

**Eco-Informatics Summer Institute  
Key Concepts and Project Summaries 2007-2009**

**2009 Institute Participants (April 2009 List from Desiree)**

<b>Name</b>	<b>Discipline</b>	<b>Project</b>	<b>Primary Adviser</b>	<b>University</b>
Amanda Amstutz	ecosystem	Wood in streams	Desiree Tullos	OSU
Meridith Bartley	ecosystem	Stream Temp	John Selker	W. KY Univ.
Hoan-Vu Do	ecosystem	Ecosystem Flux	Barbara Bond	San Diego State
Dylan Thomas	ecosystem	Fire Frequency	Enrique Thomann	Dartmouth
Alexandra Naegele	ecosystem	Ecosystem Flux	Barbara Bond	Ohio State U
Gregory Reeb	ecosystem	Climate Tracking	Julia Jones	U Wisc-Mad
Jose Rojas Echenique	ecosystem	Moths and Meadows	Tom Dietterich	U. Chicago
Michelle Leane Wimerip	math	Moths and Meadows	Tom Dietterich	Wesleyan
Raymundo Navarrete	math	Climate Tracking	Julia Jones	U. Arizona
Brian McKenzie	math	Fire frequency	Enrique Thomann	OIT
Andrew Ngeow	CS	Fire Frequency	Enrique Thomann	Middlebury
Andrew Zdyrski	CS	Climate Tracking	Julia Jones	U Hawaii Hilo
Eli Moss	CS	Moths and Meadows	Tom Dietterich	Brown
Jonathon Gillick	CS	Wood in streams	John Selker	Wesleyan
Julie Lapidus	CS	unknown	unknown	Scripps
Ben Dawson	bioengin.	Stream Temp	John Selker	OSU

**Key Concepts / Research Topics for 2009 (Tentative Listing as of May 21, 2009)**

Storage and Release of Water at HJA: monitoring, surface/subsurface hydrology, WS6-7-8; microclimate stations, LiDAR, fiber optic DTW, heat budgets, ice tracers, soil penetration tests, soil volumes, regolith thickness (Selker, Johnson, McDonnell)

Effects of Climate Change and Forest Management on Snow pack at HJA: WS-7, rain-snow transition, clear-cut/old growth, modeling and scaling; variables, temp-precip-vegetation, climate, snow pack, time series, retrospective analysis (Nolin, Sproles, Jones, O'Connell)

Fish Habitat and Wood: stream restoration, evaluation of wood structures and effects on channels, sediment storage, fish populations, wood retention, organic/inorganic retention capacity (Tullos, Wildman)

Butterflies and moths: Blue Rive region, plant and moth population students, GIS, Google Earth, independent variables, historical change (Betts, Miller, Wong, Kovchegov)

Diurnal Fluctuations of Streamflow: topographic indices, transpiration, soil moisture, streamflows, WS-1 and Alsea River, soil types, slope, climate, transpiration controls on streamflow?, sap flow, discharge, piezometer, lysimeter, soil cores, tracer tests, soil depth mapping (Hale, Jones, Bond)

## 2008 Institute Concepts – from Final Projects / Presentations

Student projects – in teams of 3, with 3-4 OSU faculty mentors

### *Ecohydrology Project*

#### Relationships

- Process
- Drivers
- Streamflow fluctuation
- Forest management
- Ecology and hydrology

#### Coast Range Project

- Soil moisture
- Discharge
- water potential
- Soil permeability
- Wood / basal area

#### HJA work

- Water budget for WS2
- Determine evapotranspiration

#### Air Temp. Data

- Inputs-Outputs-Storage
- Storage = precip-discharge
- Water year
- Visual diagram / linkages
- Time series graphs
- Water Budget Model
- Analytical Equation to Determine ET
- Rates = mm/day
- Water flux and time series
- Seasonal ET trends
- Bedrock hydrogeology
- Permeability
- Canopy / ET
- Data gaps
- Data visualization, 3-D models

### *Project: Effects of Climate Change and Forest Management on Snowpack*

#### HJA work

- Meteorological stations
- HJA study sites / met stations
- Question: how does veg. growth effect met.

#### Measurements

- Hypothesis: > veg. > shad, <temp. and < solar radiation, < wind speed, > snow
- Examined 3 HJA met stations: tree distance, angle, height, whorls
- Data mining – met. Data
- Gap light photos / analyzer software
- Solar radiation measurements
- Relate veg. growth over time to solar input

- Daily temp changes – time series
- Precip. Changes – time series
- Wind speed vs. time
- Data regression; R2 correlation coefficient
- Canopy gaps
- Photo analysis
- Circular histograms / data display
- Histograms / frequency analysis
- Historical photo analysis
- Photo grids
- 3-D models and visualization
- Data gaps
- Legacy data
- Missing data limitations

### *Moth and Meadows Project*

- Moths-ecosystems-consumers
- Climate change indicator
- GIS mapping
- Moth population counts
- Species identification
- Species vs. environmental conditions
- Moth population modeling

