United States
Department of
Agriculture

Forest Service

Pacific Northwest
Research Station

Recent Publications of the Pacific Northwest Research Station, First Quarter 1998

A list of recent publications and other products, such as videos and software, of the Pacific Northwest (PNW) Research Station is published four times a year. This list announces completion and availability of scientific and technical publications and products supported by the PNW Research Station.

Publications are arranged in two sections. The first section lists items published by the PNW Research Station and available through our distribution system. The second section lists publications available elsewhere. Within each section, items are grouped by general subject categories and alphabetically by author within categories.

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April 1998

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Pacific Northwest Research Station Publications

The following publications may be ordered by using the form on the inside back cover. Circle the code number for the publication.

Ecosystem Function

96-099

Clarke, Sharon E.; Bryce, Sandra A., eds. 1997. Hierarchical subdivisions of the Columbia Plateau and Blue Mountains ecoregions, Oregon and Washington. Gen. Tech. Rep. PNW-GTR-395. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 114 p.

This document presents two spatial scale-subregions (1:250,000) and landscape-level ecoregions (1:100,000) of an hierarchical ecoregional framework and provides a connection to both larger and smaller scale ecological classifications. Two ecoregions—the Columbia Plateau and the Blue Mountains—were subdivided by using a combination of soils, topography, geology, vegetation, and climate. Subregions were developed to meet the needs of state agencies for establishing biocriteria, reference sites, and attainability goals for water-quality regulation. The finer scale landscape-level ecoregions were developed to help local land managers address anadromous fish habitat issues.

Keywords: Ecoregions, anadromous fish habitat, fish habitat, watershed classification, landscape ecology, water quality, environmental mapping, classification.

96-249

Julin, Kent R., comp. Assessments of wildlife viability, old-growth timber volume estimates, forested wetlands, and slope stability. Gen. Tech. Rep. PNW-GTR-392. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 1-23. (Shaw, Charles G., III, tech. coord.; Conservation and resource assessments for the Tongass land management plan revision).

Resource assessments on wildlife viability, old-growth timber volume estimates, forested wetlands, and slope stability are presented. These assessments were used in the formulation of alternatives in the revision of the Tongass land management plan.

Keywords: Wildlife viability, timber volume, forested wetlands, slope stability, Tongass, Alaska.

(PNW-GTR-392 is available to download in pdf format at http://www.fs.fed.us/pnw/pubs.htm.)

Fish and Wildlife

96-249

Iverson, George C.; René, Bruce 1997. Conceptual approaches for maintaining well-distributed, viable wildlife populations: a resource assessment. In: Julin, Kent R., comp. Assessments of wildlife viability, old-growth timber volume estimates, forested wetlands, and slope stability. Gen. Tech. Rep. PNW-GTR-392. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 1-23. (Shaw, Charles G., III, tech. coord.; Conservation and resource assessments for the Tongass land management plan revision).

This paper summarizes the deliberations and findings of a workshop held in 1995 to synthesize information relating to fish and wildlife viability and ecosystems within southeast

Alaska and the Tongass National Forest. Several possible Forest-wide integrated strategies were developed for maintaining habitat to support viable fish and wildlife populations and functional old-growth ecosystems. These strategies were made available to an interdisciplinary team for use in drafting alternatives for the Tongass land management plan revision.

Keywords: Wildlife viability, Tongass, Alaska.

(PNW-GTR-392 is available to download in pdf format at http://www.fs.fed.us/pnw/pubs.htm.)

General

97-185

Carey, Andrew B.

1997. Cognitive styles of Forest Service scientists and managers in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-414. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 21 p.

Preferences of executives, foresters, and biologists of the Pacific Northwest Research Station and executives, District Rangers, foresters, engineers, and biologists of the Pacific Northwest Region, National Forest System (USDA Forest Service), were compared for various thinking styles. Engineers had the highest score for analytical thinking; District Rangers had the lowest. District Rangers had the highest preference for feeling-based, interpersonal thinking; engineers had the lowest. Research biologists and executives had low preference for detailed, sequential thinking. Research executives had less preference for interpersonal thinking than management executives. Implications for the agency are discussed.

Keywords: Cognition, thinking, personality, teams, management, Forest Service scientist, managers.

General, Nontechnical

97-342

Pacific Northwest Research Station.

1998. 1997: a year in review for the Pacific Northwest Research Station. [Portland, OR]: [U.S. Department of Agriculture, Forest Service], Pacific Northwest Research Station. 115 p.

The Pacific Northwest Research Station serves society by improving understanding, use, and management of natural resources. Our service is basic and applied research and development. This report describes our contribution to society during 1997.

Keywords: Forestry research, Pacific Northwest Research Station.

98-011

Pacific Northwest Research Station

1998. Recent publications of the Pacific Northwest Research Station, fourth quarter 1997. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 14 p.

Keywords: Bibliographies (forestry).

Mycorrhizae

97-024

Hosford, David; Pilz, David; Molina, Randy; Amaranthus, Michael

1997. Ecology and management of the commercially harvested American matsutake. Gen. Tech. Rep. PNW-GTR-412. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 68 p.

