

ALBANY PINE BUSH PRESERVE: A CASE STUDY USING CONCEPTS FROM THE LIMITS OF ACCEPTABLE CHANGE FRAMEWORK

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Abstract

The Albany Pine Bush Preserve (APBP) is a relatively small natural area in downtown Albany. It has a relatively high potential for heavy recreation impacts from large numbers of users and multiple uses. The managers of the APBP realize the need to determine the APBP's baseline conditions in order to create a recreation management plan. This study uses three strategies to collect baseline data: a measurement of physical trail conditions, an estimation of visitor numbers, and a survey of visitors' perceptions of the trail conditions. This document uses the APBP as a case study to demonstrate how the baseline data collected may be utilized in the Limits of Acceptable Change (LAC) framework in order to aid the APBP managers in their planning process.

1.0 Introduction

The Albany Pine Bush Preserve (APBP) is a 2,725 acre Nature Conservancy preserve located in downtown Albany, NY (Figure 1). The preserve is managed by the APBP Commission under the guidance of the Nature Conservancy. The APBP ecosystem is known as a pine barrens and it sustains a variety of rare and endangered species such as the Karner Blue Butterfly and the Spadefoot Toad. The Nature Conservancy recognizes that the combination of excessively well-drained soils and the pitch pine/scrub oak vegetation creates a unique ecosystem that requires special protection and management (APBP Commission 2002). The Nature Conservancy has outlined some of the threats affecting the Pine Bush and focused on four main threats that have the greatest impact on the integrity of the resource: (1) fire suppression, (2) residential and commercial development, (3) invasive exotic species, and (4) irresponsible recreation behavior (APBP

Commission 2002). The Nature Conservancy vision for the Pine Bush Preserve is "to maintain the natural ecological processes that support the long term viability of the...Pine Bush...The Preserve will also protect cultural resources, accommodate a variety of appropriate recreational uses, and provide educational and outreach opportunities for the public" (FEIS for Albany Pine Bush Preserve 2002, p. ii).

Although the APBP is managed primarily to maintain the ecological integrity of the area, the Nature Conservancy also realizes the need to address recreational uses and users. Due to its proximity to Albany's urban center and the fact that it allows multiple, non-motorized uses, the APBP has the potential to incur significant environmental and social impacts. In order to protect the resource and provide a quality recreation experience to a variety of users and diverse uses, the managers of the APBP must create a plan to guide recreation management for the Preserve.

Recreation managers across the country have faced similar challenges trying to balance recreation and resource protection. As a result, the Limits of Acceptable Change (LAC) framework for recreation planning was developed (Hendee and Dawson 2002). The LAC process is an approach to planning visitor management.

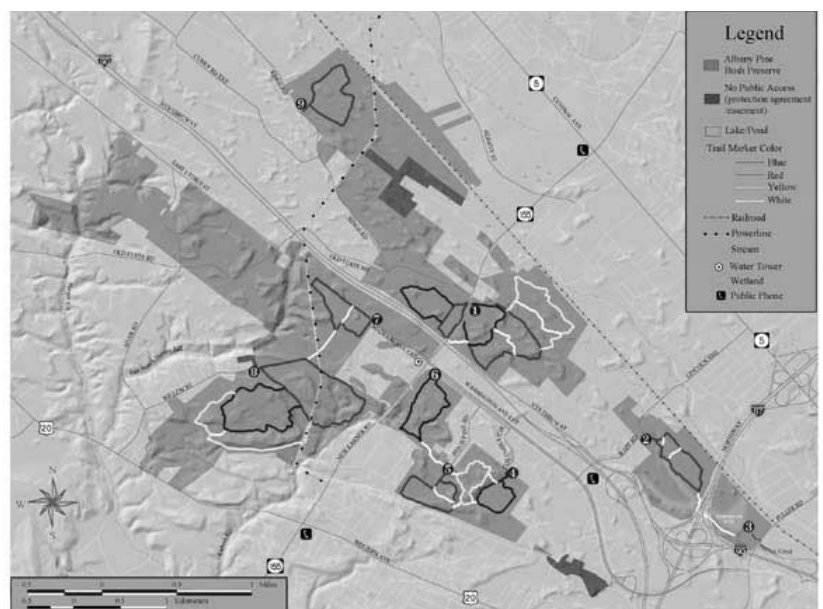


Figure 1.—Map of the Albany Pine Bush Preserve.

