some type of management activity in 2010 Only a small percentage of the monitoring forms submitted were left completely blank in the Land Management section. A significant number of monitors are also staff, stewards or restoration volunteers at the sites they monitor, and these individuals are knowledgeable about the management activities on-site.

Overall, after a notable decrease in percentages from 2001 to 2002 (*Figure 5*), levels of management for all activities appear relatively stable, despite the changing set of subpopulations monitored each year. Further investigation may find that, in 2001, volunteers were largely assigned to known species locations at sites that were under an active management schedule.

Burning, herbaceous invasive removal and brush removal are almost evenly reported. It should be noted that brush removal or burning within the same population is seldom conducted annually, so the low percentages may be due to the multi-year cycle for these activities. *Figure* 6 indicates a high percentage of mowing in 2001, most likely because monitors considered mowing for trail or roadside maintenance to be a management strategy. This type of mowing, however, often poses a threat to the population. Since then, the training has stressed a difference between mowing as a management strategy (i.e. to control invasives or brush or as a substitute for burning) and unintentional mowing of the population, which may pose a threat. Other management activities recorded in an open-ended question without quantification include deer culling, fencing/deer exclosures, and hydrological modifications.

Land Management Reports from Managers
Since 2002, to supplement monitoring reports submitted by volunteers, POC has asked land managers to complete Land Management (LM) forms, which provide more detail on the types of management that take place both within the populations and on the site, as well as, land use history. While managers report about activities in the area or management unit where the populations occur, monitors often have a more precise understanding of how management affects specific population areas. Therefore, the two reports serve to complement each other.

POC requests the first LM report to include land use history, general management history prior to monitoring, information about adjacent land use, and whether a population has been introduced for each subpopulation. Annually, a query is conducted for the precipitation regime (e.g. flooding or drought) and population and site management during the past year, including burning, mowing, invasive species management, and deer removal. As data accumulates, the cycles of land management are compared with population cycles in order to uncover the influence of management on the plants of concern.

All LM reports submitted through 2009 have been entered into the database and some 2010 forms are still being entered. The switch to the relational mySQL database halted LM data entry during 2011, resulting in a backlog of forms still to be entered. POC staff has undertaken a concerted effort to gather LM reports and offered land managers alternate methods of completing the information, including an Excel spreadsheet, an Access database format, and a single form for multiple species within a management area. By the fall of 2011, on-line submission for LM reports will be essential to the efficient gathering of POC data. Cumulatively, POC has entered at least one report for 500 subpopulations or 32.1 % of the total subpopulations monitored in the database. Again, more reports have been received, including reports in the form of spreadsheets from at least two counties. The effort to enter and use management data has been successful thus far thanks to the cooperation of managers, who are eager to see the impacts of management on their rare plant populations. However, some managers have commented that completing additional forms is challenging in light of their other responsibilities. To address this issue, managers and POC staff have discussed the possibility of having monitors who are also stewards complete the LM form and submit to the manager for final review. Some managers have already taken advantage of this steward submission alternative.

POC has not yet conducted a comprehensive analysis of the management data due to limited staff resources and program priorities for these resources. It is the hope of POC to attract other researchers or graduate students to examine closely the patterns being reported about management within populations. Meanwhile, continued collection of management data is imperative.

Despite these challenges, specific management responses to POC monitoring are frequently reported by managers, stewards and volunteers. Some examples are presented:

At Montrose Beach Dunes in Chicago, the volunteer steward provided monitoring information and worked closely with Chicago Park District staff to secure some of their GLRI (Great Lakes Restoration Initiative) grant funds for invasive species removal at the site. The Dunes, an INAI site that supports eight listed or rare species, is also a reintroduction site for *Cirsium pitcheri*.

At Dixie Briggs Fromm Nature Preserve in Kane County, an Eagle Scout Project is being planned to remove a dense mass of buckthorn and honeysuckle encircling a hill on which a population of *Cirsium hilli* occurs. At another location on that site, brush has been removed within and nearby the only known population of *Ranunculus rhomboideus* in Kane County, which was discovered by a POC monitor.

At William Powers Conservation District, Susanne Masi met with IDNR's Maggie Cole and site superintendent Saki Villalobos to discuss management needs in an area that supports three listed species. Tentative plans were made for the 2011 IDNR interns to remove buckthorn and other invasive species which were seriously threatening the area.

Research Outgrowths of POC Data

With a growing Level 1 data set and the involvement of the Chicago Botanic Garden in graduate programs with Northwestern University, the University of Illinois at Chicago, and Loyola University, the potential is growing to attract graduate students and other researchers to assist with data analysis. These resources can allow us to gain more information from the data than POC staff members have the resources to undertake.

For example, a proposal by researchers at the Chicago Botanic Garden and the University of Illinois – Chicago was approved and funded in 2011 by the Illinois Endangered Species Protection Board to examine pollinator limitation, fruit production/viability and genetic diversity in populations of *Asclepias lanuginosa* that have not produced fruits in many years of monitoring. Wisconsin populations are being compared to Illinois populations.

Another example is the increased use of GIS in POC monitoring. GPS coordinates of all POC subpopulations are routinely taken and program staff have begun to create GPS polygons of many populations which will allow an image of the population shape to be projected on a GIS map and give a more precise measurement of area covered by the populations. With the new spatial database (SQL), layers of other data, e.g. management data, can be projected over the population area. Our GIS capacity has increased with the creation of the GIS lab at CBG in 2009. For example, GIS lab manager Emily Yates used POC Level 1 data in a poster presented at the Association of American Geographers in April 2011. The poster compiled point data from 2001-2009 of rare plant populations and performed exploratory and GIS-based spatial analysis using GeoDa and ESRI ArcGiS software to investigate effects of particular management history on population persistence over time.

LEVEL 2 DEMOGRAPHIC MONITORING UPDATE

Level 2 demographic monitoring of four species (*Viola conspersa, Cypripedium candidum, Cirsium hillii* and *Tomanthera auriculata*) was initiated in 2001, and includes tagging individual plants in permanent plots in order to track them over time. In the case of *Tomanthera auriculata*, an annual species, plants are newly tagged each year and are followed from flowering to fruiting stages. Specific protocols vary by species, but plant height, leaf measurements (width or length), number of blooms, and seed set are common measurements. CBG science staff, assisted by volunteers in the field, continue to lead Level 2 work for more intensive research projects, and several of these have been reported on in past POC reports to the Wildlife Preservation Fund. Dr. Pati Vitt is utilizing 12 years of demographic data on *Viola conspersa* in writing a paper that develops a matrix analysis of the population dynamics of this species. Dr. Jeremie Fant's research on *Cirsium hillii* has involved genetic and seed viability studies, followed by germination and successful introduction of plants with mixed genetic parentage to one experimental site (CBG's constructed hill prairie) and four natural sites with appropriate habitat. Also underway is the analysis of 10 years of *Cypripedium candidum* data by POC research assistant, Greg Hitzroth. Data is being assessed for correlations that could be biologically interesting, which could then be incorporated into more complex demographic models. These models will then be tested using POC Level 1 data. Other researchers can potentially be drawn to these datasets for in depth analysis, thereby adding to the power of POC data.

PROGRAM EVALUATION

POC met or greatly exceeded nearly all the program objectives as outlined in the WPF proposal and listed below. Most have already been discussed in detail in the preceding text.

Objective 1: *Collect standardized monitoring data on rare plants on a cumulative 55% of northeast Illinois' listed EOs.*

From 2001-2010, POC had collected standardized monitoring data on a cumulative 85% (834 of 982) EOs, listed as threatened or endangered (as recorded by the IL Natural Heritage Database through July 2011) in seven northeast Illinois counties. *(Note: the Natural Heritage Database can include more than one site in a single EO when they are geographically close, whereas POC considers each site as a separate EO.)* Through 2010, POC had monitored 70% of the 169 listed species that occur in northeast Illinois.

In 2010, POC collected standardized monitoring data on 87 endangered and threatened Illinois species in 322 EOs and 75 rare, non-listed species in 157 EOs.

Table 3. Percent change in monitored element occurrences in seven Illinois counties, and in all counties for Wisconsin and Indiana. Different EOs may be monitored from year to year, so % change indicates the difference in the total number of EOs monitored.

	Cook	DuPage	Kane	Kankakee	Kendall	Lake	McHenry	Will
2009	146	79	31	0	10	131	64	29
2010	130	81	34	0	7	123	72	32
% Change	-10.96%	2.53%	9.68%	0.00%	-30.00%	-6.11%	12.50%	10.34%

In part, the decline in numbers of EOs monitored in some counties reflects the fact that some occurrences are being monitored on an alternate year basis.

Objective 2. *Collect Level 2 demographic data on selected populations of target species (Viola conspersa, Cypripedium candidum, Cirsium hillii and Tomanthera auriculata).*

In 2010, POC collected demographic data on 4 plots of *Viola conspersa*, 8 plots of *Cypripedium candidum*, 7 plots of *Cirsium hillii* and 5 plots of *Tomanthera auriculata*.

Objective 3. *Hold three volunteer training workshops and support volunteers with further training in the field.*

In 2010, 67 volunteers attended four volunteer training workshops, which took place at Edgebrook Volunteer Center (Cook County), Glacial Park (McHenry County), Will County FPD Administrative Center (Will County), and University of Wisconsin Parkside (see Attachment 9 for Workshop Agenda). POC staff mentored volunteer monitors frequently in the field, as needed. POC staff also held several group monitoring "forays", which are excellent mentoring opportunities in protocol usage and plant identification. In 2011, 76 volunteers attended four volunteer training workshops which were held at the Chicago Botanic Garden (Cook County), Danada Forest Preserve (DuPage County), Plum Creek Nature Center (Will County) and Barker House (Michigan City, Indiana). Many Illinois volunteers attended the Indiana workshop). In 2010, three volunteers joined the team as volunteer research assistants and led other volunteers at sites throughout the season. In 2011, three graduate students joined POC to do extended monitoring work that will enhance their graduate studies.

Objective 4. *Increase the number of trained volunteers recruited in cooperation with landowners (an average of five per county in the six counties of NE IL, with recruits in Kankakee County.)*

66 new volunteers were recruited and subsequently conducted monitoring in 2010, an average of 9.4 per Illinois county. All counties except for DuPage and Kendall recruited 5 or more new volunteers.

On average, all counties in Illinois decreased by 1.5 overall volunteers in 2010. See *Table 4* below for specific Illinois county information. There were no recruits in Kankakee County despite attempts to gain them. However, Kendall County joined POC for the first time. Its four sites and 10 EOs were monitored by Kendall County Forest Preserve staff and one volunteer as a pilot project. Six new volunteers have already joined the Kendall effort in 2010.

In addition, the volunteer retention rate from 2009 to 2010 was 64.4%. 122 of the 264 volunteers who monitored in 2010 had monitored for three or more years (46.2%). This level of retention increased data reliability.

Table 4. Percent change of the number of monitors in Illinois counties with Plants of Concern involvement.

Year	Cook	DuPage	Kane	Kendall	Lake	McHenry	Will
2009	98	24	27	0	66	36	27
2010	93	19	31	1	63	43	18
% Change	-5.10%	-20.83%	14.81%	100.00%	-4.55%	19.44%	-33.33%

The decline in volunteer numbers in some counties is of concern to POC, although the number of POC volunteers increased in Kane, McHenry and Kendall Counties. Issues that may have caused the decline will be discussed by POC and county staff and appropriate measures will be taken to address the situation. New volunteers continue to join as evidenced by the 76 attendees at 2011 workshops.

Objective 5. *Collaborate with public and private landowners to place volunteer monitors on their sites.*

In 2010, POC worked with 69 public and private landowners to prioritize species and to place volunteer monitors on their sites. In winter of 2011, POC held planning meetings with six Forest Preserve District staff and IDNR's Brad Semel, to discuss the 2011 season volunteer assignments. Other landowners, in the program as well as four site superintendants at IDNR-owned sites, were contacted through email and by phone to plan the 2011 monitoring season. (See Attachment 7 for partner landowners.)

