

Taxon: Hippophae rhamnoides L.	Family: Elaeagnaceae
Common Name(s): sallowthorn sea buckthorn	Synonym(s): Elaeagnus rhamnoides (L.) A.Nelson

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 31 Jul 2017
WRA Score: 9.5	Designation: H(HPWRA)	Rating: High Risk

Keywords: Temperate Tree, Thorny, Thicket-Forming, Dioecious, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Low
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Low
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	n
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n

Qsn #	Question	Answer Option	Answer
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	n
401	Produces spines, thorns or burrs	y=1, n=0	y
401	Produces spines, thorns or burrs	y=1, n=0	y
402	Allelopathic	y=1, n=0	n
402	Allelopathic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	y
503	Nitrogen fixing woody plant	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	n
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	3
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	3
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m ²)		

Qsn #	Question	Answer Option	Answer
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Some cultivars produce larger fruit, but no evidence that it is highly domesticated] "The fruit is an oblate, globular or oval drupe, 6-8 mm long, mostly orange-red to orange or yellow, with a tart, bittersweet flavour. In natural populations, berries weigh 4-60 g per 100 berries, but some Russian cultivars are larger (Yao, 1994). The seed coat is dark brown, hard and glossy." ... "Breeding of <i>H. rhamnoides</i> has been conducted in Russia for more than 60 years (Zhao, 1997), with over 50 varieties having improved characteristics (for example, larger fruit, longer peduncles, high-yielding, less spiny, or long pedicels). Fruit yields of 8-10 tons per ha can be harvested from some high-yielding varieties, such as <i>H. rhamnoides</i> subsp. <i>sinensis</i> , which has large fruit and is stable yielding."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	NA
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	Low
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"Common seabuckthorn— <i>Hippophae rhamnoides</i> L.—is native to northwestern Europe through central Asia to the Altai Mountains, western and northern China, and the northern Himalayas."
202	Quality of climate match data	High
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	" <i>H. rhamnoides</i> is widely distributed in the temperate Eurasian zone, inhabiting coastal dune sites (UK) to elevations over 4000 m in Tibet. Since it is resistant to drought, its distribution is mainly affected by temperature. The main area of distribution is in China (75-121°E, 27-48°N), occurring at high altitudes in the southwest and low altitudes in the northeast (Rousi, 1971; Liu and He, 1978; Lian, 1994)." ... " <i>H. rhamnoides</i> is frost resistant, and therefore extends to high altitudes at low latitudes in southeast China and in the Himalayan region, to areas further north at low altitudes in Europe and Canada; there are no natural stands occurring where the mean temperature of the hottest month exceeds 25°C." Climatic amplitude (estimates) - Altitude range: 200 - 3000 m - Mean annual rainfall: 200 - 500 mm - Rainfall regime: summer - Dry season duration: 6 - 8 months - Mean annual temperature: 7 - 12°C - Mean maximum temperature of hottest month: 15 - 25°C - Mean minimum temperature of coldest month: 1 - 4°C - Absolute minimum temperature: > -30°C
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"River banks and terraces, dry river beds, forest margins, thickets on mountain slopes, moraines, meadows at highest elevations; 600–4200 m."

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	" <i>H. rhamnoides</i> is widely distributed in the temperate Eurasian zone, inhabiting coastal dune sites (UK) to elevations over 4000 m in Tibet." ... " <i>H. rhamnoides</i> is frost resistant, and therefore extends to high altitudes at low latitudes in southeast China and in the Himalayan region, to areas further north at low altitudes in Europe and Canada; there are no natural stands occurring where the mean temperature of the hottest month exceeds 25°C."
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides</i> L.): a multipurpose plant. HortTechnology, 6(4), 370-380	"Sea buckthorn occurs as a native plant distributed widely throughout temperate zones between 27° and 69° N latitude and 7° W and 122° E longitude (Pan et al., 1989; Rousi, 1971) including China, Mongolia, Russia, Great Britain, France, Denmark, Netherlands, Germany, Poland, Finland, Sweden, and Norway (Fig. 2) (Wahlberg and Jeppsson, 1990; Yao and Tigerstedt, 1995)."

