MEMORANDUM OF UNDERSTANDING

BETWEEN

THE DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

AND

THE STATE OF ARKANSAS
ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY

FOR THE

STEWARDSHIP OF THE NATIONAL HYDROGRAPHY DATASET
IN THE STATE OF ARKANSAS

08/07/07

This MEMORANDUM OF UNDERSTANDING (MOU) is hereby entered into by and between the U.S. Geological Survey, hereinafter referred to as the USGS, and the State of Arkansas, Arkansas Department of Environmental Quality, hereinafter referred to as the Arkansas ADEQ.

I. PURPOSE

The purpose of this agreement is to identify the activities that the Arkansas ADEQ and the U.S. Geological Survey, referred to as partners, will undertake to maintain, update, and improve the National Hydrography Dataset (NHD) in a program of data stewardship. The partners to this agreement represent Federal, State and Local government with an interest in providing current, accurate, and consistent surface water geospatial data to meet the requirements of the National Spatial Data Infrastructure (NSDI) for hydrography. This agreement applies to high-resolution NHD data.

II. BACKGROUND

A. The success of the NHD will depend on the partnerships established with a wide variety of organizations that work with geospatial hydrography data. It is recognized that the most current, highest resolution, and continuously maintained geospatial information resides with state and local governments, private entities, educational institutions, resource oversight organizations, and other Federal agencies. These organizations will work cooperatively to implement a program to exchange updates and improvements to the NHD.

B. The NHD is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells.   The NHD interconnects and uniquely identifies the stream segments or reaches that make up the Nation's surface water drainage system. The NHD is a national framework for spatial position of surface water features, their attribution, their connectivity in a flow network, and an addressing system of linking additional related data known as events. Each reach in this framework is referenced by a permanent feature identifier known as a reach code. Each linear reach is also segmented into linear addresses measures along the reach. The USGS is the authority for reach codes and measures. Because the NHD provides a nationally consistent framework for addressing and analysis, water-related information linked to reach addresses by one organization (national, state, local) can be shared with other organizations and easily integrated into many different types of applications to the benefit of all.

C. Arkansas has identified NHD as a significant GIS component to support regional cooperative initiatives, effective and cooperative land management, cooperative ecosystem management, and a myriad of other applications. Thus it was included as an essential geospatial dataset in the Arkansas Spatial Data Infrastructure.

III. SCOPE

A. Both parties of this MOU recognize that maintaining NHD consistency, currency, and accuracy will benefit both agencies and all users of the NHD. The most direct benefit of shared maintenance is the ability to be informed about changes on the landscape and to receive spatial data that faithfully represents those changes. The best sources for information about changes are those closest to the change, such as state and local governments and organizations.

B. The Arkansas Department of Environmental Quality (ADEQ) is recognized as the State's Authoritative Source for all edit decisions regarding the NHD in Arkansas.   For areas of interest that cover U.S. Forest Service (USFS) lands ADEQ will coordinate and work with the USFS to assure that the NHD is maintained and the data is input into the National Database.

C. This agreement covers sub-basins in Arkansas as identified in Appendix D. Stewardship of sub-basins shared with adjacent states will be coordinated between the ADEQ, the USGS and with those adjacent states and their corresponding stewardship representatives.

D. The objectives in this agreement have been jointly coordinated and mutually agreed upon between the two agencies so that each agency's office can implement the programmatic and technical procedures in a coordinated manner.

IV. AUTHORITIES

A. All activities conducted under this Agreement will be in accordance with the applicable laws, executive orders, regulations, and polices of the United States and the State of Arkansas.

B. This Agreement is entered into under the MOU between the USGS and Arkansas State Land Information Board for the NSDI in the State of Arkansas. This MOU establishes a framework for coordination and cooperation between the USGS and Arkansas for facilitating the conduct of cooperative activities in areas of mutual interest in support of The National Spatial Data Infrastructure. This Agreement is also entered into by the USGS under Public Law 99-591 that bestows permanent authority to the USGS to "prosecute projects in cooperation with other agencies, Federal, State, and private" (43 U.S.C. § 36c).