Objective 6. *Collaborate with the IDNR (Regional Biologists, Natural Heritage Database, Nature Preserves Commission and Illinois Endangered Species Protection Board).*

POC continues to have a strong relationship with IDNR staff. For example, POC collaborated at Illinois Beach State Park in 2010 with Heritage Biologist Brad Semel and held planning meetings with him in both 2010 and 2011 regarding monitoring assignments at Illinois Beach State Park, Volo Bog, Moraine Hills State Park, and Chain-o-Lakes State Park. Semel received all 2010 monitoring reports for his sites, which he has used in management planning. He also serves on the POC Advisory Group with Ben Dolbeare, Invasive Species Project Manager for IDNR. Don McFall, Heritage Division Chief, is invited to Advisory Board meetings and is kept apprised of POC progress. Heritage Biologist Dan Kirk received all reports on sites within his region. POC submitted all Element Occurrence Reports to the IL Natural Heritage Database in both 2010 and 2011 (for 2009 and 2010 monitoring seasons).

POC submitted permit applications and follow up monitoring reports for the 2009 and 2010 monitoring seasons to the IL Nature Preserves Commission in 2010 and 2011. Kelly Neal, Stewardship Project Manager for the Commission also serves on the Advisory Group. POC also applied for permits on IDNR-owned sites to Mike Moomey. Site superintendents have been very positive toward the volunteer monitoring effort and in May 2011, Susanne Masi met with Saki Villalobos and Maggie Cole at William Powers Conservation Area to view a monitored area and discuss management options. Maggie Cole also has access to monitoring reports for all the IDNR sites in the region. In addition, POC has occasional contact with INPC Field Representatives Steve Byers and Kim Roman over issues that arise in monitoring at sites within their regions. Kim Roman also serves on the Advisory Group. (See Attachment 10 for IDNR and Nature Preserve Sites monitored.)

John Wilker, the IDNR sponsor of the WPF grant, is a strong supporter of the POC program.

Susanne Masi, POC manager, is an appointed member of the Illinois Endangered Species Protection Board and brings information about listed plants from POC monitoring to the group. She also serves on the Board's Endangered Species Technical Advisory Committee for Plants. Board Chair Dan Gooch serves on the POC Advisory Group.

Objective 7. *Hold an advisory group meeting*

An advisory group meeting was held on December 8, 2010, at the Chicago Botanic Garden (see Minutes, Attachment 10).

Objective 8. *Prepare summary reports, including analysis of monitoring data, for the preceding year's work by March 2010 and, as appropriate, share data with Chicago Wilderness, state agencies, and landowners that highlight management impacts on populations or concerns about the absence of management (submit data and final report to the WPF according to its reporting schedule).*

Since Chicago Wilderness ended its grants program in 2009, POC is no longer required to submit an annual report to that coalition. However, this report to the WPF will be shared with the Natural Resource Management Task Force of Chicago Wilderness and with landowner partners, if so permitted by WPF. As mentioned, all 2010 monitoring data has been submitted to state and local agencies and to individual landowners for their sites.

Objective 9. *Explore with IDNR staff the possibility of exporting POC to other urban centers of Illinois.*

As reported in 2010, POC was contacted by Karen Tharp (Illinois Nature Conservancy) and Diane Tecic (Natural Heritage Regional Administrator) about the possibility of exporting the POC program to southern Illinois where there is an active Native Plant Society. Tharp had plans to utilize her Americorps volunteer to

help establish the program there in 2011, and POC recommended that Tecic join the effort. The endeavor incorporates POC as a consultant to the potential program and POC would assist with training and share its database structure. To date, POC has no word on the status of this effort.

There has been no other movement to establish POC in other parts of Illinois. An interested local leadership, such as that displayed by Karen Tharp, and an adequate level of funding is needed to initiate this expansion. With current staffing and funding levels, the present POC based in the Chicago region is performing at maximum capacity in terms of volunteer training, support, active monitoring and landowner contact.

However, within the Chicago Region itself, the program has created active spinoffs that enhance the overall value of POC and at the same time, provide focus to targeted areas having rich flora and excellent restoration potential. POC's Midewin National Tallgrass Prairie rare plant monitoring program has been in place through a Cost Share Agreement with the US Forest Service continuously since 2003. A second spinoff is the monitoring along the lakefront and rare ravine ecosystems of Lake Michigan in Lake County through several separate, but related programs. POC has monitored at the Ft. Sheridan ravines and lakefront since 2003, through a partnership with the Lake County FPD and at McCormick Ravine since 2008, and through collaboration with the Lake Forest Garden Club and the Lake Forest Open Lands Association. In 2010, POC began working at the Openlands Lakeshore Preserve in Ft. Sheridan/Highwood through a partnership between the Chicago Botanic Garden and Openlands designed to develop a comprehensive monitoring program. POC/CBG staff and volunteers monitor 10 listed and rare species, conduct vegetation transects, and map invasive species. Other specialists will study litter organisms, interpret canopy images for light availability, and conduct migrating bird surveys. Water quality and erosion studies are being conducted by other specialists. All data gathered will be integrated via GIS grid to guide management decisions and to track the progress of management efforts. Further expansion of ravine monitoring to the Waukegan Harbor Area of Concern will occur through a grant from the Great Lakes Restoration Initiative (GLRI). POC will play a small role in training volunteers to monitor listed and rare species within the area, including ravines and the lakefront. The Waukegan area is also considered a buffer to Illinois Beach State Park. A final ravine monitoring project will take place with the support of a grant from Sustain our Great Lakes (National Fish and Wildlife Federation) awarded in July of 2011 to the Alliance for the Great Lakes for a Northeast Illinois Ravine Restoration and Monitoring Program. POC will conduct monitoring for this project in additional lakeshore ravines. Yet other ravines to the south are already monitored through POC's existing program and the lakefront is monitored through the north suburbs and the Chicago lakefront. Thus, POC ravine and lakefront monitoring extends from Illinois Beach State Park to the Indiana state line.

Plants of Concern's Public Face: Communication and Outreach

Highlights of POC's communication and outreach are listed below to demonstrate the extent of the program's influence and networking, starting with an outline of the POC website. Several items are also included as attachments. POC continues to have active partnerships with the following regional groups and projects: The Habitat Project (Audubon-Chicago Region); New Invaders Watch List (Northeast Illinois Invaive Plant Partnership and the Forest Preserve District of Lake County); Chicago Wilderness Natural Resources Management Team; and the Carol Freeman Photography Endangered Species Project.

<u>Plants of Concern Website</u>

The POC web site (www.plantsofconcern.org) was created in late 2003. Since the installation of Joomla, a content management system, all POC staff members are able to manage the web site content. The intent of the web site is multi-faceted. It is a way to spread the word about rare plants and the POC program, recruit new volunteers, and provide news and monitoring resources such as downloadable forms, form submittal, and plant information to monitors.

In 2010, from January to December, the website averaged 533 visitors per month, for a total of 6398 visits, compared with 7093 visits in 2010. The highest traffic month was May, with 642 visitors. In 2011, from January to May, the website averaged 651 visitors per month, for a total of 3255 visits.

There are seven menu sections on the web site, with some including sub-sections:

- Home (home page) contains introductory paragraphs about the POC program.
- About POC
    - About Us lists background information about the program, its goals and achievements and statistics from previous years.
    - Meet the Staff lists the entire POC staff and contact information.
    - Funders provides a list of partner websites and programs that have funded POC.
- News displays newspaper articles about the program.
- Events displays postings of event announcements for workshops, plant outings and meetings.
- Forms & Protocols lets monitors download up-to-date monitoring forms, land management forms, and guidelines and instructions on GPS usage, pacing and population estimation guidelines. The Plants of Concern *Volunteer Manual* is also available for download in this section.
- Plant Resources
    - Plant Information Websites provides a list of links to other plant resources that are related to POC or to rare plant monitoring.
    - Monitored Species Bloom Times displays the bloom time range of all POC monitored species.
    - Monitored Species Photo Gallery consists of individual web pages for each plant monitored by POC as well as photos of the species by Carol Freeman and volunteers and links to various plant resources.
- My POC Account allows monitors the opportunity to view and submit their monitoring forms on-line and lets Land Managers view the monitoring and land management forms pertaining to all of the sites they manage. In 2010, 62% of forms were submitted online.

Website goals for 2011 are to create an invasive species photo gallery and establish capacity for on-line submission of Land Management Forms.

Publications

- Grau, C. Moonwort saved from moonscape and other tales of rescue." *Habitat Herald* (11:3). p. 1.
- Garness, K. M. 2010. *Cypripedium parviflorum var. parviflorum and Cypripedium parviflorum var. makasin*. Text and illustrations in catalog for *Losing Paradise*, *Endangered Plants Here and Around the World,* a botanical illustration exhibit held at Chicago Botanic Garden, January 16-April 4, 2010; at New York Botanical Garden; May 6-July 25, 2010; at National Museum of Natural History, Smithosonian Institution, August 14-December 12, 2010; at Kew Gardens, London (called *Plants in Peril*), June 25-October 16, 2011. *Plants of Concern is mentioned in the text; Garness is a long-time POC monitor who derives artistic inspiration from the species she monitors.*
- Herold, J. 2010. Midewin and its Plants of Concern Citizen Scientists. Article posted on the USFS Celebrating Wildflowers Website: www.fs.fed.us/wildflowers/ April 26.
- Hitzroth, G. 2010. Plants of Concern Saves Rare Species. *The Habitat Herald.* (11:3) p. 3.
- Hitzroth, G. 2011. Plants of Concern Monitors Hare at Work Saving Chicago's Rare Plants. *Habitat Herald.* (12:1) p. 6.
- Masi, S. and T. Skyba. 2011. Monitoring Rare Plants at Midewin National Tallgrass Prairie: 2001-2009. Focus on the 2010 Monitoring Season. Final report to U.S. Forest Service. January.
- Masi, S. and G. Hitzroth. 2010. Plants of Concern. Mobilizing Citizen Scientists. Interim report to the Illinois Wildlife Preservation Fund, IDNR, July.
- Masi, S. and G. Hitzroth. 2011. Poster at Wild Things.

- Masi, S. 2010. Plants of Concern volunteers geared up to monitor a delicate spring species – Slender Sandwort. *Tallgrass Telegraph*. Summer.
- Skyba, T. 2010. Fun with Plants of Concern; Monitoring False Mallow. *Prairie Telegraph*. September-October: p9.
- Skyba, T. 2010. Plants of Concern 2010 Season Wrap Up. *Prairie Telegraph*. November-December: P5.
- Skyba, T. 2010. Spread the Sedge: *Carex crawei* in Drummond Prairie. *Prairie Telegraph*. July-August: p4.
- Skyba, T. 2011. Plants of Concern: Long-term Monitoring of Rare Plant Species at Midewin National Tallgrass Prairie. Poster presentation at Wild Things Conference on March 5.

Other publications in 2010 and 2011 included email newsletters from POC to volunteers and announcements of training workshops in stewardship newsletters including *The Habitat Herald*, *Gatherings Online* (VSN), *McHenry County Volunteer Newsletter*, and *Grounds Cover* (CBG).

