USACE Invasive Plant Species Best Management Practices

Contributors

Funding:

- Aquatic Plant Research Control Program, USACE ERDC-EL

Program Management and Technical Direction:

- Jeremy Crossland, USACE HQ
- Dr. Christine VanZomeran, USACE ERDC-EL
- Dr. Heather Theel, USACE ERDC-EL
- Mike Greer, USACE LRB
- Dr. Jennifer Seiter-Moser, USACE ERDC-EL

Principal Investigator/Editor:

- Aaron N. Schad, USACE ERDC-EL

Design

- Tara Whitsel, USACE ERDC
- Aaron N. Schad, USACE ERDC-EL

Technical information

- Dr. Gary O. Dick, USACE ERDC-EL (ret.)
- Jacob Kelly, University of North Texas and Oak Ridge Institute for Science and Education
- Kristina Hellinghausen, Oak Ridge Institute for Science and Education
- Aaron N. Schad, USACE ERDC-EL
- Dr. Benjamin Sperry, University of Florida
- Lynde Dodd, USACE ERDC-EL
- Dr. Chris Mudge, USACE ERDC-EL
- Dr. Nathan Harms, USACE ERDC-EL
- Dr. Nathan Beane, USACE ERDC-EL
- Dr. Bradley Sartain, USACE ERDC-EL
- Julie Nachtrieb, USACE ERDC-EL

Norway Maple (*Acer platanoides*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Steve Hurst, hosted by the USDA-NRCS PLANTS Database
- James St. John, Jonathan Billinger / CC BY (https://creativecommons.org/licenses/by/2.0)

Further Reading:

- Anderson R. 1999. Disturbance as a factor in the distribution of sugar maple and the invasion of Norway maple into a modified woodland. Rhodora, 101(907):264-273
- Brooklyn Botanic Garden. 2003. The worst invasives in the New York Metropolitan Area. New York, USA: Brooklyn Botanic Garden. http://www.bbg.org/gar2/pestalerts/invasives/worst_nym.html
- CABI, Invasive Species Compendium. https://www.cabi.org/
- New York Invasive Species (IS) Information. http://nyis.info/invasive_species/norway-maple/
- Rhoads AF, Block A. 2002. Norway maple *Acer platanoides* L. Morris Arboretum of the University of Pennsylvania. http://www.paflora.org/Acer%20platanoides.PDF
- University of Connecticut Plant Database. http://www.hort.uconn.edu
- Webb SL, Pendergast T, Dwyer ME. 2001. Response of native and exotic maple seedling banks to removal of the exotic, invasive Norway maple (*Acer platanoides*). Journal of the Torrey Botanical Society, 128(2):141-149
- Weber E. 2003. Invasive plant species of the world: A reference guide to environmental weeds. Wallingford, UK. CAB International
- Webster, CR, Wangen, SR. 2009. Spatial and temporal dynamics of exotic tree invasions: lessons from a shade-tolerant invader, *Acer platanoides*. In: Invasive Plants and Forest Ecosystems. CRC Press, 71-85

Tree of Heaven (*Ailanthus altissima*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Doug Goldman, hosted by the USDA-NRCS PLANTS Database
- W.D. Brush, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- Badalamenti E, Mantia T. 2013. Stem-injection of herbicide for control of *Ailanthus altissima* (Mill.) Swingle: a practical source of power for drilling holes in stems. iForest. http://www.sisef.it/iforest/contents?id=ifor0693-006
- Bowker D, Stringer J, 2011. Efficacy of herbicide treatments for controlling residual sprouting of tree-of-heaven. In: Proceedings, 17th central hardwood forest conference. 2010 April 5-7. Lexington, KY
- Burch PL, Zedaker SM. 2003. Removing the invasive tree *Ailanthus altissima* and restoring natural cover. Journal of Arboriculture, 29(1):18-24
- Constán-Nava S. 2013. Ecology of the invasive species *Ailanthus altissima* (Mill.) Swingle. Bases for control and eradication in Protected Natural Areas. Ecosistemas, 22(1):83-85
- Constán-Nava S, Bonet A, Pastor E, Lledó MJ. 2010. Long-term control of the invasive tree *Ailanthus altissima*: insights from Mediterranean protected forests. Forest Ecology and Management, 260(6):1058-1064
- Ding J, Wu Y, Zheng Hao, Fu WeiDong, Reardon R, Liu Min. 2006. Assessing potential biological control of the invasive plant, tree-of-heaven, *Ailanthus altissima*. Biocontrol Science and Technology, 16:547-566
- DiTomaso JM, Kyser GB. 2007. Control of *Ailanthus altissima* using stem herbicide application techniques. Arboriculture & Urban Forestry, 33(1):55-63
- Kowarik I, Säumel I. 2007. Biological flora of Central Europe: *Ailanthus altissima* (Mill.) Swingle. Perspectives in Plant Ecology, 8:207-237
- Lawrence JG. 1991. The ecological impact of allelopathy in *Ailanthus altissima* (Simaroubaceae). American Journal of Botany, 78(7):948-958
- Meloche C, Murphy SD. 2006. Managing tree-of-heaven (*Ailanthus altissima*) in parks and protected areas: a case study of Rondeau Provincial Park (Ontario, Canada). Environmental Management, 37(6):764-772
- Oregon Department of Agriculture, Noxious Weed Control Program. http://www.oregon.gov/oda/shared/Documents/Publications/Weeds/TreeOfHeavenProfile.pdf
- SE-EPPC, 2002. Southeast Exotic Pest Plant Council. http://www.se-eppc.org/
- University of Maryland Extension. https://extension.umd.edu/sites/extension.umd.edu/files/_docs/programs/woodland-steward/DNR_TreeOfHeaven.pdf

Mimosa (*Albizia julibrissin*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Larry Allain, hosted by the USDA-NRCS PLANTS Database
  Wikipedia – User: Geogre – public domain\
- Aaron N. Schad, USACE ERDC-EL

Further Reading:

- Bransby DI, Sladden SE, Aiken GE. 1992. Mimosa as a forage plant: a preliminary evaluation. Proceedings of the Forage Grasslands Conference. Georgetown, Texas, American Forage and Grassland Council, 1:28-31
- CABI, Invasive Species Compendium. https://www.cabi.org/
- Luken JO, Thieret JW. 1996. Assessment and Management of Plant Invasions. New York, USA: Springer-Verlag. 324 pp
- Panizzi AR, Slansky F. 1991. Suitability of selected legumes and the effect of nymphal and adult nutrition in the southern green stink bug (Hemiptera: Heteroptera: Pentatomidea). Journal of Econ-Entomology, 84(1):103-113
- SE-EPPC, 2002. Southeast Exotic Pest Plant Council. http://www.se-eppc.org/.
- University of Florida, Center for Aquatic and Invasive Plants. https://plants.ifas.ufl.edu/plant-directory/albizia-julibrissin/

Giant Reed (*Arundo donax*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Mark A. Garland. USA, FL, Brevard Co., Cape Canaveral Air Force Station, hosted by the USDA-NRCS PLANTS Database
- Aaron N. Schad, USACE ERDC-EL

Further Reading:

