

**Review of Existing Region II-III Reforestation Standards
IMPLEMENTATION RECOMMENDATIONS
June 22, 2016 – Final**

No changes needed

- **No statutory changes needed**
- **No regulatory changes needed for:**
 - **Applicability (11 AAC 95.190 – add conversions to purple book)**
 - **Land use conversions (AS 41.17.110, 11 AAC 95.200, 11 AAC 95.375(b), 11 AAC 95.900(13))**
 - **Clearing of spruce (11 AAC 95.195)**
 - **Harvest unit planning and design (11 AAC 95.340)**
 - **Material extraction and disposal sites (11 AAC 95.325(d)(1))**
 - **Stocking numbers (11 AAC 95.375(b)(4) and (d)(2) and (3))**
 - **Extensions (.375(e) –no change to existing language; add subsection on considering stockable and non-stockable areas)**
 - **Vegetative reproduction (.380(b))**
 - **Regeneration survey review (.385 (b))**
 - **Exemption allowance for dead and dying stands (.375(b)(2), (h))**
 - **Site preparation (additions to training and FLUP)**

Regulatory Changes

| Topic | Text | Notes | | | | | | | | |
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| Stocking standards | <p>11 AAC 95.375. Reforestation requirement. [...] (a) (b) A landowner shall reforest harvested forest land to the fullest extent practicable unless: [...] (4) in Region II or Region III, vigorous, well-distributed residual commercial trees free from significant damage meet or exceed the following standards, or a combination of trees and seedlings approved by the division, meet the following standards:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Average DBH of Remaining Stand – Inches</th> <th style="text-align: center;">Minimum Stocking Standard (in trees per acre)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Greater than <u>or equal to</u> 9</td> <td style="text-align: center;">120</td> </tr> <tr> <td style="text-align: center;">6 to 8</td> <td style="text-align: center;">170</td> </tr> <tr> <td style="text-align: center;">1 to 5</td> <td style="text-align: center;">200</td> </tr> </tbody> </table> | Average DBH of Remaining Stand – Inches | Minimum Stocking Standard (in trees per acre) | Greater than <u>or equal to</u> 9 | 120 | 6 to 8 | 170 | 1 to 5 | 200 | <p>C3am. The existing (b)(4) standard is acceptable – no change needed.</p> <p>IG Change the top category to ≥ 9" so that there is no gap</p> |
| Average DBH of Remaining Stand – Inches | Minimum Stocking Standard (in trees per acre) | | | | | | | | | |
| Greater than <u>or equal to</u> 9 | 120 | | | | | | | | | |
| 6 to 8 | 170 | | | | | | | | | |
| 1 to 5 | 200 | | | | | | | | | |
| Stocking distribution | <p>11 AAC 95.375 Reforestation requirement. (c). In areas within Region II or III where the natural <u>amount or distribution of</u> stocking of commercial trees is below the minimum standards in (b)(4) before harvest, the division will consider a variation from the stocking levels required in (d) of this section. <u>A request for variation under this section must be submitted through a DPO and document pre-harvest stocking level and distribution</u></p> | <p>C6am. The S&TC recommends that the stocking standard in .375(d)(4) allow flexibility to reflect natural variation in stocking distribution prior to harvest. If the landowner plans to request a variation, pre-existing patchy conditions within harvest units should be documented in the DPO. DOF should consider site conditions and non-stockable ground when reviewing a request for variation in tree distribution. The target is to achieve a regenerated stand that is similar to or more fully stocked than the stand that existed prior to the harvest.</p> | | | | | | | | |

