A PHOTO POINT MONITORING SYSTEM

FOR THE

ASSATEAGUE NATIONAL SEASHORE

COASTAL ECOLOGY RESEARCH LABORATORY

UNIVERSITY OF MARYLAND EASTERN SHORE
PRINCESS ANNE, MARYLAND 21853

A

PHOTO POINT MONITORING SYSTEM

Developed under, Dr. Terry Bashore

Barrier Island Management

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Shauneen Giudice
410-548-2993

Chris Pagan
410-651-1602

Herb Thompson
410-651-0205

Gary Taylor
410-749-3809

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PRESENTED TO

ASSATEAGUE NATIONAL SEASHORE

by

Shauneen Giudice
Chris Pagan
Herb Thompson
Gary Tyler

December 13, 1991

ABSTRACT

This paper describes a photo-point monitoring system to document vegetative and geologic changes on Assateague Island. Selection of photo-point sites was based on the nature of the vegetative community and susceptibility to change due to geomorphic and/or visitor-use factors. Contributing factors included site accessibility, wildlife considerations, and the existence of rare or threatened plant species. The proposed system consists of 23 individual sites and 6 transects. Each transect is composed of 4 to 10 photo-point sites located across the width of the island. The location of each transect is given in terms of distance south of the Ocean City inlet. A general description and location is given for each site. Field descriptions were composed for a subset of these sites and several were photographed. A technical protocol for the development and future implementation of such a system is described.

INTRODUCTION

Barrier islands, such as Assateague, are characterized by changes imposed by forces of wind, weather, and sea (Leatherman, 1988). The very dynamics of these forces are often crucial factors in the nature, distribution and destiny of vegetative communities (Anonymous, 1986c). Photo-documentation of these changes can provide useful indications of potential problem areas and the effectiveness of management programs (Brewer and Berrier, 1984). Furthermore, photos can provide tangible, high impact evidence to complement traditional research and educational efforts.

Such methods have been used previously in other park situations to monitor the effect of visitor use patterns, campsite reclamation, and the erosion of trails (Rinehart et al., 1978). In addition, photos have been used to chronicle forest recovery after fires and logging or mining operations. Quantitative analysis of changes in ground cover characteristics and plant species have been realized through the use of quadrat photographic techniques (Pierce and Eddleman, 1970). On the other hand, photographic panoramas taken horizontally produce broad overviews of large sites (Brewer and Berrier, 1984). While such overviews do not permit precise quantitative analysis, they can be used to obtain general estimates of percent coverage and numbers of trees (Magill, 1989).

Two sets of photo points were previously established on the northern end of Assateague Island. Both sets are composed of single horizontal photographs of landscapes. The first set, taken in 1972, included 92 photo points (Furbish, unpublished, 1990).

The points were located on the northern end of the island and appear to have been selected in conjunction with the land acquisition litigation. A subset of 10 of these sites was rephotographed in 1982 and some transect data on vegetation were recorded. In 1990, UTM coordinates were determined for both sets of photos and an attempt was made to locate the 10 data photo points from 1982. However, as of November, 1990, only 5 sites had been relocated. Field location was dependent on matching the views in the photographs with those in the field and on such reference points as telephone poles. Thus, relocation of the remaining points was considered extremely difficult and time consuming. The points, furthermore, did not necessarily include important areas where vegetative changes might be expected to occur. Nonetheless, comparison of the two photo sets did reveal several general trends such as increased ground cover, extension of shrub communities, and colonization of mud flats (Furbish, 1990).

The current interest in establishing a photo point monitoring system was to provide documentation of vegetative and geologic changes on the island. An additional goal was to record changes in adjacent land use, specifically along the mainland shoreline. Our objectives were to (1) establish general criteria for the identification of a series of photo point sites in the Maryland section of the island; (2) identify by UTM coordinates and/or landmarks, compass bearings and map location, a set of at least 10 photo points in the Maryland portion of the island; (3) write a

protocol for the future implementation of a photo point project; and (4) mark and photograph two sites.

MATERIALS AND METHODS

I. CRITERIA FOR PHOTO-POINT SELECTION

A meeting was held with the resource manager, Gordon Olson, to discuss the objectives of the project and general criteria for photo-point selection. As indicated at this meeting, the photo-points should include representative areas of the major vegetative communities, areas with differing levels and types of visitor usage and those most vulnerable to erosion and topographical changes. Specific areas of interest included the northern end of the island, dune crossing 10, and views of adjacent land use (ie. mainland shoreline development).

A review was made of available studies and maps showing the location of the previous photo points (Furbish, 1990) and the distribution of developed/recreational areas (Anonymous, 1986a). The characterization and distribution of major vegetative communities was ascertained from current vegetation maps and plant community descriptions (Hill, 1984a, Hill, 1984b). Areas critical for the protection of rare/endangered plant species were also located (Hill, 1985).

The impact of several topographical features on vegetation patterns was also considered. Dune restoration and stabilization programs, for example, have been shown to affect plant community responses. In addition, inlet formation and the size and frequency of overwash processes have been considered factors in the determination of plant community patterns (Anonymous, 1986b). A study of the relationship between geomorphic features and plant

communities found long-term erosion rates and average island width to be the best predictors of vegetation (Anonymous, 1986c). Low altitude aerial photographs (1958, 1972, and the 1980's) from both the National Seashore and Worcester County Soil Conservation Service were examined for historical changes in the distribution and/or condition of vegetative communities and to identify areas of interest along the mainland shore.

Information regarding the status of the previous photo studies of the island was obtained from Gordon Olson and Elaine Furbish, biological technician. Both recommended the inclusion of the ten data photo points that had been re-photographed in 1982. Ms. Furbish, furthermore, recommended inclusion of 28 additional photo points from the 1972 set as these photos evidenced visible changes in vegetation and topography. While UTM coordinates were assigned to these 28 photos in 1990, none have been relocated in the field.

Additional factors considered in the criteria for photo point selection were suggested by Ms. Furbish and included: (1) a probable site of future inlet formation (just south of dune crossing 11), (2) areas potentially affected by hazardous fuel, (3) the effect of the artificial dune line on vegetation, and (4) the effect of erosion of the marshes on the bay side of the island. Finally, suggestions concerning the impact of feral horses on vegetation, the location of crucial habitats for several species of birds and insects, and issues concerning changes in the fresh water ponds were obtained from the recent conference sponsored by the Assateague National Seashore.

II. PHOTO-POINT SITE IDENTIFICATION

Areas that met multiple criteria were identified and two categories of photo-point sites were selected from these. The first category consisted of 23 individual sites located throughout the Maryland portion of the island. The second category was comprised of 6 transects across the breadth of the island. Each transect was estimated to contain from 3 to 8 separate photo-point sites. Both categories of photo-point sites were characterized, mapped and submitted for Gordon Olson's approval.

A subset of the proposed individual photo-point sites were identified in the field during this study. These were primarily located in the developed zone because weather and overwash conditions made the other sites inaccessible during the latter part of the study period. UTM coordinates were determined for these points using the Park Service maps and field descriptions were written.

Transect techniques based on the sampling of individuals along a line are often used to study plant and animal populations (Cox, 1990). Such techniques have been used on Assateague Island to look at salt marsh vegetation (Furbish, 1991) and geomorphic characteristics (Anonymous, 1986c). The latter study based its analysis on data collected by the U.S. Army Corps of Engineers along 32 transect lines in 1965 and 1985. The three major zones identified were: (1) the overwash and inlet formation zone, (2) the intermediate zone, and (3) the high dune zone. They were defined with regard to overwash penetration distance, dune form,

and vegetation types. These characteristics were attributed to shoreline erosion rates. Erosion rates, in turn, were regarded as a function of distance from the Ocean City inlet. Thus, a north-south gradient of vegetation communities existed that ranged from the relatively low, sparse dunegrass and marsh communities in the north to the well-defined, dense, and more diverse communities in the south.

