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Comparison of Four Scales of Color Infrared Photography for Wetland Mapping in Maryland

U.S. Department of the Interior
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Comparisons of Four Scales of Color Infrared Photography for Wetland Mapping in Maryland

by

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INTRODUCTION

The U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI) Project is producing a series of large-scale (1:24,000) wetland maps for the country. The NWI maps show the location, size, shape, and type of wetlands within specific geographic areas. These data are collected through stereoscopic interpretation of aerial photographs. Given the national scope and budgetary constraints of the NWI Project, high-altitude aerial photography (currently 1:58,000 color infrared; formerly 1:80,000 panchromatic) is the source imagery used to prepare these maps. Color infrared photography is superior to the panchromatic (black and white) film for wetland identification and is now the standard imagery used by the NWI Project. Differences in scale also provide increased resolution allowing for smaller wetlands and more detailed boundaries to be delineated. The 1:58,000 color infrared photography was used to produce the current NWI maps for Maryland.

The Nontidal Wetlands Division of Maryland's Water Resources Administration (WRA) is responsible for developing programs to protect, preserve, and manage the state's inland or nontidal wetlands. While the WRA supported the production of NWI maps statewide, they recognized the potential limitations of the maps for local use due to the photo scale. They also realized that individual counties and municipalities may want to conduct more detailed inventories within their jurisdictions. To help these local governments, WRA wanted to be able to provide guidance on photointerpretation alternatives to performing labor-intensive and costly on-the-ground surveys. Consequently, the WRA provided funds to the Fish and Wildlife Service through an existing cooperative agreement to conduct a study designed to evaluate the differences between four scales of color infrared photography for mapping wetlands.

The objectives of this study were: (1) to compare four scales of color infrared photographs for identifying wetlands and (2) to determine differences in the effort required to interpret the photos and produce wetland maps from each photo scale. The purpose of this report is to present the findings of this study.

STUDY AREA

The Millington quad was selected for study because it represented an area with numerous small wetland basins where photo scale differences might make a significant difference in the number and acreage of wetlands mapped. This area has an abundance of variously-sized temporarily flooded forested wetlands, which are among the most difficult wetlands to photointerpret. There are both small, isolated, potholelike depressional wetlands and more expansive floodplain (streamside) wetlands in this geographic area. The Millington quad would, therefore, be a good area for evaluating the minimum mapping units for each photo scale and the resolution of each for detecting various wetland types typical of Maryland's Eastern Shore.

The Millington quad is located along the Maryland-Delaware border on the upper part of the Delmarva Peninsula (Figure 1). The towns of Millington, Sassafras, Massey and Golts are included in this geographic area. Part of the Sassafras River and the upper reaches of the Chester River occur on this quad. Figure 2 presents a reduced version of the original NWI map for this area.

Figure 1. Location of Millington Quadrangle.

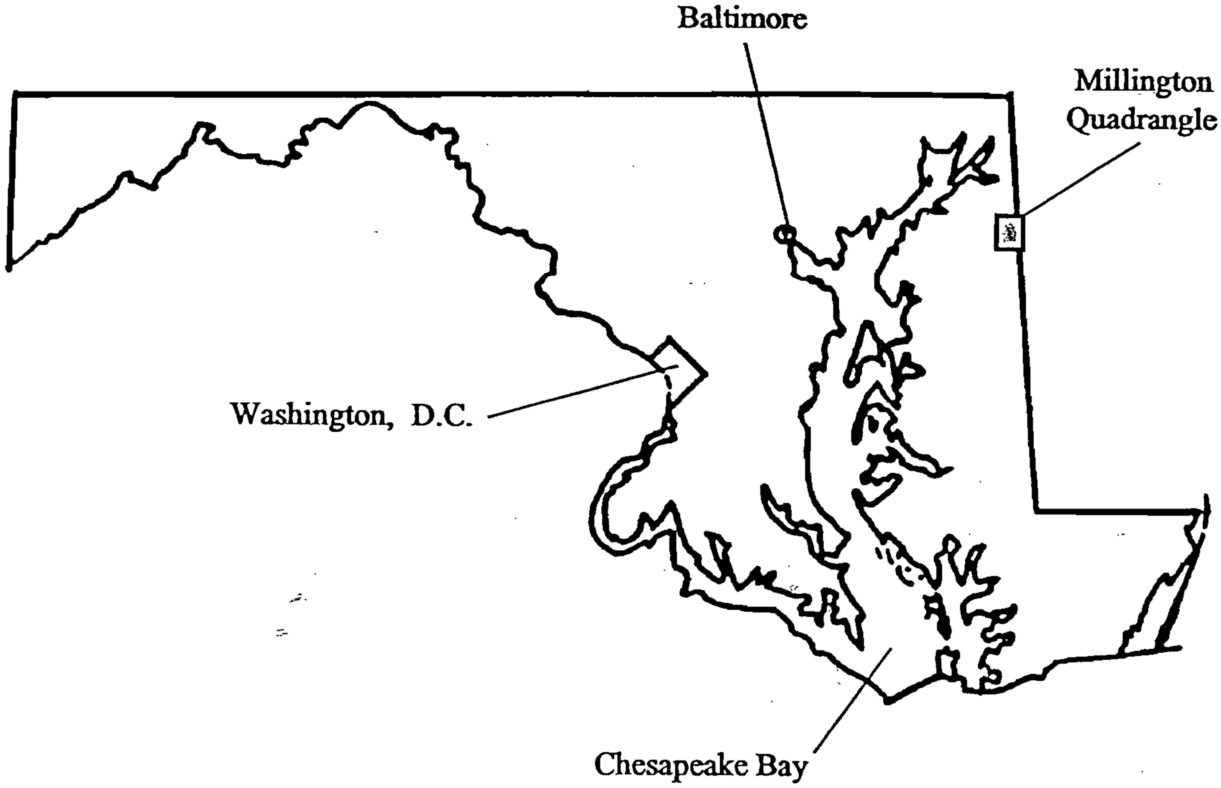
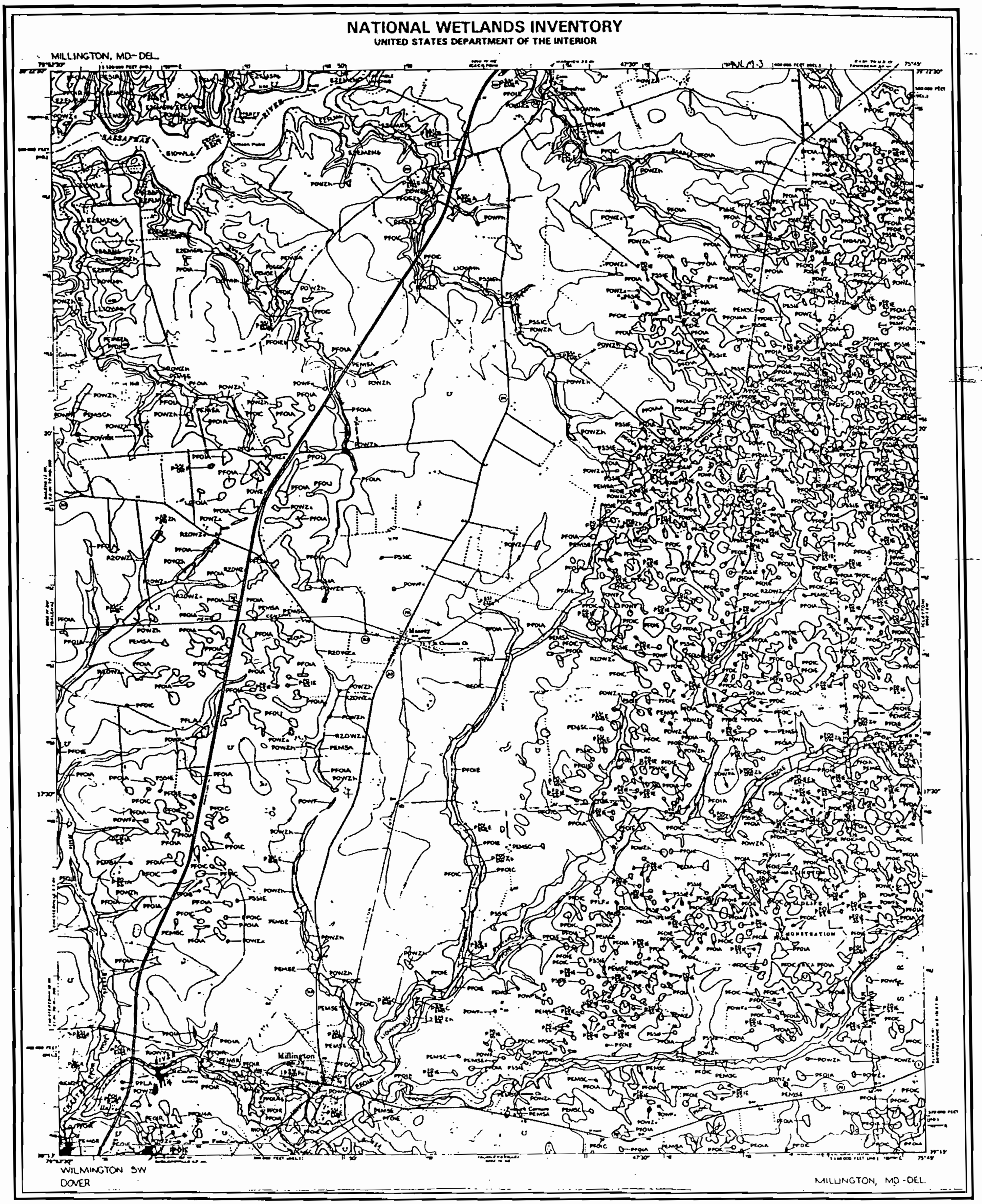


Figure 2. Original National Wetlands Inventory Map (reduced version). This wetland map was prepared from 1:58K CIR photographs



METHODS

Four scales of color infrared photographs were selected for evaluation: (1) 1:12,000 (1:12K); (2) 1:24,000 (1:24K), (3) 1:36,000 (1:36K), and (4) 1:58,000 (1:58K). These scales represent the collection of common photo scales available or readily acquired for detailed wetland mapping. Smaller scales were considered inadequate, since they would not improve the resolution and accuracy of existing NWI maps. Comparisons between the chosen scales would prove most useful for improving upon the results of the Service's National Wetlands Inventory.