Qsn #	Question	Answer
205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"Of the 2 species in the genus, only common seabuckthorn is widely cultivated (Rehder 1940). A very hardy deciduous shrub or a small tree, common seabuckthorn is used primarily for ornamental purposes. In Europe and Asia, it is used to form hedges and, because of its nitrogen- fixing symbionts, serves to enrich and protect soils (Bogdon and Untaru 1967; Kao 1964; Stewart and Pearson 1967)."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Binggeli, P., Eakin, M., Maefadyen, A., Power, J., & McConnell, J. (1992). Impact of the alien sea buckthorn (<i>Hippophae rhamnoides</i> L.) on a sand dune ecosystem in Ireland. Coastal dunes. Pp. 325-337 in Coastal Dunes. Geomorphology, Ecology and Management for Conservation. Carter RWG, Curtis TGF and MJ Sheehy-Skeffington (Eds). Balkema. Rotterdam	"H. rhamnoides has invaded a large number of sites and appears to be a serious threat to the native dune flora and fauna."
	O'Rourke, E. & Lysaght, L. 2014. Risk Assessment of <i>Hippophae rhamnoides</i> . Inland Fisheries Ireland & National Biodiversity Data Centre, Waterford, Ireland. http://nonnativespecies.ie/ . [Accessed 31 Jul 2017]	"H. rhamnoides is naturalised and locally abundant on sand dunes and sandy ground, mainly on the east and north coast of Ireland (National Biodiversity Data Centre, 2014; ISI, 2012; Reynolds, 2002). There are 170 records of the species covering 48 10km ² squares in Ireland verified by the National Biodiversity Data Centre; (Figure 1; National Biodiversity Data Centre, 2014)."
	Pearson, M., & Rogers, J. (1962). <i>Hippophaë rhamnoides</i> L. <i>Journal of Ecology</i> , 50(2), 501-513	"Native on dunes, rarely on cliffs, on the coast of east and south-east England; planted and thoroughly naturalized on dunes elsewhere in Britain, rarely inland."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Potentially] "H. rhamnoides may be an aggressive colonizer."

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	O'Rourke, E. & Lysaght, L. 2014. Risk Assessment of <i>Hippophae rhamnoides</i> . Inland Fisheries Ireland & National Biodiversity Data Centre, Waterford, Ireland. http://nonnativespecies.ie/ . [Accessed]	"Unlike other invasive plant species, there are no reports of H. rhamnoides directly causing losses to human enterprises e.g. agriculture and forestry. The losses caused by invasion of H. rhamnoides are due to control costs of the species, losses to biodiversity and losses to ecosystem function (refer to Question 4.06). No figure is available for the cost of control of H. rhamnoides throughout its global distribution but, drawing on Question 4.04, are here considered moderate."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
304	Environmental weed	y
	Source(s)	Notes
	O'Rourke, E. & Lysaght, L. 2014. Risk Assessment of <i>Hippophae rhamnoides</i> . Inland Fisheries Ireland & National Biodiversity Data Centre, Waterford, Ireland. http://nonnativespecies.ie/ . [Accessed]	"However, the invasive spread of <i>H. rhamnoides</i> , via suckering and self seeding, can pose a threat to native vegetation of sand dunes (Reynolds, 2012; Richards, 2002). The deleterious effects of the species relate to its shading-out of native dune plants and production of floristically-poor dense thickets. Such thickets also inevitably completely alter the character of the local dune habitat, species composition, and the nutrient status of the soil where it grows. This has direct effects on the composition and balance of the invertebrate fauna (JNCC, 2007; Hackney, 2008; ISI, 2012). The species is considered invasive in Britain (introduced areas), Ireland, Latvia and Lithuania (Ranwell, 1972; Richards, 2002; National Biodiversity Data Centre, 2014; NOBANIS, 2014)."

Qsn #	Question	Answer
	<p>Catling, P. M. (2005). New "top of the list" invasive plants of natural habitats in Canada. <i>Botanical Electronic News</i>, 345: 1-7</p>	<p>"Sea Buckthorn (<i>Hippophae rhamnoides L.</i>) This plant has recently attracted interest worldwide for its economic value as a nutritious food, a medicine, a soil enhancer, a pollution reducer, a source of firewood, and as a landscape management tool (e.g. Small & Catling 2002). It has been widely planted on the Canadian prairies to improve soil through nitrogen-fixing capability, to prevent erosion in dry and especially saline areas and for use as a shelterbelt. More recently it has attracted attention in Canada as an alternative crop, the leaves and berries being processed into a range of health foods and herbal products. Oil from the plant is also used for medicinal and cosmetic purposes (Li 1999, Li & Beveridge 2003). Despite its many virtues, sea buckthorn can be a serious problem. It was apparently first listed as an invasive in Canada in 1997 (Catling 1997). Now it is regarded by many in Alberta as a potentially very serious problem. One respondent from Calgary writes "it is escaping into the natural environment, not only in Britain but also here on the prairies, and, as a result, is destroying biodiversity vegetation ultimately there will be no native fruiting plants to provide winter food for grouse or other wildlife Therefore, as the native plants are displaced, there is no food for birds that depend upon insects This is leading to the decline of many bird species Here on the prairies, most of the sea buckthorn has escaped to the low lying, moist riparian areas, the richest of all in biodiversity. Where it is now established, it has turned these areas into a monoculture. From a local wildlife point of view, such colonies are now biological deserts because it readily spreads by rhizomes, a single seed is able to colonize an area of acres within a few years. Such areas soon become impenetrable thickets. They are so dense that little light reaches the ground, therefore all herbaceous plants disappear. The soil beneath them is now unprotected. During periods of flooding this results in the loss of topsoil, and the silting of waterways, choking insect and fish habitat In Calgary we now have dozens of established colonies. Volunteers have been engaged in removing some of them, but most take several years to completely control, because if one section of rhizome is overlooked it readily rejuvenates the colony." Although evidently a major and rapidly increasing problem, it does not appear on the list of the Alberta Invasive Plants Council (2005), but the Alberta Native Plant Council (2000) does list it as invasive with the comment that it "has established extensive monocultural stands on gravel and sandbars along streams." In Alberta it is already established over a relatively extensive area including Calgary, Edmonton and Hinton. According to an invasive plant newsletter in British Columbia "the potential risk to BC natural ecosystems has been brought to the attention of BC Ministry of Environment, Lands and Parks and BC Ministry of Agriculture and Fisheries." Using the NatureServe ranking system it was 15th. For some general biological information on this species, see Pearson & Rogers (1962). "</p>