This gradient and the three geomorphic zones were considered to determine the location of the 6 transects proposed in the present study. The objective of each transect is to illustrate a cross-section of the island by depicting the major vegetative communities found from bayside to ocean. Therefore, the set of transects should also illustrate gradations in the vegetative communities from north to south in relation to geomorphic factors.

Thus, the location of each transect was established by the number of kilometers from the inlet to the intersection of the transect line with the open beach. Transect 1, for example, was located directly across from the Ocean City Airport, approximately 2.7 kilometers south of the inlet. Four photo-point sites were identified in the field for this transect. They were chosen to illustrate the major plant communities in this portion of the island according to Hill's classification system (1985): marsh, shrub succession, dunegrass, and open beach. Using a compass, we left the beach and walked in a line 45 degrees West of North (magnetic) to the bayside shore. The first site was established at this point. Four photographs were taken at each site to illustrate

the view in each compass direction (due N, E, S, and W, respectively). Photographs taken from the bayside shore site, therefore, included views of the mainland shore. Each successive site was determined as we encountered each distinct plant community on the walk back towards the beach. UTM coordinates were generated for these four sites and field descriptions written.

A general description of the remaining transects and their locations was written. The number and location of sites along the these transects will need to be determined in the field. A description of two alternative methods for actual site determination in the field was elaborated.

III. PROTOCOL

Information regarding photographic equipment and field procedures was obtained primarily from Ms. Michele Demanche, professor of Fine Arts at UMES. Ms. Demanche had previously worked on a project involving the photo-documentation of the recovery of *Spartina* marshes after an oil spill. Consequently, most of her suggestions had already been field-tested in a context related to the present one. Additional information regarding the implementation and analysis of a photo-documentation system was obtained from a technical report published by the U.S. Forest Service (Magill, 1989). The draft protocol was reviewed by Ms. Demanche for technical accuracy and field tested by us for workability.

IV. SAMPLE PHOTOGRAPHS

Several of the proposed sites were photographed using the procedures described in the protocol. One of the sites (#89) had been previously photographed in 1972 and 1982. It was re-located using the map and a copy of the old photographs provided by the Park Service. The new sites included the four along Transect 2 and several in the developed zone. The purpose of these photographs was to test our own protocol and to experiment with some of the technical parameters involved.

RESULTS

I. PHOTO-POINT SELECTION CRITERIA

The major criteria for photo point selection were the nature of the vegetative community and its susceptibility to change due to geomorphic and/or visitor-use factors. Hill (1984a) described ten major plant communities: beach, dunegrass, shrub succession, *Hudsonia* dunes, bogs, woodland, fresh marsh, salt marsh, washes and salt pannes, and ponds. Geomorphic factors included island width, erosion rates, dune height and stability, and distance from the inlet. Contributing factors were site accessibility, wildlife considerations and the existence of rare or threatened species. Wildlife considerations included crucial habitat requirements for Piping plovers (McGiver, 1991) and grazing impacts of feral horses on *Spartina* marshes. Nine areas critical areas for the protection of rare or threatened plant species were identified by Hill (1984). The tables in Appendix I summarize the criteria used to identify photo-point sites.

II. PHOTO-POINT SITES

In addition to a subset of the sites previously photographed in 1972 and 1982, the proposed system consists of 23 individual sites and 6 transects. Information regarding the location and UTM coordinates of the old photo-point sites can be found in a previous study (Furbish, 1990) and will not be repeated here. All of the following information concerning the location and characteristics

of the proposed system of new sites is summarized in the form of tables in Appendix II (Protocol Summary). The approximate locations of these sites can be seen in the map found in Figure 1 (Appendix II). Transects are identified by a number from 1 to 6 in this map and individual sites by a letter. The corresponding site names are found in Table 1 (Appendix II).

The individual sites were selected on the basis of the criteria described previously. Table 2 (Appendix II) summarizes the criteria used to select each point. Site q, for example is located in the vicinity of Hungerford House. The woodlands in this area were designated by Hill (1985) as a critical area for the protection of several rare plant species. Thus, the primary purpose of this photo-point site is to document the general woodland habitat of these species. This area lies outside the major developed zone. However, because an access road exists and visiting researchers are housed in the building, human impact on the area should be monitored.

Field descriptions of a subset of these sites and their respective UTM coordinates are given in Table 3 (Appendix II). Several of these sites are located along the marked foot trails in the developed zone. These were chosen to illustrate typical vegetation in accessible areas with relatively high visitor use. Site p, for example, is located at marker 3 on the Life of the Dune trail with UTM coordinates E048615 and N422690. This site offers a view of the typical dune grass community in the vicinity of the remnants of the old road. It is most easily identified in the

field by locating the appropriate marker on the trail and facing the camera towards the old road. Another easily identifiable photograph can also be taken at this point by including the actual trail marker in the picture.

The selection criteria fulfilled by each of the 6 proposed transects is summarized in Table 4 (Appendix II). Table 5 (Appendix II) contains the approximate location of each transect and an estimate of the number of photo-point sites it contains.

Each transect should contain a representative picture of each of the major vegetative communities going from bay to ocean. However, these communities will vary among transects; thus, not all transects will contain the same number of photo point sites. Transects located north of the State Park, for example, are characterized by high erosion rates, low and inconsistent dunes, frequent overwash, and narrow island width. Vegetation is relatively sparse and primarily restricted to dune grass and shrub succession communities with few or no wooded areas. Thus, transects in this zone can be documented by relatively few photo points.

Transect 1, for example, consists of 4 sites that provide views of the mainland and bayside marsh, marsh, shrub-dunegrass, and dunegrass-beach communities. The 4 sites are located approximately 100 m from each other along a transect line running west of a point located 2.7 km south of the inlet (UTM coordinates: E049045, N423980). Field descriptions for the 4 photo point sites

along this transect can be found in Table 6 (Appendix II) and sample slides can be found in Appendix III.

The remaining transects are located south of the developed zone. Not only is the island relatively wider in this zone, but the higher dunes reduce overwash and salt spray. Wooded areas are both more numerous and more developed and, in general, there appears to be a greater number of plant communities. As a consequence, one would expect to establish a greater number of photo-point sites along these three transects than along those in the northern section.

III. PROTOCOL

This section is intended for use as a manual for the future implementation of a system of photo-point documentation of vegetative and topographic changes on the island. As requested by the resource manager, it contains a brief explanation of the purpose of such a system as well as the technical details concerning its implementation. Since the location of the proposed system of transects and individual sites was already described in the preceding section, it will not be repeated here. However, the entire protocol, including the location of the sites, is summarized in the form of tables and diagrams for easy reference in Appendix II. Finally, since it is possible that the actual work will be done by seasonal workers, we assumed a minimal level of photographic expertise and/or sophistication in data collection.

A. INTRODUCTION

A series of transects and individual photo-point sites were chosen to best represent the major vegetative communities on the island and those most vulnerable to change. The description and distribution of the different vegetative communities, as well as the location of areas critical for the protection of rare plant species and specific plant communities, were obtained from Hill's maps and studies (1984a, 1984b, 1985). A map of the park infrastructure, developed zone, and visitor-use areas was used to locate areas likely to be impacted by human use. Likewise, areas most likely to change due to geomorphic factors were identified from topographic maps and previous studies (Anonymous, 1986c). Periodic-ground level photographs of the landscapes at these sites can be used to monitor vegetative changes and to indicate areas of potential concern to resource management. Such a system of photographs can also be used to support other research efforts and to illustrate educational programs and presentations.