V. DEFINITIONS

For definition purposes in this Agreement, 'stewardship' is defined as the overall programmatic coordination to maintain an up-to-date statewide NHD dataset while 'maintenance' is defined as the necessary revisions, corrections, updates, etc. to a particular sub-basin or set of sub-basins. Further definitions of State stewardship may apply and the state steward for NHD in Arkansas will also comply with Arkansas Code 15-21-501.

VI. RESPONSIBILITIES

A. The Arkansas ADEQ agrees to:

1. Act as the single entity the USGS will interface with on stewardship issues within the State.

2. Take stewardship responsibility of 59 Hydrologic Units as documented in Appendix D.

3. Represent the interests of the user community concerned with hydrography in the State by providing the USGS with the most widely accepted representation of the surface water in the NHD.

4. Act as the designated steward for NHD in Arkansas following the guidelines documented in Arkansas Code 15-21-501.

5. Accept and consider changes submitted by the Arkansas NHD Data Stewardship Working Group and decide if the update will be accepted or not accepted, and report the decision publicly.

6. Be responsive to the input received by responding to proposed updates within an agreed upon reasonable time. For purposes of this agreement, that timeframe shall be 45 days. Updates to the USGS shall be provided in a timely manner at intervals to be determined.

7. Maintain an awareness of the activities of other agencies and organizations involved in stewardship in order to include all applicable input for a given area.

8. Provide contact information for management and technical issues.

9. Provide publicly available information on status of data stewardship activities.

10. Provide updates in the agreed upon format (Appendix A).

11. Provide metadata that clearly describes the sources used in the update and the process used to make the changes.

12. Provide the USGS with updates that meet agreed upon quality standards. Maintain quality assurance as follows

    a.   strive to ensure that the data is error free so that it will work in the
            1. transaction process,
            2. input to the working NHD geodatabase,
            3. routine validation checks,
            4. distribution, and
            5. normal applications.

    b.   perform a quality assurance check on the data before it is delivered to the USGS and ensure that the core content (features, attributes and relationships) identified in the Standards and Quality (QA/QC) Assurance Specifications are included. QA/ QC guidelines are found in the USGS QA / QC Standards (Appendix B).

13. Rework updates returned for correction and resubmit to the USGS in a timely manner.

14. Utilize nationally consistent reach codes.

15. Provide the USGS with test transactions to demonstrate the ability to meet the standards.

16. Provide the USGS with updates on known and reported errors within 45 days.

B. The U. S. Geological Survey Agrees to:

1. Be responsive to the State by processing transactions to the point of distribution in a timely manner.

2. Be responsive to the State by providing the necessary information and assistance to allow the State to stand up a stewardship program.

3. Provide the tools, documentation, and training to edit and update the NHD (Appendix C).

4. Work with the State to develop solutions to incorporate general hydrographic data needed by the State. An example would be integrating the Arkansas Watershed Boundary Dataset maintained by the NRCS but would not include the addition of storm drainage systems or other large scale hydrographic features not currently found in a natural water course.

5. Provide notification, documentation, and assistance in response to submitted updates that do not meet the requirements established and agreed upon by the partners. Return updates that need to be reworked to meet requirements.

6. Provide an Internet accessible reach code allocator and validate reach codes in update submissions.

7. Notify the State of any changes to the NHD structure, format, or content that may affect the State.

8. Provide clear guidance on expectations for acceptable updates.

9. Provide documentation on validation criteria applied to updates (Appendix B).

10. Provide documentation on formats for update transactions (Appendix A).

11. Provide contact information for management and technical issues (Section XI).
12. Make updates submitted by the steward available in the geodatabase within 60 days.

