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**Creating Metadata and Digital Infrastructure for the Maryland  
Geological Survey's Collection of Aerial Photographs, Part 4 (2014-2015)**

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<b>Acronyms and Abbreviations Used in This Report</b>	
<b><i>Acronym/Abbreviation</i></b>	<b><i>Description</i></b>
DPAP	Data Preservation Advisory Panel
EROS	Earth Resources Observation and Science Center
JHU	The Johns Hopkins University
MD DNR	Maryland Department of Natural Resources
MD SHA	Maryland State Highway Administration
MGS	Maryland Geological Survey
MSA	Maryland State Archives
NAPP	National Aerial Photography Program
NGGDPP	National Geological and Geophysical Data Preservation Program
NWIS	National Water Information System
PI	Principal Investigator
QA/QC	Quality Assurance/Quality Control
USDA	United States Department of Agriculture
USGS	United States Geological Survey

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## ABSTRACT

The Maryland Geological Survey (MGS or “the Survey”) shares the concerns of other agencies and organizations engaged in geological research – that geoscience collections and data are valuable in their own right, beyond the lifetime of the projects during which they are collected or acquired, and that special efforts are required to preserve them and ensure their accessibility.

In this, its seventh year as a recipient of a National Geological and Geophysical Data Preservation Program (NGGDPP) grant, MGS exceeded its grant objectives by (1) creating digital infrastructure (i.e., scanning) an additional ~7,200 9”x9” aerial photographs dating from 1960-1968 and 1970-1979; and (2) creating metadata for ~2,200 newly discovered aerial photographs. These previously unidentified photos included ~200 9”x9” black-and-white high-altitude aerial photographs dating from 1977-1983; ~50 9”x9” high-altitude infrared aerial photos dating from 1970-1974; ~200 9”x9” quadrangle-based infrared aerial photographs dating from 1988-1989; ~1,700 9”x9” aerial photographs from Washington, DC and vicinity dating from 1935-1939 and ca. 1950; and ~50 black-and-white 9”x9” county-based aerial photographs dating from 1987-1989 which correspond to U.S. Geological Survey (USGS) county wells. MGS scanned ~100 more aerial photographs and created metadata for ~1,600 more photographs than originally expected. Additionally, MGS continued a comprehensive Quality Control/Quality Assurance (QA/QC) check of the records in its internal data preservation databases.

In all, MGS added a total of ~2,200 new metadata records to the USGS *ScienceBase Catalog* via 5 new components titled (1) *Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High-Altitude Collection*; (2) *Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection*; (3) *Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection*; (4) *Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection*; and (5) *Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection*.

Independently of the grant, several outside collaborators generously donated their services to further MGS’s data preservation efforts. Maryland State Archives (MSA) scanned the 1980s county-based aerial photograph index maps (76 maps total). Additionally, MSA scanned 176 aerial photographs of the Rockville-Laurel area of Montgomery County, Maryland dating from 1966-1974. Currently, the 1930s, 1950s, 1960s, 1970s, and 1980s county aerial photograph index maps are available to the public online via MSA’s *Guide to Government Records* website. JHU’s *JScholarship* website is currently hosting the 1930s and 1950s county aerial photograph index maps, as well as assorted county-based aerial photographs of Baltimore County and City from the 1930s and 1950s. Links to both websites are provided on the MGS’s Data Preservation webpage: [http://www.mgs.md.gov/publications/mgs\\_data\\_preservation.html](http://www.mgs.md.gov/publications/mgs_data_preservation.html).

Aerial photographs depict land use and land cover at particular points in time. A time-series of such photographs can reveal detectable, measurable changes and trends in those patterns. Such photography is irreplaceable – once the flight date has passed, ground conditions on that date cannot be replicated or reconstructed. The Survey’s collection of aerial photographs will only grow in usefulness as land use continues to change, and as a broad range of researchers and

managers attempts to reconstruct past usage from these snapshots in time.

Aside from the inherent value of aerial photography, MGS selected the collection for documentation and digitization because (a) it is one of the Survey's most frequently used collections; (b) it is a permanent holding for which metadata are incomplete; (c) documenting the collection is the first of several steps that will eventually lead to the photos being scanned, uploaded to the Internet, and permanently preserved; (d) members of MGS's Data Preservation Advisory Panel (DPAP) unanimously recommended that this collection be the next one documented; and (e) the project supports a statewide effort to create an electronic archive of historical aerial photographs.

MGS has now completed metadata creation for the entire aerial photograph collection, and converted approximately 65 percent of this collection to digital imagery with the help of its data preservation partners, MSA and JHU. An additional ~5,300 photographs of USGS origin (approximately 16 percent of MGS's total aerial photograph collection) have been or will be scanned by the USGS Earth Resources Observation Systems (EROS) Data Center in the following years. If these photographs are counted as scanned, approximately 81 percent of the MGS aerial photograph collection is considered scanned. Since the metadata creation component of this collection is complete, MGS must now intently focus on (1) creating digital infrastructure for (i.e. scanning) the remainder of the collection; (2) making the digital scans of this collection accessible to the public; and (3) transferring the paper aerial photographs and index maps to MSA, a state facility better suited for their long-term preservation.

## **INTRODUCTION**

### **Aerial Photograph Collection: Overview**

Maryland Geological Survey (MGS) houses a large collection of historical aerial photographs of the State, most of which were donated by the Maryland State Highway Administration (SHA) or its predecessors. To date, the Survey has identified ten components, or sub-collections, of its entire aerial photograph collection.

#### **Component 1: County-Based Aerial Photographs**

The first component comprises the bulk of the collection and consists of approximately 16,100 county-based, black-and-white, 9"x9" aerial photos (1:20,000-scale). Component 1 photographs were taken during the following time periods: 1937-1938, 1949, 1951-1953, 1957, 1961-1964, 1968, 1970-1972, 1979-1981, and 1983-1990.

These photographs were usually flown or otherwise acquired by the U.S. Department of Agriculture (USDA), the U.S. Geological Survey (USGS), or the private firm Air Photographics. USDA and USGS photographs were donated to MGS, mainly by SHA. MGS purchased the copyrighted Air Photographics photographs.

## **Component 2: Fenwick and Assateague Island Aerial Photographs**

The second component, considered a “special collection,” consists of approximately 500 unrectified, black-and-white, 2’x2’ photographic enlargements flown over one or both of the State’s two Atlantic coast barrier islands, Fenwick and Assateague Islands. These photographs were taken during 13 different time periods between 1952 and 1964.

## **Component 3: Montgomery County Aerial Photographs**

The third component, another special collection, consists of approximately 200 unrectified, black-and-white, 19”x19” photographic enlargements flown over the Rockville-Laurel area of Montgomery County, Maryland. These photographs were taken annually or biannually, on 12 different dates between 1966 and 1974.

## **Component 4: County Aerial Photograph Index Maps**

The fourth component consists of approximately 400 22” x 34” photo-mosaic index maps, dating from 1936-1990. These index maps depict flight lines and frame numbers for both the county-based aerial photographs (Component 1) and the Fenwick and Assateague Islands aerial photographs (Component 2).

## **Component 5: Quadrangle-Based Aerial Photographs**

The fifth component consists of approximately 4,900 aerial photographs (mostly 9”x9”, mainly black-and-white, some color) that were primarily flown or acquired by the USGS and organized on a 7.5-minute quadrangle basis. These photographs date from 1936 – 1991. The scale of these photographs varies but primarily ranges from 1:12,000 to 1:35,400. These photographs were donated to MGS.

This component comprises a previously unidentified set of photographs that were broadly inventoried during the FY2012 NGGDPP grant cycle. These photographs were originally counted as part of Component 1. However, since the photographs were taken on a quadrangle-by-quadrangle basis, instead of a county-by-county basis, MGS decided to break these photographs out as a separate component during the FY2013 NGGDPP grant cycle.

## **Component 6: High-Altitude Black-and-White Aerial Photographs**

The sixth component is a special collection which consists of approximately 200 9”x9” black-and-white high-altitude aerial photographs dating from 1977-1983. These aerial photographs were primarily flown or acquired by the USGS and cover portions of Maryland, Pennsylvania, Virginia, and West Virginia. The scale of these photographs is 1:80,000.

## **Component 7: High-Altitude Infrared Aerial Photographs**

The seventh component, also a special collection, consists of approximately 50 9”x9” high-altitude infrared aerial photos dating from 1970-1974. These aerial photographs cover portions

of Maryland and Virginia. The counties in Maryland covered by these photographs include Anne Arundel, Baltimore, Calvert, Carroll, Charles, Frederick, Harford, Howard, Montgomery, and Prince George's Counties. The scale of these photographs is not printed on the photographs; however, MGS calculates the scale to be approximately 1:120,000 for the Series 74-039 photographs; approximately 1:140,000 for the Series 144-RC8-4L/5L photographs; and approximately 1:160,000 for the Series 72-209 photographs. The source agency of these photographs is unknown.

### **Component 8: Quadrangle-Based Infrared Aerial Photographs**

The eighth component is a special collection which consists of approximately 200 9"x9" USGS 7.5-minute quadrangle-based infrared aerial photographs dating from 1988-1989. These photographs were primarily flown or acquired by the USGS National Aerial Photography Program (NAPP). The Maryland counties covered by these photographs include Anne Arundel, Allegany, Calvert, Cecil, Charles, Dorchester, Kent, Prince George's, Queen Anne's, St. Mary's, Somerset, Talbot, and Washington Counties. The scale of these photographs is 1:40,000.

### **Component 9: Washington, DC and Vicinity Aerial Photographs**

The ninth component, also a special collection, consists of approximately 1,700 9"x9" black-and-white aerial photographs from Washington, DC and vicinity dating from 1935-1939 and ca. 1950. These photographs cover portions of Washington, DC, Maryland, and Virginia. The scale of these photographs is not printed on the photographs; however, MGS calculates the scale to be approximately 1:20,000. The source agency of these photographs is unknown.

### **Component 10: USGS Well-Related Aerial Photographs**

The tenth component is a special collection which consists of approximately 50 9"x9" black-and-white county-based aerial photographs dating from 1987-1989. The Maryland counties covered by these photographs include Anne Arundel, Baltimore, Calvert, Carroll, Cecil, Charles, Frederick, Harford, Howard, Montgomery, and St. Mary's Counties. These photographs were primarily flown or acquired by the USGS. The scale of these photographs is not printed on the photographs; however, MGS calculates the scale to be approximately 1:40,000.

These photographs have notations on them which designate well codes assigned by either MGS or USGS. These well codes correspond to the "Site Name" designation information on the USGS National Water Information System (NWIS) web interface. Users can go to <http://nwis.waterdata.usgs.gov/md/nwis/inventory> and check "Site Name". Click "Submit" and then enter the desired well code into the search box to retrieve additional information about the well (use spaces instead of dashes, e.g. AA-Ad-104 should be entered as AA Ad 10). Well information available via this interface typically includes latitude and longitude, county, hydrologic unit, well depth, hole depth, land surface altitude, national aquifers, local aquifers, field groundwater-level measurements, and field/lab water-quality sample data.

## Collection Value and Justification for Preservation

Aerial photographs depict land use and land cover at particular points in time. A time-series of such photographs can reveal detectable, measurable changes and trends in those patterns. Such photography is irreplaceable – once the flight date has passed, ground conditions on that date cannot be replicated or reconstructed. The aerial photograph collection will only grow in usefulness, as land use continues to change, and as researchers and managers attempt to reconstruct past usage from these snapshots in time. Aerial photographs appeal to a wide audience, and have broad potential usefulness.

Several examples of their past usage are illustrative. One of Maryland's most prominent physical features is the Chesapeake Bay, the largest estuary in the country. The declining health of the bay over the past half century has been a cause of concern and intensive study among a myriad of federal, state, and local government agencies. One indicator of bay health is the acreage of the bay floor covered by sea grasses, which act as a nursery for a number of aquatic species and buffer the shore from wave-generated erosion. To develop a baseline against which to measure more recent distributions of such grasses, the Maryland Department of Natural Resources (DNR) used the 1951-1953 aerial photos to delineate their historical distribution.