Consistency, accuracy, and simplicity are the overriding concerns of the methodology presented. For photographs to be comparable, both between sites and over time for the same site, the same equipment, techniques, and conditions should be reproduced for each photo. Changes in the amount of light and the angle of illumination, for example, can distort the color and texture of the photograph. This, in turn, can lead to erroneous interpretations as to the status of the vegetation (Magill, 1989). In a similar fashion, inconsistencies in the placement of the camera with

respect to the subject can alter the perception of the relative sizes of the objects being photographed and lead to misinterpretations. Finally, the techniques must be simple and broken down in a stepwise fashion to facilitate their reproducibility.

B. GENERAL CONSIDERATIONS

Since vegetation, weather and lighting vary seasonally, all photos should be taken during a specified seasonal window and at the same time of day. We recommend the months of May and June because of spring growth. Furthermore, new photographs of old photo-point sites should be taken within 10 calendar days of the date of the previous photo. For example, if the previous photograph was taken on May 5, the new photograph could be taken from May 1 through May 5 on a day with comparable weather and cloud conditions. We also recommend that the pictures be taken as close to high noon as possible to avoid shadows. This eliminates the need to consider the angle of illumination when trying to re-create the view in an old photograph.

Adequate documentation is essential for accurate replication and analysis of the photographs. Each roll of film should be assigned a number and a running film log maintained to keep track of the content and status of each roll.

Documentation for each site should include the ID number, date, location and time. General weather conditions including cloud cover and light conditions should be recorded. Camera type, settings, and angle, as well as lens and tripod height should also

be noted. Some comment concerning the condition of the site and of the marker should be made. Any problems with re-locating the site should be noted as should any deviation from the standard equipment, procedures and/or previous photographic conditions. The frame number for each picture should copied from the camera display and the number of the film roll recorded. A sample documentation form is included in Table 7 (Appendix II).

Previous photographs were taken at 10 year intervals, in 1972 and 1982, respectively. Because of the effects of chronic erosion and storm-induced topographical changes, however, we recommend that the photos be repeated at five year intervals. Magill (1989) recommended 3 to 5 years for optimal detection of problems with vegetation. Thus, severe changes resulting from storm events, beach nourishment and/or dune construction projects, and other factors may necessitate documentation at shorter intervals.

C. PHOTO-POINT SITE LOCATION

Photo-point site location involves two aspects: the re-location of sites previously photographed and the determination of the physical location of the new sites proposed in this study. Successful re-location of photo-point sites depends on the accuracy and clarity of the field description.

The field description of each photo-point site should include, if possible, either Loran or GPS coordinates. The UTM coordinates, however, should be adequate to find the general area and specific directions should help identify the exact spot. Ideally such

directions should consist of distances and compass bearings based on relatively permanent landmarks such as telephone poles, existing roads and structures, and marked trails and dune crossings. However, in the northern portion where there are no telephone poles or dune crossings, it may be advisable to use landmarks on the mainland as well. The location of sites in this area, for example, might be described in relation to the water towers in Berlin and Ocean City. If the location of the ground markers for aerial photography or the geological markers are known, they too can be used as reference points in the site descriptions.

Once the photo-point site has been located, the field description should specify the compass orientation of the camera. Access to field copies of the previous photographs will greatly facilitate the process of pin-pointing the exact view to be replicated. Most of the sites photographed in 1972 and 1982 lack adequate field descriptions and accurate re-location will depend largely on matching the view in the old photograph with the present landscape.

A careful comparison of the old photograph and the view at hand can be facilitated by the use of a transparent grid. The grid allows a more precise estimation of the area occupied by certain features (such as telephone poles or large vegetation clumps) by counting the number of grid-squares that it occupies. The relative location of a feature can be specified by counting the number of squares up and over to the feature. This technique has been employed previously in the photo-documentation of salt marsh

recovery after oil spills (Demanche, personal communication). Further explanation of its use will be included in the field procedures.

Two alternative methods are proposed for the actual determination of the number and location of photo-point sites along each transect. The first method involves specifying a standard interval, such as 100 m, between photo-point sites. The intersection of the transect with the beach would be specified by UTM coordinates and/or distance from the inlet and the first photo-point site could be established at this spot. From here, one would simply use the meter tape to measure the specified interval along a line drawn across the island according to a given compass bearing. Since magnetic north will vary over time, documentation of the date along with the actual compass reading should be made. Thus, if the established interval were 100 m, a separate photo-point site would be established every 100 m across the breadth of the island.

The second method may require several visits to each transect before the definitive locations of the sites can be determined. While these can be estimated from the maps and existing information, the definitive determination is made on the basis of a visual evaluation of the different communities along a given transect line. Again, the location of the transect will be given either in terms of the distance from the inlet or the UTM coordinates of the point where it intersects the beach. The transect line should extend in a specified compass direction from

this point. A photo-point site will be chosen to represent each of the major vegetative communities along this line. We recommend that one first walk directly to the bayside and establish the first site there. Photographs taken from this site will include views of the mainland shore. The remaining sites can be established and marked on the walk back.

The first method has the advantage of standardizing the location of the photo-point sites and site location is less subjective. Moreover, site re-location does not depend heavily on landmarks that may be obliterated by storm events. The use of standard, measured intervals also allows some estimate of the areas and positions of specific plant communities. This, in turn, may contribute towards more meaningful comparisons between photographs. However, depending on the interval specified and the width of the island, it may result in a rather large number of sites. While the second method would probably involve fewer sites, the selection of "representative" sites may involve too much subjectivity. Also, re-location of the sites may depend more heavily on field descriptions referenced to landmarks. This might entail some difficulties in the case of storm-induced changes in the general landscape and landmarks.

D. EQUIPMENT

Use of the same type of camera and film will reduce variations caused by equipment. We recommend a 35 mm camera with automatic focus and metering options. Use of the automatic options minimizes

both the skill level required and variations between individual photographers. In addition to the standard 50 mm lens, we recommend the use of a zoom lens. The adjustable focal length (28-108 mm) allows greater flexibility and facilitates the process of replication. Use of a tripod, at a specified height and angle, is also necessary to ensure consistent camera placement. Kodachrome color slide film, ASA 64, is recommended because of the permanency of the color. Prints can be made from this type of film and field copies should be made available when sites are to be re-photographed. This film speed offers the highest resolution and lighting should be adequate if the pictures are taken at high noon.

All photographs should have a consistent scale reference against which the approximate size of the vegetation can be judged. The man standing in most of the 1972 and 1982 photos roughly served this purpose. Thus, vegetation that was ankle height in 1972, looked to be knee height in 1982. However, the size and placement of the person was not uniform. For this reason, we recommend use of a surveyors' staff or other post with visible markings to standardize the scale reference. A free-standing post or one that could be stuck in the ground, a fixed distance from the tripod, would eliminate the need to use a person in the photo. Finally, the scale reference should be consistently located in the same spot in the photo (eg. the lower right hand quadrant).

Each photograph should also contain an identifying frame marker in order to avoid later identification problems. This marker could simply consist of a small dry-erase board. At each

site, the appropriate UTM coordinates and/or other identifying information could be written on this board for inclusion in the picture. A system for site identification on this marker is described in the field procedure.

Additional equipment required includes posting materials to mark the sites, acetate grids with 1/4" squares, and pre-printed documentation forms to be filled out at each site. The acetate grids should be the size of the finished photographs (8" x 10") and need to be set in a cardboard frame for durability. The use of these grids for the replication and analysis of the photographs will be explained in the field procedure. A sample grid can be found in Appendix V. While this procedure is based on the use of maps, compass, and meter tape, the use of a Loran or GPS system in the future could simplify re-location of photo point sites. Table 8 (Appendix II) itemizes the recommended equipment.

E. FIELD PROCEDURE

Adequate planning and preparation is essential for the photographic sessions to run smoothly and to obtain the most reliable results. Plan the sessions to fall within the specified seasonal window, on a day with comparable weather conditions and cloud coverage. Try to schedule them as close to the middle of the day as possible.