- Bell GP. 1997. Ecology and management of *Arundo donax*, and approaches to riparian habitat restoration in Southern California. In Plant Invasion: Studies from North America and Europe. J.H. Brock, M. Wade, P. Pysek and D. Green, eds. Leiden, the Netherlands: Backhuys, pp. 104-114
- Boose AB, Holt JS. 1999. Environmental effects on asexual reproduction in *Arundo donax*. Weed Research, 39:117-127
- Else JA, 1996. Post-flood establishment of native woody species and an exotic, *Arundo donax*, in a southern California riparian system. MSc Thesis, San Diego State University, USA.
- Dudley T. 2006. Department of Integrative Biology, University of California, Berkeley, USA and IUCN/SSC Invasive Species Specialist Group (ISSG). *Arundo donax*. http://www.issg.org/database/species/ecology.asp?si=112&fr=1&sts=sss&lang=EN
- Goolsby JA, Spencer D, Whitehand L. 2009. Pre-release assessment of impact on *Arundo donax* by the candidate biological control agents *Tetramesa romana* (Hymenoptera: Eurytomidae) and *Rhizaspidiotus donacis* (Hemiptera: Diaspididae) under quarantine conditions. Southwestern Entomologist, 34:359-376
- Kirk AA, Widmer T, Campobasso G, Carruthers R, Dudley T. 2003. California Invasive Plant Council's Symposium. The potential contribution of natural enemies from Mediterranean Europe to the management of the invasive weed *Arundo donax* (Graminae, Arundinae) in the US. USDA-ARS, European Biological Control Laboratory. USDA-ARS, Western Regional Research Center, Exotic and Invasive Weed Research Unit
- Nevada Department of Agrculture. http://agri.nv.gov/Plant/Noxious_Weeds/WeedList/Giant_reed__(Arundo_donax)/
- Newhouser M, Cornwall C, Dale R. 1999. Arundo: A Landowner Handbook. http://teamarundo.org/education/landowner_handbook.pdf
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/giant-reed/
- The Nature Conservancy. Giant Reed: Element Stewardship Abstract. In: Wildland Weeds Management & Research Program, Weeds on the Web
- Weber E. 2003. Invasive Plant Species of the World: A Reference Guide to Environmental Weeds. CABI Publishing, U.K.

Flowering Rush (*Butomus umbellatus*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Steve Hurst, hosted by the USDA-NRCS PLANTS Database
- Richard A. Howard, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- Andreas JE, Hinz HL, Häfliger P, Rice P, Parsons J, Haubrich G. 2014. Flowering rush: a new biocontrol project for North America. Proceedings of the XIV International Symposium on Biological Control of Weeds, Kruger National Park, South Africa, 2-7 March 2014, 12-13
- Carter C, Madsen JD, Ervin GN. 2018. Effects of initial propagule size and water depth on *Butomus umbellatus* L. growth and vegetative propagation. Aquatic Botany, 150:27-32
- Harms NE, Shearer JF. 2015. Apparent herbivory and indigenous pathogens of invasive flowering rush (*Butomus umbellatus* L.) in the Pacific Northwest. ERDC/TN APCRP-BC-35
- Madsen JD, Sartain B, Turnage G, Marko M. 2013. Herbicide trials for management of flowering rush in Detroit Lakes, Minnesota for 2012. Geosystems Research Institute, Mississippi State University. Report 5059
- Madsen JD, Wersal RM, Marko MD. 2016. Distribution and biomass allocation in relation to depth of flowering rush (*Butomus umbellatus*) in the Detroit Lakes, Minnesota. Invasive Plant Science and Management, 9(3):161-170

- Michigan State. Status and strategy for flowering rush (*Butomus umbellatus* L.) management. https://www.mishigan.gov/documents/deq/wrd-ais-butomus-umbellatus-499876-7.pdf
- Minnesota Department of Natural Resources. https://www.dnr.state.mn.us/invasives/terrestrialplants/herbaceous/floweringrush.html
- Minnesota Sea Grant Aquatic Invasive Species website. http://www.seagrant.umn.edu/ais/floweringrush
- Oregon Department of Agriculture, Plant Division, Noxious Weed Control. http://www.oregon.gov/ODA/PLANT/WEEDS/profile_floweringrush.shtml
- Turnage G, Alcott B, Guetter T. 2018. Adaptive management of flowering rush using the contact herbicide diquat in Detroit lakes, Minnesota 2016 – Final Report. Geosystems Research Institute, Mississippi State University. Report 5076
- Turnage G, Madsen JD, Wersal RM, Byrd JD. 2019. Simulated mechanical control of flowering rush (*Butomus umbellatus*) under mesocosm conditions. Invasive Plant Science and Management, 12(2):120-123
- University of Florida Center for Aquatic and Invasive Plants http://plants.ifas.ufl.edu/node/75
- USDA NRCS. https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/mtpmstn10617.pdf
- US Forest Service Invasive Plants website. http://www.na.fs.fed.us/fhp/invasive_plants/weeds/flowering-rush.pdf
- Wersal RM, Poovey AG, Madsen JD, Getsinger KD, Mudge CR. 2014. Comparison of late-season herbicide treatments for control of emergent flowering rush in mesocosms. Journal of Aquatic Plant Management, 52:85-89

Carolina Fanwort (*Cabomba caroliniana*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Aaron N. Schad, USACE ERDC-EL

Further Reading:

- Australian Department of Agriculture, Water and the Environment. http://www.environment.gov.au/biodiversity/invasive/weeds/publications/guidelines/wons/pubs/c-caroliniana.pdf
- Bultemeier BW. 2009. The response of three cabomba populations to herbicides and environmental parameters: Implications for taxonomy and management. MS thesis, University of Florida
- Hanlon SG, Hoyer MV, Cichra CE, Canfield DE. 2000. Evaluation of macrophyte control in 30 Florida lakes using triploid grass carp. Journal of Aquatic Plant Management, 38:48-54
- Nelson LS, Stewart AB, Getsinger KD. 2002. Fluridone effects on fanwort and water marigold. Journal of Aquatic Plant Management, 40:58-63
- Orgaard M. 1991. The genus *Cabomba* (Cabombaceae) – A taxonomic study. Nordic J Botany 11:179-203
- Schooler S, Julien M, Walsh GC, 2006. Predicting the response of *Cabomba caroliniana* populations to biological control agent damage. Australian Journal of Entomology, 45(4):327-330
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/fanwort/
- Wilson CE, Darbyshire SJ, Jones R. 2007. The biology of invasive alien plants in Canada. 7. *Cabomba caroliniana* A. Gray. Canadian Journal of Plant Science, 87(3):615-638

Bermuda Grass (*Cynodon dactylon*)

Range Map:

- USDA-NRCS PLANTS Database

Images/Maps:

- Larry Allain, hosted by the USDA-NRCS PLANTS Database
- Luis Fernández García / CC BY-SA (https://creativecommons.org/licenses/by-sa/4.0)

Further Reading:

- Abdullahi AE. 2002. *Cynodon dactylon* control with tillage and glyphosate. Crop Protection, 21(10):1093-1100
- Baldwin BG, Goldman DH, Keil DJ, Patterson R, Rosatti TJ, Wilken DH, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.
- Carey J. 1995. *Cynodon dactylon* in Fire Effects Information System, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, http://www.feis-crs.org/beta/
- Consortium of California Herbaria. cjeps.berkeley.edu/consortium/

- Cudney D, Elmore CL, Bell CE. *Cynodon dactylon* in UC IM Online http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7453.html
- Stubbendieck J, Hatch SL, Hirsch KJ. 1986. North American range plants. 3rd ed. University of Nebraska Press. Lincoln, NE
- Texas Parks and Wildlife Department. https://tpwd.texas.gov/publications/pwdpubs/media/pwd_rp_w7000_1153.pdf

