

Summary and Synthesis of the Available Literature on the Effects of Nutrients on Spring Organisms and Systems

Florida Department of Environmental Protection
June 4, 2007

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Chuck Jacoby	UF Fisheries and Aquatic Sciences Dept
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Wendy Graham	UF Water Institute
Kathleen McKee	UF Water Institute

AGENDA

- Presentation (30 min)
 - Tasks to support deliverables (Reference Database and Final Report):
 - Task 1. Collection of Available Literature
 - Task 2. Development of a Springs Literature Database
 - Task 3. Synthesis Report
 - Task 4. Seminars, Reports
- Discussion of Database Deliverable capabilities
- Discussion of Report Outline
- Discussion of August Seminar

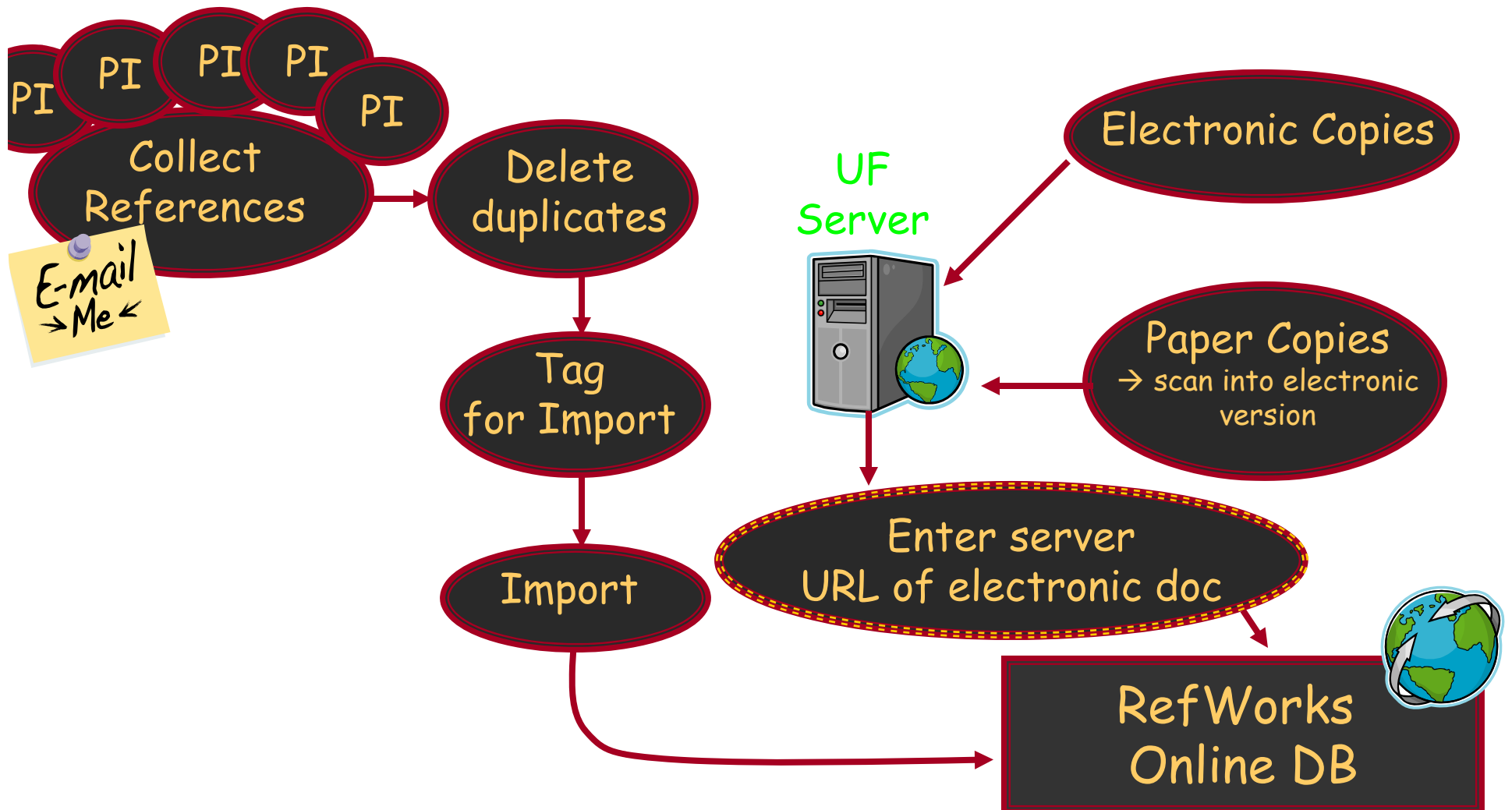
Task 1. Collection of Available Literature