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| <p>Stocking distribution</p> | | <p>IG: agrees with recommended change</p> |
| | <p>11 AAC 95.375 (d)(4). no more than 10-20 percent of the harvest area or contiguous areas may be below the stocking levels as set out in (1) or (2) of this subsection.</p> | <p>C8am. Given information on continued recruitment beyond the current deadlines for reforestation (F10), requiring reforestation on 90% of the harvest area within 5-7 years is too stringent. There is not specific information on an appropriate alternative standard currently. Reforestation on 80% of the harvest area is recommended as a more appropriate minimum target based on field experience and the time frame for regeneration surveys defined in the regulations. See also F11 and F12am regarding the benefits of patchiness for wildlife. Time extensions for achieving this standard may be considered under the procedures for extension in .375(e). IG: agrees with recommended change</p> |
| | <p>Variation procedures. 11 AAC 95.235. ((e)-new) <u>In evaluating a request for a variation to reforestation stocking distribution standards under 11 AAC 95.375(d)(4) the state forester will consider non-stockable areas, and long-term and short-term site conditions.</u></p> | <p>C12. The Division of Forestry should consider site conditions and non-stockable areas when reviewing requests for variation from the stocking standard under 11 AAC 95.375(c). Low stocking may reflect both long-term site conditions and conditions that could be remedied by forest management actions. IG: agrees with recommended change</p> |

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| | <p>Natural regeneration. 11 AAC 95.380. (a) If a forest landowner in Region II or III intends to rely on natural regeneration <u>from seed</u> for reforestation, the forest landowner shall ensure a seed source of well-formed, vigorous trees of commercial tree species. The seed source must be capable of distributing an adequate amount of seed throughout the harvest area to meet the reforestation requirements set out in 11 AAC 95.375(d). A forest landowner may not harvest the seed source identified for natural regeneration until the division has received a regeneration report showing that the harvest area has met the reforestation requirements set out in 11 AAC 95.375.</p> | <p>C23. Clarify that .380 (a) applies to natural regeneration from seed rather than vegetative reproduction: “If a forest landowner in Region II or III intends to rely on natural regeneration from seed for reforestation, the forest landowner shall ensure a seed source...” (.380(b) applies to vegetation reproduction.) (K-YES)</p> <p>See also C1am above re information for DPO. IG: agrees with recommended change</p> |
| <p>Natural regeneration</p> | <p>Reforestation requirement. 11 AAC 95.375(d). Reforestation must be achieved within five years after harvest in Region I and seven years after harvest in Region II and Region III as follows:</p> <p><u>(new §§) In Region II or Region III, the division may allow a period of up to 12 years for natural regeneration where site conditions indicate a high likelihood of regeneration success within that period based on information in the DPO.</u></p> | <p>C5am (1st 3 bullets). Where natural regeneration is the selected method of reforestation,</p> <ul style="list-style-type: none"> ▪ Based on information in the DPO, the Division of Forestry may allow a period of up to 12 years for natural regeneration in stands where the indicators show a high likelihood of regeneration success (<i>see F14 above</i>) within that period. ▪ A 12-year period would typically encompass at least one excellent white spruce seed crop, and one or two smaller, but adequate seed crops, as well as multiple hardwood seed crops. ▪ This would also provide enough time for sufficient hardwood stems to escape browsing in the absence of intense browse pressure. ▪ Require a regeneration report after 5 years to ensure that the stand is on a trajectory that is likely to be successful. If the indicators no longer support an extended period for natural regeneration, corrective measures may be |