Aerial photos for the three larger scales were specially acquired for this project on March 24, 1987. The 1:58K photos (the basis for the existing NWI map) were acquired in March 1982 by the U.S. Geological Survey's National High-Altitude Photography Program.

Conventional stereoscopic photointerpretation techniques were used to delineate wetlands at each scale. Wetlands were classified according to the U.S. Fish and Wildlife Service's *Classification of Wetlands and Deepwater Habitats* (Cowardin, et al. 1979), following standard NWI photointerpretation conventions (National Wetlands Inventory 1990a).

To minimize discrepancies and inconsistencies between different photo interpreters, a single interpreter classified the three larger scales of photography. The 1:24K scale was interpreted first, then the 1:36K and finally the 1:12K. This order of interpretation was intended to reduce the amount of transferrable information that the interpreter might use in delineating the next scale. The complexity of the area's wetlands further minimized this possibility. The 1:58K photos had previously been interpreted by another photointerpreter to produce the existing National Wetlands Inventory map for the Millington quadrangle. The newly interpreted photographs were sent to NWI headquarters in St. Petersburg, Florida for national quality control and consistency review.

Each set of interpretations for each photo scale were transferred using a Bausch and Lomb zoom transfer scope to a 1:24,000 U.S. Geological Survey topographic base map to produce a draft NWI map overlay. Four such overlays were produced for comparison. These mylar overlays were used to evaluate differences in wetland delineations between the following scales of photography: 1:12K vs. 1:24K; 1:12K vs. 1:36K; 1:24K vs. 1:36K; 1:24K vs. 1:58K; and 1:36K vs. 1:58K. There was no comparison made between 1:12K vs. 1:58K because the difference in scale allowed such detailed delineations at the 1:12K scale that comparison to the 1:58,000 would be of little value. Moreover, comparisons between the 1:58K scale and the other larger scales should point out any significant differences among them.

Overlays derived from two different scales were superimposed on one another to detect differences. Areas of disagreement between the overlays were highlighted: unique (separate) polygons representing individual wetland basins and partial polygons reflecting differences in the wetland boundaries. Areas where interpretations overlapped were considered areas of agreement and further evaluation was not conducted. Differences in wetland classification within these areas were not analyzed, since numerous areas would be expected to change classification due to mapping detail and guidelines. Moreover, the primary objective of any wetland inventory is first and foremost to accurately separate wetlands from nonwetlands. There is little question that with increasing photo scale, one can identify and classify smaller units of wetland types within individual wetland complexes.

During the course of the study, records were kept on the amount of labor expended in various steps. This was done to obtain information on increasing labor required to produce wetland inventories from various photo scales.

RESULTS

The results of this photo scale comparison are chiefly presented in Tables 1 through 10 at the end of this report. Highlights of this study are presented in the following subsections.

Minimum Mapping Unit

With increasing photo scale, it becomes possible to identify smaller and smaller features. It was therefore expected that the 1:12K would allow for the detection and mapping of additional smaller individual wetlands as well as mapping more detail within larger wetlands than could be accomplished at the other photo scales. Tables 1 through 4 present comparative data for mapping of individual wetlands. Figures 3, 4, 5, and 6 show examples of mapping detail for the same area on maps produced from 1:12K, 1:24K, 1:36K, and 1:58K photos, respectively. Increasing mapping detail with increasing photo scale is apparent upon examination of these figures.

The 1:12K photos allowed for 464 more wetlands representing 82.5 more acres to be mapped than the 1:24K photos and 580 more wetlands or 126.2 more acres than the 1:36K photos (Table 1). The biggest difference by size class was, as expected, in size classes 1 (0.1 - 0.2 acres) and 2 (0.3 - 0.5 acres) which accounted for 96.8 percent of the difference in number of wetlands and 75.8 percent of the differences in wetland acreage of those wetlands between 1:12K and 1:24K photos. Size class 1 alone accounted for 86 percent of the additional wetlands and 54.8 percent of the acreage difference at these scales. Results between 1:12K vs. 1:36K showed that 547 additional small wetlands (0.5 acres or less) amounting to 90.4 acres were identified on the 1:12K photos. This accounted for 94.3 percent of the difference in number of unique polygons and 71.6 percent of the difference in acreage of these polygons between these two scales. (Note: A unique polygon represents an individual wetland basin that was identified at one scale and not the other.)

Although 1:12K was not directly compared with 1:58K, the comparisons between the smaller scales and 1:58K provided interesting results. The acreage of unique polygons on the 1:58K interpretations was greater than the acreage of similar polygons on either the 1:36K or 1:24K imagery (Table 4). This was due to the higher number of wetlands in size class 4 (greater than 1.0 acres) which likely resulted from generalized mapping with more upland inclusions on the 1:58K. Moreover, wetland losses between 1982 (the date of the 1:58K photos) and 1987 (the date for the other photos) probably accounted for much of the "missing" polygons. The larger scales (1:24K and 1:36K), however, allowed identification of many more small wetlands (size classes 1 and 2) than the 1:58K did: 389 vs. 26 (1:24K vs. 1:58K) and 287 vs. 44 (1:36K vs. 1:58K).

Differences in Wetland Acreage

The study focused on evaluating differences between the maps prepared from the different scales of photography and essentially ignored areas of agreement which represented upwards of 90 percent of the mapped areas among the larger scales. The results from the 1:58K image, however, were substantially different from the results of the larger scales. The 1:58K identified 4307.5 acres of wetlands and deepwater habitats for 1982. Interpretation of the 1:36K photos yielded only 85 percent of this total and the 1:24K only 82 percent of it. These differences were mostly likely, due to the small scale and resultant generalized mapping and the age of the 1:58K photos (1982) vs. the other photos (1987). The latter factor may account for some of the difference in total acreage, since some wetland acreage was undoubtedly converted to nonwetland during the five-year period. This fact reduced, to some extent, the significance of comparative results of the 1:58K with the other scales.

Figure 3. Portion of Millington NWI Map produced from 1:12K CIR photo.

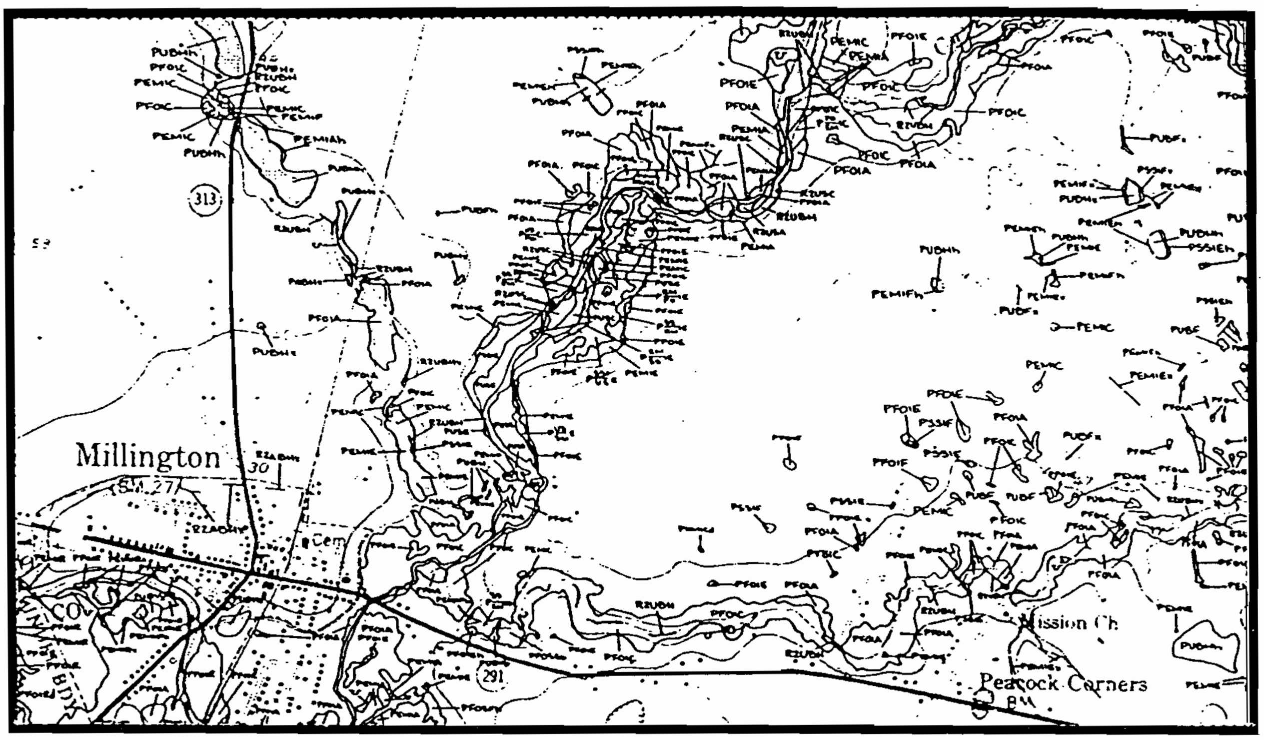


Figure 4. Portion of Millington NWI Map produced from 1:24K CIR photo.

