

Report of the Biology Sub-Committee of the Campus Natural Areas Committee

Sub-Committee Members: Robert Bohanan, Eric Bott (02/03), Ann Burgess, Glenda Denniston, Cassandra Garcia (03/05), David Rogers (02/03), Don Waller (04/05), Paul Zedler, Chair

Updated 5/27/05

Purpose of the report: This sub-committee (hereafter BSC) was charged with developing a draft plan for the natural communities of the campus natural areas. This plan was developed with the understanding that it would be merged with plans from the other sub-committees to produce a single comprehensive document which would guide management, development, and use policies.

Scope of the report: The BSC took “natural communities” to mean all areas with uncultivated vegetation or natural non-managed substrates (e.g., rock outcrops, lake bed). Inevitably, some “gray areas” (e.g., the end of Picnic Point, margin of the Class of 1918 Marsh) that are semi-natural by this definition were considered nevertheless. We have also considered areas that are presently not natural but that might be converted back to a more natural state. The BSC understood that they were expected to provide a vision for the future of the natural communities of the CNA and the outline of a plan for how to achieve the vision. We have therefore developed both a 30 year concept and a 5 year plan. But it needs to be stressed that the BSC viewed the process as one which would be subject to continual review and revision as experience is gained.

Guiding principles: Before the committee began its detailed work, we developed a set of guiding principles. These (except for #5) were presented to the entire CNA Committee and were informally approved (the following includes revisions suggested by the CNA Committee 5/12/03).

1. The preservation and restoration of natural plant and animal communities in conjunction with UW-Madison instruction and research is the primary objective for most of the Campus Natural Areas. (There has been debate in the CNAC committee about this statement after the approval of 5/12/03. The BSC does not believe that it is appropriate to change it.)
2. The underlying principles of ecology and conservation biology indicate that these should be important planning and management objectives:
 - a. Preservation of remnant intact communities
 - b. Restoration of ecological communities historically present and appropriate to the site
 - c. Creation of the largest possible blocks of contiguous natural landscape
 - i. Special planning for appropriate transitions along edges

- ii. Desirable to keep areas of like use contiguous to minimize conflicts
 - d. Consideration of the land beyond the borders of the CNA
 - e. Maintenance and creation of corridors and linkages to natural communities
 - f. Attention to biodiversity within each community type
 - g. Control of invasive species
 - h. Monitoring and record keeping
3. In determining the community appropriate to a site, the existing vegetation as well as the historical and pre-settlement data will be considered.
 4. Major changes in community physiognomy (e.g., forest to grassland) will be undertaken only after careful consideration and stakeholder input.
 5. Planning recommendations are to be considered proposals. Further study and especially on-site evaluation will be needed before they can be translated into specific action plans.
 6. Management techniques should as much as possible mimic natural processes.

The Five Year Plan

1. **Rationale:** We present a 5-year plan in recognition of two general constraints: a) because we lack the resources to do everything that we might like to, it will be necessary to consider planning to be a “rolling window” projecting forward as resources permit, and b) there are many uncertainties, and there is much to learn before we know what is possible.

2. **Presentation of the plan:** The plan connects proposed research and management actions to specific areas. Therefore, this text and the accompanying maps must be considered together.

3. **Overview:** In keeping with our guiding principles, the 5-year plan is conservative. We do not propose major changes in the proportions of physiognomic types. That is, open grasslands will mostly remain open, and tree covered areas will mostly remain forest or woodland. We do, however, propose restoration activities that will significantly alter species composition in the direction of increased importance of native species suited to the sites and to the frequency of natural or management-imposed disturbances. The only natural communities that have survived 160 years of post-settlement human actions substantially intact are small patches of woodland/forest (e.g., Eagle Heights Woods) and parts of the Picnic Point Marsh. We have used historic photos and present composition to identify these remnants. We attach special significance to these remnant communities. In contrast, there are wooded areas that have developed since agricultural and pastoral uses of the land ceased (e.g., most of Frautschi Point Woods).

We reviewed the Kline-Bader plan, area by area. We were substantially in agreement with the general vision differing primarily in the amount of area to be converted from woodland/forest to prairie or savanna. This difference is most apparent in our recommendations for Frautschi Point.

