Proposal Entitled

Hierarchical Framework for Wadeable Stream Management and Conservation.

For Submission To:

Illinois Department of Natural Resources
Paul Vehlow
One Natural Resources Way
Springfield, Illinois
62702-1271

Submitted by:

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Make Award: The Board of Trustees of the University of Illinois
c/o Office of Sponsored Programs and
Research Administration
1901 S. First Street, Suite A
Champaign, IL 61820

Amount Requested: $ 333,018
Project Period: 1 March 2011 – 28 February 2014

Leon C. Hinz Jr., Principal Investigator Illinois Natural History Survey	Brian Anderson, Director Illinois Natural History Survey
Kathy Young, Director Sponsored Programs & Research Admin. University of Illinois	R. K. Iyer, Chair Research Board University of Illinois

State Wildlife Grant
Grant Segment

Title: Hierarchical Framework for Wadeable Stream Management and Conservation.

Applicant information: Illinois Natural History Survey

Goals/ Objectives: (1) Develop Ecological Drainage Units for Illinois Streams; (2) Develop and Classify Illinois' Stream Valley Segments; (3) Define Aquatic Ecological Systems for Illinois Streams; (4) Define Natural Community Types for Illinois Streams; and (5) Develop and submit a list of candidate sites for INAI listing under Category I (High Quality and Significant Natural Communities) and revised Category VI (Unusual Concentrations of Fauna) criteria for streams.

Proposed Grant Period: 1 March 2011—28 February 2014.

Amount Requested: $ 333,018.

State(s) and Partners Involved: IL Dept. Nat. Resources/ IL Natural History Survey (UIUC).

Key Habitats Addressed: Wadeable streams in Illinois.

Summary Statement: This project will provide critical information to update the Illinois WAP Stream Campaign and the Illinois Natural Areas Inventory Stream Habitat Designations by formalizing a hierarchical classification framework, defining physical and biological expectations, and describing natural community types (NCT) for wadeable streams. NCTs will be embedded within the hierarchical stream classification and developed to parallel those used for terrestrial systems in the Illinois Natural Areas Inventory's Natural Community Classification System. This framework will define baseline conditions, identify high quality segments, and classify streams in Illinois to increase our ability to effectively conserve, manage, and protect these resources. Where data are available candidate high quality and significant natural stream communities (Category I) and unusual concentrations of flora or fauna (Category VI) will be identified and nominated for inclusion in the INAI using expectations developed in this project. This work will identify data gaps for fisheries and aquatic resources, assist with defining priorities for wadeable streams within Conservation Opportunity Areas defined in the Illinois Wildlife Action Plan, and provide a framework for tracking conservation success and monitoring activities for aquatic Species in Greatest Need of Conservation throughout Illinois.

Project Title: Development of a Hierarchical Framework for Illinois Streams.

Need:

The **Illinois Wildlife Action Plan** (WAP) used four criteria to rank key habitats and community types: (1) patch size, (2) Illinois Natural Areas Inventory (INAI) designation, (3) GAP analysis for terrestrial vertebrates or point estimates for fish and mussels, (4) recent (1995-2005) records of T&E species. These criteria penalize aquatic systems since terrestrial patch sizes are easier to measure, INAI designations based on Natural Community Types are more rigidly defined for non-aquatic systems, and no aquatic gap analysis has been conducted. Seventeen outstanding aquatic areas and only 240 acres of stream and river habitat in Illinois were recognized as high-quality natural communities in the INAI when the WAP was published (State of Illinois 2005). We suggest that aquatic and terrestrial resources be separately ranked since these systems fundamentally differ.

The **Illinois Natural Areas Inventory** (INAI) is used as a guide to support land acquisition and for protection programs with a conservation goal of including representative examples of every community type occurring within each natural division. An update of the INAI is currently underway using remote sensing for site identification followed by on-site surveys in terrestrial systems. This screening technique is unlikely to be successful for streams since the attributes of the biotic communities are not accessible with these methods (aerial photography or satellite imagery). However, streams hold an important component of the overall biodiversity within Illinois, including T&E species of fish (31) and mussels (24), and specialized communities (e.g., coolwater streams) that may have been underrepresented in INAI designations and therefore also require a status update.