Presentations, Posters, and Events involving Plants of Concern

- Hitzroth, G. and S. Masi. 2011. Plants of Concern: Citizen Science and Stewardship Making a Difference in the Chicago Region's Rare Plant Communities. Poster at Wild Things, a Chicago Wilderness Conference for People and Nature, University of Illinois at Chicago, March 5.
- Masi, S. 2010. Citizen Scientists Monitor Endangered Species in Chicago Wilderness. Presentation at USEPA BeWise 2010 Conference. U.S. Federal Building, Chicago, March 12.
- Masi, S. 2010-2011. Led several rare plant forays with teams of volunteers in monitoring searches over larger areas, at Florsheim Nature Preserve, Braidwood Dunes (in cooperation with Will County FPD), Waterfall Glen (in cooperation with DuPage County FPD) and Illinois Beach State Park (in cooperation with IDNR staff). POC volunteers were notified of these events at workshops, on the website, and by email.
- Masi, S. 2011. Citizen Scientists Make a Difference for Endangered Species. 2001-2010. Presentation at World Environment Day, Chicago Botanic Garden, June 4.
- Masi, S., coordinator. 2011. Whether and how to include endangered and threatened species in restoration seed mixes or other types of distribution. Current policies, practices, knowledge and guidelines. Panel discussion at Wild Things, a Chicago Wilderness Conference for People and Nature, University of Illinois at Chicago, March 5.
- Masi, S. and G. Hitzroth. 2011. Plants of Concern: 10 Years of Citizen-based Rare Plant Monitoring. Presentation at Wild Things, a Chicago Wilderness Conference for People and Nature. University of Illinois at Chicago, March 5.
- Masi, S. and G. Hitzroth and T. Skyba. 2011. Plants of Concern: Volunteers Monitor Rare Plants in a Standardized Regional Program. Presentation of potential research opportunities to Northwestern University Graduate Students, Chicago Botanic Garden. November 19.
- Skyba, T. and S. Masi. 2011. Plants of Concern. Long-term Monitoring of Rare Plant Species at Midewin National Tallgrass Prairie. Poster at Wild Things, a Chicago Wilderness Conference for People and Nature. University of Illinois at Chicago, March 5.

Community Service – POC Related

- Masi, S. 2010. Member of the coordinating committee and on a panel of monitoring resource persons at the In-Depth Workshop for Experienced Stewards and Monitors sponsored by The Habitat Project, Audubon-Chicago Region. Danada Forest Preserve, Wheaton, February 7.
- Masi, S. 2010 &2011. Board Member, Illinois Endangered Species Protection Board.
- Masi, S. 2010 & 2011. Plant Endangered Species Technical Advisory Committee Member.
- Masi, S. 2010. Annual Stewardship meeting, The Nature Conservancy Volunteer Stewardship Network. Danada Forest Preserve, Wheaton, September 29.
- Masi, S. and B. Schillo. 2011. Co-chairs of the Plant Section on the Chicago Wilderness Species of Greatest Conservation Need Task Force.

Grants: Current and Pending

- 2010 and 2011: POC received a Cost-Share Agreement of $17,500 from the US Forest Service for its monitoring work at Midewin National Tallgrass Prairie.
- 2009-11: POC received an Illinois Wildlife Preservation Fund Grant of $14,000 for each fiscal year.
- 2011-2012: POC was notified of the Illinois Wildlife Preservation Fund Grant of $14,000 for the fiscal year 2011-2012.
- 2010-2011: POC received a two-year award from the Donnelley Foundation at $35,000 per year.
- 2010-2011; POC received annual awards from the Nature Conservancy's Volunteer Stewardship Network ($455)
- Sustain our Great Lakes (National Fish and Wildlife Foundation): POC expects to receive $10,000 of a $150,000 grant for the Northeast Illinois Ravine Restoration and Monitoring Program project awarded to the Alliance for the Great Lakes.
- Earthwatch Institute: POC is awaiting notification on this pending grant.
- U.S. Forest Service: POC is awaiting notification on a pending Cost-Share Agreement for work at Midewin National Tallgrass Prairie.

CONCLUSION AND FUTURE DIRECTIONS

As the previous discussions in this report demonstrate, Plants of Concern remains strong and continues to grow as an essential source of data on rare plants. The data serves land managers and engages trained volunteers as they make a meaningful contribution to the regional understanding of rare plants and their status, threats that impact them and management activities that sustain them. The work initiated in Indiana and Wisconsin to export the program to the Chicago Wilderness regions of those states has borne fruit. In Illinois, programs at Midewin, Openlands Lakeshore Preserve, Waukegan Harbor Area of Concern and the recently announced Northeast Illinois Ravine Restoration and Monitoring Program project attest to POC's influence and effectiveness. POC is also able to provide updated and valuable data to the Endangered Species Protection Board.

The listings under Objective 9 above demonstrate other examples of POC contributions and recognition on both a regional and national scale. As citizen science becomes more prominent on the national level, POC is recognized as a successful and established monitoring program. At present, the POC data reservoir is very large, housing ten years of monitoring data. These data can be mined for far more analysis than POC staff can undertake with current available resources. The exploration of the data has great potential to benefit land managers as they make decisions to protect and manage rare plant populations as a parallel effort to managing communities. POC will continue to be a resource for researchers to further tap into the data and is already working with individuals from several institutions, as described in this report. These research opportunities, which maximize the benefits of POC, are only possible with the assurance of a stable long-term monitoring program.

Overall, one of the chief benefits of POC is the collaboration among the many partner agencies and their volunteers in monitoring rare species. In Illinois, in addition to seven forest preserve districts, U.S. Forest Service and IDNR, 92 other landowners have been involved in the program. Many of these would not otherwise have the resources to engage in a rare plant monitoring program. Most of these partners are also members of the Chicago Wilderness alliance. POC, as a priority project of the CW Resource Management Team, has played a key role in helping to implement the Chicago Wilderness Biodiversity Recovery Plan.

The future and scope of Plants of Concern are closely linked to funding. It is critical that this long term monitoring program continue to provide its demonstrated regional benefits. In the current economic climate, funding has become increasingly uncertain. POC's core program is assured through 2011 through support from the Donnelley Foundation, a Cost Share Agreement with the US Forest Service at Midewin National

Tallgrass Prairie, and the Wildlife Preservation Fund (through June 2011). A new grant from the National Fish and Wildlife Foundation (referenced above) extends funding into 2012, and three pending grants, including the Illinois Wildlife Preservation Fund grant, are expected to enhance that support. In addition, the Chicago Botanic Garden continues to seek federal and local funding to support a comprehensive analysis of Plants of Concern data.

ATTACHMENTS

1. GIS Map of POC Monitored Populations
2. Level 1 Monitoring Form
3. Level 1 Land Management Form Part 1
4. Level 1 Land Management Form Part 2
5. Advisory Group Member Listing, 2010
6. Plants of Concern Species List
7. Plants of Concern 2001-2010. Counties, Sites, Landowners & Element Occurrences
8. Plants of Concern 2001-2010. Species EO Frequency by County, a Regional View
9. Example of a POC Training Workshop Agenda
10. Advisory Group Minutes, December, 2010.
11. Illinois Department of Natural Resources-owned and Nature Preserve Sites Monitored by Plants of Concern.
12. Chicago Botanic Garden's Plants of Concern Program Receives Illinois Wildlife Preservation Fund Grant. Press Release issued by the Chicago Botanic Garden, Sept. 25, 2009.

Plants of Concern: Standardized Rare Plant Monitoring Using Trained Volunteers

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Interim Report to

Illinois Department of Natural Resources, Illinois Wildlife Preservation Fund

Grant #RC10L01W

Chicago Botanic Garden

July, 2010

Covering the period from January 1, 2009 to June 30, 2010

with comparative discussion from 2001

Submitted by:

Susanne Masi, Manager of Regional Floristics
Principal Investigator

Co-authored by:

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With contributions from:

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TABLE OF CONTENTS

Concepts and Objectives ____ 1
Summary: Monitoring Results 2001-2009 ____ 2
The Volunteer Component ____ 4
Level 1 Monitoring Data Analysis ____ 5
Level 2 Demographic Monitoring Update ____ 11
Program Evaluation ____ 12
Conclusion and Future Directions ____ 18
Attachments ____ 19

PLANTS OF CONCERN: CONCEPT AND OBJECTIVES

This document is an interim report, after one year of the contract period which covers from July 1, 2009 to June 30, 2011. Although this interim period officially runs from July 1, 2009 to June 30, 2010, the preparations for the 2009 season of this ongoing long-term Plants of Concern monitoring project were made from January 1, 2009. The period covered in this report is therefore January 1, 2009 to June 30, 2010. It includes an analysis of the 2009 season in relation to previous seasons, as well as an account of the initial stages of the 2010 season.

Plants of Concern (POC) was launched in 2001. This long-term rare plant monitoring initiative is unique to the region in its use of standardized monitoring protocols used by trained citizen scientists. The program has now completed nine years of monitoring and has accumulated a substantial base for analyzing long-term data on a significant number of species and Element Occurrences.

POC was initiated as a program for Chicago Wilderness and its core geographic base has been northeast Illinois. It addresses the needs articulated in the Chicago Wilderness (CW) Biodiversity Recovery Plan: to document the locations of rare species, to provide long-term monitoring of the status of rare species populations, and to track their response to management. These data are reported to the Illinois Natural Heritage Database and significantly augment state records on endangered and threatened species for the northeast part of the state. POC research provides managers with the scientifically acquired data needed to address management issues on their sites and can be used to understand the status of individual Element Occurrences (EOs) as well as multiple populations of a species across the region. On a regional scale, it builds the basis for collaboration in adapting, developing, and implementing management strategies to ensure the presence of these species on a sustainable basis. This long-term monitoring allows the program to determine at regular intervals the status of rare plant populations in relation to a monitoring baseline and management practices.

Species monitored by POC have been selected largely from the 1999 *Chicago Wilderness Biodiversity Recovery Plan's* species priority list because they are state endangered or threatened and are considered by regional land managers and ecologists to be rare and significant within the CW region. The non-listed species monitored by POC are "species of concern" that represent individual landowner's choices of rare species that they wish to track at the county level. Landowners are encouraged to create new monitoring assignments to track these rare species in their areas.

The geographic area covered by POC from 2001-2006 was primarily the six counties of NE Illinois, with one site in Kankakee County. Three sites in NW Indiana were added in 2006 and 2007, and four sites were added in SE Wisconsin in 2007. In 2009, four sites from Kendall County, IL were added. (See Map, Attachment 1.)

POC incorporates the following interrelated elements, all equally important to its success. Through them, POC has become recognized as a unique and valuable long-term monitoring program:

- Monitoring rare plants, particularly state-listed species, over time using a standardized census protocol to gain uniform data on populations on a regional basis. (Level 1 Monitoring Form, Attachment 2). Selected species have been targeted for more intensive demographic monitoring (Level 2). Since 2005, a modified Level 2 program has continued, much of it through research projects coordinated by CBG researchers assisted by volunteers.
- Monitoring rare species in relation to management activities as reported by both monitors and land managers to form a feedback loop for short- and long-term adaptive management responses (Attachment 3).
- Training volunteers as citizen scientists to leverage agency resources for monitoring rare species and to create an informed conservation constituency.

- Working in collaboration with public and private landowners, land managers, and agencies, through an Advisory Group (Attachment 4), to generate a shared approach to regional monitoring.

Two staff (Coordinator and Research Assistant) manage the program. A second nine-month Research Assistant worked exclusively in 2009 and 2010 at Midewin National Tallgrass Prairie on a POC-based monitoring program.

