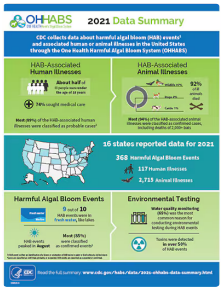
Summary Report – One Health Harmful Algal Bloom System (OHHABS), United States, 2021

Highlights

- Sixteen states voluntarily reported 368 harmful algal blooms (HABs) that resulted in a total of 117 human illnesses and at least 2,715 animal illnesses.
- HAB events predominantly occurred in summer months, peaking in August (92; 25%), and most (90%) of the 368 HAB events occurred in freshwater bodies such as lakes and reservoirs.
- Human illnesses occurred primarily in June (38; 33%), and the most commonly reported signs and symptoms were gastrointestinal, generalized (e.g., headache, fever), and dermatologic.
- Animal illnesses occurred primarily in August (2,328; 86%) and mostly involved wildlife, including a mortality event that killed at least 2,000 bats.
- The most commonly reported signs in animals were genitourinary (e.g., dark urine) in wildlife, followed by gastrointestinal (e.g., vomiting) and generalized (e.g., lethargy) in domestic pets.
- Most HAB events were classified as confirmed (85%), human illnesses as probable (89%), and animal illnesses as confirmed (74%).



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Background

Harmful algal blooms (HABs) that result from the rapid growth of algae or cyanobacteria (also referred to as blue-green algae) in natural waterbodies can harm people, animals, or the environment. HAB events of public health concern are primarily caused by microalgae (e.g., diatoms and dinoflagellates), cyanobacteria, and the toxins they can produce. HAB events, which can be intensified by factors such as nutrient pollution and warmer water temperature, can have public health, environmental, and economic impacts.

HABs are a One Health issue—they affect the health of people, animals, and our shared environment. One Health is a collaborative and multisectoral approach that involves engagement across disciplines including public health, animal health, and environmental health. Using a One Health approach, CDC collects data about HAB events and associated human or animal illnesses through the One Health Harmful Algal Bloom System (OHHABS) to inform public health prevention efforts.

In OHHABS, the term **HAB event** means either identification of a bloom or the detection of HAB toxins in water or food without a visual bloom. Human illnesses are reported individually. Animal illnesses are reported as single cases of illness or in groups, such as flocks of birds or schools of fish. The reporting system can link HAB event data with human or animal illness data. OHHABS uses standard definitions [PDF – 3 pages] to classify HAB events as suspected or confirmed and human or animal illness as suspected, probable, or confirmed.

OHHABS is available for voluntary reporting by public health agencies and their designated environmental health or animal health partners in the United States, District of Columbia, Federated States of Micronesia, Guam, Marshall Islands, Northern Mariana Islands, Palau, Puerto Rico, and U.S. Virgin Islands. Public health agencies use standard forms to report HAB events, human cases of illness, and animal cases of illness to OHHABS. Public health agencies do not need to submit all three types of forms to participate.

Data collected for HAB events include general information (e.g., observation date), geographic information, water body characteristics (e.g., salinity), observational characteristics (e.g., water color, presence or absence of scum), and laboratory testing results. Data collected for cases of illness include general demographic characteristics, exposure information, signs and symptoms, medical care, and health outcomes. OHHABS is a dynamic electronic reporting system; data within individual reports are subject to change over time. Data included in this report are from a specific point in time.

Methods

This summary describes data from OHHABS for events occurring between January 1, 2021 and December 31, 2021. Reports were received by October 3, 2022 and reviewed by CDC using standardized data quality checks. CDC downloaded the final dataset on January 30, 2023. CDC used SAS (version 9.4; SAS Institute) to conduct descriptive analyses to characterize HAB events and associated human or animal cases of illness.

This summary reflects a change in methodology to analyses involving environmental laboratory results. In prior summaries, a result was included as a "positive detection" if the reported concentration was greater than zero (>0) or there was no reported concentration (e.g., a toxin was reported but not the concentration). Reported concentrations of 0 were considered "non-detections" and not included. Beginning with the 2021 annual summary, a concentration >0 is required for the result to be counted as a positive detection and included in analyses.

If group animal reports were missing the number of individuals affected, the number was set to two for inclusion in descriptive analyses. If group animal reports indicated deaths occurred but did not provide the number of individuals that died, the number of deaths was set to missing as this could not be extrapolated from available information.

Public health agencies classified HAB events as suspected or confirmed and cases of illness as suspected, probable, or confirmed (2018 OHHABS case and event definitions [PDF – 3 pages]). Animals within group animal reports were classified according to the overall classification (e.g., if a group of 10 animals was classified as "probable," then each animal was subsequently defined as a probable case of illness).

Reported signs and symptoms were classified primarily based on the organ system affected. "Generalized" refers to constitutional signs and symptoms such as headache, fever, or lethargy in humans and weakness, lethargy, or anorexia in animals. Some signs and symptoms classified as neurologic may present in other systems (e.g., ophthalmologic). Signs and symptoms reported in OHHABS are reviewed periodically to assign classifications to newly entered values.

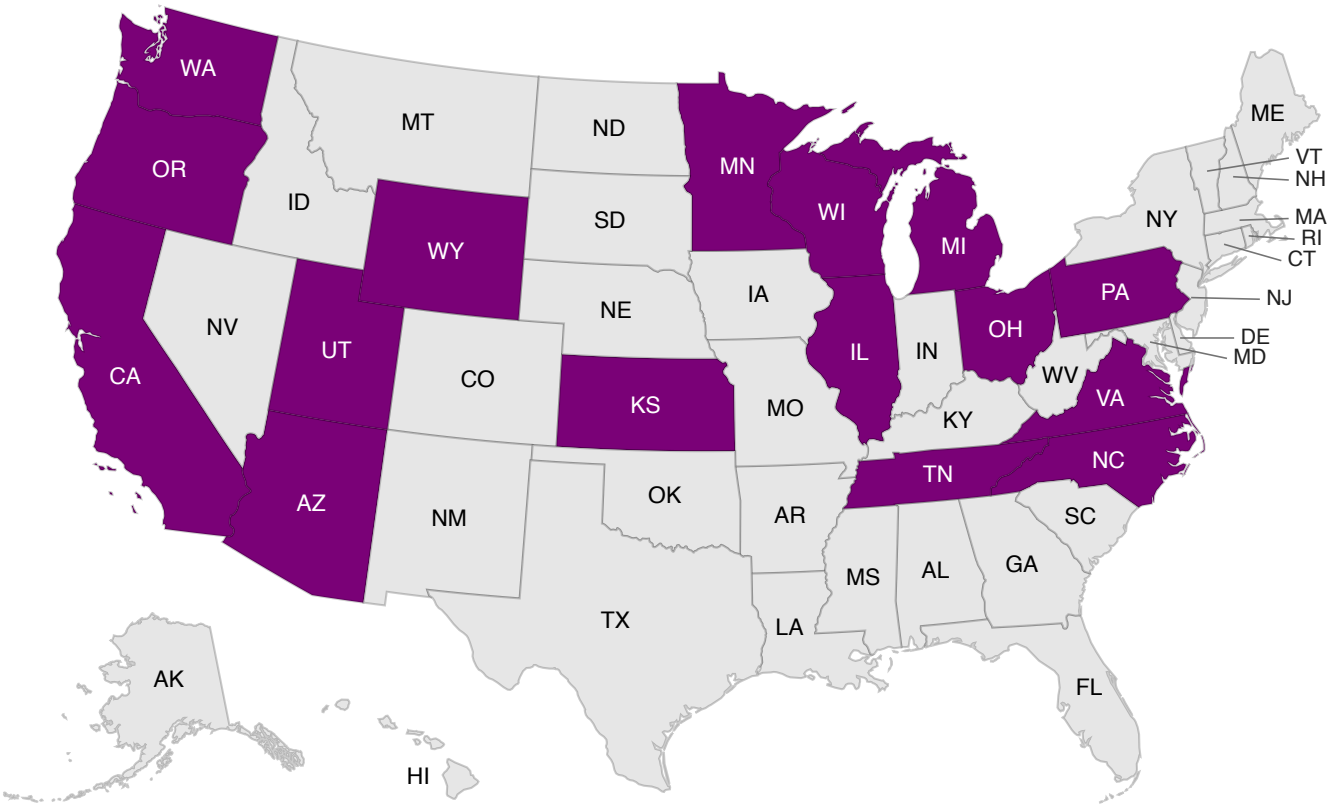
Findings

Overview

During 2021, 368 HAB events were reported by 16 state jurisdictions: Arizona, California, Illinois, Kansas, Michigan, Minnesota, North Carolina, Ohio, Oregon, Pennsylvania, Tennessee, Utah, Virginia, Washington, Wisconsin, and Wyoming (Figure 1). These HAB events resulted in 117 human cases of illness and at least 2,715 animal cases of illness. Twenty-one groups of animals were reported, ranging in size from 2–2,000 individuals. (Figure 2)

Reported HAB events occurred predominantly in summer months, peaking in August (92; 25%) (Figure 3) and were most often classified as confirmed (311; 85%) (Figure 4). Human cases of illness occurred primarily in June (38; 33%). Animal cases of illness occurred primarily in August (2,328; 86%). Case classification differed between human and animal cases of illness; the majority (104; 89%) of human cases of illness were classified as probable and 2,018 (74%) animal illnesses as confirmed (Figure 4).