Table 1.—Criteria for impact level assessment of APBP physical trail conditions.

Criteria	Level 1	Level 2	Level 3	Level 4
Trail Tread Depth	>3 feet	2-3 feet	0.5-2 feet	<0.5 feet
Trail Tread Width	>20 feet	10-20 feet	4-10 feet	<4 feet

The LAC is a tool that helps managers understand the current conditions, define the desired conditions and create a plan for achieving and maintaining the desired conditions.

The challenges and conflicts that exist at the APBP make it a good case study about the use of the LAC process. One goal of this research project is to provide the APBP Commission with baseline information concerning the environmental and social conditions of the recreational trail system. The overall study examines the physical trail system, estimates the amount of use that the system receives, and explores visitors' perceptions of the recreational experience. The overall study provides the APBP Commission with the baseline information needed to start the LAC process and develop their recreation management plan.

This paper attempts to show how the baseline data collected in this study may be incorporated into the APBP recreation management plan through the use of the LAC framework. For example, the APBP Commission has already completed the first couple of steps in the LAC and planning process—they have defined their goals and identified the issues and threats for the area. This study, however, helps to identify more specific issues, concerns and threats related to recreation. Moreover, it plays a major role in identifying types of social and environmental impacts and it is an inventory of the current conditions. This paper provides suggestions for management actions to address issues of social and environmental impacts based on the overall study.

2.0 Methods

The research was conducted to determine the social and environmental baseline conditions of the recreation system at the APBP. It is a day use area and most visitors come specifically to use the hiking trails. Therefore, the trail system was selected to study environmental impacts. In order to understand the impacts of erosion throughout the APBP, an inventory of the twenty miles

in the trail system was performed. Then the trail system was separated into four basic impact levels; level 1 was the most impacted while level 4 was the least impacted. The level of impact assigned to a segment of trail was based on the following factors: trail tread depth and trail tread width (Table 1); some visible characteristics such as surface water, slope sloughing and muddy conditions were also considered for rating impact levels.

After assigning ratings to all twenty miles of trail, five representative points from each rating level were selected. At these locations, evaluations of soil loss were made by measuring the soil lost in a cross section of trail at a selected location (Liddle 1997). Twenty sites were identified throughout the trail system. Metal stakes were placed on either side of the trail and a string was placed across the trail and made level. The depth of the trail was measured from the level string to the soil substrate at two-foot intervals between the stakes. Then the distance from stake to stake was measured along the ground. The total area of soil loss was calculated.

Visitor use was measured through the use of Trailmaster Infrared trail counters. Infrared trail counters were set up close to each of the nine access points to the APBP (Figure 1). The infrared counters operate by sending an infrared beam of light from the transmitter on one side of the trail to the receiver on the other side. If this beam of light is broken, then the counter records an incident. Each Friday, the incident records were downloaded from the counters to a laptop computer and processed with the Trailmaster Statpack Program. Visitor use was calculated from the incident counts. Since the trails starting from each access point have different layouts, different strategies were utilized to calculate the visitor use at each access point (Table 2).

The third part of the baseline study analyzed visitors' perceptions of the trail conditions. The information from the visitors was collected through the use of an on-site survey at each of the nine trailhead access points.

Table 2.—Strategies to calculate visitor use estimates at the nine APBP trailhead access points.

Trail Type	Access Points	Strategy
Loop with one Access point	Karner Barrens West, King's Road	One incident equals one visitor
Loop with two access points	Karner Barrens East: Right and Left	Take average visitor use from two counters
Cherry stem (short entrance trail to a loop)	Blueberry Hill Columbia, Blueberry Hill Pitch Pine, Rapp Road	Divide total incidents by two for each counter
Loop with two access points, one on a cherry stem.	Great Dune and Madison	Divide Great Dune incidents by two then take the average of Great Dune and Madison incidents



Figure 2.—Survey Photograph A



Figure 3.—Survey photograph B



Figure 4.—Survey Photograph C



Figure 5.—Survey photograph D

The interviewer went to the various access points on a revolving schedule, with three two-hour shifts (8-10 a.m., 12-2 p.m. and 5-7 p.m.) every Saturday, Sunday and Monday from May 31 to September 1. The survey contained ten questions: the first six questions had to do with demographics and educational information related to the APBP; and the last four questions dealt with visitors perceptions of four different photographs, which depicted various levels of trail impacts (Figures 2, 3, 4, and 5). This manuscript analyzes the survey question that asks visitors to arrange the four photographs from

the most appealing to the least appealing for their recreation. The photograph ratings were used to compare how mountain bikers and walkers perceive the trail conditions. The information gathered from the surveys was analyzed using the SSPS statistical program.

