HUBBARD BROOK ECOSYSTEM STUDY

For more than 50 years, the Hubbard Brook Experimental Forest in the White Mountains of New Hampshire has been one of the most intensely studied landscapes on earth. This book highlights many of the important ecological findings amassed during the long-term research conducted there, and considers their regional, national, and global implications.

Richard T. Holmes and Gene E. Likens, active members of the research team at Hubbard Brook since its beginnings, explain the scientific processes employed in the forest-turned-laboratory. They describe such important findings as the discovery of acid rain, ecological effects of forest management practices, and the causes of population change in forest birds, as well as how disturbance events, pests and pathogens, and a changing climate affect forest and associated aquatic ecosystems. The authors show how such long-term, place-based ecological studies are relevant for informing many national, regional, and local environmental issues, such as air pollution, water quality, ecosystem management, and conservation.
Richard T. Holmes is Research Professor of Biology at Dartmouth College, where he is also Harris Professor of Environmental Biology Emeritus. He lives in Grantham, NH. **Gene E. Likens** is co-founder of the Hubbard Brook Ecosystem Study and founder and President Emeritus of the Cary Institute of Ecosystem Studies. He lives in Clinton Corners, NY.

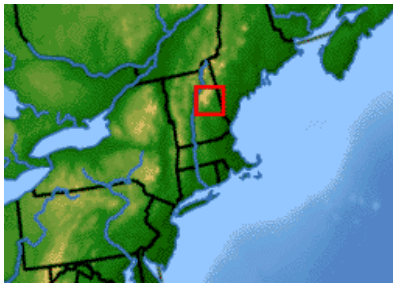
ONLINE Activity……go to www.hubbardbrook.org

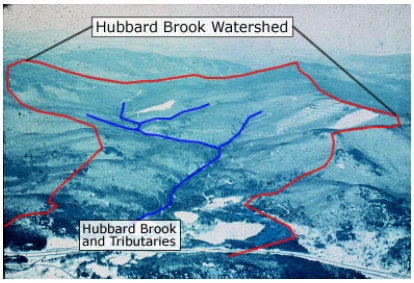
Follow the instructions and create a written report about the major aspects of the Hubbard Brook Ecosystem Study (HBES). Label each SECTION, & write a separate paragraph for each point listed in each section….DO NOT number each point.

TITLE PAGE: **Hubbard Brook Ecosystem Study**

Name
BIOL 220 Principles of Ecology
Professor's Name
Date

White Mountains National Forest





I. Introduction:

On Homepage, read **WELCOME** to Hubbard Brook Ecosystem Study involving scientific research being conducted in the 8,000 acre Hubbard Brook Experimental Forest. Briefly summarize the information on the purpose, what is being done, who is involved & how long the program has been in existence.

On the website **HOMEPAGE** in the top menu, click on **RESEARCH** to display the drop-down menu…..and choose **Research Focus**.

II. Research Focus: Provide information for each of the following points of interest.

A. Brief statement on the **Research Theme of HBES**, & examples of "disturbances".

*[copy **Figure 1. "Overall Conceptual Model HBR – LTER.."** & place here]

B. List the **4 main Research Themes**, & give a one-line explanation for each.

C. Go to the bottom of the homepage & CLICK (yellow) **"Long Term Ecological Research (LTER)**. Write a brief explanation of what it means.

*[Copy **MAP of 28 U.S. sites** & place here]

[Return to "RESEARCH" drop-down menu]

III. Synthesis of Scientific Research at Hubbard Brook:

CLICK **Online Book: "A Synthesis of Scientific Research at Hubbard Brook"**

CLICK **Chapter 01: "The Hubbard Brook Ecosystem Study: Site, History & Research Approaches"**

Write a separate line or paragraph for each of the following main points:

A. Site Description: Location, Size, Soils, Geology, Forest Types & Elevations

*[Copy **Figure 1**. **"Map of Hubbard Brook Experimental Forest"** and place here]

III. (cont.)

B. Climate:

*3 main sources of air flow influencing the regional climate

*annual precipitation, winter JAN avg. temp. & low temp., summer avg. JUL temp., length of growing season, annual ET (evapotranspiration)

C. Geology:

*types of rock underlying area

*effect of Pleistocene glaciation (receded 13,000 yrs. Ago)

D. Soils:

*type of loam in well-drained Spodosols

*pH & fertility

*forest floor layer

*depth to C-Horizon

*soil type/series

E. Streams:

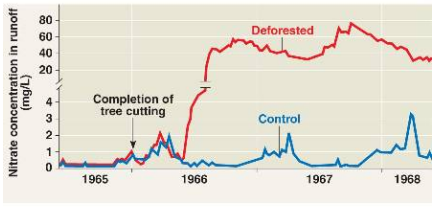
*% of land area

*ephemeral & perennial 5th Order streams

*suspended solids concentration

*% particulate matter

*stream channels & organic debris dams



Nitrogen in runoff from watersheds

F. Historical Perspective:

*Hubbard Brook Experimental Forest (HBEF) – established by whom/what year/type of research/initial size

*During 1st 8 years – Northeast Research Station/USDA monitored what kind of abiotic factors

*establishment of Hubbard Brook Ecosystem Study (HBES) – year/purpose

*# of scientific publications produced/provides wealth of information on what?

G. Atmospheric Inputs:

*measurement of what 2 types of deposition since 1963

H. Stream Output:

*purpose of V-notch weirs in 9 Watersheds

*measurement of element fluxes

*[Copy **Figure 3. Hubbard Brook Weir at Watershed 3** and place here]

I. Forest Vegetation:

*3 content items measured for vegetation?

J. Soils:

*method of measuring mass & element stocks in soils

K. Gaseous Output:

*Nitrogen (N_2) – problem with measurement

*CO_2 & H_2O vapor – type of instrument used

L. Internal Element Fluxes:

*elements leaching through soil/instrument? And where placed?

*measurement of litter fall & chemistry (N & P)

*measurement of woody litter

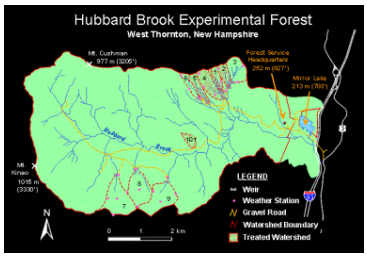
M. List of Other Online Book Chapter Topics:

*state topic for Chapters 02, 03, 04, 05, 06, 07, 08 & 09

N. Mirror Lake Research:

*Go to SEARCH Box in upper right of Homepage and type in ["Mirror Lake Research"]
List the types of studies being conducted in #'s 6., 7., 8. & 9.

[Return to "Research" drop-down menu & click "Experimental Watersheds"]



IV. Experimental Watersheds:

*List all 10 Watersheds & state the research focus/purpose of each

*Click on **Watershed 3** & complete the following:

a. State the size (area), slope degrees & aspect, elevation range, gage type, initial year & description

*[copy **MAP of Watershed 3** and place here]

b. In menu under **"DATASETS"**, CLICK **"Stream Chemistry"**….then CLICK green box on right **"Download Data [W3_stream_chemistry.txt].** Complete the following to get access to the dataset: **Name:** Michael Bernarsky
Affiliation: choose "Educational Program (post-secondary)"
Email: michael.bernarsky@bucks.edu
Phone: 267-265-8555
Intended use of the data: Check - **X "NOT for research.."**

CLICK **view data html** ….search the dataset and compare the following parameters for:

SEPT 1971 & **SEPT 2010**:

1. **FLOW (ft^3/sec)**
2. **pH**
3. **NO_3 (mg/l)**
4. **PO_4 (mg/l)**