Figure 1: States reporting HAB events for 2021.
16 states reported to OHHABS for 2021



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Data Table

Location	HAB Events	Human Illnesses	Animal Illnesses
Arizona	3	0	0
California	59	18	444
Illinois	5	3	7
Kansas	12	21	3
Michigan	77	5	5
Minnesota	1	0	1
North Carolina	39	0	0
Ohio	4	1	4
Oregon	3	0	3
Pennsylvania	77	1	0
Tennessee	5	1	16
Utah	29	56	9
Virginia	10	7	0
Washington	8	1	2,222
Wisconsin	4	3	1

Wyoming	32	0	0

Data table showing data for the United States Map figure.

Figure 2: Reported HAB events with associated human and animal cases, 2021

368 HAB events resulted in 117 human illnesses and at least 2,715 animal illnesses in 2021

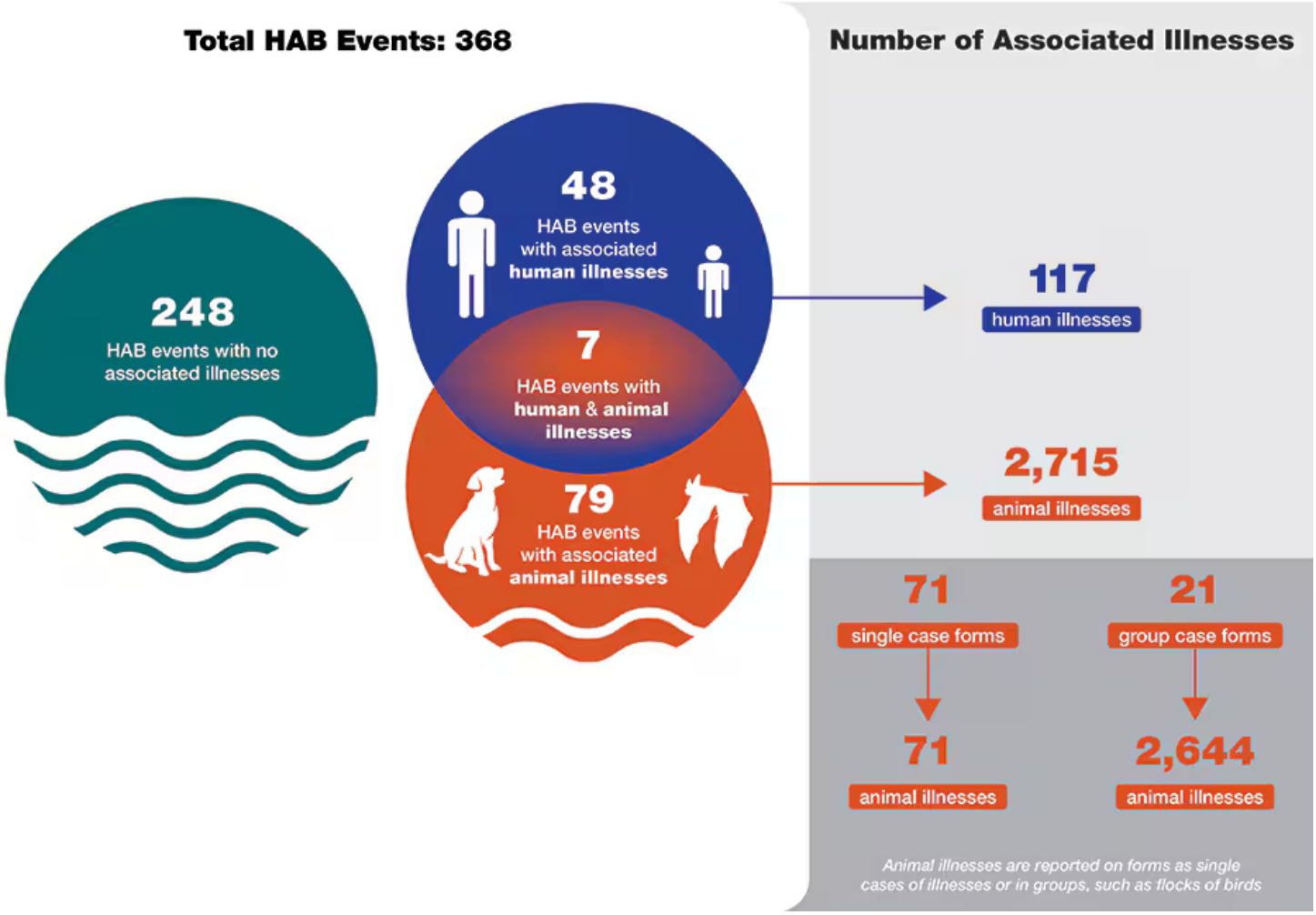
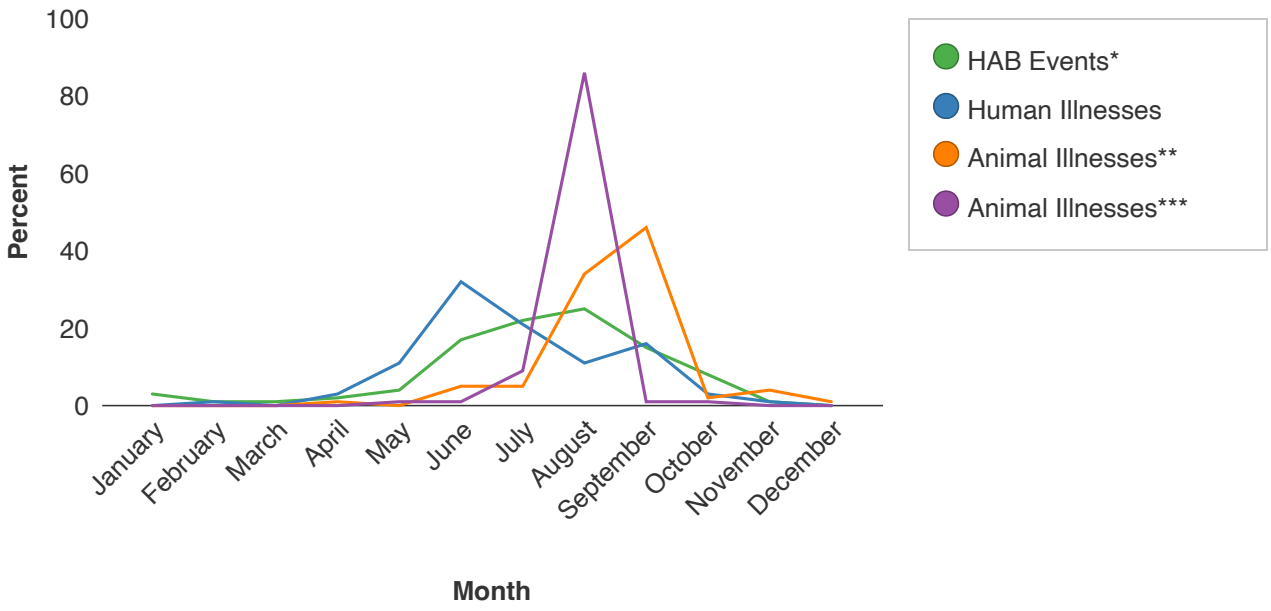


Figure 3: Reported HAB events and cases by month, 2021

Most reported HAB events and illnesses occurred during the summer in 2021



*One HAB event did not have a reported month.
**Excluding a large bat mortality event (at least 2,000 bats) in August.
***Including a large bat mortality event (at least 2,000 bats) in August.