Anchored Water Hyacinth (*Eichhornia azurea*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Richard A. Howard, hosted by the USDA-NRCS PLANTS Database / CC BY-SA 3.0 DE (https://creativecommons.org/licenses/by-sa/3.0/de/deed.en)

Further Reading:

- Bini LM, Oliveira LG, Souza DC, Carvalho P, Pinto MP. 2005. Patterns of the aquatic macrophyte cover in Cachoeira Dourada Reservoir (GO-MG). Brazilian Journal of Biology, 65(1):19-24
- Carauta JPP, Romero SHF, Frigoletto MF, Bosísio BM. 1991. Flora conservation around the Santana and Vigario reservoirs, Rio de Janeiro. (Conservação da flora na região dos reservatórios de Santana e Vigário, Rio de Janeiro.) Albertoa, 3(8):61-77
- Romero-Gonzalez GA, Fernandez-Concha GC, Dressler RL, Magrath LK, Argus GW. 2008. Flora of North America: *Eichhornia azurea* (Swartz) Kunth, Eichhornia. 4. 1842. http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=220004607
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/how-to-control-rooted-water-hyacinth/

Canadian Waterweed (*Elodea canadensis*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Robert H. Mohlenbrock, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- Barrat-Segretain MH. 2001. Invasive species in the Rhône River floodplain (France): replacement of *Elodea canadensis* Michaux by *E. nuttallii* St. John in two former river channels. Archiv für Hydrobiologie, 152(2):237-251
- Barrat-Segretain MH, Cellot B. 2007. Response of invasive macrophyte species to drawdown: the case of *Elodea* sp. Aquatic Botany, 87(4):255-261
- Bonar SA, Bolding B, Divens M. 2002. Effects of triploid grass carp on aquatic plants, water quality, and public satisfaction in Washington State. North American Journal of Fisheries Management, 22(1):96-105
- Glomski LAM, Skogerboe J, Getsinger KD. 2005. Comparative efficacy of diquat for control of two members of the Hydrocharitaceae: *Elodea* and *Hydrilla*. Journal of Aquatic Plant Management, 43:103-105
- McGavigan C. 2017. Canadian pondweed (*Elodea canadensis*) Risk Assessment Summary Sheet. In: GB Non-native Organism Risk Assessment, www.nonnativespecies.org
- Minnesota Department of Natural Resources. https://www.dnr.state.mn.us/aquatic_plants/submerged_plants/canada_waterweed.html
- Penn State Extension. https://extension.psu.edu/elodea-common-waterweed
- Pípalová I., 2006. A review of grass carp use for aquatic weed control and its impact on water bodies. Journal of Aquatic Plant Management, 44:1-12
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/elodea/
- Vernon E, Hamilton H. 2011. Literature review on methods of control and eradication of Canadian pondweed and Nuttall's pondweed in standing waters. In: Scottish Natural Heritage Commissioned Report No. 433
- Zehnsdorf A, Hussner A, Eismann F, Rönicke H, Melzer A. 2015. Management options of invasive *Elodea nuttallii* and *Elodea canadensis*. Limnologica, 51:110-117

Sericea Lespedeza (*Lespedeza cuneata*)

Range Map:

- EPPO Global Database

Images:

- C. Evans, University of Illinois, Bugwood.org

Further Reading:

- Altom JV, Stritzke JF, Weeks DL. 1992. Sericea lespedeza (*Lespedeza cuneata*). Control with Selected Postemergence Herbicides. Weed Technology Journal of the Weed Science Society of America, 6(3):573-576
- Cummings DC, Fuhlendorf SD, Engle DM. 2007. Is altering grazing selectivity of invasive forage species with patch burning more effective than herbicide treatments? Rangeland Ecology & Management, 60(3):253-260
- Farris RL, Murray DS. 2009. Control of seedling sericea lespedeza (*Lespedeza cuneata*) with herbicides. Invasive Plant Science and Management, 2(4):337-344
- Foster BL, Houseman GR, Hall DR, Hinman SE. 2015. Does tallgrass prairie restoration enhance the invasion resistance of post-agricultural lands? Biological Invasions, 17(12):3579-3590
- Gibson DJ, Shupert LA, Liu Xian. 2019. Do no harm: efficacy of a single herbicide application to control an invasive shrub while minimizing collateral damage to native species. Plants, 8(10):426
- Guernsey WJ. 1977. Sericea lespedeza (*Lespedeza cuneata*): Its Use and Management. U.S. Department of Agriculture Farmers Bulletin No. 2245, 29 pp
- Koger CH, Stritzke JF, Cummings DC. 2002. Control of Sericea Lespedeza (*Lespedeza cuneata*) with Triclopyr, Fluroxypyr, and Metsulfuron1. Weed Technology, 16(4):893-900
- Lemmon J, Fick WH, Alexander JA, Gatson GA, Olson KC. 2017. Intensive late-season sheep grazing following early-season steer grazing is an effective biological control mechanism for sericea lespedeza (*Lespedeza cuneata*) in the Kansas Flint Hills. Translational Animal Science, 1(Suppl. 1), 117-121. https://www.animalsciencepublications.org/publications/tas/tocs/1/supplement1
- Missouri department of conservation. https://mdc.mo.gov/trees-plants/problem-plant-control/invasive-plants/sericea-lespedeza-control
- Oklahoma State Extension. https://extension.okstate.edu/fact-sheets/ecology-and-management-of-sericea-lespedeza.html
- PIER, 2019. Pacific Islands Ecosystems at Risk. In: Pacific Islands Ecosystems at Risk, Honolulu, Hawaii, USA: HEAR, University of Hawaii. http://www.hear.org/pier/index.html
- Purdue University Extension. https://extension.purdue.edu/article/26030
- Schutzenhofer MR, Knight TM. 2007. Population-level effects of augmented herbivory on *Lespedeza cuneata*: implications for biological control. Ecological Applications, 17(4):965-971.
- Smith AE, Calvert GV. 1987. Weed Control in Sericea Lespedeza. University of Georgia Experiment Station Research Bulleitn 357, 12 p
- Stevens S. 2009. *Lespedeza cuneata*. In: Bugwood Wiki. Athens, Georgia, USA: Center for Invasive Species and Ecosystem Health, University of Georgia. https://wiki.bugwood.org/Lespedeza_cuneata
- Wang CZ, Zhou B, Palm HL. 2008. Detecting invasive sericea lespedeza (*Lespedeza cuneata*) in Mid-Missouri pastureland using hyperspectral imagery. Environmental Management, 41(6):853-862
- Wolf DD, Dove DC. 1987. Grazing Preference for Low Tannin Sericea Lespedeza, Proceedings of the Forage Grassland Conference, Lexington, Kentucky, p. 216-219
- Wong BM, Houseman GR, Hinman SE, Foster BL. 2012. Targeting vulnerable life-stages of sericea lespedeza (*Lespedeza cuneata*) with prescribed burns. Invasive Plant Science and Management, 5(4):487-493
- Yonce MH, Skroch WA. 1989. Control of Selected Perennial Weeds with Glyphosate. Weed Science 37(3):360-364