The commercial harvest of American matsutake mushrooms (*Tricholoma magnivelare*) from forests in the Pacific Northwest has increased dramatically in the last decade. The similarity of this mushroom to the Japanese matsutake (*T. matsutake*) has prompted its harvest to meet increasing demands for matsutake in Japan. The American matsutake is likely to remain a sustainable forest product in North America if its harvest and forest habitats are

managed appropriately. This paper reviews the ecology and productivity of the American matsutake and discusses monitoring and management of this valuable forest resource.

Keywords: Matsutake (American), Tricholoma magnivelare*, mycology, fungi, forest management, mycorrhiza, pine mushroom, special forest products.*

Regeneration

97-339

Landis, T.D.; Thompson, J.R., tech. coords. 1997. National proceedings: forest and conservation nursery associations—1997. Gen. Tech. Rep. PNW-GTR-419. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 163 p.

This proceedings is a compilation of 27 papers presented at the regional meetings of the forest and conservation nursery associations in the United States in 1997. The Northeastern Forest Nursery Association conference was held in Bemidji, MN, from August 11 to 14, 1997; the Western Forest and Conservation Nursery Association meeting was held in Boise, ID, from August 19 to 21, 1997. The subject matter ranges from seed collection and processing, through nursery cultural practices, to harvesting storage and outplanting.

Keywords: Bareroot seedlings, container seedlings, nursery practices, reforestation.

Soil, Site, Geology

96-249

Swanston, Douglas N. 1997. Controlling stability characteristics of steep terrain with discussion of needed standardization for mass movement hazard indexing: a resource assessment. In: Julin, Kent R., comp. Assessments of wildlife viability, old-growth timber volume estimates, forested wetlands, and slope stability. Gen. Tech. Rep. PNW-GTR-392. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 44-58. (Shaw, Charles G., III, tech. coord.; Conservation and resource assessments for the Tongass land management plan revision).

This paper presents an overview of factors controlling soil stability on steep terrain in southeast Alaska. A Forest-wide standardized approach for stability hazard assessment in the Tongass National Forest also is presented.

Keywords: Slope stability, Tongass, Alaska.

(PNW-GTR-392 is available to download in pdf format at http://www.fs.fed.us/pnw/pubs.htm.)

Timber Management

97-005

Cochran, P.H.; Barrett, James W. 1998. Thirty-five-year growth of thinned and unthinned ponderosa pine in the Methow Valley of northern Washington. Res. Pap. PNW-RP-502. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 24 p.

Height and diameter growth markedly increased, and basal area and cubic volume growth per acre decreased as tree spacings widened. Growth rates of dominant and codominant trees were reduced by the presence of smaller trees in the stand. Primary cause of mortality changed from suppression to bark beetles when quadratic mean diameters reached 7 inches. Stagnation rather than self-thinning occurred in the unthinned treatments.

Keywords: Growth, mortality, mountain pine beetle, seral condition, forest health, thinning.

96-249

Julin, Kent R.; Caouette, John P.
1997. Options for defining timber volume strata: a resource assessment. In: Julin, Kent R., comp. Assessments of wildlife viability, old-growth timber volume estimates, forested wetlands, and slope stability. Gen. Tech. Rep. PNW-GTR-392. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 24-37. (Shaw, Charles G., III, tech. coord.; Conservation and resource assessments for the Tongass land management plan revision).

In this paper the authors discuss five options for estimating allowable sale quantity, determining proportionality, analyzing timber economics, and calculating wildlife habitat capability for the Tongass land management plan revision.

Keywords: Timber volume, Tongass, Alaska.

(PNW-GTR-392 is available to download in pdf format at http://www.fs.fed.us/pnw/pubs.htm.)

96-249

Julin, Kent R.; Meade, Chris T.
1997. Tentative suitability of forested wetlands for timber production: a resource assessment. In: Julin, Kent R., comp. Assessments of wildlife viability, old-growth timber volume estimates, forested wetlands, and slope stability. Gen. Tech. Rep. PNW-GTR-392. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 38-43. (Shaw, Charles G., III, tech. coord.; Conservation and resource assessments for the Tongass land management plan revision).

This paper discusses the inclusion of four forested wetland soil series within the tentatively suitable timber base for the Tongass land management plan revision for southeast Alaska.

Keywords: Forested wetlands, timber production, Tongass, Alaska.

(PNW-GTR-392 is available to download in pdf format at http://www.fs.fed.us/pnw/pubs.htm.)

Watershed Management

97-100

Deal, Robert L.
1997. Understory plant diversity in riparian alder-conifer stands after logging in southeast Alaska. Res. Note PNW-RN-523. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 8 p.

Stand structure, tree height growth, and understory plant diversity were assessed in five mixed alder-conifer stands after logging in southeast Alaska. Tree species composition ranged from 7 to 91 percent alder, and basal area ranged from 30 to 55 square meters per hectare. Mixed alder-conifer stands have maintained species-rich understories for 45 years after logging, and stands with conifers and alders of relatively equal stocking contained the largest diameter conifers. Riparian alder-conifer stands maintain plant diversity and also will provide some large-diameter conifers for large woody debris for streams.