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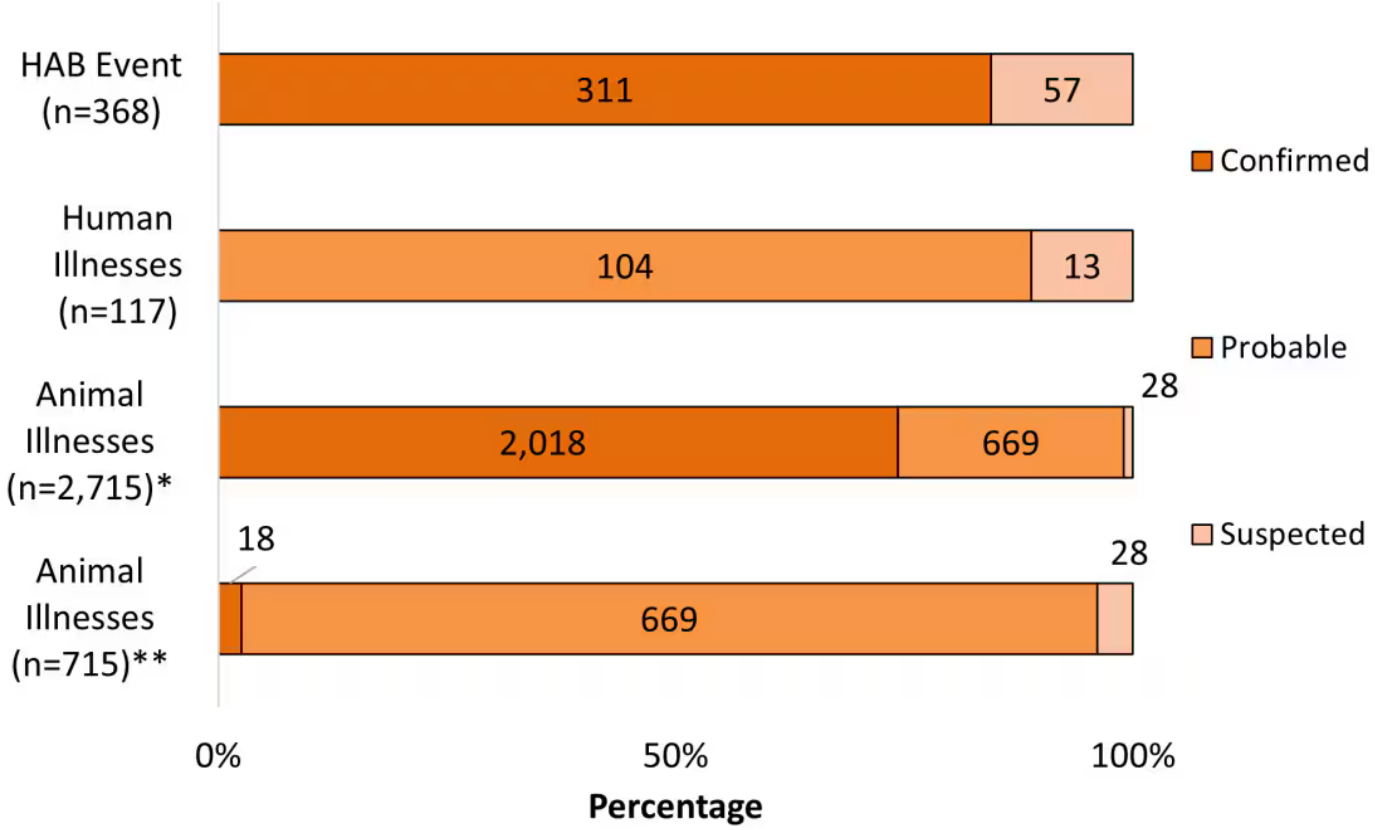
Figure 3 Data Table

	January	February	March	April	May	June	July	August	Septembe
HAB Events*	3	1	1	2	4	17	22	25	15
Human Illnesses	0	1	0	3	11	32	21	11	16
Animal Illnesses**	0	0	0	1	0	5	5	34	46
Animal Illnesses***	0	0	0	0	1	1	9	86	1

Figure 4. Proportion of reported HAB events and associated human and animal cases by classification, 2021

In 2021, 85% of HAB events were classified as confirmed, 89% of human illnesses as probable, and 74% of animal illnesses as confirmed. When a large mortality event was excluded, 94% of animal illnesses were classified as probable.



*Including a large bat mortality event (at least 2,000 bats) in August.
**Excluding a large bat mortality event (at least 2,000 bats) in August.
HAB events can only be classified as “suspected” or “confirmed.”

Figure 4 Data Table

	Confirmed – Frequency (%)	Probable – Frequency (%)	Suspected – Frequency (%)	Total – Frequency (%)
Animal Illnesses**	18 (3)	669 (94)	28 (4)	715 (100)
Animal Illnesses*	2,108 (74)	669 (25)	28 (1)	2,715 (100)
Human Illnesses	0 (0)	104 (89)	13 (11)	117 (100)
HAB Event	311 (85)	0 (0)	57 (15)	368 (100)

HAB Events

Most (330; 90%) of the 368 HAB events occurred in fresh water (Figure 5a), primarily in lakes, reservoirs, or impoundments (83%) (Figure 5b). Within the freshwater HAB event subset, observers most frequently noted green water color (27%), however, one or more observations of clear water were reported during 10% of these HAB events (Figure 6). Scum or algal matter was observed in 199 of 218 (91%) HAB events that included information on scum presence or absence.

Monitoring (65%) and citizen complaints (23%) were the most frequently reported reasons for conducting environmental testing for algal toxins or species (Figure 7). Most reports (280; 76%) included environmental testing results with positive detections (>0) of cyanobacteria, algae, or toxins and almost all of these were related to freshwater HAB events (94%). Among these 280 reports, toxins were most frequently detected (186; 66%), followed by cyanobacteria or algae (121; 43%) (Figure 8). Toxin testing primarily identified microcystins (166; 89%) (Figure 9a); multiple toxins were reported for 27 HAB events. *Aphanizomenon* was the genus most frequently identified during environmental testing, detected in 37 HAB events (Figure 9b). *Pseudo-nitzschia* was the only genus identified in marine coastal waters during eight HAB events.

Figure 5a: Reported HAB events by water salinity, 2021

Most of the 368 HAB events during 2021 occurred in fresh water (n=330)