Qsn #	Question	Answer
	Binggeli, P., Eakin, M., Maefadyen, A., Power, J., & McConnell, J. (1992). Impact of the alien sea buckthorn (<i>Hippophae rhamnoides</i> L.) on a sand dune ecosystem in Ireland. Coastal dunes. Pp. 325-337 in Coastal Dunes. Geomorphology, Ecology and Management for Conservation. Carter RWG, Curtis TGF and MJ Sheehy-Skeffington (Eds). Balkema. Rotterdam	"Table 4. Impacts of Sea Buckthorn on Sand Dune Ecosystem." "negative 1. increases nutrient status, 2. replaces botanically interesting plant communities, resulting in the displacement of uncommon or rare plant species, which require nutrient deficient conditions, 3. decreases plant species-richness, 4. facilitates the establishment of exotic woody plants such as <i>Acer pseudoplatanus</i> , <i>Clematis vitalba</i> , <i>Rubus spectabilis</i> , 5. invades all dune habitats, 6. is hard to control as its vegetative spread requires long-term management Established stands are difficult to eradicate." "Sea buckthorn significantly affects the fauna, flora and some soil characteristics of Irish dunes. Since some of its impacts are not deleterious sea buckthorn should not be eradicated, but its spread must be controlled. Large stands containing elder should be conserved with their spread checked, but small clones, and in particular younger ones should be eliminated."
	National Museums Northern Ireland. 2017. Invasive Alien Species in Northern Ireland. http://www.habitas.org.uk/invasive/index.html . [Accessed 31 Jul 2017]	"The deleterious effects of the species relate to its shading-out of native dune plants and production of floristically-poor dense thickets. Such thickets also inevitably completely alter the character of the local dune habitat, which has direct effects on the composition and balance of the invertebrate fauna."

305	Congeneric weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence. <i>Hippophae rhamnoides</i> L. subsp. <i>rhamnoides</i> cited as a weed

401	Produces spines, thorns or burrs	y
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Shrubs or trees, 1–15(–18) m tall. Bark brownish green, yellowish brown, or black; branches many, spines 2–7 cm. Leaves alternate; petiole ± absent; leaf blade abaxially silvery white suffused with brown or yellow, adaxially dark grayish green, linear or linear-lanceolate, 2–8 × 0.2–0.8 cm, ± narrowed at base, abaxially with white and brown stellate scales, margin ± revolute, apex subobtusely."
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"The plant stems bear many sharp, stout thorns and provide protection, cover, and food for various birds and small rodents (Hansen 1931; Pearson and Rogers 1962)."

402	Allelopathic	n
	Source(s)	Notes

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Improves soil quality] "H. rhamnoides has characteristics that make it suitable for improving soil fertility, controlling erosion, conserving water and stabilizing sand dunes (Baker, 1993). It plays an important role in revegetation and ecological improvement in China and especially in Tibet (Xizhang), with large soil and water conservation forests established in the upper and middle reaches of the Huangtu Plateau, and shelterbelts and dune fixation forests planted in arid and desert areas. In Canada, Hungary, Russia, Romania and Germany, sea-buckthorn has been used to reclaim wasteland or mined areas and it can also be used to improve saline or excessively alkaline soils."