In another Chesapeake Bay-related example, a graduate student at a local university interpreted historical shorelines from aerial photographs flown along the bay shoreline of one of Maryland's coastal counties. The resulting digital shoreline vectors were used to calculate shoreline rates of change (i.e., erosion or, less commonly, accretion rates for individual shore-normal transects). Coastal planners, in turn, use the rates of change to determine shoreline stabilization strategies appropriate for reaches of shoreline subject to different wave energies (and erosion rates). For instance, "living" shorelines – such as the planting of marsh grasses – are generally recommended along shorelines subject to low (<2 feet/year) rates of erosion.

Historic aerial photographs are also useful to archeologists. They provide important information on the historic built landscape – not only buildings, but other, smaller features that are not often mapped, including small roads and fence lines. These features can be extremely useful in reconstructing old plats, as many of these features are vestiges of property boundaries that can go back hundreds of years.

In some cases, very specific information can be gleaned from aerial photographs. For example, a 1950s-era aerial photo showed the precise location of a Native American ossuary (mass burial) that was excavated in the early 1970s. This historic photo enabled archeologists to determine the exact location of the original gravesite – circular areas of disturbed soil from which remains were extracted during the original archeological dig – and to identify the current owner of the property. As part of a repatriation/reburial effort, inquiries were made of the property owner to ascertain whether or not the remains might be reinterred at the original excavation site.

In addition to the intrinsic value of the aerial photograph collection, a number of other considerations led MGS to select it for documentation. First, with the exception of certain online collections, it is one of the Survey's most frequently used collections. The MGS library, home to the collection, is open to the public during normal business hours with an appointment. Many of

the library's patrons – several hundred annually – request access to the aerial photos.

Second, the collection is in need of rescue. Because of their age and popularity, the photographs are at risk of further damage due to excessive handling. Compounding that problem are the poor conditions under which the photos are stored. Temperature and relative humidity in the library fluctuate widely with the seasons. Some of the photographs have become moldy or mildewed. Ultimately, MGS intends to scan the photographs, post the digital images to the Internet, remove the photos from active circulation, and transfer the photographs to MSA, who will house the collection in an environment more conducive to its long-term preservation. Documenting and scanning the items in the collection are, thus, the first steps leading to their ultimate preservation.

Third, at its annual meeting in September 2010, MGS's Data Preservation Advisory Panel discussed the collections remaining to be documented in light of the then upcoming NGGDPP request for proposals. The consensus of the Panel was that, of the MGS collections yet to be documented, the aerial photographs were undoubtedly the collection of greatest interest to the broadest range of users. In addition, making such a collection more readily available to a wider audience might encourage greater support of data preservation efforts at the Survey. One of the Panel members, the director of the Delaware Geological Survey, attested to the widespread use of that state's web-accessible aerial photos by "not only...the geologic community, but land use people in state, county, local government, agriculture, emergency management agencies, coastal program staff, real estate industry, engineering and geological consultants, individual home owners, schools, etc."

Fourth, the project supports a wider state effort to create an electronic archive of historical aerial photographs. Over the past several years, a number of Maryland state agencies have periodically discussed inventorying, scanning, and preserving historical aerial photography held by state and local governments. In creating NGGDPP metadata and digital infrastructure for its collection, MGS is contributing to this statewide effort.

In summary, the creation of metadata and digital infrastructure for its historical aerial photograph collection satisfies the criteria outlined in MGS's *Long-Range Data Preservation Plan* (Hennessee, 2009), advances the permanent preservation of a valuable collection, honors the considered opinions of an advisory panel that fosters data preservation at the Survey, and contributes to statewide efforts to create an online resource available to a broad user community.

## **BACKGROUND**

### **Maryland and MGS Data Preservation Efforts**

Geographically, Maryland is a relatively small state, with a land area of 9,844 square miles and a water area of 623 square miles. But, with a population of nearly 5.8 million people, it is the fifth most densely-populated state in the U.S. (595 people per square mile) (MGS, 2007; U.S. Census Bureau, 2010). The state straddles six geologically diverse physiographic provinces, from the Appalachian Plateaus to the Atlantic Continental Shelf, and contains an extensive network of tidal streams and bays, most notably northern Chesapeake Bay. The Atlantic Ocean forms its eastern

border.

The State geological survey has been in existence since 1896. The types of geoscience collections held by MGS reflect its mission, as it has changed over the past 119 years. Current research is focused on the geological and groundwater resources of the State. However, MGS has retained several collections from the past, when the interests of its staff and the needs of Maryland's citizenry differed from those of today. For instance, although the Survey is no longer actively engaged in paleontological research, MGS has a macrofossil collection that numbers in the hundreds of specimens. As a consequence of its longevity and the diversity of its activities, MGS possesses a wide array of holdings in a variety of formats.

Seven years ago, in response to financial incentives offered by the NCGDPP, MGS began to address the long-term preservation of its data and collections in a formalized, systematic way. Typically, MGS researchers work with other government agencies or academic institutions on projects that are tied to funding sources and designed to meet particular objectives. Usually, the principal investigator (PI) of a project is responsible for maintaining the physical and derived or indirect data collected as part of that project. When several PIs from one of the Survey's programs collect similar kinds of data (e.g., well logs, bay bottom sediment cores), the program might establish a repository and perhaps a paper or digital catalog to facilitate access. However, prior to MGS's participation in the NCGDPP program, there were no MGS-wide provisions to preserve data and the Survey's catalog of collections resided mainly in the minds of its staff members.

### **MGS NCGDPP Grants (FY2008 – FY2013)**

In 2008, NCGDPP awarded MGS a one-year grant (FY2008) to identify and broadly describe the geoscience collections and data currently in its possession. In addition, MGS entered information about the nature, size, condition, and accessibility of those collections and data deemed "permanent" into the Collections Inventory of the National Digital Catalog (Hennessee and Shelton, 2009). Since then, MGS has identified 39 permanent collections: 9 physical collections and 30 derived or indirect data collections. A detailed list of those collections and their data preservation status is located in Appendix 1, Table A1-1.

In 2009, NCGDPP awarded MGS a second grant (FY2009), which enabled the Survey to master metadata creation through the documentation of three of its sediment core collections. Additionally, MGS developed a *Long-Range Data Preservation Plan* for its non-digital holdings (Hennessee, 2009) and appointed a curator from among its scientific staff. Inspired by the Data Preservation Workshop at Indiana University, MGS established a Data Preservation Advisory Panel (DPAP) composed of outside geologists, archivists, librarians, and archeologists. From its inception, the DPAP has fostered data preservation at MGS, helping to resolve thorny questions, endorsing proposals, and forming partnerships in applying for preservation-related grants.

The third NCGDPP grant (FY2010) allowed MGS to continue metadata creation for several more of its collections and led to a revision in the format of the Survey's final report submitted to the NCGDPP. As part of its third-year effort, MGS documented approximately 20 percent of the Fenwick and Assateague Island aerial photographs (Component 2), a pilot project of sorts for its

fourth year effort.

In 2011, its fourth year as a recipient of a NNGDPP grant (FY2011), MGS created metadata for three components of its aerial photograph collection. These components included county-based aerial photographs from the two earliest “eras” in its holdings, 1936-1938 and 1951-1953 (Component 1); the second and final subset of enlarged (2’ x 2’) aerial photos flown in the 1950s and 1960s over the State’s barrier islands (Component 2); and the entire collection of index maps (Component 4).

During the fifth NNGDPP grant cycle (FY2012), MGS created metadata for ~9,000 county-based aerial photographs flown post-1953 (Component 1) and the entire collection of Montgomery County aerial photographs flown in the 1960s and 1970s (Component 3). MGS also scanned ~4,000 1950s county-based aerial photographs (Component 1).

In 2013, NNGDPP awarded MGS a sixth grant (FY2013). This grant enabled MGS to create metadata for all of Component 5 (~4,900 quadrangle-based aerial photographs flown in the 1930s-1990s) and scan an additional ~2,800 county-based aerial photographs flown in the 1930s and 1950s (Component 1). Additionally, MGS started a comprehensive Quality Control/Quality Assurance (QA/QC) check of the records in its internal data preservation databases.

## OBJECTIVES

The objectives of the FY2014 NNGDPP project, as outlined in the proposal, were as follows:

1. Scan ~7,100 9”x9” black-and-white aerial photographs dating from 1960-1968 and 1970-1979;
2. Add information about ~600 newly discovered assorted photographs to its finding aid for the entire collection of aerial photos. The finding aid, in the form of an internal Microsoft Access database, includes fields required by NNGDPP metadata standards;
3. Extract these newly created metadata records from the internal database, format them, and submit them via digital transfer to *ScienceBase*;
4. Continue working closely with MSA, as well as JHU’s Eisenhower Library, to develop plans to make these digital images web-accessible. If, during the project period, scanned images are posted to the Historical Aerial Photography website, MGS will modify metadata previously submitted to *ScienceBase* to include the appropriate URLs; and
5. Submit a final report to the NNGDPP describing the results, findings, and lessons learned from the FY2014 project.

# GENERAL PROCEDURE

## Metadata

### MGS Internal Database and NGGDPP Metadata Creation

Metadata for the components of the aerial photography collection are derived from information stored in an internal MGS database. This database has been revised and expanded over time with the inventorying and archiving process. The current version of the aerial photograph database is named *AirPhotoDatabase2014.mdb* (Microsoft Access 2013). Some significant changes and additions to this database have occurred since MGS began inventorying its aerial photograph collection. As such, a brief history and revision summary are provided here.

At the start of the inventory process, MGS set up a Microsoft Access 2003 database, *AirPhotoIndex.mdb*, and began entering information about the aerial photos and photo-mosaic index maps in its collection. This initial database included two primary tables – *tblAirPhoto* and *tblIndexMap* – which contained information about the county-based aerial photographs and index maps, respectively (Components 1 and 4). The index maps correspond to the county-based aerial photographs and the Fenwick and Assateague Island aerial photographs (Components 1 and 2). The “titles” of all photos depicted on the index maps were entered into the air photo table, regardless of whether MGS actually held the photos in its collection. Thus, a subsequent phase of the project entailed entering information about the actual photos that comprise these MGS components.

The MGS aerial photograph collection currently consists of 10 distinct sets of aerial photographs, also known as components (see *Aerial Photograph Collection: Overview* section on pages 2-4). With the exception of Components 1 and 2, these components do not appear to have associated photo-mosaic index maps. In general, new database tables were developed to house information about these distinct components. These tables often include one or more fields that are used to capture parameter(s) that are specific to the component.

In 2013, MGS started a comprehensive Quality Assurance/Quality Control (QA/QC) review of the original *AirPhotoIndex.mdb* database records. Part of this internal QA/QC involved comparing photo scans (digital infrastructure) with associated photo inventory records and updating tables as needed. This primarily affected the information related to the county-based photography (Component 1) because this component has been the primary focus of scanning to date. In addition, queries and sorting were used to check for duplicate records, errors and omissions. This initial source data QA/QC was extremely valuable in two key ways: (1) the process forced a familiarity with the collection, which was extremely useful to the PI and other MGS NGGDPP staff; and (2) the process revealed some errors with regards to flight series, date, scale and naming conventions which otherwise may not have been noticed.