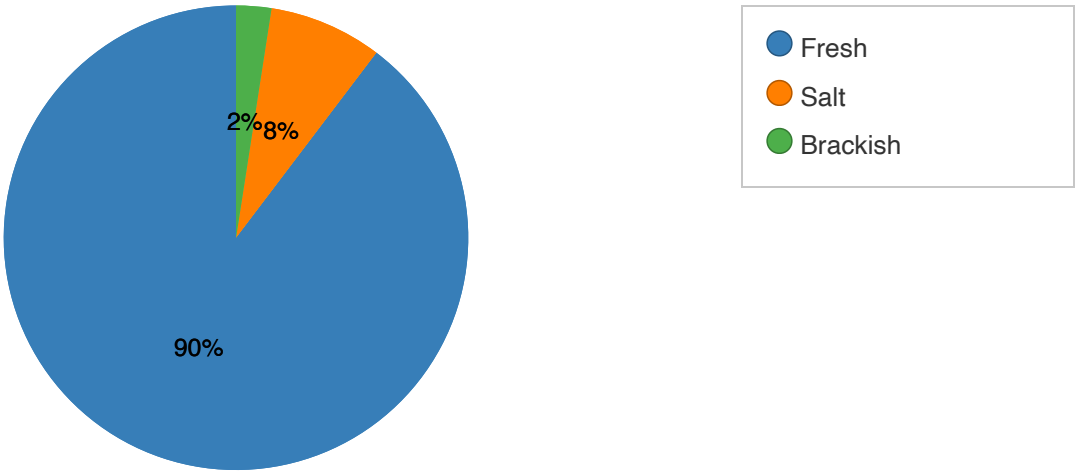


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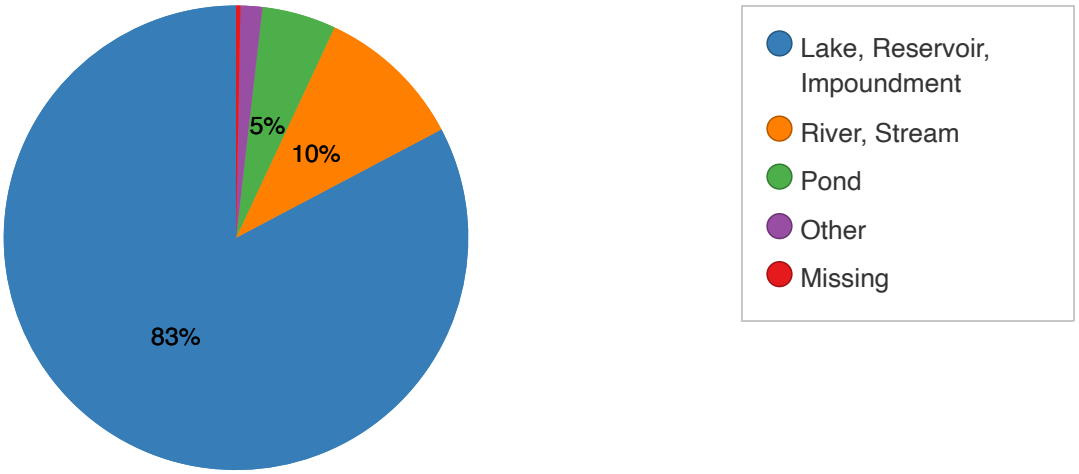
Figure 5a Data Table

Fresh	Fresh	Salt	Salt	Brackish	Brackish
330%	90%	29%	8%	9%	2%

Figure 5b: Reported freshwater HAB events by water type, 2021

Most freshwater HAB events during 2021 (n=330) were in lakes, reservoirs, or impoundments



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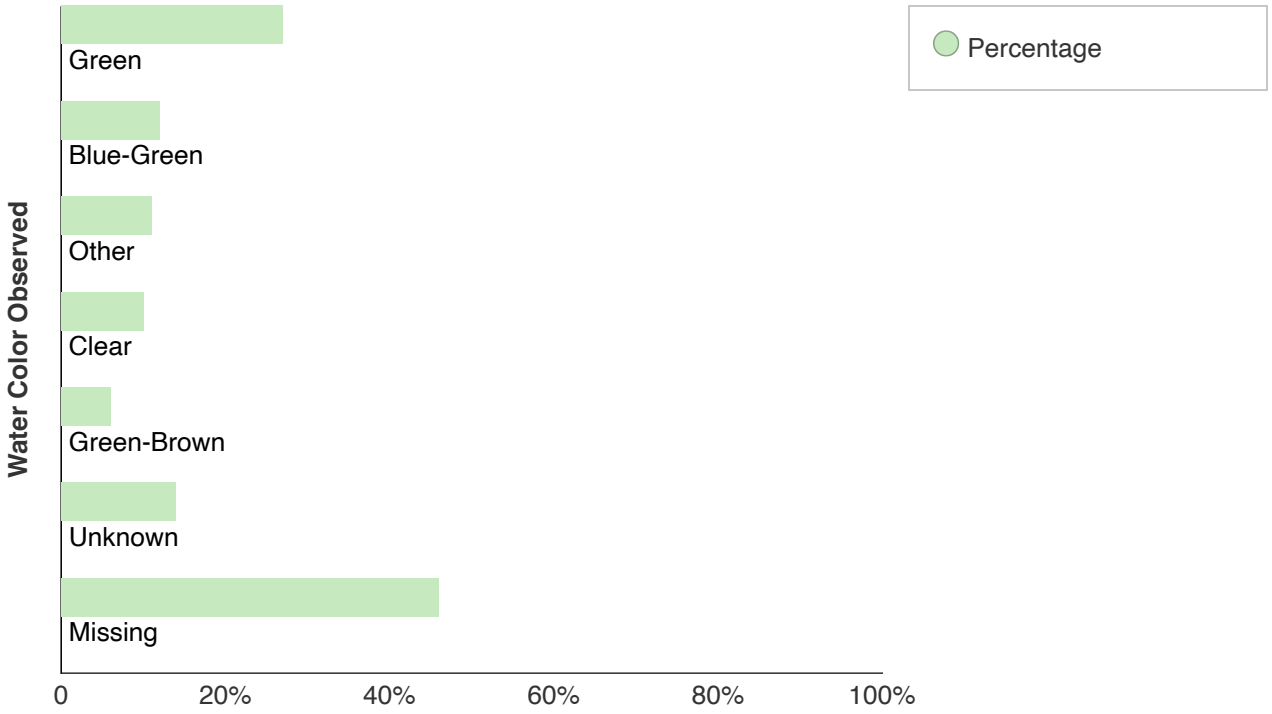
Data Table

Lake, Reservoir, Impoundment	Lake, Reservoir, Impoundment	River, Stream	River, Stream	Pond	Pon
273%	83%	34%	10%	17%	5%

Figure 6: Reported water color for freshwater HAB events, 2021

Freshwater HAB events with water color data (n=178) were most often green or blue-green in color.



Multiple water colors could be selected. Other includes: blue, brown, gray, grayish-green, milky-white, rainbow sheen, red, and other unspecified water colors.

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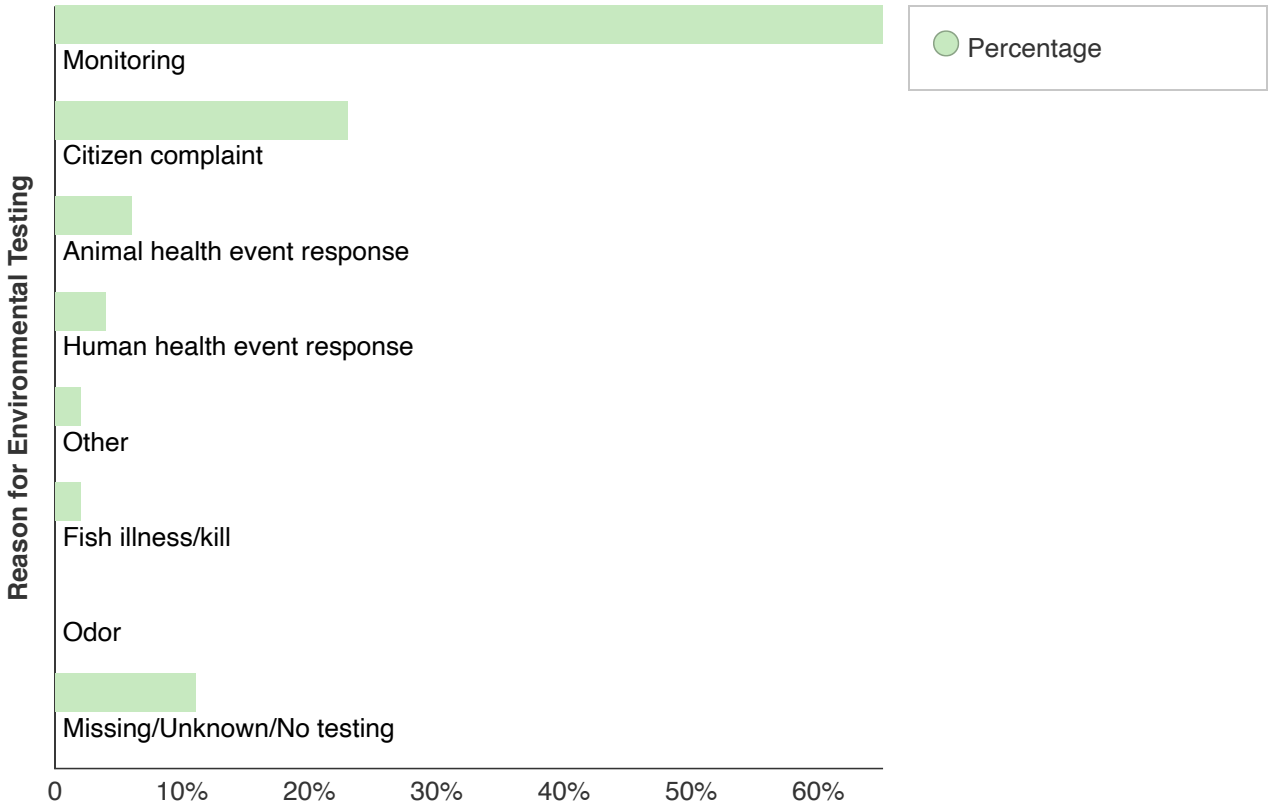
Figure 6 Data Table

