

MN NWAC Risk Assessment Worksheet (04-2011) http://www.dnr.state.mn.us/invasives/terrestrialplants/herbaceous/queenannslace.html https://www.minnesotawildflowers.info/flower/queen-annes-lace http://uswildflowers.com/detail.php?SName=Daucus%20carota http://plants.usda.gov/core/profile?symbol=daca6	Common Name Wild Carrot/Queen Anne's Lace <i>This is a continuation and a review of a NWAC risk assessment conducted in 2010^R.</i>	Latin Name <i>Daucus carota L.</i>
	Reviewer Anthony Cortilet	Affiliation/Organization Minnesota Department of Agriculture

Box	Question	Answer	Outcome
1	Is the plant species or genotype non-native?	Yes. – Biennial. Native to Europe ^{A, B, C, D, F, P, Q} .	Box 3
2	Does the plant species pose significant human or livestock concerns or has the potential to significantly harm agricultural production?		
	A. Does the plant have toxic qualities that pose a significant risk to livestock, wildlife, or people?	<p><i>Can be a digestive irritant if fed to livestock in dried hay. Otherwise, toxicity is considered to be mild ^{D, E}.</i></p> <p><i>Dairy cows that have ingested large amounts of wild carrot may produce pungent milk ^F.</i></p> <p><i>Skin exposure of plant sap to humans may cause skin irritation ^F.</i></p> <p><i>Threat to recovering grasslands ^Q.</i></p>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	B. Does the plant cause significant financial losses associated with decreased yields, reduced quality, or increased production costs?	<p><i>Regular cultivation deters wild carrot growth in production agriculture fields ^{D, E, F}.</i></p> <p><i>May become problematic in non-managed and overgrazed hay fields and pastures ^{D, E, F}.</i></p> <p><i>Has also been documented to be problematic in perennial production systems like grass seed production fields and Christmas trees ^E.</i></p>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>

Box	Question	Answer	Outcome
3	Is the plant species, or a related species, documented as being a problem elsewhere?	Yes. It is established throughout North America and all surrounding states and Canada provinces of Minnesota ^{B, C} . It has also been documented to be problematic in many states, but is only regulated in 4 – MI, IA (as a secondary noxious weed), OH, WA ^C . Wild parsnip is also closely related and is listed as a Prohibited – Control Noxious Weed in Minnesota (See NWAC Risk Assessment MDARA00025WIPAR_2_24_2014). Others in the same plant family are thought to be problematic in Minnesota and elsewhere but are not yet regulated.	Box 6
4	Is the plant species' life history & Growth requirements understood?	<i>Yes. Daucus carota is well defined in the plant literature and has been studied extensively as both a cultivated crop and a wild-escaped variety.</i>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
5	Gather and evaluate further information:		

Box	Question	Answer	Outcome
6	Does the plant species have the capacity to establish and survive in Minnesota?	Yes ^{A, B, C} . The plant has existed in Minnesota for many years and has been documented in EDDMaps in 30 counties ^B . It has been described by County Agricultural Inspectors to be most prevalent in the southern 1/3 of the state where roadside, grazing lands, and natural areas can be invaded and create large infestations ^H . Recent conversations at the 2015 Minnesota Association of County Agricultural Inspectors Annual meeting indicated that the plant is being found statewide, but has not been considered to be a significant problem by citizens, counties, townships and cities ^H . Furthermore, many CAI's indicate that with the new pollinator outreach in the state, many citizens view this as a beneficial plant. The plant may also be under or over-reported in the state since it looks similar to other closely related species that are also present.	
	A. Is the plant, or a close relative, currently established in Minnesota?	Yes ^{A, B, C} . https://www.minnesotawildflowers.info/flower/queen-annes-lace http://www.eddmaps.org/distribution/usstate.cfm?sub=5514 http://www.eddmaps.org/distribution/viewmap.cfm?sub=5514 http://plants.usda.gov/core/profile?symbol=DAUCU	Box 7
7	Does the plant species have the potential to reproduce and spread in Minnesota?	Yes ^{A, B, C, H} . It has been in southern Minnesota for many decades and has more recently been documented in other regions of the state ^{b, G} .	
	A. Does the plant reproduce by asexual/vegetative means?	No. Reproduces by seed ^{D, E, F, I} .	Box C
	B. Are the asexual propagules effectively dispersed to new areas?		
	C. Does the plant produce large amounts of viable, cold-hardy seeds?	Yes ^{D, E, F, I} .	Box F