Chinese Privet (*Ligustrum sinense*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Larry Allain, hosted by the USDA-NRCS PLANTS Database
- Lowell Urbatsch, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- Alabama A&M Extension. https://www.aces.edu/blog/topics/control-invasive-plants/control-options-for-chinese-privet/
- Batcher MS. 2000. Element Stewardship Abstract for *Ligustrum* spp. The Nature Conservancy's Wildland Invasive Species Team, University of California, Davis, CA (USA)
- Harrington TB, Miller JH. 2005. Effects of application rate, timing, and formulation of glyphosate and triclopyr on control of Chinese privet (*Ligustrum sinense*). Weed Technology, 19(1):47-54
- Langeland KA, Burks KC. 2001. Identification and Biology of Non-Native Plants. Gainesville, USA: University Press of Florida
- Mowatt J. 1981. Control of large-leaved privet (*Ligustrum lucidum*) and small-leaved privet (*L. sinense*) in urban bushland. In: Proceedings of the Sixth Australian Weeds Conference, Volume 1, City of Gold Coast, Queensland, Australia, 13-18 September 1981 [ed. by Wilson BJ, Swarbrick JT] Queensland, Australia: Queensland Weed Society, 165-168
- University of Florida. https://ipm.ifas.ufl.edu/environmental/Chinese_privet.shtml
- Weber E. 2003. Invasive plant species of the world: A reference guide to environmental weeds. Wallingford, UK: CAB International, 548 pp

Large-flower primrose-willow (*Ludwigia grandiflora*)

Range Map:

- EPPO Global Database

Images:

- K. Rawlins, UGA, Bugwood.org

Further Reading:

- IPAMS. 2009. Invasive Plant Atlas of the MidSouth. Invasive Plant Atlas of the MidSouth. Mississippi, USA: GeoResources Institute
- Manuel KL. 1989. Proceedings of Workshop on Management of Aquatic Weeds and Mosquitoes in Impoudments March 14-15, Charlotte, North Carolina. Water Resources Research Institute, Report, 247. Water Resources Research Institute, University of North Carolina, 21-26
- McGregor MA, Bayne DR, Steeger JG, Webber EC, Reutebuch E. 1996. The potential for biological control of water primrose (*Ludwigia grandiflora*) by the water primrose flea beetle (*Lysathia ludoviciana*) in the Southeastern United States. Journal of Aquatic Plant Management, 34:74-76
- North Carolina Environmental Quality. https://deq.nc.gov/about/divisions/water-resources/water-planning/water-supply-planning/aquatic-weed-control-program-5

Six petal water primrose (*Ludwigia hexapetala*)

Range Map:

- EPPO Global Database

Images:

- D. Cappaert, Bugwood.org

Further Reading:

- Laguna Foundation. http://www.lagunafoundation.org/
- Thiébaut G, Thouvenot L, Rodríguez-Pérez H. 2018. Allelopathic effect of the invasive *Ludwigia hexapetala* on growth of three macrophyte species. Frontiers in Plant Science, 9,1835.
- University of Florida Center for Aquatic and Invasive Plants. https://plants.ifas.ufl.edu/plant-directory/ludwigia-hexapetala/
- Weed Science Society of America. http://wssa.net/2013/07/wssa-weed-watch-shape-shifting-primrose-plant-plagues-communities-in-coastal-states/

Peruvian Primrose-Willow (*Ludwigia peruviana*)

Range Map:

- EPPO Global Database

Images:

- EDDMapS. 2020. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/
- A. Ferriter, State of Idaho, Bugwood.org

Further Reading:

- CABI, Invasive Species Compendium. https://www.cabi.org/
- Chandrasena N, Pinto L, Sim R. 2002. Reclaiming Botany Wetlands, Sydney through integrated management of *Ludwigia peruviana* and other weeds. In Proceedings of the 13 Australian Weeds Conference, 134-137
- Weed Science Society of America. http://wssa.net/2013/07/wssa-weed-watch-shape-shifting-primrose-plant-plagues-communities-in-coastal-states/

Japanese Climbing Fern (*Lygodium japonicum*)

Range Map:

- EPPO Global Database

Images:

- *Lygodium japonicum*. EPPO Global Database. https://gd.eppo.int

Further Reading:

- Ferriter A. 2001. *Lygodium* management plan for Florida. Florida, USA: Florida Exotic Pest Plant Council, 59 pp
- Langeland KA, Hutchinson J. 2013. Natural area weeds: old world climbing fern (*Lygodium microphyllum*). IFAS Extension, SS-AGR-21. Florida, USA: University of Florida
- Langeland KA, Stocker RK, 2001. Control of non-native plants in natural areas of Florida. SP 242. USA: Florida Cooperative Extension Service, University of Florida. http://edis.ifas.ufl.edu/pdffiles/WG/WG20900.pdf
- Leichty ER, Carmichael BJ, Platt WJ. 2011. Invasion of a southeastern pine savanna by Japanese climbing fern. Castanea, 76(3):293-299
- Lockhart C. 2005. The double-trouble ferns: status surveys of *Lygodium* treatments sites. Wildland Weeds, 23-24
- Miller JH, Manning ST, Enloe SF, United U, Forest F, Southern RR. 2010. A management guide for invasive plants in southern forests. General Technical Report - Southern Research Station, USDA Forest Service, No.SRS-131, 120 pp
- Minogue PJ, Jones S, Bohn KK, Williams RL. 2009. Biology and control of Japanese climbing fern (*Lygodium japonicum*). University of Florida Cooperative Extension Service Publication FOR218. Gainesville, Florida, USA: University of Florida Institute of Food and Agricultural Sciences
- University of Florida Center for Aquatic and Invasive Plants. https://plants.ifas.ufl.edu/plant-directory/lygodium-japonicum

Guineagrass (Megathyrsus *maximus*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Aaron N. Schad, USACE ERDC-EL

Further Reading:

- CABI, Invasive Species Compendium. https://www.cabi.org/
- Ammondt SA, Litton CM. 2012. Competition between native Hawaiian plants and the invasive grass *Megathyrsus maximus*: implications of functional diversity for ecological restoration. Restoration Ecology, 20(5):638-646
- Ammondt SA, Litton CM, Ellsworth LM, Leary JK. 2013. Restoration of native plant communities in a Hawaiian dry lowland ecosystem dominated by the invasive grass *Megathyrsus maximus*. Applied Vegetation Science, 16(1):29-39
- Páez A, González O ME, Yrausquín X, Salazar A, Casanova A. 1995. Water stress and clipping management effects on guineagrass: I. Growth and biomass allocation. Agronomy Journal, 87(4):698-706
- Texas Invasives. https://www.texasinvasives.org/plant_database/detail.php?symbol=URMA3
- Zanine AD, Nascimento Júnior DD, Sousa BM, Silveira MC, Silva WL, Santos ME. 2013. Tillering dynamics in Guinea grass pastures subjected to management strategies under rotational grazing. Revista Brasileira de Zootecnia, 42(3):155-61

- University of Florida Center for Aquatic and Invasive Plants. https://plants.ifas.ufl.edu/

Chinaberrytree (*Melia azedarach*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Aaron N. Schad, USACE ERDC-EL

Further Reading:

- CABI, Invasive Species Compendium. https://www.cabi.org/
- Center for Invasive Species and Ecosystem Health. https://www.invasive.org/library/FLFSNoxWeeds/chinaberry.html
- Dickens ED. 2015. Chinaberry (*Melia azedarach*) Control Herbicide Options. Georgia Forest Productivity Publication Series, Publication Number 002. https://bugwoodcloud.org/bugwood/productivity/pdfs/Chinaberry_control.pdf
- Henderson L. 2001. Alien Weeds and Invasive Plants. Plant Protection Research Institute Handbook No. 12. Cape Town, South Africa: Paarl Printers
- North Carolina State University. https://projects.ncsu.edu/goingnative/howto/mapping/invexse/chinaber.html
- Texas Invasives. https://texasinvasives.org/plant_database/detail.php?symbol=MEAZ
- University of Florida Center for Aquatic and Invasive Plants. https://plants.ifas.ufl.edu/
- USDA, USFS. 2009. Fire Effects Information System (FEIS). https://www.fs.fed.us/database/feis/plants/tree/melaze/all.html
- Weber E, 2003. Invasive plant species of the world: A reference guide to environmental weeds. Wallingford, UK: CAB International, 548 pp

