Informed Consent:

Title: Factors Promoting Artificial Reforestation Success of Ponderosa Pine Forests in the Southwestern United States

You are being asked toparticipate in a project conducted through School of Forestryat Northern Arizona University by Barney Gregg as part of his M.S. thesis (advisors: professors Yeon-Su Kim and Pete Fulé).

Your participation in research is completely voluntary. There is no compensation or risk to participate in this study. You can decide to participate and then withdraw or skip a question. Whether or not you choose to participate in this project will have no effect on your relationship with NAU now or in the future.

The purpose of the project is to understand:

* What factors promote artificial ponderosa pine regeneration?

The research will be conducted through semi-structured phone interviews with researchers and managers with experiences with ponderosa pine regeneration (estimated time: one hour).

All data collected will be coded with identifier numbers. All data and information collected will be stored in a password-protected computer. The information will be only released/published in aggregated form.

Your participation will contribute to future sustainability of ponderosa pine forests.

Do you agree to participate in this project?

 \_\_\_YES \_\_\_ NO

Do you agree to be audio/video recorded for this research?

\_\_\_\_YES \_\_\_\_NO

**Informant’s Background**

Role, experience

Q1. Are you a researcher, forest manager, or a nursery manager?

**IF RESEARCHER**-> Are you an academic researcher or do you work for an agency?

**IF NURSERY MANAGER**-> Who do you work for?

**IF FOREST MANAGER**-> What is your job title?

* Who do you work for?

Q2. Have you planted or worked with planted ponderosa pine?

**IF YES, CONTINUE**

**IF NO**: Thank you for your time.

Q3. At which step in artificial regeneration of ponderosa pine were you involved in?

* Planning/Site selection
* Seed collection
* Nursery operations
* Planting
* Monitoring
* Reporting
* Research involving planted ponderosa.
* Other:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

<INTERVIEWER NOTES> monitoring- regular and periodic measurement of certain parameters- physical, chemical, and biological- to detect and observe changes over time

Q4. Can you describe your experience and length of time you’ve worked with planted ponderosa pine?

**Seed Source**

**Context of seed selection- how does seed source affect artificial regeneration in the Southwest?**

Q5. Do you know the origin of your seed source?

Q6. How do you select your seed source?

 EXAMPLES:

* Agency (Specify:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Expert Advice
* Personal Choice
* Other:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q7. In your opinion, does seed source make a difference? Why, Why Not?

Q8. Are there any challenges to selecting seed sources? If so, what are these challenges?

FOLLOW-UP: Are there any issues related to official seed zones rules set by agencies?

Q9. In your opinion how can this/these challenges be addressed?

**NURSERY OPERATIONS**

Q10. Are the seedlings containerized?

**IF YES**-> what size are the containers?

 Do you think the size of the container make a difference? Why/Why not

* **IF UNDECIDED->** What information will you need to determine the effects?

**IF NO**-> Are they bare-root seedlings?

**ALL->** In your opinion, which is preferred, container or bare-root?

Q11. Are there any issues related to the supply, quality, and source of seedlings? If so, what are they?

Q12. Do the seedlings undergo any forms of treatments at the nursery? If so, what are they?

IF ASKED- examples are drought conditioning or hardening off

**IF YES->** Does the treatment/treatments make any difference? YES/NO

Follow-up: WHY do you think treatment/treatments make a difference?

**IF UNDECIDED->** What information will you need to determine the effects?

<INTERVIEWERS NOTES>

HARDENING OFF- ALLOWING PLANTS TO TRANSITION FROM A PROTECTED INDOOR ENVIRONMENT TO HARSH OUTDOOR CONDITIONS BY PERIODIC OUTDOOR EXPOSURE.

DROUGHT CONDITIONING- PERIODIC EXPOSURE OF SEEDLING TO WATER STRESS OVER THE ENTIRE PERIOD OF GROWTH IN THE NURSERY.

Q13. How old are the seedlings at the time of outplanting? **(MONTHS)**

Q14. Does seedling age at the time of outplanting make a difference? Why/Why Not

* Positive:\_\_\_\_\_\_\_\_\_\_\_
* Negative:\_\_\_\_\_\_\_\_\_\_

**IF UNDECIDED->** What information do you need to determine the effects?

Q15. what size are the seedlings at the time of outplanting?