Keywords: Riparian stands, understory plant diversity, southeast Alaska, red alder, Sitka spruce, large woody debris, stand structure.

Publications Available Elsewhere

The following publications are available through interlibrary loan or by writing to the locations indicated.

Atmosphere

Rosentrater, Lynn D.

1997. The thermal climate of the H.J. Andrews Experimental Forest, Oregon. Eugene, OR: University of Oregon. 133 p. M.S. thesis.

To describe and analyze the natural variability of monthly and seasonal temperature regimes within the H.J. Andrews Experimental Forest, sequences of monthly mean, mean maximum, and mean minimum air temperature records from 22 monitoring sites within the watershed were examined for 1981 to 1990. The core of the study is the presentation of a detailed body of descriptive statistics and the development of maps of monthly mean air temperature. A mountain microclimate simulation model also was tested for estimating air temperatures beneath the forest canopy.

Keywords: Climate, thermal climate, mountain climate.

(Available only through library or interlibrary loan.)

Ecosystem Function

Camp, Ann; Oliver, Chad; Hessburg, Paul; Everett, Richard

1997. Predicting late-successional fire refugia pre-dating European settlement in the Wenatchee Mountains. Forest Ecology and Management. 95: 63-77.

We evaluated 487 plots across a 47 000-hectare landscape by using three criteria to identify historical fire refugia patches minimally affected by successive fires: different structure from surrounding matrix, different fire regime from surrounding matrix, and presence of old individuals of fire-tolerant tree species. Several combinations of aspect, elevation, and topography best predicted refugia presence. Less than 20 percent of the presettlement landscape was identified as historical fire refugia. Refugia were not connected except by younger stands within the matrix.

Keywords: Vegetation patterns, disturbance, refugia, landscape ecology, Cascade Range–Washington, fire regimes.

(See Wenatchee order form.)

Castellano, Michael A.

1997. Towards a red list for Oregon macrofungi. In: Kaye, T.N.; Liston, A.; Love, R.M. [and others], eds. Conservation and management of native flora and fungi. Corvallis, OR: Native Plant Society of Oregon: 222-226.

President Clinton's Northwest Forest Plan (NFP) and the interior Columbia basin assessment have provided vehicles to assess macrofungus diversity over a major portion of Oregon's landscape. A preliminary list of macrofungi of special concern is recommended to begin creating a RED (rarity, endangerment, distribution) list for macrofungi of Oregon. Macrofungi of special concern residing in western Oregon habitat not covered by the NFP need additional assessment. Diversity assessment for microfungi lags far behind assessments for macrofungi, so microfungi are excluded from the present list. The development and evolution of this RED list likely will engender considerable debate, as occurred when the RED list of Oregon plants was established.

Keywords: Biodiversity, rare, endangered, mycology.

(See Corvallis order form.)

Hope, Sharon M.; Li, Ching-Yan

1997. Respiration, nitrogen fixation, and mineralizable nitrogen spatial and temporal patterns within two Oregon Douglas-fir stands. Canadian Journal of Forest Research. 27: 501-509.

Substrate respiration, mineral nitrogen, and nitrogen fixation rates were measured in trenched and undisturbed plots within two western Oregon Douglas-fir stands. Mineralizable nitrogen rates were higher at Woods Creek than at the H.J. Andrews Experimental Forest; nitrogen fixation was greater at Woods Creek than at the old-growth H.J. Andrews stands. Litter evolved more carbon dioxide and yielded more than three times the mineralizable nitrogen rates of logs and soils. Logs had greater nitrogen fixation than mineral soils at both Woods Creek and H.J. Andrews.

Keywords: Nitrogen fixation, mineralizable nitrogen, respiration.

(See Corvallis order form.)

Krankina, Olga N.; Harmon, Mark E.

1996. Comparison of carbon dynamics of two conifer forest regions: northwestern Russia and the Pacific Northwest, USA: Proceedings of an international workshop; 1995 April 9-23; Corvallis, OR. LTER Network Publ. 25. Seattle, WA: University of Washington, LTER Office. 52 p.

This paper is a compilation of abstracts prepared for a symposium and workshop held at Oregon State University in April 1995 as part of an international Long-Term Ecosystem Research project funded by the National Science Foundation. The project compares the carbon dynamics of two significant forest regions of the globe, the Pacific Northwest, USA, and northwestern Russia. The main objective of this project is to determine the major factors controlling the spatial and temporal patterns of carbon stores and fluxes within these two major coniferous ecosystems at three spatial levels: stand, landscape, and region. This publication contains the materials in both English and Russian.

Keywords: Carbon dynamics, global change, forest ecology, forest management.

(See Corvallis order form. The English version is available online at http://lternet.edu/about/program/russia.)

Li, Ching-Yan; Strzelczyk, Edmund; Pokojska, Aleksandra

1996. Nitrogen-fixing endophyte *Frankia* in Polish *Alnus glutinosa* (L.) Gartn. Microbiological Research. 151: 371-374.

