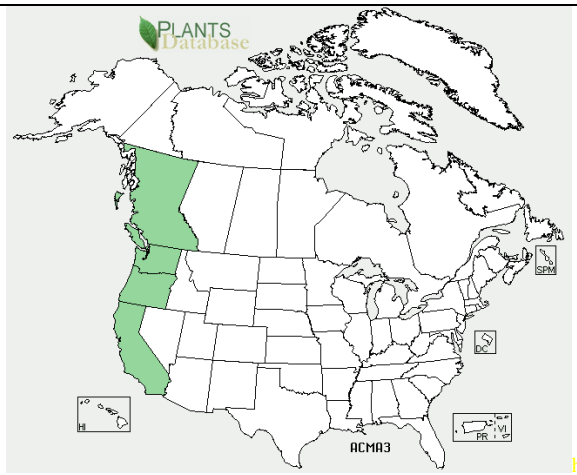
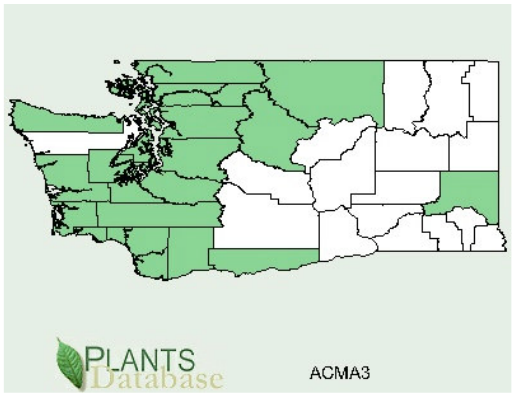
Plant Propagation Protocol for *Acer macrophyllum*
ESRM 412 – Native Plant Production
Spring 2009

TAXONOMY	
Family Names	
Family Scientific Name:	Aceraceae
Family Common Name:	Maple Family
Scientific Names	
Genus:	*Acer*
Species:	*macrophyllum*
Species Authority:	Pursh
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s)	*A. auritum*, A. *murrayanum*, A. *speciosum*, A. *coptophyllum*, A. *dartyophyllum*, A. *flabellatum*, A. *hemionites*, A. *leptodactylum*, A. *platypterum*, A. *politum*, A. *stellatum* (Van Gelderen at al.).
Common Name(s):	Big Leaf Maple, Oregon Maples (Pojar and Mackinnon).
Species Code:	ACMA3
GENERAL INFORMATION	

Geographical range for North America and Washington State:	 http://plants.usda.gov/java/profile?symbol=ACMA3  http://plants.usda.gov/java/county?state_name=Washington&statefips=53&symbol=ACMA3
Ecological distribution:	A shade-intolerant plant, distributed in submontane to montane zones. Occurs in cool mesothermal climates on fresh to very moist, nitrogen-rich soils. Populations increase with decreasing elevation and latitude (E-Flora BC).
Climate and elevation range:	Cooler temperatures dry to moist areas and in both lowland and montane zones (E-Flora BC). Can tolerate pH range of 4.8-7.0 (USDA). Elevation is mostly in the mid to low range, below 300 meters (Washington Native Plant Society, WNPS). This information differs from original protocol.
Local habitat and abundance:	At its minimum planting density per acre is 300, at its maximum its 700 (USDA). Grows more abundantly in open forests and slide areas. Prefers logging, burned, and disturbed sits (WNPS). Often grows along side pure or mixed-species stands of trees, commonly red alder or black cottonwood. Such associations are regularly on alluvial, seepage, stream-edge sites, and occasional on water-shedding sites (E-Flora BC). Other associated species: *Abies grandis, Acer circinatum, Aluns rubra, Arbutus menziesii, Cornus nuttallii, Picea sitchensis, Populus trichocarpa, Pseudotsuga menziesii, Pacific yew, Thuja plicata, Tsuga heterophylla* (USDA: Forestry Service).
Plant strategy type / successional	Fast growing; can regenerates copiously from stump sprouts in cleared areas. This can hinder revival and growth of lost/new conifers. The bark