Assemble all equipment and review its operation. Follow the manufacturers' instructions for operation and maintenance of the

equipment. Practice specific procedures as necessary and review the documentation sheets.

Documentation of previous photographs should be consulted for details concerning the field conditions and the optimal dates and times for each photo. In addition, the previous photographs themselves should be examined. If enough acetate grids are available, these can be used to record the approximate size and location of the landmarks and scale references in the old pictures. This is done by overlaying the transparent grid on top of the old photograph. The area of specific features, such as a telephone pole, man, or clump of vegetation, can be estimated by counting the number of grid-squares it occupies. Its location can be specified by counting the number of squares up and over to the feature. Erasable markers can be used to sketch these features directly on the grid.

Go over the entire procedure for setting up new photo-point sites and for re-locating old sites. The general location of the sites can be determined by the UTM coordinates and the map and the field description should provide enough information to locate the site marker. It may be necessary, however, to spend some time in the field relocating some of the more difficult sites before the actual photographic session. Use of a Loran or GPS system would greatly facilitate this.

Once the site has been pinpointed, use the field description to orient the camera and set up the tripod. For sites with previous photos and sketchy documentation, verify this by comparing

the view through the camera with that in the previous photo. For documented sites, replicate the compass bearings for orientation of camera, distance from camera to stakes and/or visual references, and tripod height.

More precise replication of previous photos can be obtained by using the grid. Hold up the marked grid and look through it. Alternate between looking at the field copy of the photo and through the grid at the actual view. Adjust the lens and/or move slightly forward or backward until the view through the grid matches that in the photo. The visual reference points, shadows, and vegetation should occupy (as much as possible) the same number of grid squares, and occupy the same position, as they do in the old photograph. Make adjustments in the placement, height, and angle of the tripod and camera to get as close as possible to the original view. Place the scale reference and frame marker in the same position as the previous photographs.

To place the camera for new photos, put the tripod in the spot designated in the field description. We recommend that photographs be taken of each compass direction (ie. due north, east, south, and west) at each site. Follow a standard routine and always begin with north, east next, then south, and west. Use the compass to orient the camera due north. Follow the procedure outlined below for taking pictures of each compass directions. Remember to change the compass direction on the frame marker after you rotate the camera.

Place the completed frame marker and scale reference a fixed distance from the tripod in this direction. The frame marker should be filled out and placed in a consistent position in the photograph. Information on the frame marker for the replication of previous photographs should include the date, the number of the old photograph and something to indicate the location of the site (ie. Loran or UTM coordinates, or compass bearings). Possible methods of recording this information concisely on the frame marker are given in Table 9 (Appendix II).

Once the equipment is in place, a final camera check should be made before taking the picture. Check the film and load if necessary. Follow the manufacturer's directions to adjust the camera settings, the lens, shutter speed, and light meter (if used). Use the automatic options for setting the aperture-shutter ratio and focussing when possible.

Snap duplicate pictures with the camera in the same position. This provides a second, "back-up" negative to be kept on file. For old sites, this will mean 2 photos that replicate the old picture as much as possible. For new sites, this will mean 2 photos of the view at each compass direction for a total of 8 pictures per site.

Complete the documentation before leaving the site. Leave the tripod legs extended until you return to the Visitors' Center. Clean the sand off and re-lubricate if necessary before retracting them. Tables 10 through 13 (Appendix II) summarize the field procedures just described.

F. STORAGE AND ANALYSIS

The finished rolls of film should be stored in labeled plastic canisters and processed as soon as possible. All instructions given by the manufacturer for the processing and storage of the slides, prints, and negatives should be followed. If two shots have been taken of each view and/or site, there should be two identical negatives. One is to be archived and the other kept as a working copy. Likewise, one set of prints and/or slides should also be filed while the other can be used for presentations and future field work. Protective covers should be provided for the field copies of the prints.

Sophisticated image analysis available through current technology allows fairly extensive analysis of photographic data. While a discussion of these techniques is beyond the scope of this paper, several low-tech options can be used to at least systematize the comparison of the photographs.

Acetate grids (such as those used in the field) can be laid over the two photographs to be compared. As in the field procedure, areas occupied by certain features can be estimated by counting the number of squares occupied. This allows for more precise comparisons of plant size, status, and coverage.

A similar system of comparison based on the use of a grid was described by Magill (1989). He recommended the side-by-side projection of color slides on backdrops with identical grids. Use of slides allowed one to magnify details that might otherwise be hard to observe. In addition, he emphasized the importance of

following a standard viewing procedure. This entailed always starting with the same part of each picture. The picture would then be scanned from left to right with attention first to the background vegetation. Trees or other large vegetation could then be counted.

If repeat photographs are exact enough, projections of slides could be superimposed. Images taken over several years could also be scanned into a computer and compiled chronologically to obtain an "animated" history of the changes in vegetation over the given time period.

IV. Sample Photos

Sample photographs and slides were taken of four sites along Transect 1, several in the developed area, and site #89 (previously photographed in both 1972 and 1982). While the basic protocol outlined above was followed, some parameters (such as distance between tripod and frame marker) varied as we experimented to find the optimal arrangements. Sample photos and slides can be found in Appendix III.

PLANS FOR IMPLEMENTATION

The protocol and identification of this series of photo-point sites can be used in the future by park personnel to implement a program of photo-documentation. We feel that the combined use of transects and individual sites would provide adequate coverage of the major vegetative communities on the island as they respond to topographic and demographic pressures. Furthermore, inclusion of the subset of 1971 and 1982 sites would add an historical perspective to the current photos. Some of these old sites may actually be included when the transects sites are mapped out. In addition, the sites previously identified in Tom's Cove could be re-photographed and integrated into the set.

The major expenses for such a project entail the photographic equipment (which the park already owns) and the ongoing expenses of salaries and photographic supplies. At least two people should work on the project together and it is difficult to estimate the amount of time it would require. The re-location of the previous sites is very labor-intensive. Furthermore, some time should be spent training the people who will actually implement the program. The usefulness of the photographs will ultimately depend on their quality of the pictures themselves.

Several methodological questions will need to be worked out. The method for determining the actual sites to photograph along the transects, for example, needs to be defined. Establishing sites at fixed intervals would reduce the subjectivity in the selection of the sites. However, a useful and feasible distance would have to

be determined. Likewise, whether it is worthwhile to take photos in the four compass directions would need to be ascertained. While this may seem like a lot of redundant photos, it offers a broader view of the vegetation within a specific local.

Finally, it might be worthwhile to combine with other projects involved with photographic monitoring. While the monitoring of the disturbed areas and of the pony exclosures may require photos at more frequent intervals, other projects may not. A poster (Marion, 1991) at the recent conference in Ocean City presented a system for covering the backcountry campsites (including some that were included in this study). This type of monitoring would appear to fall within the scope of the current project.

LITERATURE CITED

Brewer, L. and D. Berrier. 1984. Photographic techniques for monitoring resource change at backcountry sites. U. S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-96. Upper Darby, PA. 13 pp.

Anonymous. 1986a. Administrative history of Assateague Island National Seashore. in General Information Papers for Assateague Island Workshop. Buckley, P.A. and N.P. Psuty (eds). 11-12.

Anonymous. 1986b. Vegetaion. in General Information Papers for Assateague Island. Buckley, P.A. and N.P. Psuty (eds). 21-27.

Anonymous. 1986c. Geomorphic and ecological relationships at the north end of Assateague Island. in General Information Papers for Assateague Island Workshop. Buckley, P.A. and N.P. Psuty (eds). 167-186.

Cox, George W. 1990. Laboratory Manual of General Ecology. Wm.C. Brown Publishers. 64, 74.