Melaleuca (*Melaleuca quinquenervia*)

Range Map:

- EPPO Global Database

Images:

- S. Ausmus, Melaleuca weevil, USDA ARS, Bugwood.org
- USDA-NRCS PLANTS Database

Further Reading:

- CABI, Invasive Species Compendium. https://www.cabi.org/
- Balciunas JK, Bowman GJ, Edwards ED. 1993. Herbivorous insects associated with the paperbark *Melaleuca quinquenervia* and its allies: I. Noctuoidea (Lepidoptera). Australian Entomologist, 20(1):13-24
- Balciunas JK, Burrows DW. 1993. The rapid suppression of the growth of *Melaleuca quinquenervia* saplings in Australia by insects. Journal of Aquatic Plant Management, 31:265-270
- Florida Exotic Pest Plant Council. 1991. Exotic Woody Plant Control, Ken Langeland, ed
- Laroche FB, 1999. Melaleuca Management Plan: Ten years of successful melaleuca management in Florida 1988-1998, Florida Exotic Pest Plant Council. http://www.fleppc.org/Manage_Plans/mplan.pdf
- PIER, 2007. Pacific Islands Ecosystems at Risk. USA: Institute of Pacific Islands Forestry. http://www.hear.org/pier/index.html
- Pratt PD, Blackwood S, Wright SA, Purcell M, Rayamajhi MB, Giblin-Davis RM, Scheffer SJ, Tipping PW, Center TD. 2013. The release and unsuccessful establishment of the *Melaleuca* biological control agent *Fergusonina turneri* and its mutualistic nematode *Fergusobia quinquenerviae*. BioControl, 58(4):553-561
- Pratt PD, Center TD. 2012. Biocontrol without borders: the unintended spread of introduced weed biological control agents. BioControl. Proceedings of the "Biological Control for Nature" meeting, Northampton, Massachusetts, USA, 3-7 October 2010, 57(2):319-329
- Pratt PD, Rayamajhi MB, Tipping PW, Center TD. 2013. Larval dispersal of the weed biological control agent *Oxyops vitiosa* (Coleoptera: Curculionidae). Florida Entomologist, 96(1):278-279
- Pratt PD, Rayamajhi MB, Tipping PW, Center TD, Wright SA, Purcell M. 2013. Establishment, population increase, spread, and ecological host range of *Lophodiplosis trifida* (Diptera: Cecidomyiidae), a biological control agent of the invasive tree *Melaleuca quinquenervia* (Myrtales: Myrtaceae). Environmental Entomology, 42(5):925-935
- USDA, USFS. 2009. Fire Effects Information System (FEIS). https://www.fs.fed.us/database/feis/plants/tree/melqui/all.html

- Wright SA, Pratt PD, Center TD, Buckingham GR. 2013. Physiological host range of two highly specialised mutualistic symbiotes: the fly *Fergusonina turneri* and its obligate nematode *Fergusobia quinquenerviae,* potential biocontrol agents of *Melaleuca quinquenervia*. Biocontrol Science and Technology, 23(4):409-422

Japanese Stilt grass (*Microstegium vimineum*)

Range Map:

- EPPO Global Database

Images:

- C. Evans, University of Illinois, Bugwood.org
- J.H. Miller, USDA Forest Service, Bugwood.org
- R.H. Mohlenbrock, USDA NRCS WSI

Further Reading:

- DeMeester JE, Richter DD. 2009. Feedbacks of nitrogen cycling and invasion with the non-native plant, *Microstegium vimineum*, in riparian wetlands. Durham, NC, USA: Duke University
- Flory SL. 2010. Management of *Microstegium vimineum* invasions and recovery of resident plant communities. Restoration Ecology, 18(1):103-112
- Judge CA, Neal JC, Shear TH. 2008. Japanese stiltgrass (*Microstegium vimineum*) management for restoration of native plant communities. Invasive Plant Science and Management, 1(2):111-119. http://www.wssa.net
- Jacques RR. 2007. Effects of *Microstegium Vimineum* (Trin.) A. Camus (Asian Stiltgrass, Poaceae) on native hardwood seedling growth and survival. Ohio, USA: Ohio University, College of Arts and Sciences
- Kleczewski N, Flory SL, Nice G. 2011. An Introduction to *Microstegium vimineum* (Japanese stiltgrass/Nepalese browntop) an Emerging Invasive Grass in the Eastern United States. Indiana, USA: Purdue University. http://www.btny.purdue.edu/weedscience/2011/Microstegium-01.pdf
- Penn State University Extension. https://extension.psu.edu/japanese-stiltgrass
- Swearingen JM. 2000. Japanese Stilt Grass (*Microstegium vimineum*). Washington, D.C, USA: U.S. National Park Service. http://www.nps.gov/plants/alien/fact/mivi1.htm
- Tu M. 2000. Element Stewardship Abstract for *Microstegium vimineum* - Japanese stilt grass, Nepalese browntop, Chinese packing grass. Arlington, Virginia, USA: The Nature Conservancy. http://www.imapinvasives.org/GIST/ESA/esapages/documnts/micrvim
- USDA, USFS. 2009. Fire Effects Information System (FEIS). https://www.fs.fed.us/database/feis/plants/graminoid/micvim/all.html#BiologicalControl
- Warren RJ, Wright JP, Bradford MA. 2010. The putative niche requirements and landscape dynamics of *Microstegium vimineum*: an invasive Asian grass, 13(2):471-483

Starry Stonewort (*Nitellopsis obtusa*)

Range Map:

- EPPO Global Database

Images:

- J. Grazio, PA DEP, 2015

Further Reading:

- Brainard AS, Schulz KI. 2017. Impacts of the cryptic macroalgal invader, *Nitellopsis obtusa*, on macrophyte communities. Freshwater Science, 36(1):55-62
- Glisson WJ, Wagner CK, McComas SR, Farnum K, Verhoeven MR, Muthukrishnan R, Larkin DJ. 2018. Response of the invasive alga starry stonewort (*Nitellopsis obtusa*) to control efforts in a Minnesota lake. Lake & Reservoir Management, 34(3):283-295
- Kipp RM, McCarthy M, Fusaro A, Pfingsten IA. 2019. *Nitellopsis obtusa* (Desvaux in Loiseleur) J. Groves, (1919): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL. https://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=1688
- Larkin DJ, Monfils AK, Boissezon A, Sleith RS, Skawinski PM, Welling CH, Cahill BC, Karol KG. 2018. Biology, ecology, and management of starry stonewort (*Nitellopsis obtusa*, Characeae): A Red-listed Eurasian green alga invasive in North America. Aquatic Botany, 148:15-24.
- Michigan Department of Environmental Quality. https://www.michigan.gov/documents/deq/wrd-ais-nitellopsis-obtusa-strategy_499687_7.pdf

- Pullman GD, Crawford G. 2010. A decade of starry stonewort in Michigan. Lakeline: Summer 36-42.
- Sleith RS, Havens AJ, Stewart RA, Karol KG. 2015. Distribution of *Nitellopsis obtusa* (Characeae) in New York, USA. Brittonia, 67(2):166-172

Cuban Bulrush (*Oxycaryum cubense*)

