WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD
(Updated OCTOBER 1998)

Scientific Name: *Silybum marianum* (L.) Gaertn.

Common Name: milk thistle

Family: Asteraceae/Compositaea

Legal Status: Class A

Description and Variation:
Milk thistle is described as an annual, winter annual and biennial herb. It is an annual in its native range. The main stem is stout, ridged and branching, and the overall plant size can range from 2 to 6 feet tall. A distinguishing characteristic of milk thistle is the white patches, or marbling found along the veins of the dark green leaves. The broad leaves are deeply lobed, and basal leaves can be 20" long and 10" wide. The leaf margins are yellow and tipped with woody spines 1/8" to 1/2" long. The leaves are alternate, and clasping to the stem. The stem leaves are smaller and not quite as lobed. Each stem ends in a solitary composite flower head, about 2" in diameter, consisting of purple disc flowers. The flower head of milk thistle differs from other thistles with the presence of broad leathery bracts that are also tipped with stiff spines ¾" to 2" long. The seeds are heavy, ¼" long, flat, smooth and shiny, and the color ranges from black to brown mottled. The seeds do have a tuft of minutely barbed bristles, which is deciduous, and falls off in a ring when the seeds mature.

Economic Importance:
Detrimental: Considered toxic to livestock, the bigger concern of milk thistle is the establishment in rangeland or pastures with dense stands displacing native or beneficial forage species. Dense, established milk thistle stands in California produce 1.4 million viable seeds per acre and 4 tons of vegetation per acre (Roche' 1991). Heavy infestations limit the movement of livestock and prevents access to water. Low weed densities are able to displace a high number of pasture plants, as the rosette of a milk thistle plant can reach 3 feet in diameter(Sindel 1991). Milk thistle is an established weed in Canada, southwestern Oregon, California, Texas and Nebraska. Milk thistle has escaped cultivation in central Texas to infest over 200,000 acres in three counties. Contaminated seed from California led to sugar beet infestations in Nebraska (Omtvedt 1984).

Milk thistle is a nitrate accumulator, lethal when livestock ingest the plant, particularly in the early wilting stage - whether it wilts from mowing, drought or herbicide application (Roche' 1991). Livestock deaths are attributed to nitrate poisoning from milk thistle in Australia and California (Kingsbury 1964).

Economic Importance:

Beneficial:
Milk thistle is an ancient medicinal plant used to purify and protect the liver as early as 23-79 AD. Milk thistle positively effects all forms of liver disease. The active chemical component of milk thistle is silymarin, which is a combination of three flavonoids. The seeds contain the highest amount of silymarin, but the whole plant is used medicinally. Silybin (part of the chemical structure of silymarin) is an antioxidant, it also alters the membrane structure of the liver cell, blocking the absorption of penetrating toxins into the cell. Silybin stimulates the production of new liver cells to replace damaged cells (www.kcweb.com/herb/milkt.htm).

An injection of silybin is an antidote for Death Cap mushroom (*Amanita phalloides*) poisoning (Turner and Szczawinski 1991; www.kcweb.com/herb/milkt.htm). Milk thistle is kept in German hospitals for emergency treatment of Death Cap poisonings.

Habitat:
Milk thistle, and thistles in general, occur in fertile lands of improved pastures that have been overgrazed and poorly managed (Sindel 1991). It is considered ruderal, or weedy, in its native range, and is found in dense stands along roadsides, waste areas and it prefers high fertility soils (Gabay et al. 1994). Pastures are invaded from roadside populations, ditches and disturbed areas.
Geographic Distribution:
Milk thistle is native to the Mediterranean region of Europe.

History:
Milk thistle was listed on the first South Australia noxious weed list of 1851. Agricultural practices of the 1940's contributed to the spread in Australia (Sindel 1991). This species is now found in the United States, Canada, New Zealand, Australia, South Africa, Chile and Argentina. In Washington, field infestations are found in Clark, Cowlitz and Klickitat Counties, with ornamental sites occurring elsewhere. Oregon infestations are heavy in the southwestern part of that state, with scattered sites in the Willamette Valley, and it is widespread in California. Milk thistle can be found as a garden ornamental, and shows up in flower and vegetable seed packets (Roche' 1991).

Growth and Development:
Milk thistle is considered to be an annual, winter annual or biennial outside of the native range. Thistles classified as an annual or biennial may complete an annual life cycle if they can germinate early enough in the growing season. Late winter and spring seedlings will behave as a biennial. Germination occurs in autumn and spring. Seedling establishment is favorable after fall rains begin, particularly after a dry summer when there is an absence of grass cover, as thistle seedlings require light (Medd and Lovett 1979a as cited in Groves and Kaye 1989). Milk thistle overwinters as a rosette, sometimes reaching 3 feet in diameter. Some cold temperatures are required for flower production. Each flower head produces about 190 seeds, with an average of 6,350 seeds per plant, with 94% viable. The seeds show little to no dormancy requirement, and any dormancy length is affected by temperature and moisture. Seeds remain viable for 9 years, or more (Sindel 1991). Dormancy is induced when buried in the soil. Germination rates are higher in older seeds (Groves and Kaye 1989). The seeds are heavy, with a deciduous plume, and they often fall near the parent plant (Roche' 1991). Strong vegetative growth and allelopathy during germination could account for the dense, monospecific stands (as cited in Gabay et al. 1994).

Reproduction:
Milk thistle reproduces by seed. Unopened, fully formed flower buds will produce seeds if left attached to the plant (Sindel 1991).

Response to Herbicide:
Annual thistle are most susceptible to chemical control in the fall. Biennial thistles are most susceptible to control in the early spring, in the rosette stage, although the rosettes may cover some seedlings (Hodge 1970 and cited in Sindel 1991). For specific chemical control recommendations, refer to the Pacific Northwest Weed Control Handbook, updated annually (William et al. 1998).

Response to Cultural Methods:
An integrated pasture management approach is effective in thistle control. Practices include establishment of perennial pastures species, slashing/mowing, goats as initial grazers, herbicides when necessary and grazing management. Thistles are the most susceptible to control during the seedling stage, or as they grow from the seedling stage to the rosette state. Goats will graze milk thistle. Less than 1% of seeds passed through their digestive tract, and none of those germinated (as cited in Sindel 1991).

Response to Mechanical Methods:
Mowing may prolong plant survival for another year, producing plants more resistant to chemical control (Sindel 1991).

Biocontrol Potentials: The European weevil *Rhinocyllus conicus* was released in Canada in 1968, and released in southern California in 1971 for milk thistle control. This weevil has an annual life cycle, and attacks thistles in the genera *Carduus, Onopordum, Silybum* and *Cirsium*. (Goeden and Ricker 1974). The larvae of *R. conicus* do not always attack the seed tissue of milk thistle, even though they are often found in the seed head. (Coombs et al. 1995) *Septoria silybi* is a fungus, causing leaf lesions, interfering with photosynthesis (Roche' 1991).

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Rationale for Listing:

Considered weedy in its native land, milk thistle spread and established in agricultural lands, rangelands and pastures in Oregon, California, Texas and Nebraska. As a member of the composite family, milk thistle is a prolific seed producer, and seedling establishment favors road sides and waste areas, spreading into pastures and rangelands. Milk thistle can be found as a garden ornamental, and it shows up in seed packets of both garden flowers and vegetables

Milk thistle is a Class A noxious weed, where limited field infestations at this time make eradication a feasible goal.