The initial QA/QC work in 2013 resulted in an updated, more accurate and user-friendly database which MGS re-named *AirPhotoDatabase2014.mdb*. Some original tables within this database were renamed to better identify content. In addition, during the current (FY2014) NGGDPP grant period, MGS added five new tables which comprise metadata for Components

6-10 of MGS's aerial photograph collection. The current tables in the database associated with the 10 aerial photograph collection components include:

- *tbl\_CountyAirPhotoInv* – an updated inventory and metadata source for the county-based flights of aerial photography (Component 1);
- *tblAerialPhotos\_OC\_1964\_v2* - the original inventory and metadata source for the Fenwick and Assateague Island aerial photography (2'x2') (Component 2);
- *tbl\_AerialPhotos\_MontCo\_1966-1974* – the original inventory and metadata source for Montgomery County aerial photography enlargements (Component 3);
- *tbl\_APIndexMapInv* - the original inventory and metadata source for the aerial photography index maps (Component 4);
- *tbl\_QuadAirPhotoInv* – an inventory of the quadrangle-based aerial photography (Component 5);
- *tbl\_SpclColl 1- HAPPhot* – a new inventory of the high altitude, black-and-white aerial photography (Component 6);
- *tbl\_SpclColl 2- HAPInfrPhot* – a new inventory of the high-altitude, infrared aerial photography (Component 7);
- *tbl\_SpclColl 3- QuadInfrPhot* – a new inventory of the quadrangle-based, infrared aerial photography (Component 8);
- *tbl\_SpclColl 4- Wshngtn DC-Vcnty* – a new inventory of the Washington, DC and vicinity aerial photography (Component 9); and
- *tbl\_SpclColl 5- USGSWellPhot* – a new inventory of the USGS NWIS well-related aerial photography (Component 10).

In some ways, the information stored in the *AirPhotoDatabase2014.mdb* database differs in content or format from the fields that comprise NGGDPP-compliant metadata. Inventory tables in the internal MGS database includes additional information pertaining to photo condition, the physical and cultural features depicted on the photo, the ID of the associated air photo index map, the location of the photo (i.e., room, file cabinet, cabinet drawer), etc. – fields not necessarily of interest to *ScienceBase* Catalog users. Additionally, NGGDPP metadata require that dates be reported in YYYYMMDD format, instead of the MM/DD/YYYY format employed in the Access database. Several NGGDPP metadata fields (including title, abstract, and coordinates) must be constructed, largely by concatenating fields in the internal MGS inventory tables.

MGS creates metadata for the National Digital Catalog with guidance from the *NGGDPP Metadata Preparation Guide* (01/2013) and the NGGDPP instructions, *Preparing Metadata for the National Digital Catalog* (05/15/2009), which provides a worksheet for mapping existing digital data into the NGGDPP-required metadata fields. For each component of the collection, MGS completes an *NGGDPP Metadata Form* describing the information to be supplied as metadata, including explanations and examples for each metadata field and a list of information sources, as appropriate. Metadata forms for new Components 6-10 are included as Appendices 2-6, respectively. The NGGDPP-compliant metadata tables are initially built and compiled within a MGS data preservation Access database.

## Metadata Submission to *ScienceBase*

The NNGDPP instructions referenced above, coupled with MGS-specific instructions for metadata upload, included as an appendix in a previous report (Hennessee and Shelton, 2010), made metadata submission fairly straightforward. MGS used the same process as years past to convert Access metadata tables to .csv-formatted files for upload to the *ScienceBase Catalog*. MGS particularly appreciated its direct interaction with NNGDPP personnel, especially Tamar Norkin, who helped resolve minor glitches in the process.

NNGDPP-compliant metadata for 2,206 aerial photographs (comprising Components 6-10 of MGS's aerial photograph collection) were submitted to the *ScienceBase Catalog* in August of 2015. The names of these *ScienceBase* items, their *ScienceBase* ID, and the online links to these components are listed below:

*Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High-Altitude Collection*

ScienceBase ID: 55c50826e4b033ef5212bd4b

Link to ScienceBase Page:

<https://www.sciencebase.gov/catalog/item/55c50826e4b033ef5212bd4b>

*Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection*

ScienceBase ID: 55e0756ce4b0f42e3d040f03

Link to ScienceBase Page:

<https://www.sciencebase.gov/catalog/item/55e0756ce4b0f42e3d040f03>

*Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection*

ScienceBase ID: 55df7430e4b0518e354e0b67

Link to ScienceBase Page:

<https://www.sciencebase.gov/catalog/item/55df7430e4b0518e354e0b67>

*Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection*

ScienceBase ID: 55e35a3fe4b05561fa2081f9

Link to ScienceBase Page:

<https://www.sciencebase.gov/catalog/item/55e35a3fe4b05561fa2081f9>

*Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection.*

ScienceBase ID: 55e4935fe4b05561fa208470

Link to ScienceBase Page:

<https://www.sciencebase.gov/catalog/item/55e4935fe4b05561fa208470>

## Verifying Accuracy and Completeness of the Uploaded Metadata

Once the metadata files were uploaded, MGS verified the completeness and accuracy of the uploads. To check completeness, MGS verified that the total number of records in each sub-collection, determined from the appropriate internal database table, matched the number received

in the *ScienceBase Catalog*. Then, for a subset of records in each component submitted, MGS checked the accuracy of the upload by verifying that the content received in the *ScienceBase Catalog* matched the information in the corresponding internal database tables.

After verifying the accuracy and completeness of the metadata upload, MGS reviewed and, as needed, revised the associated information contained in the original Collections Inventory. This step is necessary because the exact number of items uploaded may differ from the estimated number reported in the initial description of a collection. Or, metadata are completed for additional items in a collection. Or, as a collection is itemized and documented, the contents of the collection is broadened to include more kinds of items, or narrowed to include fewer, necessitating a change in the collection description.

## **Digital Infrastructure**

### **Creation**

MGS continued to scan its aerial photographs with a Plustek OpticPro A320 Flatbed Scanner in grayscale at a resolution of 1200 dpi in both JPG and TIF formats. Approximately 7,200 county-based photographs from the 1960s and 1970s were scanned during the FY2014 NGGDPP grant period.

### **Quality Assurance/Quality Control Check**

After each photograph was scanned and the resultant JPG and TIF files were created, MGS staff opened each file to verify its quality and QA/QC the name of the file against the flight /project series, film negative roll, and frame printed on the photograph. In addition, the scan date, filename, and file format were documented and the scan check box updated for the corresponding record in the pertinent table within the MGS internal database.

### **Accessibility**

#### **Paper Holdings**

Currently, MGS holds all of the photographs and index maps that comprise its collection of aerial photography. Library patrons are welcome to access the collection in-house with an appointment during normal MGS Library hours (noon to 4:30pm Monday through Friday). MGS will begin the process of systematically transferring the paper aerial photographs of Component 1 (county-based aerial photographs) to MSA for permanent preservation during the FY2015 NGGDPPP grant cycle. In general, photographs will only be considered for permanent transfer to MSA if the photographs have been scanned and the associated metadata records have undergone a thorough QA/QC check.

#### **Digital Scans**

MSA and JHU have posted many of MGS's aerial photographs and aerial photograph index maps to their websites, *Guide to Government Records* and *JScholarship*, respectively. Please see the

“RESULTS / Aerial Photograph Collection: Current Status” section on pages 14-19 for a detailed list of the aerial photographs and index maps currently available online.

Additionally, visitors to the MGS Library can view the digital images of the aerial photographs and aerial photograph index maps in-house on an MGS computer. MGS can also deliver digital images to requestors via the cloud-based file transfer service known as Google Drive.

## **File Backup Protocol**

Starting in 2013, the PI, in consultation with MGS NNGDPP staff, instituted a new protocol for backing up both the data preservation databases and the digital scans of the aerial photographs. The data preservation databases are currently stored on MGS’s network in a dedicated folder. On a daily basis, copies of the data preservation databases are posted to a dedicated portable hard drive and also to the local drive of a staffer’s computer. As such, there are always three current copies of the databases in three separate locations.

As aerial photographs are scanned, the digital files are temporarily stored on a staffer’s local computer in a dedicated folder. On a weekly basis, these digital scans are copied to MGS’s network which backs itself up on a nightly basis. As such, every week the most up-to-date collection of digital scans is backed up in two distinct network locations. MGS is also maintaining complete copies of the digital scans on dedicated portable hard drives.

## **RESULTS**

### **FY2014 Grant Objectives**

MGS exceeded this year’s grant objectives in several ways. First, MGS scanned approximately 100 more county-based aerial photographs flown in the 1970s-1980s than expected. The number of photographs that MGS scanned during FY2014 is slightly higher than estimated due to additional 1970s-1980s county-based aerial photographs being discovered “in stock” during the QA/QC and scanning process.

During FY2014, MGS also created metadata for five newly discovered components of the aerial photograph collection (Components 6-10). These components were discovered during the latter part of the FY2013 NNGDPP grant cycle and, at that time, MGS originally estimated the total number of photographs in Components 6-10 to be approximately 600 photographs. However, during the FY2014 NNGDPP grant cycle, MGS discovered an additional ~1,600 photographs in Component 9, the *Washington, DC and Vicinity Aerial Photographs* component.

With the addition of these additional Component 9 photographs, MGS created metadata for a total of approximately 2,200 aerial photographs during the FY2014 NNGDPP grant cycle - ~1,600 more metadata records than originally expected per our FY2014 NNGDPP grant proposal. These new records were uploaded to the *ScienceBase Catalog* as five new collections titled: (1) *Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White*

*High-Altitude Collection*; (2) *Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection*; (3) *Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection*; (4) *Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection*; and (5) *Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection*.

As part of the metadata upload process, MGS continued its vigorous and comprehensive QA/QC process on records in the *AirPhotoDatabase2014.mdb* Microsoft Access database.

MGS is continuing to work closely with MSA and JHU to explore ways of making these digital scans available to the public. As of now, the digital scans created during the FY2014 grant period are only available upon request from MGS. The Survey struggles with network storage issues and the lack of a digital framework suitable for hosting such large numbers of digital photographs. MGS is exploring the possibility of using the State of Maryland's *iMap* portal to host some of these photographs in the future.

## **Aerial Photograph Collection: Current Status**

Below is a summary of the ten components of the aerial photograph collection, including each component's metadata, digital infrastructure, and online availability status.

### **Component 1. County-Based Aerial Photographs**

The first component, the bulk of the collection, consists of approximately 16,000 county-based black-and-white 9"x9" aerial photos (1:20,000-scale) from several time periods – 1937-1938, 1949, 1951-1953, 1957, 1961-1964, 1968, 1970-1972, 1979-1981, and 1983-1990.

These photographs were usually flown or otherwise acquired by the USDA, USGS, or Air Photographics. USDA and USGS photographs were donated to MGS, mainly by SHA. MGS purchased the copyrighted Air Photographics photos.

As of August 2015, only photographs flown during 1937-1938, 1949, 1951-1953, 1957, 1961-1964, 1968, 1970-1972, and 1979 have been digitized (1200 dpi; all in TIF format; most also in JPG format). MGS plans to scan the 1980s and 1990s era photographs during the FY2015 NGGDPP grant cycle.

Select photographs of Baltimore County and Baltimore City from 1937-1938 and 1952-1953 are available online via JHU's *JScholarship* website here: <https://jscholarship.library.jhu.edu/handle/1774.2/32749> .

Metadata for this component (updated during the FY2013 NGGDPP grant cycle) is available via the *Historical Aerial Photographs of Maryland, 1937-1990, County Collection* on USGS' *ScienceBase Catalog* website here: <https://www.sciencebase.gov/catalog/item/4f4e4a94e4b07f02db658dba> . The *ScienceBase* ID for this component is 4f4e4a94e4b07f02db658dba.

## **Component 2: Fenwick and Assateague Island Aerial Photographs**

The second component, considered a “special collection,” consists of approximately 500 unrectified, black-and-white, 2’x2’ photographic enlargements, flown over one or both of the State’s two Atlantic coast barrier islands, Fenwick and Assateague Islands, during 13 different time periods between 1952 and 1964.

These aerial photographs were scanned by JHU and are available on JHU’s *JScholarship* website here: <https://jscholarship.library.jhu.edu/handle/1774.2/36062> .