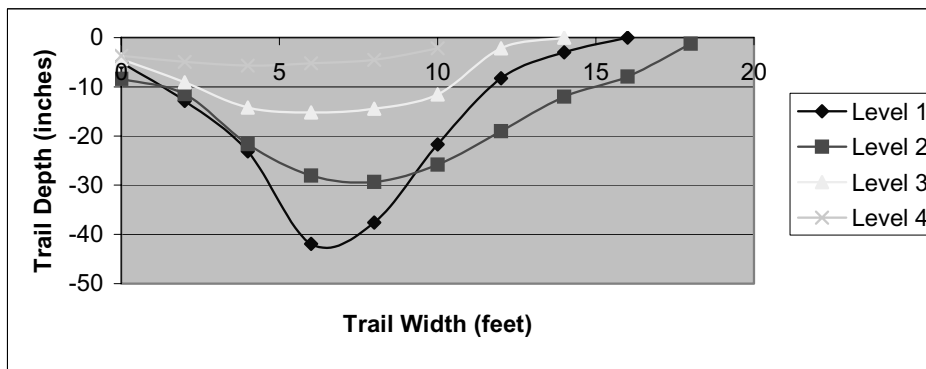


Figure 6.—Average trail depth for four different trail impact levels in the APBP.

3.0 Results and Discussion

3.1 Physical Trail Conditions

The study of the physical trail conditions resulted in an inventory of the entire trail system. The survey of the twenty miles of trail found that one percent of the trail system was Level 1, five percent was Level 2, twenty-seven percent was Level 3, and the remaining sixty-seven percent rated as Level 4 (showing the least amount of impact). Nevertheless, thirty-three percent of the trail system inventoried was noticeably impacted, with trail soil loss depths ranging from six inches to over three feet deep.

Figure 6 provides a visual depiction of the average trail depths for the four levels inventoried. Recall that only one percent of the trail system resembles Level 1 and it shows the dramatic impacts that are occurring in the APBP. That one percent of the system is spread out among different trails and most often found on steeper trail sections. One third of the trail system shows erosion greater than one foot deep. One percent of the trail system is more than three feet deep. There are visible impacts in the form of soil erosion that are affecting the environmental resource.

Previous studies such as David Cole's research in the Bitterroot Wilderness provide insight about soil erosion findings, such as the mechanisms of trail erosion. Cole explains that trails act as "conveyor belts" for materials down slope (1991). According to Liddle (1997), "soil is eroded mostly by wind or water; recreation activities provide the circumstances for erosion and increase its rate of occurrence," (pp. 39). Although erosion is a natural process, it is accelerated by recreation activities, which provide the conduit, the path of least resistance, for water erosion or an opening for wind erosion.

Recreation activities are one part of the equation and the resource characteristics of the site are the other part. The amount of impact an area can sustain is site specific and must be examined in terms of its soil and vegetation characteristics. These two related variables determine the relative impact of the recreation activities. For example, Cole (1991) showed that alpine systems and riparian systems were much more susceptible to recreation impacts than grassy prairie systems. There exists a relationship between recreation activities, the amount of use and the relative susceptibility of the particular ecosystem, in this case a pine barrens, to recreation impacts. The APBP has deep sandy soils (Dineen 1982) and this type of soil, like the sandy soils found in coastal areas, has been observed to erode easily both by wind and water (Gibbertson 1983). Due to the relative susceptibility of the Pine Bush soils to erosion, managers must pay careful attention to the effects of recreation on trails and how trails are designed to mitigate erosion problems.

How do these results relate to the LAC framework and the APBP Commission's planning process? In the LAC process, indicators must be developed to monitor environmental impacts. In this section of the baseline study, erosion indicators were used to analyze the environmental impacts occurring on the trails. Pine Bush managers may utilize the indicators—trail tread depth and trail tread width—set up in the baseline study to monitor trail erosion in the future. Furthermore, they may set standards to determine the acceptable future conditions for the trail system based on these indicators. Thus, they will be able to compare the current conditions to the future conditions and determine whether the change that occurs is acceptable or not.