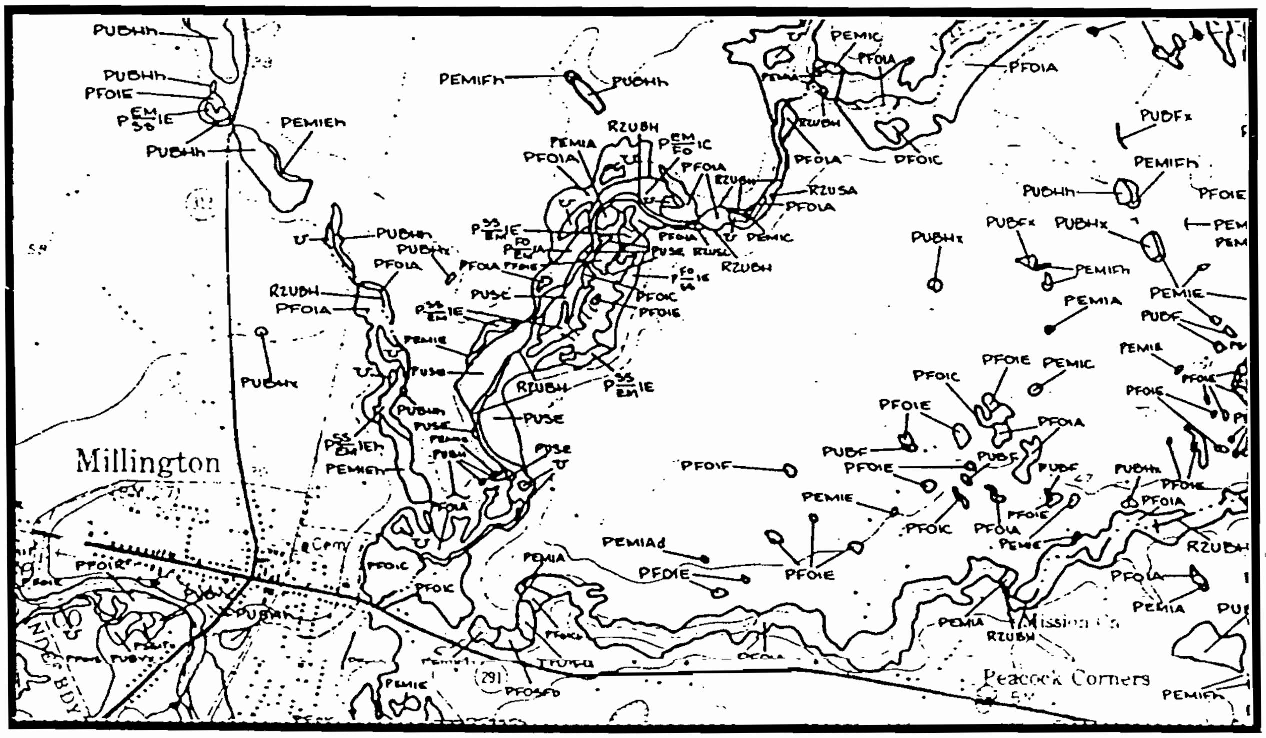


Figure 5. Portion of Millington NWI Map produced from 1:36K CIR photo.

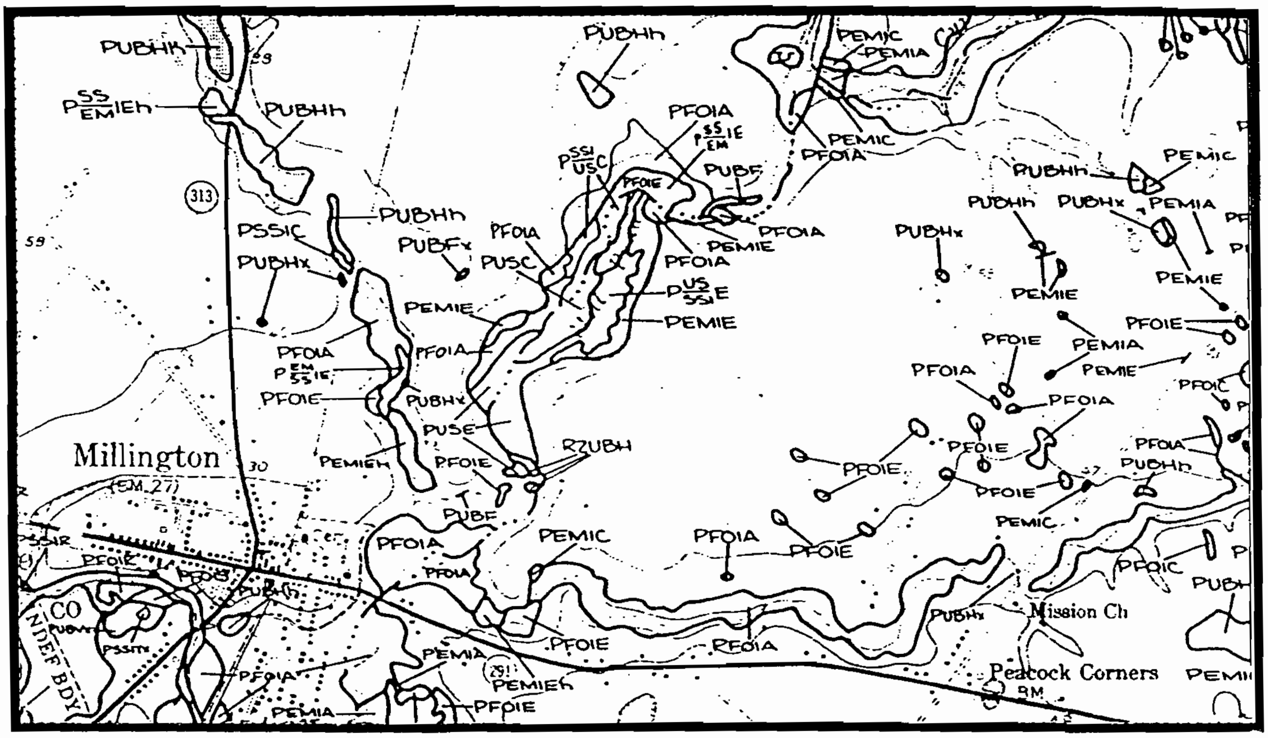
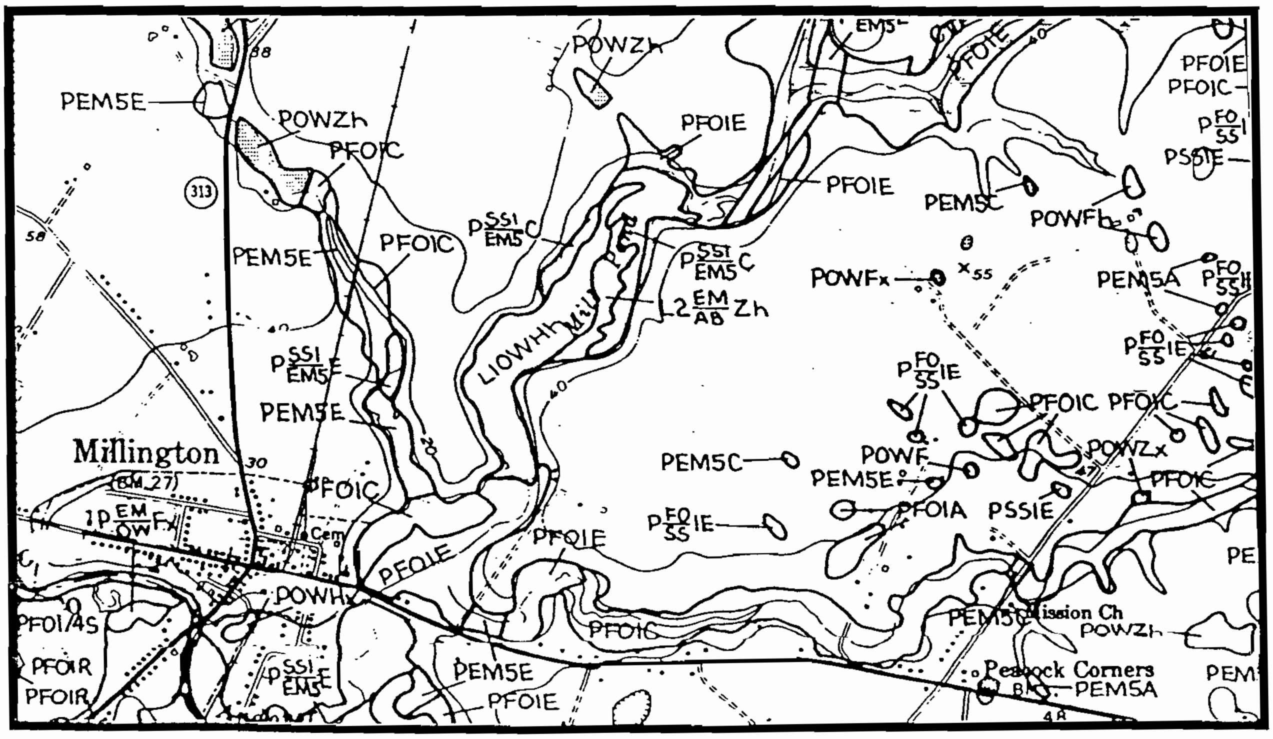


Figure 6. Portion of Millington NWI Map produced from 1:58K CIR photo.



