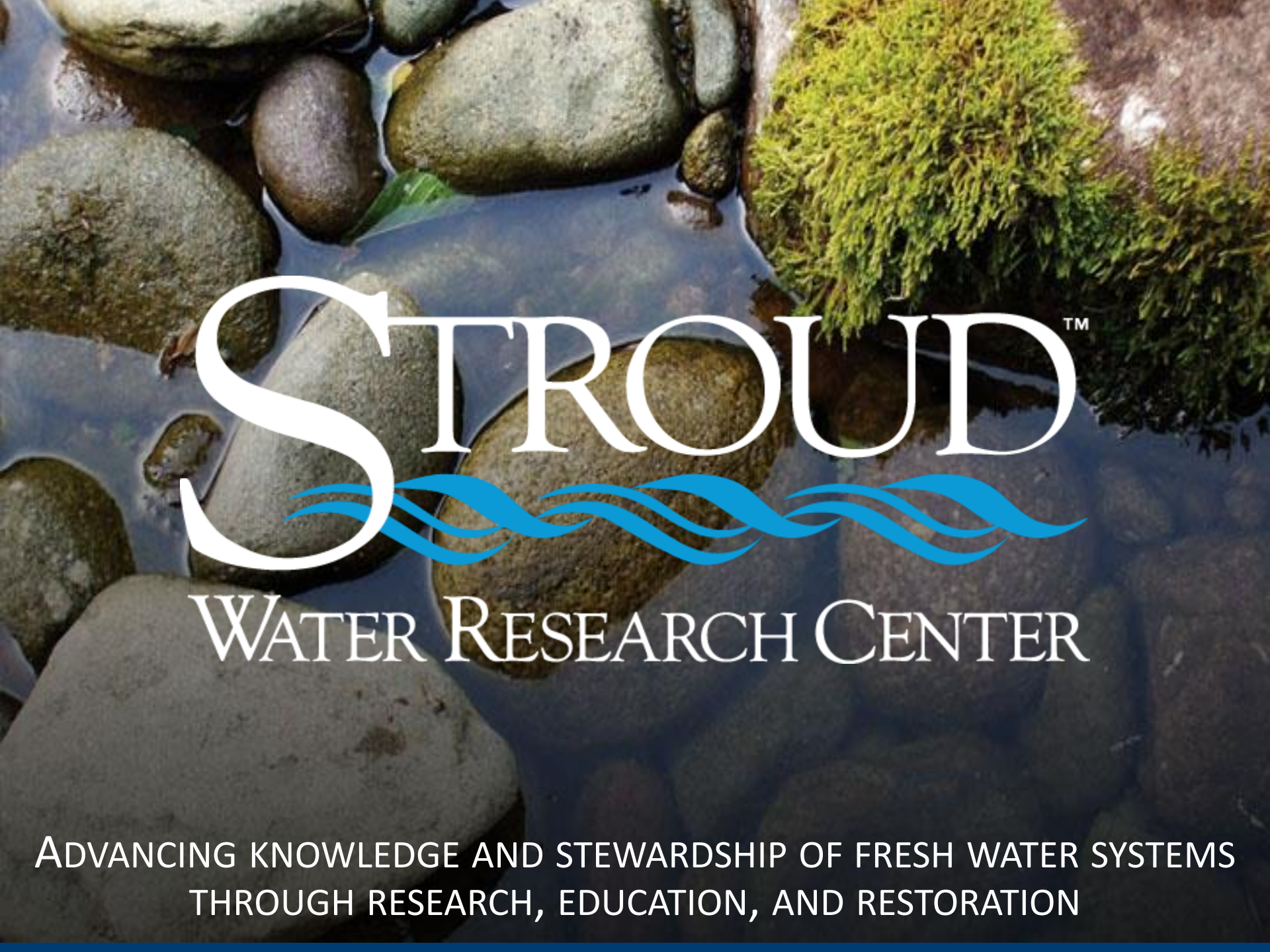

ADVANCING KNOWLEDGE AND STEWARDSHIP OF FRESH WATER SYSTEMS THROUGH RESEARCH, EDUCATION, AND RESTORATION

Watershed 101 Introduction

May 18-19 and 31, 2017

Welcome

Logistics and materials

Overview and introductions

Workshop Goals

Workshop overview

Photo credit: NASA Earth as Art

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Workshop schedule

Day 1 (Thurs, May 18, 2017)
- Physical
  - Presentations
  - Activity sessions
- Chemical
  - Presentations
  - Activity sessions

