

MISSION
and
OPERATING STRUCTURE
for
THE NATIONAL FOREST
GENETIC ELECTROPHORESIS LABORATORY

Introduction. The National Forest Genetic Electrophoresis Laboratory (NFGEL) was established in 1988 as part of the National Forest System of the USDA-Forest Service. The focus of the lab was to assess the genetic variation in conifers using starch gel electrophoresis. Forest Service Regional Tree Improvement programs submitted conifer material to (1) obtain information on the effects of timber management on genetic diversity and gene pools, (2) validate specific materials, and (3) obtain genetic information about relative amounts and geographic patterns of natural variation. Ten years have passed and many things have changed. NFGEL has expanded their scope of activities to address genetic conservation and management of all plant species. To date, they have studied 20 different gymnosperm and 19 different angiosperm species. Angiosperms studied include woody species (such as aspen, cottonwood, and oaks) as well as grasses, shrubs, and forbs. Land management questions NFGEL now study include issues of genetic diversity and structure, taxonomy, and plant identification. Their work supports tree improvement programs, conservation of plant species (particularly threatened, endangered, and sensitive species), and restoration efforts. The Forest Service benefits from NFGEL's service by gathering information on genetic diversity for a variety of forest plant species that can be used to validate management strategies. The steering committee thought this ten-year-anniversary would be an appropriate time to update the mission and structure of NFGEL.

MISSION

The mission of NFGEL is to provide state-of-the-art molecular genetic information to the National Forests and other cooperating agencies for the evaluation and protection of our nation's genetic resource. Techniques used will be the minimum necessary to resolve the genetic question at hand.

PURPOSE

The purpose of the Laboratory is to analyze molecular genetic markers (proteins and DNA) in plant material submitted by Forest Service employees and those from other cooperating entities.

I. Objectives:

- A. Provide baseline genetic information
 - 1. Delineate patterns of genetic information where that information is lacking or incomplete.
 - 2. Develop techniques/protocols for the analysis of molecular genetic variation in species where they are lacking.

- B. Determine the effect of management on the genetic resource.
 1. Evaluate the effects of different silvicultural systems by comparing genetic variation in unmanaged stands with the residual genetic variation after vegetative manipulation.
 2. Evaluate the genetic variation in natural vs. artificially regenerated stands.
 3. Determine the geographic origin of seedlots, seedlings, and plantations.
 - C. Support the tree improvement program.
 1. Verify the purity of controlled crosses.
 2. Identify genetic material where identification is lost or suspect. This could include clones, provenances, seedlots and families.
 3. Estimate pollen dispersal and contamination in seed orchards.
 4. Estimate inbreeding in seed orchards or natural stands.
 5. Verify the purity of controlled crosses.
 - D. Support conservation and restoration programs, especially those involving native and TES (threatened, endangered, and sensitive) species.
 1. Evaluate genetic diversity and map patterns of variation.
 2. Identify plant material and make taxonomic determinations.
 3. Assess the genetic variation in material manipulated in agronomic settings.
- II. Tools:
- A. Protein analyses.
 1. Starch gels electrophoresis.
 2. Isoelectric focusing.
 - B. DNA analyses.
 1. PCR (polymerase chain reaction) based technologies including RAPDs (random amplified polymorphic DNA).
 2. RFLPs (restriction fragment length polymorphisms).
 3. DNA extractions.
- III. Services:
- A. Project proposal development.
 - B. Sample design and collection strategy formulation.
 - C. Protein and DNA marker electrophoresis.
 - D. Data interpretation and analysis.
 - E. Report of results and management implications.

PRIORITIES SETTING

Projects may be proposed by any Forest Service or cooperating agency employee. Each Region will be given an approximately equal amount of laboratory time per fiscal year. This will not be on an annual basis but on a four year running total. This will allow for regions to accomplish large projects at the expense of past or future use. Regions may negotiate time allotments between and among one another. This will allow for inactive regions to defer their time until they develop projects and assemble their material. Extended deferrals are discouraged as they may cause scheduling difficulties for priority future work. Priorities will be set by the Steering Committee with input from the Laboratory Director.

STEERING COMMITTEE

The Steering Committee is responsible for providing overall direction, establishing priorities, and monitoring the results and effectiveness of the Laboratory. The Committee will be composed of:

1. The National Geneticist
2. The National Botanist
3. Regional Geneticists (5)
4. At Large Members (3)
5. Laboratory Director (Ex officio)

At large members would be selected by the Washington Office from a group nominated by the regions or the WO. At large members could be ecologists, botanists, or others from the Forest Service or cooperating agencies. The selection criteria will be:

1. An interest in genetic variation.
2. Availability to attend the annual meeting.
3. A positive futuristic outlook.

At large members will serve for a 3-year term with staggered terms. Those initially appointed can serve for 5, 4, and 3-year terms to accommodate the stagger. The Committee will meet annually in the Spring. Meeting dates and place will be set by the Committee at the annual meeting. Emergency decisions will be made by electronic communications or conference call.

SUPERVISION

NFGEL is administered through the Eldorado National Forest-Region 5. The Forest Supervisor will be responsible for direct supervision of the Laboratory Director with input from members of the Steering Committee. The Director will supervise all other NFGEL employees, including an Assistant Director, Data Manager, Lab Manager, and Lab Biotechnicians.

FUNDING

Funding will come from a variety of sources. Current primary funding is NFFV funds removed at the WO level for support of NFGEL. A base level of NFFV funding will be used to provide continuity in the existence and operation of the Laboratory. New major equipment and major equipment replacement and repairs will be discussed at the annual meeting and funding sources developed on a case by case basis. Funding from outside the Forest Service is encouraged as long as projects support NFGEL's mission and National Forest Service projects do not suffer inordinate delays.

COOPERATION

Techniques, equipment, and knowledge in the area of molecular genetic analyses and their application to forest plant species continually improve. The successful advancement of this science, and fulfillment of NFGEL's mission, requires constant refreshment of ideas with others in similar areas of work. Cooperation with the Pacific Southwest Research Station (PSW) has been outstanding since the inception of NFGEL. While NFGEL's protein lab is located at the Placerville Nursery, Camino, CA, the DNA work is carried out in a cooperative arrangement at the PSW Institute of Forest Genetics in Placerville, CA. PSW has shared facilities, equipment, personnel and supplies. NFGEL has reciprocated by providing supplies, personnel, and equipment to PSW. Future funding of NFS and Research will require even closer ties. Cooperation has also occurred between NFGEL and other Forest Service Research Stations from the southeastern U.S. to the Pacific Northwest as well as with several universities. The cooperation and coordination among these units will increase as NFGEL expands its services to include new techniques and species.