- Books, Journal Articles, Reports, Proceedings
- Stores abstracts, annotations, URLs when available
- Online System for multiple users
- Organizable with Folders
- Searchable by any field including:
 - Author
 - Keyword
 - Major Subject
 - Reference Type
 - Publisher, Agency

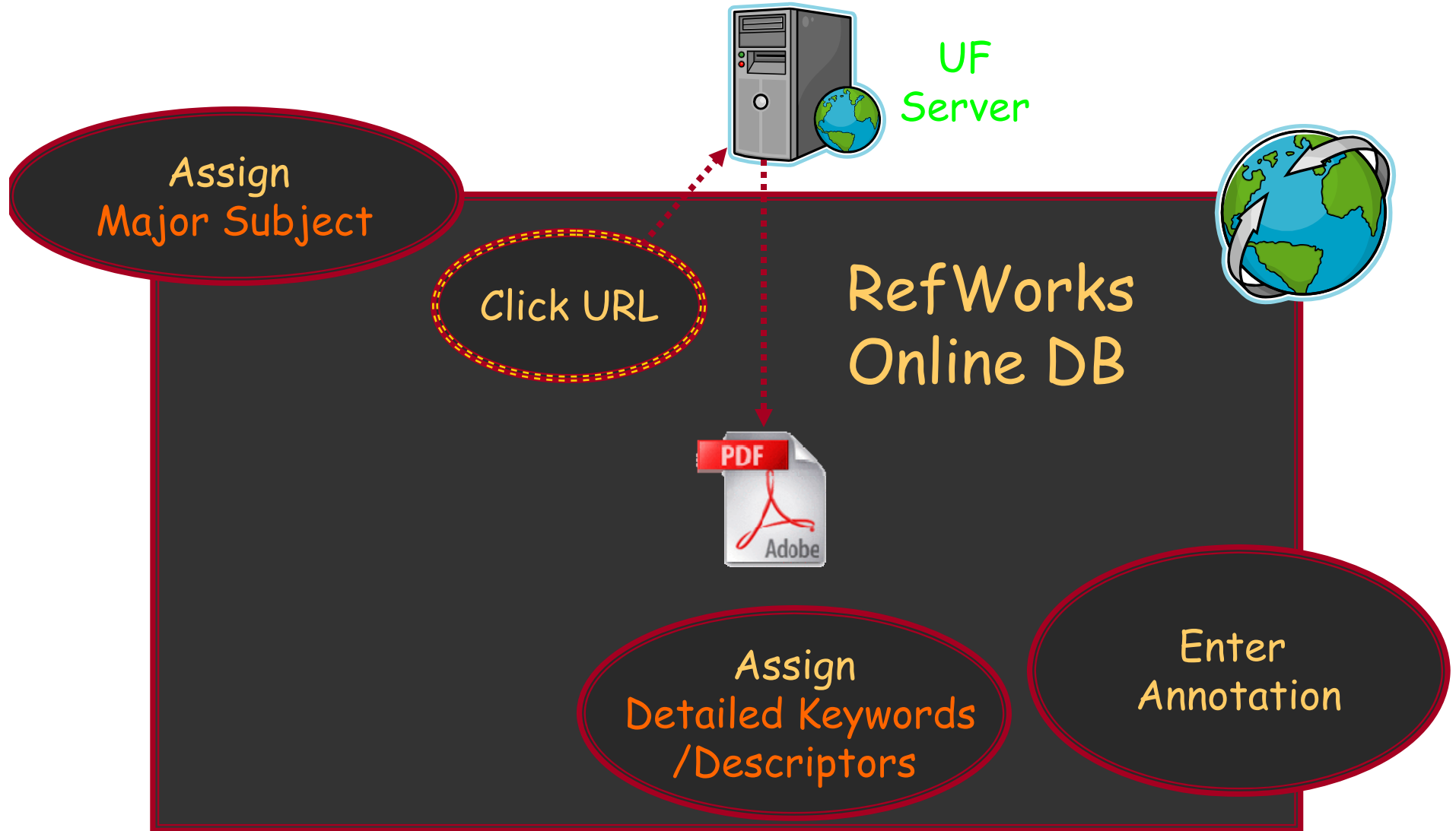
Task 1. Collection of Available Literature

