Guidance for Afforestation of Crop or Pasture Land Uses

Reforestation vs Afforestation vs Agroforestry:

These terms are closely related and there are many ways natural resource professionals around the world define and separate them.

For the purposes of this guidance, we will distinguish them based on a shift in land use and/or the length of time a piece of ground that could grow trees has not grown trees (agriculture land use to forest for afforestation; and forest to forest for reforestation and active agriculture to active agriculture for agroforestry).
**Reforestation** is the natural or artificial restocking of existing forests and woodlands that have had trees recently removed, by natural disturbance or human caused disturbance (forest to forest). Refer to Title 440, Part 502, Subpart A, Common Terms, forestland for the definition of forestland.

**Afforestation** is the establishment of a stand of trees on a site that in recent history has not been managed as forestland (such as cropland, pasture, other Ag lands) for an extended period of time. Generally speaking afforestation is planting trees for establishing or restoring forest plant communities for forestry or wildlife purposes.

Commonly, under afforestation we will plant native trees on previously farmed crop, pastures and other Ag land whose ecological site historically supported a forest plant community and no longer meets the definition of cropland or pasture (see Title 440, Part 502, Subpart A, Common Terms, cropland and pasture). However, planting native or introduced tree species on active crop, pasture and other Ag land could also be considered afforestation, and would be achieved under NRCS's Agroforestry and/or Forestry Practices. Either is acceptable within Farm Bill programs as long as a resource concern is being treated and improved.

**Agroforestry** is the planting of trees for the purpose of treating resource concerns on actively farmed crop, pasture and other Ag lands to meet the objectives of an agricultural operations. Planting trees solely for producing agricultural crops (i.e. orchards) and enhancing the economics of agricultural operations is a human consideration and will be considered part of the business of agriculture not identified as agroforestry. It is **not** generally recommended to plant trees on ecological sites that have not historically supported a forest plant community due to the amount of water needed to support the planted trees. If trees are planned on these types of sites for the purposes of carbon sequestration or treating any other resource concerns, regardless if it is considered agroforestry or afforestation, an NRCS Area and State Specialist will need to be consulted early in the planning process to determine if the proposed project is acceptable. However, planting living structures like windbreaks or living snow fences will generally be considered agroforestry even if the designs are adapted to address wildlife considerations and may be planted in areas without a history of a forest plant community.

**Resource Concerns Treated by Afforestation:**

Under certain resource concerns and circumstances it is appropriate to afforest actively farmed crop and pasture land. An example is planting trees and/or shrubs to restore a priority habitat community. However, there are other resource concerns where the site is assessed and evaluated only with regard to the current land use. For afforestation to be appropriate for addressing that type of resource concern, the land will no longer be considered cropland or pasture based on Title 440, Part 502, Subpart A, Common Terms, cropland and pasture, but would be considered in the early successional stages of forestland. Finally, it is important to remember, a farmer’s desire to change crops is a human consideration not a resource concern.
**Degraded Plant Condition-Inadequate structure and composition:** Plant communities have insufficient composition and structure to achieve ecological functions and management objectives. Inadequate structure and composition also includes degradation of wetland habitat, targeted ecosystems, or unique plant communities.

This is the resource concern most easily associated with afforestation. Afforestation directly treats Degraded Plant Condition- Inadequate structure and composition based on a predominantly non-native plant community having insufficient composition and structure to achieve ecological functions and management objectives associated with the historically native plant community. Usually, this resource concern is often focused on unique native ecosystems and habitats. Actively farmed lands may be afforested in the restoration of priority or unique habitats, such as (but not limited to) Oak or Aspen woodlands and riparian forests. Common practices used when treating this resource concern are 391 Riparian Forest Buffer, 612 Tree & Shrub Establishment and 643 Restoration and Management of Rare and Declining Habitats.

**Inadequate Habitat for Fish and Wildlife-habitat degradation:** Quantity, quality, or connectivity of food cover, space, shelter, and/or water is inadequate to meet the requirements of identified fish, wildlife and invertebrate species.