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| | | <p>required.</p> <p>IG: Recognize that not all sites are appropriate for extended natural regeneration periods.</p> <p>The agencies may consider other actions proposed (e.g., site preparation, harvest unit design) to mitigate concerns in determining whether to extend the regeneration period. (See DPO notes below)</p> |
| | <p>Regeneration survey and report.</p> <p>11 AAC 95.385. (a) A forest landowner in Region II or III shall conduct a regeneration survey and file a regeneration report with the division. A forest land owner in Region I shall file a regeneration report with the division and, if requested by the division, conduct a regeneration survey. A regeneration survey <u>or alternative documentation</u> must be conducted in a manner acceptable to the division. In an area reforested by natural regeneration, planting, or artificial seeding, a regeneration report shall be submitted within [...]</p> <p>2) seven years after the timber harvest in Region II or III. <u>If the period for natural regeneration is extended to twelve years under 11 AAC 95.375(d)(new), a regeneration report must be submitted</u></p> <p><u>a) within five years after the timber harvest to determine whether the reforestation requirements are likely to be met, and</u></p> <p><u>b) within twelve years after the timber harvest to document that the standards have been met.</u></p> <p><u>If either report or field verification shows deficiencies in reforestation, the division will direct the forest landowner to correct them.</u></p> | <p>C5am (4th bullet).</p> <ul style="list-style-type: none"> Require a regeneration report after 5 years to ensure that the stand is on a trajectory that is likely to be successful. If the indicators no longer support an extended period for natural regeneration, corrective measures may be required. <p>C10am. If the deadline for natural regeneration is extended beyond 7 years (see C5am), a reforestation report must be submitted within five years of harvest. (K-YES)</p> <p>IG: concurs with addition of allowance for other forms of documentation acceptable to the Division.</p> |

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| Seed source | <p>Reforestation requirement. 11 AAC 95.375. (f) <u>Unless otherwise authorized by the division, S</u>seeds used for reforestation must be <u>(1) from a similar latitude, climatic area, and elevation as the harvested area, or (2) a mix of seed for native species from similar conditions with seed from up to 10° latitude south of the planting site. Seeds from other locations may be used if they have been demonstrated to be successful and are approved by the Division.</u> unless otherwise approved by the division. <u>(new) Known invasive tree species shall not be planted.</u></p> | <p>C13_options #1 and #2. As noted in F19, natural regeneration and artificial reforestation can both be beneficial in achieving reforestation goals. When artificial reforestation is the chosen approach, given changing climate conditions, sound options include</p> <ol style="list-style-type: none"> 1) Using seed/seedlings of native species from a similar latitude, climatic area, and elevation, 2) Using seed/seedlings of native species from similar conditions in a mix with seed/seedlings from up to 10 <u>degrees latitude south of the planting site.</u> Seeds from farther south may be used if they have been demonstrated <p>IG agrees with recommendation with the following changes to 2): “Seeds from farther south or other locations may be used if they have been demonstrated to be successful.”</p> <p>C14. Species rated higher than 50 on the AKEPIC list of invasive species should not be planted. For example, bird cherry (<i>Prunus padus</i>, rated 74) should not be planted as it has been documented to be harmful to native ecosystems. IG: agrees with recommendation DOF note: specify “know invasive species” in regulation; use the purple book to translate that to AKEPIC >50 so that a change in the AKEPIC system doesn’t require a change in the regulation</p> |
| Exemption from reforestation requirements | <p>Reforestation requirement. 11 AAC 95.375. (g) To apply for an exemption from reforestation requirements under (b)(2) <u>or (c)</u> of this section, a landowner must request an exemption in the reforestation section of a detailed plan of operations under 11 AAC</p> | <p>See also C6am above</p> <p>C9am. New technologies such as satellite imagery, aerial imagery, or lidar in combination with hyperspectral scanning</p> |

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| <p>95.220(10) or a change in operations under 11 AAC 95.230 and must demonstrate that the affected stand is significantly composed of insect and disease-killed, fire killed, wind thrown, or fatally damaged trees. If required by the division, the request must include a description of the sampling procedure, the sampling data, and a data summary. The data summary must show the number of commercial trees per acre that are dead or fatally damaged, and the percentage of commercial trees in the stand that are dead or fatally damaged. Sample plots must be located without bias throughout the affected stand. For stands 1,000 acres or less, the minimum sample density is 10 plots per 100 acres. For stands greater than 1,000 acres, the minimum sample density is six plots per 100 acres. Fewer plots are acceptable if the sample standard error is less than 10 percent of the mean. Either fixed diameter or variable plot sampling methods are acceptable. Sample plots must average approximately at least five sample trees of commercial value. Trees must be recorded by diameter class as either dead, damaged by insects, disease, fire, or wind, or not impacted. The division may accept other documentation or field evidence approved by the division may be used in lieu of sampling, in cases where the extent of damage is obvious.</p> | <p>offer additional options for assessing areas of dead and dying trees. The S&TC recommends that other methods of survey be considered that offer adequate review of requests for reforestation exemptions under 11 AAC 95.375(g) and (h).</p> <p>IG: The IG recommends providing flexibility for landowners to document dead and dying trees through sampling procedures or remote sensing systems acceptable to the Division.</p> |
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Non-Regulatory Implementation Actions