Furbish, C. E. 1990. Vegetation monitoring using transects and photo points. Unpublished in-house report for Assateague Island National Seashore.

Furbish, C. E. 1991. Dune-saltmarsh vegetaion survey. Poster presented at Assateague Island Workshop.

Hill, Stephen P. 1984a. Classification/Description. in General Information Papers for Assateague Island Workshop. Buckley, P.A. and N.P. Psuty (eds). 31-35.

Hill, Stephen P. 1984b. Vegetation map. in General Iformation Papers for Assateague Island Workshop. Buckley, P.A. and N.P. Psuty (eds). 57-59.

Hill, Stephen, P. 1985. A botanical survey of the Maryland portion of Assateague Island. Vegetation mapping: the rare or threatened vascular plant species: status and locations.

Leatherman, Stephen P. 1988. Barrier Island Handbook. Coastal Publication Series, University of Maryland, Laboratory for Coastal Studies. College Park, MD. p 1.

Magill, A. 1989. Monitoring environmental change with color slides. U. S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. General Technical Report PSW-117. Berkeley, CA. 55 pp.

Marion, J. 1991. Photo-point monitoring of back-country campsites. Poster at the 1991 Assateague Island Science Conference, Ocean City, Md.

McGiver, L. 1991. Piping plover management in Maryland. Paper presented at the 1991 Assateague Island Science Conference, Ocean City, Md.

Pierce, W.R. and L.E. Eddleman. 1970. A field stereophotography technique for range vegetation analysis. Journal of Range Management 23:218-220.

Rinehart, R., C. C. Hardy and H. G. Rosenau. 1978. Measuring trail conditions with stereo photography. Journal of Forestry 76(8):501-503.

APPENDIX I.

Summary of Criteria Used for the Selection of Photo-point Sites

Table 1. Vegetative Communities (Hill, 1984) and Critical Areas for the Protection of Rare and Threatened Plant Species (Hill, 1985)

Dune Herbaceous Zone	Beach
	Dunegrass community * narrow band short distance west of high tide * generally wider north of State Park * Ammophila breviligulata
Shrub zone	Shrub succession * single, nearly continuous community running length of island between dunegrass community (E) and several western communities * generally defined by deciduous trees, shrubs, vines
	Hudsonia * found within larger shrub succession community * more frequent south of McCabe house * defined by plant: Hudsonia tomentosa (dune stabilizer)
	Bog * best examples on easter edge of Fox Hills near old paved road at old landfill excavation sites * found between dune ridges * Single cranberry bog W of N Beach parking lot
Arborescent Zone	Woodland communities * well developed at Green Run, Scott's Point, Pine Tree canoe campground, Hungerford
Marsh Herbaceous Zone	Fresh marsh * great species diversity * important for island wildlife * several types: woodland, transition, and flatland or levels marsh (found at Fox Hill)
	Salt marsh * extensive along western shore of island * depends on regular immersion * rough water can cause silt erosion * well developed zonation along waters edge
	Washes and salt pannes * high salt buildup on level land as water evaporates * mostly barren, best developed at S end Fox Hill levels
	Ponds * drop in water level in ponds in southern portion
Disturbed Vegetation	* construction sites, former roads * areas where exotics may develop stands that crowd out native species
Critical Areas for protection of rare species	* North boundary of State Park (2 areas) * Great Egging Island * Developed zone (2 areas) * woodlands around Hungerford, Pine Tree, Scott's Point * bogs and marshes of south Fox Hills harbour

Table 2. Geomorphic zones, Topographic and Wildlife considerations

Geomorphic/ecologic zones	Defined with regards to dune form, distance of overwash penetration and vegetative types
Overwash and inlet formation zone	* Km 0 - 6 immediately south of inlet * characterized by low topography * vegetation primarily dune and shrub communities * next predicted inlet about 1.5-3 km * zone of maximum erosion +++beach major Piping plover habitat +++marshes grazed by ponies, few secretive birds
Intermediate zone	* Km 6 - 9.7 south of inlet * start of maintained duneline around McCabe House * as zone of maximum erosion and sediment starvation moves southward, this area will be affected -as zone of sediment starvation and maximum erosion moves southward, this zone will be affected * grazing of marshes by ponies
High dune zone	* Km 9.7 - 13 south of inlet * higher dunes with more stable and protected vegetative communities found here * less overwash and inlets--effect on marshes?

Table 3. Visitor Usage (Anonymous, 1986a)

Natural zone (MD)	Primitive subzone	6,000 acres west of primary duneline	
		Use	hikers/hunters
			off road vehicles on designated roads
			canoe program, camps
			former property owners
	Traditional Recreation Subsone	1,000 acres from foot of dune to water	
		Use	some foot access
			most activity cenetered around offroad vehicles
			swimming, surfing, picnics, fishing
Developed Zone	180 acres south of State Park		
	Parking lots, campgrounds, bathhouses		
	Major improvements on 1950's hydrofill area		

APPENDIX II.

Protocol:
Description of Photo-point Sites
and
Summary of Procedures

Figure 2. Location of proposed photo-point sites and transects.