Natural Divisions are used for both the WAP and the INAI. This classification groups areas in Illinois with similar topography, soils, bedrock, plants, and animals into fifteen geographic regions. While useful for terrestrial delineation these characteristics may not be appropriate for streams that are restricted to their channels and flow through numerous climatic or physiographic zones. Terrestrial plants, key indicators for Natural Division classification and grading, are unlikely to be good indicators of the aquatic community in the adjacent stream channel. **Watersheds** are considered the natural units for managing freshwater systems and by including their boundaries with climatic features that have demonstrated importance for differentiating distinct aquatic assemblages we can better define and identify stream community types within a formal classification.

Therefore, to address these needs we propose formalizing a **stream classification** that would parallel the system used for terrestrial areas and better reflect expectations for lotic ecosystems based on their geologic and evolutionary history. Replacing Natural Divisions with a hierarchical system designed specifically for streams will improve our ability to identify, protect, and manage unique and high-quality aquatic resources in Illinois. Furthermore, the integrated georeferenced database associated with the hierarchical classification will allow researchers and managers to more efficiently evaluate state-wide conditions for all stream types, track species in greatest need of conservation (SGNC), and provide timely analysis of biological communities in Illinois' streams. This framework will also assist with locating data gaps in existing monitoring programs for rare species or community types, identify stream resources within (or missing from) existing Conservation Opportunity Areas (COA), and organize available information for management and conservation assessment purposes.

Objectives:

Our primary objectives are to consolidate and analyze existing resources to provide information necessary to revise the Wildlife Action Plan and the Illinois Natural Areas Inventory by (1) formalizing a hierarchical classification of wadeable streams in Illinois, (2) defining appropriate natural community types for streams, (3) attributing expected natural community types to defined management units (valley segments), and (4) developing a list of candidate stream segments for listing within the Illinois Natural Areas Inventory.

Job 1. Compile and update databases:

A single comprehensive georeferenced database will be compiled using data available from the IDNR, INHS and other sources. This database will form the framework that the hierarchical classification and natural communities are built upon and attributed to.

Job 2. Develop Ecological Drainage Units (EDUs):

Ecological Drainage Units (EDUs) are aggregates of drainages within distinct physiographic settings (Aquatic Subregions) that share a common evolutionary history (Sowa et al. 2005, 2007). EDUs are large landscape scale units conceptually similar to the Natural Divisions used in the development of the Illinois WAP and INAI. EDUs differ from Natural Divisions by also considering potential isolating mechanisms that are unique to lotic biota (e.g., restrictions to dispersal associated with confinement to the stream channel).

Job 3. Define Aquatic Ecological Systems (AES):

Aquatic Ecological Systems (AES) are hydrogeomorphic units with similar physiographic character, basin morphology and position within larger drainages will be defined using watershed boundaries, physiography, climate, and differences in functionally defined biotic assemblages. AESs are large landscape scale units that subdivide EDUs and are conceptually similar to Sections of Natural Divisions used in the INAI but will be specific for aquatic systems.

Job 4. Classify stream segments as valley segment types (VSTs):

Individual valley segments represent aggregations of adjacent stream reaches and will be the smallest scale unit we will define in this project. Spatially distinct macrohabitat units (valley segments) have been defined by size, flow, gradient, temperature, and surficial geology to account for longitudinal ecosystem structure and function in Illinois streams. Existing valley segments will be reviewed and updated where appropriate to be consistent with the higher levels of the classification. Each valley segment will also be described as a specific type based on its physical character. Valley segments reside within aquatic ecological systems (Job 3) and will be associated with an expected natural community type (Job 5).