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| Implementation Handbook “Purple Book” | <p>Definitions.</p> <p>11 AAC 95.900. (9) "commercial operation" and 10) "commercial timber harvest" mean:</p> <p>A. in Region I or II, an operation or harvest with an annual production in excess of 10,000 board feet of wood products for sale; and</p> <p>B. in Region III, an operation or harvest with an annual production in excess of 30,000 board feet of wood products for sale;</p> <p><i>Add conversion factors to purple book</i></p> | <p>C22. The S&TC recommends development of applicability thresholds for Region II and III that reflect non-BF measurements for harvests that are not focused on sawtimber</p> <p>IG. The IG recommends adding conversion factors to the Implementation Handbook to translate the board-foot thresholds into cubic feet/cunits, cords, and tonnage.</p> <ul style="list-style-type: none"> • Convert cubic feet to cords at 85 cf • Add conversion factors – see separate chart |
| | <p>Add explanation that</p> <p>1) Species that have been demonstrated to naturalize in Alaska without becoming invasive, including lodgepole pine and Siberian larch may be considered commercial species and considered for reforestation under 11 AAC 95.375 <u>with the approval of the Division</u>.</p> <p>2) Variations for operational-scale assisted migration trials may be considered under 11 AAC 95.235(c) to provide for systematic evaluation of suitability of native and non-native species and non-local seed sources for commercial reforestation.</p> | <p>C13-bullets #3 and #4/IG. As noted in F19, natural regeneration and artificial reforestation can both be beneficial in achieving reforestation goals. When artificial reforestation is the chosen approach, given changing climate conditions, sound options include [...]</p> <p>3) Including species that have been demonstrated to naturalize in Alaska without becoming invasive, including lodgepole pine and Siberian larch.</p> <p>4) Providing for systematic evaluation of operational-scale assisted migration trials <u>within and among species</u>.</p> |

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| | <p>Add explanation for 11 AAC 95.375 (f)(new) that: Species rated higher than 50 on the Alaska Exotic Plants Information Clearinghouse (AKEPIC) list are considered known invasive species and should not be planted.</p> | <p>C14. Known invasive species, including species rated higher than 50 on the Alaska Exotic Plants Information Clearinghouse (AKEPIC) list of invasive species should not be planted. For example, bird cherry (<i>Prunus padus</i>, rated 74) should not be planted as it has been documented to be harmful to native ecosystems. (K-YES)</p> <p>AKEPIC List: http://accs.uaa.alaska.edu/invasive-species/non-native-plant-species-list/</p> |
| DPO | <p>Add to DPO Supplement C: Tree species considered by the Division for stocking purposes include Sitka spruce, white spruce, Lutz spruce, aspen, balsam poplar, western black cottonwood and paper birch <u>or other commercial species approved by the Division.</u></p> | <p>IG: Add to DPO Supplement C on acceptable species: Tree species considered by the Division for stocking purposes include Sitka spruce, white spruce, Lutz spruce, aspen, balsam poplar, western black cottonwood and paper birch <u>or other commercial species approved by the Division.</u></p> |
| | <ul style="list-style-type: none"> • Add checkboxes for indicators • Add checkbox for request for extended period for natural regeneration • Add 11 AAC 95.380 list of species for vegetative reproduction • Add notes box for describing site conditions for boxes checked “NO” on the DPO form <u>or describing other site specific conditions.</u> • <u>Add notes from IG</u> • <u>Adding in a checkbox for season of harvesting.</u> | <p>F14am. The S&TC identified indicators of the likelihood that regeneration without planting will successfully result in a forest that can produce a sustained yield of commercial species:</p> <ul style="list-style-type: none"> • Seed bed conditions: <ul style="list-style-type: none"> ○ Moss layers are absent or shallow (e.g., moss is likely to dry out after the stand is opened); ○ For birch and spruce: exposed mineral soil will exist after harvesting and/or site preparation on at least 25% of the harvest unit, and is well-distributed across the unit. • For vegetative reproduction from suckering: soil disturbance is minimized. • Availability of seed sources <ul style="list-style-type: none"> ○ For white, Lutz, or Sitka spruce: <ul style="list-style-type: none"> ▪ proximity to seed trees (within 3 tree heights) ▪ exposure to prevailing winds, |