The metadata for this component is available via the *Historical Aerial Photographs of Fenwick and Assateague Islands, Maryland, 1952-1964* collection on USGS’ *ScienceBase Catalog* website here: <https://www.sciencebase.gov/catalog/item/4f4e4aafe4b07f02db66cf18> . The *ScienceBase* ID for this component is 4f4e4aafe4b07f02db66cf18.

## **Component 3: Montgomery County Aerial Photographs**

The third component, another special collection, consists of approximately 200 unrectified, black-and-white, 19”x19” photographic enlargements, flown over the Rockville-Laurel area of Montgomery County, Maryland, annually or biannually, on 12 different dates between 1966 and 1974.

These photographs were scanned for MGS by MSA staff during the summer of 2015 and are available on MSA’s *Guide to Government Records* website here: <http://guide.mdsa.net/pages/series.aspx?id=SE145> .

The metadata for this component is available via the *Historical (1966-1974) Aerial Photographs of the Rockville-Laurel Area, Montgomery County, Maryland* collection on USGS’ *ScienceBase Catalog* here: <https://www.sciencebase.gov/catalog/item/5069f121e4b046e0dfdbbc73> . The *ScienceBase* ID for this component is 5069f121e4b046e0dfdbbc73.

## **Component 4: County Aerial Photograph Index Maps**

The fourth component consists of approximately 400 22” x 34” photo-mosaic index maps, dating from 1936-1990, depicting flight lines and frame numbers for both the aerial photos flown for a particular county or section of a county, as well as the 2’x2’ photographic enlargements for the barrier islands. These index maps are the reference companion maps to the first component, the county-based aerial photographs.

All of the index maps have been scanned. The 1930s, 1950s, 1960s, 1970s, and 1980s index maps are available on MSA’s *Guide to Government Records* website here: <http://guide.mdsa.net/pages/index.aspx> (click on “View by Agency”, enter “Maryland Geological Survey” under “Agency”, and scroll down to the county listings). The 1930s and 1950s index maps are available on JHU’s *JScholarship* website here: [https://jscholarship.library.jhu.edu/handle/1774.2/36422/browse?rpp=20andetal=-1andtype=titleandsort\\_by=1andorder=ASCandoffset=0](https://jscholarship.library.jhu.edu/handle/1774.2/36422/browse?rpp=20andetal=-1andtype=titleandsort_by=1andorder=ASCandoffset=0) . Digital copies of the 1990s index maps

are not currently posted online; however, MGS visitors can view the digital images in-house or request copies of the digital images.

The metadata for this component is available via the *Historical Air Photo Index Maps of Maryland, 1936-1990* collection on USGS' *ScienceBase Catalog* here: <https://www.sciencebase.gov/catalog/item/4f70c4dee4b08a0b754221e1> . The *ScienceBase* ID for this component is 4f70c4dee4b08a0b754221e1.

### **Component 5: Quadrangle-Based Aerial Photographs**

The fifth component consists of approximately 4,900 aerial photos (mostly 9"x9", mainly black-and-white, some color) that were primarily flown or acquired by the USGS and organized on a 7.5-minute quadrangle basis. These photographs date from 1936 – 1991. The scale of the photography varies but primarily ranges from approximately 1:12,000 to 1:35,400. These photographs were donated to MGS.

This component comprises a previously unidentified set of photos that were inventoried during the FY2012 NNGDPP grant cycle. These photographs were originally counted as part of Component 1 above. However, since the photos were flown on a quadrangle-by-quadrangle basis, instead of a county-by-county basis, MGS decided to break these photographs out as a separate component.

MGS does not plan to scan the Component 5 aerial photographs because the USGS EROS Center is in the process of scanning the majority of photographs flown or otherwise acquired by the USGS. In fact, as of February 2015, approximately sixty-five percent of the photographs in Component 5 have already been scanned by the EROS group. MGS anticipates that the remainder of the Component 5 photographs will be made available in digital form by EROS in the next several years.

The metadata for this component was completed during the FY2013 NNGDPP grant cycle and is available via the *Historical Aerial Photographs of Maryland, 1936-1991, Quad Collection* on USGS' *ScienceBase Catalog* website here: <https://www.sciencebase.gov/catalog/item/53fcdfe8e4b0413fd75eab5b> . The *ScienceBase* ID for this component is 53fcdfe8e4b0413fd75eab5b.

### **Component 6: High-Altitude Black-and-White Aerial Photographs**

The sixth component is a special collection which consists of approximately 200 9"x9" black-and-white high-altitude aerial photographs dating from 1977-1983. These aerial photographs were primarily flown or acquired by the USGS and cover portions of Maryland, Pennsylvania, Virginia, and West Virginia. The scale of these photographs is 1:80,000.

MGS does not plan to scan the photographs in this component since the photos originated with the USGS. According to the NNGDPP, the USGS EROS group is scanning the majority of USGS aerial photographs over the next several years. As such, it is likely that digital images of

these photographs will soon be available via EROS. MGS will continue to monitor the USGS EROS *EarthExplorer* online service for these images.

The metadata for this component was completed during the FY2014 NGGDPP grant cycle and is available via the *Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High-Altitude Collection* on USGS' *ScienceBase Catalog* website here: <https://www.sciencebase.gov/catalog/item/55c50826e4b033ef5212bd4b> . The *ScienceBase* ID for this component is 55c50826e4b033ef5212bd4b.

### **Component 7: High-Altitude Infrared Aerial Photographs**

The seventh component, also a special collection, consists of approximately 50 9"x9" high-altitude infrared aerial photos dating from 1970-1974. These aerial photographs cover portions of Maryland and Virginia. The counties in Maryland covered by these photographs include Anne Arundel, Baltimore, Calvert, Carroll, Charles, Frederick, Harford, Howard, Montgomery, and Prince George's Counties. The scale of these photographs is not printed on the photographs; however, MGS calculates the scale to be approximately 1:120,000 for the Series 74-039 photographs; approximately 1:140,000 for the Series 144-RC8-4L/5L photographs; and approximately 1:160,000 for the Series 72-209 photographs. The source agency of these photographs is unknown.

These photographs are not yet scanned; if funded, MGS plans to scan these photographs during the FY2016 NGGDPP grant period.

The metadata for this component was completed during the FY2014 NGGDPP grant cycle and is available via the *Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection* on USGS' *ScienceBase Catalog* website here: <https://www.sciencebase.gov/catalog/item/55e0756ce4b0f42e3d040f03> . The *ScienceBase* ID for this component is 55e0756ce4b0f42e3d040f03.

### **Component 8: Quadrangle-Based Infrared Aerial Photographs**

The eighth component is a special collection which consists of approximately 200 9"x9" USGS 7.5-minute quadrangle-based infrared aerial photographs dating from 1988-1989. These photographs were primarily flown or acquired by the USGS NAPP. The Maryland counties covered by these photographs include Anne Arundel, Allegany, Calvert, Cecil, Charles, Dorchester, Kent, Prince George's, Queen Anne's, St. Mary's, Somerset, Talbot, and Washington Counties. The scale of these photographs is 1:40,000.

MGS does not plan to scan the photographs in this component since the photos originated with the USGS. The USGS EROS group is scanning the majority of USGS aerial photographs over the next several years. As such, it is likely that digital images of these photographs will soon be available via EROS. MGS will continue to monitor the USGS EROS *EarthExplorer* online service for these images.

The metadata for this component was completed during the FY2014 NGGDPP grant cycle and is available via the *Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection* on USGS' *ScienceBase Catalog* website here:

<https://www.sciencebase.gov/catalog/item/55df7430e4b0518e354e0b67> . The *ScienceBase* ID for this component is 55df7430e4b0518e354e0b67.

### **Component 9: Washington, DC and Vicinity Aerial Photographs**

The ninth component, also a special collection, consists of approximately 1,700 9"x9" black-and-white aerial photographs from Washington, DC and vicinity dating from 1935-1939 and ca. 1950. These photographs cover portions of Washington, DC, Maryland, and Virginia. The scale of these photographs is not printed on the photographs; however, MGS calculates the scale to be approximately 1:20,000. The source agency of these photographs is unknown.

These photographs are not yet scanned; if funded, MGS plans to scan these photographs during the FY2016 NGGDPP grant period.

The metadata for this component was completed during the FY2014 NGGDPP grant cycle and is available via the *Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950* on USGS' *ScienceBase Catalog* website here:

<https://www.sciencebase.gov/catalog/item/55e35a3fe4b05561fa2081f9> . The *ScienceBase* ID for this component is 55e35a3fe4b05561fa2081f9.

### **Component 10: USGS Well-Related Aerial Photographs**

The tenth component is a special collection which consists of approximately 50 9"x9" black-and-white county-based aerial photographs dating from 1987-1989. The Maryland counties covered by these photographs include Anne Arundel, Baltimore, Calvert, Carroll, Cecil, Charles, Frederick, Harford, Howard, Montgomery, and St. Mary's Counties. These photographs were primarily flown or acquired by the USGS. The scale of these photographs is not printed on the photographs; however, MGS calculates the scale to be approximately 1:40,000.

These photographs have notations on them which designate well codes assigned by either MGS or USGS. These well codes correspond to the "Site Name" designation information on the USGS NWIS web interface. Users can go to <http://nwis.waterdata.usgs.gov/md/nwis/inventory> and check "Site Name". Click "Submit" and then enter the desired well code into the search box to retrieve additional information about the well (use spaces instead of dashes, e.g. AA-Ad-104 should be entered as AA Ad 10). Well information available via this interface typically includes latitude and longitude, county, hydrologic unit, well depth, hole depth, land surface altitude, national aquifers, local aquifers, field groundwater-level measurements, and field/lab water-quality sample data.

MGS does not plan to scan the photographs in this component since the photos originated with the USGS. According to the NGGDPP, the USGS EROS Center is scanning the majority of USGS aerial photographs over the next several years. As such, it is likely that digital images of

these photographs will soon be available via EROS. MGS will continue to monitor the USGS EROS *EarthExplorer* online service for these images.

The metadata for this component was completed during the FY2014 NGGDPP grant cycle and is available via the *Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection* on USGS' *ScienceBase Catalog* website here:

<https://www.sciencebase.gov/catalog/item/55e4935fe4b05561fa208470> . The *ScienceBase* ID for this component is 55e4935fe4b05561fa208470.

## **NON-GRANT-RELATED ACTIVITIES**

Although the activities described in this section were not directly funded by the NGGDPP, MGS is including this section for two reasons. First, undertaking the activities was inspired by the Survey's involvement with the NGGDPP. Second, compiling all of the Survey's data preservation activities in one place allows the report to serve double duty – not only as a final report to the NGGDPP, but also as an annual report to MGS's data preservation stakeholders (e.g., MGS staff and members of the MGS Data Preservation Advisory Panel).

### **MGS-MSA-JHU Cooperative**

The following activities were conducted during September 2014 – August 2015 as a continuation of the cooperative agreement forged between MGS, MSA, and JHU in July of 2011. Tim Baker and James Watson of MSA and Jim Gillispie of JHU graciously provided their services and guidance, and steadfastly supported MGS's data preservation efforts over the years. Cooperative efforts included:

- MGS arranged to have its 1980s air photo index maps (Component 4) scanned by MSA. MSA scanned all 57 county-based aerial photograph index maps from the 1980s and posted these images to its *Guide to Government Records* website.
- MSA scanned all photographs in Component 3 (Montgomery County Aerial Photographs) and posted the images to their *Guide to Government Records* website.
- JHU provided MGS with a list of maps needed to complete its collection of Maryland USGS topographic maps. MGS is currently compiling what needed maps it has in-house, and will provide paper copies to JHU for scanning. If MGS has more than one copy, MGS will give one copy to JHU for its permanent collection.
- MSA agreed to help MGS meet its FY2015 NGGDPP grant Match objective by offering the services of an MSA Scanner Operator to assist MGS with its FY2015 scanning tasks.