403	Parasitic	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Shrubs or trees, 1–15(–18) m tall. Bark brownish green, yellowish brown, or black; branches many, spines 2–7 cm." [Elaeagnaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides L.</i>): a multipurpose plant. HortTechnology, 6(4), 370-380	"In ancient Greece, leaves of sea buckthorn added to horse fodder was well reputed to result in weight gain and shiny hair; thus, the Latin name 'Hippophae' meaning shining horse (Lu, 1992)."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Palatable leaves, but fines may deter browsing] "In arid and semi-arid areas of northern China, it is used as fuel, fodder and fertilizer." ... "In cold arid regions such as in Canada and the Tibetan plateau, it is a valuable hedgerow and windbreak species, lopped for fodder and small fuelwood." ... "Traditionally, numerous food products have been made from the fruit, such as wine and jellies. The leaves are used to supplement animal fodder."

405	Toxic to animals	n
	Source(s)	Notes
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"juicy ripe fruits edible, fodder for goats, camel and sheep" [No evidence]

406	Host for recognized pests and pathogens	
	Source(s)	Notes

Qsn #	Question	Answer
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Holotrichia oblita, Gryllotalpa unispina and Agrotis segetum are the main underground pests in nurseries, attacking young roots. These can be controlled with poisonous baits and lamplight luring. Holcocerus arenicolus is another root-boring cossid that attacks H. rhamnoides in arid regions of China. Defoliating pests include Malacosoma neustria testacea and Maladera orientalis. Fruit-eating pests include Rhagoletis batava and Curculio spp. Flooding in combination with pesticide applications, can be used to control Gelechia hippophae (sea buckthorn moth) (Amsheev, 1991). Fusarium and Pythium can be important pathogens at the seedling stage (Fan, 1988)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Based on traditional uses as well as scientific research, the nutritious fruits (rich in vitamin C) have been the origin of many important medicinal and nutritional products, especially in Russia and China." ... "The fruit of H. rhamnoides is extremely nutritious and rich in vitamins, with the vitamin C concentration ranging from 360 mg/100 g of berries (subsp. rhamnoides) to 2500 mg/100 g for the Chinese subsp. sinensis (Yao et al., 1992; Yao and Tigerstedt, 1994). Berries are rich in carotene, vitamin E, flavonoids, proteins and free amino acids (Zhang et al., 1989). There are at least 24 chemical elements present in the juice, notably nitrogen, phosphorus, iron, manganese, boron, calcium, aluminium and silicon (Zhang et al. 1989; Schroeder and Yao, 1999)."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Medicinal and edible uses] "Juicy ripe fruits edible, fodder for goats, camel and sheep" ... "Fruits acidic, astringent, antihemorrhagic. A syrup from the very sour fruit used in lung complaints, tuberculosis, for cold and cough, a decoction used to cure skin eruptions; fruit paste to stop wound bleeding; concentrate juice decoction applied on the neck to cure influenza and cough. The bark or the fruit paste applied to treat pains of the pelvic girdle or the joints; bark paste used to heal wounds and ulcers; bark taken orally as blood purifier. Veterinary medicine, juice extract given as antidote/antipoison, when poisonous grasses are eaten by the domestic animals."

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"A tendency to form thickets by root suckering limits its use in shelterbelts." [No evidence. but ability to form thickets may increase fuel load & risk of fire]

Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"H. rhamnoides is a light-demanding pioneer species and often the first woody plant to colonize open areas (Rousi, 1965, Yao, 1994). It does not survive or establish in forested areas that exceed a canopy density of 50%."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"It grows best on moist, neutral to basic, sandy soils (Pearson and Rogers 1962)."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"This species tolerates drought, infertile soils and low temperatures. ... "H. rhamnoides can grow in variety of alkaline and saline soils, such as coarse gravel hilly brown soils, yellow soils, brown soils, sandy gravel alluvial soils and peaty soils. It can tolerate the saline soil of the Qaidam Basin (China), which has a pH of 9.5 and salt content of 0.6-1.1%, and can tolerate sea water flooding (Schroeder, 1995). The ideal soil for sea buckthorn is a moist sandy loam, rich in humus and with good gas conductivity, which is beneficial for the development of its root system and the formation and growth of root nodules (Fang and Zhang, 1983)."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Shrubs or trees, 1–15(–18) m tall. Bark brownish green, yellowish brown, or black; branches many, spines 2–7 cm."

412	Forms dense thickets	y
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"A tendency to form thickets by root suckering limits its use in shelterbelts."
	Binggeli, P., Eakin, M., Maefadyen, A., Power, J., & McConnell, J. (1992). Impact of the alien sea buckthorn (<i>Hippophae rhamnoides L.</i>) on a sand dune ecosystem in Ireland. Coastal dunes. Pp. 325-337 in Coastal Dunes. Geomorphology, Ecology and Management for Conservation. Carter RWG, Curtis TGF and MJ Sheehy-Skeffington (Eds). Balkema. Rotterdam	"Sea buckthorn is a dioecious bird-dispersed species, but often few seedlings become established. However once established, it spreads vegetatively to rapidly form large stands of impenetrable thickets."