4. Presentation of recommendations: The realization of the 5-year plan would require multiple projects that cover nearly all of the CNA. We recognize that it may not be possible to begin all of these immediately or even during the next 5 years. We therefore list them in priority order. The numbers correspond to numbers on the map and indicate where in the CNA the proposed actions are to take place.

5. A few comments on terminology: Our plan does not contain detailed planting lists or exact specifications for which species are to be retained and which to be selectively removed in restoring and maintaining communities. Some of this detail is contained in the Kline-Bader report, but most remains to be worked out. For purposes of this overview plan we designate the restoration goals as community types using generally accepted broad categories derived from Curtis's Vegetation of Wisconsin. The following figure importantly in our plan and therefore merit definition: 1) Mesic forest – a forest dominated by more shade-tolerant species (e.g., sugar maple, basswood, yellowbud hickory, white ash) which can persist indefinitely with little or no fire disturbance. Spring ephemerals reach their best development in such forests. 2) Dry-mesic forest – a forest with tree species of low to intermediate shade tolerance, primarily species of oak but with other characteristic tree species (e.g., shagbark hickory). Typically such forests allow considerable light through the tree canopies so that the understory has an abundance of shrubs and herbs. Dry-mesic forests are thought by many to require fire to maintain their composition. 3) Savanna – a type of vegetation with as many definitions as there are savanna ecologists. As used here, the term is synonymous with oak opening. It is sufficient for our purposes to say that it is vegetation with trees present but at wide spacing so that there are significant areas (not just occasional gaps) more-or-less open to full sun. Because of these sunny patches, the flora of savannas includes many prairie species. The presence of open-grown trees with spreading canopies is a defining character of savannas. In Wisconsin, such trees take a minimum of 50 years to reach characteristic size and form, making savanna restoration a project undertaken for the benefit of the next generation. Open grown trees do commonly occur in present day forests and woodlands. Most of these are trees that developed along fence lines or in grazed pastures. Few primary savanna trees survive. But where they occur, open grown trees allow the savanna character to be recaptured simply by clearing away the surrounding, usually much smaller trees. 4) Prairie – grasslands with varying degrees of forb (non-grass herbaceous plants) dominance. Reasonable facsimiles of prairies can be established in 5-10 years, though 20 to 30 years is required to approximate natural patterns more closely. Prairies cannot be maintained in southern Wisconsin without regular removal of at least the above-ground parts of invading woody species by fire or mowing. Therefore, restoration to prairie should not be undertaken without assurance that at least one, and preferably both, of these management practices is possible.

Because we used air photos from the 1930's to determine the remnant forests, we use the terms "Pre-1930" and "Post-1930" to distinguish the remnants from forests

formed as the result of tree invasion (or re-establishment depending on what was originally present) into areas used for grazing or agriculture. The species that are in the post-1930 forests have a high proportion of exotic, non-local, or weedy species. Some of these would have been present pre-settlement. For example, box elder probably occurred along the lakeshore, but it has been greatly favored by human disturbance and therefore its abundance today is almost certainly much greater than it was in the past, especially in upland areas.

6. The animal component. Our plan addresses primarily the plant part of the biological community. This does not mean that we are not interested in the animals. Rather, we accept the practical reality that animals are directly and indirectly dependent on the plant component, and the plant component is much easier to manipulate. We also believe that it is futile to introduce animals if an approximately appropriate plant community is not first present. It is possible that some ecological processes or some restoration manipulation might benefit from the introduction of animals over the next 5 years, but we know of no such case. (Use of introduced bio-control agents is a possible exception, but given recent concerns about such agents we recommend thorough review before any introductions.) We are also aware that animal ecologists have criticized a plant-centric approach, and in particular the assumption that if an appropriate plant community is established all of the appropriate animals will take up occupancy. We understand that it is not that simple. We also acknowledge that fine-tuning of our plans may be necessary to create habitat for desired animal species. We therefore encourage the involvement of a broad range of biologists in the review of our plans. We support the idea of surveys and monitoring of animal populations, with the expectation that in the near future animal management and restoration plans can be added to this document.

