Notes: false brome working group
October 13, 2005
Siuslaw River Room
Siuslaw NF Supervisor's Office

Next meeting: April 12, 2006, 9:00-12:00, Siuslaw Supervisor's Office.
REMINDER: please get new *2005 inventory locations* to Cindy McCain (cmccain@fs.fed.us, 541-750-7050 for details).

I. Introduction and review of agenda

A. The false brome seed study in progress to see how long seeds stay viable in soil will be reinitiated to clear up preliminary results. it appears that seeds live for two to three years in the soil. In the first trial, seeds were put out in February. This time, they'll be put out in October/November.

B. Oct.14 there will be a meeting with Starker Forest and other partners (Institute for Applied Ecology (IAE), OSU) to extend work being done around Butterfly Meadows (adjacent to OSU McDonald Research Forest). They may plan to use results on previous herbicide trials to treat a larger (½ acre) area. Researchers are attempting to control false brome in an area where it threatens two ESA listed species: Kincaid's lupine and Fender's Blue butterfly populations. (See notes from previous meetings for details on herbicides, combinations, timing, etc. at http://www.appliedeco.org/FBWG.htm .)

It was noted that Round-up kills false brome and if applied late in the season some natives are retained. Pre-emergent herbicides also help control re-establishment from seed. Follow-up work on the butterfly meadow research will look at longer term results on natives and the *Brachypodium*.

C. BLM and IAE are researching how to control infestations on roadsides. They have found that mowing is effective when done in April or May or later in the season. Mulching is recommended after mowing. Blue wild rye seed has been sown after mowing. The blue wild rye seed was collected from the project vicinity. Some roadsides in Fall Creek and Jasper Creek, the "epi-center" of false brome infestation southeast of Eugene, were mowed and results are very promising.

D. False brome can self-pollinate, and probably has a mixed mating-system.

II. Source site—OSU McDonald -Dunn Research Forest (near Corvallis, OR)

A. Ecology studies: "History of local invasion by *B. sylvaticum* chronicled by a field ecology class" [Dr. Peter McEvoy-OSU]
There has been a false brome invasion in McDonald forest for the past 30 years. Dr. Peter McEvoy's Oregon State University field ecology methods class periodically measured a short transect since the late 1970's near Oak Creek that

passes through varied plant communities. Some of the older data is still only on hard copy, but some of the later data has been analyzed (especially with OSU graduate student Susan Morre). Currently the class is being continued by Dr. Pat Muir.

Dr. McEvoy discussed models to look at the rate of spatial spread of false brome. Spatial spread depends on environment and life cycles of the species. He used examples from his experience in working with biocontrols for invasives such as tansy ragwort or purple loosestrife in pointing out spread patterns

There are two processes to consider when looking at the spread: population growth and population redistribution. The current map with inventory data shows our current knowledge of false brome distribution, but there is no available information on when the sites became established. More work will be necessary before we can establish spread rate and direction. The map suggests that population growth is density dependent, growth is highly stochastic, and human distribution has contributed to increased spread. More work is also necessary to determine the environmental/biological impact of the invader: impact= abundance x distribution x per capita effect (PCE).

Transect results: sampling was done from the riparian zone, across the meadow, and into forest ecosystems in McDonald forest. False brome was most abundant in the conifer forest. In all habitats sampled, false brome was the dominant non-woody species. This was true even in the riparian ecosystem which had the highest diversity of native species. Other measures of impacts on species diversity (diversity indices) are being examined. All habitats have become progressively less diverse with the expansion of false brome. False brome flourishes in all habitats along the transect (whether they be shaded, light, wet or dry). It appears to be fairly tolerant of a wide range of conditions common in western Oregon. Where else those conditions apply is of wide concern.

Peter McEvoy and Susan Morre will be working on the data to develop the longer story of the spread of false brome along the transect and plan to publish the results.

Conclusions: the invader is more abundant in upland conifer and meadow than in riparian ecosystems. It spread faster in the upland habitats. False brome is leading to biotic impoverishments at all trophic levels.

Dr. McEvoy recommends the following article, noting: “The three ingredients we need are (1) population growth rate, (2) dispersal rate (autonomous or 'natural' plus anthropogenic or human-assisted), and (3) spatial spread. The basic idea is Population Growth x Dispersal = Spatial Spread. The following article provides a concise summary of how to measure and model spatial spread.

