	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
2	Stygobromus hoffmani	Alleghany County cave amphipod	Aquatic Invertebrate	Amphipoda	II	b	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
3	Crangonyx montanus	An amphipod	Aquatic Invertebrate	Amphipoda	III	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
4	Fontigens bottimeri	Appalachian springsnail	Aquatic Invertebrate	Aq. Snail	I	a	Caves and Karst, Headwater Streams	7.2.6, 9.3, 6.1.7	Withdrawal of Surface Water / Agricultural and Forestry Effluents / Caving	Withdrawal of fresh surface water for human consumption, crop production or other purposes. E.g., withdrawal by municipalities, spring water bottling companies and farmers; reservoirs for firefighting, creation of man-made lakes. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) /	Work with the Virginia Department of Environmental Quality to develop biologically meaningful regulations pertaining to water withdrawls from springs that provide water for the springsnail, and from streams which the springsnail occupies. Increase partnerships to implement best management practices such as alternate water sources for cattle to avoid direct withdrawls from springs and small streams.(7.2.6), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. Also, work with Virginia Department of Environmental Quality to develop riparian buffers requirements for permitted activities along waterways with rare species/SGCN.(9.3), Work with localities, land owners and caving groups to limit access to caves where rare species could be impacted from caving activities. (6.1.7)		

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1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
5	Crangonyx antennatus	Appalachian Valley cave amphipod	Aquatic Invertebrate	Amphipoda	IV	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
6	Stygobromus mundus	Bath County cave amphipod	Aquatic Invertebrate	Amphipoda	II	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
7	Stygobromus biggersi	Biggers' cave amphipod	Aquatic Invertebrate	Amphipoda	II	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

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8	Crangonyx fontinalis	Bland County amphipod	Aquatic Invertebrate	Amphipoda	II	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
9	Stygobromus spinosus	Blue Ridge spring amphipod	Aquatic Invertebrate	Amphipoda	IV	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
10	Fontigens orolibas	Blue Ridge springsnail	Aquatic Invertebrate	Aq. Snail	III	a	Caves and Karst, Headwater Streams	7.2.6, 9.3, 6.1.7	Withdrawal of Surface Water / Agricultural and Forestry Effluents / Caving	Withdrawal of fresh surface water for human consumption, crop production or other purposes. E.g., withdrawal by municipalities, spring water bottling companies and farmers; reservoirs for firefighting, creation of man-made lakes. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) /	Work with the Virginia Department of Environmental Quality to develop, biologically meaningful regulations pertaining to water withdrawls from springs that provide water for the springsnail, and from streams which the springsnail occupies. Increase partnerships to implement best management practices such as alternate water sources for cattle to avoid direct withdrawls from springs and small streams.(7.2.6), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. Also, work with Virginia Department of Environmental Quality to develop, riparian buffers requirements for permitted activities along waterways with rare species/SGCN.(9.3), Work with localities, land owners and caving groups to limit access to caves where rare species could be impacted from caving activities. (6.1.7)		

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11	Pleurocera gradata	Bottle hornsnail	Aquatic Invertebrate	Aq. Snail	I	a	Creeks and Rivers	9.1, 9.3, 1.1	Domestic and Urban Wastewater / Agricultural and Forestry Effluents / Housing and Urban Areas	Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments, toxic substances, chemicals, etc. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Anything that is related to or integrated with urban or housing structures. Urban areas (cities), suburbs, villages, cottages, shopping areas, offices, schools, hospitals, and urban parks, among others.	develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), Work with localities and regulatory agencies to develop, biologically meaningful standards for impacts associated with urban and suburban development such as loss of riparian buffers and increased impervious surfaces, which lead to loss of instream habitat due to factors such as runoff and hydrological changes. Biologically-relevant riparian buffer rules must be put in place along all waterways, as well as limitations on impervious surfaces and properly handling runoff from these surfaces in order to help maintain the natural hydrograph.(1.1)		
12	Stygobromus conradi	Burnsville Cove cave amphipod	Aquatic Invertebrate	Amphipoda	II	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
13	Stygobromus sextarius	Capital area groundwater amphipod	Aquatic Invertebrate	Amphipoda	II	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