Range Map:

- EPPO Global Database

Images:

- J. Jernigan, Alabama Wildlife & Freshwater Fisheries Bugwood.org

Further Reading:

- Bryson CT, Maddox VL, Carter R. 2008. Spread of Cuban club-rush (*Oxycaryum cubense*) in the southeastern United States. Invasive Plant Science and Management, 1(3):326-329
- Enloe SF, Jacono C. Cuban bulrush, UF IFAS presentation. https://bugwoodcloud.org/CDN/floridainvasives/Southwest/23rdAnnualInvasiveSpeciesWorkshop/Presentations/cuban_bulrush_ENLOE_talk1.pdf
- Invasive Species Specialist Group. http://issg.org/database/species/ecology.asp?si=1231
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/bulrush/
- University of Florida Center for Aquatic and Invasive Plants. https://plants-archive.ifas.ufl.edu/manage/why-manage-plants/floridas-most-invasive-plants/cuban-club-rush/
- Watson AL, Madsen JD. 2014. The effect of the herbicide and growth stage on Cuban club-rush (*Oxycaryum cubense*) control. Journal of aquatic plant management, 52:71-74

Torpedo Grass (*Panicum repens*)

Range Map:

- EPPO Global Database

Images:

- J.D. Byrd, MSU, Bugwood.org
- K. Brown, UF, Bugwood.org

Further Reading:

- Florida Exotic Pest and Plant Council. Panicum repens: torpedo grass. http://www.fleppc.org/ID_book/Panicum%20repens.pdf
- Mississippi State University Extension. http://extension.msstate.edu/publications/publications/torpedograss
- University of Florida Center for Aquatic and Invasive Plants. 2009. *Panicum repens*: Torpedo Grass.

Reed Canarygrass (*Phalaris arundinacea*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Robert H. Mohlenbrock, hosted by the USDA-NRCS PLANTS Database
- Sheri Hagwood, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- David PG. 1999. Response of exotics to restored hydroperiod at Dupuis Reserve, Florida. Restoration Ecology, 7(4):407-410.
- Missouri Department of Conservation. https://mdc.mo.gov/trees-plants/problem-plant-control/invasive-plants/reed-canary-grass-control
- Washington State Noxious Weed Control Board. https://www.nwcb.wa.gov/images/weeds/Reed-Canarygrass-Control_Whatcom.pdf

European Common Reed (*Phragmites australis*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Aaron N. Schad USACE ERDC-EL

Further Reading:

- Al-Juboory BA, Ali AG. 1996. Effect of herbicides, dates of application and their interaction on common reed (Phragmites communis Trin.). Arab Journal of Plant Protection, 14(2):74-80
- Amsberry L, Baker MA, Ewanchuk PJ, Bertness MD. 2000. Clonal integration and the expansion of *Phragmites australis*. Ecological Applications, 10:1110-1118
- Invasive Plants. Common reed. http://www.invasiveplants.net/phragmites/phrag/morph.htm
- CABI. Protecting North America's wetlands from common reed. https://www.cabi.org/projects/project/56397
- Great Lakes Phragmites Collaborative. https://www.greatlakesphragmites.net/phragbasics/spread/
- Marks M, Lapin B, Randall J. 1994. *Phragmites australis* (*P. communis*): threats, management and monitoring. Natural Areas Journal, 14(4):285-294
- New York Invasive Species (IS) Information. http://nyis.info/invasive_species/common-reed/
- New York Invasive Species Research Institute. http://www.nyisri.org/research/biological-control/biocontrol-updates-resources
- Plut K, Paul J, Ciotir C, Major M, Freeland JR. 2011. Origin of non-native *Phragmites australis* in North America, a common wetland invader. Fundamental Applied Limnology 179:121–129
- Rolletschek H, Rolletschek A, Hartzendorf T, Kohl JG. 2000. Physiological consequences of mowing and burning of *Phragmites australis* stands for rhizome ventilation and amino acid metabolism. Wetlands Ecology and Management, 8(6):425-433
- Saltonstall K, Stevenson J. 2007. The effects of nutrients on seedling growth of native and introduced Phragmites australis. Aquatic Botany. 86:331-336
- Smith SM. 2005. Manual control of *Phragmites australis* in freshwater ponds of Cape Cod National Seashore, Massachusetts, USA. Journal of Aquatic Plant Management, 43:50-53
- University of Florida Center for Aquatic and Invasive Plants. http://plants.ifas.ufl.edu/node/323
- USDA, USFS. http://www.fs.fed.us/database/feis/plants/graminoid/phraus/all.html
- USDA, NRCS https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/idpmctn11494.pdf
- Wisconsin Department of Natural Resources. https://dnr.wi.gov/

Water Lettuce (*Pistia stratiotes*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Richard A. Howard, hosted by the USDA-NRCS PLANTS Database
- Robin R. Buckallew, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- BioNET-EAFRINET Keys and Fact Sheets. https://keys.lucidcentral.org/keys/v3/eafrinet/weeds/key/weeds/Media/Html/Pistia_stratiotes_(Water_Lettuce).htm
- Dray FA, Center TD. 2002. Chapter 5: Waterlettuce. In: Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, 65-78 [ed. by Driesche RVan]
- Evans JM. 2013. *Pistia stratiotes* L. in the Florida peninsula: biogeographic evidence and conservation implications of native tenure for an 'invasive' aquatic plant. Conservation and Society, 11:233-246.
- Fernandes RC, Barreto RW. 2005. Ramularia pistiae sp. nov. - a new leaf spot fungus on water lettuce (*Pistia stratiotes*) from Nicaragua. Mycotaxon, 92:49-53. http://www.mycotaxon.com
- Habeck DH, Thompson CR. 1994. Host specificity and biology of *Spodoptera pectinicornis* (Lepidoptera: Noctuidae), a biological control agent of waterlettuce (*Pistia stratiotes*). Biological Control, 4(3):263-268
- Langeland KA, Smith BE. 1993. Evaluation of triclopyr and diquat for managing mixed populations of waterhyacinth (*Eichhornia crassipes*) and water lettuce (*Pistia stratiotes*). Proceedings Southern Weed Science Society: weed science in harmony with the environment, 46th annual meeting, Charlotte, North Carolina, USA, 18-20 January 1993., 250-254
- Rivers L. 2002. Water Lettuce (*Pistia stratiotes*). Gainsville, USA: University of Florida and Sea Grant
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/water-lettuce/

- Thayer DD, Haller WT. 1985. Effect of herbicides on floating aquatic plants. Journal of Aquatic Plant Management, 23:94-95
- USDA NRCS. 2013. The PLANTS Database: Plants profile for *Pistia stratiotes* (water lettuce). National Plant Data Team, Greensboro, NC 27401-4901 USA. http://plants.usda.gov/core/profile?symbol=PIST2&mapType=nativity
- USGS, NAS. https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=1099
- Wade PM. 1990. Physical control of aquatic weeds. In: Pieterse AH, Murphy KJ, eds. Aquatic Weeds. Oxford, UK: Oxford University Press, 93-135
- Waipara NW, Bourdôt GW, Hurrell GA. 2006. *Sclerotinia sclerotiorum* shows potential for controlling water lettuce, alligator weed and wandering jew. In: New Zealand Plant Protection Hastings, New Zealand: New Zealand Plant Protection Society, 23-27. http://www.hortnet.co.nz/publications/nzpps/

Common Salvinia (*Salvinia minima*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Richard A. Howard, hosted by the USDA-NRCS PLANTS Database
  Forest & amp
- Kim Starr / CC BY. https://creativecommons.org/licenses/by/3.0