stage:	supports moss communities because it its rich in calcium. Early successional stage plant and characteristically found in young-seral forests (E-Flora BC).
Plant characteristics:	This plant is a deciduous tree. Can grow to 20-30 m tall and 1-1.5 meters around (WNPA). Moderately long-lived, individuals can grow for 300 years (OWIC). Large 5-lobed leaves, hanging cylindrical flower clusters, and paired winged (samaras) fruit (Hitchcock & Cronquist).
PROPAGATION DETAILS	
Ecotype:	Marin Country, California (Young, NPN 2001).
Propagation Goal:	Plants
Propagation Method:	Seed
Product Type:	Container (plug)
Stock Type:	1,2,3,4 gallon containers (Steinfeld). Deepot 40 (Young).
Time to Grow:	1 year (Steinfeld).
Target Specifications:	Seedlings are ready when roots are established but not bound (Steinfeld).
Propagule Collection:	Seed should be collected fresh in autumn or between October 1st and December 1st. Collected by use of long pole pruner from trees (Young). Seed carried in plastic bags to keep from drying out and placed in cold storage pending stratification (Steinfeld).
Propagule Processing/ Propagule Characteristics:	Seeds can be slow to germinate and are best sown after they ripen in a cold frame. Weak or no plants will be produced if seeds are harvested to soon. When the seeds are fully developed they can be harvested and sown immediately. This must be before they are dried or produced germination inhibitors (USDA). "Short seed life, decay quickly. Possible to store for 1 year or more, if collected when seed is at lowest moisture"(Information from 2003 protocol cannot be confirmed with given source list). Consulted protocols by Young and Steinfeld but information was N/A.
Pre-Planting Propagule Treatments:	A 48 hour cold water soaking is only necessary if seeds are dry prior to stratification. Seeds should be stratified for 2 to 3 months prior to sowing date in open trays. Temperature of rooms should be 33 degrees F. High humidity should be maintained with foggers and seed coat must have an obvious moisture layer (Steinfeld). Store at 1 degree C until stratifying begins. (Information from 2003 protocol cannot be confirmed with given source list).
Growing Area Preparation / Annual	Seeds can be grown outside, no shade necessary. Best surface is sloped and graded so that water, rain or irrigation, will not pool. Average temperatures for best growth in summer are 87.5 degrees F. Tolerant of fall/winter temperatures

Practices for Perennial Crops:	between 67 and 37 degrees F. Containers are distributed by Stuewe & Sons, Inc and are TreepotsTM in sizes 1,2,3,4 gallon size. Growing media is Grower's Gold Mix #1. Contents include: composted pine/fir bark, Canadian sphagnum peat moss, and screened volcanic pumice in 40,35,and 25 percentages. A starter fertilizer, 6-10-6 with fritted trace elements, is added to wet media and containers then filled to 1" below top (Steinfeld).
Establishment Phase:	When radical appears on seeds they can be taken from stratification and sown one seed per container. The wing should be vertical in soil. Container should be placed so that there is an opening between every container allowing more light per plant. To each container an isobutylidene diurea top dressing should be applied after several weeks. Fertilizer should also be applied. Wil-Gro (Wilbur-Ellis), a 18-6-12 with Mg, S and Fe elements works well and can be used in the following concentrations per container: 1/16 cup for 1-gallon containers, 1/8 cup for 2, 3 and 4-gallon containers. Irrigation during his time should be 1-2 times per week (Steinfeld).
Length of Establishment Phase:	One month (Steinfeld).
Active Growth Phase:	Seeds should be irrigated every morning depending on the moisture of the plug. The plug should not be allowed to dry completely. During hottest summer temperatures seedlings need to be irrigated every 2-3 days fro 4.5 hours. No disease monitoring needed as non occurs within this species. Do moisture for general insects and pests. Hand-weed seedlings every 6 weeks (Steinfeld).
Length of Active Growth Phase:	3 month (Steinfeld).
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	Start in late summer and reduce occurrence of irrigations. Seedlings should be used to low temperatures during the night but if temperatures should drop to the low teens the containers should be brought inside. Depending on whether the plants stay in containers for one or two years the bottom of the container and roots can be trimmed. This is done to keep roots from circling the bottom and forming a mass. The bottom of the root plug can be pulled and the end cut with industrial-strength paper cutter. For plants that stay in the same container for two years, the bottom inch of the container can be cut with abrasive blade leaving the it completely open. The container will be unusable after plant extraction but spiraling is prevented (Steinfeld).
Length of Hardening Phase:	3 months (Steinfeld).

Harvesting, Storage and Shipping (of seedlings):	Extraction from containers shouldn't take place until right before planting. Seedlings should be shipped upright in cardboard in enclosed vehicles. Refrigerated or non-refrigerated transport is not particularly important (Steinfeld).
Length of Storage (of seedlings, between nursery and outplanting):	Consulted protocols by Young and Steinfeld but information was N/A. Consulted USDA, E-Flora BC, WNPS, Wawrnell School of Forestry and Natural Resources, USDA: Forest Service, UK: Plants for A Future, OWIC. No information found.
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Planting can take place in early spring as long as snow is not still present and soil isn't frozen. When placing into ground soil makes sure that seedling plug is a few inches below ground. Do not leave plug media exposed. There should be a slight depression around the seedling that will allow water to pool. Remove competitive grasses and forbs around seedling. To protect from deer, netting can be set up around seedling. If seedlings are planted in early fall they should be watered after planting (Steinfeld).
Other Comments:	Note: The original protocol's sources did not contain the information in the protocol. Its possible that the last web link is no longer available or the format changed. Consulted protocols by Young and Steinfeld but information was N/A. Consulted USDA, E-Flora BC, WNPS, Warnell School of Forestry and Natural Resources, USDA: Forest Service, UK: Plants for A Future, OWIC. No information found.
INFORMATION SOURCES	
References:	United States Department of Agriculture (USDA) Plant Index http://plants.usda.gov/index.html (accessed on 4/15/09). Pojar, J. and A. MacKinnon. 1994. Plants of the Pacific Northwest Coast Washington, Oregon British Columbia & Alaska. BC Ministry of Forests and Lone Pine Publishing, Vancouver, British Columbia, Canada Young, Betty. 2001. Propagation protocol for production of container *Acer macrophyllum* Pursh. plants (Deepot 40); USDI NPS - Golden Gate National Parks, San Francisco, California. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 14 April 2009). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. http://www.nativeplantnetwork.org/network/view.asp?protocol_id=543