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14	Elimia aterina	Coal elimia	Aquatic Invertebrate	Aq. Snail	II	a	Headwater Streams	9.2, 9.3, 9.1	Industrial and Military Effluents / Agricultural and Forestry Effluents / Domestic and Urban Wastewater	sectors, including mines, energy production sectors and other resource extraction industries. These effluents may result from deliberate or accidental spills that are legal or illegal and (may) contain various nutrients, sediments, toxic substances and chemicals. Among others. Considering the difficulty in identifying contaminants or contaminant "cocktails" that are responsible for environmental damage, other unknown contaminants from industries will be listed with Threat 9.2. This section excludes natural sources of contaminants that are found in the environment (e.g., mercury found in soils or in river substrates). Intoxication due to natural sources of these contaminants are likely to result from an indirect threat increasing exposure and to which conservation actions can be matched. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments,	Coordinate with the Virginia Department of Environmental Quality and Virginia Energy to develop meaningful biological standards for coal and gas extraction, and to develop, meaningful biological standards to improve industrial discharges. Mixing zones need to be eliminated in areas where rare species occur, or sufficient mitigation implemented to offset known impacts. (9.2), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1)		
15	Stygobromus estesi	Craig County cave amphipod	Aquatic Invertebrate	Amphipoda	IV	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
16	Stygobromus cumberlandus	Cumberland cave amphipod	Aquatic Invertebrate	Amphipoda	III	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

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17	Bactrurus angulus	Cumberland Gap cave amphipod	Aquatic Invertebrate	Amphipoda	I	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
18	Stygobromus ephemerus	Ephemeral cave amphipod	Aquatic Invertebrate	Amphipoda	I	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
19	Stygobromus finleyi	Finley's cave amphipod	Aquatic Invertebrate	Amphipoda	II	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

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20	Elimia catenaria	Gravel elimia	Aquatic Invertebrate	Aq. Snail	III	a	Creeks and Rivers	9.1, 9.3, 1.1	Domestic and Urban Wastewater / Agricultural and Forestry Effluents / Housing and Urban Areas	Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments, toxic substances, chemicals, etc. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Anything that is related to or integrated with urban or housing structures. Urban areas (cities), suburbs, villages, cottages, shopping areas, offices, schools, hospitals, and urban parks, among others.	Develop, biologically meaningful standards for the wastewater effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), Work with localities and regulatory agencies to develop, biologically meaningful standards for impacts associated with urban and suburban development such as loss of riparian buffers and increased impervious surfaces, which lead to loss of instream habitat due to factors such as runoff and hydrological changes. Biologically-relevant riparian buffer rules must be put in place along all waterways, as well as limitations on impervious surfaces and properly handling runoff from these surfaces in order to help maintain the natural hydrograph.(1.1)		
21	Stygobromus hubbardi	Hupp's Hill cave amphipod	Aquatic Invertebrate	Amphipoda	I	b	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
22	Stygobromus abditus	James cave amphipod	Aquatic Invertebrate	Amphipoda	III	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