VII. DATA OWNERSHIP AND RIGHTS

All data produced, updated, and maintained in the NHD is public domain and thus is available to any interested party.

VIII. FINANCIAL COMMITMENTS

This MOU does not constitute a financial commitment on the part of either partner. The MOU is designed to serve as a mechanism under which each will work cooperatively to exchange updates and continually make improvements to the NHD.

IX. STANDARDS, DEFINITIONS, QUALITY ASSURANCE (QA/QC) SPECIFICATIONS, AND TECHNICAL REFERENCES

See Appendix A & B for the current references to NHD delivery formats, standards, definitions, and QA/QC.

X. PERIOD OF AGREEMENT

This agreement becomes effective on the date of signature by both partners and continues until modified by mutual consent or unless terminated within 60 days written notice by either partner. The agreement will be reviewed periodically and amended or revised when required.

XI. POINTS OF CONTACT

The USGS and the Arkansas ADEQ designate the following persons as points of contact for this MOU and Stewardship program:

NHD Stewardship   NHD Stewardship

U.S. Geological Survey   Arkansas ADEQ

Name: Bill Sneed   Dick Cassat
Title: NSDI Geospatial Liaison   Chief, Technical Services Division
Address: U.S. Geological Survey   ADEQ
            AR NSDI Partnership Office   Technical Services Division
            401 Hardin Road   8001 National Drive
            Little Rock, AR 72211   Little Rock, AR 72209
Phone: 501-228-3665   501-682-0937
FAX: 501-228-3601   501-682-0936
Email: wsneed@usgs.gov   dc@adeq.state.ar.us

NHD Technical   NHD Technical

U.S. Geological Survey   Arkansas ADEQ

Name: Tim Hines   Cynthia Ragan
Title: Cartographic Technician   GIS Coordinator
Address: U.S. Geological Survey   ADEQ
            NGTOC   Technical Services Division
            1400 Independence Road   8001 National Drive
            Rolla, MO 65401   Little Rock, AR 72209
Phone: 573-308-3758   501-682-0956
FAX: 573-308-3652   501-682-0936
Email: thines@usgs.gov   ragan@adeq.state.ar.us

XII. APPROVALS

_____   _____
Cheryl Morris   **Dick Cassat**
Central Region Geographic Information Officer   **Chief, ADEQ Technical Services Division**
U.S. Geological Survey   **Arkansas ADEQ**

Date: Date:

Appendices

A – Data Delivery Format

B – Standards and Quality Assurance Specifications

C – Edit Tools Used

D – Arkansas Hydrologic Unit Code List

Appendix A

DATA DELIVERY FORMAT

NHDGDB Input XML File Specification

All data transactions shall be in Extensible Language (XML) format, as defined in
The NHDGDB Input XML File Specification below.

XML Overview

XML stands for E**X**tensible **M**arkup **L**anguage. The XML file format is required to load
data to the NHD geodatabase.   It is a markup language much like HTML that was
designed to describe data. The syntax rules of XML are very simple and very strict.
Below is a sample XML file.

```
<?xml version="1.0"?>
<Transaction>
<GDBVersionInformation>NHD20040728</GDBVersionInformation>
<ProcessingOrganization>USGSMCMC</ProcessingOrganization>
<Resolution>High</Resolution>
<CreateMetadata>
     <ID>-2</ID>
     <Attribute>
          <POD>Deleted overlapping reach in NHDFlowline to
          join with adjacent subbasin.</POD>
          <PDA>20040727</PDA>
     </Attribute>
</CreateMetadata>
<DeleteFeature>
     <ID>113794769</ID>
</DeleteFeature>
</Transaction>
```

The first line in the document - the XML declaration - defines the XML version. The next
line describes the root element of the document. The next lines describe the 5 child
elements of the root. And finally the last line defines the end of the root element.

All XML elements must have a closing tag. XML tags are case sensitive. All XML documents must contain
a single tag pair to define a root element - <Transaction></Transaction> for NHDGDB XML files.

