Forest Management Definitions by Forest Type for Silviculture Scenarios

The following table provides an overview of management definitions by forest type for the four silviculture scenarios simulated using the Forest Vegetation Simulator. For additional details, see "*Estimating current and future carbon stocks and emissions in Minnesota forest and forest products under multiple management scenarios*," Section 4: Forecasting Forest Conditions Under Management Scenarios.

Forest Type	**No Management Silviculture Scenario**	**Business as Usual (BAU) Silviculture Scenario** *Primarily derived from regional forest management guides, MN DNR forest cover type guidelines, & extensive expertise.*	**Climate-adapted Silviculture Scenario** *Primarily derived and modified from Adaptive Silviculture for Climate Change experiments & extensive expertise.*	**Economic Intensive Silviculture Scenario** *Primarily derived from regional forest management guides, MN DNR forest cover type guidelines, personal communication, observation, & extensive expertise*
Aspen/birch	No management	Harvest aspen at year 50; simulate two cycles. Leave conifer residuals as leave trees.	Plant mixed-woods systems and encourage conifer with aspen (40%), white spruce (40%), eastern white pine (10%), and northern red oak (10%). Harvest 50% of aspen at year 40 and let conifers grow; second harvest at year 75.	Clearcut with no residuals every 40 years.
Red pine	No management	Thin from below to 90 sq ft/ac every 20 years. Leave white pine as leave trees. Rotation at 90 years.	Plant red pine and native future-adapted species in half of stand, including eastern white pine, northern red oak, bur oak, and red maple. Thin from below; thinning to 120 sq ft/ac every 20 years. Extended rotation of 150 years. Run additional fire option.	Thin from above to 90 sq ft/ac at year 30; second thin from above when 130 sq ft/ac; Third thin from above ten years following second thin; remove overwood at year 70.

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Upland spruce/fir	No management	Thin from throughout diameter range 50% of basal area at year 40-50 (low SI [<50 ft]) or year 20-30 (high SI [>50 ft]). Rotation age: 65-75 years (high SI) or 90-100 years (low SI).	Manage for mixed-wood systems – plant upland spruce crop trees while encouraging aspen growth. Clearcut at age 100.	Thin from throughout diameter range at year 35 to 90 sq ft/ac, clearcut at year 55; promote natural regeneration of aspen.
Oak	No management	Two-stage shelterwood cut; first cut at year 80, removal of overwood at 90.	Plant native future-adapted species in half of stand, including basswood, black cherry, and bur oak. Three-stage shelterwood cut; first cut at year 70, second prep cut at 95 with planting, final removal cut at 110. Additional fire option.	Thin at year 50 (remove 40% of basal area from throughout the diameter range); two-stage shelterwood cut; first cut at year 70, removal of overwood at 80.
Northern hardwoods	No management	Thinning every 20 years beginning at year 50; thin to 90 sq ft/ac.	Selection harvests, with cuts every 20 years beginning at year 50 to promote uneven-aged stands. Shift to variable density harvests with both patches and thinning the matrix.	Thin year 50 and 70 to 90 sq ft/ac; shelterwood with reserve at year 80, reserves compose 30 sq ft BA, promoting red oak, basswood, yellow birch.

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Lowland conifers	No management	Clearcut between year 80 and 120 - no residuals. Rotation age for high site index (> 35 ft) is 80-90 years and for low site index (< 35 ft) is 110-120 years.	Shelterwood with reserves at year 100, with the likelihood that the reserve trees will fall over creating down dead wood. Regeneration of black spruce, eastern larch, northern white cedar, aspen, eastern white pine, and paper birch.	Same as lowland conifers BAU scenario.
Black ash	No management	On more mesic hardwood sites, clearcut with aspen, balsam poplar, and ash resprouts. On more wet sites, group selection with underplanting. Group selection cuts of 25% of the stand of the stand happening every 20 years. Underplanting of swamp white oak, balsam poplar, sycamore, and river birch. Includes a scenario that simulates EAB mortality. Increased disturbance and spread out mortality on all stands across first 50 years of simulation. Specified a 100% mortality rate to all black ash >= 1.0 inches DBH.	Same as black ash BAU scenario.	Heavy shelterwood with reserves. Harvest at year 90 to a basal area of 40 sq ft.

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Other	No management	Thinning every 20 years beginning at year 30; thin to 90 sq ft/ac. Clearcut at year 70.	Aggregated shelterwood with reserves with the goal of increasing species diversity.	Thin at year 35; clearcut at year 50.