501	Aquatic	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Terrestrial] "Shrubs or trees, 1–15(–18) m tall." ... "River banks and terraces, dry river beds, forest margins, thickets on mountain slopes, moraines, meadows at highest elevations; 600– 4200 m."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 30 Jul 2017]	Family: Elaeagnaceae

503	Nitrogen fixing woody plant	y
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"In Europe and Asia, it is used to form hedges and, because of its nitrogen- fixing symbionts, serves to enrich and protect soils (Bogdon and Untaru 1967; Kao 1964; Stewart and Pearson 1967)."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It has a strong capacity to fix atmospheric nitrogen and nitrogen-fixing root nodules are produced in association with the actinomycete Frankia (Li, 1989)."

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Shrubs or trees, 1–15(–18) m tall. Bark brownish green, yellowish brown, or black; branches many, spines 2–7 cm. Leaves alternate; petiole ± absent; leaf blade abaxially silvery white suffused with brown or yellow, adaxially dark grayish green, linear or linear-lanceolate, 2–8 × 0.2–0.8 cm, ± narrowed at base, abaxially with white and brown stellate scales, margin ± revolute, apex subobtusate."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"H. rhamnoides is widely distributed in the temperate Eurasian zone, inhabiting coastal dune sites (UK) to elevations over 4000 m in Tibet. Since it is resistant to drought, its distribution is mainly affected by temperature. The main area of distribution is in China (75-121°E, 27-48°N), occurring at high altitudes in the southwest and low altitudes in the northeast (Rousi, 1971; Liu and He, 1978; Lian, 1994)."

Qsn #	Question	Answer
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides L.</i>): a multipurpose plant. HortTechnology, 6(4), 370-380	[No evidence] "Sea buckthorn is native to Europe and Asia (Fig. 2). The total area of sea buckthorn in China, Mongolia, and Russia is about 810,000 ha of natural stands and 300,000 to 500,000 ha planted (Sun, 1995). Natural sea buckthorn stands are also widespread in Europe on river banks and coastal dunes along the Baltic Coast of Finland, Poland, and Germany (Biswas and Biswas, 1980; Kluczynski, 1989; Rousi, 1971) and on the western coast and along the Gulf of Bothnia in Sweden. In Asia, sea buckthorn is distributed widely throughout the Himalayan regions including India, Nepal, and Bhutan and in the northern parts of Pakistan and Afghanistan(Lu, 1992)."

602	Produces viable seed	y
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"Orange-yellow, drupelike acidic fruits about the size of a pea (figure 1) (Rehder 1940) ripen in September or October (Hoag 1965; Hottes 1952) and frequently persist on the shrubs until the following March. Each fruit contains a bony, ovoid seed (figures 1 and 2). Seedcrops are borne annually." ... "Internal dormancy in seeds of seabuckthorn can be broken by stratification in moist sand for 90 days at 2 to 5 °C (Cram and others 1960; Pearson and Rogers 1962). Stratification for 15 days is sufficient if seeds are sown in the autumn (Grover and others 1962)." ... "This species can be propagated by layers, suckers, and root cuttings as well as by seeds (Avanzanto and others 1987; Papp 1982, Varga and Foldesi 1985)."

603	Hybridizes naturally	
	Source(s)	Notes
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides L.</i>): a multipurpose plant. HortTechnology, 6(4), 370-380	[Unknown. Hybridization used in breeding programs] "Hippophae belongs to the family Elaeagnaceae. Arne Rousi (1971) classified Hippophae (2n = 24) into three species based on morphological variations: <i>H. rhamnoides L.</i> , <i>H. salicifolia D. Don</i> , and <i>H. tibetana Schlecht.</i> Hippophae rhamnoides was divided further into nine subspecies: <i>carpatica</i> , <i>caucasica</i> , <i>gyantsensis</i> , <i>mongolica</i> , <i>sinensis</i> , <i>turkestanica</i> , <i>yunnanensis</i> , <i>rhamnoides</i> , and <i>fluviatilis Rousi</i> . Liu and He (1978) described a fourth species, <i>H. neurocarpa Liu & He</i> , found on the Qinghai-Xizang plateau of China. These classifications were accepted generally by Lian (1988), but taxonomists still disagree on the precise classification of the genus." ... "Breeding sea buckthorn has been conducted for decades in Russia (Goncharov, 1995), Ukraine (Gladon et al., 1994), China (Huang, 1995), and Finland (Hirrsalmi, 1993). The first breeding programs began with mass selection from natural populations. This method is still common practice (Wahlberg and Jeppsson, 1990) but is gradually being replaced by hybridization (Huang, 1995; Yao and Tigerstedt, 1994)."