This resource concern may also be directly treated by afforestation depending on the target wildlife species or suite of species. Afforestation of land (crop, pasture, other Ag) which previously supported non-forest ecosystems with different ecosystem functions, maybe detrimental to non-target fish and wildlife species. Therefore it is particularly important to be aware of any species of concern or specific species populations of concern that could be detrimentally affected by afforestation. One example would be planting woody vegetation where an elk herd that is in declining status is using old pasture for forage. Another example is with the Oregon Spotted Frog where spring egg mass deposition is on flooded pasture.

Afforestation to treat an Inadequate Habitat resource concern is appropriate for the following situations:

1. Inactive Farmland-Priority Habitat Restoration: Idle or abandoned farmland may be afforested in the restoration of priority or unique habitats for specific priority species, suite of priority species, species of concern, or T& E species.

2. Inactive Farmland-General Wildlife Habitat Restoration: Crop and pasture can only be afforested for general wildlife habitat purposes when they are no longer being farmed and the land is showing signs of succession back to the native plant community, or if invasive plant species are disrupting that natural succession process back to the native plant community.

3. Active Farmland-Priority Habitat Restoration: Actively managed farmland may be afforested in the restoration of priority or unique habitats for specific priority species, suite of priority species, species of concern, or T& E species.

4. Active Farmland-General Wildlife Habitat Restoration: Improving wildlife habitat in general is based on current land use. Habitat elements provided by the current land use should be assessed and limiting factors identified.
a. Associated Agricultural land and Other Associated Agricultural land uses may be afforested for general wildlife habitat purposes at any time as long as no “at-risk” wildlife or plant species will be negatively impacted.

Common practices used when treating this resource concern is 391 Riparian Forest Buffer, 612 Tree & Shrub Establishment, 643 Restoration and Management of Rare and Declining Habitats and 645 Upland Wildlife Habitat Management.

When designing afforestation specification for general wildlife habitat, where appropriate, ensure the planting specification considers inclusion of a mix of conifer, deciduous trees, and mast producing shrubs. Mast producing trees and shrubs will require access to partial to full sun in order to bear fruit. Careful consideration of light requirements is needed in planting layout.

Degraded Plant Condition-productivity and health: Plant productivity, vigor and/or quality negatively impacts other resources or does not meet yield potential due to improper fertility, management or plants not adapted to site.

Afforestation would only be appropriate, if the site is no longer farmed (see Title 440, Part 502, Subpart A, Common Terms, cropland and pasture) and is currently considered under-stocked forest land. If it is considered understocked forestland, the plant communities will shows signs of succession back to its native forest land use. Unfortunately, intensively managed introduced plant communities often degrade when management ceases, they do not always follow the native successional process but are interrupted by highly invasive non-native species. This land, which is now considered an understocked forest stand will need assistance getting back on a healthy successional path for this native plant community. Planting native woody species (afforestation) can be very helpful in the goal of moving the plant community back to a native successional path and 612 Tree & Shrub Establishment is commonly used to accomplish this goal.

In order to ensure that the afforestation provides an adequate level of conservation to treat this resource concern, multiple native woody species (trees and/or shrubs) will be planted, when the ecological site can support multiple species. For sites that can support multiple species, it is recommended that a single species does not make up more than 75% of the planting/seeding stock. In addition, consider including mast producing woody species in the planting mix for a general improvement in terrestrial wildlife habitat.

When choosing native woody species for planting or seeding on a site, refer to Plant Material Technical Note on Conservation Trees and Shrub Planting, the local soil survey for the ecological site descriptions and common species found on the soil or common species to manage. Acceptable alternate sources for this information would be USFS habitat types and plant associations that are in close proximity to the site in question or the plant associations used by WA DNR.
Trees could be added to actively farmed lands to treat resource concerns associated with the agricultural operation and be compatible with the agricultural objectives but would be considered agroforestry not afforestation.

**Additional Resource Concern Categories Treatable by Afforestation or Agroforestry.**
The following general resource concern categories will discussed as a whole because the use of afforestation or agroforestry to treat the individual resource concerns within the categories are not different enough to warrant separate discussions.