Job 5. Define Natural Community Types (NCTs):

The INAI defines natural communities as “ecological assemblages of co-existing, interacting species, considered together with their physical environment and associated ecological processes,that reoccur on the landscape where similar conditions are present.” We will describe NCTs and their biological

expectations within our hierarchical classification using their dominant natural features with coordination from INAI staff. This is essentially the same as developing regional criteria for bioassessment indices (e.g., fish IBI regions) or current evaluations by INAI staff that recognize "A community type that occurs in two or more Natural Divisions is composed of different flora and fauna characteristics in each Natural Division and Section."

Job 6. Produce a list of candidate sites for INAI using existing data:

By establishing regional expectations for aquatic communities, we will provide a system for ranking stream reaches and setting goals/priorities for conservation and restoration activities. We will produce a list of valley segments for possible INAI listing under Category I and a similar list using revised criteria for Category VI streams. The locations of valley segments that meet these criteria will assist in defining priorities within Conservation Opportunity Areas.

Job 7. Prepare manuscripts and reports:

Develop documents based on the hierarchical stream classification, natural community types and associated aquatic assemblages in Illinois.

Expected Results and Benefits:

This project will fill knowledge gaps in Illinois' Wildlife Action Plan (IDNR 2005) by formalizing a hierarchical stream classification (EDU, AES, VST) and by defining natural community types (NCT) that parallel their terrestrial counterparts in the Illinois Natural Areas Inventory. The stream classification will set expected conditions for individual stream segments that can be used as a rating standard for field assessment. Project results can be used in updates of the INAI stream community types and portions of the WAP that use INAI site ratings (e.g., defining conservation opportunity areas). A list of candidate INAI sites for stream habitats (Category I) will be developed based on currently available information and NCT expectations defined within each stream classification unit. Criteria for Unusual Concentration of Flora or Fauna (Category VI) for streams will be reviewed in light of new and revised information. A list of candidate INAI sites will be developed based on these revisions and any updated criteria.

The Illinois Wildlife Action Plan's Streams Campaign contains several **Action Items** that will be addressed within this project. Baseline conditions will be defined for wadeable streams that will allow for monitoring change in condition (Item 7). The hierarchical classification will enable all stream types to be represented in conservation planning and management including the identification of high-quality examples of stream communities (Item 6). Distributions and key habitat variables for SGNC taxa that depend on stream habitats (including T&E species) will be mapped and identified at the landscape scale (Item 4).

Conservation Opportunity Areas were defined by the WAP as priority locations for wildlife conservation that were based on descriptions of landscapes, natural divisions, priority resources, and the status of protected lands. Streams were ranked by their designation as an Illinois Natural Areas Inventory site, presence of threatened or endangered wildlife species (observed from 1995-2005), and diversity of fish and freshwater mussel Species in Greatest Need of Conservation. However, since these rankings were completed for the WAP in 2005 there has been a revision of the BSC/BSS (Bol et

al. 2007; State of Illinois 2008), a significant update of the IDNR Fisheries database and a statewide survey of mussels has been initiated (T-53). Irrespective of changes that might occur by developing different standards for natural communities in streams these revisions, updates, and initiatives would likely alter the distribution of INAI sites and potential Conservation Opportunity Areas (COA). A major goal of the WAP for Species in Greatest Need of Conservation (SGNC) is the maintenance of populations at currently-occupied locations and their re-establishment at 50% or more of historic locations where suitable habitat persists or can be restored. This project will define distributional expectations for fish populations within given stream segment types (VST). These expectations can be used where historical records are lacking and to look for suitable habitat for protection and the potential re-establishment of these species (Item 4).

Results of this project can also provide the background data necessary for conducting an Aquatic GAP analysis for wadeable streams in Illinois. Attributed stream segments (VSTs) define a habitat template that aquatic biota can be associated with based on their known distributions. Such an analysis can be used to identify where there is a need for additional information on SGNC or their habitats that is not being collected with current monitoring programs.