SUMMARY: CUMULATIVE MONITORING RESULTS 2001 – 2009

In 2009, the project's ninth year, POC saw increases in the numbers of species, Element Occurrences (Eos) and volunteer involvement. Retention of Element Occurrences was high, with 55.3% of EOs (listed and non-listed) monitored in previous years also monitored in 2009. In 2009, 80 new EOs were monitored. Element occurrences of the 115 listed species monitored by POC in seven NE Illinois counties represent approximately 57.5% of the listed EOs in the region, as recorded by the Natural Heritage Database as of 2009. The following graph and table are detailed in the remainder of the report and in Attachments 6-7. *(Note: The statistics in the following figures, tables and attachments were derived from the POC database for analysis on several different dates starting 1/12/2010 and may reflect minor discrepancies in numbers. Graphs from previous years may not correspond precisely due to additional report submissions, merging of subpopulations and other factors)*

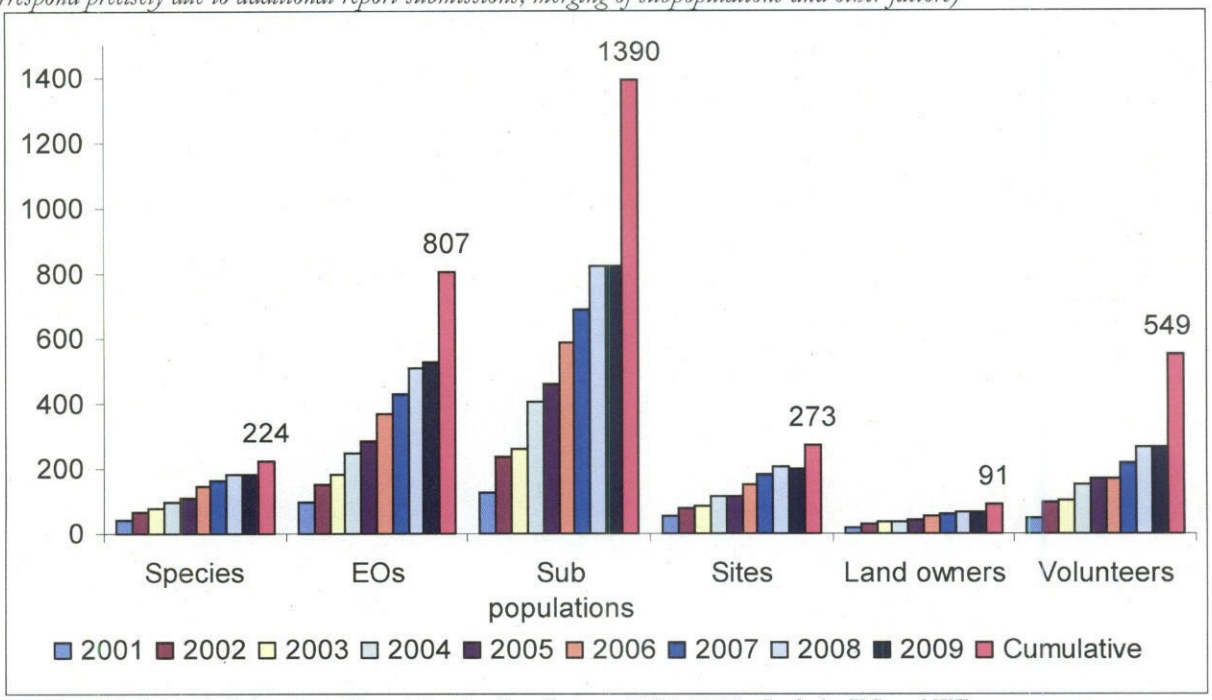


Figure 1. POC accomplishments and participation for all years, 2001-2009. Includes IN and WI.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	Cumulative
Species	44	66	78	96	109	144	162	180	184	224
EOR	96	154	180	247	283	367	431	508	526	807
Subpopulations	128	238	260	406	458	588	692	824	823	1390
Sites	57	76	84	117	116	149	181	206	200	273
Landowners	20	29	34	38	44	53	61	67	66	91
Volunteers	49	95	102	151	169	167	220	268	269	549

Table 1. POC accomplishments and participation for all years, 2001-2009, including IN and WI.

* Includes 115 listed and 109 rare, non-listed species (Attachment 5).

**A subpopulation is defined as a grouping of a species within the same EO that is tracked separately because it is located more than 50 meters from another grouping, or because the grouping is within a different management unit or habitat.

In each annual report, numbers reported in previous reports may shift slightly because of late submission and data entry. These are included in subsequent reports. In addition, some subpopulations from earlier years have been merged with others, also causing shifts in earlier report numbers

Species monitored in multiple counties (see Attachment 7 for a breakdown of listed and non-listed species and the number of EOs monitored for each).

Species (listed and nonlisted) monitored across multiple counties are the basis for a regional assessment of species status.

Illinois	Wisconsin	Indiana
1 species in 6 counties		
3 species in 5 counties		
14 species in 4 counties		
25 species in 3 counties		
51 species in 2 counties	5 species in 2 counties	1 species in 2 counties
116 species in 1 county	21 species in 1 county	4 species in 1 county

*Five species are only monitored outside of Illinois, two in Wisconsin and three in Indiana. The other species in Illinois and Wisconsin represent an expanded monitoring range for Illinois-monitored species.

2001-2009 cumulative EOs monitored (listed and non-listed), by IL county:

Cook County:	198
DuPage County:	150
Kane County:	57
Kendall	10
Kankakee	1
Lake County:	216
McHenry County:	79
Will County:	51

Volunteer statistics

Number of cumulative volunteers by county: 2001-2009 (some monitors have assignments in more than one county).

Ilinois				Wisconsin		Indiana	
Cook	212	Kendall	1	Kenosha	16	Porter	5
DuPage	50	Lake	165	Waukesha	3		
Kane	60	Will	73	Walworth	10		
Kankakee	2	McHenry	93				

New volunteers in 2009 (total: 81; 7 monitored in two or more counties)
Cook: 34; DuPage: 2; Kane: 3; Kendall: 0; Lake: 19; McHenry: 7; Will: 11. (IN: 0; WI: 10)
Average: 10.9 new volunteers per IL county.

Volunteer retention
Retention from 2008 to 2009: 66.5% (184 of 267) of those that monitored in 2008 were retained in 2009
Retention from 2001 to 2009: 44.9% (22 of 49) of volunteers that monitored in 2001 monitored in 2009

Retention from 2001 to 2009: 74.7% (201 of 269) volunteers who monitored in 2009 also monitored previously

Of interest is that 147 of the 269 volunteers (54.7%) who monitored in 2009 had monitored in three or more preceding years, and 206 of 549 volunteers (37.5%) who monitored at any time in the program did so for three or more years.

Volunteers monitoring for 9 years: 15
Volunteers monitoring for 8 years: 18
Volunteers monitoring for 7 years: 13
Volunteers monitoring for 6 years: 27
Volunteers monitoring for 5 years: 35
Volunteers monitoring for 4 years: 39
Volunteers monitoring for 3 years: 59
Volunteers monitoring for 2 years: 107
Volunteers monitoring for 1 year: 235 (includes 81 new volunteers in 2009)

	2009	**2008** (for comparison)
Volunteer hours in the field in 2009	2455	2179.2
Volunteer hours in workshop training in 2009	420	501.5
Volunteer hours in office support in 2009	436.5	248.5
Total	3209.5	2929.2

Stewards as monitors
In 2009, 22.3%, or 60 of 269 volunteer monitors, were also volunteer stewards. Overall, 16.8%, or 92 of 549 of our volunteers, are also stewards. The percentage of stewards monitoring is slightly decreasing which may suggest fewer new stewards but more new volunteers.

THE VOLUNTEER COMPONENT OF POC

Volunteers are the backbone of the program and POC could not function without them. Both public conservation agencies and private groups recognize the importance of volunteers in greatly leveraging their resources for monitoring and management work. Each major agency has one or two staff, usually a volunteer coordinator and/or ecologist, assigned to work with POC in recruitment, training, and field assistance.

Recruitment
Volunteers were recruited through word of mouth (agency volunteer coordinators and current POC monitors), articles and announcements in stewardship newsletters, such as *The Habitat Herald*, Midewin's *Tallgrass Telegraph*, and staff presentations at stewardship meetings such as Wild Things in February, 2009. The training workshops were listed on the POC website and promoted through newsletters and an email newsletter to previous, current and prospective POC volunteers. Similar activities took place in early 2010 (see Attachment 10, *Habitat Herold* article, January, 2010).

Training
Volunteer training occurred in two different formats: in 2009, through five-and-a-half-hour workshops and in-field training. Four workshops were offered, one each in Cook and Will Counties, two in Lake County, and one in Kenosha County, Wisconsin. Seventy-six (76) prospective and some returning volunteers were introduced to POC program objectives and trained in monitoring techniques for Level 1 protocols. Representatives from county agencies presented information about rare plants monitored in their counties, guided volunteer assignments, and discussed the relationships between monitoring and management and the benefits of POC to their work. The sensitivity and confidentiality of rare plant locations was stressed in training sessions, and new volunteers were required to sign a Confidentiality Form. In the field, POC

program staff, interns, agency ecologists, site stewards, or experienced volunteer monitors provided new monitors with additional field assistance with protocols and orientation to sites and populations.

Four workshops were held in 2010, in Cook, McHenry and Will Counties, IL, and in Kenosha County, WI. 67 volunteers attended. Although workshop attendance numbers were down in 2010, quite a few new volunteers have joined the program at special forays and staff-led monitoring events. POC staff and three volunteer assistants have since helped with additional mentoring in the field from April through June.

Volunteer retention is important to ensure continuity of monitoring and consistent application of protocols. Retention rates from year to year have held fairly high, as reported above. Monitors who are stewards represent 22.4% of all volunteer monitors and add significantly to continuity of data and familiarity with site management reports. Agency staff members also contribute to program continuity and consistency. Since 2001, POC has worked with many of the same staff from the major agencies. Where there has been turnover, a new staff member has been assigned to take on POC responsibilities. It is clear there will continue to be a high level of staff involvement working with the volunteers, as each year new volunteers need support in the field. However, as volunteers are trained, they become more self-sufficient and can mentor recruits, and they have done so successfully.

LEVEL 1 MONITORING DATA

Database, Data Submission, Data Review and Confidentiality

All Level 1 monitoring data are entered into the CBG-housed Access database developed and managed by Conservation Information Manager Bianca Rosendorn. Because of the sensitive nature of the data on listed species, the Access database is restricted to CBG personnel and volunteers working with the program. Volunteers must submit field/paper copies of their monitoring forms, but also have the option of submitting reports online on a secure POC website. Individual monitors can access only their assigned monitoring reports online and only by means of a password. In 2009, 59% (485 of 824) of forms, up 9% from 2008, were submitted online, saving hours of manual data entry by program staff. Monitoring reports are reviewed for accuracy and completeness both by landowners, who have access to their own site reports, and POC staff. After data entry and review are completed, typically in March, Access-based reports are submitted to the Illinois Natural Heritage Database, to landowners for their sites, and to the Nature Preserves Commission for nature preserves and land and water reserves.

Level l protocols were essentially finalized by 2002, having been evaluated by the Advisory Group after the first year of monitoring. In subsequent years, only minor modifications were made. This standardization of protocols is important for data consistency across years and counties.

Through Level 1 work, POC is gathering census data about the status of individual populations, such as the number of individual plants and the area covered by each population, as well as a record of the threats and invasive plants impacting populations. Monitors record observable management activities that have occurred within the previous year; additionally, monitors who are also volunteer stewards or land managers provide management information from their own records via a Land Management form.

Results and Discussion

The Level 1 analyses below reflect information based on subpopulation reports entered in the database through April, 2010. Many EOs have multiple subpopulations, defined as separate groupings of plants spaced at least 50m apart, or distinguished from each other by habitat, management applications, or other factors. For each category of analysis, only reports with data in that category were included in the percentages given. Forms with no data (NA or blank) for a particular field were excluded from the percentages given in the analysis, but, where possible, the percentages of the total forms that were excluded due to a NA answer are shown in order to provide a perspective on sample size.

It is important to note that in the analyses presented, data for each year are not based on an equivalent set of populations monitored. Each year, new populations/subpopulations are added to the program, and previously monitored populations/subpopulations may not be monitored in that year. Therefore, yearly increases or decreases in values do not reflect a cumulative change for the same group of populations. In addition, as populations move and grow, it sometimes becomes necessary to merge formerly separate subpopulations, which has reduced the total number of separate subpopulations reported over the years.