For the larger scales, differences in total wetland and deepwater habitat acreage were rather small: 115.7 acres (1:12K vs. 1:24K), 259.5 acres (1:12K vs. 1:36K), and 43.5 acres (1:24K vs. 1:36K). Clearly the 1:12K photos produced the most acreage of wetlands. These differences generally represented a seven percent increase in total acreage from 1:36K to 1:12K, a three percent increase from 1:24K to 1:12K, and about a one percent decrease from 1:36K to 1:24K. The reason for the latter decrease may be attributed to more generalized mapping at 1:36K. Most of the increase in acreage from 1:36K and 1:24K to 1:12K was due to smaller individual wetlands being mapped (Tables 5 and 6).

Tables 5 through 9 enumerate the actual differences in unique polygons and wetland boundaries between wetland maps for the Millington quad produced by the four scales of color infrared photos. These differences were primarily attributed to palustrine forested wetlands. The temporarily flooded type (PFO1A), the most difficult wetland type to photointerpret in the study area, yielded the biggest variation. Seasonally flooded and seasonally flooded/saturated forested wetlands (PFO1C and PFO1E, respectively) accounted for most of the remaining differences.

Acreage Differences in Wetland Boundary Interpretations

With increasing photo scale, it should be possible to more accurately delineate the wetland-upland boundary. Comparisons among the larger scale photos appeared to generally support this view, as more acreage due to boundary differences was identified on the 1:12K photos than on either the 1:24K or 1:36K photos (140.7 acres vs. 107.5 acres and 233.3 acres vs. 100 acres, respectively). However, when 1:24K was compared with the 1:36K, more wetland acreage due to boundary differences was found on the latter: 244.3 acres vs. 141.8 acres. This may be due to more generalized mapping at the 1:36K, but without doing extensive field verification it was not possible to further evaluate the causes of this difference.

The 1:58K photos produced more wetland acreage than the other scales evaluated due to boundary differences: 594.6 more acres than the 1:36K photos and 749.5 more acres than the 1:24K photos. This was apparently due to more generalized mapping of wetlands and deepwater habitats, plus the difference in photo date (1982 for 1:58K and 1987 for the others). This differences also suggested that generalization of wetland boundaries at the 1:36K vs. the 1:24K may be responsible for more acreage being identified on the former, since comparisons with the 1:58K show a similar pattern.

Comparisons in Levels of Effort

To perform a meaningful evaluation of the time required to prepare a wetland map from different scales of photography, the procedures must be consistent. In the current study, we were interested in learning how much information could be collected from interpreting color infrared photographs at different scales rather than establishing a consistent map standard (i.e., minimum mapping unit) and then evaluating the time necessary to produce a map from different photos scales. To produce a map for the present study once the photos have been ordered and received, four main steps were carried out: (1) data preparation which involves cutting photos from rolls of aerial film and plotting work areas on acetate overlays, (2) photointerpretation, (3) quality control of interpreted photos, and (4) map preparation (transferring data from interpreted aerial photos to a base map). Of course, other steps would be required to produce a final NWI map, including field work, draft map review, and editing, but this was beyond the scope of the current study. Table 10 presents pertinent findings on the amount of effort required to produce a wetland map following standard NWI mapping conventions (National Wetlands Inventory, 1990b).

The number of photos required to cover a standard large-scale U.S.G.S. topographic map obviously increase with increasing photo scale. This was the reason for the enormous rise in data preparation time from 1:58K photos to 1:12K photos. It also was a key factor increasing labor for other steps, although increasing mapping detail associated with larger scale photos was the prime reason for the increased effort required during the other steps. If the desired minimum mapping unit was kept the same for all scales, the photointerpretation times undoubtedly would be more similar, with differences being more dependent on the handling time associated with the number of photos and edge matching interpreted overlays. Yet, for the present study, we were interested in assessing the varied levels of details possible through interpreting different scales of photography for the same area, so the minimum mapping unit varied with photo scale.

The time required to produce preliminary wetland maps from the four scales was as follows: 150.5 hours from 1:12K photos, 87.6 hours from 1:24K photos, 40.25 hours from 1:36K, and 24.2 hours from 1:58K. Thus, it took 6.2 times as much effort to produce a wetland map from the 1:12K photos as it did from the 1:58K, 3.6 times as long to produce a map from the 1:24K compared with the 1:58K, and 1.7 times as long from the 1:36K versus the 1:58K. About 2.2 times as much effort was required to produce a wetland map from the 1:24K photos than from the 1:36K photos. Differences in effort required to produce a wetland map, obviously translate into varied costs.

GENERAL CONCLUSIONS

The major study findings are summarized below:

1. The 1:12K photos produced the greatest acreage of wetlands compared to the other larger scales (1:36K and 1:12K), chiefly because of the ability to delineate small individual wetlands (less than 0.5 acres in size). (Note: If we permitted mapping "dot-sized" wetlands at the other two scales, the differences would be minimized.)

2. Differences between the larger scale photos are more meaningful than comparisons with the 1:58K photos since the latter were acquired in March 1982, while the former were acquired in March 1987. Thus, wetland changes during the intervening five-year period may be responsible for an unknown amount of the acreage difference.

3. Differences in total wetland and deepwater habitat acreage among the three larger scales were rather small: a seven percent increase from 1:36K to 1:12K, a three percent increase from 1:24K to 1:12K, and about a one percent decrease from 1:36K to 1:24K. Most of the increased acreage was due to smaller wetlands mapped on the 1:12K photos. The latter decrease appeared to be related to generalized mapping at 1:36K vs. 1:24K.

4. Forested wetlands accounted for the main acreage differences in unique polygons (small individual wetlands) and in refinements of wetland boundaries, with the temporarily flooded type having the greatest impact.

5. The level of effort (and subsequent costs) increased dramatically with increasing photo scale due to the number of photos and to the level of detail that can be observed and delineated. It took 6.2 times as much effort to produce a wetland map from the 1:12K photos as it did from the 1:58K, 3.6 as long as to produce a wetland map from the 1:24K compared with the 1:58K, and 1.7 times as long from the 1:36K versus the 1:58K. A wetland map produced from the 1:24K photos took 2.2 times as much effort than a similar map from the 1:36K photos. While the labor (actual hours) required to produce wetland maps for Millington is not relevant to other regions of the state, these ratios should be somewhat similar and are probably meaningful statewide.

6. For the Millington area, there were distinct advantages gained from using the 1:12K photos since many small isolated "pothole" wetlands occur in this region. In other areas of the state where such small wetlands are not abundant, less benefits are likely to be derived from this type of photography. This is especially true for areas where wetlands are essentially streamside or floodplain wetlands that are linear features along conspicuous waterways. The larger scales of photography may be useful in detecting small seepage wetlands on slopes in central and western Maryland.

RECOMMENDATIONS FOR LOCAL WETLAND INVENTORIES

The following recommendations are offered as guidance for conducting more detailed wetland inventories. They are based on the results of this study plus the experience of the authors.

1. First decide what level of detail is important. What is the smallest wetland of interest to the county or municipality? Remember that two minimum mapping units may need to be established: one for individual wetland polygons (e.g., "isolated wetlands") and another for internal wetland polygons within a wetland complex (e.g., mapping detail within an individual wetland). The former should be the smallest possible given the scale of the photography used and the intent of the inventory, while the latter should be larger, sufficient to meet the user's needs. For the latter, a minimum internal polygon size of three to five acres may be suitable for most purposes. Afterall, most users are primarily interested in the location of wetlands and classification considerations are secondary concerns. Also, the level of detail required will essentially determine the photo scale for the inventory, provided funding is not the limiting factor.

2. Realistic minimum mapping units for individual wetlands at the different scales may be: (1) about one acre at 1:58K, (2) 0.5 to 1.0 acre at 1:36K, (3) 0.25 to 0.5 at 1:24K, and (4) 0.1 to 0.25 acre at 1:12K. Smaller wetlands at these scales could be identified as "dot-sized wetlands" if necessary. For local wetland inventories, we recommend mapping wetlands of any size that are photointerpretable, regardless of photo scale, yet a minimum mapping unit for internal polygons should be established. The above minimum mapping units, however, reflect the smallest wetland that can be consistently delineated as a polygon on an aerial photo of a particular scale.

3. Field work must be conducted to verify the accuracy of the photointerpretation and as needed to identify significant wetlands that were not photointerpreted for one reason or another (e.g., seasonality of photos, temporarily flooded evergreen forested wetlands, and small linear seepage slope wetlands). These wetlands may be able to be detected on the imagery if a subtle photo signature or characteristic landscape position can be observed. Take detailed notes on each site visited, including a list of dominant and common plant species, hydric soil properties, signs of hydrology (water in or above the soil, plus indirect indicators, such as water-stained leaves, silt marks and drift lines), and any observed wildlife. A sample field form is shown in Figure 7. Locations of field sites should be recorded. All field data should be kept on file in a tabular form or entered into an computerized information management system.