Approach:

This study will be completed by staff of the Illinois Natural History Survey in cooperation with staff of the Illinois Department of Natural Resources Watershed Protection Section and Illinois Natural Areas Inventory located in Springfield. Draft classification units and other documents will be reviewed and modified with input from a working group including staff from IDNR (Watershed Protection, Fisheries, Natural Heritage), IEPA, and INHS. The general approach we will take for developing the hierarchical classification is based on previous work by many researchers (e.g., Higgins et al. 2005, Maxwell et al. 1995, Seelbach et al. 1997) and has been most fully developed for use within the context of State Wildlife Action Plans by Sowa and his colleges in Missouri (Sowa and Diamond 2006; Sowa et al. 2005, 2007). This project will produce attributed GIS shapefiles that describe a series of nested classification units that can be used for conservation and management planning for stream systems at a variety of landscape scales. Furthermore, these units will be developed to complement and enhance the stream portion of the ecological classification currently used within the Illinois Natural Areas Inventory.

Job 1. Compile and update databases:

Existing data summaries of landscape characteristics are available for reaches based on the 1:100,000 NHD within the stream database system developed in earlier projects. Biological data from IDNR community fisheries sampling, INHS stream sampling, and INHS museum fisheries databases will be integrated into the system and catchment summaries revised where necessary. These data will assist with development of the classification framework in Jobs 2-4 and with defining natural community types in Job 5.

Job 2. Develop Ecological Drainage Units (EDUs):

Ecological Drainage Units (EDUs) are aggregates of drainages within distinct physiographic settings (Aquatic Subregions) that share a common evolutionary history (Sowa et al. 2005, 2007). EDUs are conceptually similar to the Natural Divisions used in the development of the Illinois WAP and INAI

but also consider potential isolating mechanisms (e.g., restrictions to dispersal associated with confinement to the stream channel) that are unique to lotic biota. Ecological Drainage Units contain assemblages of species that have evolved under similar ecological conditions and define the species pool within relatively large geographical areas that provide the building blocks of the species assemblages we observe in specific drainages. Ecological Drainage Units will be identified as groups of major drainages with relatively distinct evolutionary histories based on similarity of their native fish and mussel assemblages. We will define EDUs within each Aquatic Subregion using drainage basin boundaries and physiography in the context of historical distribution patterns of fish and mussel species (Sowa et al. 2005, 2007). There are fourteen Natural Divisions in Illinois but we expect EDUs to reflect the number of major drainage networks in the state (~5). Draft EDUs will be developed from sites with relatively similar fish and mussel assemblages using ordination plots and clustering dendograms. Draft EDUs will be reviewed and refined by the working group. A statewide map and an attributed GIS shapefile will be produced and provided to the IDNR Watershed Protection Section depicting the refined EDUs developed with the working group.

Job 3. Define Aquatic Ecological Systems (AES):

AESs are conceptually similar to Sections of Natural Divisions used to regionalize scoring of natural communities within the INAI but will be specific for aquatic systems. Species assemblages result from habitat conditions and functional processes acting upon the regional species pool. Similar habitat and functional characteristics are expected to select for species with traits that are appropriate to local conditions. Aquatic Ecological Systems are the result of geographically distinct evolutionary histories within major drainages that reflect these conditions. We will identify AES polygons using cluster analysis of landscape properties (e.g., geology, groundwater, soil character) believed to control instream habitat conditions and functional processes (e.g., chemistry, hydrology, nutrients). AES types are broad scale habitat units defined by variations in physiography that are structurally and functionally similar within type although their biological assemblages may differ due to their geographical location. AESs will be nested within EDUs to provide context for Natural Community Types and their expected species assemblages (Job 5). Draft AES types will be reviewed and refined by the working group. A statewide map and an attributed GIS shapefile will be produced and provided to IDNR Watershed Protection Section depicting the refined AESs developed with the working group.