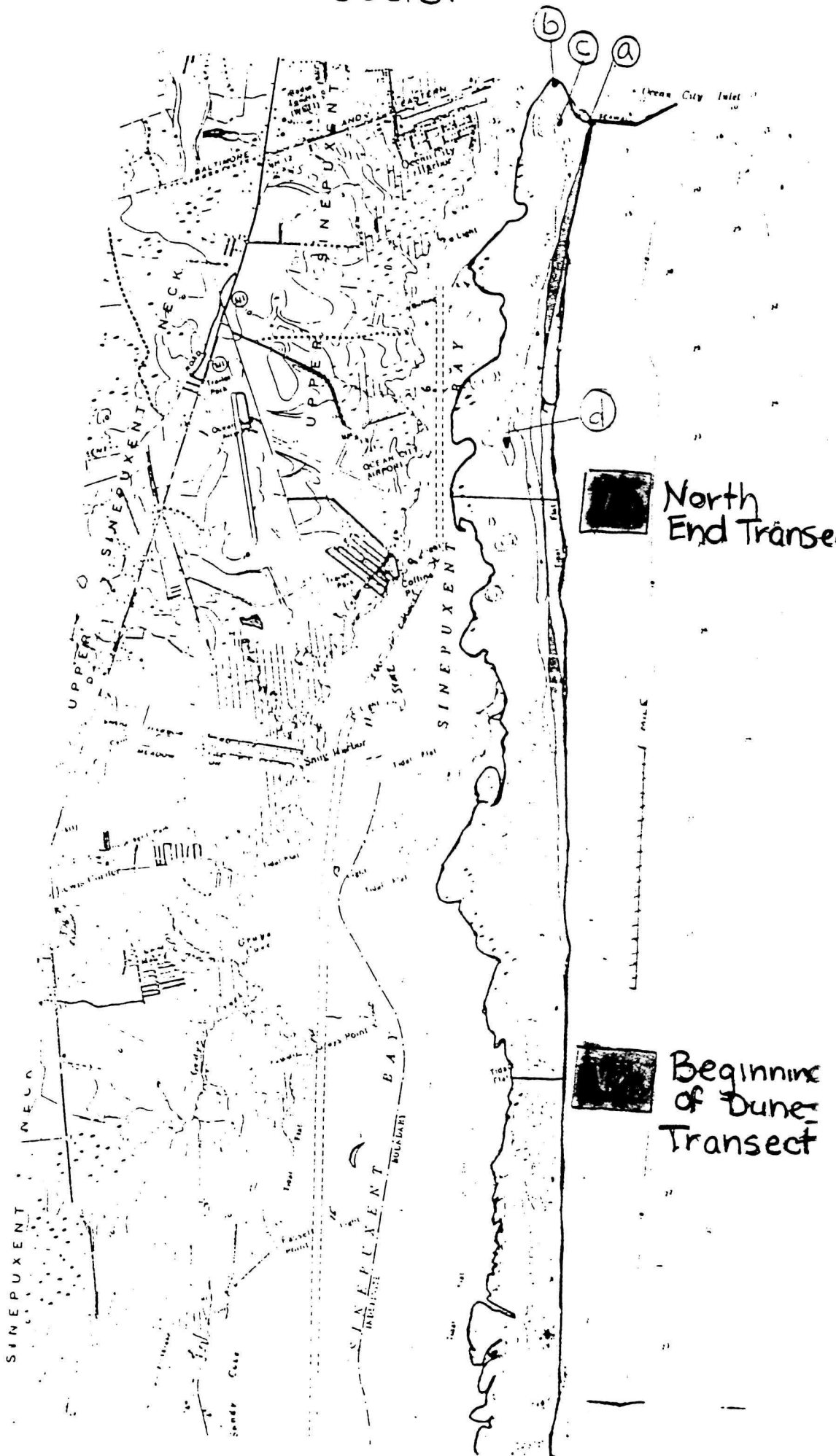
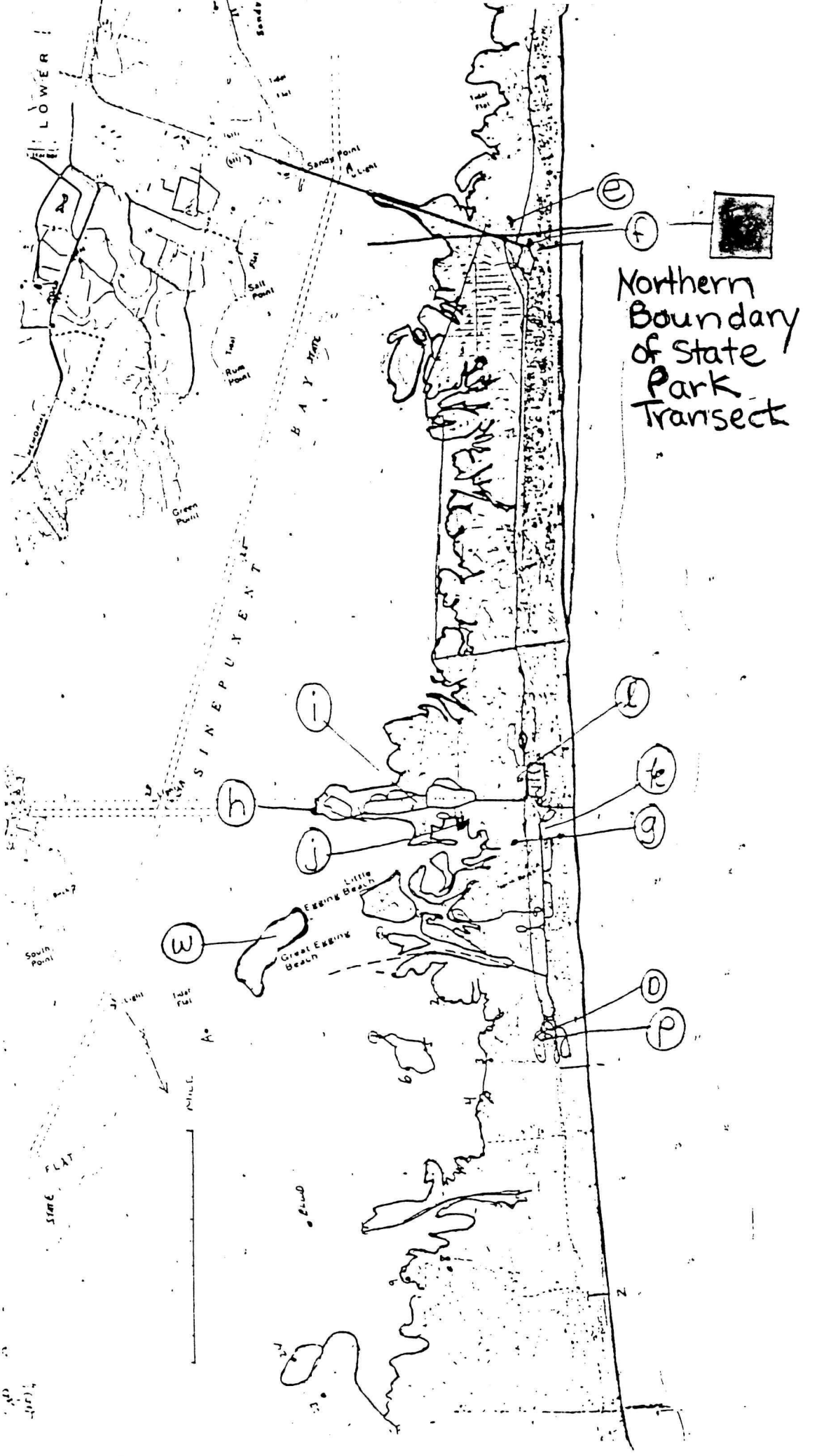
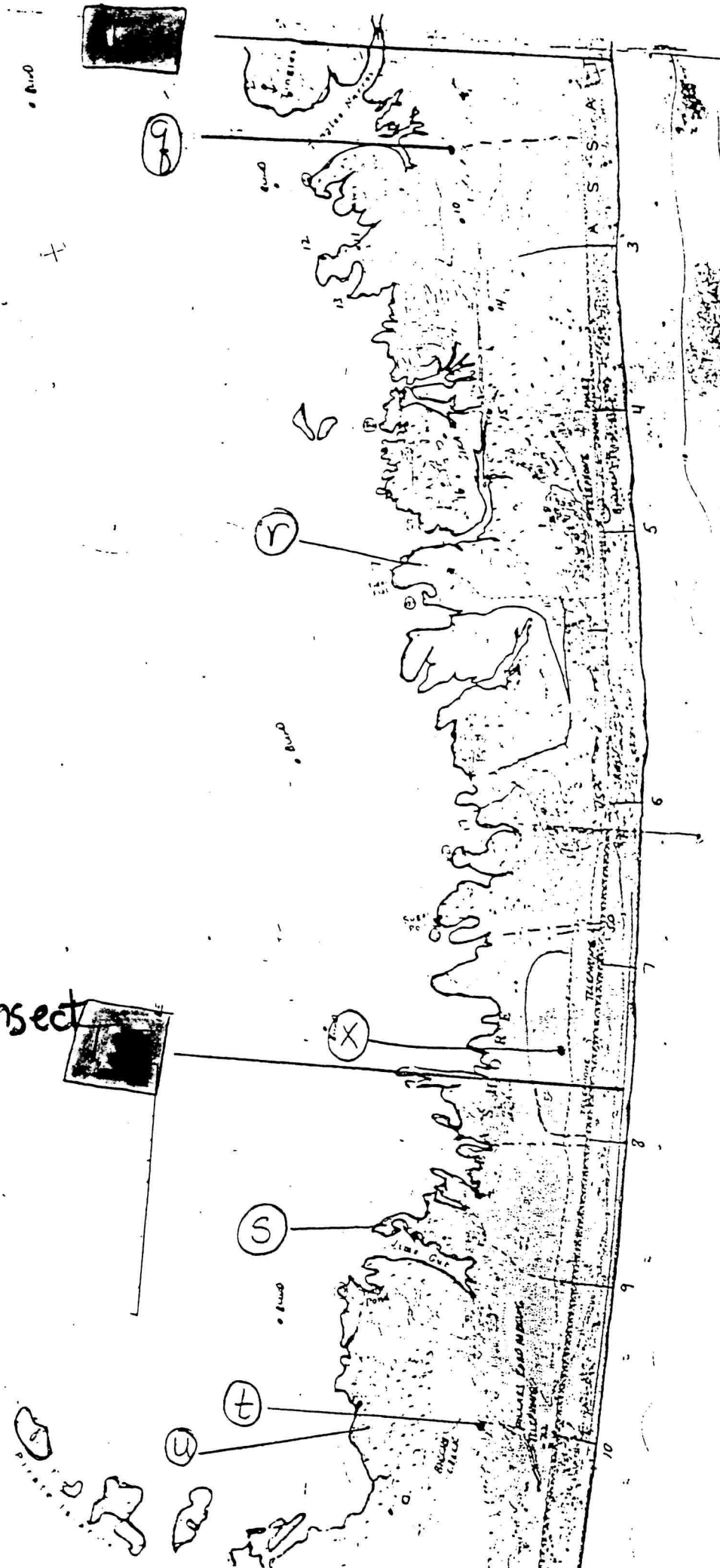