Day 2 (Fri, May 19, 2017)
- Biological
  - Microbiology and algae presentations
  - Activity session
  - Macroinvertebrates and fish presentations
  - Activity session

Day 3 (Wed, May 31, 2017)
- Study/project design
  - Presentation
  - Activity session
- Monitoring and watershed management resources
  - Presentations
  - Demonstrations/discussions

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Watershed 101 materials

- In 3-ring binder:
  - Agenda (in sleeve)
  - Reimbursement directions (in sleeve)
  - Wikiwatershed handout (in sleeve)
  - Resources list (in sleeve)
  - Presentations (w tab dividers)
- Note pads – for note taking and workshop feedback (feedback box)

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Instructor Introductions

- Stroud Water Research Center
  - Dave Bressler – days 1-3
  - Matt Ehrhart – days 1 and 3
  - Melinda Daniels, PhD – days 1 and 3
  - Dave Arscott, PhD – days 1 and 3
  - Jinjun Kan, PhD – days 2 and 3
  - John Jackson, PhD – days 2 and 3
- The Academy of Natural Sciences of Drexel University
  - Allison Stoklosa – day 2
  - Greg Barren – day 2
  - Kathryn Christopher – day 3
  - Dave Keller – day 3

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Attendee Introductions

- Name
- Organization
- Role in Delaware River watershed science and management efforts (e.g., coordinator, volunteer, scientist, manager, etc.)

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Watershed 101 Intentions

- Better understanding of:
  - The fundamental characteristics and processes in watershed ecology
  - The connections between land and water, abiotic and biotic processes, in Delaware River basin
  - How this knowledge is used for strategic monitoring

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Watershed 101 Intentions

- For the purpose of:
  - Developing quantifiable and realistic management goals
  - Improving data quality to support accurate assessment of progress toward goals
  - Understanding if and how projects are producing better water