Job 4. Classify stream segments as valley segment types (VSTs):

Valley segments are spatially explicit units defined by their physical characteristics that can be used for management purposes. Valley segment types are descriptions that provide a means of recognizing similar types of stream habitats. Stream segments defined as reaches of stream channel between two adjacent confluences are attributed according to stream size, flow, gradient, temperature, surficial geology, and network position within our database system (Job 1). Valley segments are formed by aggregating adjacent stream segments with similar physical, chemical, and hydrologic characteristics to delineate specific units for conservation and management. We will review existing valley segments defined using a spatially constrained clustering program developed for Midwestern streams (Brenden et al. 2008a) within the context of the classification units developed in Jobs 2-3. Modifications to the existing valley segments will be made where appropriate. We will classify these valley segments into valley segment types based on combinations of attributes that represent a distinct VST (Sowa and Diamond 2006; Sowa et al. 2005, 2007). While valley segments are spatially distinct units all valley segments with similar attributes will have the same VST. Brenden et al. (2008b) developed a stream classification for Michigan with a similar approach using regression tree analysis to distinguish

segment types with catchment area, temperature, and gradient. We will also follow this approach for Illinois streams and compare these results with the current INAI system based solely on stream size and gradient. A statewide map and an attributed GIS shapefile will be produced and provided to IDNR Watershed Protection Section depicting individual valley segments attributed with their VST.

Job 5. Define Natural Community Types (NCTs):

Natural Communities are ecological systems defined by characteristic assemblages of species and associated ecological processes that reoccur on the landscape where similar physical environments are present. Natural Community Types are simply names for specific natural communities and will be defined using data available from existing monitoring programs (fish, macroinvertebrates, mussels). NCTs will be placed in context using EDUs and AESs that describe the physiographic and evolutionary conditions where these communities developed. Biological expectations (species assemblages) for NCTs will be defined within each EDU and AES where available data permit. Draft NCTs will be reviewed and refined by the working group. A list of characteristic species for each NCT along with a statewide map and an attributed GIS shapefile depicting the expected NCTs for each valley segment will be produced and provided to IDNR Watershed Protection Section developed with the working group.

Job 6. Produce a list of candidate sites for INAI using existing data:
Valley segments containing sites with existing data will be rated as potential candidate sites for the INAI based on the NCTs developed in Job 5. Sites, or valley segments, rated as Grade A or Grade B within each EDU and AES will be nominated for inclusion in the INAI where appropriate. We will also examine the current criteria used for Category VI streams (e.g., BSS, BSC, coolwater), make suggestions for revision, and provide a list of candidate sites for INAI nomination using these criteria.

Job 7. Prepare manuscripts and reports:

Produce annual progress reports and a final report describing the Illinois Hierarchical Stream Classification. Develop detailed guidance for nomination of Natural Community Types (Category I) and Unusual Concentrations of Flora or Fauna (Category VI) for streams within the Illinois Natural Area Inventory. Assist INAI staff to prepare nominations of stream segments for INAI listing using criteria established within this project.

Literature Cited:

Bol, L., A.M. Holtrop, L.C. Hinz Jr. and J. Epifanio. 2007. Evaluating streams in Illinois based on aquatic biodiversity. Illinois Natural History Survey Technical Report 2007(57).

Brenden, T.O., L. Wang, P.W. Seelbach, R.D. Clark Jr., M.J. Wiley, B.L. Sparks-Jackson. 2008a. A spatially constrained clustering program for river valley segment delineation from GIS digital river networks. Environmental Modelling & Software 23:638-649.

Brenden, T.O., L. Wang, P.W. Seelbach. 2008b. A river valley segment classification of Michigan streams based on fish and physical attributes. Transactions of the American Fisheries Society 137: 1621-1636.

Higgins, J.V., M.T. Bryer, M.L. Khoury, and T.W. Fitzhugh. 2005. A freshwater classification approach for biodiversity conservation planning. Conservation Biology 19(2): 432-445.