The overall value of these data is to reveal general levels of threats, management activity, and plant recruitment throughout POC populations. More direct assessment of change or trends is possible when the analysis is applied to the same group of populations over time; with up to ten years of data on many populations, this analysis can yield high quality data. As future resources and funding allow, POC will be able to undertake this more detailed analysis.

Ecological Threats (numbers from 3-16-2010)

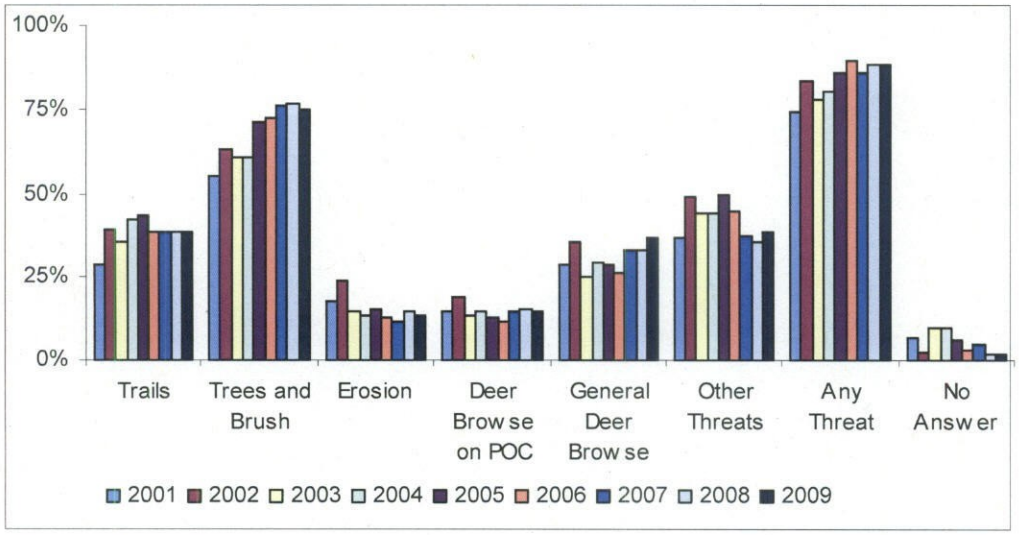


Figure 2. The percent of subpopulations in each year with a given threat present. The analysis of threats presented here does not reflect the percent impact or magnitude of each threat recorded by monitors, only the presence of the threat.

Only unauthorized trails were reported in 2001, so there is no value for authorized trails in 2001. Authorized and unauthorized trails were lumped into 'total trails' for this analysis. In 2001 and 2002, no distinction was made between brush encroachment of less than or greater than 1 meter in height, so those two categories are combined here as well. Separated data is available for these lumped values, for most years, upon request. The 'Not answered' columns indicate the low percent of reports for which no answer was given for this section.

As shown in the above graph, the percent of subpopulations that were impacted by at least one ecological threat (invasive brush and trees, deer browse, erosion and trails) was between 76 and 88% from 2001-2009. These numbers are fairly consistent from year to year, with a slow increase over time, as the importance of recording threats to populations has been increasingly stressed in POC training. Over all sites, for all years, 91% of subpopulations have had at least one threat reported. This is likely higher than yearly values because it represents all years and all subpopulations, not a subset of subpopulations for a single year.

The monitoring form includes a prompt to record additional threats. The most common threats added to the list in descending order of prevalence are: trampling (by humans, deer, dogs, etc.), trash and pollution, mowing, and browse (such as by insects or small mammals).

Brush and tree encroachment, which can include native species such as *Cornus racemosa*, as well as invasive species, continues to be the most widespread threat to monitored populations, followed by trails and deer browse on all species within the population area. Overall, considering that the set of monitored occurrences is not the same from year to year, the relative percent of subpopulations impacted by each of the recorded threats appears relatively consistent from year to year.

Invasive species

Because of the large threat they pose to Plants of Concern, we closely examined the effect of invasive species. The invasive analysis presented in Figure 3 is based on data indicating the presence of the top 10 most reported species each year, rather than on the percent of subpopulations affected.

Invasive species updated (03/22/2010)

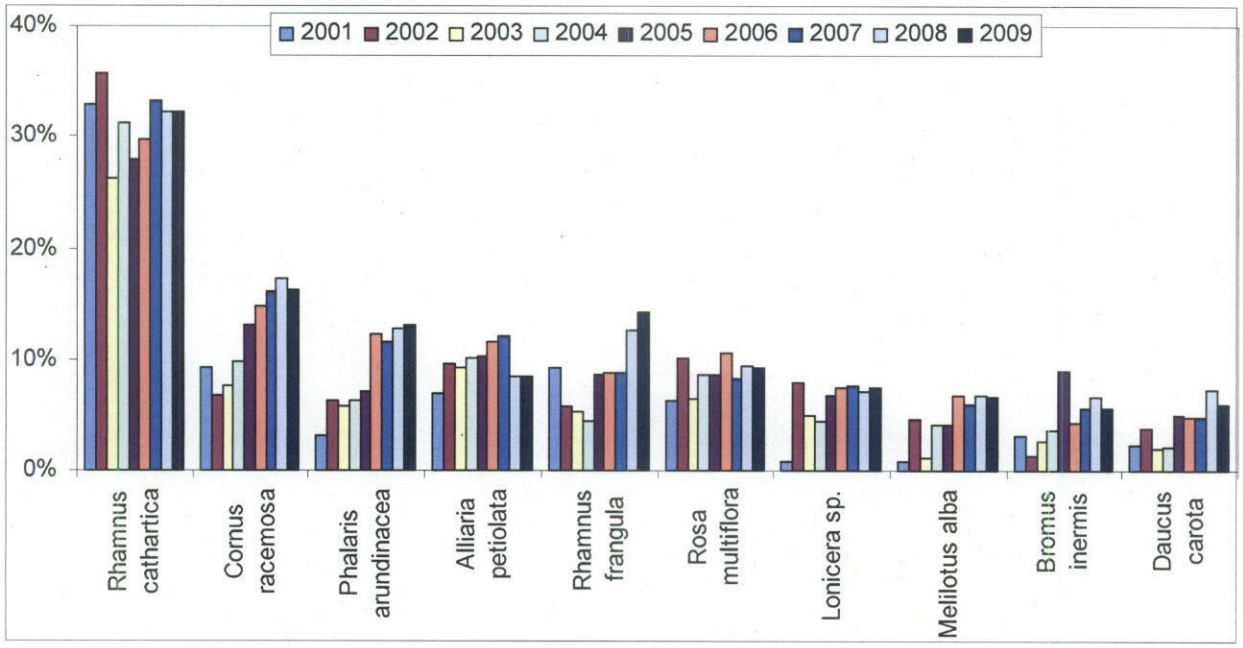


Figure 3. Top 10 most reported invasive plant species documented by POC monitors from all years. Percentages are based on the ratio of reports indicating presence of an invasive species to the total number of subpopulations with reports submitted that year.

Monitors have identified 312 distinct species as invasive plants over nine years, some of them native species and many of them having a minor or contextual presence. 203 invasives were recorded in 2009. Of all monitored subpopulations, 90% had at least one invasive species present in 2009. As with threats (Figure 2), this analysis does not look at the magnitude of impact on the individual subpopulations, but it focuses on the percent of subpopulations impacted to any degree.

Monitors occasionally record plants by genus if they are unsure of the species (e.g., *Rhamnus* sp.). In order to incorporate these unidentified species with their identified conspecifics, the invasive list was collapsed for analysis to a generic list by combining the individual species of each genus (e.g., *Rhamnus cathartica, Rhamnus frangula*, and *Rhamnus* sp. were combined into *Rhamnus*).

Acer (6*)	Elymus (2)	Rhamnus (2)
Alliaria	Fraxinus (5*)	Rhus (6*)
Berberis (2)	Lonicera (7*)	Rosa (2*)
Bromus (3)	Lythrum	Rubus (4*)
Celastrus	Melilotus (2)	Rumex
Cirsium (4*)	Pastinaca	Salix (8*)
Cornus (3)	Phalaris	Solidago (9*)
Daucus	Phragmites	Trifolium (4*)
Dipsacus (3*)	Poa (3*)	Typha (4*)
Elaeagnus (2)	Populus (3*)	Ulmus (3*)

Table 2. 30 of the most frequently reported Invasive genera recorded by POC since 2001. Genera are assumed to include one taxon unless parenthetically noted otherwise. A star (*) indicates that a general 'sp.' designation is included as one of the taxa included for that genus (i.e. the (2) for* Salix *means that it includes* Salix sp. *and* S. interior*). This chart does not reflect the level of impact of each genus, which is also reported by monitors.*

Reproductive rates

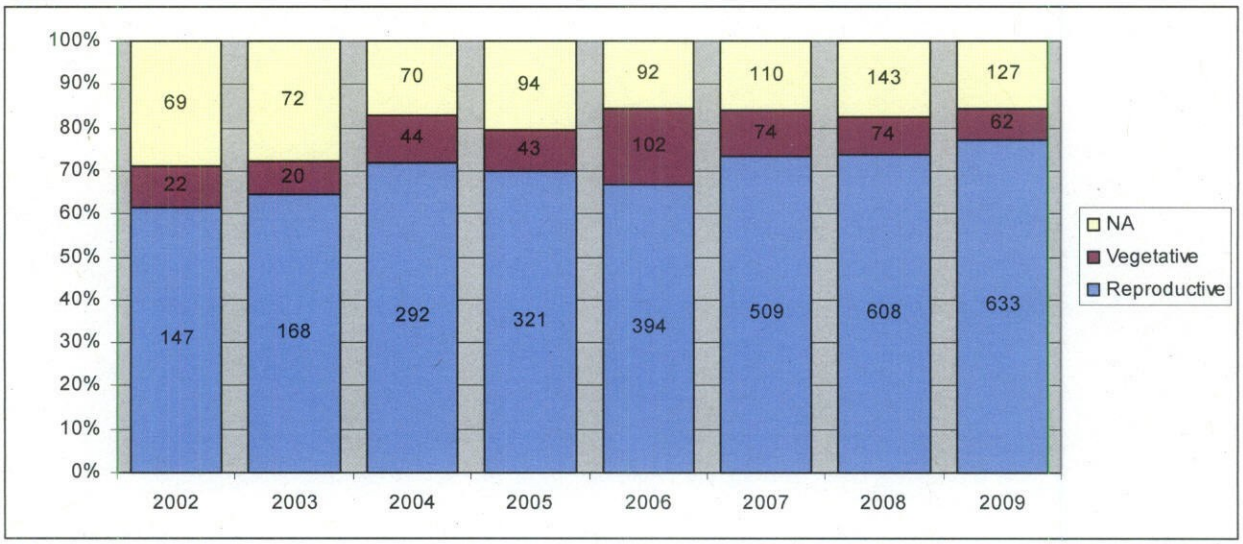


Figure 4. The percent of subpopulations reported as reproductive (i.e. flowering and/or fruiting), vegetative, or for which no reproductive data was available for all years. Total number of reports per category and year is shown in each bar. The total number of reports varies each year (see Table 1). In 2001 forms did not include a field for flowering and fruiting and could not be analyzed in a similar way.

POC data indicate that a large percentage of monitored subpopulations are reproducing (Fig.4). This becomes clearer when forms missing reproductive data are excluded; in such an analysis, we see that over all years, an average of 87% of subpopulations are reported as reproductive (range: 79-91%). Monitors ideally make their observations during flowering time, but in some instances this is not feasible and fruit presence is recorded. With annual species it is not unusual to find plants in both flower and fruit at the time of monitoring. Level 1 numbers do not reflect full reproductive status of populations, i.e., whether fruits are produced (for most reports), whether seed is viable, and whether juvenile recruitment is taking place. Annuals, which are reproductive every year, are included in the percentages above. About 15% of all subpopulations are designated as annuals each year. The average percent of non-annual reproductive subpopulations over 9 years is 85% (range: 75-90%).