7. Summary list of the recommendations for the 5-year plan:

1. Removal, treatment of invasive plants with restoration
 - 1A. Removal of invasive herbs and shrubs (garlic mustard, buckthorn, honeysuckle, porcelain berry) in severely disturbed areas.
Restoration, replacement of exotics where ground cover, erosion protection, or biodiversity enhancement is necessary
Research/monitoring component advisable
 - 1B. Removal of clusters of large invasive/exotic trees in woodlands/forests
2. Prairie restoration
 - 2A. Creation of savanna along the margins; preservation of existing open-grown oak trees
3. Oak regeneration study
4. 1918 Marsh and surrounding prairie (study area)
5. High-use naturally landscaped amenity areas
6. Marsh restoration
7. Special consideration for the lakeshore fringe
8. Incorporation of the “Big Woods” area adjacent to University Housing and Lot 34 into the CNA
9. Importance of fire as a management tool

10. Attention to views
11. Delineation of exact boundaries of the CNA to be accompanied by a pledge from the campus administrators not to construct buildings within the CNA.

8. Explanation of each recommendation

1. Removal, treatment of invasive plants, with restoration. This is a blanket recommendation that applies throughout the CNA. There was unanimous agreement that efforts to control the most invasive species, especially exotics, must be a continuing project. Whenever possible, these efforts should be exploited as research and teaching opportunities, but the urgency of control for some of the species is such that there must be management action regardless of whether teaching and research are being optimized.

1A. Restoration and replacement: This recommendation is directed to “problem areas” that have been heavily disturbed. Experience has shown that removal of invasives, especially in areas that have suffered past disturbance, is not sufficient to return the community to natural levels of diversity or to prevent erosion resulting from the exposure of soil. Therefore, we have set as a 5-year objective establishing management experiments that evaluate procedures for site remediation and for replacing, rather than simply removing exotic species.

1B. Invasive or non-native trees do not, in general, pose as serious a threat as the shrubs and herbs, but they are visually apparent. Removal of trees will leave large gaps that will attract notice and that could be the site of even worse infestations of invasives. Therefore, the need for restoration and replacement is particularly acute in such locations. As an example, the grove of black locusts in Eagle Heights woods. (See also the discussion of oak regeneration below.) Included in this recommendation, but not mapped in detail, is the need to control the invasive exotic Norway maple. These have been planted or have sprung up from seeds from their exotic parents in many places in the CNA.

2. Prairie restoration. We endorse the recommendation of the Kline-Bader plan for a large scale prairie restoration in the area of the old field adjacent to the Eagle Heights Garden and encompassing the Biocore Prairie, and extending into the partly open woodland to the east. (see map). It will not be possible to complete the restoration of such a relatively large area in 5 years, but we strongly urge that as much progress be made as possible. It would be appropriate for restoration to be a major focus of fund raising and volunteer activities over the next 5 years.

2A. Savanna creation along the margins: The Kline-Bader plan called for extensive creation of savanna, mostly on Frautschi Point. For several reasons, we advocate a go-slow approach, but also believe that it is aesthetically and educationally important that some savanna/open woodland areas be created. At present the CNA has only small fragments with any character of savanna – a few open-grown trees. Since open woodland and savanna were historically very important elements of the vegetation, we see the restoration of such areas as a high priority from both the educational and aesthetic viewpoints. We propose that savanna restoration initially be restricted to the margins of the prairie area by some balance between cutting back the edge of the forest through removal of non-oak species and planting of oaks into the edge of the restored prairie. Because bur oak (*Q. macrocarpa*) was more abundant in the past, planting this species

should be emphasized. We also recommend creating a miniature “oak opening” centered on the magnificent remnant open-grown white oak in the woods of Frautschi Point. (see map) The long-term vision includes creating savanna in part of Bill's Woods.

3. Experimental oak regeneration. The Kline-Bader plan recognized that one of the most basic challenges to be faced in managing the CNA is that the normal processes of vegetation change will eventually lead to the virtual extinction of oak species. This will be a slow process, but mature oaks are lost every year and there are in general few nearby saplings to replace them and few saplings anywhere in the CNA. (Working out the details of the rate of change would be an interesting student research project.) The problem is that the CNA are now isolated from the kind of regional disturbances, mainly fire, that are thought to have been necessary to ensure oak replacement. Kline-Bader addressed this issue by proposing experimental burning, essentially to re-introduce fire to the system. We endorse this. We recommend that experimental burning be underway within 5 years so that results can begin to be assessed. But we also suggest that other approaches be considered, including planting of oaks, possibly in conjunction with the removal of invasives or undesirable species. The production of artificial clearings is another option. There is on-campus expertise available to help devise management strategies.