Jensen, M.E., I.A. Goodman, P.S. Bourgeron, N.L. Poff, and C.K. Brewer. 2001. Effectiveness of biophysical criteria in the hierarchical classification of drainage basins. Journal of the American Water Resources Association 37(5): 1155-1167.

Maxwell, J.R., C.J. Edwards, M.E. Jensen, S.J. Paustain, H. Parrot, and D.M. Hill. 1995. A hierarchical framework of aquatic ecological units in North America (Nearctic Zone). General technical report NC-17. U. S. Department of Agriculture Forest Service, North Central Forest Experimental Station, St. Paul, Minnesota.

Seelbach, P.W., M.J. Wiley, J.C. Kotanchik and M.E. Baker. 1997. A landscape-based ecological classification system for river valley segments in Lower Michigan. Fisheries Research Report No. 2036. Michigan Department of Natural Resources, Ann Arbor, MI. 51 pp.

Sowa, S.P., D.D. Diamond. 2006. Using GIS and an aquatic ecological classification system to classify and map distinct riverine ecosystems throughout EPA region 7. Final Report, submitted to US EPA Landscape Ecology Branch, Environmental Photographic Interpretation Center, Reston, VA. 242 pp.

Sowa, S.P., G. Annis, M.E. Morey, and D.D. Diamond. 2007. A gap analysis and comprehensive conservation strategy for riverine ecosystems of Missouri. Ecological Monographs 77(3): 301-334.

Sowa, S.P., D.D. Diamond, R. Abbitt, G. Annus, T. Gordon, M.E. Morey, G.R. Sorensen, and D. True. 2005. A gap analysis for riverine ecosystems of Missouri. Final Report, submitted to the USGS National Gap Analysis Program, Moscow, ID. 1675 pp.

State of Illinois. 2005. The Illinois comprehensive wildlife conservation plan and strategy – version 1. Prepared by the Illinois Department of Natural Resources and approved by the U.S. Fish and Wildlife Service.

State of Illinois. 2008. Integrating multiple taxa in a biological stream rating system. Illinois Department of Natural Resources, Springfield, IL. 32pp. 1 appendix.

Location:
This three year project will be completed by INHS staff in Springfield and Champaign with the assistance of IDNR staff in Springfield. The streams hierarchical framework and associated work will be developed for wadeable streams throughout Illinois.

Potential Working Group Members in addition to project personnel:
Doug Carney, Yong Cao, Joel Cross, Kevin Cummings, Ed DeWalt, Jana Hirst, Gary Lutterbie, Steve Pescitelli, Mike Retzer, Karen Rivera, Robert Rung, Randy Sauer, Matt Short, Roy Smogor, Bob Szafoni, Trent Thomas, John Wilker.

Compliance:

Annual reports will be prepared at the end of each year of the study culminating in a Final report at the close of the project. Results of the work completed in this project will be made available by publication in the scientific literature and to the Illinois Department of Natural Resources.

Budget Justification:

IDNR Project Support: This project supports the IDNR's Wildlife Action Plan and the Illinois Natural Areas Inventory. To promote coordination with IDNR personnel, primary project staff will be located at the IDNR headquarters in Springfield. The IDNR will provide project staff office space and other supplies and items necessary to support the project. Examples include telephone, computer support (e.g., printer, network, and email access), motor pool, etc.

Salaries and Wages: We request a total of $195,000 to support one full time and one half-time research scientists for the duration of the project. A portion of the salary of Brian Anderson, used for cost sharing, is paid by the Illinois Natural History Survey and is at no cost to the sponsor. A portion of the salaries of Charlie Foor, Ann Holtrop, and Andrew Hulin, used for cost sharing, is paid by the Illinois Department of Natural Resources and is at no cost to the sponsor.

Fringe Benefits: We request a total of $69,401 in Fringe benefits in accordance with those budgeted for wages.

Travel: We request a total of $6,000 to coordinate with resource professionals throughout Illinois and to reimburse staff for expenses encountered while meeting with work group members, and presenting research findings at professional scientific meetings.