Box	Question	Answer	Outcome
	D. If this species produces low numbers of viable seeds, does it have a high level of seed/seedling vigor or do the seeds remain viable for an extended period?		
	E. Is this species self-fertile?	<i>Yes. In the absence of wind or insect pollination the flowers are self-fertile ¹.</i>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	F. Are sexual propagules – viable seeds – effectively dispersed to new areas?	Yes. Seeds have hooked spines that attach to clothing and animal fur ^F . The entire umbel can also detach from the standing stalk late in the season and blow in the wind to new areas (like a tumble weed) dispersing seed ^{1, Q} .	Box I
	G. Can the species hybridize with native species (or other introduced species) and produce viable seed and fertile offspring in the absence of human intervention?	<i>Not Known. It can hybridize with cultivated carrots ¹. No other information could be found in the literature regarding other parsley / carrot family hybridization with <i>Daucus carota</i>.</i>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	H. If the species is a woody (trees, shrubs, and woody vines) is the juvenile period less than or equal to 5 years for tree species or 3 years for shrubs and vines?		
	I. Do natural controls exist, species native to Minnesota that are documented to effectively prevent the spread of the plant in question?	Nothing has been documented for Minnesota. Black swallowtail butterflies do feed on the plant ^M .	Box 8

Box	Question	Answer	Outcome
8	Does the plant species pose significant human or livestock concerns or has the potential to significantly harm agricultural production, native ecosystems, or managed landscapes?	The species has not been documented in Minnesota to pose significant human or livestock concerns. There has been some talk among state and federal land managers that this species is a threat to wildlife management areas and the establishment of native vegetation ^Q . Whether or not this threat is significant or not, remains to be documented. Additionally, County Agricultural Inspectors have indicated that very few, if any, complaints are filed with the county regarding this species ^H . Although public land managers report this species as being a problem on their lands, they generally do not favor regulations requiring them to control or eradicate a species on their management areas.	
	A. Does the plant have toxic qualities, or other detrimental qualities, that pose a significant risk to livestock, wildlife, or people?	Wild carrot contains furocoumarins and if people or light skinned animals come into contact with the skin could cause irritating rashes or burns that lead to scaring ^{K, L} . It can displace native wildlife habitat and may be mildly toxic to livestock if feed in baled hay ^{D, E, F, I, Q} . However, in all cases it has not been documented to be a significant risk.	Yes - Box 9
	B. Does, or could, the plant cause significant financial losses associated with decreased yields, reduced crop quality, or increased production costs?	<i>Washington state has documented it to be a significant problem in perennial cropping systems like Christmas trees, grass seed fields, and pastures^D. There has been no documentation of financial losses in Minnesota.</i>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	C. Can the plant aggressively displace native species through competition (including allelopathic effects)?	<i>There is no documentation of allelopathy in wild carrot. It has been documented to grow and spread (sometimes aggressively) on native landscapes in Minnesota, thus displacing native species where it establishes^{A, B, C, G, Q}.</i>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>

Box	Question	Answer	Outcome
	D. Can the plant hybridize with native species resulting in a modified gene pool and potentially negative impacts on native populations?	<i>No. See 7-G.</i>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	E. Does the plant have the potential to change native ecosystems (adds a vegetative layer, affects ground or surface water levels, etc.)?	<p><i>Not conclusive. It does have potential to change native ecosystems and has been seen to invade into disturbed ecosystems, developing into large monocultures. It also has been effectively controlled in these situations.</i></p> <p><i>It appears to invade native ecosystems during periods of disturbance (droughts, gopher activity, human activity, etc.) and has been reported by Minnesota Department of Natural Resources and U.S. Fish and Wildlife Service land managers in the state to be a threat to native ecosystems. However, there is no direct documentation at this time. It has not been determined whether this species is taking advantage of climate changes in Minnesota – becoming more aggressive - and also dominating in certain situations as an early successional species; similarly to other non-native biennial species that are eventually displaced by re-emergence of native plants when disturbances are minimized (A. B. Cortilet, MDA Weed Scientist, Professional Experience).</i></p>	<i>This text is provided as additional information not directed through the decision tree process for this particular risk assessment.</i>
	F. Does the plant have the potential to introduce or harbor another pest or serve as an alternate host?		