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| DPO | | <ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Large seed crop in year prior to harvest or current year <ul style="list-style-type: none"> ○ For birch: proximity to seed trees (within 2 tree heights If wind is limited by surrounding canopy) ○ For aspen and cottonwood: exposure to prevailing winds. • Risk of vegetative competition is low <ul style="list-style-type: none"> ○ No more than 2% of the area is covered by <i>Calamagrostis</i> prior to harvest (Man et al. 2008). Sites on toe-slopes, fine-textured soils (silt or finer), and other moist sites are more likely to be subject to grass competition. ○ Presence of <i>Equisetum</i> prior to harvest indicates good sites for white spruce regeneration (Cater and Chapin, 2000). • Existing stands are not infested with spruce beetles (<i>Dendroctonus</i> and <i>Ips</i>) • <i>Tomentosus</i> root rot is not evident in stands where spruce regeneration is desired • The site is not currently subject to intense herbivory due to <ul style="list-style-type: none"> ○ peaks in the hare population cycle, ○ dense moose populations, ○ scarcity of browse on the landscape (i.e., isolated patches of reproduction are more vulnerable to herbivory), or ○ microtenes (e.g., tundra voles) on Kodiak-Afognak. (K-YES) <p>IG:</p> <ul style="list-style-type: none"> • Add the indicators in F14am to the DPO Reforestation Commitment form as checkboxes • Amend the bullet on aspen regeneration from suckers to: “For |
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DPO

vegetative reproduction from aspen suckering: root damage soil disturbance is minimized.” Soil disturbance can be needed to remove organic mats and increase soil temperature.

- Include the following notes on the form:
 - If likely competition or other factors indicate challenges for natural reforestation, prompt reforestation through site preparation and/or artificial regeneration is recommended to ensure success and minimize costs.”
 - Where vegetative reproduction is targeted the harvest area: Contains sufficient, well-distributed paper birch, aspen, balsam poplar, western black cottonwood, red alder, or other species known to revegetate vegetatively as approved by the Division.
 - *Calamagrostis* (bluejoint grass) is not visually evident. If *Calamagrostis* is visually evident, describe abundance and distribution in notes box below. Note: *Calamagrostis* coverage of more than 1-2% indicates that grass coverage may expand rapidly after harvest without treatment.
 - **Add to point on *Tomentosus* root rot:** Harvest areas are free of known incidence of *tomentosus* root rot. Note: *tomentosus* can kill regeneration of spruce and, to a lesser degree, pine and larch. If *tomentosus* is present, describe the extent of the problem in the notes box below. Reforestation should be designed to minimize continuation or spread of the disease.
- Add to DPO Supplement C on acceptable species: Tree species considered by the Division for stocking purposes include Sitka spruce, white spruce, Lutz spruce, aspen, balsam poplar, western black cottonwood and paper birch or other commercial species approved by the Division.