Management within subpopulations (04/23/2010)

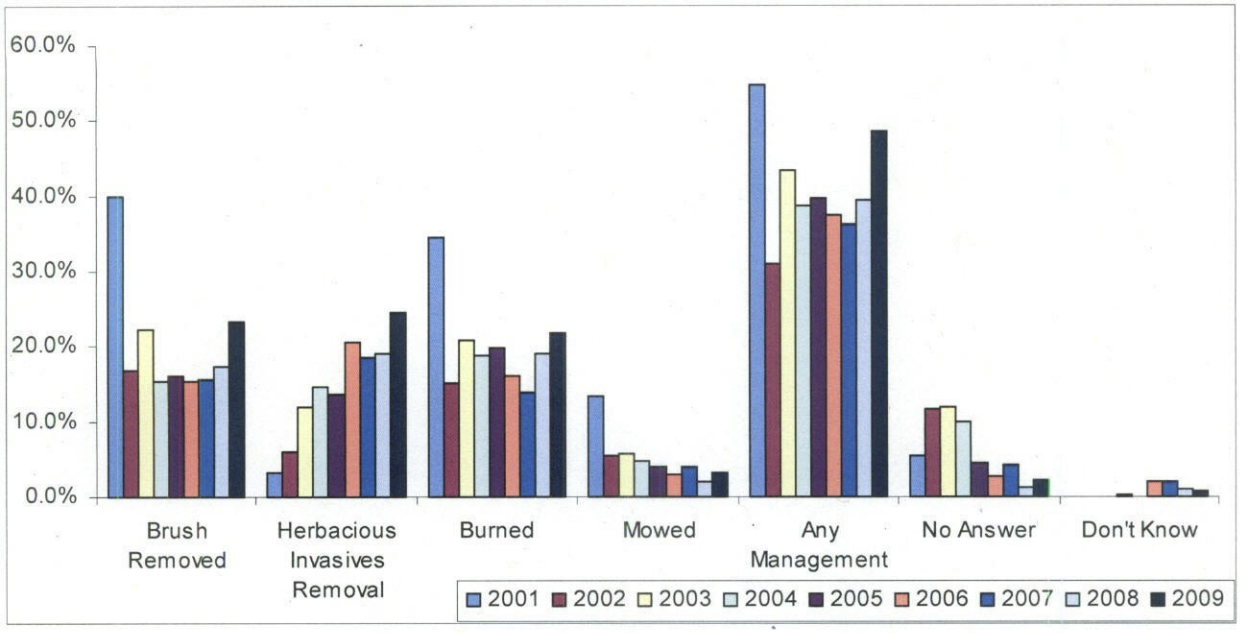
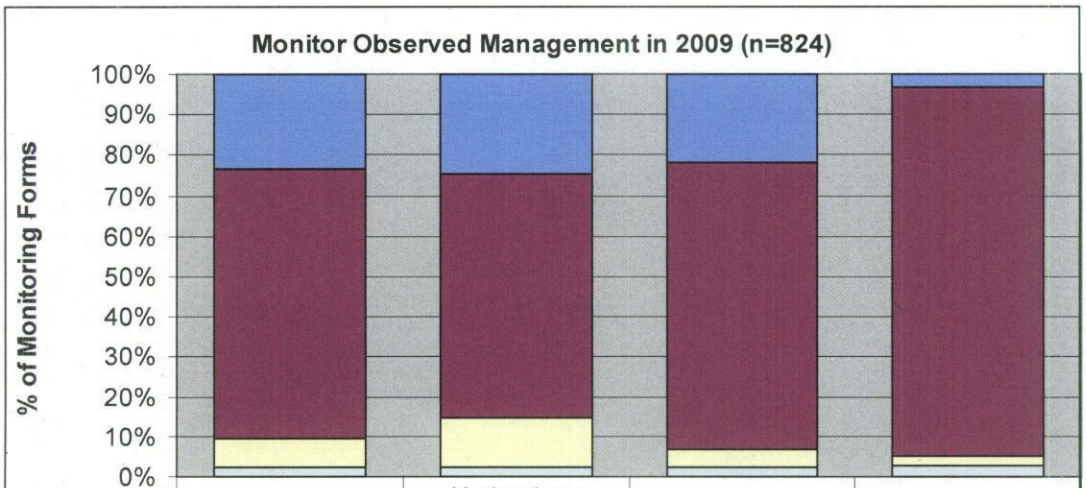


Figure 5. Management observed by monitors for all years. Percentages for individual management techniques are based on only those reports for which a "yes" or "no" answer was given for each management activity (as observed or known by the monitor). The percent of reports with blanks or a "don't know" response are shown separately. Herbaceous invasive removal was not recorded in a field in 2001.



	Brush Removal	Herbacious Removal	Burning	Mowing
Yes	23.42%	24.51%	21.72%	3.28%
No	67.11%	60.92%	71.60%	91.38%
Don't Know	6.92%	12.01%	4.49%	2.55%
No Answer	2.55%	2.55%	2.18%	2.79%

Figure 6. Monitor-observed management for 2009 (04/23/2010)

Evidence of Management
Based on monitors' observations, 48.5% of POC populations showed evidence of some type of management activity in 2009 (of 823 total reports). Only a small percentage of the monitoring forms submitted were left completely blank in the Land Management section. It is worth noting that a significant number of monitors are also staff, stewards or restoration volunteers at the sites they monitor, and as a result, these individuals are knowledgeable about the management activities on-site, often through direct participation.

Overall, after a notable decrease in percentages from 2001 to 2002 (Fig. 5), levels of management for all activities appear relatively stable, despite the changing set of subpopulations monitored each year. With further investigation we may find that, in 2001, volunteers were largely assigned to known species locations at sites that were under an active management schedule.

Burning, herbaceous invasive removal and brush removal are almost evenly reported. It should be noted that brush removal or burning within the same population is seldom done annually, so these percentages may seem low due to a multi-year cycle for these activities. Mowing was high in 2001 possibly because monitors considered mowing for trail or roadside maintenance to be a management strategy. This type of mowing, however, usually poses a threat to the population. We have since stressed in training a difference between mowing as a management strategy (i.e. to control invasives or brush, or as a substitute for burning), and unintentional mowing of the population, which may pose a threat. Other management activities recorded in an open-ended question without quantification, include deer culling, fencing/deer exclosures, and hydrological modifications.

Land Management Reports from Managers

In conjunction with the Level 1 monitoring forms, since 2002, POC has asked land managers to complete Land Management (LM) forms detailing the types of management that take place both within the populations and on the site, as well as land use history. This form provides more detailed management information. While managers report about activities in the area or management unit where the populations occur, they may or may not know precisely how management affects specific population areas as well as monitors do. Therefore, the two reports serve to complement each other.

Overall, POC is building up a valuable management record. On Part 2 of the LM form, we ask for land use history, general management history prior to monitoring, information about adjacent land use, and whether a population has been introduced. These historical aspects do not change year to year, and managers only need complete this section once. In Part 1, we ask annual questions about the precipitation regime (e.g. flooding or drought) and both population and site management during the past year, including burning, mowing, invasive species management, and deer removal. We believe that as data accumulates we will be able to construct a picture of the cycles of land management to compare with the population cycles in order to uncover the influence of management on the plants of concern.

All submitted LM reports through 2009 have been entered into the database. POC staff has undertaken a concerted effort to gather LM reports from managers and offered them alternate methods of completing the information on the form, including an Excel spreadsheet, an Access database format, or using a single form for multiple species within an area. By summer 2011 on-line submission will be another option. This effort is being met with cooperation on the part of managers, who are eager to see the impacts of management on their rare plant populations. Cumulatively, POC has received at least one report for 759 subpopulations or 54.6 % of the total subpopulations monitored; this number is up 20% from the 2008 percentage. Managers comment that completing additional forms is challenging in light of their other responsibilities. We have begun discussing with some managers the possibility of having monitors who are also stewards complete the LM form, which would then be reviewed by the manager.

POC has not conducted a comprehensive analysis of these management data, mainly due to time constraints and the emphasis given to analysis of monitoring reports and program development. Given the growth of the program, and decreased funding for staff, it appears that we will only be able to undertake limited analysis in the foreseeable future. It is our hope to attract other researchers or graduate students to look closely at the patterns being reported about management within populations. Meanwhile, continued collection of management data is imperative, and managers are encouraged to review these data for their own sites – POC can share tailored queries from the database for individual sites to show multiple years of population counts and changes in threats and invasive species in conjunction with management activities undertaken.

Despite these challenges, specific management responses to POC monitoring are being reported by managers and volunteers. Some examples are presented:

At Gensburg-Markham prairie, a manager moved a fire break 20 meters to allow fire to reach the complete area of a listed species population. The season following the fire showed an increase of 12% of the species being monitored in that area.

In Dupage County, a tree had fallen on only one of four clumps of *Carex bromoides*. After this was reported by the POC monitor, the FPD of DuPage County removed the tree.

Also in DuPage County, at one site more than 90% of invasive brush was removed in a 12 m circumference around a rare fern after being reported by a monitor.

At Lake County and Cook County sites, deer cages were placed by stewards, with land manager permission, around plants to protect several endangered species.

Scott Meister, Natural Resource Management Coordinator, FPD of DuPage County, provided this statement: *"Based on an aerial count from last winter, data that we collected this year, and the data that you [POC monitor] collected indicating browse on the lady's slippers, we will again be proposing [to IDNR] to lethally remove a handful of deer from West Chicago Prairie during the upcoming winter....I really wanted to let you know how grateful I am that you are monitoring the populations, but of equal importance, submitting your data in timely fashion."* IDNR and the McHenry County Conservation district also use POC data to plan deer removal activities.

Related Research/Level 1

With a growing Level 1 data set and the involvement of the Chicago Botanic Garden in graduate programs at Northwestern University, the University of Illinois at Chicago, and Loyola University, the potential is growing for attracting graduate students and other researchers to assist with data analysis. This important step would allow us to gain more information from the data than POC staff members have the resources to undertake.

For example, a proposal by researchers at the Chicago Botanic Garden and the University of Illinois, Chicago, was submitted to and approved by the Illinois Endangered Species Protection Board to examine pollinator limitations, fruit production and viability and genetic diversity in two populations of *Asclepias lanuginosa* which have not produced fruits in many years of monitoring. The funds for this research were not appropriated for 2010, but the Principal Investigators plan to reapply for this funding for the 2011 season.

LEVEL 2 DEMOGRAPHIC MONITORING UPDATE

Level 2 demographic monitoring of four species (*Viola conspersa, Cypripedium candidum, Cirsium hillii* and *Tomanthera auriculata*) was initiated in 2001, and includes tagging individual plants in permanent plots in order to track them over time. In the case of *Tomanthera auriculata*, an annual species, plants are newly tagged each

year, and those tags are followed throughout the season. Specific protocols vary by species, but plant height, leaf measurements (width or length), number of blooms, and seed set are all common measurements. Level 2 monitoring was partly discontinued in 2005 after a seed viability study was completed in 2004 and upon discussion with the Advisory Group. However, that year some Level 2 monitoring took place through related projects, such as Pati Vitt's *Viola conspersa* and *Tomanthera auriculata* research and Jeremie Fant's *Cirsium hillii* genetic studies. Since 2006, several populations of all four species were monitored at Level 2. This research activity demonstrates the ripple effect POC has had in stimulating additional work on species for which a large amount of data is already available. Research can build on that data, thereby increasing its robustness and value. Program staff members believe that ongoing Level 2 work, guided by researchers and assisted by volunteers, can result in a long-term data set, relatively rare in ecological studies, that provides significant information on population dynamics unavailable through Level 1 work. University researchers, including graduate and post-doctoral students, as well as CBG staff, can be and have been attracted to this work. An examples of a more recent study built on Level 2 demographic data include the following:

CBG geneticist Jeremie Fant and colleagues are working on a manuscript combining the genetics, habitat quality and demography of *Cirsium hillii*, using eight years of Level 2 data. No published demographic data currently exists for this species, and a greater understanding of the life history of this rare thistle could improve management and therefore the health of populations across the region. The combination habitat quality and genetics in conjunction with demographic data will allow scientists to identify those characteristics which are important for reproductive health and those which are not, allowing land managers to focus their efforts in areas which will have the largest impact. In addition this data generated will also serve as a model of other species with similar life history (clonal species with lower flowering) that also occupy fragmented and rare habitats like gravel hills. Already through this work, it has become clear that this species is not a monocarpic perennial (a plant that persists for two to several years until it flowers, after which point it dies), as was previously assumed. Several individuals have bloomed more than one year in a row.