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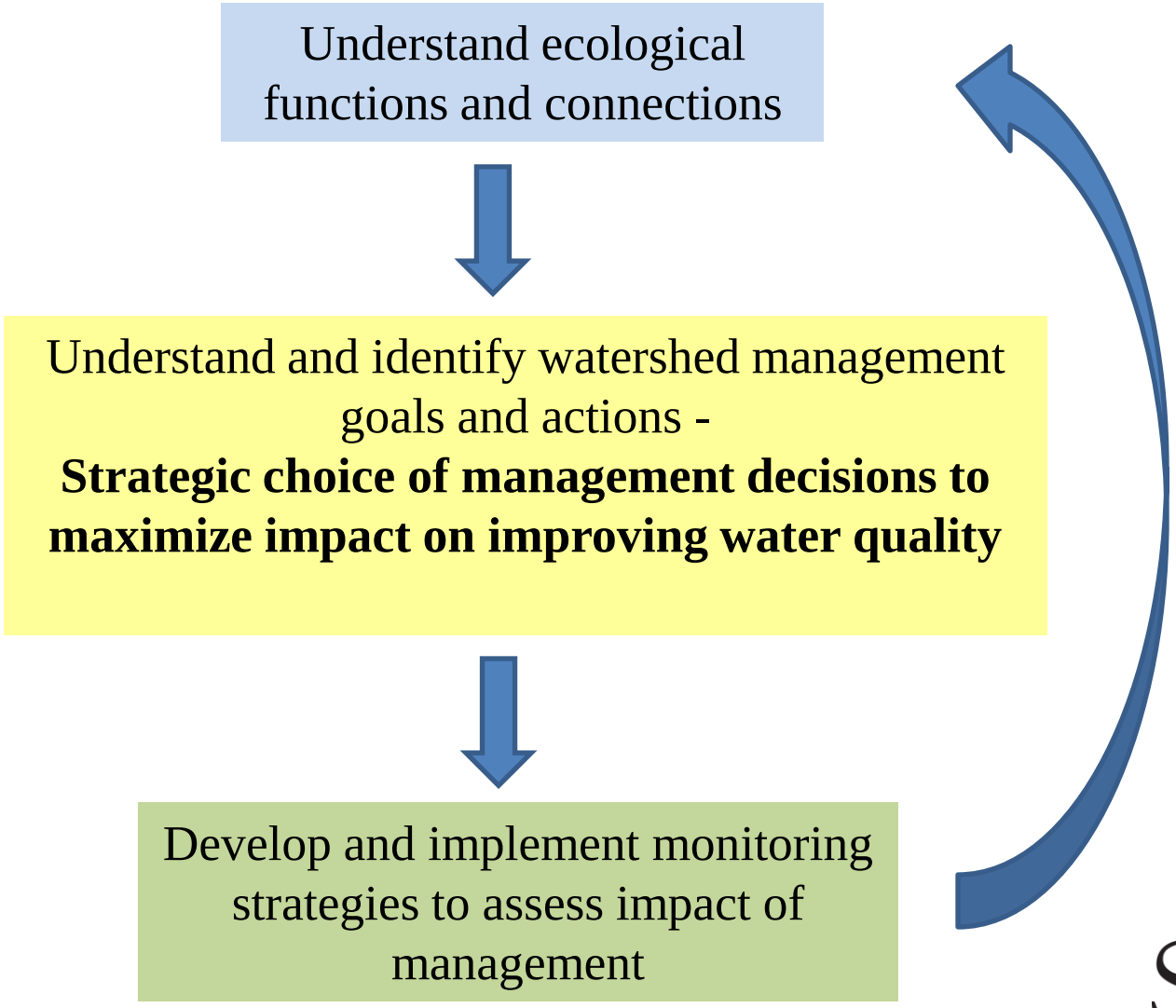
The basic process



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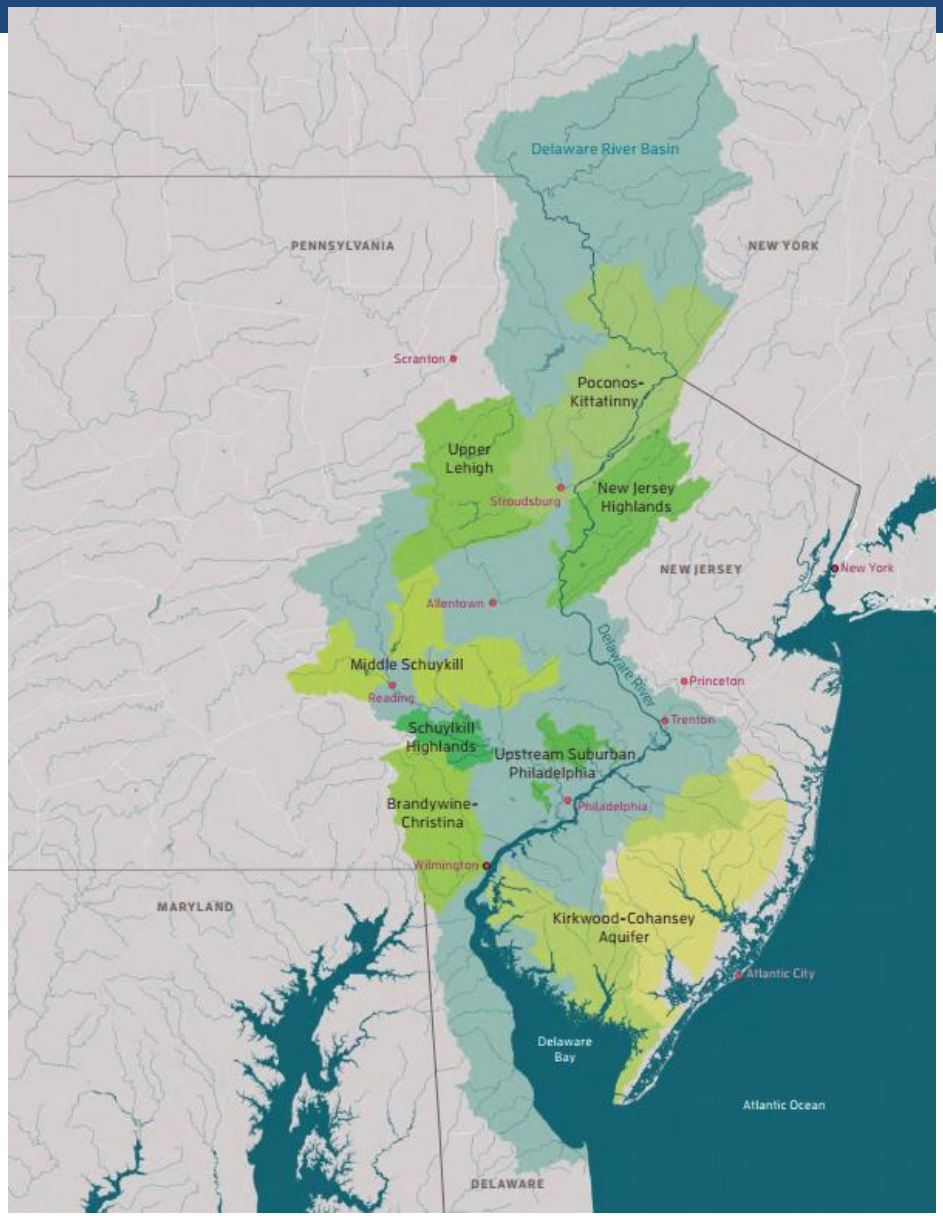
Overview of DRWI

