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MIDSTORY REDUCTION TREATMENTS WITH A SHINN SC-1

Fire: forest protection *October 1999*

INTRODUCTION: Fire control and exclusion have led to an increase in the non-commercial midstory and understory components of forest stands on the Croatan National Forest near the coast of North Carolina. The growth of this vegetation has created a fire risk in the wildland-urban interface. The use of a mechanical fuel management treatment is being explored in areas where fire cannot be safely implemented.

Fig. 1: The Shinn SC-1 boom-mounted rotating drum.

Shinn Cutting Systems of Concord, North Carolina has developed a cutting system that can reduce unwanted vegetation into mulch. The machine it uses was originally designed for utility line clearing. The owner of the machine, Foster's Clearing of Fort Mill, South Carolina, typically clears utility right-of-ways, although it occasionally uses the Shinn SC-1 to remove individual trees in residential areas.

GENERAL FEATURES: Resource managers are concerned with mechanically removing midstory and understory stems at an affordable price while protecting the soil and residual trees. Stands identified for this treatment typically cannot be prescribe burned due to smoke management concerns or risk of fire climbing into the crowns of the overstory trees. No market exists in these areas to warrant commercially removing the shrubs, saplings, and vines.

Fig. 2: The Shinn SC-1 head at work on a Komatsu excavator.

In February 1999, the U.S. Forest Service Southern Research Station contracted the Shinn SC-1, with an operator, to clear the understory and midstory vegetation in two areas on the Croatan National Forest in Havelock, North Carolina. One area was bordered by a shopping center, a four-lane highway, and the Cherry Point Marine Base. The other area was immediately adjacent to an apartment complex with buildings within 20 feet of the forest boundary.

While this demonstration was implemented on National Forest land, this

type of operation has application on private lands. This system can be used to create and maintain permanent fire lines or to mulch old log decks.

OPERATION: The boom-mounted head contains a rotating drum with a series of 40 individually replaceable quad-pointed teeth. As the drum connects with vegetation, it severs the stem, mulches it in the head, and discharges the material in front of the machines in a forward motion. The drum housing includes two baffles that keep the material in the head until it is small enough to be discharged. Additional baffles can be added to process finer chips. The cutting system can be used to mulch standing as well as down material. It can also mulch piled material.

During the Croatan demonstration, the machine mulched the material to an acceptable level with just one pass. Within the study plots, the vegetation, existing overstory tree damage, and existing soil damage were classified prior to treatment. All trees five inches and less dbh were prescribed for removal. The Shinn effectively mulched all this material. Downed logs and old road construction log piles were processed into mulch as effectively as the smaller vegetation and debris.

SPECIFICATIONS AND COSTS: The stands had been regenerated naturally. The average production rate over all production plots was approximately 0.43 acres/productive machine hour. Stands planted in rows may result in a higher production rate. Assuming all new equipment, the machine cost was estimated at $92/scheduled machine hour, including an operator. Fuel use was estimated based on horsepower of the machine.

Shinn modifies excavators for its cutting systems. In 1997 Foster's Clearing had the Shinn SC-1 mounted on the boom of its 1996 Komatsu PC 220LC. The machine modification consisted of adding a Cummins C8.3-240 horsepower engine behind the existing engine and installing hydraulics (including a Sunstrand 25 pump). The hydraulic pressure to the system is 3,900 psi with a flow rate of 94 gallons per minute. The modification adds approximately six feet behind the existing engine compartment. The Shinn SC-1 modifications cost approximately $150,000. No modifications were made to the boom. The modification adds approximately 11,800 pounds to the excavator.

Shinn manufactures two larger systems, the SC-2 and SC-3, which have higher horsepower engines and faster recovery times than the SC-1. Shinn also manufactures a smaller system, the SC-Lite, which is intended for mounting on a 130 or 150 size excavator. This system adds only 3,200 pounds to the weight of the excavator and only 3.75 feet to the machine length. Resource managers may want to use this machine for midstory reductions when close tree spacing dictates a smaller machine for maneuverability.

Further information concerning this cutting system or other mechanical treatments may be obtained from either of the authors.

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