604	Self-compatible or apomictic	n
	Source(s)	Notes

Qsn #	Question	Answer
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"Flowering and fruiting. The species is dioecious; its very small, yellowish, pistillate flowers appear in March or April before the leaves (Pearson and Rogers 1962; Slabaugh 1974)."
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Dioecious] "Shrubs or trees, deciduous, dioecious, spiny." ... "Male flowers: calyx lobes greenish brown, ovate-orbicular, 3–4 × 3–3.5 mm, concave, outside with numerous brown and sparse white stellate scales; stamens 1/2–2/3 as long as calyx; anthers nearly sessile, oblong-linear, ca. 1.5 mm. Female flowers 2–5 in axils of branchlets; pedicels ca. 0.5 mm, to 5 mm in fruit; calyx brown, tubular, oblong-obovate, 2.5–4 × 1–1.5 mm, outside with stellate brown and few white scales, lobes obtuse, interior with rather long white hairs, dense in upper part; Ovary globose-ovoid, 1–2 mm, ca. 1/2 as long as calyx, glabrous; style ca. 0.5 mm; stigma oblong, 0.5–1 mm, exserted. Peduncle 1–7 mm."

605	Requires specialist pollinators	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	[Wind-pollinated] "The flowers are unisexual, dioecious and appear before the leaves. The peduncle of female trees develops into twigs or spines and that of male trees is shed after flowering. Male flowers are located in the axil of bracts and blossom earlier than female flowers, and have no pedicels, four stamens with a short filament. Female flowers have a short pedicel, superior ovary with one carpel, one ovule and a short style. Male and female flowers produce no nectar and are wind pollinated."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"A tendency to form thickets by root suckering limits its use in shelterbelts."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"It has a well-developed horizontal root system, which can expand up to 2 m per year." ... "Plants degenerate after about 15 years and reproduce by suckering."
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides L.</i>): a multipurpose plant. HortTechnology, 6(4), 370-380	"Sea buckthorn easily produces suckers within a few years of planting, which is a good source for propagation (Kondrashov and Kuimov, 1987). The possibility of invasiveness by suckers to surrounding areas is high; routing cultivation and herbicide application are the best control measures for this potential weediness characteristics of sea buckthorn."

607	Minimum generative time (years)	3
	Source(s)	Notes
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides L.</i>): a multipurpose plant. HortTechnology, 6(4), 370-380	"The sex of seedlings cannot be ascertained until they start to flower (Synge, 1974). Flower buds are formed mostly on 3-year-old wood, differentiated during the previous growing season (Bernath and Foldesi, 1992)."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The fruit is an oblate, globular or oval drupe, 6-8 mm long, mostly orange-red to orange or yellow, with a tart, bittersweet flavour." ... "The seeds are usually dispersed by birds or other wild animals." [No evidence. Seeds lack means of external attachment]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"Of the 2 species in the genus, only common seabuckthorn is widely cultivated (Rehder 1940). A very hardy deciduous shrub or a small tree, common seabuckthorn is used primarily for ornamental purposes. In Europe and Asia, it is used to form hedges and, because of its nitrogen- fixing symbionts, serves to enrich and protect soils (Bogdon and Untaru 1967; Kao 1964; Stewart and Pearson 1967)."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The bright orange fruit and narrow, silver-green leaves are attractive features that give <i>H. rhamnoides</i> ornamental value, especially as the fruit persists all winter. It is therefore used as a garden plant in many European countries and the Canadian prairies (Shroeder and Yao, 1999)."

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Contaminant, Crop, Forestry, Herbal, Ornamental" [Unable to confirm that this plant is dispersed as a contaminant]

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	"Fruit orange or reddish, globose, ovoid, globose-ovoid, or ellipsoid, terete, 4–9(–10) × 3–8 mm, glabrous, succulent and aromatic. Endocarp easy to separate from seed. Seed dark brown, sometimes nearly black, glossy, ovoid-oblong, or oblong-ellipsoid, 4–7 × 1.5–2 or 4–5 mm."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The seeds are usually dispersed by birds or other wild animals."