William Penn Foundation (WPF) Delaware River Watershed Initiative (DRWI) project overview – **http://www.drwi.net/downloads**

- 50 leading conservation organizations in Delaware River basin
- Goal: “watersheds that provide high quality and sufficient water quantity for healthy ecosystems and human communities”
  - **More Clean Water**

Overview of DRWI

- Ongoing projects by conservation organizations
- DWRI emphasis on “establishing and maintaining an expansive monitoring program to assess whether this work is effective at protecting and/or restoring water quality”
  - 8 focus areas for the work – “clusters”
    - **Restoration, protection, and hybrid**
  - Cluster member organizations aligned toward shared goals
  - **Measurable outcomes**
  - **ANSD lead monitoring initiative**
  - **Workshops to support citizen science efforts toward these goals**



Delaware River Basin

- Longest un-dammed river in the U.S east of the Mississippi
- One of only four river sections (73mi) in the Northeast U.S. to have been designated as part of the National Wild and Scenic River System
- 330 miles long
- Largest tributaries – Schuylkill and Lehigh Rivers
- Basin Area: 33,041 km^2 (12,754 mi^2)
- Number of fish species: 105
- Land cover:
    - 60% forest
    - 24% agriculture
    - 9% urban
    - 7% surface water/other
- Population: 7.3 million
- Population for water: 15 million

Overview of Stroud watershed science and management workshops

- Watershed 101 starting point for additional workshops:
  - Customized version of Watershed 101 for institutional leaders
  - Developing studies and monitoring plans (in depth)
  - Automated in-situ monitoring using EnviroDIY sensor stations
  - Data management and analysis
  - Training on specific monitoring methods
  - Stream restoration
  - Wikiwatershed, Model My Watershed
- Starting point for Stroud 1:1 work with watershed groups

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Agenda days 1 and 2

Day 1 – Workshop overview and background; physical and chemical characteristics of streams and rivers