The first nitrogen-fixing *Frankia* in nodules of Polish *Alnus glutinosa* was successfully isolated. The pure culture of *Frankia* showed nitrogenase activity in the medium without combined nitrogen. The isolate was capable of forming N_2-fixing symbiotic root nodules on *A. glutinosa* seedlings.

Keywords: Frankia*, actinorhiza,* Alnus.

(See Corvallis order form.)

Rozycki, Henryk; Strzelczyk, Edmund; Li, Ching-Yan

1996. Impact of B-group vitamins on growth of *Azospirillum*. Acta Microbiologica Polonica. 45(2): 203-212.

The growth of N_2-fixing *Azospirillum*, isolated from mycorrhizae and mycorrhizal fungi, was not affected by thiamine, biotin, and pantothenate under aerobic conditions. Under microaerophilic conditions, however, its growth was stimulated by these three vitamins.

Keywords: Azospirillum*, nitrogen-fixing bacteria, associative diazotrophs.*

(See Corvallis order form.)

Sollins, Phillip; Homann, Peter; Caldwell, Bruce A.

1996. Stabilization and destabilization of soil organic matter: mechanisms and controls. Geoderma. 74: 65-105.

A conceptual model is presented of the processes by which plant leaf and root litter is transformed to soil organic carbon (C) and carbon dioxide. Stabilization of a portion of the litter C yielded material that resists further transformation; destabilization yielded material that is more susceptible to microbial respiration. Stability of the organic C was viewed as resulting from three general characteristics: recalcitrance comprised molecular-level characteristics of organic substances, including elemental composition, presence of functional groups, and molecular conformation, that influenced their degradation by microbes and enzymes; interactions referred to the intermolecular interactions between organics and either inorganic substances or other organic substances that alter the rate of degradation of those organics or synthesis of new organics; accessibility referred to the location of organic substances with respect to microbes and enzymes. Mechanisms by which these three characteristics change through time are reviewed along with controls on the mechanisms.

Keywords: Soil, soil organic matter, soil carbon.

(See Corvallis order form.)

Webster, J.R.; Meyer, J.L.

1997. Stream organic matter budgets—introduction. In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 5-13.

This paper reports on a workshop and subsequent analyses that had the objectives (1) to explore relations between physical variables of streams and their watersheds (climate, geomorphology) and organic matter dynamics by using data from a broad geographic area, (2) to compare stream organic matter dynamics in a diverse array of streams to suggest determinants of observed patterns, and (3) to reveal deficiencies in currently available data on organic matter dynamics in streams.

Keywords: Stream ecology, organic matter.

(See Corvallis order form.)

Webster, J.R.; Meyer, Judy L.

1997. Organic matter budgets for streams: a synthesis. In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 141-161.

The authors used simple organic matter budgets to provide an integrated view of stream ecosystem function. They assessed the balance of inputs and outputs for all the stream budgets, followed by a multivariate categorization of streams based on organic matter fluxes and standing crops. The authors related measures of relative importance of allochthonous and autochthonous sources of organic matter and four indices of ecosystem efficiency to various physical properties of the streams.

Keywords: Stream ecology, carbon cycling, organic matter.

(See Corvallis order form.)

Fire

Landsberg, Johanna D. “Joan”

[1997]. Fire and forests: fire—a good servant or a bad master. In: Forest and tree resources: Proceedings of the 11th world forestry conference; 1997 October 13-22; [Ankara, Turkey]. [Place of publication unknown]: [Publisher unknown]: 209-213.

Fire can be a “good servant or a bad master.” Fire is a natural disturbance component of ecosystems, and interrupting or removing fire can be as detrimental as its unwanted presence. We base our ideas of perceived benefits or deleterious effects of fire primarily on human values and beliefs. Fire research has produced knowledge of fire behavior, fire ecology, fire suppression, and other fire sciences, which are being incorporated into ecosystem management. The importance of fire management is

increasing as forests, woodlands, and grasslands have greater demands placed upon them for both commodities and amenities.

Keywords: Fire management, developing countries.

(See Wenatchee order form.)

Landsberg, Johanna D.; Lehmkuhl, John F.
1997. Tigers, rhinos, and fire management in India. In: Greenlee, Jason M., ed. Proceedings: 1st conference on fire effects on rare and endangered species and habitats; 1995 November 13-16; Coeur d'Alene, ID. [Place of publication unknown]: International Association of Wildland Fire: 101-107.

Fire management capabilities in India are limited in both suppression of wildfires and use of prescribed fire. Fire has long been a modifier of the grassland habitat that the Bengal (Asian) tiger and the Indian one-horned rhinoceros depend on, either directly or indirectly. The Bengal tiger depends on healthy grasslands to support its primary prey, and the Indian rhino depends on grasslands for forage and cover. Grasslands not burned become impenetrable, even by rhinos. Research in the grasslands of Chitwan National Park, Nepal, showed season of burning altered production-biomass, the time of appearance of young succulent shoots, and the length of the grazing season of various grass species. Applied research is needed to determine size, intensity, and frequency of prescribed fires for management of grassland habitat for Bengal tigers and one-horned rhinoceros. The creation of a strong fire management program that includes the use of prescribed fire will provide India with additional options for the management of its rich forest and grassland resources.