C1am. DPOs need more in-depth information where natural regeneration is the planned reforestation method. Information provided should address the seven indicators of likely natural

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| | | regeneration success or failure in F14am and information on planned or completed site preparation or supplemental planting. Regulation (K-YES) IG: Add the indicators to the DPO supplemental form. |
| FLUPs | The information required in the DPO Reforestation Commitment and Supplement C should also be addressed in FLUPs for state timber sales. | Provide the information on natural regeneration from the DPO Reforestation Commitment and Supplement C in the FLUP for state sales. (F14 and IG notes under DPO section above.) |
| | Site preparation | C16. Mechanical site preparation should avoid driving heavy equipment over den sites greater than 12” in diameter (e.g., dens for fox, wolves, bears). implementation through FLUPs/contracts on state land, IG: agrees with recommendation |
| Cooperative planning | Research & monitoring cooperative | IG: Support for re-establishing the Northern Forest Cooperative or a similar group to share information on ongoing research, research needs, improve collaboration, etc. This could help move forward the high priority research needs. The Working Forest Group is a possibility for help coordinating. The All-hands/All Lands group on the Kenai performs a similar function |
| | Reforestation planning | R12. The S&TC recognizes that climate change is likely to lead to large-scale disturbances (e.g., more frequent and extensive wildfire and insect infestations) that will result in needs for reforestation. The S&TC recommends that the State and other landowners conduct cooperative advanced planning to meet anticipated needs for reforestation. Possible actions include seed collection and maintenance of seed banks. (K-YES) IG-OK |

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| Training | Natural regeneration | IG: Training is needed on the natural regeneration indicators. |
| | Site preparation | C16. Mechanical site preparation should avoid driving heavy equipment over den sites greater than 12” in diameter (e.g., dens for fox, wolves, bears). Education and voluntary cooperation with private landowners under AS 41.17.910 IG: agrees with recommendation |
| | Invasive species | <p>See also C13 re planting options</p> <p>C18. Invasive plant species are becoming increasingly widespread in Alaska, and some invasive species have the potential to impact reforestation. For example, bird vetch (<i>Vicia cracca</i>) has been documented in forest areas covering seedlings and saplings. Equipment used for scarification or planting can introduce invasive species to harvested areas. Before equipment is used on a reforestation site, it should be cleaned and inspected to minimize introduction of invasive species. .</p> <p><i>Consider this recommendation for harvest equipment also. The S&TC recognizes that this can be a challenge for landowners and operators and encourages the IG to consider ways to encourage voluntary adoption, and notes some history of success in other industries, e.g., gravel sales. Possible new regulation; implement through FLUPs on state land, or other voluntary methods</i></p> <p>IG re C18 and C19: The IG recognizes that spread of invasive species can be a problem. Movement of vehicles can help spread invasive species, including – industrial, research, recreation, highway maintenance, etc. The IG encourages voluntary use of the following guidance for reforestation equipment and other vehicles, and encourages the agencies to provide information and training about known invasive species, and prevention of spread, and where known, safe locations for washing vehicles.</p> <ul style="list-style-type: none"> • Scout for invasive plants before performing work in an area. • Identify known locations of invasive plants, report new locations, and make use of local knowledge and groups if available. • Avoid working in areas with invasive plants, and work from areas without to areas with invasive plants if that is not possible. |