Hastings, A., K. Cuddington, K. F. Davies, C. J. Dugaw, S. Elmendorf, A. Freestone, S. Harrison, M. Holland, J. Lambrinos, U. Malvadkar, B. A. Melbourne, K. Moore, C. Taylor, and D. Thomson. 2005. The spatial spread of

invasions: new developments in theory and evidence. Ecology Letters 8:91-101. (http://www.blackwell-synergy.com/doi/abs/10.1111%2fj.1461-0248.2004.00687.x)

Dr. McEvoy later identified information needs such as 1) local estimates of biomass change over time for estimating population growth rates and 2) how fast reinvasion occurs after treatment.

B. Update on invasive species strategy under new Forest Plan [Debbie Johnson]

Debbie Johnson covered the Invasive Species section of the new McDonald-Dunn Forest Plan. Her group has looked at weed control at McDonald Forest. The group has devised a priority list of invasives from a list of over 100 non-natives known to be present in the property. Priorities were given to 8species.

The group has developed a multi-step process for controlling priority species. This results in a management plan for each target species: background of species, survey design, control, education, and monitoring.In addition to management of these individual species, the plan also establishes some priority habitats for weed management, such as around remnant prairie areas. The 2006 action plan focuses on doing a forest-wide survey for priority species and controlling false brome along the edges of roads and trails and where people or equipment come in contact with the plants. And finally the best control technique is put in to effect.

There are some potential weed research projects on McDonald-Dunn for 2006 including: 1) competition between false brome and overstory trees; 2) post-harvest vegetation composition and seedling growth competition with and without herbicides; and 3) Himalayan blackberry rust trials.

III. Research on False brome as archetypical invader- update on genetics (PSU's Alisa Ramakrishnan/David Rosenthal)

A. David Rosenthal's presentation showed research results and plans for future research. His group looked at the Phylogeography of Invasion. Goals of the research include investigating questions including: where did *B. sylvaticum* now in the US originate, where are new populations coming from, is there evidence of differentiation between source populations and introduced populations, evidence of differentiation among introduced populations?

Rosenthal is looking at chloroplast DNA (cpDNA) sequence variation in samples collected from across its native range (Europe and Asia) and in the U.S. (Oregon) to determine the origin of *B. sylvaticum*. It was found that the cpDNA fingerprint is identical in all sampled U.S. populations. Several European *Brachypodium sylvaticum* populations in at least six European countries also have the same cpDNA fingerprint. The take home note is that this work shows

that local invaders did come from Europe. Work is ongoing to narrow down the number and source of initial US introductions. Preliminary data suggest that there may have been hybridization of allopatric populations after initial colonization in the U.S.

Is there a differentiation among Oregon and between Oregon and European populations? To investigate this, specimens from 23 populations were field collected and seeds were germinated in the greenhouse. New data suggest that peripheral plants do have significantly lower growth rates in the greenhouse. Now Rosenthal would like to plant U.S. and European populations outside. Planting needs to be in an area void of and isolated from false brome infestation. He needs help finding a location and transplanting specimens.

B. Alisa Ramakrishnan's presentation was titled Where Have All the (Native Understory Plants) Gone: *Brachypodium sylvaticum*: An Invasive Species Caught in the Act. The objective of her work is to identify post-invasion patterns of gene flow using molecular genetic markers. Ramakrishnan's research will be used to identify both early migration patterns and any post-invasion evolution that may have occurred, causing false brome to become invasive.

To date, her data show that the center of the range, which contains the earliest known populations, is also the center of genetic diversity. Her data suggest that it is possible that two separate introduction events occurred, one near Eugene's Mt. Pisgah area, and one in the Corvallis McDonald Forest area. More research is in the works with this group, and is documented online (http://web.pdx.edu/%7Eramakris/index.htm).

IV. Update on UofO work on ecology of invasion (Julie Stewart-doctoral project-Biology with Bitty Roy; Heather Simmons)

A. Julie Stewart has begun summarizing results from field season and is investigating the Enemy Release Hypothesis (ERH), including above-ground invertebrates and fungi. Her approach is comparing sprayed plots and non-sprayed plots to examine effects of removal of pathogens and herbivores on measures of plant fitness. This study will be repeated in Switzerland to compare false brome populations in its home range with conditions in Oregon.