Keywords: India, Bengal tiger, Panthera tigris*, Asian tiger, one-horned rhinoceros,* Rhinoceros unicornis*, fire management, grasslands.*

(See Wenatchee order form.)

Fish and Wildlife

Butler, Robert W.; Williams, Tony D.; Warnock, Nils; Bishop, Mary Anne
1997. Wind assistance: a requirement for migration of shorebirds? The Auk. 114(3): 456-466.

The authors investigated the importance of wind-assisted flight for spring migration of western sandpipers (*Calidris mauri*) along the Pacific Flyway. They estimated energy requirements for migration in calm wind and with wind-assisted flight for different rates of fat deposition. Fat deposition rates of 1.0 gram per day and 0.4 gram per day in calm conditions resulted in a predicted body mass on arrival in Alaska of only 60 percent and 26 percent of average lean mass. Birds migrating with wind assistance would be able to complete migration with fat deposition rates as low as 0.4 gram per day, similar to values reported for this size bird from field studies.

Keywords: Avian migration, energy requirements, Calidris mauri*, wind assistance.*

(See Juneau order form.)

Everett, R.; Schellhaas, D.; Spurbeck, D. [and others]
1997. Structure of northern spotted owl nest stands and their historical conditions on the eastern slope of the Pacific Northwest Cascades, USA. Forest Ecology and Management. 94: 1-14.

The northern spotted owl (*Strix occidentalis caurina*) uses a wide array of nesting habitat throughout its current range and successfully reproduces in various stand types on the eastern slope of the Pacific Northwest Cascade Range. Tree density and the proportion of shade-tolerant tree species have increased significantly in spotted owl nest sites in both dry and wet forests since settlement by Europeans. Barring disturbance, further increases in the dominance of shade-tolerant species should occur over time with continual change in nest

stand structure and composition. However, old-forest structural attributes in dense, overstocked stands are at high fire hazard and should be viewed as transitional until old-forest habitat with improved sustainability becomes available.

Keywords: Forest disturbance, spotted owl, habitat, nest sites.

(See Wenatchee order form.)

Johnson, Oscar W.; Warnock, Nils; Bishop, Mary Anne [and others]

1997. Migration by radio-tagged Pacific golden-plovers from Hawaii to Alaska, and their subsequent survival. The Auk. 114(3): 521-524.

The authors radio-tagged 20 Pacific golden plovers (*Pluvialis fulva*) on wintering grounds in Hawaii in April 1996, just before their trans-Pacific migration. Three birds were later located at three sites in Alaska: Copper River Delta, Mulchatna and Nushagak River regions, and near King Salmon. Nineteen of the 20 birds returned to Hawaii in fall 1996, including the three individuals recorded in Alaska. This is the first time radio telemetry has shown a link between specific wintering and breeding grounds for an insular Pacific shorebird.

Keywords: Avian migration, radio telemetry, Pluvialis fulva*, Alaska.*

(See Juneau order form.)

Olson, Deanna H.; Leonard, William P.; Bury, R. Bruce, eds.

1997. Sampling amphibians in lentic habitats: methods and approaches for the Pacific Northwest. Northwest Fauna Number 4. Olympia, WA: Society for Northwestern Vertebrate Biology. 134 p.

This handbook was developed to provide a "toolbox" of methods to conduct surveys of amphibians in lentic habitats in the Pacific Northwest. Guidance is provided for selecting suitable methods, which is contingent on sampling objectives, site-specific lentic habitat conditions, and anticipated fauna. Examples of studies that have integrated methodologies for specific study objectives are included. This book represents a regional consensus of methodologies by experts from government agencies, universities, private institutions, and industry. The methodologies or approaches detailed may have applications in temperate zone lentic habitats globally.

Keywords: Amphibians, lentic, ponds, lakes, wetlands, survey, methods, techniques, sampling.

(May be ordered from Janet Jones, Treasurer, Society for Northwestern Vertebrate Biology, 4820 Yelm Highway SE, Suite B-175, Olympia, WA 98503. Cost is $12.00 plus $1.50 for shipping within the United States and $2.50 outside the United States; WA residents, add 8% sales tax.)

General

Golladay, Stephen W.

1997. Suspended particulate organic matter concentration and export in streams. In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 122-131.

This paper examines values of suspended particulate organic matter (POM) concentration and POM export rates across a broad range of sites, including the H.J. Andrews Experimental Forest, Oregon. Of the physical factors analyzed, only total annual precipitation, stream order, and gradient showed any relation with POM concentration, percentage of POM, or POM export. There was no correlation between measures of organic matter standing stock and POM concentration, percentage of POM, or POM export.

Keywords: Stream ecology, sediment, organic matter.

(See Corvallis order form.)

Jones, Jeremy B., Jr.