	Green	Blue-Green	Other	Clear	Green-Brown	Unknown	Missing
Percentage	27%	12%	11%	10%	6%	14%	46%

Figure 7: Reasons for environmental testing of HAB events, 2021

In 2021, the primary reason for environmental testing in 368 HAB events was water quality monitoring (65%)



Multiple reasons could be selected.

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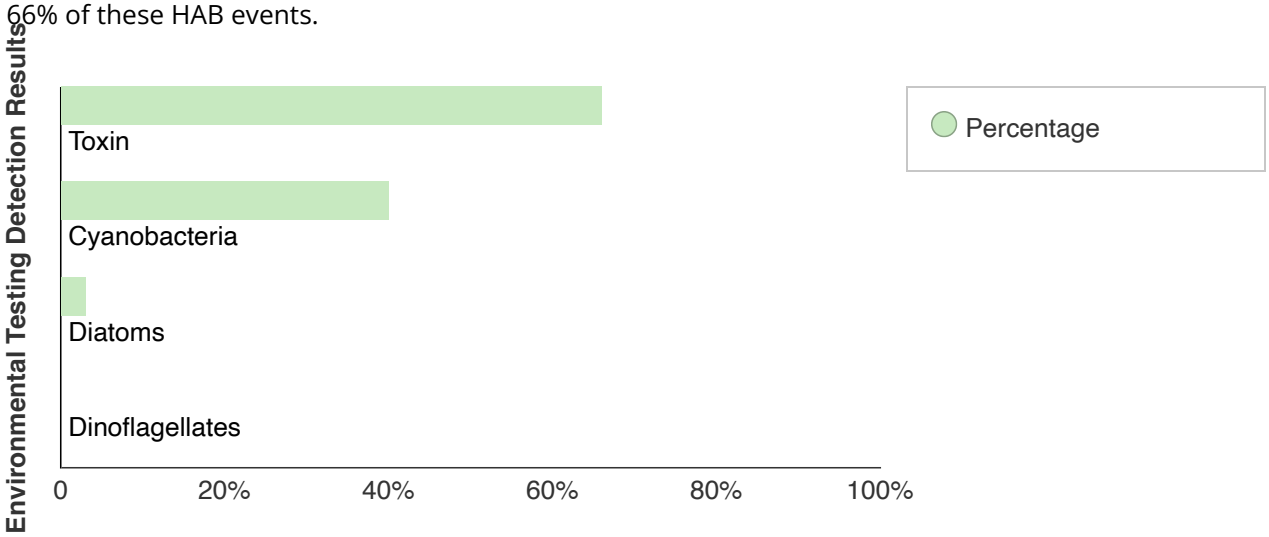
Figure 7 Data Table

	Monitoring	Citizen complaint	Animal health event response	Human health event response
Percentage	65%	23%	6%	4%

Figure 8: Environmental testing findings during HAB events, 2021

Environmental testing detected cyanobacteria, algae, or toxins in 280 (76%) of HAB events, with toxins identified in 66% of these HAB events.



Multiple options could be selected. Reports might have included findings of toxins, organisms, or both.

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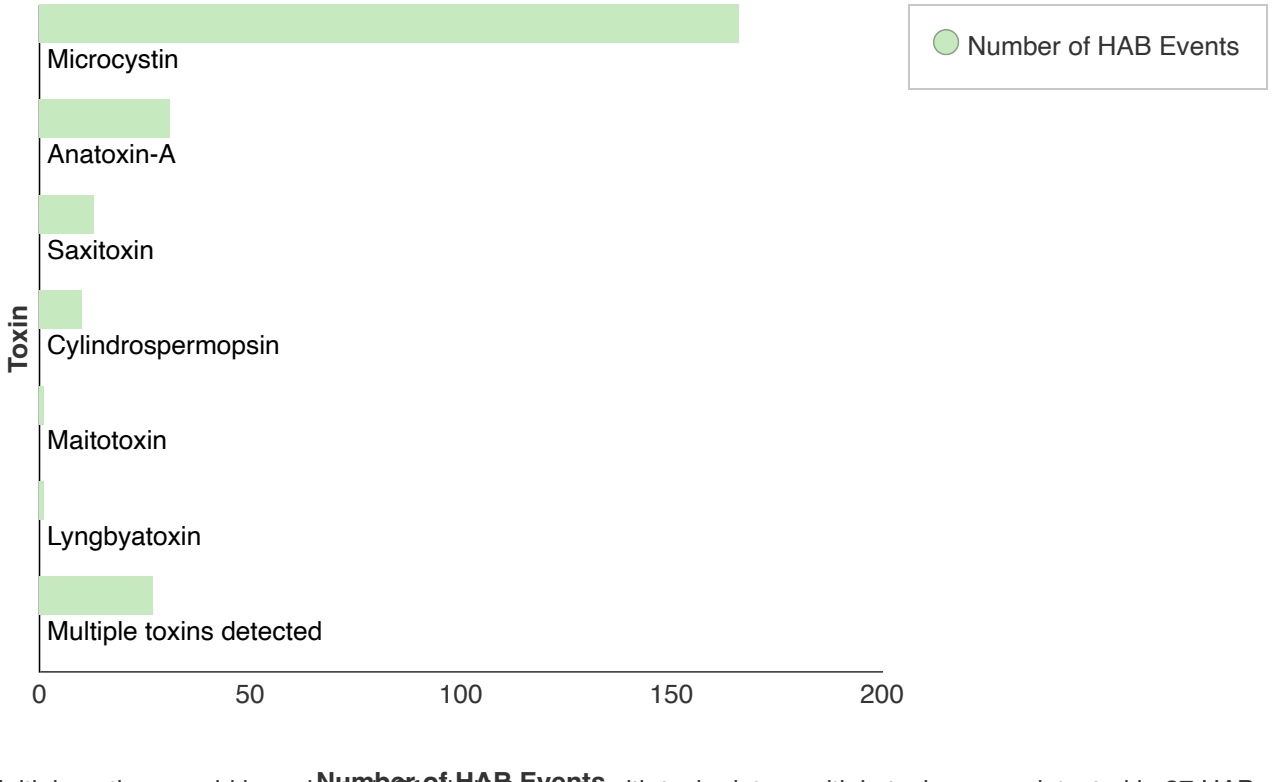
Figure 8 Data Table

	Toxin	Cyanobacteria	Diatoms	Dinoflagellates
Percentage	66%	40%	3%	0%

Figure 9a. Identified toxins during environmental testing of HAB events, 2021

Microcystins were the most commonly identified toxins during environmental testing, detected in 166 of 186 HAB events (89%).



Multiple options could be selected. Of all HAB events with toxin data, multiple toxins were detected in 27 HAB events (15%).