The other side of this question is the very apparent on-going successional change toward more shade-tolerant (mesic) species. Kline-Bader recommends that succession be allowed to proceed in Eagle Heights Woods, North Shore Woods, and Wally Baumann woods. We do not include this “let succession proceed” recommendation in our numbered list because it does not necessarily require any management actions. On the other hand, the outcome of this succession could be a rather impoverished forest unless plants characteristic of rich forests are artificially introduced. This is not a pressing problem unless failure to make such introductions results in the establishment of difficult-to-displace invasive or otherwise undesirable species.

4. Class of 1918 Marsh Study Area. We do not make specific recommendations for this area except to endorse the existing idea that what we wish to have at this site is a biologically interesting marsh surrounded by native vegetation grading from marsh to upland prairie. For many reasons, it is imperative to honor the intent of the class gift and the legacy of Jim Zimmerman who was the main proponent of saving this remnant marsh. The present condition falls far short of the vision, but we lack the information necessary to specify exactly which management actions need to be taken. We therefore note the problem and recommend that studies and experiments be undertaken with the objective of devising a detailed management plan for this challenging site.

5. High use naturally landscaped amenity areas and historical horticultural plantings. There are several areas that have high use and will continue to have high use. In these areas, restoration to anything approximating a natural community is probably neither feasible nor desirable. For example, open areas on Picnic Point could be uniformly planted to prairie, but the tallgrass typical on silt loam soils is not very conducive to reclining to take in the view. Nor is native prairie tolerant of high use. But this does not mean that the vegetation has to be only lawn or exotic plantings. It is possible to use native species in conjunction with the selective use of trampling-tolerant grass species to produce a kind of simulated natural environment. Exotic turf species could be used in high-use places but the trees, shrubs and associated herbs that form the

backdrop should be natives. This was essentially the Kline-Bader proposal for the tip of Picnic Point, and we endorse this recommendation. We propose that the conversion of the end of Picnic Point toward such high-use simulated savanna-type plantings be well underway by year 5. There are excellent opportunities for donors and volunteers. The required detailed plan does not yet exist. Production of this plan should be a high priority for the next two years. Similar plans should also be worked up for other areas on Picnic Point, and along the Lakeshore path, where management of vegetation is essentially a horticultural enterprise.

We addressed elsewhere the removal of non-native/non-local species, taking the case of species that are naturalized (black locust, Norway maple). Another case is presented by the many horticultural plantings dating from past efforts which had a different concept of what green areas should look like. For example, there are plantings of cedars and Scots pine on Frautschi Point and a variety of exotic trees planted at the base of Picnic Point. Most of these pose no threat as invasives, and therefore their removal is not a high priority except where indicated by other management needs. We recommend a policy which gradually removes these exotic plantings as opportunities arise. There is ample space in planters, parking strips, and the other green areas of campus outside of the CNA for the horticulturalists to plant interesting and decorative exotic species.

6. Picnic Point Marsh Restoration. Jill Baum conducted a detailed study of Picnic Point Marsh and her study shows that this area has substantially filled in with trees during the last 50 years. We endorse the general recommendation of Kline-Bader to remove at least some of the trees, but this should be done only if it does not encourage the spread of reed canary grass. As with the exotic tree removal, an experimental approach seems advisable.

7. Special considerations for the lakeshore fringe. (Not mapped.) The lakeshore fringe is an area of special sensitivity and interest from multiple viewpoints. The presence of more mesic elements that are presumably survivors from a pre-settlement mesic fringe forest that was protected from fire is of special ecological concern. The large red oaks and basswood trees are probably not primary (that is, trees present at the time of settlement) but are very likely first or at most second-generation descendants of trees present in the pre-settlement forest.