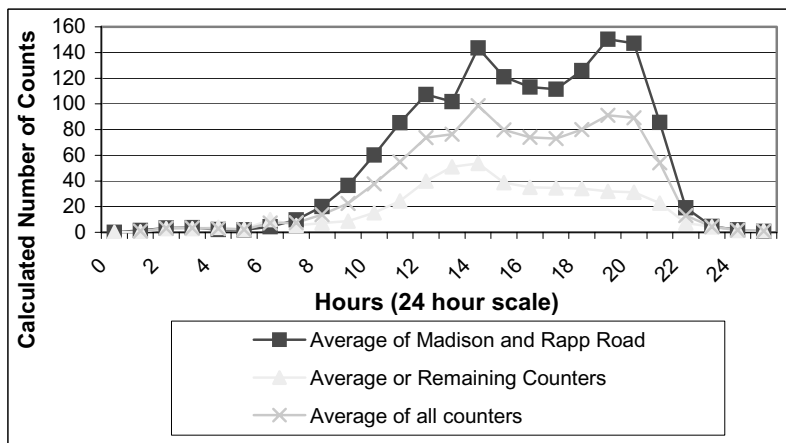


Figure 7.—The estimated distribution of APBP use over a 24-hour period

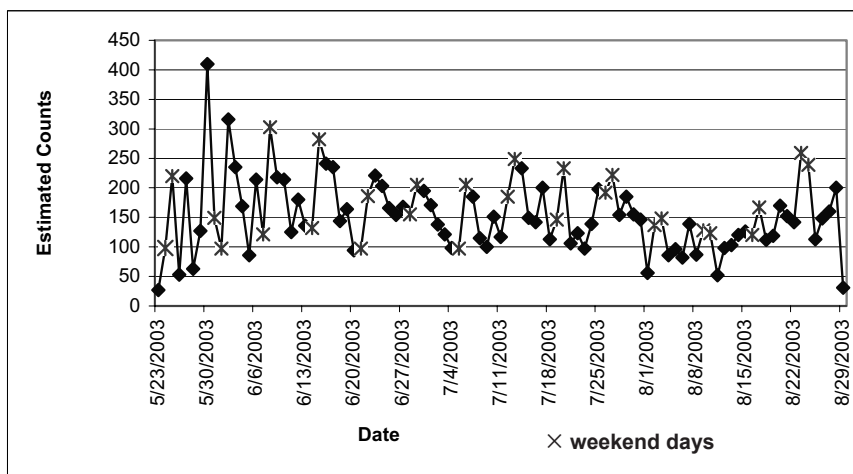


Figure 8.—The estimated distribution of APBP use for the period of May-September, 2003

These results are important because they show that environmental impacts currently exist on the trails. In the LAC process, managers will have to address these environmental impacts in order to fulfill the requirements of the Commission's vision. As part of the planning process, managers must consider alternative trail designs and erosion control techniques to mitigate environmental impacts and continue to provide recreation opportunities. The trail design standards should reflect the multiple uses permitted on the trail system. With the participation of the public, the resource managers will consider alternative management actions during the LAC process. Each action should help to protect the resource on which the recreation activities depend.

3.2 Visitor Use Estimation

The results of the visitor use estimate provide a great deal of temporal information about how visitors use

the APBP. Figure 7 shows the average distribution of users over the course of a day. It gives the overall average for the nine counters, and also separates out the Madison-Great Dune and Rapp Road areas from the other access points, because their patterns were different than the other areas. Note that the greatest amount of use at the Madison-Great Dune and Rapp Road areas occurred between 8 and 9 p.m., right at dusk during the summer months. The other peak time of use registered between 2 and 3 in the afternoon. Figure 8 illustrates the distribution of use over the course of the summer from May through August, 2003.

The distribution of use demonstrates an average decrease in use over the summer months. The stars that indicate the weekend days display an odd pattern. For the first half of the summer they show Saturday as a low use day but Sunday as a high use day. As the summer progresses,

Table 3.—The arrangement of four impact level photographs by APBP walkers versus mountain bikers.