4. Consider producing maps using a photo base instead of a planimetric or topographic map base. Such a photo map could be an orthophotoquad which provides sufficient ground-control for entering map data into a geographic information system (GIS), but conventional orthophotoquads are expensive. In lieu of this, simple enlargement of the aerial photo and preparing an wetland overlay (showing location of wetlands and deepwater habitats by type) may provide an inexpensive, but useful product for general planning purposes. The photo base provides an actual photo image of the area showing new facilities - roads, buildings, etc. - and current land use patterns that help users identify specific locations of wetlands. The aerial photo image can now be used to produce a digital orthophoto through existing relatively low-cost computer software systems (Parent 1991). This allows integration of the interpreted wetland data with an existing GIS.

Figure 7

NWI FIELD DATA SHEET

SITE NO. ____ **REPORTED BY:** ______________________________ **DATE:** __________

LOCATION(1:100,000 Map): ______________________ **U.S.G.S. QUAD:** ______________

TOWN: ______________ **COUNTY:** ______________ **STATE:** ________

Brief description of site relative to identifiable points on topographic map: ______________

____

(Attach copy of topographic map)

NWI MAP CLASSIFICATION: ____________ **IN-FIELD CLASSIFICATION:** ____________

DESCRIPTION OF PLANT COMMUNITY

Dominance Type: ____

Common Plants: ____

____

____

Less Common Plants: ____

____

____

____

SOILS

Soil type (Series/Map Unit) ____

_____Histosol _____Histic Epipedon (Thickness_____) _____Gleyed _____Mottled

Other Indicators ____

Munsell *Matrix* Hue and Chroma__________ Depth______; *Mottle* Hue and Chroma__________ Depth________

LIST OF HYDROLOGY INDICATORS

_____Standing Water Present _____ Depth

_____Water Marks Present (explain) ______________

_____Buttressed Trunks (Species) ______________

____

_____Peat Moss

_____Water-stained Leaves

_____Water-carried Debris

_____Other Hydrology Signs (specify) ______________________________

_____Saturated Soils Present Within__________ Inches of Ground Surface

_____Shallow Roots(Species)______________

____

_____Bare (scoured) Areas

_____Oxidized Rhizospheres

____

____

Figure 7

DISCUSSION OF PHOTO-INTERPRETATION: ____________________

____

____

WILDLIFE OBSERVATIONS: ____________________

____

____

5. Since photo acquisition costs are high due to the need for a special flight, consult with other groups in the county or municipality to see if they could benefit from this aerial photography and would be willing to share in the costs. Often, public works departments have a need for large-scale aerial photography. Managers of state and Federal parks, refuges, and forests may also be interested.

6. Regardless of the photo scale selected, it is imperative that leaf-off photos be acquired. Leaf-off photos mean that the leaves are not on deciduous woody plants (trees and shrubs). This condition permits observation of wet soils and subtle changes in the slope of the ground (topography) that would, otherwise, be obscured by the tree canopy. These photos are usually taken in early spring before leaf-out. This time of year is preferred because the ground water tables should be at their highest point and therefore many wetland soils may exhibit signs of wetness at the surface. Photos, however, should not be acquired during periods of abnormally high rainfall which may cause flooding of low-lying upland floodplains and may obscure herbaceous and shrubby vegetation in flooded wetlands. If the winter precipitation has been significantly below normal, field examination of wetlands in the area should be made prior to photo acquisition to determine whether they are sufficiently wet to be detected through photointerpretation. Be sure to consult an expert under these circumstances.

References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31 103 pp.

National Wetlands Inventory. 1990a. Photointerpretation Conventions for the National Wetlands Inventory. U.S. Fish and Wildlife Service, St. Petersburg, FL. 45 pp. plus appendices.

National Wetlands Inventory. 1990b. Cartographic Conventions for the National Wetlands Inventory. U.S. Fish and Wildlife Service, St. Petersburg, FL. 73 pp.

Parent, P. 1991. Digital orthophotography provides a new tool for GIS database integration. GIS World (November 1991): 48-49.

Table 1. Comparison between 1:12K photos and other scales for the Millington quad emphasizing unique polygons. Unique polygons represent individual wetlands mapped at one scale and not the other. Note: Polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres, and 4 = greater than 1.0 acres.

		Number of Polygons in Size Classes					Acreage of Polygons in Size Classes				
Comparative Scales	Scale	Class 1	Class 2	Class 3	Class 4	Total	Class 1	Class 2	Class 3	Class 4	Total
1:12K vs. 1:24K	1:12K	451	60	20	11	542	52.1	21.0	15.0	26.5	114.6
	1:24K	52	10	8	8	78	6.9	3.7	6.0	15.5	32.1
1:12K vs. 1:36K	1:12K	472	100	25	16	613	58.5	36.4	18.2	30.0	143.1
	1:36K	22	3	5	3	33	3.2	1.3	4.3	8.1	16.9

Table 2. Comparison between 1:24K photos and other scales for the Millington quad, emphasizing unique polygons. Unique polygons represent individual wetlands mapped at one scale and not the other. Note: Polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres 4 = greater than 1.0 acres.

		Number of Polygons in Size Classes					Acreage of Polygons in Size Classes				
Comparative Scales	Scale	Class 1	Class 2	Class 3	Class 4	Total	Class 1	Class 2	Class 3	Class 4	Total
1:24K vs. 1:12K	1:24K	52	10	8	8	78	6.9	3.7	6.0	15.5	32.1
	1:12K	451	60	20	11	542	52.1	21.0	15.0	26.5	114.6
1:24K vs. 1:36K	1:24K	183	30	18	22	253	23.9	11.1	13.5	44.2	92.7
	1:36K	42	11	14	6	73	5.2	3.8	11.0	13.7	33.7
1:24K vs. 1:58K	1:24K	294	95	36	28	453	40.2	34.9	32.9	45.1	153.1
	1:58K	5	21	37	51	114	1.0	7.7	29.2	141.2	179.1

Table 3. Comparison between 1:36K photos and other scales for the Millington quad, emphasizing unique polygons. Unique polygons represent individual wetlands mapped at one scale and not the other. Note: Polygon size classes are as follows: 1 = 0. 1- 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres, and 4 = greater than 1.0 acres.

		Number of Polygons in Size Classes					Acreage of Polygons in Size Classes				
Comparative Scales	Scale	Class 1	Class 2	Class 3	Class 4	Total	Class 1	Class 2	Class 3	Class 4	Total
1:36K vs. 1:12K	1:36K	22	3	5	3	33	3.2	1.3	4.3	8.1	16.9
	1:12K	472	100	25	16	613	58.5	36.4	18.2	30.0	143.1
1:36K vs. 1:24K	1:36K	42	11	14	6	73	5.2	3.8	11.0	13.7	33.7
	1:24K	183	30	18	22	253	23.9	11.1	13.5	44.2	92.7
1:36K vs. 1:58K	1:36K	172	115	54	32	373	27.9	42.6	40.1	71.1	181.7
	1:58K	12	32	38	64	146	2.2	12.4	29.3	178.7	222.6

Table 4. Comparison between 1:58K photos and other scales for the Millington quad, emphasizing unique polygons. Unique polygons represent individual wetland mapped at one scale and not the other. Note: Polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0. 3- 0.5 acres, 3 = 0.6 - 1.0 acres, and 4 = greater than 1.0 acres.

		Number of Polygons in Size Classes					Polygons in Size Classes				
Comparative Scales	Scale	Class 1	Class 2	Class 3	Class 4	Total	Class 1	Class 2	Class 3	Class 4	Total
1:58K vs. 1:24K	1:58 K	5	21	37	51	114	1.0	7.7	29.2	141.2	179.1
	1:24 K	294	95	36	28	453	40.2	34.9	32.9	45.1	153.1
1:58K vs. 1:36	1:58 K	12	32	38	64	146	2.2	12.4	29.3	178.7	222.6
	1:36 K	172	115	54	32	73	27.9	42.6	40	71.1	181.7

Table 5. Comparison between 1:12K photos and 1:24K photos by wetland type for Millington quad emphasizing unique polygons. <u>Note</u>: Polygon type represents unique polygons (full - F) or modified boundaries (partial - P); polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres, and 4 = greater than 1.0 acres.

		Total Acreage by Polygon Size Class on 1:12K					Total Acreage by Polygon Size Class on 1:24K					
Wetland Type	Polygon Type	Class 1	Class 2	Class 3	Class 4	Total all Classes	Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
E2EM1P	P	0.1	--	--	--	0.1	--	--	--	--	--	--
E1UBL*	P	--	--	--	0.1	--	--	--	--	--	--	--
PABF	F	0.3	--	--	--	0.3	--	--	--	--	--	--
PABF	P	0.4	--	--	--	0.4	--	--	--	--	--	--
PABH	F	0.1	--	--	--	0.1	--	--	--	--	--	0.1
PEM1B	F	--	--	--	--	--	--	0.4	--	--	0.4	0.4
PEM1A	F	2.2	--	--	1.2	3.4	0.3	0.3	--	1.3	1.9	1.5
PEM1A	P	--	0.3	0.9	1.6	2.8	0.1	--	--	--	0.1	2.7
PEM1C	F	4.3	0.3	--	--	4.6	0.3	0.5	--	--	0.8	3.8
PEM1C	P	0.5	--	--	--	0.5	--	--	--	--	--	0.5
PEM1E	F	2.9	1.4	--	--	4.3	0.9	--	--	--	0.9	3.4
PEM1E	P	0.2	0.3	--	--	0.5	0.6	--	--	--	0.6	0.1
PEM1F	F	0.7	0.7	--	--	1.4	0.2	--	0.6	--	0.8	0.6
PEM1F	P	0.4	0.3	--	--	0.7	--	--	--	--	--	0.7