### **MGS Internal Activities**

In addition to tasks completed as part of the MGS-MSA-JHU Cooperative, MGS also conducted several data preservation-related tasks in-house. Specifically, MGS staff is working diligently to organize and sort through legacy materials left behind by former staff members as they retire or move on to other employment. Since the summer of 2014, MGS NGGDPP staff has designated

specific areas for “Recycle”, “Shred”, “Possible Archive”, and “Definite Archive” materials. Items placed in the Possible Archive and Definite Archive areas are assessed by MGS NNGDPP staff and, as time allows, properly inventoried and archived. This is an ongoing and slow process, as MGS staff work on this task during their infrequent breaks between funded projects.

In August 2015, MGS contracted a company to shred obsolete sensitive documents. Approximately 2,125 pounds of material were shredded on-site and recycled by Vangel, Inc. of Baltimore, Maryland. Additionally, approximately 1,050 pounds of paper from MGS have been recycled via Baltimore City’s curbside single stream recycling program since August 2015. In September 2015, MGS NNGDPP staff sorted through all of the material designated as “Possible Archive” with the assistance of numerous MGS staff, including several retired MGS geologists with immense knowledge of MGS’s historical projects. MGS hopes to repeat this process several more times, as more legacy documents and materials are identified as “Possible Archive” items.

MGS also continued its compilation of a still-incomplete digital finding aid – essentially metadata – for its many publications, both reports and maps. The finding aid is being utilized in the Survey’s website redesign, to facilitate searching and serving digital versions of MGS publications. The MGS curator is working closely with the website design team to ensure data preservation database and website compatibility. This compatibility will facilitate the delivery of the Survey’s digital publications and information about other MGS collections to the public.

### **Data Preservation Advisory Panel**

At its annual meeting in late January of 2015, the Survey’s Data Preservation Advisory Panel (DPAP) encouraged MGS to apply for FY2015 NNGDPP funding to (1) develop digital infrastructure (i.e. scan) ~1,500 county-based aerial photographs from the 1980s and 1990s (Component 1); (2) scan ~1,700 quadrangle-based aerial photographs from the 1950s-1990s (Component 5); (3) update digital infrastructure by performing a comprehensive QA/QC of ~4,000 records for the 1930s-1950s county-based aerial photographs; (4) rescue data at risk by purchasing archival-quality drop-front storage boxes and folders for the entire county-based aerial photograph collection (~16,000 photos); and (5) rescue data at risk by re-housing ~4,000 of the 1930s-1950s county-based aerial photographs into the above-referenced archival boxes and transfer the photographs to MSA for permanent storage and preservation. The DPAP wrote a letter of endorsement, which MGS included with its grant application materials.

### **FY2015 NNGDPP GRANT STATUS**

On June 1, 2015, MGS received a letter from NNGDPP stating that full funding had been awarded for the FY2015 grant cycle. In the letter, however, NNGDPP alerted MGS that funding could not be used to scan the USGS quadrangle-based aerial photographs (Component 5). The USGS EROS group is currently scanning USGS aerial photographs, and as such, NNGDPP will not fund duplicate efforts. On July 24, 2015, MGS submitted a revised budget to NNGDPP personnel requesting that the funds originally slated for Component 5 scanning be re-directed towards the QA/QC of 1,000 additional county-based photograph records and the subsequent re-housing and transfer of these additional 1,000

photos to MSA for permanent storage. The NNGDPP approved this minor revision to MGS's FY2015 Attachment A and budget, and MGS received full grant funding on August 13, 2015.

On September 3, 2015, MGS hosted a FY2015 NNGDPP grant kick-off meeting. Attendees included Katherine Knippler (PI), Dale Shelton, Heather Quinn, and Richard Ortt of MGS; and Tim Baker, Rob Schoeberlein, and Saul Gibusiwa of MSA. Topics discussed at the meeting included a brief overview of historical MGS NNGDPP grant activities, the FY2015 grant tasks, personnel roles, and billing protocol. Katherine, Dale, Heather and Saul will be completing the FY2015 NNGDPP grant activities during the September 2015 – August 2016 timeframe.

On September 10, 2015, a QA/QC Methodology meeting was held. The personnel responsible for this task – Katherine, Dale, and Heather – attended the meeting. Topics discussed included a review of MGS QA/QC methodology and revisions/updates necessary to improve the QA/QC process.

MGS hosted a FY2015 NNGDPP project quarterly meeting on November 23, 2015 with grant personnel to discuss project progress thus far. Work on the grant tasks is proceeding smoothly and on schedule.

## CONCLUSIONS

During the past year, MGS has initiated and/or successfully completed a number of activities in building what it hopes will become a first-rate repository of collections useful to the larger geoscience community. Specifically, MGS exceeded its grant objectives by scanning approximately 7,200 county-based aerial photographs flown in the 1960s and 1970s and creating metadata for approximately 2,200 previously undiscovered aerial photographs. These previously unidentified photos included ~200 9"x9" black-and-white high-altitude aerial photographs dating from 1977-1983; ~50 9"x9" high-altitude infrared aerial photos dating from 1970-1974; ~200 9"x9" quadrangle-based infrared aerial photographs dating from 1988-1989; ~1,700 9"x9" aerial photographs from Washington, DC and vicinity dating from 1935-1939 and ca. 1950; and ~50 black-and-white 9"x9" county-based aerial photographs dating from 1987-1989 which correspond to USGS county wells in Maryland. MGS scanned ~100 more aerial photographs and created metadata for ~1,600 more photographs than originally expected. Additionally, MGS continued a comprehensive QA/QC check of the records in its internal data preservation databases.

MGS added a total of ~2,200 new metadata records to the USGS' *ScienceBase Catalog* via these five new components: (1) *Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High-Altitude Collection*; (2) *Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection*; (3) *Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection*; (4) *Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection*; and (5) *Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection*.

MGS continued its successful QA/QC protocol during the FY2014 NNGDPP grant period. These QA/QC efforts were initiated during the FY2013 grant cycle. The bulk of the FY2014

grant work included scanning ~7,200 county-based aerial photographs from the 1960s and 1970s (part of Component 1). The metadata for this component was completed during the FY2013 grant period. While each photograph was being scanned, MGS staff systematically navigated to that photograph's metadata record in the *AirPhotoDatabase2014.mdb* database and performed a QC of all of the information previously entered in the database for the photograph. MGS staff checked for accurate information and correct spelling/format. Examples of fields that were reviewed include: County Name, Date of Photo, Flight Series, Frame, Photo Scale, File Name, and File Location. MGS believes this is a valuable effort (and an efficient use of "down time" while the photograph is scanning) which results in more accurate metadata records. This QA/QC is continuing during the current FY2015 NNGDPP grant cycle. Once all records for the Component 1 photographs undergo a thorough QA/QC check, MGS will upload final, updated metadata to the USGS *ScienceBase Catalog*.

Independently of the grant, MSA and JHU generously donated their services to further MGS's data preservation efforts. MSA scanned the 1980s county aerial photograph index maps (part of Component 4) and all of the Montgomery County Aerial Photographs (Component 3). Currently, the 1930s, 1950s, 1960s, 1970s, and 1980s county aerial photograph index maps are available to the public online via MSA's *Guide to Government Records* website. JHU's *JScholarship* website is currently hosting the 1930s and 1950s county aerial photograph index maps, as well as assorted county-based aerial photographs of Baltimore County and City from the 1930s and 1950s. The 1990s county aerial photograph index maps are available digitally to MGS patrons via in-house viewing on an MGS computer, or via transfer to the requestor using Google Drive.

Having created and uploaded metadata for 18 of its 39 permanent collections to the *ScienceBase Catalog*, MGS now fully understands the process and has developed procedures and collection-level reporting requirements for documenting that work. The Survey has implemented an intensive, in-house plan for scanning its large collection of 9"x9" aerial photographs. Since metadata creation is complete for the aerial photograph collection, MGS must now focus on creating digital infrastructure for the remaining photographs that have not yet been scanned, making the digital scans readily available to the public, and transferring the paper photographs to a facility better-suited for their long-term storage and preservation. Looking forward, MGS will continue documenting its remaining collections, seek funding for and prepare all of the collections for long-term preservation, and continue investigating possible mechanisms for public access to the collections.

## REFERENCES

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## APPENDICES

## Appendix 1. MGS's Permanent Collections and Their Preservation Status

<b>Table A1-1: Status of MGS permanent collections, by NGGDPP collection category, as of September 2014 (shaded cells indicate that the activity is complete).</b>							
Collection category	Permanent collections (N)	Items in collection*	Collection inventory	Metadata creation	Digital infrastructure	Internet accessibility	Education/outreach
<b>PHYSICAL COLLECTIONS</b>							
1. Auger samples							
2. Fluid samples							
3. Geochemical samples							
<b>4. Hand samples</b>	2						
<i>Maryland Rocks and Minerals</i> (P1510)		99 (203)	NGGDPP 2008	NGGDPP 2010			
<i>Exhibition Flasks: Mineral Commodities of Maryland</i> (P1692)		38	NGGDPP 2010	NGGDPP 2010			
5. Ice cores							
<b>6. Paleontological samples</b>	1						
<i>Maryland Macrofossils</i> (P1518)		156 (200) species; 1500 specimens	NGGDPP 2008	NGGDPP 2010			
<b>7. Rock cores</b>	1						
Rock Cores (P1531)		200	NGGDPP 2008	(NGGDPP 2010)			
<b>8. Rock cuttings</b>	1						
Rock Cuttings (P1532)		200,000	NGGDPP 2008				
<b>9. Sediment cores</b>	4						
Coastal Plain Cores (P1507)		125	NGGDPP 2008	NGGDPP 2009			
Atlantic Continental Shelf Cores (P993)		282	NGGDPP 2008	NGGDPP 2009			

Collection category	Permanent collections (N)	Items in collection*	Collection inventory	Metadata creation	Digital infrastructure	Internet accessibility	Education/outreach
Chesapeake Bay Cores (P1648)		4,255	NGGDPP 2009	NGGDPP 2009			
Heavy Minerals, Atlantic Coastal Shelf (P1519)		250					
10. Sidewall cores							
11. Thin sections and polished sections							
12. Type stratigraphic sections							
<b>Subtotal</b>	<b>9</b>						
<b>DERIVED/INDIRECT DATA</b>							
<b>13. Drilling/completion reports</b>	1						
Well Permits and Well Completion Reports, Maryland (P1526)		500,000	NGGDPP 2008				
<b>14. Drill stem and other tests</b>	1						
Aquifer (Pump) Tests, Maryland Coastal Plain (P1521)		262	NGGDPP 2008				
<b>15. Field notes</b>	1						
Geology Field Notebooks, Maryland (P1522)		70	NGGDPP 2008				
<b>16. Geochemical data</b>	1						
Maryland Groundwater Quality Data (P1530)		?	NGGDPP 2008				
17. Geophysical data							
<b>18. Lithology logs</b>	1						
Geological (Lithological) Descriptions of Coastal Plain Cores and Well Cuttings, MD and VA (P1527)		52	NGGDPP 2008				
<b>19. Maps</b>	1						
MGS Maps, including Oversized Inserts in MGS Publications (no USGS ID)		1500	In progress (9/2015)	In progress (9/2015)			
20. Paleomagnetic resistivity							
<b>21. Paper reports</b>	3						