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23	Crangonyx baculispina	Lancaster County amphipod	Aquatic Invertebrate	Amphipoda	II	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
24	Stygobromus leensis	Lee County cave amphipod	Aquatic Invertebrate	Amphipoda	I	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
25	Stygobromus pseudospinosus	Luray Caverns amphipod	Aquatic Invertebrate	Amphipoda	I	b	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
26	Stygobromus stegerorum	Madison cave amphipod	Aquatic Invertebrate	Amphipoda	I	b	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
27	Stygobromus fergusoni	Montgomery County cave amphipod	Aquatic Invertebrate	Amphipoda	II	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
28	Stygobromus morrisoni	Morrison's cave amphipod	Aquatic Invertebrate	Amphipoda	II	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
29	Stygobromus phreaticus	Northern Virginia well amphipod	Aquatic Invertebrate	Amphipoda	I	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
30	Fontigens tartarea	Organ cavesnail	Aquatic Invertebrate	Aq. Snail	I	a	Caves and Karst	7.2.6, 7.2.7, 6.1.7	Withdrawal of Surface Water / Withdrawal of Groundwater / Caving	Withdrawal of fresh surface water for human consumption, crop production or other purposes. E.g., withdrawal by municipalities, spring water bottling companies and farmers; reservoirs for firefighting, creation of man-made lakes. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. /	Work with the Virginia Department of Environmental Quality to develop, biologically meaningful regulations pertaining to water withdrawls from springs and small streams that feed caves which the cavesnail occupies. Increase partnerships to implement best management practices such as alternate water sources for cattle to avoid direct withdrawls from springs and small streams. (7.2.6), Work with the Virginia Department of Environmental Quality to develop, biologically meaningful regulations pertaining to groundwater withdrawls that are hydrologically connected to caves which the cavesnail occupies. (7.2.7), Work with localities, land owners and caving groups to limit access to caves where rare species could be impacted from caving activities. (6.1.7)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
31	Somatogyrus virginicus	Panhandle pebblesnail	Aquatic Invertebrate	Aq. Snail	II	a	Creeks and Rivers, Large Rivers	9.1, 9.3, 1.1	Domestic and Urban Wastewater / Agricultural and Forestry Effluents / Housing and Urban Areas	Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments, toxic substances, chemicals, etc. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Anything that is related to or integrated with urban or housing structures. Urban areas (cities), suburbs, villages, cottages, shopping areas, offices, schools, hospitals, and urban parks, among others.	Develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), Work with localities and regulatory agencies to develop, biologically meaningful standards for impacts associated with urban and suburban development such as loss of riparian buffers and increased impervious surfaces, which lead to loss of instream habitat due to factors such as runoff and hydrological changes. Biologically-relevant riparian buffer rules must be put in place along all waterways, as well as limitations on impervious surfaces and properly handling runoff from these surfaces in order to help maintain the natural hydrograph.(1.1)		
32	Metriocnemus knabi	Pitcher plant midge	Aquatic Invertebrate	Diptera	II	a	Non-tidal Wetlands	1.1.2, 7.3.2,	Low-Density Housing Areas / Vegetation Succession /	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Natural vegetation succession causing habitat loss for species of early successional habitats. /	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2)Pitcher plant bogs decline with progressing natural succession. Need disturbance to keep them open (fire, woody vegetation removal, etc.) (7.3.2)		
33	Stygobromus pizzinii	Pizzini's amphipod	Aquatic Invertebrate	Amphipoda	II	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
34	Stygobromus foliatus	Rappahannock spring amphipod	Aquatic Invertebrate	Amphipoda	III	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
35	Stygobromus kenki	Rock Creek groundwater amphipod	Aquatic Invertebrate	Amphipoda	II	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
36	Stygobromus baroodyi	Rockbridge County cave amphipod	Aquatic Invertebrate	Amphipoda	II	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
37	Stygobromus mausi	Round hill cave amphipod	Aquatic Invertebrate	Amphipoda	I	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
38	Leptoxis dilatata	Seep mudalia	Aquatic Invertebrate	Aq. Snail	IV	a	Creeks and Rivers	9.1, 9.3, 1.1	Domestic and Urban Wastewater / Agricultural and Forestry Effluents / Housing and Urban Areas	Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments, toxic substances, chemicals, etc. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Anything that is related to or integrated with urban or housing structures. Urban areas (cities), suburbs, villages, cottages, shopping areas, offices, schools, hospitals, and urban parks, among others.	Develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), Work with localities and regulatory agencies to develop, biologically meaningful standards for impacts associated with urban and suburban development such as loss of riparian buffers and increased impervious surfaces, which lead to loss of instream habitat due to factors such as runoff and hydrological changes. Biologically-relevant riparian buffer rules must be put in place along all waterways, as well as limitations on impervious surfaces and properly handling runoff from these surfaces in order to help maintain the natural hydrograph.(1.1)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
39	Promenetus exacuous	Sharp sprite	Aquatic Invertebrate	Aq. Snail	IV	a	Creeks and Rivers	9.1, 9.3, 1.1	Domestic and Urban Wastewater / Agricultural and Forestry Effluents / Housing and Urban Areas	Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments, toxic substances, chemicals, etc. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Anything that is related to or integrated with urban or housing structures. Urban areas (cities), suburbs, villages, cottages, shopping areas, offices, schools, hospitals, and urban parks, among others.	Develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), Work with localities and regulatory agencies to develop, biologically meaningful standards for impacts associated with urban and suburban development such as loss of riparian buffers and increased impervious surfaces, which lead to loss of instream habitat due to factors such as runoff and hydrological changes. Biologically-relevant riparian buffer rules must be put in place along all waterways, as well as limitations on impervious surfaces and properly handling runoff from these surfaces in order to help maintain the natural hydrograph.(1.1)		
40	Stygobromus gracilipes	Shenandoah Valley cave amphipod	Aquatic Invertebrate	Amphipoda	IV	c	Caves and Karst	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
41	Leptoxis virgata	Smooth mudalia	Aquatic Invertebrate	Aq. Snail	II	a	Creeks and Rivers	9.2, 9.3, 9.1	Industrial and Military Effluents / Agricultural and Forestry Effluents / Domestic and Urban Wastewater	sectors, including mines, energy production sectors and other resource extraction industries. These effluents may result from deliberate or accidental spills that are legal or illegal and (may) contain various nutrients, sediments, toxic substances and chemicals. Among others. Considering the difficulty in identifying contaminants or contaminant "cocktails" that are responsible for environmental damage, other unknown contaminants from industries will be listed with Threat 9.2. This section excludes natural sources of contaminants that are found in the environment (e.g., mercury found in soils or in river substrates). Intoxication due to natural sources of these contaminants are likely to result from an indirect threat increasing exposure and to which conservation actions can be matched. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments,	Coordinate with the Virginia Department of Environmental Quality and Virginia Energy to develop meaningful biological standards for coal and gas extraction, and to develop, meaningful biological standards to improve industrial discharges. Mixing zones need to be eliminated in areas where rare species occur, or sufficient mitigation implemented to offset known impacts. (9.2), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1)		
42	Wyeomyia haynei	Southern pitcher plant mosquito	Aquatic Invertebrate	Diptera	II	a	Non-tidal Wetlands	1.1.2, 7.3.2,	Low-Density Housing Areas / Vegetation Succession /	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Natural vegetation succession causing habitat loss for species of early successional habitats. /	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2)Pitcher plant bogs decline with progressing natural succession. Need disturbance to keep them open (fire, woody vegetation removal, etc.) (7.3.2)		