- SWFWMD
- SJRWMD
- SRWMD
- NFWWMD
- USGS
- FDEP / FGS
- Rob Mattson bibliography
- Aquatic, Wetland and Invasive Plant Information Retrieval System (APIRS)
- Journal Article Searches

Task 2. Development of a Springs Literature Database



Task 2. Development of a Springs Literature Database



Web-based references manager

- Allows open access (to UF subscribers) for sharing annotated bibliography
- Has URL links for on-line materials



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- **Jeff Olsen Associate Vice President of Online Learning & Services**
Director of Library and Information Sciences
St John's University
USA

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If you need to manage information for any reason -- whether it be for writing, research or collaboration -- RefWorks is the perfect tool. Use the tutorials and information resources on this site to work smarter with RefWorks!

NEWS

- ▶ **New Partnerships with Serial Solutions and WebFeat**
- ▶ **Spring Feature Release: Attachment Feature Official Launch, March 2007**

[more >](#)

EVENTS

- ▶ **Inforum**
May 22, 2007
- ▶ **SLA (Special Libraries Association)**
June 03, 2007
- ▶ **IATUL**
June 11, 2007

[more >](#)

WEBINARS

- ▶ **RefWorks Fundamentals**

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Title: The transition of a freshwater karst aquifer to an anoxic marine system SO ESTUARIES AB
Authors: [Garman, K.M.](#); [Garey, J.R.](#)
Source: 2005, 28, 5, 686-693
- Ref ID: 285 Journal Reference 2 of 92 Springs [View](#) [Edit](#) [S·F·X](#)
Title: Nutrient inputs to the coastal ocean through submarine groundwater discharge: controls and potential impact
Authors: [Slomp, C.P.](#); [Van Cappellen, P.](#)
Source: [SO JOURNAL OF HYDROLOGY AB](#), 2004, 295, 1-4, 64-86
- Ref ID: 287 Journal Reference 3 of 92 Springs: Outside Scope [View](#) [Edit](#) [S·F·X](#)
Title: The behavior of U- and Th-series nuclides in groundwater
Authors: [Porcelli, D.](#); [Swarzenski, P.W.](#); [Porcelli, D.](#); [Andersson, P.S.](#); [Smoak, J.M.](#); [Granling, C.M.](#); [McCorkle, D.C.](#); [Mulligan, A.E.](#); [Woods, T.L.](#)
Source: [Limnol.Oceanogr.](#), 2003, 48, 3, 957-970
- Ref ID: 288 Journal Reference 4 of 92 Springs: Outside Scope [View](#) [Edit](#) [S·F·X](#)
Title: Source of trace element variability in Great Barrier Reef corals affected by the Burdekin flood plumes
Authors: [Alibert, C.](#); [Kinsley, L.](#); [Fallon, S.J.](#); [McCulloch, M.T.](#); [Berkelmans, R.](#); [McAllister, F.](#)
Source: [SO GEOCHIMICA ET COSMOCHIMICA ACTA AB](#), 2003, 67, 2, 231-246
- Ref ID: 280 Journal Reference 5 of 92 Springs: Outside Scope [View](#) [Edit](#) [S·F·X](#)
Title: Groundwater vulnerability and risk mapping in a geologically complex area by using stable isotopes, remote sensing and GIS techniques
Authors: [Dimitriou, E.](#); [Zacharias, I.](#)
Source: [SO ENVIRONMENTAL GEOLOGY AB](#), 2006, 51, 2, 309-323
- Ref ID: 281 Journal Reference 6 of 92 Springs [View](#) [Edit](#) [S·F·X](#)
Title: Biogeochemical transport in the Loahatchee River estuary, Florida: The role of submarine groundwater discharge
Authors: [Swarzenski, P.W.](#); [Orem, W.H.](#); [McPherson, B.F.](#); [Baskaran, M.](#); [Wan, Y.](#)
Source: [SO MARINE CHEMISTRY AB](#), 2006, 101, 3-4, 248-265
- Ref ID: 282 Journal Reference 7 of 92 Springs: Outside Scope [View](#) [Edit](#) [S·F·X](#)
Title: Statistical clustering of major solutes: Use as a tracer for evaluating interbasin groundwater flow into Indian Wells Valley, California
Authors: [Guler, C.](#); [Thyne, G.D.](#)
Source: [SO ENVIRONMENTAL & ENGINEERING GEOSCIENCE AB](#), 2006, 12, 1, 53-65
- Ref ID: 283 Journal Reference 8 of 92 Springs [View](#) [Edit](#) [S·F·X](#)