**Water Quality Degradation** is a resource concern that is often effectively treated by afforestation. For example, a riparian forest buffer which is 35 foot wide or greater, is installed along a stream on land that use to be farmed to the streambank, in order to filter out sediment or other impurities prior to entering the stream. (See 391 Riparian Forest Buffer- this practice fits under both forestry and agroforestry depending on the size of the buffer, and its purposes)

**Air Quality Impacts** are often treated by afforestation or agroforestry. Trees and shrubs can prevent and reduce particulate matter movement in the air, and has the potential reduce ozone precursors, greenhouse gases and objectionable odors. These issues are commonly treated with agroforestry practices like 380 Windbreak/Shelterbelt Establishment, 311 Alley Cropping, or the forestry practices 612 Tree & Shrub Establishment. Carbon sequestration is also an available purpose for all forestry and agroforestry practices that include planting trees.

**Soil Erosion** (by wind or water) is treatable by afforestation or agroforestry. Most of the agroforestry and forestry practices that plant trees and shrubs can be designed for addressing erosion caused by either wind or water. However 380 Windbreak/Shelterbelt Establishment is designed specifically for wind erosion.

**Soil Condition** particularly compaction, can be treated by afforestation. Soil condition is treated in order to achieve the purposes and ecosystem functions of that particular land use. So 311 Alley Cropping or 379 Multi-storied cropping practices are agroforestry practices to improve soil condition for agriculture crops on agricultural land (cropland or pasture) or non-timber forest products on forest lands.

**Forestry Practices and Conservation Systems used in Afforestation**

Wildlife practices such as 643 Restoration of Rare and Declining Habitats and 645 Upland Wildlife Habitat Management may provide the focus and objectives of afforestation but 612 Tree and Shrub Establishment or 391 Riparian Forest Buffer are often the practices under which afforestation is completed. Forestry practices 612, 391 and Agroforestry practice 379 Multi-Storied Cropping, are often supported by 490 Tree and Shrub Site Preparation, 315 Herbaceous Weed Control, and 314 Brush Management.

Keep in mind, that crop and pasture land has not supported trees for decades or generations, so the microbial populations in the soils are not optimum for trees and shrub growth and survival. It is recommended that containerized planting stock be used or have bare root stock inoculated with mycorrhizal fungus.
Agroforestry Practices On Agricultural Lands

Trees and shrubs may be added to actively managed crop or pasture lands to address resource concerns, improve cropping efficiency, energy efficiency, provide shelter for livestock or develop a new integrated cropping systems.

If a landowner/operator wants to add trees for livestock shelter to a pasture that will continue to be grazed, then consider 381 Silvopasture Establishment. Among other benefits, Silvopasture can provide, improve air quality, reduce erosion, improve water quality and improve wildlife habitat.

If a landowner/operator wants to add trees to a cropping system in order to reduce soil erosion (caused by wind or water), moderate microclimate, reduce odor, reduce noise, provide a visual screen, improve carbon sequestration, reduce air quality impacts or for energy benefits consider 311 Alley cropping, 379 Multi-storied Cropping or 380 Windbreak/Shelterbelt Establishment.

If an agricultural landowner/operator wants to create a working buffer along their streams or wetlands then 391 may be used in conjunction with other conservation practices to achieve the goal of protecting the stream or wetland but continue to produce an agricultural crop on at least part of the buffer.

Requirements for Inventory and Analysis

Any time afforestation treatments are being considered, you must document benchmark conditions and desired future conditions using the resource concern checklist and one or more of the following tools:

1. Biological TN 14 for general wildlife habitat elements. If a priority species, species of concern or ESA species is identified for the site through our environmental evaluation process (CPA-52), then the needs for that species will be addressed. Here are some websites to help determine if at-risk species or habitats are found on your planning unit:

   PHS Interactive Mapping Tool http://wdfw.wa.gov/mapping/phs/
   Critical Habitat Mapper http://ecos.fws.gov/crithab/
   WDFW Game Management Plans http://wdfw.wa.gov/conservation/game/

2. Forest Health Assessment as well as standard forest or vegetation inventory methods and tools used to document the vegetation’s composition, structure, potential productivity and current plant health. A vegetation inventory could be as simple as a fixed radius plot with the planner collecting data on the grass, forb and shrub species present, their cover, and height.