- 8:00-8:30 – Informal discussions, light breakfast and refreshments
- 8:30-8:50 – Introduction – David Bressler (Stroud Center)
- 8:50-9:15 – Scope and scale – Dr. David Arscott (Stroud Center)
- 9:15-12:00 – Unit 1 – Physical characteristics and processes in the monitoring context – Dr. Melinda Daniels (Stroud Center)
  - 9:15-10:15 – Introduction, hydrology, geomorphology
  - 10:15-10:30 – Break
  - 10:30-11:30 – Geomorphology, temperature and solar
  - 11:30-12:00 – Discussion
- 12:00-1:00 – Lunch
- 1:00-4:00 – Unit 2 – Chemical characteristics and processes in the monitoring context – Dr. David Arscott (Stroud Center)
  - 1:00-2:15 – Geochemistry, basic chemistry parameters
  - 2:15-2:30 – Break
  - 2:30-3:30 – Nitrogen, Phosphorus, Carbon
  - 3:30-4:00 – Discussion
- 4:00-5:00 – Discussion, flexible time

Day 2 – Biological characteristics of streams and rivers

- 8:00-8:30 – Informal discussions, refreshments
- 8:30-8:45 – Intro, open discussion, questions from day 1
- 8:45-3:30 – Unit 3 – Biological characteristics and processes in the monitoring context
  - 8:45-9:35 – Microbiology – Dr. Jinjun Kan/David Bressler (Stroud Center)
  - 9:35-10:15 – Algae/primary productivity – Greg Barren (Academy of Natural Sciences of Drexel University)
  - 10:15-10:30 – Break
  - 10:30-12:00 – Macroinvertebrates – Dr. John Jackson
- 12:00-1:00 – Lunch
  - 1:00-1:45 – Macroinvertebrates (cont'd)
  - 1:45-2:00 – Break
  - 2:00-3:00 – Fish – Allison Stoklosa (Academy of Natural Sciences of Drexel University)
  - 3:00-3:30 – Discussion
- 3:30-5:00 – Discussion, flexible time, lead-in to day 3

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Agenda day 3

Day 3 – Project/study design and monitoring

- 8:00-8:30 – Informal discussions, refreshments
- 8:30-9:00 – Project/study design – John
- 9:00-9:25 – Scope and scale – Matt Ehrhart (Stroud Center)
- 9:25-10:00 – Discussion
- 10:00-10:15 – Break
- 10:15-11:15 – Physical – Melinda
- 11:15-12:00 – Chemical – Dave A
- 12:00-1:00 – Lunch
- 1:00-1:30 – Microbiology – Jinjun
- 1:30-2:00 – Algae – Kathryn Christopher (Academy of Natural Sciences of Drexel University)
- 2:00-2:15 – Break
- 2:15-2:45 – Fish – David Keller (Academy of Natural Sciences of Drexel University)
- 2:45-3:30 – Macroinvertebrates and Final Thoughts – John
- 3:30-5:00 – Discussion and wrap-up