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RefWorks

- Has permanent reference ID

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- Type

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- Publication

- Year, etc.

Ref ID

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Ref ID: 11

Ref Type: Report

Source Type: Electronic

Authors: Barrios, K.

Title: St. Marks River and Wakulla River Springs Inventory Leon and Wakulla Counties, Florida

Pub Year: 2006

Report Number: Water Resources Special Report 06-03

Notes: Enter annotation here . . .

Publisher: Northwest Florida Water Management District

Place of Publication: Havana, FL

Availability: Electronic

Data Source: Cohen - has copy

Created: 4/24/2007 5:51:17 PM Local Timezone (GMT - 4hr)

Last Modified: 5/23/2007 2:35:13 PM Local Timezone (GMT - 4hr)

URL: http://www.nwfwmd.state.fl.us/rmd/springs/Wakulla_StMarks/index.htm; <http://www.nwfwmd.state.fl.us/pubsdata/techpubs.html>

Website Title: Spring Inventory of the Wakulla and St. Marks Rivers

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RefWorks

Reference Type

Author(s)

Title

Year

Notes

Availability

Data source

URL for on-line materials

DOI - digital object identifier if available

Basic citation info

- What CFW has

- Who on project submitted source

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RefWorks

Search options

- Advanced
- By author
- By descriptor (keyword)
- By periodical

RefWorks

Searches can be done using

• Descriptors

- Basic subjects
- Keywords

• Major Subjects

- Assigned for bibliography

• Annotator

- Who wrote the annotation

• Title

- Etc.

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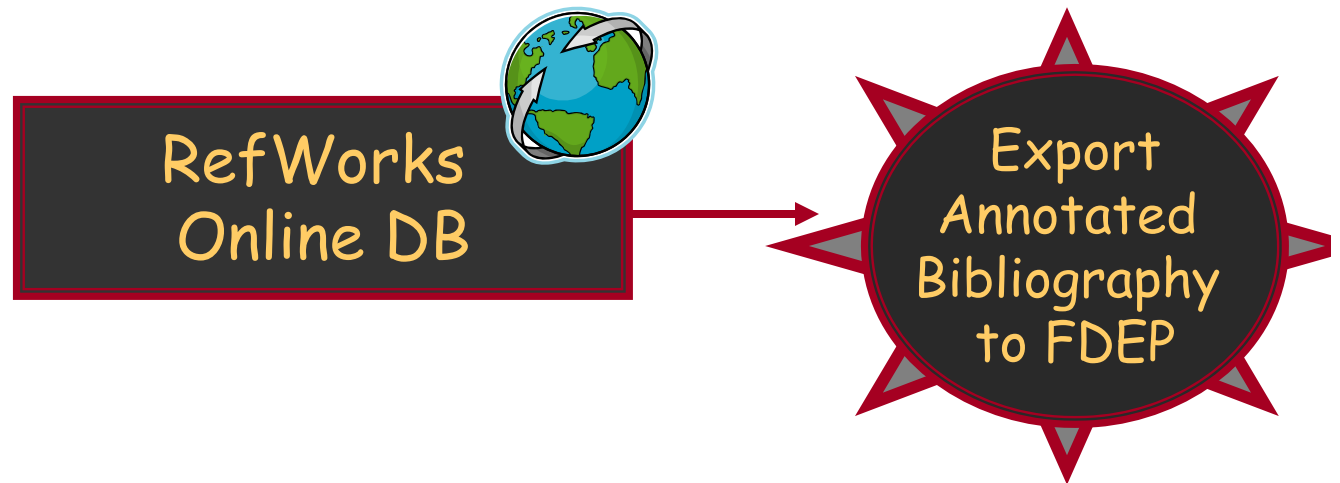
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Springs

Search Clear

Task 2. Development of a Springs Literature Database



Format?