3. Water Quality Technical Note 1: If afforestation is used to treat degraded water quality then complete WQ TN 1 and if the site involves a wad-able natural channel (perennial or intermittent), then SVAP2 evaluation is also necessary.
4. RUSLE2 may also help document site sheet and rill erosion as the source of sediment in surface water.

5. Air Quality Technical Note 1, COMET, and/or WEPS if afforestation is associated with air quality impacts.

References and Definitions

National Planning Procedures Handbook
Title 180, Part 600, Subpart A-General,
600.2 Definitions, (68) Land Use Designation

i. **Crop**. - Land used primarily for the production and harvest of annual or perennial field, forage, food, fiber, horticultural, orchard, vineyard, or energy crops.

ii. **Forest**. - Land on which the historic and or introduced vegetation is predominantly tree cover managed for production of wood products or non-timber forest products.

iv. **Pasture**. - Land composed of introduced or domesticated native forage species that is used primarily for the production of livestock. Pastures receive periodic renovation and cultural treatments, such as tillage, fertilization, mowing, weed control, and may be irrigated. Pastures are not in rotation with crops.

Within the document “other Ag land” refers to Land use designations Associated Agricultural Lands and Other Associated Agricultural Land. Also see the definition of agricultural land under Title 440- Programs, Part 502 Terms and Abbreviations Common to all Programs, Subpart A- Common Terms

Land Program Manuals
Title 440- Programs, Part 502 Terms and Abbreviations Common to all Programs,
Subpart A- Common Terms
502.0 Definitions

**Cropland**
A land cover/use category that includes areas used for the production of adapted crops for harvest. Two subcategories of cropland are recognized: cultivated and non-cultivated.

Cultivated cropland comprises land in row crops or close-grown crops and also other cultivated cropland (for example, hayland or pastureland that is in a rotation with row or close-grown crops). Non-cultivated cropland includes permanent hayland and horticultural cropland, including orchards and vineyards.

In addition, cropland is defined as land that is not currently tilled, but has been tilled in a prior year and is suitable to be tilled for crop production; is currently devoted to one- or two-row
shelterbelt planting, orchard, vineyard, or other related crops; is new land broken out if both of the following conditions are met:

i. Land is planted to a crop to be carried through to harvest.

ii. Tillage and cultural practices in planting and harvesting the crop must be consistent with normal practices in the area; land that is in terraces that, according to FSA records, were cropped in the past even though they are no longer capable of being cropped; land that is in sod waterways or filter strips planted to perennial cover; and land that is currently in a CRP contract under a CRP-1, including alternative perennials, until CRP-1 expires or is terminated. See 2-CRP, paragraph 327, for alternative perennials.

Forest land
A land cover/use category that is at least 10 percent stocked by single-stemmed woody species of any size that will be at least 4 meters (13 feet) tall at maturity. Also included is land bearing evidence of natural regeneration of tree cover (cut over forest or abandoned farmland) that is not currently developed for non-forest use. Ten-percent stocked, when viewed from a vertical direction, equates to an aerial canopy cover of leaves and branches of 25 percent or greater. The minimum area for classification as forest land is 1 acre, and the area must be at least 100 feet wide.

Pasture
Land on which the primary cover is introduced or native forage plants managed by using agronomic practices, such as regular fertilizer applications, liming, and weed control in addition to grazing management.

Also known as “pastureland,” which means a land cover/use category of land managed primarily for the production of introduced forage plants for grazing animals. Pastureland cover may consist of a single species in a pure stand, a grass mixture, or a grass-legume mixture. Management usually consists of cultural treatments: fertilization, weed control, reseeding or renovation, and control of grazing.

Non-industrial private forest land (NIPF)
Rural lands with existing tree cover and other lands including cropland, pastureland, surface-mined lands, and non-stocked forest lands that are suitable for growing trees and are owned by any nonindustrial private individual, group, association, corporation, Indian Tribe, or other private legal entity that has definitive decision making authority over the land.

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