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Extras

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Small groups for day 1

Insert small groups table

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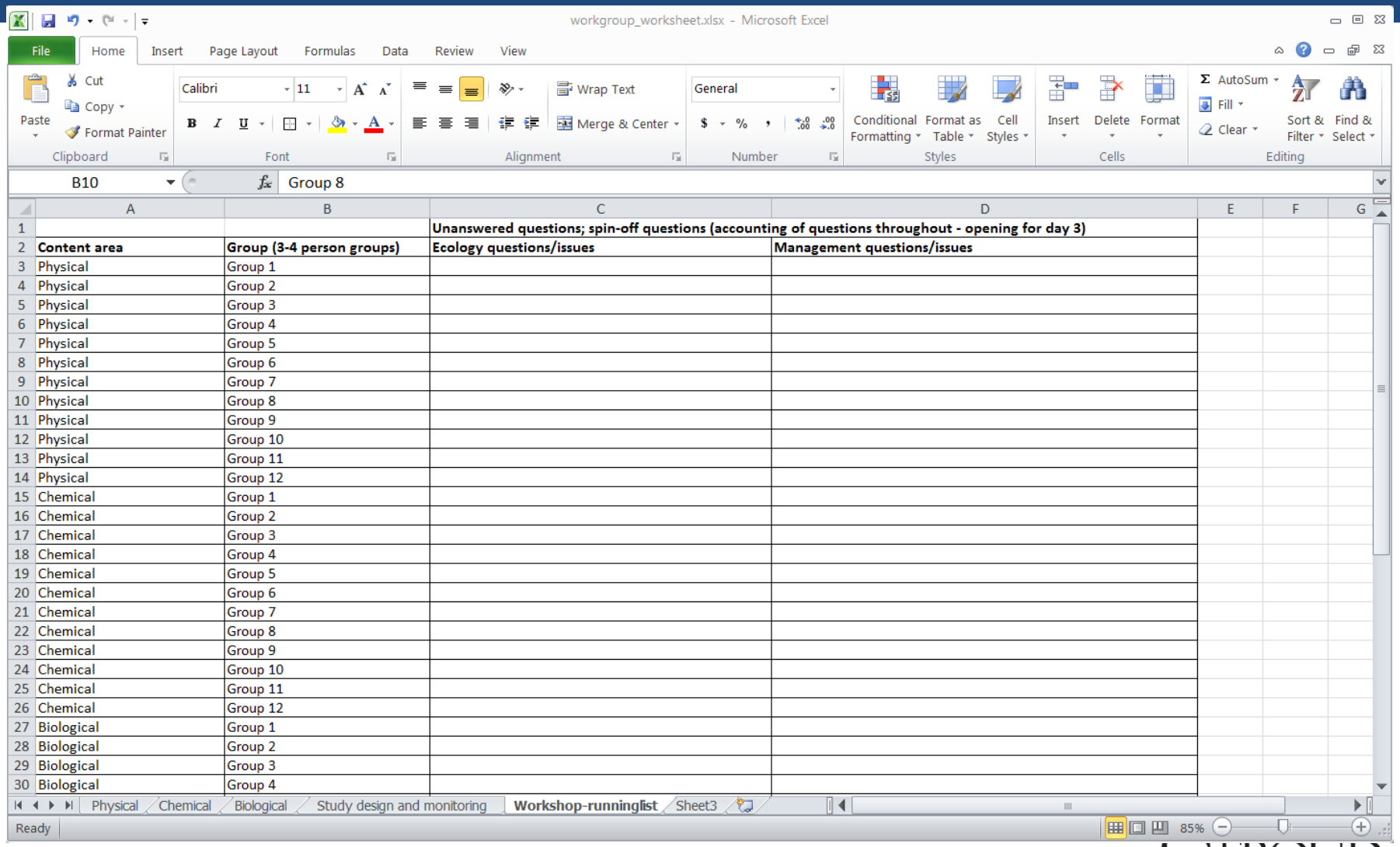
Large group synthesis worksheet



	A	B	C	D	E	F	G
1			**Unanswered questions; spin-off questions (accounting of questions throughout - opening for day 3)**				
2	**Content area**	**Group (3-4 person groups)**	**Ecology questions/issues**	**Management questions/issues**			
3	Physical	Group 1					
4	Physical	Group 2					
5	Physical	Group 3					
6	Physical	Group 4					
7	Physical	Group 5					
8	Physical	Group 6					
9	Physical	Group 7					
10	Physical	Group 8					
11	Physical	Group 9					
12	Physical	Group 10					
13	Physical	Group 11					
14	Physical	Group 12					
15	Chemical	Group 1					
16	Chemical	Group 2					
17	Chemical	Group 3					
18	Chemical	Group 4					
19	Chemical	Group 5					
20	Chemical	Group 6					
21	Chemical	Group 7					
22	Chemical	Group 8					
23	Chemical	Group 9					
24	Chemical	Group 10					
25	Chemical	Group 11					
26	Chemical	Group 12					
27	Biological	Group 1					
28	Biological	Group 2					
29	Biological	Group 3					
30	Biological	Group 4					

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Watershed 101 Learning Objectives

- Better understanding of the fundamental characteristics and processes in watershed ecology
- Better understanding of watershed ecological processes in the Delaware River basin
  - Linking abiotic and biotic processes and understanding Delaware River basin landscape connection to instream conditions
- How to link ecological issues to project design and monitoring planning
  - How is ecological knowledge used in helping design projects and goals?
  - How is monitoring used to help in understanding watershed function and progress toward goals?
  - How is monitoring used in describing efficacy of restoration and protection projects?

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