→ RefWorks

→ EndNote

→ MS Access

Task 3. Synthesis Report

- Introduction
- Ch 1 Springs as Ecosystems (B. Knight)
- Ch 2 Sources, Transformations and Sinks of Nutrients in Karst Systems (M. Cohen)
- Ch 3 Biogeochemical Processes (P. Inglett)
- Ch 4 Macrophytes and Algae (T. Frazer)
- Ch 5 Macroinvertebrates and Fish (C. Jacoby)
- Ch 6 Invasive Species and Management (J. Evans)
- Ch 7 Ecosystem Level Processes (B. Knight)
- Ch 8 Synthesis (M. Brown)

Ch. 1 Springs as Ecosystems (B. Knight)

- Introduction
 - Historic Context
 - Major Literature Sources
- Springs as Ecosystems
 - Springs Ecosystem Model
 - Environmental Forcing Functions
 - Solar Inputs
 - Atmospheric Inputs
 - Groundwater Inputs
 - Anthropogenic Inputs
 - Energy Storages/Structure
 - Spring/Spring Run Basin
 - Water and Dissolved Constituents
 - Primary Producers
 - Primary Consumers
 - Higher-Level Consumers
- Literature Cited

Ch. 2 Sources, Transformations and Sinks of Nutrients in Karst Systems (M. Cohen)

- Introduction
 - Nitrogen Pollution Globally
 - Nitrogen Pollution in Florida
 - Nitrogen Biogeochemistry
- Sources of N
 - Overview of Env Loading of N
 - Sources of Nitrate-N in GW
 - Loads / Yields Watershed Scale
 - Inferring Sources of Nitrates
 - Temporal / Spatial Var of NO₃ Loading
 - Annual / Seas Patterns N loading
 - Spatial Patterns of NO₃ Loading
- Assessing Vulnerability to NO₃ Loading
 - Geologically Induced Vuln
 - Land Use Induced Vuln
 - Time Lag Issues
- NO₃ Transformations and Transport
 - Transport of NO₃
 - Transformations of N
- Sinks for Nitrogen
 - Ecosystem Reactivity
 - Reactivity -Sub-Surface
 - Zones of Enhanced Reactivity: Riparian Wetlands
 - Zones of Enhanced Reactivity: Lakes
 - Zones of Enhanced Reactivity: Headwater Streams
 - Ecosystem Saturation
 - Anthropogenic Enhancement of N Removal
- Regional Load Case Studies
 - Santa Fe Basin
 - Upper Floridan Aquifer
 - Suwannee River Springs
 - Silver Springs
 - Rainbow Springs
 - Wekiwa Springs
 - Wakulla Springs
 - Ichetucknee Springs

Ch. 3 Biogeochemical Processes

(P. Inglett)

- Introduction
 - Importance
 - Major Literature Sources
 - Characteristic Environments/Organism Groups
 - Submerged surfaces
 - Epiphytic/Epilithic/Epibenthic
 - Sediments
 - Oxic/Anoxic Interface
 - Biogeochemical Processes
 - Carbon
 - Autochthonous/Allochthonous
 - Organic Matter Decomposition
 - Phosphorus
 - Inorganic/Organic
 - Ca/Fe Interactions
 - Nitrogen
 - Nitrogen Mineralization
 - Nitrogen Fixation
 - Denitrification
 - Sulfur
 - Sulfate Reduction
 - Sulfide Oxidation
 - Micronutrients
 - Effects of Nutrients
 - Nitrogen Impacts
 - Phosphorus Impacts
 - Carbon/Organic Matter Impacts
 - Sulfur Impacts
 - Research Needs
- Literature Cited

Ch. 4 Macrophytes and Algae

(T. Frazer)

- Introduction
 - Factors affecting the abundance and distribution of aquatic plants and algae
 - Effects of nutrient enrichment on plant and algae (general)
- Spring Flora (patterns of abundance and distribution)
 - Historical
 - Present
- Effects of Nutrients on Spring Flora
 - Direct
 - Indirect
- Nuisance and Invasive species
- Additional Research Needs and Questions
- Literature Cited