Qsn #	Question	Answer
705	Propagules water dispersed	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Hippophae rhamnoides ... Dispersed by: Humans, Animals, Flyers, Water, Escapee"
	Wu, Z.Y., Raven, P.H. & Hong, D.Y. (eds.). 2007. Flora of China. Vol. 13 (Clusiaceae through Araliaceae). Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis	[Distribution suggests water may secondarily disperse seeds] "River banks and terraces, dry river beds, forest margins, thickets on mountain slopes, moraines, meadows at highest elevations; 600–4200 m."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Lu, X., Sun, K., Ma, R., Zhang, H., Su, X., & Wang, M. (2006). Fruits foraging patterns and seed dispersal effect of frugivorous birds on <i>Hippophae rhamnoides sinensis</i> . <i>Frontiers of Biology in China</i> , 1(3), 318-322	"Behaviors of 18 species of birds eating fruits of <i>Hippophae rhamnoides</i> spp. <i>sinensis</i> were observed from September 2003 to March 2004. Their foraging patterns were found to be very different and can be divided into five classes: (1) direct swallowing the fruits on crown of the shrubs and sometimes regurgitating seeds soon after; (2) carrying the fruits to their perching sites and swallowing; (3) pecking the fruits from the shrubs to the ground, eating pulp and seeds but leaving pericarp; (4) pecking through the pericarp, eating pulp and leaving pericarp and seeds; (5) pecking through the pericarp on the top of fruits, and only eating seeds. These foraging patterns have different effects on seed dispersal of <i>H. rhamnoides</i> spp. <i>sinensis</i> . The germination experiment of three groups of seeds (seeds from feces, dry fruits and extracted seeds from dry fruits) was carried out. Although ingestion processes of birds had some adverse effects on the seed germination of <i>H. rhamnoides</i> spp. <i>sinensis</i> , the seeds from feces still have a relatively higher germination ratio. <i>H. rhamnoides</i> spp. <i>sinensis</i> provides food to a variety of frugivorous birds, and the birds disperse its seeds. Thus, a mutually beneficial relationship between the bird and the seed is formed."
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. The Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"Orange-yellow, drupelike acidic fruits about the size of a pea (figure 1) (Rehder 1940) ripen in September or October (Hoag 1965; Hottes 1952) and frequently persist on the shrubs until the following March. Each fruit contains a bony, ovoid seed (figures 1 and 2). Seedcrops are borne annually."
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"The seeds are usually dispersed by birds or other wild animals."

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Rooney, P. J., Houston, J., & Weaver, G. P. (2011). The Conservation and Management of Sea Buckthorn (<i>Hippophae rhamnoides</i>) in the UK. Sand Dune and Shingle Network Occasional Paper No.3. Liverpool Hope University Press	[Dispersed internally] "Baker (1996) highlights the role of birds in the distribution and spread of sea buckthorn by voiding seed at a distance from the fruiting bush. Baker (1996) also cites the work of Gillham (1987) noting that seeds voided by birds are six times more likely to germinate than seeds that have not passed through the gut of a bird. The role and importance of birds in spreading sea buckthorn within and between sites deserves greater attention."

Qsn #	Question	Answer
708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Lu, X., Sun, K., Ma, R., Zhang, H., Su, X., & Wang, M. (2006). Fruits foraging patterns and seed dispersal effect of frugivorous birds on <i>Hippophae rhamnoides sinensis</i> . <i>Frontiers of Biology in China</i> , 1(3), 318-322	"Behaviors of 18 species of birds eating fruits of <i>Hippophae rhamnoides</i> spp. <i>sinensis</i> were observed from September 2003 to March 2004. Their foraging patterns were found to be very different and can be divided into five classes: (1) direct swallowing the fruits on crown of the shrubs and sometimes regurgitating seeds soon after; (2) carrying the fruits to their perching sites and swallowing; (3) pecking the fruits from the shrubs to the ground, eating pulp and seeds but leaving pericarp; (4) pecking through the pericarp, eating pulp and leaving pericarp and seeds; (5) pecking through the pericarp on the top of fruits, and only eating seeds. These foraging patterns have different effects on seed dispersal of <i>H. rhamnoides</i> spp. <i>sinensis</i> . The germination experiment of three groups of seeds (seeds from feces, dry fruits and extracted seeds from dry fruits) was carried out. Although ingestion processes of birds had some adverse effects on the seed germination of <i>H. rhamnoides</i> spp. <i>sinensis</i> , the seeds from feces still have a relatively higher germination ratio. <i>H. rhamnoides</i> spp. <i>sinensis</i> provides food to a variety of frugivorous birds, and the birds disperse its seeds. Thus, a mutually beneficial relationship between the bird and the seed is formed."
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"The seeds are usually dispersed by birds or other wild animals."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. <i>The Woody Plant Seed Manual</i> . USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"Orange-yellow, drupelike acidic fruits about the size of a pea (figure 1) (Rehder 1940) ripen in September or October (Hoag 1965; Hottes 1952) and frequently persist on the shrubs until the following March. Each fruit contains a bony, ovoid seed (figures 1 and 2). Seedcrops are borne annually." [Unlikely. Single-seeded]

