Nate Hough-Snee
Plant Propagation Protocol: Carex Obnupta
25 APR 2007
ESRM 412 – Native Plant Production
JD Bakker

TAXONOMY	
Family Names	
Family Scientific Name:	*Cyperaceae*
Family Common Name:	Sedge
Scientific Names	
Genus:	*Carex*
Species:	*Obnupta*
Species Authority:	Bailey
Common Synonym(s)	
Genus:	*Carex*
Species:	*magnifica*
Species Authority:	Dewey (ex-Piper)
Common Name(s):	Slough sedge
Species Code (as per USDA Plants database):	CAOB3 (Formerly CAROBN)
GENERAL INFORMATION	
General Distribution (geographical range (states it occurs in), ecosystems, etc):	Local to portions of Northern California, and common through out perennially moist low-elevation sites from Oregon up through southern British Columbia. (Pojar)
Climate and elevation range	Low elevation; hypermaritime to submaritime cool mesothermal climates in seasonally inundated or seasonally saturated areas. (Leigh,)
Local habitat and abundance; may include commonly associated species	Marshes, swamps, riparian zones, bogs, moist clearings, forest edges and meadows. Scattered to abundant; abundance decreases with elevation. Occurs frequently on nutrient-rich soils/wetlands. Common communities include *Salix hookeriana, Fraxinus latifolia, Alnus rubra, Rubus spectabilis*—often occurs under *A. rubra*/*R. spectabilis* dominated overstory, scattered moist-soil conifers: *Picea sitchensis, Thuja plicata, Tsuga heterophylla*. (Kunze)
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	Early-to-mid seral, competitive in native settings—compromised by fast-growing invasives i.e. *Phalaris arundinacea*
PROPAGATION DETAILS	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the	Marin County, CA, Although experimental transplanting trials with the similar wetland carices *C. nudata, C. languinosa* and *C. elongata* have occurred

seed that was tested came from):	in the prairie potholes of the upper Midwest, Arizona high elevation meadows (Steed and Dewald 2003) and the mid-elevation peatlands of Germany and Switzerland (Schütz, 2000) with some success.
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
Propagation Method (Options: Seed or Vegetative):	Seed, Rhizomatous transplantings of many wetland carex species are possible (Steed and DeWald 2003) as are rhizome splitting (Yetka and Galatowitsch 1999)
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container-grown plugs
Stock Type:	Deepot 16, 2"x7" tube-sized plugs
Time to Grow (from seeding until plants are ready to be outplanted):	May 1st (Young 2001) or equivalent spring season based on latitude and habitat (Schutz 1997), outplant in summer (Steed and Dewald, 2003). Approximately 60 days—30 in flat, 30 in plugs (Young, 2001).
Target Specifications (size or characteristics of target plants to be produced):	Firm Plug in container,
Propagule Collection (how, when, etc):	*C. obnupta* flowers June-August (Flora of N. America), seed collection occurs shortly thereafter in August-mid-November (Young 2001)
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	1,203 seeds per gram (AOSA), Seed inflorescences will appear brown when mature.
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Insert into "creped moist cellulose wadding with towel on top" at 20-35 C (AOSA), soak in water for 24 hours (Young, 2001), Cold stratify at temperatures between 1-5° C (Kettenring and Galatowitsch, 2006). *Carex* dormancy durations tend to vary based on habitat (Schutz 1997) with wetland species having stronger initial germination (Schutz 2000). Schutz and Rave (2003) found that *C. elongata's* dormancy is genetically based, but more so based on climatic variation. If similar assumptions can be made about *C. obnupta*, then further studies to identify ideal conditions must be conducted.
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Recommended media: "Sunshine Mix #4 Aggregate Plus (peat moss, perlite, major and minor nutrients, gypsum, and dolomitic lime)." (Young, 2001) Seeds are mixed with growing media to sow and are surface