Materials & Supplies: We request a total of $3,400 for the purchase of a dedicated project computer and to provide minimal support for general office supplies.

Contractual Services: We request $3,714 for Contractual Services over the three year project period. These funds are needed for software licensing, assistance with GIS analysis, and to reimburse staff for conference registration fees necessary to present research findings at professional meetings.

Facilities and Administrative Costs: We request $55,503 to offset facilities and administrative costs. Rates have been negotiated by the University of Illinois at Urbana/Champaign. Brian Anderson is located on the University of Illinois campus so the F&A on his salary, used for cost share, is at the on-campus rate.

Personnel:
The personnel funds requested in this project will fund one full time research scientist and one half-time research scientist for the project duration. However, other INHS and IDNR personnel listed below will provide additional support to the project.

The following personnel from IDNR Office of Resource Conservation (ORC), One Natural Resources Way, Springfield, IL 62702 will manage this project:

Ann Marie Holtrop
IDNR Watershed Protection Section
phone: (217) 785-4325
email: ann.holtrop@illinois.gov

Additional personnel involved in this project at the same location include:

Charlie Foor
IDNR Watershed Protection Section
phone: (217) 782-3073
email: charlie.foor@illinois.gov

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Other personnel involved in project include:
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Estimated Cost:

PROJECT BUDGET - Grant Segment Year I
Hierarchical Framework for Illinois Streams
Effective Dates: 03/01/11 - 2/29/12

Expense Categories	Federal Request	UIUC/ INHS Cost Share	IDNR Cost Share	Total Project Costs
Salaries and Wages				
Professional Scientist	$65,000	$6,535	$15,000	$86,535
Total Salaries and Wages	$65,000	$6,535	$15,000	$86,535
Fringe Benefits				
INHS Professional 35.59%, IDNR 36.27%	$23,134	$2,325	$5,441	$30,900
Total Fringe Benefits	$23,134	$2,325	$5,441	$30,900
Total Salaries, Wages, and Fringe Benefits	$88,134	$8,860	$20,441	$117,435
Travel	$2,000			$2,000
Materials & Supplies	$2,400			$2,400
Contractual Services	$1,238			$1,238
Equipment >$5,000	$0			$0
Total Direct Costs	$93,772	$8,860	$20,441	$123,073
Total Modified Direct Costs*	$93,772	$8,860	$20,441	$123,073
Indirect Costs				
Assessed to Sponsor 20%	$18,754			$18,754
Assessed by IDNR 22.9%			$4,681	$4,681
Assessed by UIUC/INHS 44.2%		$3,916		$3,916
Unrecovered F&A (20% vs. 44.2%)		$22,693		$22,693
Total Project Costs	$112,526	$35,469	$25,122	$173,117
Percentages	65.000%	20.489%	14.511%	100%

PROJECT BUDGET - Grant Segment Year II
Hierarchical Framework for Illinois Streams
Effective Dates: 03/01/12 - 2/28/13

Expense Categories	Federal Request	UIUC/ INHS Cost Share	IDNR Cost Share	Total Project Costs
Salaries and Wages				
Professional Scientist	$65,000	$6,149	$15,000	$86,149
Total Salaries and Wages	$65,000	$6,149	$15,000	$86,149
Fringe Benefits				
INHS Professional 35.59%, IDNR 36.27%	$23,134	$2,186	$5,441	$30,761
Total Fringe Benefits	$23,134	$2,186	$5,441	$30,761
Total Salaries, Wages, and Fringe Benefits	$88,134	$8,335	$20,441	$116,910
Travel	$2,000			$2,000
Materials & Supplies	$500			$500
Contractual Services	$1,238			$1,238
Equipment >$5,000	$0			$0
Total Direct Costs	$91,872	$8,335	$20,441	$120,648
Total Modified Direct Costs*	$91,872	$8,335	$20,441	$120,648
Indirect Costs				
Assessed to Sponsor 20%	$18,374			$18,374
Assessed by IDNR 22.9%			$4,681	$4,681
Assessed by UIUC/INHS 44.2%		$3,684		$3,684
Unrecovered F&A (20% vs. 44.2%)		$22,223		$22,223
Total Project Costs	$110,246	$33,242	$25,122	$169,610
Percentages	65.000%	20.189%	14.811%	100%