Required Elements of a NHDGDB XML File

Every XML file must start with the XML declaration line: `<?xml version="1.0"?>`

The second line of the XML file must be the opening tag of the root element:
`<Transaction>`

The last line of the XML file must be the closing tag of the root element:
`</Transaction>`

Every XML file must contain the following child elements:
GDBVersionInformation

    Opening/Closing Tag: `<GDBVersionInformation></GDBVersionInformation>`
    Description: The version of the GDB the updates will be applied to. If you are loading only new data then the version will be NewLoad. If you are loading updates to existing data the version is the version found in the NHDProcessingParameters table in the distributed personal geodatabase.
    Example:
    `<GDBVersionInformation>NHD20040728</GDBVersionInformation>`

Processing Organization

    Opening/Closing Tag: `<ProcessingOrganization></ProcessingOrganization>`
    Description: The processing organization loading the data. This must be the same as the processing organization that allocated the reach codes used in the load file.
    Example:
    `<ProcessingOrganization>USGSRMMC</ProcessingOrganization>`

Resolution

    Opening/Closing Tag: `<Resolution></Resolution>`
    Description: The resolution of the data being loaded. Valid values are Local, High or Medium.
    Example:
    `<Resolution>High</Resolution>`

CreateMetadata

    Opening/Closing Tag: `<CreateMetadata></CreateMetadata>`
    Description: This transaction contains the data that was in the CMDI transaction of the FCP file. The attributes are loaded to the NHDMetadata and NHDSourceCitation tables. The CreateMetadata element contains 2 child elements - `<ID></ID>` and `<Attribute></Attribute>`. The ID element contains a numeric identifier that is unique across all CreateMetadata transactions. If there are multiple CreateMetadata transactions in the XML file this identifier is used in the CreateRelatonship transactions that specify Feature-to-Metadata relationships. This identifier is re-assigned when it is loaded into the geodatabase and stored in the NHDMetadata table as the DUUID.
    Attributes:

XML Tag	Field Name
AAR	AttributeAccuracyReport
LCR	LogicalConsistencyReport
COR	CompletenessReport
HOR	HorizPositionalAccuracyReport
VOR	VertPositionalAccuracyReport
POD	ProcessDescription
PDA	ProcessDate
MED	MetadataDate
MSN	MetadataStandardName
MSV	MetadataStandardVersion
DSC	DatasetCredit
COO	ContactOrganization
ADT	AddressType
ADD	Address
CIT	City
STP	StateOrProvince
PSC	PostalCode
CVT	ContactVoiceTelephone
COI	ContactInstructions
SourceCitation	--

There can be multiple SourceCitation elements. Each element is stored as a record in the NHDSourceCitation table. The DUUID column of the NHDSourceCitation record will be the DUUID assigned to the NHDMetadata record. The SourceCitation element can have the following child elements:

XML Tag	Field Name
TIT	Title
SCA	SourceCitationAbbreviation
ORG	Originator
PUD	PublicationDate
BED	BeginningDate
END	EndingDate
SRC	SourceContribution
SSD	SourceScaleDenominator
TSM	TypeOfSourceMedia
CAD	CalendarDate
SCR	SourceCurrentnessReference

The ProcessDescription attribute (POD) is the only required attribute in the CreateMetadata transaction. If an attribute is null it does not need to be included in the XML file.