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	Notes
	CAB International, 2005. <i>Forestry Compendium</i> . CAB International, Wallingford, UK	"Seeds remain viable for 3-4 years after indoor storage."
	Bonner, F.T. & Karrfalt, R.P. (eds.). 2008. <i>The Woody Plant Seed Manual</i> . USDA FS Agriculture Handbook 727. Government Printing Office, Washington, D.C.	"The seeds are orthodox and store easily at low moisture contents and temperatures. Dry seeds have been kept satisfactorily for 1 to 2 years at room temperature (Slabaugh 1974). Viability of 60% has been reported for seeds stored 4 to 5 years (Smirnova and Tikhomirova 1980)."

803	Well controlled by herbicides	
	Source(s)	Notes

Qsn #	Question	Answer
	Rooney, P. J., Houston, J., & Weaver, G. P. (2011). The Conservation and Management of Sea Buckthorn (<i>Hippophae rhamnoides</i>) in the UK. Sand Dune and Shingle Network Occasional Paper No.3. Liverpool Hope University Press	"Bacon (2003 pp. 4/153-156) summarises management techniques for sea buckthorn scrub by grazing, cutting and herbicide application." ... "The clearance involves the use of heavy machinery to grub up sea buckthorn. This has been costed at £5,000/ha. The re-growth is being controlled using the herbicide Timbrel16, applied at 6 litres/ha by boom sprayer, weed-wipe or knapsack sprayer depending upon the density of re-growth. The wetting agent Mixture-B is used to increase the uptake of herbicide. The costs for herbicide application were £500/ha. To help the establishment of dune grassland on the cleared dunes, grass cut by forage harvester (cut and collect) from other areas of grey dune is spread over the cleared areas. Early results are good and the re-establishment of grassland will be followed up by fencing and grazing. Low stocking rates will allow a degree of scrub to return to create the desired scrub/grassland mosaic."
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides L.</i>): a multipurpose plant. HortTechnology, 6(4), 370-380	"The possibility of invasiveness by suckers to surrounding areas is high; routing cultivation and herbicide application are the best control measures for this potential weediness characteristics of sea buckthorn."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	CAB International, 2005. Forestry Compendium. CAB International, Wallingford, UK	"Ability to sucker; fix nitrogen; regenerate rapidly" ... "Older trees were rejuvenated by pruning and dense thickets thinned to a canopy density of 0.6-0.7, leaving corridors 1.5 m wide every 6-9 m to facilitate harvesting."
	National Museums Northern Ireland. 2017. Invasive Alien Species in Northern Ireland. http://www.habitas.org.uk/invasive/index.html . [Accessed 31 Jul 2017]	"With well-established large infestations only physical removal involving cutting or digging up the plants, either by hand or mechanically, is feasible. Herbicide should be applied to remaining stumps."
	Li, T. S., & Schroeder, W. R. (1996). Sea buckthorn (<i>Hippophae rhamnoides L.</i>): a multipurpose plant. HortTechnology, 6(4), 370-380	[Coppices] "PRUNING. The purpose of pruning sea buckthorn is to train branches, promote growth, and facilitate harvesting (Albrecht et al., 1984). Savkin and Mukhamadiev (1983) reported that moderate pruning will increase the yield and fruiting life of the plants. Sea buckthorn grows up to 2 to 3 m in 4 years and forms its crown at the base of the main trunk. The crown should be pruned annually to remove overlapping branches, and long branches should be headed to encourage development of lateral shoots. In about the fifth year, the main trunk stops growing, and branches begin to grow from lateral buds. Mature, fruiting plants should be pruned to allow more light penetration if the bush is dense." ... "The wide adaptation, fast growth, strong coppicing, and suckering habits, coupled with efficient nitrogen fixation, make sea buckthorn particularly suitable for planting in degraded soils."

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability in temperate regions
- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Naturalized in Ireland, & possible elsewhere (broad native range)
- Regarded as an environmental weed in Ireland (threatens dune diversity)
- Thorny
- Tolerates many soil types
- Forms dense thickets
- Nitrogen fixing (alters soil nutrients)
- Reproduces by seeds & vegetatively by suckers
- Seeds dispersed by birds, other frugivorous animals, water & intentionally by people
- Seeds able to be stored for extended periods; may form a persistent seed bank
- Able to coppice & resprout after cutting

Low Risk Traits

- Natural populations do not occur where mean temperature exceeds 25°C (may limit ability to spread in tropical islands to higher elevations)
- Provides fodder for livestock
- Ornamental medicinal & edible uses
- Valued for soil stabilization & soil improvement
- Dioecious