1997. Benthic organic matter storage in streams: influence of detrital import and export, retention mechanisms, and climate.

In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 109-119.

This synthesis of world literature, including that from the H.J. Andrews Experimental Forest, examines how benthic organic matter and the factors potentially governing storage differ over a range of spatial scales. Storage of benthic organic matter in streams, which ranges over five orders of magnitude, is strongly influenced by the productivity of adjacent vegetation as expressed by litterfall rate, physical factors affecting retention and transport, and other factors.

Keywords: Stream ecology, organic matter, ecosystem productivity.

(See Corvallis order form.)

Lamberti, Gary A.; Steinman, Alan D.
1997. A comparison of primary production in stream ecosystems. In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 95-104.

This paper identifies physical, chemical, and biological variables that might help explain the wide range of primary production observed in streams from a variety of biomes and locations throughout the world. The authors used regression approaches to search for predictive, statistical relationships that might reveal how aquatic, riparian, and watershed variables are associated with differences in primary production among 30 streams from the original data set for which primary production was measured.

Keywords: Primary production, stream ecology, organic matter.

(See Corvallis order form.)

Michener, William K.; Brunt, James W.; Helly, John J. [and others]
1997. Nongeospatial metadata for the ecological sciences. Ecological Applications. 7(1): 330-342.

“Metadata” represent the set of instructions or documentation that describe the content, context, quality, structure, and accessibility of a data set. In this paper, the authors examine potential benefits and costs associated with developing and implementing metadata for nongeospatial ecological data. They present a set of generic metadata descriptors that could serve as a basis for a “metadata standard” for nongeospatial ecological data.

Keywords: Data archive, data lineage, data management, information science, metadata, quality assurance.

(See Corvallis order form.)

Mulholland, Patrick J.
1997. Dissolved organic matter concentration and flux in streams. In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 131-141.

This paper examines variation in annual average dissolved organic matter concentrations and fluxes in streams to identify factors most responsible for this variation. Watershed processes controlling organic matter storage and surface flowpaths are more significant than instream biological processes. These analyses are based on data from the global literature, including that from the H.J. Andrews Experimental Forest, Oregon.

Keywords: Stream ecology, organic matter, water quality.

(See Corvallis order form.)

Sinsabaugh, Robert L.
1997. Large-scale trends for stream benthic respiration. In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 119-122.

Stream benthic organic matter respiration was examined across a range of sites, including the H.J. Andrews Experimental Forest, Oregon. The analysis considers respiration rate in

relation to stored benthic organic matter, water temperature, primary production, and other system variables.

Keywords: Stream ecology, respiration, organic matter.

(See Corvallis order form.)

Geographical Information Systems

Lawrence, Rick L.; Means, Joseph E.; Ripple, William J.
1996. An automated method for digitizing color thematic maps. Photogrammetric Engineering and Remote Sensing. 62(11): 1245-1248.

There is an increasing need for ways to rapidly enter analog data into geographic information systems. Traditional methods of hand digitizing or hand tracing followed by scanning are costly and time consuming. The authors developed a rapid, easy-to-use method for digitizing color thematic maps that uses standard image-processing techniques. The method uses a digital camera followed by supervised spectral classification and postclassification smoothing.

Keywords: GIS, remote sensing techniques, map digitizing.

(See Corvallis order form.)

Insects

Kelsey, Rick G.; Joseph, Gladwin
1997. Ambrosia beetle host selection among logs of Douglas fir, western hemlock, and western red cedar with different ethanol and µ-pinene concentrations. Journal of Chemical Ecology. 23(4): 1035-1051.

In early June, Douglas-fir and western hemlock logs that had overwintered in the forest contained higher ethanol concentrations and ambrosia beetle attack densities than logs of western redcedar. Douglas-fir logs produced higher ethanol concentrations than western hemlock, but the beetles did not discriminate between these two conifers. Ethanol and µ-pinene were significant covariates of ambrosia beetle densities. µ-Pinene did not synergize the activity of ethanol, or of ethanol and pheromone, during ambrosia beetle host selection.

Keywords: Host selection, kairomones, ambrosia beetle, ethanol, µ-pinene, Trypodendron lineatum, Gnathotrichus *spp.*

(See Corvallis order form.)

Mason, R.R.; Jennings, D.T.; Paul, H.G.; Wickman, B.E.
1997. Patterns of spider (Aranaea) abundance during an outbreak of western spruce budworm (Lepidoptera: Tortricidae). Environmental Entomology. 26(3): 507-518.

Spiders are well-known predators of western spruce budworm. During a budworm outbreak, arboreal spiders were systematically sampled from the crowns of Douglas-fir and grand fir for 3 years. Thirteen families and at least 26 species were represented in the sample. Data are given on the relative abundance and species diversity by tree species and foraging characteristics.

Keywords: Arachnida, arboreal spiders, population density, species diversity.

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Mycorrhizae

North, Malcolm; Trappe, James; Franklin, Jerry
1997. Standing crop and animal consumption of fungal sporocarps in Pacific Northwest forests. Ecology. 78(5): 1543-1554.