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
43	Elimia arachnoidea	Spider elimia	Aquatic Invertebrate	Aq. Snail	I	a	Headwater Streams	9.2, 9.3, 9.1	Industrial and Military Effluents / Agricultural and Forestry Effluents / Domestic and Urban Wastewater	sectors, including mines, energy production sectors and other resource extraction industries. These effluents may result from deliberate or accidental spills that are legal or illegal and (may) contain various nutrients, sediments, toxic substances and chemicals. Among others. Considering the difficulty in identifying contaminants or contaminant “cocktails” that are responsible for environmental damage, other unknown contaminants from industries will be listed with Threat 9.2. This section excludes natural sources of contaminants that are found in the environment (e.g., mercury found in soils or in river substrates). Intoxication due to natural sources of these contaminants are likely to result from an indirect threat increasing exposure and to which conservation actions can be matched. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) / Point or non-point source wastewater from residential and urban areas; these discharges (may) contain nutrients, sediments,	Coordinate with the Virginia Department of Environmental Quality and Virginia Energy to develop meaningful biological standards for coal and gas extraction, and to develop, meaningful biological standards to improve industrial discharges. Mixing zones need to be eliminated in areas where rare species occur, or sufficient mitigation implemented to offset known impacts. (9.2), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3), develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1)		
44	Io fluvialis	Spiny riversnail	Aquatic Invertebrate	Aq. Snail	III	a	Creeks and Rivers	9.1, 9.2, 9.3	Domestic and Urban Wastewater / Industrial and Military Effluents / Agricultural and Forestry Effluents	residential and urban areas; these discharges (may) contain nutrients, sediments, toxic substances, chemicals, etc. / Wastewater (pollutants) from industrial and military sectors, including mines, energy production sectors and other resource extraction industries. These effluents may result from deliberate or accidental spills that are legal or illegal and (may) contain various nutrients, sediments, toxic substances and chemicals. Among others. Considering the difficulty in identifying contaminants or contaminant “cocktails” that are responsible for environmental damage, other unknown contaminants from industries will be listed with Threat 9.2. This section excludes natural sources of contaminants that are found in the environment (e.g., mercury found in soils or in river substrates). Intoxication due to natural sources of these contaminants are likely to result from an indirect threat increasing exposure and to which conservation actions can be matched. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage	Develop, biologically meaningful standards for the waste water effluent, including elimination of mixing zones where rare species are present, or provide sufficient miitgation for impacts. Implement best management practices to minimize impacts from residential areas such as nutrient and pesticide runoff. (9.1) , Coordinate with the Virginia Department of Environmental Quality and Virginia Energy to develop meaningful biological standards for coal and gas extraction, and to develop, meaningful biological standards to improve industrial discharges. Mixing zones need to be eliminated in areas where rare species occur, or sufficient mitigation implemented to offset known impacts. (9.2), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. (9.3)		Propagation of this species should be restarted to augment and reintroduce the species where popualtions have declined and been extirpated.