Photo Arrangement	Photo A	Photo B	Photo C	Photo D
Walkers	%	%	%	%
First (Most appealing)	61.8	28.8	4.5	6.4
Second	14.5	31.5	31.8	23.6
Third	22.7	28.8	13.6	32.7
Fourth (Least Appealing)	0.9	10.8	50.0	37.3
Mountain Bikers				
First (Most Appealing)	39.0	39.0	2.4	19.5
Second	9.8	36.6	14.6	39.0
Third	48.8	19.5	2.4	29.3
Fourth (least appealing)	2.4	4.9	80.5	12.2

however, Saturdays become a higher use day along with Sundays. The holiday weekends, Memorial Day, 4th of July and Labor Day, show low use values and the results suggest that the APBP is not a vacation destination. The distribution of visitation over a 24-hour period indicates that visitors did not come to the APBP to spend a whole day. It is more likely, judging by these results and by the size of the APBP and its trail system, that visitors come for short periods of time, perhaps on a lunch break, after school or work or even after dinner.

The visitor use estimation information can be incorporated into the LAC process through monitoring. The results represent the current conditions, but social changes may occur that affect these patterns. Understanding when visitors use the APBP provides information about the kind of recreation experience visitors are seeking. For example, the temporal distribution patterns suggest that visitors come to the Pine Bush for short visits. Managers can use this data to provide acceptable social opportunities during the planning process. The data from the physical trail conditions section shows that environmental impacts are occurring with the present amount of visitor use. Hence APBP managers must consider management actions that would address the environmental impacts at the current visitor use levels.

3.3 Visitors' Perceptions of Trail Conditions

The third part of the study dealt with visitors' perceptions of the trail conditions. The results of this section compare two user groups—walkers and mountain bikers—and how each group rated the trail impact photographs.

Although the results in table 3 were not statistically significant when comparing mountain bikers to walkers in a Chi Square analysis, some differences can be seen between the two user groups. The walkers show some preference for Photo A as the first choice, while the mountain bikers preferred both Photos A and B as the first choice. The most popular second choice for mountain bikers was Photo D, while walkers favored photos B and C for their second choice. Although the majority of both walkers and mountain bikers arranged Photo C as the least appealing, there were more mountain bikers (80% compared to only 50% of walkers) who ranked Photo C as their fourth choice.

The reason that the differences between the preferences of mountain bikers compared to walkers are important is that the two user groups have different needs and preferences for trail conditions. For example, the majority of mountain bikers agreed that Photo C is very unappealing and it shows an open sandy location that is difficult for mountain bikers to ride through. The walkers seem to prefer the less impacted trail conditions, while the mountain bikers may recognize the trail impacts, but they are looking for other elements like hills, challenges, or less sandy soils when determining their preferences.

During the LAC process, the recreation managers may use this comparative information to help understand the different preferences of the two user groups and to create management alternatives that fit the needs of each group. Furthermore, because the walkers and mountain bikers seek different experiences and trail conditions, user-

user conflicts may arise or increase if these differences are not addressed. In the planning process, managers should consider trail designs that target different users' needs. Considering changes to the trail design as part of the management actions for the alternative opportunity classes in the LAC process, may allow managers to provide a quality recreation experience to its user groups, while protecting the resource on which the recreation opportunities depend.

4.0 Conclusion

Recreation management in the APBP is as complex and complicated as the resource itself. Due to the possible high use from the surrounding urban area, and the dedication to providing multiple use recreation opportunities, the APBP Commission is challenged with the management of a recreation resource that has a great potential for environmental impacts. In addition, the APBP protects a fragile and unique ecosystem, which is relatively susceptible to recreation impacts because of its sandy soils. In order to protect the resource and provide a quality, multiple use recreation area, the APBP managers create a recreation management plan that incorporates the information about the environmental and social conditions of the APBP. Using the LAC process, they can incorporate these data into their recreation plan and future monitoring program. Since the data shows that impacts are occurring with present number of visitors, there is an indication that management actions to address environmental impacts may be required. In order to achieve the APBP Commission's vision of preserving the

pine barrens ecosystem and providing opportunities for recreation, heritage and education, the APBP managers must analyze the baseline data, illustrating the current social and environmental conditions and decide how to deal with unacceptable changes.

5.0 Literature Cited

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