Figure 1
(b)


LOWER
Sandy Point
Light
Salt Point
Rum Point
Green Point
BAY
SINEPUXENT
Little Egging Beach
Great Egging Beach
South Point
Light
Tidal Flat
STATE
FLAT
e
f
i
l
h
k
j
g
w
D
P
Northern Boundary of State Park Transect

Tingle's Island Transect

Fox Hills Transect



Scotts Point

Table 1. Individual Photo Point Site Names and Map Symbols

Map Symbol	Site name
a	Ocean side of North tip
b	Bay side of North tip
c	Aerial marker, center of north tip
d	Pond, nothern tip
e	Marsh just N of gatehouse, McCabe Road
f	NE corner of State Park
g	Life of Forest Trail, marker 7
h	Campground peninsula tip
i	Bayside campgrounds, Campground Peninsula
j	Life of the Marsh Trail, marker 4
k	Old Ferry Landing
l	North Beach Picnic Area
m	Mowed flat marshes at N end of campground
n	Area to west of main parking lots
o	Life of the Dune Trail, entrance
p	Life of the Dune Trail, marker 13
q	Hungerford Cabin, pine woodlands
r	Pine Tree canoe campground peninsula
s	Jim's Gut canoe campground
t	Dune crossing 10 Hunting Trail, woods
u	Dune crossing 10 Hunting Trail, marsh
v	Midway between Dune crossings 11 and 12
w	Great Egging Island
x	D-Loop, Site #89

Table 2. Selection Criteria for Individual Photo Point Sites

	Site	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x
VEGTATION	Beach	x																							
	Dune	x					x						x			x	x	x							
	Shrub			x			x			x			?			x	x								
	Hudsonia						?						?			?									
	Bog														x										
	Woods							x										x			x				
	Fresh marsh				x	x								x											
	Salt marsh		x						?	x	x	x							x	x		x			x
	Pond				x																				
	Salt panne																								
	Disturbed veg					x		x	?	?	?	?	?	?		x									
	Critical veg					x	x							x	x			x	x					x	
ZONE	North end	x	x	x	x	x	x																		
	Developed zone							x	x	x	x	x	x	x	x	x	x								
	Prim. zone																	x	x	x	x	x	x		x
VISITOR USE	High use Ft T							x	?	x	x	x	x	x	x	x	x								
	Low use Ft T	x	x	x		?	?											x	x	x	x	x			
	Offroad veh.																	?	x	x					x
	Car camp									x				x											
	Canoe camp																		x	x					
	Day use	x	x	x	?	?	?	x	x	x	x	x	x	x	x	x	x	x							
TOPOGR.	High dune area							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
	Low dune area	x	x	x	x																				
	Erosion	x	x						x		x	?						?	?			?			
	Overwash area	x	x	x	x																		x		x
	Future inlet																						x		
MISC.	Mainland view	x	x						x	?	?	?						?	?	?					
	Old photo							?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?		x
	Wldlf.habitat	x																							

Table 3

Field Description and Location of Selected Individual Sites

Site ID	UTM Coordinates E / N	Site name	Field Description
H	E048510 N422895	Peninsula tip	Bayberry drive to bayside campground road Drive to the end of the road. Picture should include wall erected to slow erosion
J	E048603 N422832	Life of the Marsh trail	Follow trail to marker #4 orient camera 45% SSW picture should include both the marsh and guts.
I	E048540 N422884	Bayside campground	Picture should be taken from camp loop A facing due north.
K	E048575 N422786	Old Ferry landing	Picture should be taken from the boardwalk next to bridge due west and should include gut and marshes on either side.
G	E048611 N422760	Life of the forest trail	Follow trail to marker #7. Camera should include marker when being taken.
O	E048615 N422705	Life of the dunes trail	Point is at marker #1, marker should be included in picture with dunes in the background.
P	E048615 N422690	Life of the dunes by old road	Point used to monitor the rate of road dissipation. Located at marker #3
Q	E048448 N422416	Hungerford house	Include house in picture. Take picture facing west.
D	E049054 N423970	Airport pond	Pond located north of O.C airport approx. 1km north of transact 1.

Table 3a

Longitude and Latitude developed from UTM coordinates*

Site ID	Longitude			Latitude			Conc.		
H	-79	3	46.576	+3	48	59.752	-0	16	13.588
J	-79	3	43.558	+3	48	57.720	-0	16	13.243
I	-79	3	45.604	+3	48	59.395	-0	16	13.498
K	-79	3	44.457	+3	48	56.221	-0	16	13.197
G	-79	3	43.289	+3	48	55.382	-0	16	13.060
O	-79	3	48.151	+3	48	53.585	-0	16	12.925
P	-79	3	43.149	+3	48	53.108	-0	16	12.890
A	-79	3	25.423	+3	49	40.757	-0	16	15.077
B	-79	3	25.589	+3	49	41.763	-0	16	15.157
C	-79	3	25.906	+3	49	40.300	-0	16	15.077
T3S1	-79	3	34.396	+3	49	16.185	-0	16	15.939
T1S1	-79	3	30.830	+3	49	35.078	-0	16	15.037
T1S2	-79	3	29.439	+3	49	35.084	-0	16	14.944
T1S3	-79	3	28.372	+3	49	35.090	-0	16	14.873
D	-79	3	29.147	+3	49	34.761	-0	16	14.902
Q	-79	3	48.508	+3	48	44.181	-0	16	12.615
T	-79	3	56.074	+3	48	16.334	-0	16	11.146
U	-79	3	58.599	+3	48	16.809	-0	16	11.347

* Zone 18 code 1 (Clark 1866).

Table 6

Field Description and Location of Selected Transact Sites

Site ID	UTM Coordinates E / N	Site Location	Field description
T12S1N 3.7m	E049045 N423980	2.7km south of inlet	1.7 miles south of inlet directly across from the Ocean city airport. Bayside marsh and bay. Some mainland. Camera is facing North
T1S1E 3.7m	"	"	Bayside marsh and north end beach. Camera has been turned 45% from the previous site.
T1S1S 3.7m	"	"	Bayside marsh, the bay, and the mainland. Camera is facing South.
T1S1W 3.7m	"	"	Bay and mainland. Red and White shed from the airport is included
T1S2N 3.7m	E049078 N423980	Approx. 100m east of site 1, marked by pvc pipe.	Spartina marsh and dune spoils.
T1S2E 3.7m	"	Camera turned due east.	Beach, ocean, and dunes.
T1S2S 3.7m	"	Camera turned due south.	Spartina marsh, dunes.
T1S2W 3.7m	"	Camera turned due west.	Spartina marsh and bay.