Collection category	Permanent collections (N)	Items in collection*	Collection inventory	Metadata creation	Digital infrastructure	Internet accessibility	Education/outreach
Published MGS Reports		~500	In progress (9/2015)	In progress (9/2015)			
Unpublished MGS Reports (P1553)		300	NGGDPP 2008	In progress (9/2015)			
Doctoral Dissertations on Maryland Geology (P1523)		28	NGGDPP 2008				
22. Petrophysical data							
<b>23. Photographs</b>	12						
<i>Historical (1948-1977) Photographs of Tidal Shorelines, Maryland (P1565) (components: (1) envelopes of photos and assoc. film negatives, (2) slides)</i>		(1) ~1,300 (2) 12,000	NGGDPP 2008	(1) 11/2013 (2) to be done			
X-rays and Xeroradiographs of Marine and Estuarine Sediment Cores, MD		300	NGGDPP 2008				
<i>Historical Air Photo Index Maps of Maryland, 1936-1980</i>		395	NGGDPP 2011	NGGDPP 2011	2012-2015 (JHU and MSA)		
<i>Historical Aerial Photographs of Maryland, 1937-1990, County Collection (P1603)</i>		16,074	NGGDPP 2008	NGGDPP 2011-2012	NGGDPP 2012-2015		
<i>Historical Aerial Photographs of Maryland, 1936-1991, Quad Collection</i>		4,867	NGGDPP 2012	NGGDPP 2013	2015 – USGS EROS		
<i>Historical Aerial Photographs of Fenwick and Assateague Islands, Maryland, 1952-1964 (P1691)</i>		505	NGGDPP 2010	NGGDPP 2010-2011	2011 (JHU)		
<i>Historical (1966-1974) Aerial Photographs of the Rockville-Laurel Area, Montgomery County, Maryland</i>		176	NGGDPP 2012	NGGDPP 2012	2015 (MSA)		

Collection category	Permanent collections (N)	Items in collection* (N)	Collection inventory	Metadata creation	Digital infrastructure	Internet accessibility	Education/outreach
<i>Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High Altitude Collection</i>		211	NGGDPP 2014	NGGDPP 2014	2015 – USGS EROS		
<i>Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection</i>		48	NGGDPP 2014	NGGDPP 2014			
<i>Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection</i>		196	NGGDPP 2014	NGGDPP 2014	2015 – USGS EROS		
<i>Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection</i>		1,706	NGGDPP 2014	NGGDPP 2014			
<i>Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection</i>		45	NGGDPP 2014	NGGDPP 2014	2015 – USGS EROS		
24. Potential fields							
25. Production history							
<b>26. Routine analysis data</b>	2						
Marine and Estuarine Beach and Bottom Sediment Data (P1612)		~50	NGGDPP 2008	(NGGDPP 2010)			
Paleontological and Palynological Data Derived from MD Water Wells (P1524)		?	NGGDPP 2008				
27. Scout tickets							
<b>28. Seismic data</b>	1						
Marine and Estuarine Seismic Profile Prints (P1554)		240	NGGDPP 2008				
29. Source rock maturity analysis							
30. Special analysis data							
31. Stratigraphic horizons							
<b>32. Surface and airborne data</b>	3						

Collection category	Permanent collections (N)	Items in collection* (N)	Collection inventory	Metadata creation	Digital infrastructure	Internet accessibility	Education/outreach
Bathymetric Surveys, MD Water Bodies (P1547)		8	NGGDPP 2008	NGGDPP 2010			
Elevation Surveys of Arnold, Broad Creek, and Crofton Meadows Well Fields, Anne Arundel Co., MD (P1529)		15	NGGDPP 2008				
Beach Profiles, Coastal Maryland (P1613)		?	NGGDPP 2008				
<b>33. 2-D and 3-D seismic reflection</b>	<b>1</b>						
2-D Seismic Reflection Profiles, Maryland Coastal Plain (P1520)		2	NGGDPP 2008				
34. Vertical seismic profiles							
<b>35. Well logs</b>	<b>2</b>						
Geophysical Logs, Western Maryland Deep Wells (P1528)		337	NGGDPP 2008	NGGDPP 2010			
Well Logs, Maryland and Neighboring States (P1525)		2,000	NGGDPP 2008				
<b>Subtotal</b>	<b>30</b>						
Collection category	Permanent collections (N)	Items in collection*	Collection inventory	Metadata creation	Digital infrastructure	Internet accessibility	Education/outreach
<b>TOTAL</b>	<b>39</b>						

## **Appendix 2. NGGDPP Metadata Form – *Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High-Altitude Collection***

**MGS Collection ID:** *Not assigned yet*

**Original NGGDPP ID:** *N/A*

**ScienceBase ID:** *55c50826e4b033ef5212bd4b*

**November 2015**

### **Sources of Information:**

- Information embedded, stamped and/or handwritten on the aerial photographs or associated index maps and stored in the internal MGS Microsoft Access databases *AirPhotoDatabase2014.mdb*
- USGS *ScienceBase Catalog* (collection ID)
- 2006 *Implementation Plan for the National Geological and Geophysical Data Preservation Program*, Appendix 2 (data type)  
<http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf>

### **Collection ID**

**Definition:** NGGDPP collection identification number.

**Value:** “55c50826e4b033ef5212bd4b” (*ScienceBase Catalog* ID for the collection *Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High-Altitude Collection*).

**Source:** Generated by the *ScienceBase Catalog* upon submittal of metadata for *Historical Aerial Photographs of MD, PA, VA, and WV, 1977-1983, Black-and-White High-Altitude Collection*; will be stored internally in *DataPreservation.mdb* – *tblCollection* – field “*ScienceBaseID*”.

### **Title**

**Definition:** Official, human-readable title for individual record, used in listings and search results (short, distinctive) – mandatory.

**Value:** A concatenation of three standard elements representing the flight/project area and film used in the production of the photo, separated by dashes (i.e., flight/project area – film negative roll – frame number). Also includes a brief definition in parentheses of what the numbers in the title signify e.g. “(Flight Series-Film Negative Roll-Frame Number)”.

**Source:** Usually embedded in upper right corner of aerial photograph; elements comprising the title are stored as two separate fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl1- HAPPhot* table – fields “Flight Series” and “Frame” (in the database, the field “Flight Series” includes both the flight/project and the film negative roll, separated by a dash).

**Examples:**

- AMN-1-1 (Flight Series = AMN-1; Frame = 1)
- ANK (JO)-5DD-212 (Flight Series = ANK (JO)-5DD; Frame = 212)
- AHU-2-176 (Flight Series = AHU-2; Frame = 176)

**Alternate Title**

**Definition:** Additional title identifiers for individual record (e.g., for further identification by other Web service interfaces); textual titles or specific sample IDs used by collection – optional.

**Value:** None at present.

**Source:** N/A

**Abstract**

**Definition:** Human-readable description of individual record, used to help determine nature of underlying physical data resource; contains much information about data resource – mandatory.

**Value:** “Unrectified, [Photo Type], 9 in. x 9 in., [Photo Scale] scale aerial photograph flown over [State Name] on [Date of Photo]”.

**Source:** A concatenation of information stored in the *AirPhotoDatabase2014.mdb* database, linked by text (i.e., *tbl\_SpplColl1- HAPPhot* – fields Photo Type, Photo Scale, State Name, Date of Photo).

**Data Type**

**Definition:** A controlled vocabulary of one or more data types – mandatory.

**Value:** “Photograph”.

**Source:** Determined by MGS, based on the list of data types provided in Appendix 2 of the 2006 NGGDPP *Implementation Plan*.

**SupplementalInformation**

**Definition:** Information on how to access physical data represented by metadata record (e.g., general for entire collection, such as URL, or specific reference to online resource, like ordering system with specific ID) – mandatory.

**Value:** “Contact the MGS curator at (410) 554-5500 for additional information.”

**Source:** N/A

## **Coordinates**

**Definition:** Geographic coordinates (longitude, latitude), in decimal degrees – mandatory.

**Value:** (-)decimal longitude, decimal latitude. This field presently contains the approximate centroid of the state over which the photography was flown.

**Source:** Curator-created table of approximate state centroid locations (“Approx\_State\_Centroids\_Used”), located here on the Common on mgsdc MGS network drive: R:\Data\_Preservation\Location\_Tables.

## **AlternateGeometry**

**Definition:** Alternate method of storing geospatial footprint; description of authoritative source of geographic location and how simple coordinates derived – optional.

**Value:** “Geographic coordinates (NAD83) represent approximate centroid of first state listed in abstract. Secondary and tertiary state coordinates are listed here if applicable: [list additional state coordinates here]”.

**Source:** Curator-created table of approximate state centroid locations (“Approx\_State\_Centroids\_Used”), located here on the Common on mgsdc MGS network drive: R:\Data\_Preservation\Location\_Tables.

## **OnlineResource**

**Definition:** URL pointer(s) to textual information about specific record – optional.

**Value:** None supplied.

**Source:** N/A

## **BrowseGraphic**

**Definition:** URL pointer(s) to images representing specific record – optional.

**Value:** None supplied.

**Source:** N/A

## **Date**

**Definition:** Meaningful date (e.g., collection date) attached to record; may be to any degree of precision or left blank (e.g., 20010101, 1939-1945, -20030331, 2000) – optional.

**Value:** Date on which the aerial photo was flown, in YYYYMMDD format.

**Source:** Usually embedded in upper left corner of aerial photograph.

**Examples:** Dates as they occur on the photos, “APR -5 1938” or “AUG 23 1952,” for example, are reformatted, respectively, as follows: “19380405” or “19520823”.

### **DatasetReferenceDate**

**Definition:** Reference date indicating currency of underlying data record (e.g., date metadata record added to National Catalog); format=YYYYMMDD – mandatory.

**Value:** Date record provided to NCGDPP for uploading to the *ScienceBase Catalog*, in YYYYMMDD format, namely “20130821”.

**Source:** Provided by curator.

### **VerticalExtent**

**Definition:** Vertical extent (e.g., vertical depth information for rock core samples); contains 2-3 elements: unit of measure, max value, min value (e.g., m, 35.4, 0 => rock core measured at 35.4 total meters).

**Value:** N/A

**Source:** N/A

### Appendix 3. NGGDPP Metadata Form – *Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection*

MGS Collection ID: *Not assigned yet*  
Original NGGDPP ID: *N/A*  
ScienceBase ID: **5e0756ce4b0f42e3d040f03**

November 2015

#### **Sources of Information:**

- Information embedded, stamped and/or handwritten on the aerial photographs or associated index maps and stored in the internal MGS Microsoft Access databases *AirPhotoDatabase2014.mdb*
- USGS *ScienceBase Catalog* (collection ID)
- 2006 *Implementation Plan for the National Geological and Geophysical Data Preservation Program*, Appendix 2 (data type)  
[\[http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf\]](http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf) \_

#### **Collection ID**

**Definition:** NGGDPP collection identification number.

**Value:** “5e0756ce4b0f42e3d040f03” (*ScienceBase Catalog* ID for the collection *Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection*)

**Source:** Generated by the *ScienceBase Catalog* upon submittal of metadata for *Historical Aerial Photographs of Maryland, 1970-1974, High-Altitude Infrared Collection*.

#### **Title**

**Definition:** Official, human-readable title for individual record, used in listings and search results (short, distinctive) – mandatory.

**Value:** A concatenation of three standard elements representing the flight/project area and film used in the production of the photo, separated by dashes (i.e., flight/project area – film negative roll – frame number). Also includes a brief definition in parentheses of what the numbers in the title signify e.g. “(Flight Series-Film Negative Roll-Frame Number)”.

**Source:** Usually embedded in upper right corner of aerial photograph; elements comprising the title are stored as two separate fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 2- HAPInfrPhot* – fields “Flight Series” and “Frame” (in the database, the field “Flight Series” includes both the flight/project and the film negative roll, separated by a dash).

**Examples:**

- AMN-1-1 (Flight Series = AMN-1; Frame = 1)
- ANK (JO)-5DD-212 (Flight Series = ANK (JO)-5DD; Frame = 212)
- AHU-2-176 (Flight Series = AHU-2; Frame = 176)
- 24003-179-101 (Flight Series = 24003-179; Frame = 101)

**Alternate Title**

**Definition:** Additional title identifiers for individual record (e.g., for further identification by other Web service interfaces); textual titles or specific sample IDs used by collection – optional.