Q16. Does size of seedlings at the time of outplanting make a difference? YES/NO

* Positive:\_\_\_\_\_\_\_\_\_\_\_\_
* Negative:\_\_\_\_\_\_\_\_\_\_\_

**IF UNDECIDED->** What information will you need to determine the effects?

**Site Preparations**

**How does planting methods and cost affect artificial regeneration in the Southwest?**

Q17. Do you make any site preparations before planting ponderosa pine seedlings? If so, how?

**IF ASKED**, examples are control of competing vegetation, removing downed logs, fertilizer application, salvaged logging, or tilling.

**IF YES->** How do you determine when to use site preparations and the methods?

 Do you think site preparations have a negative, positive, or no effect on seedling survival?

Q18. In your opinion, what are the effects of climate change on planted ponderosa pine?

Q19. Do you consider potential effects of climate change when you select sites for planting?

Q20. When selecting sites, how do the potential effects of climate change influence your decision?

Q21. In your opinion, should multi-species planting be considered in ponderosa pine sites?

IF ASKED, examples are adding pinyon to ponderosa pine sites in lower elevations and other high elevation mixed conifers to higher elevation sites.

**IF YES->** What would be the PROS?

 What would be the CONS?

IF NO-> Why should multi-species planting not be considered?

**Planting Methods**

Q22. Have you used tree shelters?

IF YES->

* what kinds of shelters have you worked with? Any specific brands?
* Did they have any positive results? If so, what are they?
* Did they have any negative results? If so, what are they?
* What are the challenges of using them?
* Would you recommend them for other projects planting ponderosa pine seedlings?

IF NO->

* Why do you choose not to use them?
* Is the cost a factor for not using them?
* Do you think they are useful or not?

IF UNDECIDED-> Is there anything else you would need to know before recommending them?

Q23. How are the seedlings spatially planted?

IF ASKED, examples are Regular grid or grouped design.

Q24. Have you utilized any nurse structures?

IF ASKED, examples are planting next to rocks, logs, shrubs, or tree boles.

IF YES->

* Did they have any positive results? If so, what are they?
* Did they have any negative results? If so, what are they?
* What are the challenges using them?
* Would you recommend using nurse structures?

Q25. What is the desired density of planting?

Q26. What is the desired eventual density of forest stand?

Q27. What percent of mortality is expected for planted seedlings on average?

Q28. What time of the year or season do you normally plant?

Q29. Are the planting times from the previous question linked to current or expected soil moisture or monsoon events?

**Follow-up**: Are there other factors for determining the planting time?

Q30. How long after a wildfire should planting be done?

Q31. Does it matter what aspect planting is done on?

Q32. What tree planting tools are used for planting? Are there any tools preferred?

Q33. Who plants the seedlings? Personnel from your organization, volunteers, or contractors?

IF SAME ORGANIZATION->

* What is the average or range of cost per acre per acre to plant using personnel from the same organization?
* What are the PROS of using personnel from the same organization to plant?
* What are the CONS and challenges of using personnel from your organization to plant?

IF CONTRACTORS->

* are the contractors local or non-local? If non-local, where are they from?
* What is the average or range of cost per acre to contract?
* Are there any quality control issues with contracting out planting operations?
* What are the PROS of contracting?
* What are the CONS and challenges of contracting?
* Would you recommend contracting planting operations?

IF BOTH->

* Which cost more, contract planting or using personnel from your organization?
* In your opinion, which do you prefer, personnel from the same organization to plant or contracting planting? Why?

Q34. Are there any issues related to contracting planting operations? If so, what are they?

IF ASKED, examples are quality control

Q35. Are there any issues related to budgeting, and budget period? If so, what are they?

IF ASKED, examples are the need to spend money in certain times even if not appropriate for planting or unavailability of money at times appropriate for planting.

Q36. In your opinion, how can this/these issue(s) be addressed?

Q37. Is there anything else related to artificial regeneration of ponderosa pine in the Southwest that we did not cover?

Q38. Is there anyone else who has experience with artificial regeneration of ponderosa pine in the Southwest who I should contact?

GET CONTACT INFO ( if possible, ask the interviewee to introduce you)

Thank you for your time. If you can think of anything to add later, please contact me by phone at (928) 594-8163 or by email at bmg334@nau.edu.

If you would like the final copy of my thesis, you may provide a mailing or email address.