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| Training, cont. | Invasive species, cont. | <ul style="list-style-type: none"> • Time your operations to prevent or reduce seed production or seed dispersal. • Revegetate with native, local, and/or noninvasive species. • Use certified weed-free materials, including seed mixes, gravel, topsoil, hay/straw, erosion control tubes, etc. • Clean vehicles and equipment regularly, using high pressure washer and physical removal, before leaving areas with invasive species. • Inspect equipment when arriving at sites without invasive species. |
| | Institutional knowledge | <p>C11. The S&TC emphasizes the importance of capturing and synthesizing institutional knowledge on the role of scientific information in developing the FRPA and regulations, identifying research priorities, and exercising professional discretion in applying the standards. It is important to convey the reasons for developing the standards to agency staff, landowners, and operators. This is particularly important in the context of losses of experienced staff. Implement through administrative actions –compile and document staff knowledge, train new employees, and develop, make available, and publicize training materials. (K-YES)</p> <p>IG: The IG concurs with the need for this information and recommends getting copies of FRPA training materials to IG and others. The agencies should work with Cooperative Extension to help warehouse information in an accessible place.</p> <p>Note: UAF and Coop Extension have expertise in developing training materials, including video presentations.</p> |

| Topic | Priority | Research and Monitoring Needs |
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| Stocking and stand development | Moderate | R4. Based on existing data, including the Levels-of-Growing-Stock (LOGS) study (e.g., Hollingsworth 2002, Packee 2001, 1999(b)), the existing standard in (d)(2) is acceptable. However, additional research is recommended on how stands at densities of 450 seedlings per acre and higher develop over the rotation in terms of form, growth rate, and mortality. Studies should review both spruce and hardwood stands. IG - OK |
| | Very High | R10. Recommend a systematic review to document forest regeneration that has occurred on harvest areas in relation to local site conditions and forest management practices. This would be similar to the study done by Miho Morimoto in the Fairbanks area. Priorities for studies are the Tyonek, Copper Basin, Mat-Su, Kenai, and Tok-Delta areas, as well as more remote areas with a history of harvesting. (K-YES) IG-OK; contributes to developing model in R14am. Consider Tyonek and Caribou Hills studies; also Kenai Peninsula Borough plantings on small private ownerships and areas covered by Jandreau report on the Kenai Peninsula. |
| | High | R14am. To better predict future growth and yield, we need better information on the timing and processes that occur between harvesting and canopy closure in both spruce and hardwood stands, particularly on sites where natural regeneration is the means of achieving reforestation. IG – OK; include assessment of the effect of different site preparation and reforestation methods. It would be helpful to have Forest Vegetation Simulator (FVS) modules predicting stand development in interior and southcentral Alaska in the US Forest Service growth model. |
| Reforestation after infestation | Moderate | R3am. What reforestation and forest development has occurred on harvested areas exempted from reforestation requirements following spruce bark beetle mortality, with and without subsequent burning? How do they compare to areas that were logged and reforested? IG - OK |
| Site prep | Low | R8. Research is needed to determine the optimum conditions and timing for use of prescribed fire to achieve tree regeneration in birch-dominated stands where grass competition after disturbance is a concern. IG-OK. Note: This is focused on birch stands where there is a risk of competition from grass. The low rating relates to the difficulty of using prescribed fire in Alaska due to wildfire risks and shortage of staff to manage prescribed fires, etc. |