Example:

```
<CreateMetadata>
<ID>1</ID>
<Attribute>
      <MSV>FGDC-STD-001-1998</MSV>
      <MSN>FGDC Content Standard For Digital Geospatial Metadata, ver.2</MSN>

      <MED>20040512</MED>
      <COO>U.S. Geological Survey</COO>
      <COI>Monday-Friday,7AM-3PM CST</COI>
      <CVT>(573) 308-3647</CVT>
      <PSC>65401</PSC>
      <STP>Missouri</STP>
      <CIT>Rolla</CIT>
      <ADD>Mid-Continent Mapping Center - 1400 Independence
            Road</ADD>
      <ADT>Mailing and Physical Address</ADT>
      <POD>Create high-resolution NHD from revised DLG data and U.S. Forest
Service Cartographic Feature Files (CFFs).</POD>

      <PDA>20040420</PDA>
      <SourceCitation>
            <SCA>NHD basic features</SCA>
            <SCR>Date the revision process step was
                  completed</SCR>
            <CAD>20040405</CAD>
            <TSM>online</TSM>
            <SSD>24000</SSD>
            <SRC> spatial and attribute information</SRC>
            <END>Not Applicable</END>
            <BED>Not Applicable</BED>
            <PUD>unpublished materials</PUD>
            <TIT>NHD basic features</TIT>
            <ORG> U.S. Geological Survey  </ORG>
      </SourceCitation>
      <VOR>Statements of vertical positional accuracy for
      elevation of water surfaces are  based on accuracy
      statements made for  U.S. Geological Survey topographic
      quadrangle maps...</VOR>
      <HOR>Statements of horizontal positional accuracy are based on  accuracy
      statements made for U.S. Geological Survey topographic  quadrangle maps.
      ...</HOR>

      <COR>The completeness of the data reflects the
      published USGS  topographic quadrangle and/or the U.S.
      Forest Service Primary Base Series (PBS) map...</COR>
      <LCR>For DLG data, points, nodes, lines, and areas
      conform to  topological rules...</LCR>
```

```
        </Attribute>
    </CreateMetadata>
```

Other Elements of a NHDGDB XML File

The other elements that may be included in the NHDGDB XML file are used to create, modify or delete features and reaches and to create, modify, or delete relationships.

CreateFeature
>**Opening/Closing Tag:**   <CreateFeature></CreateFeature>
>**Description:** This transaction is used to create a feature in a feature class or create a reach in the NHDReachcodeComId table. It contains five child elements:
>1) ID – a numeric identifier that is unique across all features in the XML file. This identifier will be reassigned a unique comid when the feature is loaded to the geodatabase.
>2) FeatureType – the feature type of the feature
>3) Dimensionality – a number representing the feature's dimension: 2 for point, 3 for line, 4 for polygons, or 5 for reaches
>4) Coordinate – This element contains the collection of points that define the geometry of the feature. Each point is a child element of the Coordinate element. The format for the Point element is
>   `<Point X="-89.3687125" Y="46.8583277"/>`
>5) Attribute – This element contains the attributes for the feature or reach. Note that not all attributes in the list below will apply to every feature type. There are several attributes that are not stored as fields in the feature class. These attributes along with the feature type are used to derive the FCODE attribute.

XML Tag	Field Name
RSL	Resolution
GID	GNIS_ID
NAM	GNIS_NAME
FLD	FlowDir
ELE	Elevation
RCH	Reachcode
OWT	WBAreaComId
ICS	(used to derive fcode)
RET	(used to derive fcode)
COM	(used to derive fcode)
HYC	(used to derive fcode)
STG	(used to derive fcode)
PIT	(used to derive fcode)
RTS	(used to derive fcode)

SZT	(used to derive fcode)
OPS	(used to derive fcode)
POA	(used to derive fcode)
CDY	(used to derive fcode)
CGC	(used to derive fcode)

Each of the 5 child elements listed above is required to create a feature. The Coordinate element does not apply to reaches. There are no required attributes. If an attribute is null it does not need to be included in the XML file. If there are no attributes for the feature, the Attribute element can be empty –
```
<Attribute></Attribute>
```