Table 6 cont

Site ID	UTM Coordinates N / E	Site Location	Site description
T1S3N 3.7m		100m east of site 2 Camera is pointed north	Point includes Spartina marsh and shrubs.
T1S3E 3.7m		Camera is pointed due east.	Point includes dunes and beach.
T1S3S 3.7m		Camera facing due south	Point includes shrubs and marsh.
T1S3W 3.7m		Camera facing due west	Point includes mostly salt marsh.
T1S4N 3.7m		100m east of site 3. Camera facing north	Point includes dunes and beach.
T1S4E 3.7m		Camera facing east.	Point includes mostly beach.
T1S4S 3.7m		Camera facing south.	Point includes mostly dunes and beach
T1S4W 3.7m		Camera facing west.	Point includes shrubs and salt marsh.
Start of T2 transact	E048889 N423299	6km from inlet.	Point located on the beach in front of McCabe house.

SAMPLE DOCUMENTATION FORM

	DATE	TIME
ons	Cloud cover	
erent from previous photo? If so, explain:		
E	N	
dinates		
:		
er:		
y:		
ting the site? If so, explain:		
	Lens	
ed		
gle		
scale reference and tripod		
aken	Frame number(s)	
s? If so, explain:		
procedures? If not, explain:		

r/aperture

m)
8 mm)

site

ngs

ible from 10 m
anding

d

otographs

Table 9. Sample Coding Scheme for Frame Markers

a. For transect sites	tn Transect number (1-6)
	sn To indicate site number * s1 indicates the first site on the transect either on the western shore of the island or at the intersection of transect with the beach. * s2 will be the next site, s3 the next, and so forth for the length of the transect.
	Letter (N,E,S,W) designating the compass direction of the camera.
	D Distance of scale reference from tripod. * This should be a standard distances in all photos. * It should be close enough to allow the markings to be read.
b. For individual sites	ISy Individual Site Number
	L Letter (N,E,S,W) designating the compass direction of the camera
	D Distance between tripod and scale reference.
	A couple of words that describe site eg. FT marker 4 DC 11 dune DC 10 hunting trail

Table 10. General Recommendations for Photo-point Documentation.

1. Season	spring (May - June)
2. Time of day	high noon
3. Weather	clear, not overcast
4. Periodicity	every 5 years minimum
5. Equipment	same type camera and film for all photos
	assemble and review operation
	note any problems with equipment
6. Documentation	importance of consistency, accuracy
7. Background	become familiar with characteristics and distribution of major plant communities

Table 11. Methods for Identification of Photo-Point Sites Along the Transects.

a. Fixed Interval Method

1. Use the UTM coordinates and distance from the inlet to locate the intersection of the transect with the beach.
2. Establish Site 1 here just above the water line.
3. Record tidal information on the documentation form.
4. Use compass and meter tape to measure a fixed distance or interval (such as 100 m) west.
5. Establish Site two at this spot.
6. Continue to measure and mark each successive interval as you move west.
7. Establish a photo-point site at the end of each interval.
8. Establish a final site on the western edge of the island.
9. Record tidal information for this site in the documentation

b. Representative Site Method.

1. Find out about the vegetation in the areas in which the transects are located.
2. Locate the intersection of the transect with the beach by using the UTM coordinates and distance from inlet.
3. Walk west across the island to the bayside shore.
4. Notice the different plant communities and topographic features that you encounter.
5. Establish the first photo-point site here.
6. Record tidal information for this spot in the documentation
7. Retrace your steps east back towards the ocean.
8. Establish the second photo-point site in the next major vegetative community that you encounter and/or at the places where one community changes into another.
9. Continue in this manner, always going east, until you have crossed the island and returned to the starting place.

Table 12. Field Procedures for New Sites

1.	Use the map and UTM coordinates to find the general site location. (UTM coordinates should get you within 10-20 m)
2.	Pinpoint the site area according to the field description of its location and/or use of the Loran or GPS system.
3.	Use the field description to locate the site marker.
4.	Set up the tripod (fully extended) according to the field description.
5.	Complete the information on the frame marker.
6.	Measure a fixed distance (10 m) due N from tripod.
7.	Place the frame marker and visual reference post here.
8.	Orient the camera so that these always occupy the same position in the finished photo (such as the lower right hand corner).
9.	Check film; load if necessary.
10.	Use the automatic options to set aperture/shutter ratio and film speed.
11.	Focus camera.
12.	Take two identical pictures of each view.
13.	Rotate camera due east and repeat the sequence.
14.	Rotate camera due south and repeat the sequence.
15.	Rotate camera west and repeat the sequence.
16.	Leave tripod extended till returning to Visitors' Center.
17.	Complete the site documentation before leaving site.

Table 13. Field Procedures for Old Sites.

a. Locating the site.

1. Consult the documentation of the previous photo.
2. Take new photos within 5 calendar days of the previous photos (+ or -) if possible.
3. Choose a day with comparable weather and cloud conditions.
4. Take the new photo at the same time of day as the previous photo.
5. Overlay a grid on the previous photo(s) of the site to be photographed and use erasable markers to mark the position and size of * prominent vegetation * landmarks and visual references (ie. telephone poles) * size and position of shadows (to indicate the angle of illumination)
6. Use the map and UTM coordinates to find the general site location (this should get you within 10-20 m).
7. Pinpoint the site area according to the field description and/or use of the Loran or a GPS system.
8. Transects may be walked the day before to locate the markers. This may help speed things up on the actual day and allow more pictures to be taken around high noon.
9. Locate the site marker and orient yourself according to the field description.
10. Verify your position by comparing the view with that depicted in the field copy of the previous photograph.

Table 13 continued.

b. Re-photographing old sites.

1.	Hold up the grid and look through it.
2.	Alternate between looking at the field copy of the photo and the view through the grid.
3.	Adjust the lens or move slightly forward or backward untill the views match.
4.	The visual reference points, shadows, and large features should occupy the same number of grid squares and be in the same position as in the old photograph.
5.	Set up the tripod and mount the camera.
6.	Adjust the height and angle of the tripod so that the view through the camera is as close to the original view as possible.
7.	Complete the frame marker and place in the same location as in the old photo.
8.	Check and load film if necessary.
9.	Set camera speed.
10.	Use automatic options for aperture/shutter ration.
11.	Focus camera.
12.	Snap at least 2 identical pictures.
13.	Complete documentation before leaving site.
14.	Leave tripod legs extended until returned to V. Center.

APPENDIX III.

Sample Photographs and Slides

Scanning and Printing Photographs

Scanning:

This method of scanning can only be done using the Scanning Gallery program and the Hewlett-Packard Scan Jet Scanner. Be sure that the machine is set to scan 256 shades of grey. Place the picture face down on the Scanner's glass screen right beside the orange arrow. Lower the lid and then move the cursor over **preview scan** and press return. The picture will soon appear on the video screen after which you must place the cursor over the scanned image and with the left key on the mouse depressed move the cursor over the area of the image you wish to scan. Release the button and select the **Scan** option. The program will ask you for a file name in this way: **Unnamed.TIF**. Delete the word unnamed and type **c:\ your filename.TIF**. Press return and the image is now converted into a file.

Printing:

This set of instructions deals specifically with the publishing system AMI PRO. In order to import a picture one must create a graphics window. This is done by moving the cursor using the mouse to the upper left hand portion of the screen that contains the symbol shaped as a box. Press the left key on the mouse and move back onto the main screen. Starting at the upper left hand portion of the screen move the mouse downward and to the right until the box is as large as you want the imported picture to be and lift your finger off the button. Next move the cursor to the heading entitled **File** at the top of the screen and press return. Move the cursor down the list of selections to import/export and press return. Be sure to select the type of file you wish to import, such as PCX or TIFF file. Move the cursor over to the filename box and go down to the symbol [-a-]. Press return and a list of files should appear over this symbol. Select your file and press return. After the picture appears on screen move the cursor over to **File** and click the left button on the mouse again. Move the cursor down the selection list until you see the word **Print** and then click the mouse button. Now the scanned image is printed to make a hard copy of the picture file.

72 hours to print

APPENDIX IV.

Sample Grid