	A	B	C	D	E	F	G	H	L	P	T	U	V
1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
45	Holsingeria unthanksensis	Thankless ghostsnail	Aquatic Invertebrate	Aq. Snail	I	a	Caves and Karst	7.2.6, 9.3, 6.1.7	Withdrawal of Surface Water / Agricultural and Forestry Effluents / Caving	Withdrawal of fresh surface water for human consumption, crop production or other purposes. E.g., withdrawal by municipalities, spring water bottling companies and farmers; reservoirs for firefighting, creation of man-made lakes. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) /	Work with the Virginia Department of Environmental Quality to develop, biologically meaningful regulations pertaining to water withdrawls from springs that provide water for the springsnail, and from streams which the springsnail occupies. Increase partnerships to implement best management practices such as alternate water sources for cattle to avoid direct withdrawls from springs and small streams.(7.2.6), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. Also, work with Virginia Department of Environmental Quality to develop, riparian buffers requirements for permitted activities along waterways with rare species/SGCN.(9.3), Work with localities, land owners and caving groups to limit access to caves where rare species could be impacted from caving activities. (6.1.7)		
46	Stygobromus indentatus	Tidewater ampipod	Aquatic Invertebrate	Amphipoda	IV	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		
47	Stygobromus araeus	Tidewater interstitial amphipod	Aquatic Invertebrate	Amphipoda	IV	c	Other Subterranean	1.1.2, 7.2.7, 9.3.2	Low-Density Housing Areas / Withdrawal of Groundwater / Soil Erosion, Sedimentation	Extensive development that is residential (including resorts), where the spacing allows ecological functions to continue to some extent. This type of development is seen particularly in rural and agroforestry areas. E.g., residential buildings in agricultural areas, cottages, vacation homes near water bodies, ecotourism lodges, fishing resorts, backcountry ski lodges. / Withdrawal of groundwater for human consumption, crop production or other purposes. E.g., pumping water from the water table. / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5).	Habitat protection is essential, so cooperation and education of land owners should be high priority. (1.1.2), Groundwater quality and quantity are important to this species (7.2.7), Follow BMPs to limit erosion and sedimentation (9.3.2)		

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1	**Scientific_Name**	**Common_Name**	**Grouping**	**Type**	**Tier**	**COR**	**Habitats**	**Threat_Code**	**Threat_Description**	**Threat_Long**	**Actions**	**Working_Lands**	**Notes**
48	Sigara depressa	Virginia piedmont water boatman	Aquatic Invertebrate	Hemiptera	I	c	Creeks and Rivers	7.3.3, 9.3.2,	Natural Erosion and Sedimentation / Soil Erosion, Sedimentation /	Removal, transport and deposition of sediments that is caused by natural erosional processes. To be distinguished from the transport of sediments that is associated with tides (Threat 4.3.1), or by drainage systems in agriculture (Threat 7.2.5) and forestry (Threat 7.2.6). / Erosion and sedimentation that are due to agricultural or silvicultural activities, regardless of the presence of local drainage systems (threat 7.2.4 and 7.2.5). /	Need to maintain good water quality of stream habitats (7.3.3), Follow BMPs to limit erosion and sedimentation (9.3.2)		
49	Fontigens morrisoni	Virginia springsnail	Aquatic Invertebrate	Aq. Snail	I	a	Caves and Karst, Headwater Streams	7.2.6, 9.3, 6.1.7	Withdrawal of Surface Water / Agricultural and Forestry Effluents / Caving	Withdrawal of fresh surface water for human consumption, crop production or other purposes. E.g., withdrawal by municipalities, spring water bottling companies and farmers; reservoirs for firefighting, creation of man-made lakes. / Wastewater (pollutants) that is generated by agricultural, silvicultural and aquacultural activities. These discharges are transported primarily in drainage systems, runoff and eroded; they (may) contain various nutrients, toxic substances, chemicals, etc. Excludes erosion and sedimentation that is associated with drainage systems in agriculture and forestry (7.2) or oil spills from machinery (9.2) /	Work with the Virginia Department of Environmental Quality to develop, biologically meaningful regulations pertaining to water withdrawls from springs that provide water for the springsnail, and from streams which the springsnail occupies. Increase partnerships to implement best management practices such as alternate water sources for cattle to avoid direct withdrawls from springs and small streams.(7.2.6), Increase partnerships to implement best management practices such as alternate water sources for cattle and protecting/establishing vegetated stream buffers for agriculture and forestry. Also, work with Virginia Department of Environmental Quality to develop, riparian buffers requirements for permitted activities along waterways with rare species/SGCN.(9.3), Work with localities, land owners and caving groups to limit access to caves where rare species could be impacted from caving activities. (6.1.7)		