Aboveground and belowground fungal fruiting bodies were sampled for 46 months in managed-young, natural-mature, and old-growth western hemlock stands in Washington State.

Standing crop of truffle fungi sporocarps was 0.78 kilogram per hectare in managed-young stands compared to 4.51 and 4.02 kilograms per hectare in natural-mature and old-growth stands. In all stands, standing crop of truffles was lowest in winter. Mean animal consumption of truffles was 0.64 kilogram per hectare, a value that exceeded the available standing crop quantity of 0.36 kilogram per hectare in managed-young stands during winter. In natural-mature and old-growth stands, truffle biomass remained high throughout the year and exceeded consumption in all seasons. The results are discussed in terms of dominant fungal food resources for populations of small mammals in Pacific Northwest temperate forests.

Keywords: Mycophagy, mycorrhiza, western hemlock, forest succession, mushrooms, truffles.

(See Corvallis order form.)

Pilz, David; Molina, Randy
1997. American matsutake mushroom harvesting in the United States: social aspects and opportunities for sustainable development. In: Palm, Mary E.; Chapela, Ignacio H., eds. Mycology in sustainable development: expanding concepts, vanishing borders. Boone, NC: Parkway Publishers, Inc.: 68-75.

Commercial matsutake mushroom harvesting in the Pacific Northwest United States has increased dramatically in recent years. The diversity of circumstances characterizing the matsutake harvest, nationally and internationally, provides an excellent opportunity for comparative studies of sustainably developing communities in harmony with their natural environments.

Keywords: Mushrooms, special forest products, sustainable development.

(See Corvallis order form.)

Simard, Suzanne W.; Perry, David A.; Smith, Jane E.; Molina, Randy
1997. Effects of soil trenching on occurrence of ectomycorrhizas on *Pseudotsuga menziesii* seedlings grown in mature forests of *Betula papyrifera* and *Pseudotsuga menziesii*. New Phytologist. 136: 327-340.

Seedlings of *Pseudotsuga menziesii* were grown for 6 to 16 months in untrenched and trenched treatments in three 90- to 120-year-old mixed forests dominated by *Betula papyrifera* and *P. menziesii.* Net photosynthesis rate of *P. menziesii* seedlings was greater in the untrenched than trenched treatment. The effect of trenching on seedling performance was attributed mainly to differences in ectomycorrhizal colonization patterns. Results suggest that influence of overstory trees and pattern of ectomycorrhizal formation are important to *P. menziesii* seedling performance in deeply shaded forest environments.

Keywords: Mycorrhizae, soil trenching, photosynthesis, Douglas-fir, birch.

(See Corvallis order form.)

Plant Ecology

Benfield, E.F.
1997. Comparison of litterfall input to streams. In: Webster, J.R.; Meyer, Judy L., eds. Stream organic matter budgets. Journal of the North American Benthological Society. 16(1): 104-108.

This paper summarizes data on rates of litterfall and lateral movement of particulate organic matter to stream ecosystems from studied sites throughout the world, including the H. J. Andrews Experimental Forest, Oregon. Rates are extremely variable, depending on productivity of stream-adjacent vegetation, hillslope steepness, and other factors.

Keywords: Stream ecology, litterfall.

(See Corvallis order form.)

King, David A.

1997. Branch growth and biomass allocation in *Abies amabilis* saplings in contrasting light environments. Tree Physiology. 17: 251-258.

Aboveground biomass allocation and height and branch growth were studied in saplings of the shade-tolerant conifer *Abies amabilis* Dougl. ex Forbes growing in large openings and in the understory of an old-growth forest in western Oregon. Saplings growing in large gaps had conical crowns, whereas understory saplings had umbrella-shaped crowns as a result of much greater rates of branch extension than stem extension. Understory saplings grew slowly in height because of low rates of biomass production and low allocation of biomass to stem extension. About 40 percent of new biomass was allocated to foliage in both groups, but understory saplings allocated more of the remaining growth increment to branches and less to stem than did saplings growing in large gaps.

Keywords: Allometry, branch growth, conifer, height growth, Abies amabilis*.*

(See Corvallis order form.)

Scherer, George; Everett, Richard; Zamora, Ben

1997. *Trifolium thompsonii* stand conditions following a wildfire event in the Entiat Mountains of central Washington. In: Greenlee, Jason M., ed. Proceedings: 1st conference on fire effects on rare and endangered species and habitats; 1995 November 13-16; Coeur d'Alene, ID. [Place of publication unknown]: International Association of Wildland Fire: 245-252.

Trifolium thompsonii (Thompson's clover) is listed as a threatened legume on the eastern side of the Washington Cascade Range where wildfire is the dominant disturbance agent. Recent fires within the range of Thompson's clover indicate that the clover responds favorably to fire disturbance. Thompson's clover individuals on sites recently burned were significantly taller and had more flowerheads than those on sites with no recent fire activity, suggesting a Thompson's clover response to fire-caused resource release. This information combined with a species density ranging from 0.6 to 4.8 plants per square meter suggested that Thompson's clover appears to achieve optimum stand conditions on sites where periodic grass-and shrub-eliminating fires occur.