**Value:** None at present.

**Source:** N/A

**Abstract**

**Definition:** Human-readable description of individual record, used to help determine nature of underlying physical data resource; contains much information about data resource – mandatory.

**Value:** “Unrectified, [Photo Type], 9 in. x 9 in., [Photo Scale] scale aerial photograph flown over [State Name] in [Date of Photo]. Maryland Counties covered: [County Name]”.

**Source:** A concatenation of information stored in the *AirPhotoDatabase2014.mdb* database, linked by text (i.e., *tbl\_SpclColl 2- HAPInfrPhot* – fields Photo Type, Photo Scale, State Name, Date of Photo, County Name).

**Data Type**

**Definition:** A controlled vocabulary of one or more data types – mandatory.

**Value:** “Photograph”.

**Source:** Determined by MGS, based on the list of data types provided in Appendix 2 of the 2006 NGGDPP *Implementation Plan*.

**Supplemental Information**

**Definition:** Information on how to access physical data represented by metadata record (e.g., general for entire collection, such as URL, or specific reference to online resource, like ordering system with specific ID) – mandatory.

**Value:** “Contact the MGS curator at (410) 554-5500 for additional information.”

**Source:** N/A

## **Coordinates**

**Definition:** Geographic coordinates (longitude, latitude), in decimal degrees – mandatory.

**Value:** (-)decimal longitude, decimal latitude. This field presently contains the approximate centroid of the state over which the photography was flown.

**Source:** Curator-created table of approximate state centroid locations (“Approx\_State\_Centroids\_Used”), located here on the Common on mgsdc MGS network drive: R:\Data\_Preservation\Location\_Tables.

## **AlternateGeometry**

**Definition:** Alternate method of storing geospatial footprint; description of authoritative source of geographic location and how simple coordinates derived – optional.

**Value:** “Geographic coordinates (NAD83) represent approximate centroid of first state listed in abstract. Secondary and tertiary state coordinates are listed here if applicable: [list additional state coordinates here]”.

**Source:** Curator-created table of approximate state centroid locations (“Approx\_State\_Centroids\_Used”), located here on the Common on mgsdc MGS network drive: R:\Data\_Preservation\Location\_Tables.

## **OnlineResource**

**Definition:** URL pointer(s) to textual information about specific record – optional.

**Value:** None supplied.

**Source:** N/A

## **BrowseGraphic**

**Definition:** URL pointer(s) to images representing specific record – optional.

**Value:** None supplied.

**Source:** N/A

## **Date**

**Definition:** Meaningful date (e.g., collection date) attached to record; may be to any degree of precision or left blank (e.g., 20010101, 1939-1945, -20030331, 2000) – optional.

**Value:** Date on which the aerial photo was flown, in YYYYMMDD format.

**Source:** Usually embedded in upper left corner of aerial photograph, elements comprising the date are stored in fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 2-HAPInfrPhot* table – field Date of Photo ( MM/DD/YYYY format), subsequently reformatted to NCGDPP-compliant format YYYYMMDD.

**Examples:** Dates as they occur on the photos, “APR -5 1938” or “AUG 23 1952,” for example, are ultimately reformatted, respectively, as follows: “19380405” or “19520823”.

### **DatasetReferenceDate**

**Definition:** Reference date indicating currency of underlying data record (e.g., date metadata record added to National Catalog); format=YYYYMMDD – mandatory.

**Value:** Date record provided to NCGDPP for uploading to the *ScienceBase Catalog*, in YYYYMMDD format, namely “20130821”.

**Source:** Provided by curator.

### **VerticalExtent**

**Definition:** Vertical extent (e.g., vertical depth information for rock core samples); contains 2-3 elements: unit of measure, max value, min value (e.g., m, 35.4, 0 => rock core measured at 35.4 total meters).

**Value:** N/A

**Source:** N/A

## Appendix 4. NGGDPP Metadata Form – *Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection*

MGS Collection ID: *Not assigned yet*  
Original NGGDPP ID: *N/A*  
ScienceBase ID: 55df7430e4b0518e354e0b67

November 2015

### **Sources of Information:**

- Information embedded, stamped and/or handwritten on the aerial photographs or associated index maps and stored in the internal MGS Microsoft Access databases *AirPhotoDatabase2014.mdb*
- USGS *ScienceBase Catalog* (collection ID)
- 2006 *Implementation Plan for the National Geological and Geophysical Data Preservation Program*, Appendix 2 (data type)  
[\[http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf\]](http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf) \_

### **Collection ID**

**Definition:** NGGDPP collection identification number.

**Value:** “55df7430e4b0518e354e0b67” (*ScienceBase Catalog* ID for the collection *Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection*).

**Source:** Generated by the *ScienceBase Catalog* upon submittal of metadata for *Historical Aerial Photographs of Maryland, 1988-1989, Quad-Based Infrared Collection*.

### **Title**

**Definition:** Official, human-readable title for individual record, used in listings and search results (short, distinctive) – mandatory.

**Value:** A concatenation of three standard elements representing the flight/project area and film used in the production of the photo, separated by dashes (i.e., flight/project area – film negative roll – frame number). Also includes a brief definition in parentheses of what the numbers in the title signify e.g. “(Flight Series-Film Negative Roll-Frame Number)”.

**Source:** Usually embedded in upper right corner of aerial photograph; elements comprising the title are stored as two separate fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 3- QuadInfrPhot* – fields “Flight Series” and “Frame” (in the database, the field “Flight Series” includes both the flight/project and the film negative roll, separated by a dash).

**Examples:**

- AMN-1-1 (Flight Series = AMN-1; Frame = 1)
- ANK (JO)-5DD-212 (Flight Series = ANK (JO)-5DD; Frame = 212)
- AHU-2-176 (Flight Series = AHU-2; Frame = 176)
- 24003-179-101 (Flight Series = 24003-179; Frame = 101)

**Alternate Title**

**Definition:** Additional title identifiers for individual record (e.g., for further identification by other Web service interfaces); textual titles or specific sample IDs used by collection – optional.

**Value:** None at present.

**Source:** N/A

**Abstract**

**Definition:** Human-readable description of individual record, used to help determine nature of underlying physical data resource; contains much information about data resource – mandatory.

**Value:** “Unrectified, [Photo Type], 9 in. x 9 in., [Photo Scale] scale aerial photograph flown over [County Name] County in Maryland on [Date of Photo]. 7.5-minute USGS Quadrangle covered: [Quadrangle Name]”.

**Source:** A concatenation of information stored in the *AirPhotoDatabase2014.mdb* database, linked by text (i.e., *tbl\_SpplColl 3- QuadInfrPhot* – fields Photo Type, Photo Scale, County Name, Date of Photo, Quadrangle Name).

**Data Type**

**Definition:** A controlled vocabulary of one or more data types – mandatory.

**Value:** “Photograph”.

**Source:** Determined by MGS, based on the list of data types provided in Appendix 2 of the 2006 NGGDPP *Implementation Plan*.

**Supplemental Information**

**Definition:** Information on how to access physical data represented by metadata record (e.g., general for entire collection, such as URL, or specific reference to online resource, like ordering system with specific ID) – mandatory.

**Value:** “Contact the MGS curator at (410) 554-5500 for additional information.”

**Source:** N/A

### **Coordinates**

**Definition:** Geographic coordinates (longitude, latitude), in decimal degrees – mandatory.

**Value:** (-)decimal longitude, decimal latitude. This field presently contains the approximate centroid of the 7.5-minute USGS quadrangle over which the photography was flown.

**Source:** A concatenation of coordinates derived (via ArcGIS) from the 7.5-minute quadrangle grid downloaded from the USGS National Map; stored in table *tbl\_QuadUSGS\_Ctr\_latlonNGGDPP* within the internal MGS database *AirPhotoDatabase2014.mdb*.

### **AlternateGeometry**

**Definition:** Alternate method of storing geospatial footprint; description of authoritative source of geographic location and how simple coordinates derived – optional.

**Value:** “Geographic coordinates (NAD83) represent approximate centroid of [Quadrangle Name] (7.5-minute) quadrangle from the U.S. Geological Survey”.

**Source:** N/A

### **OnlineResource**

**Definition:** URL pointer(s) to textual information about specific record – optional.

**Value:** None supplied.

**Source:** N/A

### **BrowseGraphic**

**Definition:** URL pointer(s) to images representing specific record – optional.

**Value:** None supplied.

**Source:** N/A

### **Date**

**Definition:** Meaningful date (e.g., collection date) attached to record; may be to any degree of precision or left blank (e.g., 20010101, 1939-1945, -20030331, 2000) – optional.

**Value:** Date on which the aerial photo was flown, in YYYYMMDD format.

**Source:** Usually embedded in upper left corner of aerial photograph, elements comprising the date are stored in fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 3-QuadInfrPhot* table – field Date of Photo ( MM/DD/YYYY format), subsequently reformatted to NCGDPP-compliant format YYYYMMDD.

**Examples:** Dates as they occur on the photos, “APR -5 1938” or “AUG 23 1952,” for example, are ultimately reformatted, respectively, as follows: “19380405” or “19520823”.

### **DatasetReferenceDate**

**Definition:** Reference date indicating currency of underlying data record (e.g., date metadata record added to National Catalog); format=YYYYMMDD – mandatory.

**Value:** Date record provided to NCGDPP for uploading to the *ScienceBase Catalog*, in YYYYMMDD format, namely “20130821”.

**Source:** Provided by curator.

### **VerticalExtent**

**Definition:** Vertical extent (e.g., vertical depth information for rock core samples); contains 2-3 elements: unit of measure, max value, min value (e.g., m, 35.4, 0 => rock core measured at 35.4 total meters).

**Value:** N/A

**Source:** N/A

## Appendix 5. NGGDPP Metadata Form – *Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection*

MGS Collection ID: *Not assigned yet*  
Original NGGDPP ID: *N/A*  
ScienceBase ID: 55e35a3fe4b05561fa2081f9

November 2015

### **Sources of Information:**

- Information embedded, stamped and/or handwritten on the aerial photographs or associated index maps and stored in the internal MGS Microsoft Access databases *AirPhotoDatabase2014.mdb*
- USGS *ScienceBase Catalog* (collection ID)
- 2006 *Implementation Plan for the National Geological and Geophysical Data Preservation Program*, Appendix 2 (data type)  
[\[http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf\]](http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf) \_

### **Collection ID**

**Definition:** NGGDPP collection identification number.

**Value:** “55e35a3fe4b05561fa2081f9” (*ScienceBase Catalog* ID for the collection *Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection*).

**Source:** Generated by the *ScienceBase Catalog* upon submittal of metadata for *Historical Aerial Photographs of Washington, DC, MD, and VA, 1935-1939 and ca. 1950 Collection*.

### **Title**

**Definition:** Official, human-readable title for individual record, used in listings and search results (short, distinctive) – mandatory.

**Value:** A concatenation of three standard elements representing the flight/project area and film used in the production of the photo, separated by dashes (i.e., flight/project area – film negative roll – frame number). Also includes a brief definition in parentheses of what the numbers in the title signify e.g. “(Flight Series-Film Negative Roll-Frame Number)”.

**Source:** Usually embedded in upper right corner of aerial photograph; elements comprising the title are stored as two separate fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 4- Wshngtn DC-Vcnty* – fields “Flight Series” and “Frame” (in the database, the field “Flight Series” includes both the flight/project and the film negative roll, separated by a dash).

**Examples:**

- AMN-1-1 (Flight Series = AMN-1; Frame = 1)
- ANK (JO)-5DD-212 (Flight Series = ANK (JO)-5DD; Frame = 212)
- AHU-2-176 (Flight Series = AHU-2; Frame = 176)
- 24003-179-101 (Flight Series = 24003-179; Frame = 101)

**Alternate Title**

**Definition:** Additional title identifiers for individual record (e.g., for further identification by other Web service interfaces); textual titles or specific sample IDs used by collection – optional.