PROGRAM EVALUATION

POC met or greatly exceeded nearly all the program objectives as outlined in the WPF proposal and listed below. Most have already been discussed in detail in the preceding text.

Objective 1: *Collect standardized monitoring data on rare plants on a cumulative 55% of northeast Illinois' listed EOs.*

Through 2009, POC had collected standardized monitoring data on a cumulative (2001-2009) 57.5 % of the EOs in seven northeast Illinois counties listed as threatened or endangered, as recorded by the IL Natural Heritage Database through April 2009. Through 2009, POC had monitored 68% of the 168 listed species in northeast Illinois.

POC collected standardized monitoring data on 184 species in 526 occurrences, which included an additional 80 occurrences this year (a 12.2% increase from 2008). The number of EOs monitored increased in four out of eight counties, remained stable in one and had minor decreases in three. Kendall added 10 new EOs. POC now monitors approximately 57.5% of the Illinois listed EOs in NE Illinois, based on 2009 data from the Natural Heritage Database. However, the Heritage Database can include more than one site in a single EO when they are geographically close, whereas POC considers each site as a separate EO.

	Cook	DuPage	Kane	Kankakee	Kendall	Lake	McHenry	Will
2008	146	81	31	1	0	136	60	28
2009	147	79	31	0	10	130	66	29
% Change	0.7%	-2.5%	0.0%	-100.0%	100.0%	-4.4%	10.0%	3.6%

Table 3. Percent change in monitored element occurrences in seven Illinois counties, and in all counties for Wisconsin and Indiana. Different EOs may be monitored from year to year, so % change indicates the difference in the total number of EOs monitored.

Objective 2. *Collect Level 2 demographic data on selected populations of target species (Viola conspersa, Cypripedium candidum, Cirsium hillii and Tomanthera auriculata).*

In 2009, POC collected demographic data on 4 plots of *Viola conspersa*, 8 plots of *Cypripedium candidum*, 7 plots of *Cirsium hillii* and 5 plots of *Tomanthera auriculata*.

Objective 3. *Hold three volunteer training workshops and support volunteers with further training in the field.*

Four volunteer training workshops were held in 2009 at: Sand Ridge Nature Center (Cook County), Ryerson Conservation Area (Lake County), Volo Bog (McHenry County), and University of Wisconsin Parkside (Kenosha County; several Illinois volunteers attended the Wisconsin workshop). POC staff mentored volunteer monitors in the field on a weekly basis, as needed. Seventy-six (76) volunteer attended. In 2010 four volunteer training workshops were held at: Edgebrook Volunteer Center (Cook County), Glacial Park (McHenry County), Will County FPD Administrative Center (Will County), and University of Wisconsin Parkside. 67 volunteers attended. In 2009 an experienced monitor offered to be a volunteer research assistant and led other volunteers at the Chicago Botanic Garden throughout the season. In 2010, three volunteer research assistants joined the team and will be active with volunteers throughout the season.

Objective 4. *Increase the number of trained volunteers recruited in cooperation with landowners (an average of five per county in the six counties of NE IL, with recruits in Kankakee County.)*

The average number of increased volunteers across all counties was 9.5. See table below for specific IL county information. There were no recruits in Kankakee County despite attempts to gain them. However, Kendall County joined POC for the first time. Its four sites and 10 EOs were monitored by Kendall County Forest Preserve staff as a pilot project. Volunteers have already joined the effort in 2010.

81 new volunteers were recruited and subsequently conducted monitoring in 2009, an average of 10.9 per Illinois county. All counties except for Kane recruited more than 5 volunteers (3 new volunteers in Kane County). POC recruited 11 new volunteers in Wisconsin in 2009.

In addition the volunteer retention rate from 2008 to 2009 was 66.5%. 147 of the 269 volunteers who monitored in 2009 had monitored for three or more years (54.7%). This level of retention increases data reliability.

Numbers for 2010 will be submitted in the next report.

Year	Cook	DuPage	Kane	Kankakee	Lake	McHenry	Ogle	Will
2008	88	26	28	1	73	44	0	21
2009	99	24	28	0	67	37	2	28
% Change	12.50%	-7.69%	0.00%	-100.00%	-8.22%	-15.91%	200.00%	33.33%

Table 4. Percent change of the number of monitors in Illinois counties with Plants of Concern involvement.

Objective 5. *Collaborate with public and private landowners to place volunteer monitors on their sites.*

In 2009, POC worked with 66 public and private landowners to place volunteer monitors on their sites. In winter of 2010, POC held planning meetings with six major agencies, including Brad Semel representing IDNR, to discuss the 2010 season volunteer assignments.

Objective 6. *Collaborate with the IDNR (Regional Biologists, Natural Heritage Database, Nature Preserves Commission and Illinois Endangered Species Protection Board).*

POC continues to have a strong relationship with IDNR staff. For example, POC collaborated in the field in 2009 with IDNR Heritage Biologist Brad Semel and held planning meetings with him in both 2009 and 2010 regarding monitoring assignments at Illinois Beach State Park, Volo Bog, Moraine Hills State Park, and Chain-o-Lakes State Park. Semel received all monitoring reports for his sites for 2009 in order to assist in management planning and he also serves on the POC Advisory Group. Heritage Biologist Dan Kirk received all reports on sites within his region. Ben Dolbeare, Invasive Species Project Manager for IDNR, serves on the Advisory Group. Glen Kruse, Heritage Division Chief, served on the Advisory Board until his retirement in August, 2009. He has been replaced by Don McFall, holding that same position.

POC submitted all Element Occurrence Reports to the IL Natural Heritage Database in both 2009 and 2010 (for 2008 and 2009 monitoring seasons). Jeannie Barnes of the Database, who serves on the Advisory Group made this comment in a December, 2009, email: "*Thank you for all that your volunteers do to monitor the plants in NE Illinois and to you and your staff for getting the data to us every year. Without the help of POC the status of listed plants in the Heritage Database would not be as complete as it is. We look forward to our continued partnership.*"

POC submitted permit applications and follow up monitoring reports to the IL Nature Preserves Commission in both 2009 and 2010 (for 2008 and 2009 monitoring seasons). Kelly Neal, Stewardship Project Manager for the Commission, serves on the Advisory Group. In addition, POC has occasional contact with NPC Field Representatives Steve Byers and Kim Roman over issues that arise in monitoring at sites within their regions. Kim Roman also serves on the Advisory Group.

John Wilker, the IDNR sponsor of the WPF grant, is a strong supporter of the POC program.

Susanne Masi, POC coordinator, is an appointed member of the IL Endangered Species Protection Board. She brings information about listed plants from POC monitoring to that group and participated in the 2009 listing process. She also serves on the Board's Plant Endangered Species Technical Advisory Committee. Board Chair Dan Gooch serves on the POC Advisory Group.

Objective 7. *Hold an advisory group meeting*

An advisory group meeting was held on December 15, 2009, at the Chicago Botanic Garden. (See Minutes, Attachment 9).

Objective 8. *Prepare summary reports, including analysis of monitoring data, for the preceding year's work by March 2010 and, as appropriate, share data with Chicago Wilderness, state agencies, and landowners that highlight management impacts on populations or concerns about the absence of management (submit data and final report to the WPF according to its reporting schedule).*

With the ending of the Chicago Wilderness grants program in 2009, POC was no longer required to submit an annual report to that coalition. However, this report to the WPF includes analysis of the 2009 monitoring data along with discussion of POC activities undertaken to plan and implement the 2010 monitoring season. This report will be shared with the Natural Resource Management Task Force of Chicago Wilderness and with landowners, if so permitted by WPF. As mentioned, all 2009 monitoring data has been submitted to state agencies as well as individual landowners for their sites.

Objective 9. *Explore with IDNR staff the possibility of exporting POC to other urban centers of Illinois.*

POC was contacted separately by Karen Tharp (Illinois Nature Conservancy) and Diane Tecic (Natural Heritage Regional Administrator) about the possibility of exporting the POC program to southern Illinois where there is an active Native Plant Society. Tharp has applied for funding for an Americorps volunteer to help establish the program there in 2011, and POC recommended that Tecic join that effort. POC would serve as consultant to this potential program, assist with training, and would share its database structure.

Within the Chicago Region itself, the program has two active spinoffs. POC received a small grant from the Garden Club of America to support the Lake Forest Garden Club's participation in Plants of Concern through its Partners for Plants program. Garden club members are being trained in POC protocols to monitor approximately 10 listed and rare species at McCormick Ravine and nearby sites. The Lake Forest Open Lands Association, which has management responsibility for McCormick Ravine, is also participating in this effort. Another larger effort that grew out of POC is a long-term monitoring program being initiated in summer 2010 at the Openlands Lakeshore Preserve in Ft. Sheridan as a partnership between the Chicago Botanic Garden and Openlands. The Preserve is a mosaic of ravine, lake bluff and beach habitats. POC/CBG staff and volunteers will monitor 10 listed and rare species, conduct vegetation transects, map five invasive species that impact high quality areas and conduct a tree inventory in two ravines. Openlands has contracted the Chicago Botanic Garden to undertake this work.

There has been no other movement to establish POC in other parts of the state. What is needed to initiate such a program is interested local leadership, such as that displayed by Karen Tharp, and an adequate level of funding.

However, POC has influenced monitoring programs in other areas. For example, the Blue Mounds Area Project in SW Wisconsin which has begun a pilot project for monitoring listed species on private lands and has adopted more than 80% of the POC protocols. BMAP hopes to expand this program by linking with TNC and IDNR properties in the area. POC would play a consulting role in the expanded project.

Highlights of the extensive public communication and outreach for POC are also presented below to demonstrate the extent of the Program's influence and networking, starting with an outline of the POC website. Several items are also included as attachments. POC continues to have active partnerships with the following regional groups and projects: The Habitat Project (Audubon-Chicago Region); New Invaders Watch List (The Nature Conservancy and the Forest Preserve District of Lake County); Chicago Wilderness Natural Resources Management Team; and the Carol Freeman Photography Endangered Species Project.

Plants of Concern Website

The POC web site (www.plantsofconcern.org) was created in late 2003. Conservation Data Manager Bianca Rosendorn manages the web site design and content. The intent of the web site is multi-faceted. It is a way to spread the word about rare plants and the POC program, recruit new volunteers, and provide news and monitoring resources such as downloadable forms, form submittal, and plant information to monitors.

In 2009, from January to December, the website averaged 591 visitors per month, for a total of 7093 visits, compared with 5813 visits in 2008, an increase of 18%. The highest traffic month was June, with 701 visitors. In 2010, from January to May, the website averaged 538 visitors per month, for a total of 3011 visits.

There are 12 sections on the web site:

- **Home** (home page) contains introductory paragraphs about the POC program.
- **About POC** lists background information about the program, its goals and achievements and statistics from previous years.
- **News & Events** posts newspaper articles about the program as well as announcements of events such as workshops, plant outings and meetings.
- **Meet the Staff** lists the entire POC staff and contact information.
- **Blank Forms & Protocols** lets monitors download up-to-date monitoring forms, land management forms, and guidelines and instructions on GPS usage, pacing and population estimation guidelines. The Plants of Concern Volunteer Manual is also available for download in this section.