Table 5 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:12K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:24K Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
PEM1/SS1C	P	--	--	--	--	--	0.2	--	--	--	0.2	0.2
PFO1A	F	22.2	11.7	11.0	20.3	65.2	2.1	0.7	4.6	12.7	20.1	45.1
PFO1A	P	12.9	15.9	25.6	45.4	99.8	6.2	16.1	18.0	49.4	89.7	10.1
PFO1C	F	8.8	4.0	1.9	1.7	16.4	1.5	1.0	--	1.5	4.0	12.4
PFO1C	P	4.1	6.3	7.4	5.0	22.8	2.1	3.1	4.8	--	10.0	12.8
PFO1E	F	6.1	2.3	0.7	--	9.1	0.9	0.5	--	--	1.4	7.7
PFO1E	P	3.0	1.4	--	1.3	5.7	1.5	1.2	0.8	--	3.5	2.2
PFO1F	F	0.1	0.3	0.8	--	1.2	--	--	0.8	--	0.8	0.4
PFO1F	P	0.3	--	--	--	0.3	--	--	--	--	--	0.3
PFO1R	P	0.3	0.3	0.9	--	1.5	0.1	0.6	--	--	0.7	0.8
PFO1S	F	0.1	0.3	--	--	0.4	--	--	--	--	--	0.4
PFO1S	P	0.2	--	0.7	--	0.9	--	--	--	--	--	0.9
PFO1/EM1C	P	--	0.5	0.6	--	1.1	--	--	--	--	--	1.1
PFO1/EM1E	P	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PSS1E	F	1.3	--	--	--	1.3	0.2	--	--	--	0.2	1.1
PSS1E	P	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PSS1C	F	0.1	--	--	--	0.1	--	--	--	--	--	0.1

Table 5 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:12K: Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:24K: Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
PSS1F	F	0.2	--	--	--	0.2	--	0.3	--	--	0.3	0.1
PSS1F	P	--	--	--	--	--	0.2	--	--	--	0.2	0.2
PSS1/EM1C	F	0.1	--	0.6	--	0.7	--	--	--	--	--	0.7
PSS1/EM1E	F	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PSS1/EM1E	P	--	0.4	--	--	0.4	--	--	--	1.2	1.2	0.8
PUBF	F	1.4	--	--	--	1.4	0.2	--	--	--	0.2	1.2
PUBF	P	0.1	--	--	--	0.1	0.1	--	--	--	0.1	0
PUBH	F	0.6	--	--	3.3	3.9	0.3	--	--	--	0.3	3.6
PUBH	P	0.5	1.2	0.6	--	2.3	0.2	--	--	--	0.2	2.1
PUSA	F	0.1	--	--	--	0.1	--	--	--	--	--	0.1
PUSC	P	--	--	--	--	--	--	0.4	0.6	--	1.0	1.0
R2ABH	F	0.1	--	--	--	0.1	--	--	--	--	--	0.1
R2UBH*	F	0.2	--	--	--	0.2	--	--	--	--	--	0.2
R2UBH*	P	0.3	--	--	--	0.3	--	--	--	--	--	0.3

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Table 6. Comparison between 1:12K photos and 1:36K photos by wetland type for Millington quad emphasizing unique polygons. <u>Note</u>: Polygon type represents unique polygons (full - F) or modified boundaries (partial - P); polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres, and 4 = greater than 1.0 acres.

		Total Acreage by Polygon Size Class on 1:12K					Total Acreage by Polygon Size Class on 1:36K					
Wetland Type	Polygon Type	Class 1	Class 2	Class 3	Class 4	Total all Classes	Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
E1UBL*	P	0.3	0.3	0.7	--	1.3	--	--	--	--	--	1.3
PABF	F	0.3	--	--	--	0.3	--	--	--	--	--	0.3
PABF	P	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PEM1A	F	1.9	1.1	--	--	3.0	0.4	--	--	--	0.4	2.6
PEM1A	P	0.2	1.6	--	1.4	3.2	--	--	--	--	--	3.2
PEM1C	F	5.7	2.2	--	--	7.9	--	--	--	--	--	7.9
PEM1C	P	0.1	0.5	0.8	--	1.4	--	0.3	--	--	0.3	1.1
PEM1E	F	2.1	0.7	0.6	--	3.4	--	--	--	--	--	3.4
PEM1E	P	1.5	0.6	--	--	2.1	--	--	--	--	--	2.1
PEM1F	F	0.5	0.7	0.6	--	1.8	--	--	0.9	--	0.9	0.9
PEM1F	P	0.8	0.4	--	--	1.2	--	--	--	--	--	1.2
PEM1R	F	0.1	--	--	--	0.1	--	--	--	--	--	0.1
PEM1R	P	--	0.4	--	--	0.4	--	--	--	--	--	0.4
PEM1/SS1E	P	--	--	--	--	--	--	--	--	1.2	1.2	0.8

Table 6 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:12K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:36K Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
PEM1/FO5E	P	--	0.4	--	--	0.4	--	--	--	--	--	0.4
PFO1A	F	25.9	18.9	13.3	20.7	78.8	1.8	0.8	1.8	8.1	12.5	66.3
PFO1A	P	13.6	23.4	25.0	91.1	153.1	4.2	17.1	21.6	40.7	83.6	69.5
PFO1C	F	8.9	7.9	1.3	8.2	26.3	0.2	--	--	--	0.2	26.1
PFO1C	P	6.1	11.6	8.6	10.5	36.8	1.3	3.3	2.8	3.7	11.1	25.7
PFO1E	F	7.5	3.0	1.4	--	11.9	0.4	--	0.9	--	1.3	10.6
PFO1E	P	5.9	5.9	3.4	2.0	17.2	0.6	1.3	--	1.7	3.6	13.6
PFO5F	F	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PFO5F	P	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PFO1R	P	0.5	0.7	0.7	--	1.9	--	--	--	--	--	1.9
PFO1S	F	0.1	--	--	--	0.1	--	--	--	--	--	0.1
PFO1S	P	--	0.7	0.7	1.7	3.1	--	--	--	--	--	3.1
PFO1/EM1C	F	--	--	--	1.1	1.1	--	--	--	--	--	1.1
PFO1/EM1C	P	--	0.3	0.7	--	1.0	--	--	--	--	--	1.0
PFO1/EMIE	F	--	0.4	--	--	0.4	--	--	--	--	--	0.4
PF1/EM1E	P	--	0.5	--	--	0.5	--	--	--	--	--	0.5
PFO1/SS1E	P	--	0.5	--	--	0.5	--	--	--	--	--	0.5
PFO1/SS1S	P	--	0.4	--	--	0.4	--	--	--	--	--	0.4

Table 6 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:12K: Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:36K: Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
PF05/SS1F	P	0.5	--	0.7	--	--	--	--	--	--	--	0.7
PSS1C	F	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PSS1E	F	0.9	--	--	--	0.9	0.1	--	--	--	0.1	0.8
PSS1E	P	0.1	--	--	--	0.1	0.2	--	--	--	0.2	0.1
PSS1F	F	0.5	--	--	--	0.5	0.1	--	--	--	0.1	0.4
PSS1F	P	0.1	--	--	--	0.1	--	--	--	--	--	0.1
PSS1/EM1E	P	--	--	0.6	--	0.6	--	--	--	--	--	0.6
PUBF	F	1.7	--	--	--	1.7	0.2	0.5	--	--	0.7	1.0
PUBF	P	0.4	--	--	--	0.4	--	--	--	--	--	0.4
PUBH	F	1.5	0.7	--	--	2.2	--	--	0.7	--	0.7	1.5
PUBH	P	0.8	0.9	--	1.1	2.8	--	--	--	--	--	2.8
PUSC	F	--	--	1.0	--	1.0	--	--	--	--	--	1.0
PUSE	P	0.1	--	--	--	0.1	--	--	--	--	--	0.1
R2UBH*	F	0.3	0.5	--	--	0.8	--	--	--	--	--	0.8
R2UBH*	P	--	1.1	0.9	1.6	3.6	--	--	--	--	--	3.6
R2USA	F	--	0.3	--	0.3	--	--	--	--	--	--	0.3
R2USC	F	0.2	--	--	--	0.2	--	--	--	--	--	0.2

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Table 7. Comparison between 1:24K photos and 1:36K photos by wetland type for Millington quad emphasizing unique polygons. <u>Note</u>: Polygon type represents unique polygons (full - F) or modified boundaries (partial - P); polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres, and 4 = greater than 1.0 acres.