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| Site prep | Very High | R15-IG new. Research is needed to determine the optimum methods for mechanical site preparation to achieve tree regeneration in stands where grass competition after disturbance is a concern. Studies should include equipment and timing. |
| Seed source | Moderate | R7. Good records on seed source are valuable to assess reforestation success and contribute to research on adaptation to climate change. The S&TC recommends that 1) landowners maintain records of seed and seedling sources, 2) a group be convened to compile and analyze existing records, and address questions of successes and risks in selecting seed sources, 3) information on Alaska tree seed sources be included in the national gene data bank. (K-YES) IG - OK |
| | Very High | R9. Systematic testing of non-native species for potential benefits and risks in adapting to climate change is encouraged, with a focus on species that are known to be capable of naturalizing in Regions II and III (see also C13am regarding options for planting). (K-YES) IG – OK. The IG recommends documentation and ongoing monitoring by DOF or another agency/institution of existing provenance trials such as those established by John Alden. IG – Add: More information is needed on how seedlings of native species from other provenances and non-native species grow over a full rotation. Existing and future provenance trials need to be tracked over long periods of time and documentation preserved and kept publicly available. |
| Harvesting, regeneration, and wildlife | High | R6am. In the long term, a monitoring program of stand- and landscape-level harvest treatments provides the opportunity for adaptive management of both forest regeneration and beneficial ecosystem services of wildlife. Timber harvest in Regions II and III has historically been small (10-40 acre) diameter-limit cuts that reflected the patchiness of the forest, and most research has focused on that type and scale of harvest. For boreal forests, we recommend research on whether timber harvest could mimic landscape patterns of natural burns by having larger sale units that retain multiple “habitat islands” to mimic unburned patches with late-seral forest characteristics (Hunter 1993). Larger sale units would create more early seral forage that should reduce proportional browsing effects compared to relatively small timber sales in a matrix of mature forest. Retention islands provide interior forest conditions and a wind-firm environment for retention of snags or cavity trees compared to retaining single trees or more open harvest units. This monitoring strategy for timber sales provides a means of hypothesis testing to determine: (1) the optimal size of “habitat islands” for selected wildlife species or guilds, and (2) the key habitat features that best provide for commercial tree output while sustaining the wildlife populations and key ecosystem services |

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| Harvesting, regeneration, and wildlife | | <p>described in the bibliographic summary (e.g. maintain habitat for wildlife species that inoculate soil with mycorrhizal fungi and for species that prey on tree herbivores).</p> <p>Gaining reliable knowledge through adaptive management (Walters and Holling 1990, Fisher 2002) would be best achieved with (1) explicit objectives for tree and wildlife species and (2) at least 2 plausible cause-effect mechanisms for each treatment variable before logging and reforestation activities begin. Monitoring designs should include non-treatment (control) sites to discern possible confounding of treatment effects and include the context of spatial scale when interpreting outcomes at specified future dates.</p> <p>(K-YES) IG – OK; add: For example, follow-up studies on large-scale harvests on the Kenai Peninsula in response to the spruce bark beetle outbreaks would be valuable for assessing wildlife use as well as reforestation across the landscape.</p> |
| | Moderate | <p>R5am. In the short term, recent research highlights a need to identify the degree to which key timber species in the Interior rely on root-associated fungi dispersed by red-backed voles, the most common small mammal in Alaska boreal forests. Obligate dispersal of spores by red-backed voles is positively related to extent of forest retention in the Pacific Northwest (Jacobs and Luoma 2008), and recent data for Alaska point to an unexpectedly high amount of fungi in the diet of this species (Baltensperger 2015). Diets of <i>Microtus</i> voles in Alaska also include fungi, but to a lesser degree than red-backed voles (Baltensperger et al. 2015). The relative importance of <i>Microtus</i> in dispersing key mycorrhizal fungal spores in Alaska is unknown. K-YES IG-OK</p> |
| | Moderate | <p>R13. Whole-tree logging alters debris at harvested sites, thus potentially impacting small mammal species that can promote regeneration via dispersal of tree-root fungal spores (F17am). The primary research goal is to determine whether differences in debris loading (volume and size class) or dispersion following whole-tree logging are associated with an alteration in peak rodent abundance measured in late summer. Experimental design could evaluate debris patterns and wildlife outcomes before vs. after logging, and compare this to control sites. It may be possible to evaluate outcomes under different winter conditions (extreme vs. moderate temperature vs. snow-free). Logging during extreme cold and/or snow-free conditions is expected to produce the greatest debris shed during skidding. Sampling design should also include the factor of green coniferous debris >4" diameter as a risk factor of <i>Ips</i> and spruce beetle damage on surrounding live conifers (F17am). Substantive differences in small mammal abundance associated with differences in debris may inform harvest guidelines for maintaining debris on harvested sites as habitat for species that are the primary dispersing agent of key tree-root (mycorrhizal) fungi. (K-YES) IG-OK; need to include consideration of economics among harvesting systems.</p> |