	Steinfeld, David. 2003. Propagation protocol for production of container *Acer macrophyllum* plants (1,2,3,4 gallon containers); J. Herbert Stone Nursery, Central Point, Oregon. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 14 April 2009). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery. http://www.nativeplantnetwork.org/network/view.asp?protocol_id=2365 Flora of the Pacific Northwest, Hitchcock, C.,and Cronquist,A., University of Washington Press, Seattle and London, 1973. p.289 California Native Plant Link Exchange http://www.cnplx.info/nplx/species?taxon=Acer+macrophyllum (Accessed on 4/15/09). D. M. van Gelderen, P.C. De Jong, H.J. Oterdoom, Theodore R. Dudley. *Maples of the World.* Timber press, Inc. March 2005. http://books.google.com/books?id=cHgxTv9ktCcC&pg=RA1-PA212&lpg=RA1-PA212&dq=acer+macrophyllum,+synonyms&source=bl&ots=sldw3Kligc&sig=idMu7f5IFKKHrC1JZp6j47-XUlU&hl=en&ei=kk3lSbeqNpaSswPg0cmmBA&sa=X&oi=book_result&ct=result&resnum=8 E-Flora BC: Electronic Atlas of the Plants of British Columbia http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Acer%20macrophyllum&redblue=Both&lifeform=2- (Accessed on 4/15/09). MaplesTrees.com http://www.maple-trees.com/pages/bigleaf-maple/acer-macrophyllum.php (Accessed on 4/14/09). Washington native plant society http://www.wnps.org/landscaping/herbarium/pages/acer-macrophyllum.html (accessed on 4/15/09). Warnell School of Forestry and Natural Resources http://www.forestry.uga.edu/ (accessed on 4/15/09). United States Department of Agriculture, Forest Service: Silvics of North America, Volume 2: Hardwoods. http://www.na.fs.fed.us/spfo/pubs/silvics_manual/volume_2/acer/macrophyllum.htm UK Plants for the Future: Database http://www.ibiblio.org/pfaf/cgi-bin/arr_html?Acer+macrophyllum&CAN=LATIND (accessed on 4/14/09). OSU. Oregon wood innovation center http://owic.oregonstate.edu/species/maple.php (accessed on 4/14/09).
Other Sources	UNIVERSITY OF ARKANSAS HORTICULTURE 3103 SUMMARY SHEET-Looking for possible varieties or subspecies, and cultivar. http://www.uark.edu/campus-

Consulted:	resources/cotinus/plants4_html/acermacr.html (Accessed on 04/14/09)
Protocol Author:	Victoria Burgess
Date Protocol Created or Updated (MM/DD/YY):	04/15/09

Note: This template was modified by J.D. Bakker from that available at:
http://www.nativeplantnetwork.org/network/SampleBlankForm.asp

Original Protocol

Plant Data Sheet

Species
Big leaf maple, Acer macrophyllum

Range
Southwest British Columbia to Southern California.

Climate, elevation
Sea level to 2000 m

Local occurrence (where and how much)
Entire state of Washington.

Habitat preferences
Small forest openings and open areas.

Plant strategy type/successional stage
Early successional stage

Associated species
Acer circinatum, Acer glabrum

Maybe collected as: (seed, layered, divisions, etc.)
Seed, salvage

Collection restrictions or guidelines
Collect as late as possible, but before the rains (between October through January)

Seed germination (needs dormancy breaking?)
Cold stratify at 1-5 degrees C, 40-80 days prior to sowing

Seed life (can be stored, short shelf life, long shelf life)
Short seed life, decay quickly. Possible to store for 1 year or more, if collected when seed is at lowest moisture.

Recommended seed storage conditions
Store at 1 degree C until stratifying begins.

Propagation recommendations (plant seeds, vegetative parts, cuttings, etc.)
Plant seeds, salvage plants with three for more leaves, grow in containers for two years before planting.

Soil or medium requirements (inoculum necessary?)
Prefers alluvial soils.

Installation form (form, potential for successful outcomes, cost)
Seeds or container plants grown from seed, salvage, bare root.

Recommended planting density
300 – 700 per acre, 6 – 10 O.C.

Normal rate of growth or spread: lifespan
Perennial, high seed production after ten years.

Sources cited

Pojar, J. and A. MacKinnon. 1994. Plants of the Pacific Northwest Coast Washington, Oregon British Columbia & Alaska. BC Ministry of Forests and Lone Pine Publishing, Vancouver, British Columbia, Canada p.45

USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

The Plants Database. http://plantsdatabase.com

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