Keywords: Thompson's clover, Trifolium thompsonii*, fire effects, disturbance regimes, species management.*

(See Wenatchee order form.)

Soil, Site, Geology

Iverson, Richard M.

1997. Hydraulic modeling of unsteady debris-flow surges with solid-fluid interactions. In: Chen, Cheng-lung, ed. Debris-flow hazards mitigation: mechanics, prediction, and assessment: Proceedings of the 1st international conference; 1997 August 7-9; San Francisco, CA. New York: American Society of Civil Engineers: 550-560.

Interactions of solid and fluid constituents produce the unique style of motion that typifies debris flows. To simulate this motion, a new hydraulic model represents debris flows as deforming masses of granular solids variably liquefied by viscous pore fluid. The momentum equation of the model describes how internal and boundary forces change as coarse-grained surge heads, dominated by grain-contact friction, grade into muddy debris-flow bodies more strongly influenced by fluid viscosity and pressure. Scaling analysis reveals that pore-pressure variations can cause flow resistance in surge heads to surpass that in debris-flow bodies by orders of magnitude. Numerical solutions of the coupled momentum and continuity equations provide good predictions of unsteady, nonuniform motion of experimental debris flows from initiation through deposition.

Keywords: Debris flow, geomorphology, groundwater hydrology.

(See Corvallis order form.)

Major, J.J.; Iverson, R.M.; McTigue, D.F. [and others]

1997. Geotechnical properties of debris-flow sediments and slurries. In: Chen, Cheng-lung, ed. Debris-flow hazards mitigation: mechanics, prediction, and assessment: Proceedings of the 1st international conference; 1997 August 7-9; San Francisco, CA. New York: American Society of Civil Engineers: 249-259.

Measurements of geotechnical properties of various poorly sorted debris-flow sediments and slurries emphasized their granular nature and revealed that properties of slurries can differ significantly from those of compacted sediments. Measurements showed that (1) cohesion probably offers little resistance to shear in most debris flows under the low, confining stresses normally found in nature; (2) intrinsic hydraulic permeabilities of compacted debris-flow sediments range from about 10^{-14} to 10^{-9} m^2; permeabilities of "typical" debris-flow slurries fall toward the low end of the range; (3) debris-flow slurries are characterized by very large values of "elastic" compressibility ($C \sim 10^{-2}$ k Pa^{-1}; and (4) hydraulic diffusivities of quasistatically consolidating slurries are ~ 10^{-14} to 10^{-7} m^2/s. Low hydraulic diffusivity of debris slurries permits excess fluid pressure and low effective strength to persist during sediment transport and deposition.

Keywords: Debris flow, geomorphology, ground-water processes, sedimentation.

(See Corvallis order form.)

Reid, Mark E.; LaHusen, Richard G.; Iverson, Richard M.

1997. Debris-flow initiation experiments using diverse hydrologic triggers. In: Chen, Cheng-lung, ed. Debris-flow hazards mitigation: mechanics, prediction, and assessment: Proceedings of the 1st international conference; 1997 August 7-9; San Francisco, CA. New York: American Society of Civil Engineers: 1-11.

Controlled debris-flow initiation experiments focused on three hydrologic conditions that can trigger slope failure: localized ground-water inflow, prolonged moderate-intensity rainfall, and high-intensity rainfall. Detailed monitoring of slope hydrology and deformation provided exceptionally complete data on conditions preceding and accompanying slope failure and debris-flow mobilization. Ground-water inflow and high-intensity sprinkling led to abrupt, complete failure, whereas moderate-intensity sprinkling led to retrogressive, block-by-block failure. Failure during ground-water inflow and during moderate-intensity sprinkling occurred without widespread positive pore pressures. In all three cases, pore pressures in most locations increased dramatically (within 2-3 seconds) during failure. In some places, pressures in unsaturated materials rapidly "flashed" from 0 to elevated positive values. Transiently elevated pore pressures and partially liquefied soil enhanced debris-flow mobilization.

Keywords: Debris flow, geomorphology, ground-water processes.

(See Corvallis order form.)

Stark, John M.; Hart, Stephen C.

1997. High rates of nitrification and nitrate turnover in undisturbed coniferous forests. Nature. 385: 61-64.

The authors use an ^{15}N isotope-dilution technique in intact soil cores to measure gross rates of nitrification and microbial assimilation of nitrate in 11 undisturbed forest ecosystems of New Mexico and Oregon. Gross nitrification rates were surprisingly high in all the forests examined. Net nitrification rates poorly predicted gross rates because the soil microbial communities had the capacity to assimilate almost all the nitrate produced.

Keywords: Soil, nitrogen cycling, nitrification.

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Simard, Suzanne W.; Perry, David A.; Smith, Jane E.; Molina, Randy. *Effects of soil trenching on occurrence of ectomycorrhizas on* Pseudotsuga menziesii *seedlings grown in mature forests of* Betula papyrifera *and* Pseudotsuga menziesii*.*

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