PROJECT BUDGET - Grant Segment Year III
Hierarchical Framework for Illinois Streams
Effective Dates: 03/01/13 - 2/28/14

Expense Categories	Federal Request	UIUC/ INHS Cost Share	IDNR Cost Share	Total Project Costs
Salaries and Wages				
Professional Scientist	$65,000	$6,149	$15,000	$86,149
Total Salaries and Wages	$65,000	$6,149	$15,000	$86,149
Fringe Benefits				
INHS Professional 35.59%, IDNR 36.27%	$23,134	$2,186	$5,441	$30,761
Total Fringe Benefits	$23,134	$2,186	$5,441	$30,761
Total Salaries, Wages, and Fringe Benefits	$88,134	$8,335	$20,441	$116,910
Travel	$2,000			$2,000
Materials & Supplies	$500			$500
Contractual Services	$1,238			$1,238
Equipment >$5,000	$0			$0
Total Direct Costs	$91,872	$8,335	$20,441	$120,648
Total Modified Direct Costs*	$91,872	$8,335	$20,441	$120,648
Indirect Costs				
Assessed to Sponsor 20%	$18,374			$18,374
Assessed by IDNR 22.9%			$4,680	$4,680
Assessed by UIUC/INHS 44.2%		$3,684		$3,684
Unrecovered F&A (20% vs. 44.2%)		$22,223		$22,223
Total Project Costs	$110,246	$34,242	$25,121	$169,609
Percentages	65.000%	20.189%	14.811%	100%

PROJECT BUDGET - Grant Segment 3 year Total
Hierarchical Framework for Illinois Streams
Effective Dates: 03/01/11 - 2/28/14

Expense Categories	Federal Request	UIUC/ INHS Cost Share	IDNR Cost Share	Total Project Costs
Salaries and Wages				
Professional Scientist	$195,000	$18,833	$45,000	$258,833
Total Salaries and Wages	$195,000	$18,833	$45,000	$258,833
Fringe Benefits				
INHS Professional 35.59%, IDNR 36.27%	$69,402	$6,697	$16,323	$92,422
Total Fringe Benefits	$69,402	$6,697	$16,323	$92,422
Total Salaries, Wages, and Fringe Benefits	$264,402	$25,530	$61,323	$351,255
Travel	$6,000			$6,000
Materials & Supplies	$3,400			$3,400
Contractual Services	$3,714			$3,714
Equipment >$5,000	$0			$0
Total Direct Costs	$277,516	$25,530	$61,323	$364,369
Total Modified Direct Costs*	$277,516	$25,530	$61,323	$364,369
Indirect Costs				
Assessed to Sponsor 20%	$55,502			$55,502
Assessed by IDNR 22.9%			$14,042	$14,042
Assessed by UIUC/INHS 44.2%		$11,284		$11,284
Unrecovered F&A (20% vs. 44.2%)		$67,139		$67,139
Total Project Costs	$333,018	$103,953	$75,365	$512,336
Percentages	65.000%	20.290%	14.710%	100%

Project Schedule:

	03/11 – 08/11	09/11 – 02/12	03/12 – 08/12	09/12 – 02/13	03/13 – 08/13	09/13 – 2/14
Job 1. Update and integrate database system.	X	X				
Job 2. Identify Ecological Drainage Units.	X	X				
Job 3. Identify Aquatic Ecological Systems.		X	X	X		
Job 4. Classify Valley Segments.		X	X	X		
Job 5. Define Natural Community Types.				X	X	
Job 6. Rate/Nominate INAI sites.					X	X
Job 7. Develop manuscripts and Reports.					X	X