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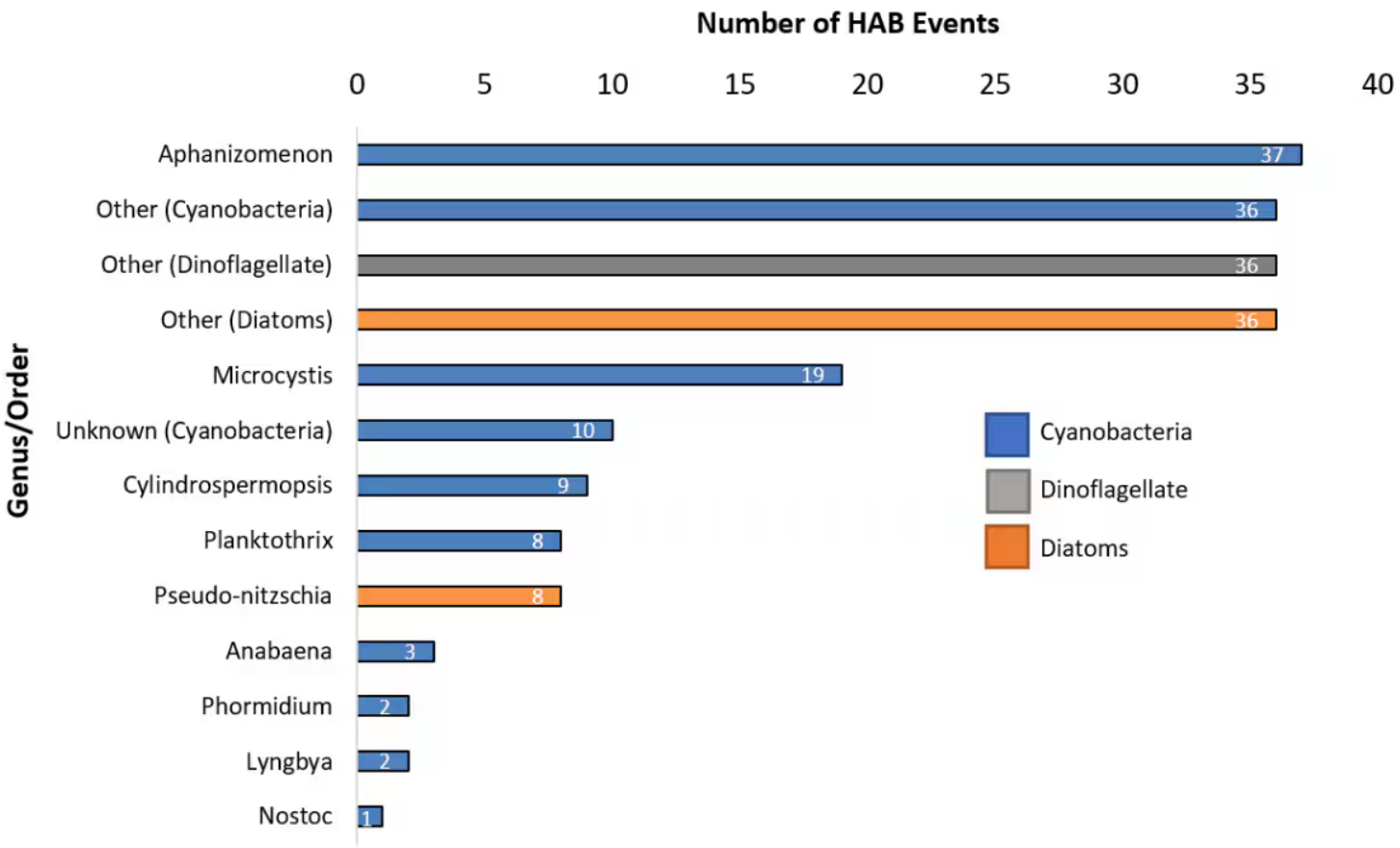
Figure 9a Data Table

	Microcystin	Anatoxin-A	Saxitoxin	Cylindrospermopsin	Maitotoxin	Lyngb
Number of HAB Events	166	31	13	10	1	1

Figure 9b. Identified genera during environmental testing of HAB events, 2021

Aphanizomenon was the most commonly identified genus during environmental testing, detected in 37 HAB events (30%).



Multiple options could be selected.

Figure 9b Data Table

Genera	Frequency	(%)
Nostoc	1	(0)
Lyngbya	2	(2)
Phormidium	2	(2)
Anabaena	3	(2)
Pseudo-nitzschia	8	(7)
Planktothrix	8	(7)
Cylindrospermopsis	9	(7)
Unknown (Cyanobacteria)	10	(8)
Microcystis	19	(16)
Other (Diatoms)	36	(30)
Other (Dinoflagellate)	36	(30)
Other (Cyanobacteria)	36	(30)
Aphanizomenon	37	(30)

Human Illnesses

Of 117 human cases of illness reported to OHHABS for 2021, 45 (38%) illnesses occurred in adults aged 18-45 years and 54 (46%) illnesses occurred in people under age 18 (Figure 10). People who became ill were exposed to HABs predominately at public outdoor areas (38%) and beaches (30%). Nearly all (89%) of the 117 people who became ill reported water and 7% reported air as a source of exposure (multiple sources were reported in 1% of illnesses). People sought care in 86 (74%) instances; over half (59%) called a poison control center, and 8% of illnesses resulted in an emergency department visit (Table 1). No deaths were reported.

Numerous signs and symptoms were reported; the most commonly reported types were gastrointestinal (59%), generalized (43%), and dermatologic (31%) (Figure 11). Overall, diarrhea (37%) and vomiting (33%) were the most commonly reported signs and symptoms (Table 2). Median time to illness onset was 12 hours (0–96; n=76) and median illness duration was 24 hours (0.50-720; n=63); 50% of ill people still exhibited signs or symptoms at the time of interview (Table 1).

Figure 10: Percentage of HAB-associated human cases by age group, 2021

Almost half (46%) of the reported illnesses during 2021 occurred among people under the age of 18, followed by adults 18-45 years (39%).