Box	Question	Answer	Outcome
9	Does the plant species have clearly defined benefits that outweigh associated negative impacts?	<p>Wild carrot is also referred to as Queen Anne’s Lace and under this name, is often listed as a beneficial plant for butterflies – especially Black Swallowtail – which also can feed on a variety of other plants in the parsley family, in addition to other native plants^M. Although it is considered a weedy species by some, recent pollinator movements in the state have shown that many people consider it to be an important butterfly plant.</p> <p>This species has many references referring to it as having medicinal qualities that include cholesterol reduction, dropsy, chronic dysentery, kidney ailments, worms, uterine pain, etc. It also may improve memory and cognitive function^{N,O}.</p>	
	A. Is the plant currently being used or produced and/or sold in Minnesota or native to Minnesota?	Found in a variety of seed mixes – especially for butterflies, although recent awareness to potential invasiveness has made it increasingly rare to find (Stephen Malone, MDA Seed Program, personal communication 2015). An internet search yields many sites with business’ offering seed packets of <i>Daucus carota</i> . Current pollinator movements in the U.S. have shown that many people find it as a beneficial butterfly plant, thus the continued demand in seed mixes.	Box B
	B. Is the plant an introduced species and can its spread be effectively and easily prevented or controlled, or its negative impacts minimized through carefully designed and executed management practices?	The species is introduced and steps to prevent movement have been largely been successfully to this point in Minnesota. It is a biennial and can be managed through mowing and herbicide applications. Small patches can be hand-pulled. A species management plan would not apply well in this case since wild carrot does not have significant benefits that outweigh the associated impacts (see the MN Plant Risk Assessment Protocol for the definition of a Specially Regulated Plant).	No – Box C

Box	Question	Answer	Outcome
	C. Is the plant native to Minnesota?	No	Box D
	D. Is a non-invasive, alternative plant material commercially available that could serve the same purpose as the plant of concern?	In terms of this species being considered a beneficial plant for butterflies (i.e., black swallowtail), there are many other native species that would serve the same purpose and not have the negative impacts ^M . For example, the native spotted water hemlock, <i>Cicuta maculata</i> L., and several non-invasive herb species like dill and parsley also serve as hosts for black swallowtails in Minnesota.	Box 10
	E. Does the plant benefit Minnesota to a greater extent than the negative impacts identified at Box #8?		
10	Should the plant species be enforced as a noxious weed to prevent introduction &/or dispersal; designate as prohibited or restricted?		
	A. Is the plant currently established in Minnesota?	Yes – See Box 6A	Box B
	B. Does the plant pose a serious human health threat?	Although the plant could be an irritant to human skin if exposed to the sap, documentation showing a serious human impact is lacking for Minnesota as compared to wild parsnip, cow parsnip, and water hemlock.	No – Box C

Box	Question	Answer	Outcome
	C. Can the plant be reliably eradicated (entire plant) or controlled (top growth only to prevent pollen dispersal and seed production as appropriate) on a statewide basis using existing practices and available resources?	<p>It is too widespread in Minnesota to be effectively eradicated statewide. However, individual counties could require eradication if the plant is not yet known to be widespread. Mowing prior to seed set can be effective over time and herbicide control has also shown to be effective against wild carrot when applied in the early spring or late fall on rosettes or young bolting plants ^{D, E, F, H, I}.</p> <p>Wild carrot is also not thought at this time to be a serious weed of concern by counties, townships and cities ^H.</p> <p>Because it can still be found in pollinator and butterfly seed mixes, it is an issue within the seed industry. Listing it as a Restricted Noxious Weed would allow for enforcement of sale in Minnesota.</p>	No – List as a Restricted Noxious Weed
11	Should the plant species be allowed in Minnesota via a species-specific management plan; designate as specially regulated?		
Final Results of Risk Assessment			
	Review Entity	Comments	Outcome