- Probabilistic modeling
- Data mining
- Species-habitat associations
- Null hypothesis
- Hypothesis testing
- Database / SQL
- Apriori modeling – shopping basket analysis

## ***Woody Debris in Streams***

Quartz Creek / McKenzie  
Constructed woody debris jams

5 year monitoring data on channel  
morphology, wood/leaf retention, and  
stream geomorphology

Monitoring wood movement  
Some fish population data

Active experiment – ginkgo leaf drop  
6 – 50 meter reaches  
Fish census  
Days-to-weeks observations in field

Bayesian networks  
Wood retention / retention time

Cabled vs. un-cabled jams

Time series analysis  
Fish population per sq. m  
20-year study / data set

Tranquil vs. turbulent conditions

Channel width and depth measurement

## ***Project: Subsurface flows in headwater catchment***

Catchment-scale runoff and storage  
Stream temp and tracer study  
“subsurface topography” influence  
on water movement

HJA WS-7  
Salt tracer  
DTS fiber optic  
Excel, MatLab, “OpenDX”

Tracer study – 36 hours, 300 meter reach  
Conductivity measurements  
Discharge measurements

Longitudinal temp. profiles

Conductivity and temp diagrams

Blow counts, soil penetration test, depth to  
refusal = “bedrock” (Taylor comment, what  
about cobbles and boulders?)

Regolith thickness model

Time series – groundwater levels over 2  
days

Macropore flow (roots, burrows)

“bedrockology” is a term that is used...  
arghhh

## ***2007 Institute Project Titles***

*The Effect of Topology on Fuel Moisture* (J. Best, A. Tepley)

Key Concepts: Fire disturbance, succession, management, transects, fuel moisture, time scale: 24 hr;  
location variables – slopes, aspect, air temp; topography,

*Determining Factors that Reflect Aphid Presence* (G. Layman, S. Moore, E. Borer, Ph.D)

Key Concepts: Aphid counts, quadrats, box traps, site variables / locations

*How Debris Flow Channels Refill in the Western Cascades* (A. Lambie, F. Swanson, Ph.D)

Key Concepts: Freq. and volume of debris flow disturbance in WS10, HJA; quantify post-debris flow  
wood and sediment accumulation; field measurements, volume estimates; wood / sed. accumulation  
rates in channels scoured during debris flow; wood as sed. storage mechanism

*Coherence of Net Primary Productivity Estimates* (K. Hagmann)

Key Concepts: Biomass measurements, reference stands,

*Effects of Gopher Mounds on Plant Species Diversity in a Meadow System* (N. Griffin, C. Halpern, Ph.D)

Key Concepts: Pocket gophers, grass / plant species richness, gopher disturbance, 1-m quadrats; plot spacing vs. species associations

*Visualization of a Forest System* (J. Hill)

Key Concepts: Virtual forest, visualization, visual C programming

*Do Food Webs Follow Predictions from Simple Theory?* (J. Ramos, E. Borer, Ph.D)

Key Concepts: Biomass, food webs, species richness,

*Coho Salmon Spawning Preference in Artificial Stream Channels at the Oregon Hatchery Research Center* (L. Weiss, D. Tullos, Ph.D)

Key Concepts: Gravel size, water depth, water velocity – affects on spawning habitat; hyporheic zone; dissolve oxygen, flow conditions, artificial streams, upwelling/down-welling in hypo. Zone. Substrate grain size, tracer test, salt concentrations, grain size analysis, D50,

*Dendroecology: Separating Effects in Ring Growth in *Pseudotsuga Menziesii* Response to Fire* (M. Press, A. Tepley)

Key Concepts: Tree rings, cores, DBH, doug fir, treatments vs. ring growth

*Multivariate Techniques for Modeling Storm Hydrographs in the HJA Experimental Forest* (M. Martin, J. Jones, Ph.D)

Key Concepts: HJA, WS2, WS8, WS9, stream order, slope length, gradient, storm events, hydrographs, base flow, peak discharge, event duration, peak-lag, precipitation event, principle components analysis, antecedent moisture, multivariate statistical analysis

*Modeling the Effects of Hyporheic Flow on Stream Temperature* (Z. Salem, E. Thomann, Ph.D, J. Jones, Ph.D, J. Ramirez)

Key Concepts: Hyporheic flow, flow velocity, stream temperature model, groundwater flow, flow model, heat transfer model,

*Equations of Motion for Shallow Gravity Flow* (R. Williams)

Key Concepts: Bouyancy, pressure, temp, density, velocity, fluid flow, heat loss, katabatic flow, equations defining flow

*The Effect of Temperature on the Survival of Chinook Salmon Eggs and Fry: a probabilistic model* (M. Teose, E. Waymire, Ph.D, J. Dunham, Ph.D, J. Ramirez)

Key Concepts: Dams, temperature control, spawning, salmon eggs, incubation temperature, biomass, population size, modeling growth rate, probabilistic modeling,