**Value:** None at present.

**Source:** N/A

**Abstract**

**Definition:** Human-readable description of individual record, used to help determine nature of underlying physical data resource; contains much information about data resource – mandatory.

**Value:** “Unrectified, [Photo Type], 9 in. x 9 in., [Photo Scale] scale aerial photograph flown over [State Name(s)] during the time period [Date of Photo]. Maryland Counties covered, if applicable and known, include: [County Name]”.

**Source:** A concatenation of information stored in the *AirPhotoDatabase2014.mdb* database, linked by text (i.e., *tbl\_SpplColl 4- Wshngtn DC-Vcnty* – fields Photo Type, Photo Scale, State Name(s), Date of Photo, County Name).

**Data Type**

**Definition:** A controlled vocabulary of one or more data types – mandatory.

**Value:** “Photograph”.

**Source:** Determined by MGS, based on the list of data types provided in Appendix 2 of the 2006 NGGDPP *Implementation Plan*.

**Supplemental Information**

**Definition:** Information on how to access physical data represented by metadata record (e.g., general for entire collection, such as URL, or specific reference to online resource, like ordering system with specific ID) – mandatory.

**Value:** “Contact the MGS curator at (410) 554-5500 for additional information.”

**Source:** N/A

### **Coordinates**

**Definition:** Geographic coordinates (longitude, latitude), in decimal degrees – mandatory.

**Value:** (-)decimal longitude, decimal latitude. This field presently contains the approximate centroid of the state/district over which the photography was flown.

**Source:** Curator-created table of approximate state/district centroid locations (“Approx\_State\_Centroids\_Used”), located here on the Common on mgsdc MGS network drive: R:\Data\_Preservation\Location\_Tables.

### **AlternateGeometry**

**Definition:** Alternate method of storing geospatial footprint; description of authoritative source of geographic location and how simple coordinates derived – optional.

**Value:** “Geographic coordinates (NAD83) represent approximate centroid of first state/district listed in abstract. Secondary and tertiary state/district coordinates are listed here if applicable: [list additional state/district coordinates here]”.

**Source:** Curator-created table of approximate state centroid locations (“Approx\_State\_Centroids\_Used”), located here on the Common on mgsdc MGS network drive: R:\Data\_Preservation\Location\_Tables.

### **OnlineResource**

**Definition:** URL pointer(s) to textual information about specific record – optional.

**Value:** None supplied.

**Source:** N/A

### **BrowseGraphic**

**Definition:** URL pointer(s) to images representing specific record – optional.

**Value:** None supplied.

**Source:** N/A

### **Date**

**Definition:** Meaningful date (e.g., collection date) attached to record; may be to any degree of precision or left blank (e.g., 20010101, 1939-1945, -20030331, 2000) – optional.

**Value:** Date on which the aerial photo was flown, in YYYYMMDD format.

**Source:** Usually embedded in upper left corner of aerial photograph, elements comprising the date are stored in fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 4-Wshngtn DC-Vcnty* table – field Date of Photo ( MM/DD/YYYY format), subsequently reformatted to NGGDPP-compliant format YYYYMMDD.

**Examples:** Dates as they occur on the photos, “APR -5 1938” or “AUG 23 1952,” for example, are ultimately reformatted, respectively, as follows: “19380405” or “19520823”.

### **DatasetReferenceDate**

**Definition:** Reference date indicating currency of underlying data record (e.g., date metadata record added to National Catalog); format=YYYYMMDD – mandatory.

**Value:** Date record provided to NGGDPP for uploading to the *ScienceBase Catalog*, in YYYYMMDD format, namely “20130821”.

**Source:** Provided by curator.

### **VerticalExtent**

**Definition:** Vertical extent (e.g., vertical depth information for rock core samples); contains 2-3 elements: unit of measure, max value, min value (e.g., m, 35.4, 0 => rock core measured at 35.4 total meters).

**Value:** N/A

**Source:** N/A

## Appendix 6. NGGDPP Metadata Form – *Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection*

MGS Collection ID: *Not assigned yet*  
Original NGGDPP ID: *N/A*  
ScienceBase ID: **55e4935fe4b05561fa208470**

November 2015

### **Sources of Information:**

- Information embedded, stamped and/or handwritten on the aerial photographs or associated index maps and stored in the internal MGS Microsoft Access databases *AirPhotoDatabase2014.mdb*
- USGS *ScienceBase Catalog* (collection ID)
- 2006 *Implementation Plan for the National Geological and Geophysical Data Preservation Program*, Appendix 2 (data type)  
[\[http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf\]](http://datapreservation.usgs.gov/docs/2006DataPreservation.pdf) \_

### **Collection ID**

**Definition:** NGGDPP collection identification number.

**Value:** “55e4935fe4b05561fa208470” (*ScienceBase Catalog ID for the collection *Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection**)

**Source:** Generated by the *ScienceBase Catalog* upon submittal of metadata for *Historical Aerial Photographs of Maryland, 1987-1989, USGS NWIS Well-Related Collection*.

### **Title**

**Definition:** Official, human-readable title for individual record, used in listings and search results (short, distinctive) – mandatory.

**Value:** A concatenation of three standard elements representing the flight/project area and film used in the production of the photo, separated by dashes (i.e., flight/project area – film negative roll – frame number). Also includes a brief definition in parentheses of what the numbers in the title signify e.g. “(Flight Series-Film Negative Roll-Frame Number)”.

**Source:** Usually embedded in upper right corner of aerial photograph; elements comprising the title are stored as two separate fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 5- USGSWellPhot* – fields “Flight Series” and “Frame” (in the database, the field “Flight Series” includes both the flight/project and the film negative roll, separated by a dash).

### **Examples:**

- AMN-1-1 (Flight Series = AMN-1; Frame = 1)
- ANK (JO)-5DD-212 (Flight Series = ANK (JO)-5DD; Frame = 212)
- AHU-2-176 (Flight Series = AHU-2; Frame = 176)
- 24003-179-101 (Flight Series = 24003-179; Frame = 101)

### **Alternate Title**

**Definition:** Additional title identifiers for individual record (e.g., for further identification by other Web service interfaces); textual titles or specific sample IDs used by collection – optional.

**Value:** Contains information related to the USGS Well ID e.g. “Corresponds to Well #AA-Ad-104”.

**Source:** Values sourced from the “Additional Notes 2” column in the *tbl\_SpclColl 5-USGSWellPhot* table in the *AirPhotoDatabase2014.mdb* database.

### **Abstract**

**Definition:** Human-readable description of individual record, used to help determine nature of underlying physical data resource; contains much information about data resource – mandatory

**Value:** “Unrectified, [Photo Type], 9 in. x 9 in., [Photo Scale] scale aerial photograph flown over [County Name] County in Maryland on [Date of Photo]. [Additional Notes 2]”.

**Source:** A concatenation of information stored in the *AirPhotoDatabase2014.mdb* database, linked by text (i.e., *tbl\_SpclColl 5-USGSWellPhot* – fields Photo Type, Photo Scale, County Name, Date of Photo, Additional Notes 2).

### **Data Type**

**Definition:** A controlled vocabulary of one or more data types – mandatory.

**Value:** “Photograph”.

**Source:** Determined by MGS, based on the list of data types provided in Appendix 2 of the 2006 NGGDPP *Implementation Plan*.

### **SupplementalInformation**

**Definition:** Information on how to access physical data represented by metadata record (e.g., general for entire collection, such as URL, or specific reference to online resource, like ordering system with specific ID) – mandatory.

**Value:** “Contact the MGS curator at (410) 554-5500 for additional information.”

Source: N/A

**Coordinates**

**Definition:** Geographic coordinates (longitude, latitude), in decimal degrees – mandatory

**Value:** (-)decimal longitude, decimal latitude. This field presently contains the centroid of the county over which the photography was flown (Table A6-1).

**Source:** A concatenation of coordinates from the Geographic Names Information System (GNIS); stored in table *tbl\_CountyCentroids\_NGGDPPformat* within the internal MGS database *AirPhotoDatabase2014.mdb*.

<b>Table A6-1: Geographic coordinates (NAD83) of county centroids, from the Geographic Names Information System (GNIS), January 2011 (Feature class = Civil)</b>				
<b>County</b>	<b>Latitude (DMS)</b>	<b>Longitude (DMS)</b>	<b>Latitude (dec. deg.)</b>	<b>Longitude (dec. deg.)</b>
Allegany	394000N	0783959W	39.666667	-78.666389
Anne Arundel	390000N	0763659W	39.	-76.616389
Baltimore	392800N	0763859W	39.466667	-76.649722
Baltimore City	391725N	0763644W	39.290278	-76.612222
Calvert	383300N	0763459W	38.55	-76.583056
Caroline	385200N	0754959W	38.866667	-75.833056
Carroll	393300N	0770059W	39.55	-77.016389
Cecil	393400N	0755659W	39.566667	-75.949722
Charles	382900N	0765859W	38.483333	-76.983056
Dorchester	382800N	0755959W	38.466667	-75.999722
Frederick	392800N	0772359W	39.466667	-77.399722
Garrett	393300N	0791459W	39.55	-79.249722
Harford	393300N	0761759W	39.55	-76.299722
Howard	391501N	0765559W	39.250278	-76.933056
Kent	391800N	0760159W	39.3	-76.033056
Montgomery	390900N	0771159W	39.15	-77.199722
Prince Georges	385000N	0765059W	38.833333	-76.849722
Queen Anne’s	390400N	0755859W	39.066667	-75.983056
Somerset	380800N	0754359W	38.133333	-75.733056
St. Mary’s	381800N	0763659W	38.3	-76.616389
Talbot	384600N	0760459W	38.766667	-76.083056
Washington	393700N	0774559W	39.616667	-77.766389
Wicomico	382200N	0753559W	38.366667	-75.599722
Worcester	381200N	0752259W	38.2	-75.383056

### **AlternateGeometry**

**Definition:** Alternate method of storing geospatial footprint; description of authoritative source of geographic location and how simple coordinates derived – optional.

**Value:** “Geographic coordinates (NAD83) represent centroid of [County Name] County in Maryland from the U.S. Geological Survey's Geographic Names Information System (GNIS).”

**Source:** N/A

### **OnlineResource**

**Definition:** URL pointer(s) to textual information about specific record – optional.

**Value:** None supplied.

**Source:** N/A

### **BrowseGraphic**

**Definition:** URL pointer(s) to images representing specific record – optional.

**Value:** None supplied.

**Source:** N/A

### **Date**

**Definition:** Meaningful date (e.g., collection date) attached to record; may be to any degree of precision or left blank (e.g., 20010101, 1939-1945, -20030331, 2000) – optional.

**Value:** Date on which the aerial photo was flown, in YYYYMMDD format.

**Source:** Usually embedded in upper left corner of aerial photograph, elements comprising the date are stored in fields in the *AirPhotoDatabase2014.mdb* database – *tbl\_SpclColl 5-USGSWellPhot* table – field Date of Photo ( MM/DD/YYYY format), subsequently reformatted to NGGDPP-compliant format YYYYMMDD.

**Examples:** Dates as they occur on the photos, “APR -5 1938” or “AUG 23 1952,” for example, are ultimately reformatted, respectively, as follows: “19380405” or “19520823”.

### **DatasetReferenceDate**

**Definition:** Reference date indicating currency of underlying data record (e.g., date metadata record added to National Catalog); format=YYYYMMDD – mandatory.

**Value:** Date record provided to NGGDPP for uploading to the *ScienceBase Catalog*, in YYYYMMDD format, namely “20130821”.

**Source:** Provided by curator.

**VerticalExtent**

**Definition:** Vertical extent (e.g., vertical depth information for rock core samples); contains 2-3 elements: unit of measure, max value, min value (e.g., m, 35.4, 0 => rock core measured at 35.4 total meters).

**Value:** N/A

**Source:** N/A