		Total Acreage by Polygon Size Class on 1:24K					Total Acreage by Polygon Size Class on 1:36K					
Wetland Type	Polygon Type	Class 1	Class 2	Class 3	Class 4	Total all Classes	Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
E1UBL*	P	--	--	--	--	--	0.3	1.3	1.3	4.7	7.6	7.6
E2EM1P	P	--	--	--	--	--	0.2	--	--	--	0.2	0.2
E2US2P	P	--	--	--	--	--	0.1	--	--	--	0.1	0.1
L1ABH*	P	--	0.4	--	--	--	0.4	--	--	--	--	0.4
L1UBH*	P	--	--	--	--	--	0.2	0.4	--	2.4	3.0	3.0
PEM1A	F	0.5	0.9	1.9	1.3	4.6	0.1	0.3	--	1.4	1.8	2.8
PEM1A	P	--	--	--	--	--	0.3	0.3	--	6.3	6.9	6.9
PEM1B	F	0.2	0.5	--	--	0.7	--	--	--	--	--	0.7
PEM1C	F	2.8	0.7	--	--	3.5	0.2	--	--	--	0.2	3.3
PEM1C	P	0.2	--	--	--	0.2	0.4	--	--	--	0.4	0.2
PEM1E	F	1.8	--	--	--	1.8	0.3	--	--	--	0.3	1.5
PEM1E	P	0.3	--	--	--	0.3	0.5	0.3	0.6	--	1.4	1.1
PEM1F	F	0.3	0.4	--	--	0.7	--	--	0.8	--	0.8	0.1
PEM1F	P	--	0.3	--	--	0.3	0.2	--	--	--	0.2	0.1
PFO1A	F	8.5	6.6	8.2	34.5	57.8	2.4	3.1	7.9	12.3	25.7	32.1
PFO1A	P	8.1	15.2	20.7	58.6	102.6	13.4	34.9	32.1	75.7	156.1	53.5

Table 7 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:24K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:36K Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
PFO1C	F	4.7	1.2	1.8	6.2	13.9	0.8	0.4	0.6	--	1.8	12.1
PFO1C	P	5.3	6.2	5.6	8.1	25.2	8.5	9.1	10.3	15.8	43.7	18.5
PFO1E	F	3.1	0.8	0.7	1.1	5.7	0.7	--	0.9	--	1.6	4.1
PFO1E	P	2.6	2.3	1.3	--	6.2	4.7	5.4	3.8	1.4	15.3	9.1
PFO1F	F	--	--	--	1.1	1.1	--	--	--	--	--	1.1
PFO1F	P	--	0.5	--	--	0.5	--	--	--	--	--	0.5
PFO5F	P	0.1	--	--	--	0.1	--	--	--	--	--	0.1
PFO1R	P	0.1	0.7	--	--	0.8	0.2	--	--	1.2	1.4	0.6
PFO1S	P	--	--	0.6	--	0.6	0.2	--	--	--	0.2	0.4
PSS1C	F	0.1	--	--	--	0.1	0.1	--	--	--	0.1	0
PSS1C	P	--	--	--	--	--	--	0.4	--	--	0.4	0.4
PSS1E	F	0.4	--	--	--	0.4	0.1	--	--	--	0.1	0.3
PSS1E	P	0.2	--	--	--	0.2	0.2	--	--	--	0.2	0
PSS1F	F	--	--	--	--	--	0.1	--	--	--	0.1	0.1
PSS1F	P	0.2	--	--	--	0.2	--	--	--	--	--	0.2
PSS1/FO1R	P	--	--	--	--	--	--	--	0.7	--	0.7	0.7
PSS1/FO1E	P	0.2	--	--	--	0.2	--	--	--	--	--	0.2

Table 7 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:24K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:36K Class 1	Class 2	Class 3	Class 4	Total all Classes	Difference in Acres
PSS1R	P	--	--	--	--	--	0.1	--	--	--	0.1	0.1
PUBF	F	0.6	--	--	--	0.6	--	--	--	--	--	0.6
PUBF	P	--	--	--	--	--	0.1	--	--	--	0.1	0.1
PUBH	F	0.6	--	--	--	0.6	0.4	--	0.8	--	1.2	0.6
PUBH	P	--	0.5	--	--	0.5	1.0	1.3	1.0	2.0	5.3	4.8
PUSA	P	--	--	--	--	--	--	0.3	0.7	--	1.0	1.0
PUSC	F	--	--	0.9	--	0.9	--	--	--	--	--	0.9
R1UBV*	P	--	--	0.7	1.2	1.9	--	--	--	--	--	1.9
R2UBH*	F	0.2	--	--	--	0.2	--	--	--	--	--	0.2
R2UBH*	P	0.1	--	--	1.5	1.6	--	--	--	--	--	1.6
R2USA	F	0.1	--	--	--	0.1	--	--	--	--	--	0.1

*Deepwater Habitats

Table 8. Comparison between 1:24K photos and 1:58K photos by wetland type for Millington quad emphasizing unique polygons. Note: Polygon type represents unique polygons (full - F) or modified boundaries (partial - P); polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres, 4 = 1.1 - 10.0 acres, and 5 = greater than 10 acres.

		Total Acreage by Polygon Size Class on 1:24K					Total Acreage by Polygon Size Class on 1:58K						
Wetland Type	Polygon Type	Class 1	Class 2	Class 3	Class 4	Total all Classes	Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Difference in Acres
E1UBL*	P	0.2	0.5	0.6	1.6	2.9	--	0.4	1.0	--	--	1.4	1.5
E2EM1P	P	0.1	--	0.7	--	0.8	0.2	0.6	--	--	--	0.2	0.6
E2EM2N	P	--	--	--	--	--	--	0.6	--	--	--	0.6	0.6
.1OWH*	--	--	--	--	--	--	--	0.3	--	3.2	--	3.5	3.5
PABH	F	0.3	0.7	--	--	1.0	--	0.3	--	--	--	0.3	0.7
PEM1A	F	1.3	1.5	--	1.7	4.5	--	0.6	1.7	1.7	--	4.0	0.5
PEM1A	P	--	--	--	--	--	0.2	0.4	--	1.4	--	2.0	2.0
PEM1B	F	0.5	--	0.6	--	1.1	--	--	--	--	--	--	1.1
PEM1C	F	2.4	3.6	1.9	1.2	9.1	--	1.3	0.8	1.5	--	3.6	5.5
PEM1C	P	--	0.8	0.8	--	1.6	--	0.8	1.0	4.5	--	6.3	4.7
PEM1E	F	3.1	2.3	0.7	1.1	7.2	--	--	--	--	--	--	7.2
PEM1E	P	0.2	1.0	2.3	--	3.5	0.6	0.3	2.5	9.3	--	12.7	9.2
EM1R	P	--	--	--	--	--	--	0.3	--	--	--	0.3	0.3
EM1F	F	0.2	1.4	--	--	1.6	--	--	--	--	--	--	1.6
EM1F	P	0.2	0.6	--	--	0.8	--	--	--	--	--	--	0.8

Table 8 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:24K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:58K Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Difference in Acres
PEM1/SS1E	F	--	--	0.7	--	0.7	--	--	--	--	--	--	0.7
PFO1A	F	8.5	7.5	9.3	13.3	38.6	--	1.2	17.8	97.0	--	116.0	77.4
PFO1A	P	5.5	12.0	25.0	67.5	110.0	8.9	26.9	46.2	278.4	126.1	486.5	376.5
PFO1C	F	8.8	5.7	5.2	5.9	25.6	0.2	0.9	2.1	18.3	--	21.5	4.1
PFO1C	P	1.9	6.8	17.9	15.9	42.5	8.1	26.1	41.6	160.5	--	236.3	193.8
PFO1E	F	9.3	8.2	4.5	11.2	33.2	--	--	2.8	1.5	--	4.3	28.9
PFO1E	P	2.9	9.5	5.4	5.7	23.5	2.2	9.7	11.3	96.4	22.3	141.9	118.4
PFO1F	F	0.2	1.3	4.1	--	5.6	--	--	--	--	--	--	5.6
PFO1J	F	--	--	--	--	--	--	--	--	12.5	--	12.5	12.5
PFO1R	P	0.3	0.7	0.9	4.3	6.2	0.4	1.0	3.5	--	--	4.9	1.3
PFO1S	F	--	--	0.8	--	0.8	--	--	--	--	--	--	0.8
PFO1S	P	--	--	--	--	--	--	--	--	2.5	--	2.5	2.5
PFO1/EM1A	P	--	--	0.6	--	0.6	--	--	--	1.6	--	1.6	1.0
PFO1/SS1E	F	--	--	--	--	--	0.2	2.3	2.8	1.1	--	6.4	6.4
PFO1/SS1E	P	--	--	--	--	--	0.9	4.0	2.4	2.8	--	10.1	10.1
PFO1/SS1A	F	--	--	--	--	--	--	--	--	2.7	--	2.7	2.7
PFO/SS1A	P	--	--	--	--	--	--	--	--	12.2	--	12.2	12.2

Table 8 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:24K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:58K Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Difference in Acres
PFO1/EME	P	--	--	--	--	--	--	1.3	--	1.5	--	2.8	2.8
PFO1/EMR	P	--	--	--	--	--	--	0.4	--	2.5	--	2.9	2.9
PFO5F	P	0.6	--	--	7.0	1.3	--	--	--	--	--	--	1.3
PFO5/SS1F	P	--	--	0.9	--	0.9	--	--	--	--	--	--	0.9
PSS1A	P	--	--	--	--	--	--	--	--	2.0	--	2.0	2.0
PSS1C	F	0.1	--	--	--	0.1	--	--	--	--	--	--	0.1
PSS1C	P	--	--	--	--	--	--	--	--	1.3	--	1.3	1.3
PSS1E	F	1.1	0.3	--	--	1.4	0.6	0.3	0.6	--	--	1.5	0.1
PSS1E	P	--	--	--	--	--	0.4	0.4	--	--	--	0.8	0.8
PSS1F	P	--	--	0.6	--	0.6	--	0.5	1.3	--	--	1.8	1.2
PSS1R	P	0.1	0.5	--	--	0.6	--	--	--	--	--	--	0.6
PSS1/F01E	P	--	--	--	3.5	3.5	--	--	--	--	--	--	3.5
PSS1/EMA	F	--	--	--	--	--	--	0.5	--	3.7	--	4.2	4.2
PSS1/EMC	P	--	--	--	--	--	--	--	--	1.4	--	1.4	1.4
PSS1/EME	P	--	--	--	--	--	--	1.4	1.7	5.5	--	8.6	8.6
PUBF	F	2.4	0.3	0.6	--	3.3	--	--	--	--	--	--	3.3
PUBF	P	0.4	0.7	--	--	1.1	--	0.5	0.8	--	--	1.3	0.2