Examples:
```
<CreateFeature>
<ID>2741</ID>
<FeatureType>460</FeatureType>
<Dimensionality>3</Dimensionality>
<Coordinate>
    <Point X="-89.357778" Y="46.8515609"/>
    <Point X="-89.3578384" Y="46.8515731"/>
    <Point X="-89.3578863" Y="46.8515721"/>
    <Point X="-89.3579428" Y="46.85158"/>
    <Point X="-89.3580227" Y="46.8515783"/>
    <Point X="-89.3619394" Y="46.852555"/>
</Coordinate>
<Attribute>
    <HYC>289</HYC>
    <FLD>1</FLD>
    <RSL>2</RSL>
</Attribute>
</CreateFeature>

<CreateFeature>
<ID>2</ID>
<FeatureType>557</FeatureType>
<Dimensionality>5</Dimensionality>
<Attribute>
    <RCH>04020101000002</RCH>
</Attribute>
</CreateFeature>
```


ModifyFeature
> **Opening/Closing Tag:**   <ModifyFeature></ModifyFeature>
> **Description:** This transaction is used to modify an existing feature in a feature class or modify a reach. The ModifyFeature transaction contains the same elements as the CreateFeature transaction. The ID element is the comid of the

feature or reach to modify. The Coordinate element only needs to be provided for a feature if the geometry of that feature has changed.

Example:
```
<ModifyFeature>
<ID>49081000</ID>
<FeatureType>334</FeatureType>
<Dimensionality>3</Dimensionality>
<Attribute>
     <GID>01552301</GID>
     <NAM>New River</NAM>
</Attribute>
</ModifyFeature>
```

DeleteFeature

Opening/Closing Tag: <DeleteFeature></DeleteFeature>

Description: This transaction is used to delete a feature from a feature class or delete a reach from the NHDReachcodeComId table. It contains one child element (ID) that specifies the comid of the feature or reach to be deleted. When a feature is deleted, all vertical relationships for that feature are also deleted. When a reach is deleted, the reachcode, GNIS_id, and GNIS_name attributes of all features related to the reach are deleted (set to null).

Example:
```
<DeleteFeature>
     <ID>113794781</ID>
</DeleteFeature>
```

CreateRelationship

Opening/Closing Tag: <CreateRelationship></CreateRelationship>

Description: This transaction is used to create composed-of relationships, vertical relationships, or feature-to-metadata relationships. It contains 4 required child elements.

1) ID – a numeric identifier
2) Object1 – For composed-of relationships this is the comid or temporary id of the reach. For vertical relationships this is the comid or temporary id of the 'abovecomid'. For feature-to-metadata relationships this is the temporary duuid found in the CreateMetadata transaction.
3) Object2 - For composed-of relationships this is the comid or temporary id of the basic feature. For vertical relationships this is the comid or temporary id of the 'belowcomid'. For feature-to-metadata relationships this is the temporary id of the feature.
4) TypeRelationship – specifies the relationship type: 1 for composed-of relationships, 5 for vertical relationships, and 7 for feature-to-metadata relationships.

The NHDGDB load software does not load flow relationships into the geodatabase. Creating a composed-of relationship will cause the feature to have the same reachcode attribute as the reach. If the reach has the GNIS_ID and

GNIS_NAME attributes populated, the GNIS attributes of the feature will be updated to be the same as the GNIS attributes of the reach.
Creating a vertical relationship adds a record to the NHDVerticalRelationship table.
Creating a feature-to-metadata relationship adds a record to the NHDFeatureToMetadata table.
Example:
```
<CreateRelationship>
<ID>1</ID>
<Object1>6</Object1>
<Object2>2737</Object2>
<TypeRelationship>1</TypeRelationship>
</CreateRelationship>
```

ModifyRelationship
Opening/Closing Tag: <ModifyRelationship></ModifyRelationship>
Description: This transaction is used to modify composed-of relationships. This transaction can not be used to modify vertical relationships or feature-to-metadata relationships. It contains 4 child elements.
1) ID – the comid of the feature in the composed-of relationship
2) Object1 – the comid of the reach
3) Object2 – the comid of the feature
4) TypeRelationship – specifies the relationship type (1). This element is not required.