- **Monitored Species Bloom Times** includes the bloom time range of all POC monitored species.
- **Monitored Species Photo Gallery** comprises individual web pages for each plant monitored by POC as well as photos of the species by Carol Freeman and volunteers and links to various plant resources.
- **Invasive Species List** includes a list of all the common invasive species found in the POC monitoring area.
- **Plant Information Websites** includes links to other plant resources that are related to POC or to rare plant monitoring.
- **Funders** provides a list of partner websites and programs that have funded POC.
- **Login** allows monitors the opportunity to view and submit their monitoring forms on-line. It also allows Land Managers to view all the monitoring and land management forms pertaining to all the sites they manage. In 2009, 59% of all forms were submitted on-line for a total of 485 on-line submissions, an increase of 9% from 2008.

Website goals for 2010 are to create an invasive species photo gallery and establish capacity for on-line submission of Land Management Forms.

Publications

- *Chicago Botanic Garden Member Guide.* 2009. Plants of Concern. Saving rare plants at the new Rice Science Center. Summer.
- Freeman, C. 2009. *In Beauty, I Walk*, 2009 calendar by Carol Freeman Photography. *A statement by Susanne Masi for POC appears on the back cover of the calendar, as does a description of the program. A number of the images used are of POC species.*
  Garness, K. 2009. A passion for saving paradise. *Chicago Wilderness Magazine*, Summer 2009. This article about regional orchids includes mention of Plants of Concern and POC volunteers.
- Goad, R. 2009. Chiwaukee Prairie and a Blossoming POC Chapter. *The Habitat Herald.* April 2009.
- Herold, J. 2010. Midewin and its Plants of Concern Citizen Scientists. Article posted on the USFS Celebrating Wildflowers Website: www.fs.fed.us/wildflowers/ April 26.
- Hitzroth, Greg. 2010. Plants of Concern Saves Rare Species. *The Habitat Herald.* January 2010.
- Masi, S. and A. Kelly. 2009. Plants of Concern. Standardized Rare Plant Monitoring Using Trained Volunteers. Final report to Chicago Wilderness and the Illinois Conservation Foundation for the 2008 season.
- Masi, S. and D. Drekich. 2009. Monitoring Rare Plants at Midewin National Tallgrass Prairie: 2001-2008. Focus on the 2008 Monitoring Season. Final report to National Fish and Wildlife Foundation and to Midewin National Tallgrass Prairie. January.
- Masi, S. and J. Herold. 2010. Monitoring Rare Plants at Midewin National Tallgrass Prairie: 2001-2009. Focus on the 2009 Monitoring Season. Final report to U.S. Forest Service. January.
- Masi, S. 2009. Plants of Concern. Mobilizing Citizen Scientists. Final report to the Illinois Wildlife Preservation Fund, IDNR, July.
- Masi, S. 2010. Plants of Concern volunteers geared up to monitor a delicate spring species – Slender Sandwort. *Tallgrass Telegraph.* Summer.
- Vitt, P., K. Havens, B. Kendall, and T. Knight. 2009. Effects of community level grassland management of the non-target rare annual *Agalinis auriculata. Biological Conservation.* In Press.

Other publications included email newsletters to volunteers and announcements in stewardship newsletters such as *The Habitat Herald, Gatherings Online* (VSN), *McHenry County Volunteer Newsletter*, and *Grounds Cover* (CBG). 2009-2010.

Presentations, Posters, Teaching and Events involving Plants of Concern

- Masi, S. 2009-2010. Led several rare plant forays were held that involved a team of volunteers in monitoring searches over larger areas, at Florsheim Nature Preserve, Ryerson Conservation Area (organized by Ken Klick of the Forest Preserve District of Lake County), Braidwood Dunes (in cooperation with Will County FPD) and Illinois Beach State Park (in cooperation with IDNR staff). POC volunteers were notified of these events at workshops, through the website, and by email.
- Masi, S. and K. Glennemeier. 2009. Plants of Concern. What Volunteer Monitors Have Learned. Presentation at Wild Things Stewardship Conference, February 7 at University of Illinois at Chicago.
- Masi, S. and R. Goad. 2009. Plants of Concern: A Citizen science-based monitoring program. Poster at Wild Things Stewardship Conference, February. 7 at University of Illinois, Chicago.
- Masi, S. 2009. Plants of Concern Update. Volunteer Stewardship Network Meeting, August 10, Ryerson Woods.
- Masi S. and R. Goad. 2009. Plants of Concern. A citizen science-based monitoring program. Poster at the Janet Meakin Poor Symposium, October 2 at Chicago Botanic Garden. Co-presented with G. Hitzoth.
- Masi, S. and D. Drekich. 2009. Long-term Study of rare plant species found in and around Midewin National Tallgrass Prairie. Co-presented with J. Herold. Janet Meakin Poor Symposium, October 2, Chicago Botanic Garden.
- Masi, S., G. Hitzroth and J. Herold. 2009. Plants of Concern: Volunteers Monitor Rare Plants in a Standardized Regional Program. Presentation to Northwestern University Graduate Students, October 30, Chicago Botanic Garden.
- Masi, S. 2010. Presentation to the class "Botanical Art-Rare & Endangered Species & More " instructed by Derek Norman in conjunction with the *Losing Paradise* Exhibit January 11, Chicago Botanic Garden.
- Masi, S. 2010. Member of the coordinating committee and on a panel of monitoring resource persons at the In-Depth Workshop for Experienced Stewards and Monitors sponsored by The Habitat Project, Audubon-Chicago Region. Danada Forest Preserve, Wheaton, February 7..
- Masi, S. 2010. Citizen Scientists Monitor Endangered Species in Chicago Wilderness. Presentation at USEPA BeWise 2010 Conference. U.S. Federal Building, Chicago, March 12.
- Masi, S. 2009, 2010. Coordinated and taught Research Experience for Undergraduates (NSF) monitoring field workshop. NSF. Lake in the Hills Fen, June 1, 2009 and May 24, 2010. With N. Zyrega, L. Egerton-Warburton, POC Research Assistants and POC volunteers. June 1, 2009 and May 24, 2010.

Media, Awards and Community Service

- APGA. (American Public Garden Association). People and Gardens. 2009. Announcement of the Plants of Concern award from WPF for 2009-2010. www.publicgarden.org, Sept.2009.
- Masi, S. 2009. Awarded the "U.S. Forest Service Excellence in Botany Partnership Award" Shared with Eric Ulaszek of Midewin National Tallgrass Prairie. May 6, Washington, D.C.
- Masi, S. 2009-2010. Member of Advisory Group to the Chicago Park District Nature Area Management Process for input on monitoring components of the plan. Five Nature Areas have Plants of Concern species.
- Masi, S. 2009-2010. Board Member, Illinois Endangered Species Protection Board.
- Schuler, M. 2009. Press Release: Chicago Botanic Garden's Plants of Concern Program Receives Illinois Wildlife Preservation Fund Grant.. September 25. (Attachment 10)
- Witt, M. 2009. Media Advisory. Midewin & Chicago Botanic Garden Receive National Botany Award. Placed by Midewin National Tallgrasss Prairie Public Services. June 3

Grants

- 2009. POC received a Cost-Share Agreement of $17,500 from the US Forest Service for its 7th season of monitoring work at Midewin National Tallgrass Prairie.
- 2009. POC's Wisconsin Chapter coordinated by Lori Artiomow was awarded a $5000 grant to monitor rare plants at Chiwaukee Prairie from the Citizen-based Monitoring Network of Wisconsin.
- 2009-10. POC received an Illinois Wildlife Preservation Fund Grant of $14,000, which included notification of a three-year award for that same sum each year, from July 2009-June 2012.
- 2009-2010. POC received a two-year award from the Donnelley Foundation at $35,000 per year.
- 2009. POC received a Cost-Share Agreement of $15,000 from the US Forest Service for its 7th season of monitoring work at Midewin National Tallgrass Prairie.
- 2010. POC received a $3000 grant from the Garden Clubs of America's Partners for Plants Program ($3000)
- 2009-2010. POC received an award from the Nature Conservancy's Volunteer Stewardship Network ($455)

CONCLUSION AND FUTURE DIRECTIONS

As the above discussions demonstrate, Plants of Concern continues to grow and show its strength as an essential source of data on rare plants that serves land managers and engages trained volunteers to make a meaningful contribution to the regional understanding of rare plants, their status, threats that impact them, and management activities that sustain them. The work initiated in 2006 with Indiana and particularly with Wisconsin to export the program to the Chicago Wilderness regions of those states has borne fruit. In Illinois, programs at Midewin, Openlands Lakeshore Preserve, and McCormick Ravine in Northeast Illinois, as well as the beginning planning for a POC program through TNC in southern Illinois, attest to POC's influence and effectiveness.

POC was able to provide valuable data to the Endangered Species Protection Board as it made its 2009 listing recommendations to the Legislature. The Chicago Park District has invited Susanne Masi, representing POC, to be on an Advisory Group for the development of the District's management plans for their Natural Areas. POC will contribute to the monitoring component essential to measuring success of management activities. The listings under Objective 9 above demonstrate other examples of POC contributions on a regional as well as national scale. As Citizen Science becomes more prominent on the national level, POC is being recognized as a successful and established monitoring program. At present the POC data reservoir is very large, with nine complete years of monitoring data in an Access database format. These data can be mined for far more analysis than POC staff can provide with the current resources available. The exploration of these data has great potential to benefit land managers as they make decisions to protect and manage rare plant populations as a parallel effort to managing communities. POC will continue to be a resource for attracting researchers to further tap into the data and is already working with individuals from several institutions, as described in this report. These opportunities, only made possible with a stable long-term monitoring program, should be made more widely available in order to maximize the benefits of POC.

Overall, one of the greatest benefits of POC is the collaboration between the many agencies and their volunteers in monitoring rare species. In addition to seven forest preserve districts, the Chiwaukee Prairie Preservation Fund, U.S. Forest Service and IDNR, 81 other landowners have been involved in the program, many of whom would not otherwise have the resources to engage in a rare plant monitoring program. POC, as a priority project of the CW Resource Management Team, has played an important role in the Chicago Wilderness Biodiversity Recovery Plan.

The future and scope of Plants of Concern are closely linked to funding. It is essential that this long term monitoring program continue to provide its demonstrated regional benefits. In the current economic climate, funding has become increasingly uncertain, but POC's core program is assured through support from the Wildlife Preservation Fund through June 2011 (and has received notification of additional funding through 2012), from the Donnelley Foundation through 2011, and from a Cost Share Agreement with the US Forest Service at Midewin National Tallgrass Prairie through 2011. In addition, the Chicago Botanic Garden continues to seek federal and local funding to support a comprehensive analysis of Plants of Concern data using such statistical analysis programs as CART to understand population trends and dynamics in relation to management activities and various threats and to share these results with POC constituent landowners and land managers.

ATTACHMENTS

1. GIS map of POC monitored populations
2. Level 1 monitoring form
3. Level 1 land management form, Parts 1 and 2
4. Advisory Group listing, 2009
5. Plants of Concern Species List
6. Plants of Concern 2001-2009. Counties, Sites, Landowners & Element Occurrences (Excel)
7. Plants of Concern 2001-2009. Species EO Frequency by County, a Regional View (Excel)
8. G. Hitzroth. 2010. Plants of Concern Saves Rare Species. *The Habitat Herald.* January, 2010. Article in Habitat Project
9. Advisory Group Minutes, December, 2009.
10. Chicago Botanic Garden's Plants of Concern Program Receives Illinois Wildlife Preservation Fund Grant. Press Release issued by the Chicago Botanic Garden, Sept. 25, 2009.
11. Illinois Department of Natural Resources owned and Nature Preserve Sites Monitored by Plants of Concern.