Table 8 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:24K: Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:58K: Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Difference in Acres
PUBH	F	1.8	1.8	3.6	10.7	17.9	--	0.3	--	1.2	--	1.5	16.4
PUBH	P	0.5	2.3	4.3	1.1	8.2	0.2	3.6	4.0	2.7	--	10.5	2.3
PUSC	F	0.2	0.3	0.9	--	1.4	--	--	0.6	--	--	0.6	0.8
R1UBV*	P	--	--	0.6	--	0.6	0.4	1.1	0.8	--	--	2.3	1.7

*Ceepwater Habitats

Table 9. Comparison between 1:36K photos and 1:58K photos by wetland type for Millington quad emphasizing unique polygons. Note: Polygon type represents unique polygons (full - F) or modified boundaries (partial - P); polygon size classes are as follows: 1 = 0.1 - 0.2 acres, 2 = 0.3 - 0.5 acres, 3 = 0.6 - 1.0 acres, 4 = 1. 1 - 10.0 acres, and 5 = greater than 1.0 acres.

		Total Acreage by Polygon Size Class on 1:36K					Total Acreage by Polygon Size Class on 1:58K						
Wetland Type	Polygon Type	Class 1	Class 2	Class 3	Class 4	Total all Classes	Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Difference in Acres
E1UBL*	P	0.2	0.4	8.4	19.3	28.3	0.1	1.4	3.3	10.8	--	14.6	13.7
E2EM1P	F	0.2	0.3	--	--	0.5	--	--	--	--	--	--	0.5
E2EM1P	P	0.2	--	--	---	0.2	--	--	--	--	--	--	0.2
E2EM2N	F	--	--	--	--	--	--	0.3	--	--	--	0.3	0.3
E2EM2N	P	--	--	--	--	--	0.1	--	1.0	--	--	1.1	1.1
E2US2P	F	0.2	--	--	--	0.2	--	--	--	--	--	--	0.2
E2FLM	P	--	--	--	--	--	--	--	--	1.3	--	1.3	1.3
L1UBH	P	--	--	1.2	3.4	4.6	--	0.9	4.1	--	--	5.0	0.4
PABF	F	--	--	--	--	--	--	0.5	--	--	--	0.5	0.5
PABH	F	0.3	--	--	--	0.3	--	--	--	--	--	--	0.3
PABH	P	--	0.3	--	--	0.3	--	--	--	--	--	--	0.3
PEM1A	F	0.4	2.5	2.7	3.3	8.9	0.2	0.6	0.8	1.8	--	3.4	5.5
PEM1A	P	0.1	0.4	--	--	0.5	0.2	0.7	--	1.9	--	2.8	2.3
PEM1B	F	0.3	0.3	--	--	0.6	--	--	--	--	--	--	0.6
PEM1C	F	1.5	2.0	3.6	--	7.1	--	0.9	2.1	6.3	--	9.3	2.2

Table 9 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:36K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:58K Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Difference in Acres
PSS1/EM5A	P	--	--	--	--	--	--	--	0.7	2.8	--	3.5	3.5
PSS1/EM5E	P	--	0.4	--	--	0.4	--	0.3	0.9	13.2	--	14.4	14.0
PSS1/EM5C	P	--	--	--	--	--	--	0.5	0.7	--	--	1.2	1.2
PSS1/FO1E	P	--	--	--	1.1	1.1	--	--	--	--	--	--	1.1
PSS1/FO1F	P	--	--	0.6	--	0.6	--	--	--	--	--	--	0.6
PUBF	F	0.5	1.4	--	1.6	3.5	--	--	--	--	--	--	3.5
PUBF	P	--	0.4	--	1.1	1.5	--	0.7	--	--	--	0.7	0.8
PUBH	F	1.3	3.4	3.6	16.6	24.9	--	1.2	--	--	--	1.2	23.7
PUBH	P	0.6	2.4	1.7	13.9	18.6	0.7	4.0	2.9	6.3	--	13.9	4.7
PUSA	P	--	--	--	1.2	1.2	--	--	--	--	--	--	1.2
PUSC	F	--	--	--	--	--	--	--	0.6	--	--	0.6	0.6
R1UBV*	P	--	--	1.0	--	1.0	--	--	--	--	--	--	1.0

*Deepwater Habitats

Table 10. Summary of labor required at various steps (excluding ground-truthing and Regional Quality Control) to prepare a large-scale wetland map from different scales of photography. The symbol "x" is used to indicate ratios within a particular step, so 2x takes twice as much time as "x". Hours of labor for "x" in each step in designated in parentheses.

	Scale of Aerial Photography (# photos)			
Step	1:58K (3)	1:36K (6)	1:24K (12)	1:12K (42)
Data Preparation	0.5x	x (l hr.)	2x	7x
Photointerpretation	0.9x	x (10.25 hrs.)	2.1x	4.4x
Quality Control (National PIQC)	x	x (0.5 hrs.)	2.5x	6x
Map Preparation	0.5x	x (28 hrs.)	2.2x	3.3x

Table 9 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:36K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:58K Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Differemce in Acres
PEM1C	P	--	--	0.8	--	0.8	--	1.2	1.0	--	--	2.2	1.4
PEM1E	F	2.0	2.9	0.7	3.2	8.8	0.4	0.6	--	--	--	1.0	7.8
PEM1E	P	0.2	0.3	1.0	--	1.5	--	--	4.5	6.2	--	10.7	9.2
PEM1F	F	0.2	--	--	--	0.2	--	--	--	–	--	--	0.2
PEM1F	P	--	0.3	--	--	0.3	--	--	--	--	--	--	0.3
PFO1A	F	10.3	12.9	18.8	29.5	71.5	--	1.9	18.9	108.9	--	129.7	58.2
PFO1A	P	2.4	22.7	36.8	139.4	201.3	1.3	11.0	33.4	324.0	168.0	537.7	336.4
PFO1C	F	4.4	7.7	4.7	1.2	18.0	0.4	1.6	2.8	23.9	--	28.7	10.7
PFO1C	P	3.5	11.9	13.8	47.8	77.0	2.0	15.9	32.2	147.4	13.6	211.1	134.1
PFO1E	F	5.9	8.4	2.9	6.5	23.7	0.2	--	1.8	2.0	12.1	16.1	7.6
PFO1E	P	2.7	8.7	10.9	12.4	34.7	0.2	7.2	12.7	95.5	13.3	128.9	94.2
PFO5F	F	--	--	1.2	7.2	8.4	--	--	--	--	--	--	8.4
PFO5F	P	--	0.9	1.9	3.4	6.2	--	--	--	--	--	--	6.2
PFO1J	F	--	--	--	--	--	--	--	--	14.4	--	14.4	14.4
PFO1R	P	--	0.7	1.0	1.8	3.5	0.2	1.2	0.9	2.1	--	4.4	0.9
PFO1S	F	--	--	1.0	2.0	3.0	--	--	--	--	--	--	3.0
PFO1/SS1A	P	--	--	--	--	--	--	--	0.7	6.2	--	6.9	6.9

Table 9 (cont'd)

Wetland Type	Polygon Type	Total Acreage by Polygon Size Class on 1:36K Class 1	Class 2	Class 3	Class 4	Total all Classes	Total Acreage by Polygon Size Class on 1:58K Class 1	Class 2	Class 3	Class 4	Class 5	Total all Classes	Difference in Acres
PFO1/SS1A	F	--	--	--	--	--	--	--	--	7.9	--	7.9	7.9
PFO1/SS1E	F	--	--	--	--	--	0.4	3.5	0.6	--	--	4.5	4.5
PFO/SS1E	P	--	--	--	--	--	--	1.1	3.5	--	--	4.6	4.6
PFO1/4S	P	--	--	--	--	--	--	--	--	2.6	--	2.6	2.6
PFO5Z	P	--	--	--	--	--	--	--	--	1.7	--	1.7	1.7
PFO1/EM5A	P	--	--	--	--	--	--	--	--	2.5	--	2.5	2.5
PFO1/EM5E	P	--	--	--	--	--	--	0.4	--	2.6	--	3.0	3.0
FFO1/EM5R	P	--	--	--	--	--	--	--	--	1.2	--	1.2	1.2
PSS1A	P	--	--	--	--	--	--	--	--	1.6	--	1.6	1.6
PSS1C	F	0.1	--	--	--	0.1	--	--	--	1.4	--	1.4	1.3
PSS1E	F	0.1	0.4	--	--	0.5	0.6	0.8	--	--	--	1.4	0.9
PSS1E	P	0.2	0.5	--	--	0.7	--	0.6	--	--	--	0.6	0.1
PSS1F	F	0.2	0.4	--	--	0.6	--	0.5	0.8	--	--	1.3	0.7
PSS1F	P	--	--	--	--	--	--	0.5	0.7	--	--	1.2	1.2
PSS1R	F	--	--	0.9	--	0.9	--	--	--	--	--	--	0.9
PSS1R	P	--	0.5	--	--	0.5	--	--	--	--	--	--	0.5
PSS1/EM5A	F	--	--	--	--	--	--	--	0.9	--	--	0.9	0.9