Further Reading:

- ISSG, 2006. ISSG Global Invasive Species Database. Auckland, New Zealand: University of Auckland. http://www.issg.org/database
- Madeira PT, Jacono CC, Tipping P, Van TK, Center TD. 2003. A genetic survey of Salvinia minima in the southern United States. Aquatic Botany, 76(2):127-139
- Texas Invasives. https://www.texasinvasives.org/plant_database/detail.php?symbol=SAMI7
- USGS, 2005. Salvinia. United States Geological Survey. USA: USGS. http://salvinia.er.usgs.gov/
- USGS, NAS. https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=297

Giant Salvinia (*Salvinia molesta*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Robin R. Buckallew, hosted by the USDA-NRCS PLANTS Database
- Mark A. Garland, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- CABI, Invasive Species Compendium. https://www.cabi.org/
- Knutson, A and J Nachtrieb (eds.). 2012. A guide to mass rearing the salvinia weevil for biological control of giant salvinia. Texas A&M University AgriLife Extension Service Species Publications ESP-475. http://lubbock.tamu.edu/files/2015/06/Mass_Rearing_Salvinia_Weevil-10-15-2012.pdf
- McFarland DG, Nelson LS, Grodowitz MJ, Smart RM, Owens CS. 2004. *Salvinia molesta* D.S. Mitchell (giant salvinia) in the United States: a review of species ecology and approaches to management. Aquatic Plant Control Research Program ERDC/EL SR-04-2. https://apcrp.el.erdc.dren.mil/elpubs/pdf/srel04-2.pdf
- Nelson, LS, Skogerboe JG, Getsinger KD. 2001. Herbicide evaluation against giant salvinia. J Aquatic Plant Manage 39:48-53. https://www.apms.org/wp/wp-content/uploads/2012/10/v39p48.pdf
- Oliver JD. 1993. A review of the biology of giant salvinia (*Salvinia molesta* Mitchell). J Aquatic Plant Manage 31:227-231. http://www.apms.org/japm/vol31/v31p227.pdf
- Sartain BT, Mudge CR. 2018. Evaluation of 12 foliar applied non-aquatic herbicides for efficacy against giant salvinia (*Salvinia molesta*). Journal of Aquatic Plant Management 56:101-112.
- Texas Invasives. https://www.texasinvasives.org/plant_database/detail.php?symbol=SAMO5
- University of Florida Center for Aquatic and Invasive Plants. http://plants.ifas.ufl.edu
- USGS, 2005. Salvinia. United States Geological Survey. USA: USGS. http://salvinia.er.usgs.gov/
- USGS, NAS. https://nas.er.usgs.gov/

Brazilian Peppertree (*Schinus terebinthifolia*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Aaron N. Schad USACE ERDC-EL

Further Reading:

- Dawkins K, Esiobu N. 2016. Emerging insights on Brazilian pepper tree (*Schinus terebinthifolius*) invasion: the potential role of soil microorganisms. Frontiers in Plant Science 7
- Enloe SF, Leary JK, Prince CM, Sperry BP, Lauer DK. 2020. Brazilian peppertree and mangrove species response to foliar-applied novel auxin-type herbicides. Invasive Plant Science and Management 13:102-107
- Manrique V, Cuda JP, Overholt WA, Williams DA, Wheeler GS. 2008. Effect of host-plant genotypes on the performance of three candidate biological control agents of *Schinus terebinthifolius* in Florida. Biological Control 47:167-171
- Morton JF. 1978. Brazilian pepper—Its impact on people, animals and the environment. Economic Botany 32:353-359
- National Park Service. https://www.nps.gov/orgs/1103/upload/FactSheet_BrazilianPeppertree.pdf
- University of Florida Center for Aquatic and Invasive Plants. http://plants.ifas.ufl.edu, https://edis.ifas.ufl.edu/aa219
- USGS and USFS, FEIS, https://www.fs.fed.us/database/feis/plants/shrub/schter/all.html
- Wheeler GS, McKay F, Vitorino MD, Manrique V, Diaz R, Overholt WA. 2016. Biological Control of the Invasive Weed *Schinus terebinthifolia* (Brazilian Peppertree): A Review of the Project with an Update on the Proposed Agents. Southeastern Naturalist, 15:15-34
- Wheeler GS, Silverson N, Dyer K, McKay F. 2016. Brazilian Collections and Laboratory Biology of the Thrips *Pseudophilothrips ichini* (Thysanoptera: Phlaeothripidae): A Potential Biological Control Agent of the Invasive Weed Brazilian Peppertree (Sapindales: Anacardiaceae), Florida Entomologist, 99(1):6-11

Saltcedar (*Tamarix ramosissima*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- Mr. & Mrs. Robert G. Young, hosted by the USDA-NRCS PLANTS Database
- Steven Perkins, hosted by the USDA-NRCS PLANTS Database

Further Reading:

- CABI, Invasive Species Compendium. https://www.cabi.org/
- DeLoach, C.J., M.J. Pitcairn, D. Woods. 1996. Biological control of saltcedar in Southern California. In: Joe DiTomaso and Carl E. Bell, eds., Proceedings of the Saltcedar Management Workshop, Rancho Mirage, California, pp. 30-31
- DeLoach CJ, Gerling D, Fornasari L, Sobhian R, Myartseva S, Mityaev ID, Lu QG, Tracy JL, Wang R, Wang JF, Kirk A, Pemberton RW, Chikatunov V, Jashenko RV, Johnson JE, Zheng H, Jiang SL, Liu MT, Liu AP, Cisneroz J. 1996. Biological control programme against saltcedar (*Tamarix* spp.) in the United States of America: progress and problems. Proceedings of the 9th international symposium on biological control of weeds, Stellenbosch, South Africa, 19-26 January 1996., 253-260
- DeLoach CJ, Tracy JL. 1997. Effects of biological control of saltcedar (*Tamarix ramosissima*) on endangered species: Draft Biological Assessment, 17 October 1997. USDA/ARS, Temple, Texas, USA
- DeLoach CJ, Lewis PA, Herr JC, Carruthers RI, Tracy JL, Johnson J. 2003. Host specificity of the leaf beetle, *Diorhabda elongata deserticola* (Coleoptera: Chrysomelidae) from Asia, a biological control agent for saltcedars (Tamarix: Tamaricaceae) in the Western United States. Biological Control, 27(2):117-147
- DeLoach CJ, Carruthers RI, Dudley TL, Eberts D, Kazmer DJ, Knutson AE, Bean DW, Knight J, Lewis PA, Milbrath LR, Tracy JL, Tomic-Carruthers N, Herr JC, Abbott G, Prestwich S, Harruff G, Everitt JH, Thompson DC, Mityaev I, Jashenko R, Li B, Sobhian R, Kirk A, Robbins TO, Delfosse ES. 2004. First results for control of saltcedar (*Tamarix* spp.) in the open field in the western United States. In: Cullen JM, Briese DT, Kriticos DJ, Lonsdale WM, Morin L, Scott JK, eds. Proceedings of the XI International Symposium on Biological Control of Weeds, 28 April-2 May 2003. Canberra, Australia: CSIRO Entomology, 505-513
- Duncan KW, McDaniel KC. 1998. Saltcedar (Tamarix spp.) management with imazapyr. Weed Technology, 12(2):337-344