Modifying a composed-of relationship will cause the feature to have the same reachcode attribute as the reach. If the reach has the GNIS_ID and GNIS_NAME attributes populated, the GNIS attributes of the feature will be updated to be the same as the GNIS attributes of the reach.
Example:
```
<ModifyRelationship>
<ID>54487893</ID>
<Object1>54488305</Object1>
<Object2>54487893</Object2>
<TypeRelationship>1</TypeRelationship>
</ModifyRelationship>
```

DeleteRelationship
Opening/Closing Tag: <DeleteRelationship></DeleteRelationship>
Description: This transaction is used to delete composed-of relationships and vertical relationships. It contains 1 child element - ID. When deleting a composed-of relationship, ID is the comid of the feature in the composed-of relationship. When deleting a vertical relationship, the ID is the comid of the vertical relationship. Deleting a composed-of relationship causes the reachcode, gnis_id, and gnis_name attributes of the feature to be set to null.
Example:
```
<DeleteRelationship>
```

```
        <ID>36475343</ID>
    </DeleteRelationship>
```

Other Notes:

With XML white space inside elements is preserved. For example, if the process description in your XML file contains leading spaces, there will be leading spaces in the process description in the geodatabase.

Indentation of child elements is not required, but may be useful for readability. For example, the following transactions are considered the same:

```
<ModifyFeature>
    <ID>49081000</ID>
    <FeatureType>334</FeatureType>
    <Dimensionality>3</Dimensionality>
    <Attribute>
        <GID>01552301</GID>
        <NAM>New River</NAM>
    </Attribute>
</ModifyFeature>

<ModifyFeature>
<ID>49081000</ID>
<FeatureType>334</FeatureType>
<Dimensionality>3</Dimensionality>
<Attribute>
<GID>01552301</GID>
<NAM>New River</NAM>
</Attribute>
</ModifyFeature>
```

Appendix B

STANDARDS and QUALITY ASSURANCE SPECIFICATIONS

For standards on data content, use:

Standards for National Hydrography Dataset - High Resolution (*DRAFT)*
Defines features, feature attributes, attribute values, delineation, representation rules, and data extraction for the National Hydrography Dataset-High Resolution (NHD-HR) at scales larger than 1:100,000. (145 p., 271KB, PDF)

http://rockyweb.cr.usgs.gov/nmpstds/nhdstds.html

For reference documents on features, attributes and relationships in the NHD, please go to:
http://nhd.usgs.gov/techref.html

Here you will find:

- **Concepts and Contents   HTML 597k** | **PDF 739k Word Doc 1.93MB** "Concepts and Contents" is the primary reference document for the National Hydrography Dataset. In this document, one will find information ranging from a high level overview of the NHD to detailed descriptions of the NHD data content. The "Concepts and Contents" document describes the elements of the dataset that make the NHD an effective resource to new users as well as those who have been using the USGS Digital Line Graph and the EPA Reach File. The main points of this document are summarized in the "NHDinGEO " document.

- **NHDinGEO Data Model Schema** - Diagram of the tables, the table items, the item definitions, and the relationships between the tables in the NHDinGEO data model.
    - **Hydrography** (66k)
    - **Metadata and Misc. Objects** (107k)

- **NHD Model Version 1.06 (Draft)** The NHD Model Version 1.06 only exist in draft form. Until the release of version 1.06, please reference NHD Model Version 1.04.

- **NHD Data Standards** - Defines valid feature types and their characteristics, the delineation or extent of a feature, how a feature is stored in the data, and detailed capture conditions for each of the feature types in the National Hydrography Dataset (NHD).

- **NHD Fact Sheet** - A brief summary of the history and characteristics of the NHD, with additional information concerning obtaining, and maintaining the NHD.

Geographic Names Information System (GNIS) - Access GNIS to check, submit new, or make changes to names in GNIS.