The percentage of damage on the 10 plants measured per plot was higher in unsprayed control plots (meaning the treatment worked) and there was increased amount as well as diversity of damage. Plant fitness, estimated as the number of florets, was higher in the control plots.

The conclusion is that pathogens and herbivores cause a significant but small decrease in fitness, indicating that the false brome is not immune from herbivory

or pathogen infection in its new environment. Swiss results will show whether the enemy release hypothesis will be supported if insect and pathogen impacts are more significant on plant fitness in the native range.

B. Heather Simmons is studying evidence of false brome infection with an endophyte (*Epichloe sylvaticum*) extensively studied in false brome's native range. The endophyte has two forms: one asexually reproducing form which has an apparently symbiotic function (producing an alkaloid which discourages herbivory); the sexually reproductive form is a "choke" which prevents reproduction by the *Brachypodium*.
The infection rate in both the native and Oregon environment appears to be 100%, but the Oregon populations seem to have only the asexually reproducing form.

V. Round robin on information from members-new sites, treatment results, update on Institute for Applied Ecology studies.

1. The Siuslaw NF added several sites, including the Corvallis watershed on Marys Peak and the Five Rivers area in the Alsea drainage.
2. BLM has an EIS slated to go to printer in June (invasive included).
3. Eugene has GIS info on new sites.
4. McDonald Forest did pre-logging herbicide treatments in harvest units and along roads. Washing equipment is standard.
5. Starker Forest is considering sowing native seeds into mulched areas after false brome removal near Kincaids lupine/Fenders blue butterfly site.
6. There are small herbicide screening plots in Butterfly Meadows. This will be expanded this fall to operational treatments inside the meadow.
7. Graduate students at OSU are monitoring Butterfly Meadows. Thirty natives will be protected.
8. Mary's River watershed council is getting information out to local landowners. There is a dial up information line.
9. Umpqua NF added false brome information to its website and trailhead. Its false brome site is also in a municipal watershed.
10. ODA has lots of false brome projects. Treatment of small sites can be successful in getting rid of false brome. There was a $15,000 grant given to the Trappist Abbey in Lafayette. With that money, the monks were largely able to shut down seed production in their site. ODA has made treatments in the past but has learned that after spraying (Glyphosate) in July and came back the next year the false brome knocked back or absent (there are dicots growing back as well as broadleaf perennials, and ferns).
11. Willamette: the Forest Service finished a regional EIS which expands weed treatments. It's expected to be signed and effective

soon. The Willamette NF will get funding for the Environmental Assessment necessary for using the treatment tools approved through the EIS on the Forest.

12. Vinegar treatment tried by Willamette botanists was ineffective in preventing resprouting of the false brome.
13. McKenzie has 30 new false brome infestations at H.J. Andrews Experimental Forest. There is now a washing station and information board. OSU students are working at H.J. Andrews to help control invasion.
14. UofO's Susie Holmes started a greenhouse study on competition between native grasses and false brome. It was suggested by Julie Stewart that there could be a project investigating underground interaction (competition) between native grasses and false brome.

VI. People attending the meeting signed up for three groups, education/outreach, research/control, or inventory/habitat. Each group will work on issues to present at the next meeting **Apr.12.**

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Research/control coordinator: David Rosenthal (drosen@pdx.edu)
Education/outreach coordinator: Susan Fritts (sfritts@fs.fed.us)
Inventory/habitat coordinator: Cindy McCain (cmccain@fs.fed.us)

VII. Field trip to Timberhill, the oak restoration site adjacent to McDonald Forest: case study in false brome control strategy-Bob Zybach

The site was an Oak Savanna in 1852. After logging, the site turned into a Douglas fir stand and presently is being restored to a native landscape for an outdoor classroom.

In retrospect, the false brome should have been treated prior to logging because the soil disturbance form the logging and piling favored false brome spread.

The two main dispersal agents are water and gravity. It has been found that false brome migrates with the shade line (it likes the shade). Zybach believes that regular prescribed burning may contribute to long-term control of false brome.