Ch. 5 Macroinvertebrates and Fish (C. Jacoby)

- Background
 - Factors affecting the distribution and abundance of macroinvertebrates and fish
 - Overview of responses to nutrients for macroinvertebrates and fish
- Distribution and abundance of macroinvertebrates and fish in Florida springs
 - Historical
 - Present
- Impacts of nutrients on macroinvertebrates and fish
 - Direct (from known to uncertain)
 - Indirect (from known to uncertain)
- Gaps and research needs
- Literature cited

Ch. 6 Invasive Species and Management

(J. Evans)

- Major Invasive Plants
 - *Eichhornia, Pistia, Hydrilla, Hygrophila*
- Commonly Cited Problems
 - Competition with native plants
 - Community structure changes
 - Overgrowth affecting navigation, dissolved oxygen, organic sedimentation rates
- Invasive Plant Management in Florida
 - Maintenance control - maintain at "lowest feasible levels"
 - Herbicides used, amounts, etc.
- Nutrients and Invasive Plants
 - nutrient/growth response relationships
 - Differences in nutrient relationships among the species
- Functions Provided by Invasive Plants
 - Contaminant uptake, Wildlife habitat, Buffering
- Case Studies
- Research Needs/Gaps
- Literature Cited

Ch. 7 Ecosystem Level Processes

(B. Knight)

- Ecosystem Level Processes
 - Basin Erosion and Sediment Transport
 - Primary Productivity
 - Community Respiration
 - Secondary Productivity
 - Photosynthetic/Respiration Ratio
 - Ecological Efficiency
 - Community Export
 - Pollutant Assimilation
 - Human and Aesthetic
- Effects of Nutrients on Spring Ecosystems
 - Primary Producers
 - Community Metabolism
 - Community Structure
 - System Export
 - Human and Aesthetic
- Additional Research Needs and Questions

Ch. 8 Synthesis

(M. Brown)

- Overview of nutrient effects - current knowledge
 - Organisms
 - Trophic dynamics
 - Ecological processes
- Hypotheses - organization, impacts, and effects
- Nutrient and spring ecosystem model
 - Mechanistic vs. empirical models
 - Energy and material flows
 - Trophic organization
 - Sensitivity analysis
 - Simulation results - test of hypotheses
- Knowledge gaps
- Future research directions
- Literature Cited

Task 4. Seminars, Reports

Project Timeline

June 1	Citations in RefWorks
June 4	Update Meeting with FDEP
June 4	Final report outline
August 15	Annotation of large # of references
August 21	Intermediate seminar
November 1	Draft chapters
January 31	Final seminar
February 1	First draft of final report
March 15	Draft final report

Task 4. Seminars

- August 21
Intermediate seminar in Gainesville
“...to encourage participation from experts on springs ecology ... allowing the opportunity for comment on project progress.”
- Prior to January 31
Final Seminar to FDEP in Tallahassee

August 21 Seminar

List of Invitees (p. 1 of 2)

- FDEP
 - Joe Hand, Russ Frydenborg + others!
- FGS
 - Gary Maddox, Harley Means
- USGS
 - Brian Katz, Stephen Walsh
- SRWMD
 - Louis Mantini, Kirk Webster
- SWFWMD
 - Mark Hammond, Marty Kelly, Veronica Craw, Gregg Jones
- NFWMD
 - Kristopher Barrios
- SJRWMD
 - Rob Mattson, Dave Fisk, David Hornsby

August 21 Seminar

List of Invitees (p. 2 of 2)

- FWCC
 - Joe Prenger, Kent Smith
- UF
 - Jack Ewel, Jon Martin, Thea Edwards, Mark Clark, Andrea Albertin, Marty Anderson
- Faculty Outside UF
 - Wm Burnett (FSU), Jeffrey Chanton (FSU), Philip Darby (UWF), Jim Sickman (UCRiv), Jan Stevenson (Michigan)
- TNC
 - Doug Shaw
- Springs Working Groups
 - Faye Baird, Jim Stevenson
- Consulting
 - Bob Burleson, Carol Lippincott, Aga Pinowska, Scott Emery, Sam Upchurch,

Discussions

- Database Deliverable Capabilities
- Final Report Content
- August Seminar

Thank you!