8. Annexation of the “Big Woods” and Lot 34. The Big Woods (see map) is presently under the jurisdiction of University Housing, but because of the presence of tree cover is valuable green space that logically belongs with the rest of the CNA. Likewise, Lot 34 is critical for preserving a view beloved by generations. At some point, it would be desirable to remove the lot and restore the woodland. In the meantime, the fringe of trees is aesthetically important to the Lakeshore Path. We recognize that annexing these parcels will require negotiation.

9. Importance of fire as a management tool. The plant communities of what is now the CNA burned frequently in the past. Most ecologists believe that oak openings and prairies cannot be maintained in a condition resembling this original state without fire. Therefore, it is imperative that arrangements be made that will allow for fire to be used regularly for management and experimental purposes.

10. Attention to views. The opening of views (both near and far) is compatible with our overall restoration and management objectives. Projects to improve views will

be explored experimentally and incrementally in a variety of settings. For example, in many places invasives, especially buckthorn and honeysuckle, block both near and far views. It is important that removal be coupled with planting and other appropriate restoration techniques. An excellent example of this approach is given in the Kline-Bader plan (p. 32).

...set up trial plots to determine the most successful technique for replacement of the honeysuckle on the banks with native species without causing soil erosion. Consider use of mechanical barriers, mulch, leaving honeysuckle roots and crowns to hold the soil temporarily, etc....Use one or two of the best methods to replace all exotic woody plants on the banks with native species of shrubs and herbs. Where views are to be preserved, use low growing species such as pennsylvania sedge.

11. Identification of boundaries. (not mapped, general to the CNA). We recommend as a high priority working with the relevant groups on campus to designate the exact boundaries of CNA. Of particular short-term importance is deciding how large a marginal area belongs to the Class of 1918 Marsh, but there a similar problems all through the CNA. The process should probably begin with a proposal from the CNAC, which will have to be approved up the administrative hierarchy.

The Thirty Year Vision

The 30 year vision is general at this point. If, however, we actually achieve what we have outlined by 2033, we will have substantially fulfilled the vision of the Kline-Bader plan (and endorsed by this committee) of having the CNA contain high-quality examples of a diversity of native ecosystems in an ecologically appropriate and aesthetically pleasing arrangement.

The plan to reach the 30 year vision allows succession to proceed on the richer, moister sites toward a sugar maple-dominated mesic forest with a rich understory of spring ephemerals and other characteristic species. Other areas, mostly to the east and south and on drier sites, would be maintained as oak woods through the use of fire or other means as appropriate. Even in 30 years, any regenerated oak forests would still be dominated by relatively small trees. The partly open and badly disturbed parts of Bill's Woods are an appropriate site to attempt to recreate savanna. The restored prairie would in 30 years be comparable to the Curtis Prairie ca. 1965, which means that it would appear as a reasonable approximation of tall-grass prairie. The edges of the prairie would support open woodland/savanna, with gradual and natural-appearing transitions into the denser woodlands sustained by frequent management fires, which would become an annual practice in the CNA as they are in the U. W. Arboretum. We would like the smell of prairie fire to be one of the memories that students take with them from their years at the university.

The heavy use areas would be landscaped with native plants supplemented with horticultural species that can tolerate high levels of foot traffic. For example, the end of Picnic Point would have open simulated savanna with patches of native prairie and understory species in aesthetically pleasing arrangements and would have a well-designed system of paths and overlooks with trampling-tolerant turf. Burning would also be used to maintain some of the areas and would provide excellent photo opportunities from air and the lake.

The lakeshore path would be a green corridor of majestic native trees (eventually, maybe not in 30 years) selected for their scenic qualities and tolerance of the lakeshore location. Some of the shorter-lived species would be included in the mix to maintain the historically correct elements – black willow, cottonwoods, box elder. Red oaks propagated from acorns collected from trees on-site would be planted along the lakeshore fringe to maintain them in the system. The understory would be native species selected to be aesthetically pleasing while also preventing shoreline erosion. Plantings could also stress diversity, so that the Lakeshore Path would also serve as an informal arboretum (in the traditional sense of a collection of trees and shrubs) to serve teaching purposes.

The marsh elements of the CNA would be sensitively merged into the other community types and maintained in an open condition with good water quality to encourage a diversity of aquatic plant and animal species.

The system of paths would allow a person to take a loop that would lead them through the collection of communities. Educational materials at several levels would explain the natural history of the sites.