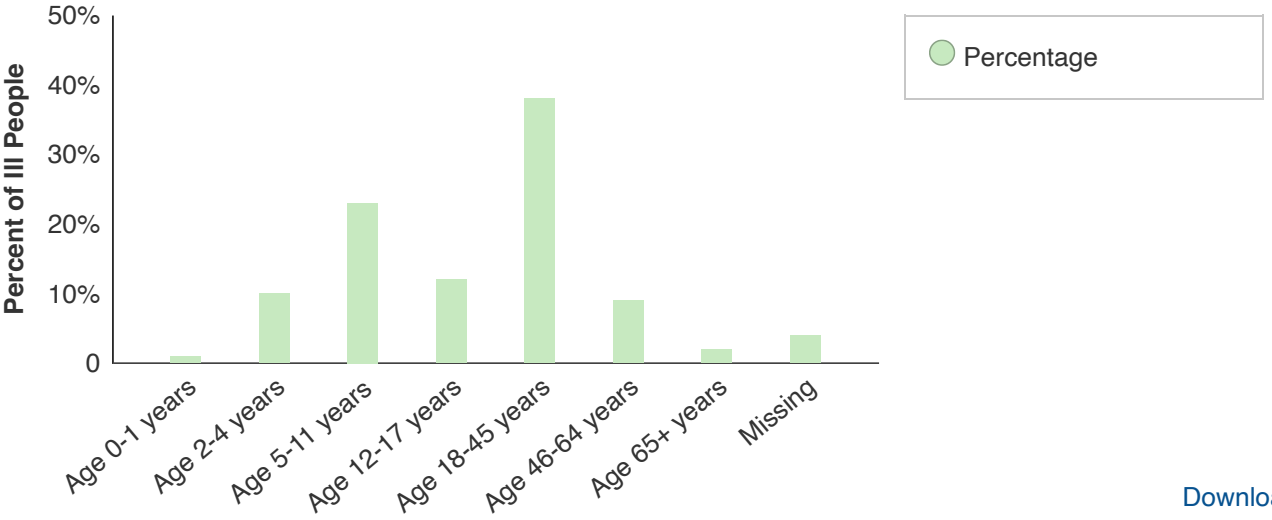


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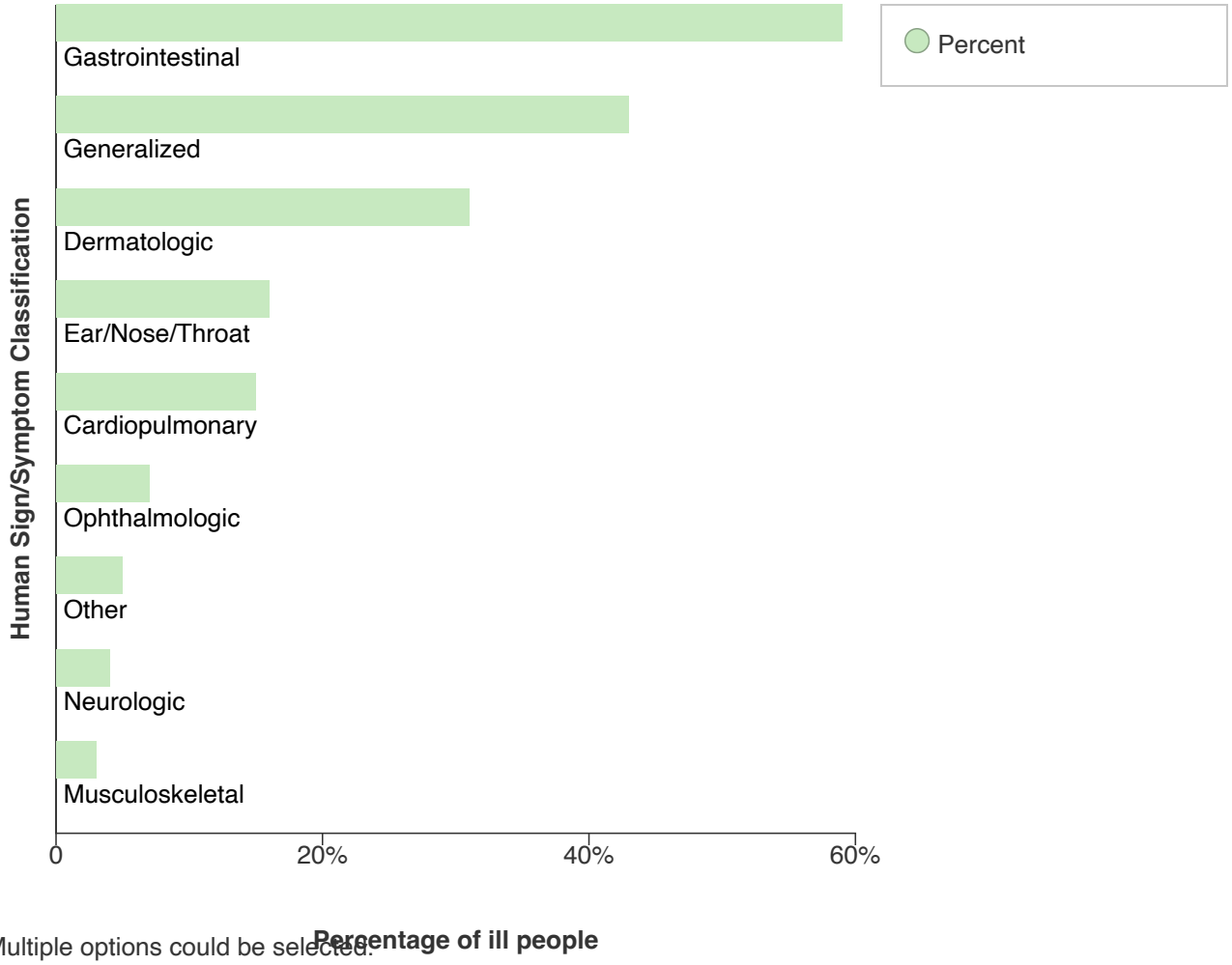
Figure 10 Data Table

	Age 0-1 years	Age 2-4 years	Age 5-11 years	Age 12-17 years	Age 18-45 years	Ag
Percentage	1%	10%	23%	12%	38%	9%

Figure 11: Signs and symptoms of HAB-associated human cases, 2021

Gastrointestinal, generalized, and dermatologic were the most frequently reported types of signs and symptoms among people who became ill during 2021 (n=117).



Multiple options could be selected.

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Figure 11 Data Table

	Gastrointestinal	Generalized	Dermatologic	Ear/Nose/Throat	Cardiopulmonary	Ophthalr
Percent	59%	43%	31%	16%	15%	7%

Table 1. Medical care for HAB-associated human cases, 2021
74% of ill people sought care from at least one source (n=117).

Health-seeking behavior	Number	(%)
Any health-seeking behavior	86	(74)
Call to a poison control center	69	(59)
Visit to healthcare provider	21	(18)
Visit to emergency department	9	(8)
Received first aid care	1	(1)
Experiencing symptoms at time of interview	58	(50)

Table 2. Signs and symptoms reported by HAB-associated human cases, 2021
Diarrhea (37%) and vomiting (33%) were the most commonly reported signs and symptoms of human illness (n=117).

Classification	Sign or Symptom	Number	(%)
Gastrointestinal		**69**	**(59)**
	Abdominal cramps	1	(1)
	Abdominal pain (tenderness)	15	(13)
	Diarrhea	43	(37)
	Gastrointestinal (nonspecific)	1	(1)
	Nausea	30	(26)
	Vomiting	39	(33)
Generalized		**50**	**(43)**
	Anaphylaxis	1	(1)
	Anorexia (loss of appetite)	11	(9)
	Body ache	2	(2)

	Chills	3	(3)
	Fatigue	18	(15)
	Fever	18	(15)
	Headache	22	(19)
	Lethargy (lack of energy, tiredness)	4	(3)
	Loss of Appetite	1	(1)
	Malaise (general discomfort)	5	(4)
	Myalgia (general achiness, pain)	2	(2)
	Pallor	4	(3)
Dermatologic		**36**	**(31)**
	Bullous skin lesions (fluid filled blisters)	1	(1)
	Dermatologic (nonspecific)	1	(1)
	Erythema (redness)	2	(2)
	Irritated skin	12	(10)
	Itchy welts	1	(1)
	Pruritus (itchy skin)	15	(13)
	Rash	25	(21)
	Skin blisters	2	(2)
	Skin infection	1	(1)
	Urticaria (hives)	9	(8)
Ear, Nose, Throat		**19**	**(16)**
	Ears, ache or pain	2	(2)
	Nasal inflammation	2	(2)
	Nasal, congestion (rhinitis)	9	(8)

	Nasal, coryza (runny nose)	1	(1)
	Oral, numbness	1	(1)
	Rhinorrhea	2	(2)
	Throat pain	3	(3)
	Throat, irritation	2	(2)
	Throat, sore	10	(9)
	Tongue, burning	1	(1)
Cardiopulmonary		**18**	**(15)**
	Cardiac pain	3	(3)
	Chest tightness	5	(4)
	Cough	12	(10)
	Difficulty breathing	2	(2)
	Pneumonia (lung infection)	1	(1)
	Respiratory (nonspecific)	2	(2)
	Shortness of breath	1	(1)
	Wheezing	2	(2)
Ophthalmologic		**8**	**(7)**
	Eyes, burning	2	(2)
	Eyes, discharge	2	(2)
	Eyes, irritation	4	(3)
	Eyes, red	1	(1)
Other		**6**	**(5)**
	Other	6	(5)
Neurologic		**5**	**(4)**
	Dizziness	4	(3)

	Numbness	2	(2)
Musculoskeletal		**3**	**(3)**
	Backache	1	(1)
	Muscle fatigue	2	(2)

Animal Illnesses

At least 2,715 animal cases of illness occurred and were reported to OHHABS for 2021, including a large wildlife mortality event in Washington involving at least 2,000 bats. Most wildlife cases were classified as confirmed (76%), domestic pet cases as probable (67%), and livestock cases as suspect (60%) (Figure 12). Among 48 domestic pet cases, 25 livestock cases, and 2,642 wildlife cases, the animals most affected were dogs (100%), cattle (100%), and bats (76%), respectively (Figure 13a). Veterinary care was provided to 59 animals, including 35 marine mammals and 24 dogs.

Data describing signs of illness were available for 180 animals (100 mollusks, 46 dogs, and 34 fish). Generalized (80%), gastrointestinal (76%), and neurologic (52%) signs were most frequently reported for domestic pets (Figure 14a). Genitourinary (99%) and unknown (1%) signs were reported for wildlife (Figure 14b). Individually, vomiting (59%) and lethargy (37%) were the most commonly observed signs in reported domestic pet illnesses and dark urine in mollusks and fish (99%) was the only sign observed for wildlife (Table 3). Median time to illness onset was 3.0 hours (0.02–24.0) for the 16 domestic pets with available information, and median duration of illness was 24.0 hours (0.02–72.0) for 12 domestic pets with available information. In total, 2,489 (92%) of the animals died.