- Hart CR. 2003. Saltcedar biology and management. Publ. No. L-5540. Texas Cooperative Extension, Texas A&M University System, College Station, Texas, USA
- Hudson LE. 1999. Climatic and hydrologic effects on the establishment of *Tamarix ramosissima* in the cold desert of northern Wyoming (Bighorn Lake). M.S. Thesis, University of Montana, Missoula
- Jackson NE. 1996. Chemical control of saltcedar (*Tamarix ramosissima*). In: Joe DiTomaso and Carl E. Bell, eds., Proceedings of the Saltcedar Management Workshop, Rancho Mirage, California, pp. 21-27
- Lewis PA, DeLoach CJ, Knutson AE, Tracy JL, Robbins TO. 2003. Biology of *Diorhabda elongata deserticola* (Coleoptera: Chrysomelidae), an Asian leaf beetle for biological control of saltcedars (*Tamarix* spp.) in the United States. Biological Control, 27(2):101-116
- McGinty A, Thornton O, 2003. Colorado River Saltcedar Control Project. Proceedings of the Symposium: Saltcedar and Water Resources in the West, 16-17 July 2003, San Angelo, TX, USA, 145-151
- Sisneros D, 1991. Herbicide Analysis: Lower Colorado River vegetation management study. USDI Bureau of Reclamation, Report R-91-06. Denver, Colorado, USA
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/how-to-control-salt-cedar/
- University of Florida Center for Aquatic and Invasive Plants. http://plants.ifas.ufl.edu

Water Chestnut (*Trapa* spp.)

Range Map:

- EPPO Global Database

Images:

- Lynde Dodd, USACE ERDC-EL

Further Reading:

- Aquatics. http://www.aquatics.org/bmpchapters/BMP4ed.pdf
- Ding JQ, Blossey B, Du YuZhou, Zheng FuShan. 2006. *Galerucella birmanica* (Coleoptera: Chrysomelidae), a promising potential biological control agent of water chestnut, *Trapa natans*. Biological Control, 36(1):80-90
- Hummel M, Kiviat E. 2004. Review of world literature on water chestnut with implications for management in North America. Journal of Aquatic Plant Management, 42:17-28
- Invasive plants of the eastern United States website. https://wiki.bugwood.org/Archive:BCIPEUS/Trapa_natans
- IPANE. 2001. Invasive Plant Atlas of New England (IPANE) at the University of Connecticut online database. http://invasives.eeb.uconn.edu/ipane/
- Kiviat E. 1993. Under the spreading water-chestnut. News from Hudsonia, 9(1):1-6.
- Lui K, Butler M, Allen M, Snyder E, da Silva J, Brownson B, Ecclestone A. 2010. Field guide to aquatic invasive species: Identification, collection and reporting of aquatic invasive in Ontario waters. Ministry of Natural Resources, Ontario, Canada.201 pp
- New York State Department of Environmental Conservation. https://www.dec.ny.gov/animals/109536.html
- Crow GE, Hellquist CB. 2000. Aquatic and wetland plants of northeastern North America. University of Wisconsin Press
- Pemberton RW, 1999. Natural enemies of Trapa spp. in Northeast Asia and Europe. Biological Control, 14(3):168-180
- Poovey AG, Getsinger KD. 2007. Subsurface applications of triclopyr and 2,4-D amine for control of water chestnut (*Trapa natans* L.). Journal of Aquatic Plant Management, 45:63-66
- University of California, Davis. https://wric.ucdavis.edu/information/crop/natural%20areas/wr_T/Trapa.pdf
- USGS, NAS. https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=263&Potential=N&Type=0
- Vermont Department of Environmental Conservation. https://dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives/control
- Wu M. 2007. Can ultrasound eradicate water chestnuts? Ecological Restoration, 25(1):64-65

Chinese Tallow (*Triadica sebifera*)

Range Map:

- USDA-NRCS PLANTS Database

Images:

- James Henson, hosted by the USDA-NRCS PLANTS Database
- Aaron N. Schad USACE ERDC-EL

Further Reading:

- Bruce KA, Cameron GN, Harcombe PA, Jubinsky G. 1997. Introduction, impact on native habitats, and management of a woody invader, the Chinese tallow tree, Sapium sebiferum (L.) Roxb. Natural Areas Journal, 17(3):255-260
- Enloe SF, Loewenstein NJ, Streett D, Lauer DK. 2015. Herbicide treatment and application method influence root sprouting in Chinese tallowtree (Triadica sebifera). Invasive Plant Science and Management, 8(2):160-8
- Mississippi Forestry Commission. https://www.mfc.ms.gov/forest-health/invasive-plants/chinese-tallow-tree/
- Owens B, 2001. Louisiana Invasive Plants: Chinese tallow tree. In: LSU AgCenter. Louisiana, USA: Louisiana University College AgCenter.https://www.lsuagcenter.com/topics/environment/invasive%20species/chinese%20tallow%20tree
- Rice B, 2002. Weed Alert! *Sapium sebiferum* (syn. *Triadica sinensis*) (Chinese Tallowtree, Florida Aspen, Popcorn Tree). The Nature Conservancy, Wildland Invasive Species Team. http://tncweeds.ucdavis.edu/alert/alrtsapi.html
- SE-EPPC, 2003. Southeast Exotic Pest Plant Council Invasive Plant Manual. Chinese Tallowtree. http://www.invasive.org/eastern/eppc/SASE.html
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu/management-options/tallowpopcorn-tree-non-native/
- University of Arkansas Extension. https://www.uaex.edu/environment-nature/ar-invasives/invasive-plants/chinese-tallow-tree.aspx
- Wheeler GS, Ding JQ. 2014. Is Chinese tallowtree, Triadica sebifera, an appropriate target for biological control in the United States? Invasive Plant Science and Management, 7(2),345-359.

General References

- Aquatic Plant Research Control Program (APCRP), USACE-ERDC, https://apcrp.el.erdc.dren.mil/
- CABI, Invasive Species Compendium. https://www.cabi.org/
- Center for Invasive Species and Ecosystem Health, www.invasive.org
- Early Detection and Distribution Mapping System (EDDS), https://www.eddmaps.org/
- Encycloweedia. https://www.cdfa.ca.gov
- Enloe SF, Langeland K, Ferrell J, Sellers B, MacDonald G. 2018. Integrated Management of Nonnative Plants in Natural Areas of Florida, UF IFAS. https://edis.ifas.ufl.edu/pdf%5CWG%5CWG20900.pdf
- Gettys LA, Haller WT, Petty DG eds. 2020. Biology and control of aquatic plants: a best management practices handbook 4th ed. Aquatic Ecosystem Restoration Foundation. http://aquatics.org/bmp.html
- Invasive Plant Atlas of the United States, https://www.invasiveplantatlas.org
- Miller JH. 2003. Nonnative invasive plants of southern forests: a field guide for identification and control. Gen. Tech. Rep. SRS-62. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 93 pp
- TAMU Agrilife Extension, AquaPlant. https://aquaplant.tamu.edu
- Texas Invasives. https://www.texasinvasives.org/
- United States Army Corps of Engineers Natural Resource Management Gateway, https://corpslakes.erdc.dren.mil/
- United States Department of Agriculture, Plants database. https://plants.usda.gov
- United States Department of Agriculture, National Invasive Species Information Center (NISIC), https://www.invasivespeciesinfo.gov
- United States Forest Service, Fire Effects Information System. https://www.feis-crs.org/feis/
- United States Geologic Survey, Nonindigenous Aquatic Species, https://nas.er.usgs.gov/
- University of Florida Center for Aquatic and Invasive Plants. http://plants.ifas.ufl.edu