	sown into flats and then placed on a heated bench—heat was not specified as limiting factor in any other literature.
Establishment Phase (from seeding to germination):	30 Days—approximately 40% of seeds germinate in this time (Young)
Length of Establishment Phase:	Transplant seedlings 30 days after germination to individual containers. Young (2001) recommends "2"x7" tubes (Deepot 16) containing standard potting mix of peat moss, fir bark, perlite, and sand.
Active Growth Phase (from germination until plants are no longer actively growing):	Dependent on latitude, habitat (Schutz 2000)
Length of Storage (of seedlings, between nursery and outplanting):	From plant characterisitics and ecology, it seems that minimal storage would be the most desirable circumstance unless irrigation is available.
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Transplant Survival averages 65% (Young 2001) in Marin County, CA. Steed and DeWald found that three wetland carex species outplanted in summer established at a higher rate than their fall-planted counterparts. Wetland sedges planted into N and P rich locations have been shown to grow more biomass than sites limited in either nutrient (Güsewell, 2005)
Other Comments:	
INFORMATION SOURCES	
References:	See below…
Other Sources Consulted (but that contained no pertinent information):	Brandel, M. and Schutz, W. (2005). Temperature effects on dormancy levels and germination in temperate forest sedges (*Carex)*. *Plant Ecology*; 176, 245-261. Leck, M. and Schutz, W. (2005). Regeneration of *Cyperaceae*, with particular reference to seed ecology and seed banks. *Perspectives in Plant Ecology, Evolution and Systematics*; 7, 95-133.
First Name of Author:	Nathaniel
Last Name of Author:	Hough-Snee
Date Entered or Updated (MM/DD/YY):	04/25/07

Works Cited

AOSA. Updated 2006. *Suggested purity and/or germination testing methods for species without AOSA Rules testing procedures*. Association of Official Seed Analysts, Stillwater, OK.

Flora of North America online: Volume 23: Cyperaceae. Accessed 24 April 2007 from http://www.efloras.org/volume_page.aspx?volume_id=1023

Güsewell, S. (2005). Responses of wetland graminoids to the relative supply of N and P. *Plant Ecology* 176, 35-55.

Kunze, L.M. (1994). Preliminary classification of native, low-elevation, freshwater wetland vegetation in western Washington. Washington State Department of Natural Resources, Natural Heritage Program; Olympia, WA. pp. 98.

Leigh, M. (1999). *Grow You Own Native Landscape*. Native Plant Salvage Project: WSU Cooperative Extension—Thurston County.

Pojar, J. and A. MacKinnon (1994). *Plants of the Pacific Northwest Coast Washington, Oregon British Columbia & Alaska*. Forest Service of British Columbia and Lone Pine Press; Vancouver, BC

Schütz, W., (1997). Are germination strategies important for the ability of cespitose wetland sedges (Carex) to grow in forests? Canadian Journal of Botany. 75, 1692–1699.

Schütz, W. (2000). Ecology of seed dormancy and germination in sedges (*Carex*). *Perspectives in Plant Ecology, Evolution and Systematics*: 3, 67–89.

Schütz, W., Rave, G., (1999). The effect of cold stratification and light on the seed germination of temperate sedges (Carex) from various habitats and implications for regenerative strategies. Plant Ecology; 144, 215–230.

Schütz, W., Rave, G. (2003). Variation in seed dormancy of the wetland sedge *Carex elongata* between populations and individuals in two consecutive years. *Seed Science Research*; 13, 315–322.

Steed, J. and DeWald, L (2003). Transplanting sedges (*Carex* spp.) in southwestern riparian meadows. *Restoration Ecology*: 11(2), 247–256.

Yetka, L. and Galatowitsch, S. Factors affecting revegetation of *Carex lacustris* and *Carex stricta* from rhizomes. *Restoration Ecology*; 7(2), 162-171.

Young, B. (2001). Propagation protocol for production of container *Carex obnupta* Bailey plants (Deepot 16); Golden Gate National Parks, San Francisco, California. In: Native Plant Network. URL: http://www.nativeplantnetwork.org (accessed 24 April 2007).