Box	Question	Answer	Outcome
	NWAC Listing Subcommittee	Although this species primarily keys-out to being listed as a Prohibited – Control Noxious Weed, because of the lack of interest by counties, townships and cities to enforce wild carrot control, the listing subcommittee discussed listing it as a Restricted Noxious Weed. This would show that NWAC feels this is a potentially invasive and destructive weed, letting landowners know that voluntary control or eradication would be preferred and that sales of seed for pollinator or butterfly plantings are illegal and that other native or non-invasive plants should be sought for these purposes.	List as a Restricted noxious Weed.
	NWAC Full-group	Voted 11 in favor and 0 opposed.	REGULATE. LIST AS A RESTRICTED NOXIOUS WEED.
	MDA Commissioner	REGULATE. LIST AS A RESTRICTED NOXIOUS WEED.	LIST AS A RESTRICTED NOXIOUS WEED.
	FILE # WildCarrot_2015_MDARA00051WICT		
Final Summary			

References:

^A Minnesota Wild Flowers website: <https://www.minnesotawildflowers.info/flower/queen-annes-lace>

^B EDDMaps website: <http://www.eddmaps.org/distribution/usstate.cfm?sub=5514> & <http://www.eddmaps.org/distribution/viewmap.cfm?sub=5514>

^C United States Department of Agriculture, Natural Resources Conservation Service's PLANTS

Database: <http://plants.usda.gov/core/profile?symbol=DAUCU>

^D Penn State Extension Weed Management Webpage. 2015. Wild Carrot. <http://extension.psu.edu/pests/weeds/weed-id/wild-carrot>

^E Jed B. Colquhon. Pacific Northwest Extension Publication. Oregon State University, University of Idaho, & Washington State University. 2003 – reviewed 2012. PDF – PNW

447: <https://catalog.extension.oregonstate.edu/sites/catalog.extension.oregonstate.edu/files/project/pdf/pnw447.pdf>

^F The Ohio State University Extension. Ohio Perennial & Biennial Weed Guide. Wild Carrot, *Daucus carota*: <http://www.oardc.ohio-state.edu/weedguide/singlerecord.asp?id=530>

^G Plants for a Future website: <http://www.pfaf.org/user/Plant.aspx?LatinName=Daucus+carota>

- ^H 2015 Minnesota Association of County Agricultural Inspectors Annual Short-Course.
- ^I Illinois Wildflowers. Wild Carrot webpage: http://www.illinoiswildflowers.info/weeds/plants/wild_carrot.htm
- ^J Magnussen, L. S. and T. P. Hauser. 2007. Hybrids between cultivated and wild carrots in natural populations in Denmark. *Heredity*. Vol. 99, pages 185 – 192.
- ^K Bell, C. E. 2014. University of California Weed Science. Phytophotodermatitis, umbels and leucoderma. Invasive Plants in Southern California Blog: <http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=13817>
- ^L Rietschel, R.L., J. F. Fowler, and A. A. Fisher. 2008. Fisher's Contact Dermatitis – 6th edition. People's Medical Publishing House – USA. Chapter 21, pages 426 & 427.
- ^M University of Florida. Entomology and Nematology Website. Eastern Black Swallowtail, *Papilio polyxenes asterius*: http://entnemdept.ufl.edu/creatures/bfly/bfly2/eastern_black_swallowtail.htm
- ^N Duke, J. A. 1983. *Daucus carota* L., Apiaceae. Handbook of Energy Crops. Published on the Purdue University Center for New Crops and Plants Products website: https://www.hort.purdue.edu/newcrop/duke_energy/Daucus_carota.html
- ^O Vasudevan, M. and M. Parle. 2006. Pharmacological evidence for the potential of *Daucus carota* in the management of cognitive dysfunctions. *Biological Pharmaceutical Bulletin*. 29(6): 1154-61.
- ^P Wild Flowers of the United States. Web Database of Plants: <http://uswildflowers.com/detail.php?SName=Daucus%20carota>
- ^Q Minnesota Department of Natural Resources. Invasive Terrestrial Plants. Queen Anne's Lace (*Daucus carota*): <http://www.dnr.state.mn.us/invasives/terrestrialplants/herbaceous/queenannslace.html>
- ^R Van Riper, Laura. Noxious Weed Advisory Committee Risk Assessment. 2010. Wild Carrot. 15 pages.