Appendix C

EDIT TOOLS TO BE USED

A tool is needed to specifically edit NHD data since the NHD structure is somewhat complex. This complexity is part of the design that makes the NHD so suitable for a stewardship environment. Many components are tracked in special tables that trace the legacy of the data. The NHDGeoEdit tool was developed by the U.S. Forest Service and made available to the partner for use. The USGS has assumed responsibility for the maintenance of the NHDGeoEdit tool being shared with the partner.

For user-developed applications, go to: http://nhd.usgs.gov/applications.html

Appendix D

ARKANSAS HYDROLOGIC UNIT CODE LIST
(59 Units)

08010100	Lower Mississippi-Memphis; state(s): AR, IL, KY, MO, MS, TN
08020100	Lower Mississippi-Helena; state(s): AR, MS
08020203	Lower St. Francis; state(s): AR, MO, MS, TN
08020204	Little River Ditches; state(s): AR, KY, MO
08020205	L'anguille; state(s): AR
08020301	Lower White-Bayou Des Arc; state(s): AR
08020302	Cache; state(s): AR, MO
08020303	Lower White; state(s): AR, MS
08020304	Big; state(s): AR
08020401	Lower Arkansas; state(s): AR, MS
08020402	Bayou Meto; state(s): AR
08030100	Lower Mississippi-Greenville; state(s): AR, LA, MS
08030207	Big Sunflower; state(s): AR, MS
08030209	Deer-Steele; state(s): AR, LA, MS
08040101	Ouachita Headwaters; state(s): AR
08040102	Upper Ouachita; state(s): AR
08040103	Little Missouri; state(s): AR
08040201	Lower Ouachita-Smackover; state(s): AR
08040202	Lower Ouachita-Bayou De Loutre; state(s): AR, LA
08040203	Upper Saline; state(s): AR
08040204	Lower Saline; state(s): AR
08040205	Bayou Bartholomew; state(s): AR, LA
08040206	Bayou D'arbonne; state(s): AR, LA
08050001	Boeuf; state(s): AR, LA
08050002	Bayou Macon; state(s): AR, LA, MS
11010001	Beaver Reservoir; state(s): AR, MO
11010003	Bull Shoals Lake; state(s): AR, MO
11010004	Middle White; state(s): AR
11010005	Buffalo; state(s): AR
11010006	North Fork White; state(s): AR, MO
11010007	Upper Black; state(s): AR, MO
11010008	Current; state(s): AR, MO
11010009	Lower Black; state(s): AR, MO
11010010	Spring; state(s): AR, MO
11010011	Eleven Point; state(s): AR, MO
11010012	Strawberry; state(s): AR
11010013	Upper White-Village; state(s): AR
11010014	Little Red; state(s): AR

11070206   Lake O' The Cherokees; state(s): AR, KS, MO, OK
11070208   Elk; state(s): AR, MO, OK
11070209   Lower Neosho; state(s): AR, OK
11110103   Illinois; state(s): AR, OK
11110104   Robert S. Kerr Reservoir; state(s): AR, OK
11110105   Poteau; state(s): AR, OK
11110201   Frog-Mulberry; state(s): AR
11110202   Dardanelle Reservoir; state(s): AR
11110203   Lake Conway-Point Remove; state(s): AR
11110204   Petit Jean; state(s): AR
11110205   Cadron; state(s): AR
11110206   Fourche La Fave; state(s): AR
11110207   Lower Arkansas-Maumelle; state(s): AR
11140106   Pecan-Waterhole; state(s): AR, OK, TX
11140108   Mountain Fork; state(s): AR, OK
11140109   Lower Little; state(s): AR, OK
11140201   Mckinney-Posten Bayous; state(s): AR, LA, TX
11140203   Loggy Bayou; state(s): AR, LA
11140205   Bodcau Bayou; state(s): AR, LA
11140302   Lower Sulphur; state(s): AR, TX
11140304   Cross Bayou; state(s): AR, LA, TX