Figure 12: Proportion of HAB-associated animal cases by animal category by classification, 2021

Most animal illnesses reported for 2021 were classified as confirmed. When a large bat mortality event was excluded, most animal illnesses were classified as probable.

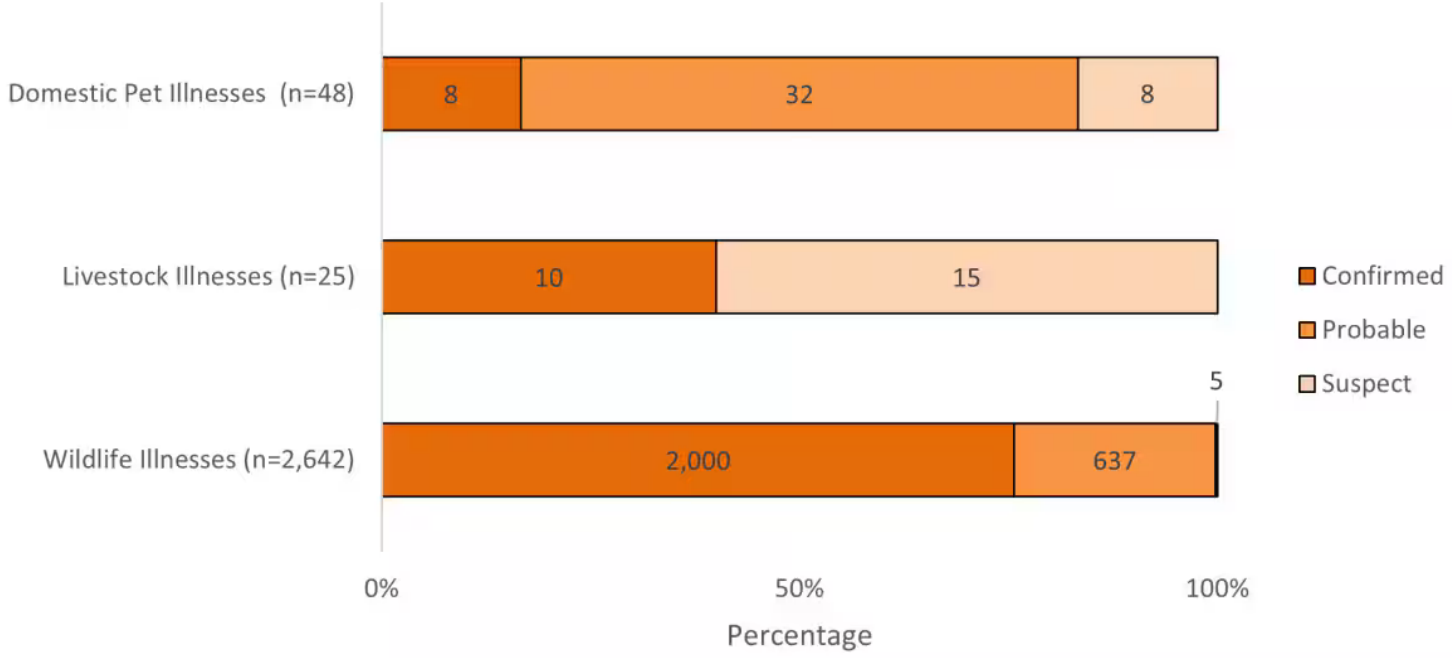


Figure 12 Data Table

	Confirmed Frequency (%)	Probable Frequency (%)	Suspect Frequency %)	Total Frequency (%)
Wildlife Illnesses	2,000 (76)	637 (24)	5 (0)	2,642 (100)
Livestock Illnesses	10 (40)	0 (0)	15 (60)	25 (100)
Domestic Pet Illnesses	8 (17)	32 (67)	8 (17)	48 (101)

Figure 13a: Reported animal types of HAB-associated animal cases, 2021 – including a bat die off of 2,000 individuals*

Most animal illnesses reported for 2021 were associated with a wildlife mortality event affecting at least 2,000 bats. All of the domestic pet illnesses occurred in dogs and all of the livestock illnesses occurred in cattle.

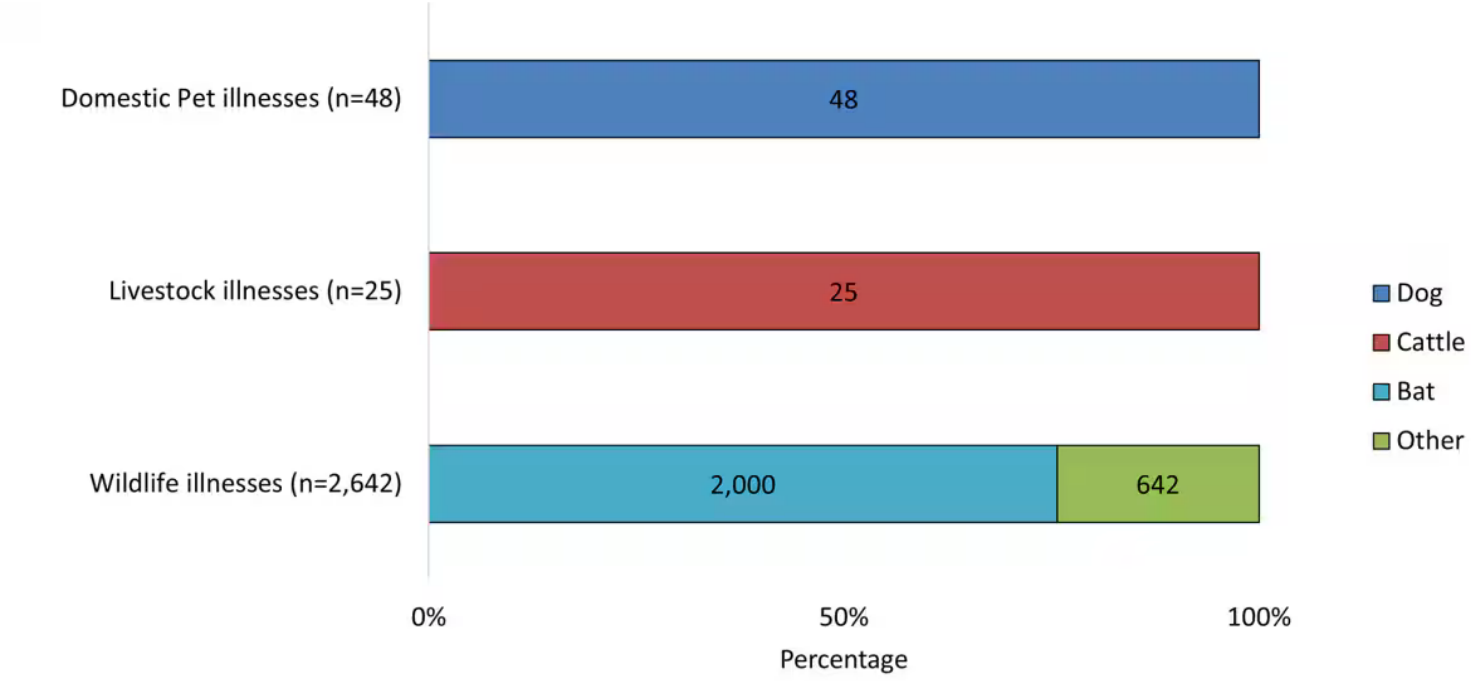


Figure 13a Data Table

	Frequency (%)
Individual Number of Animals Affected	2,715 (100)
Domestic Pet	48 (2)
Dog	48 (100)
Livestock	25 (1)
Cattle	25 (100)
Wildlife	2,642 (97)
Bat	2,000 (76)
Other	642 (24)

* On September 12, 2023, the number of bat illnesses in Figure 13a was corrected from 2,100 to 2,000. The number of other wildlife illnesses was corrected from 542 to 642.

Figure 13b: Reported animal types of HAB-associated animal cases (excluding bat mortality event), 2021

Excluding the bat mortality event, fish were the most reported type of animal that became ill during 2021.

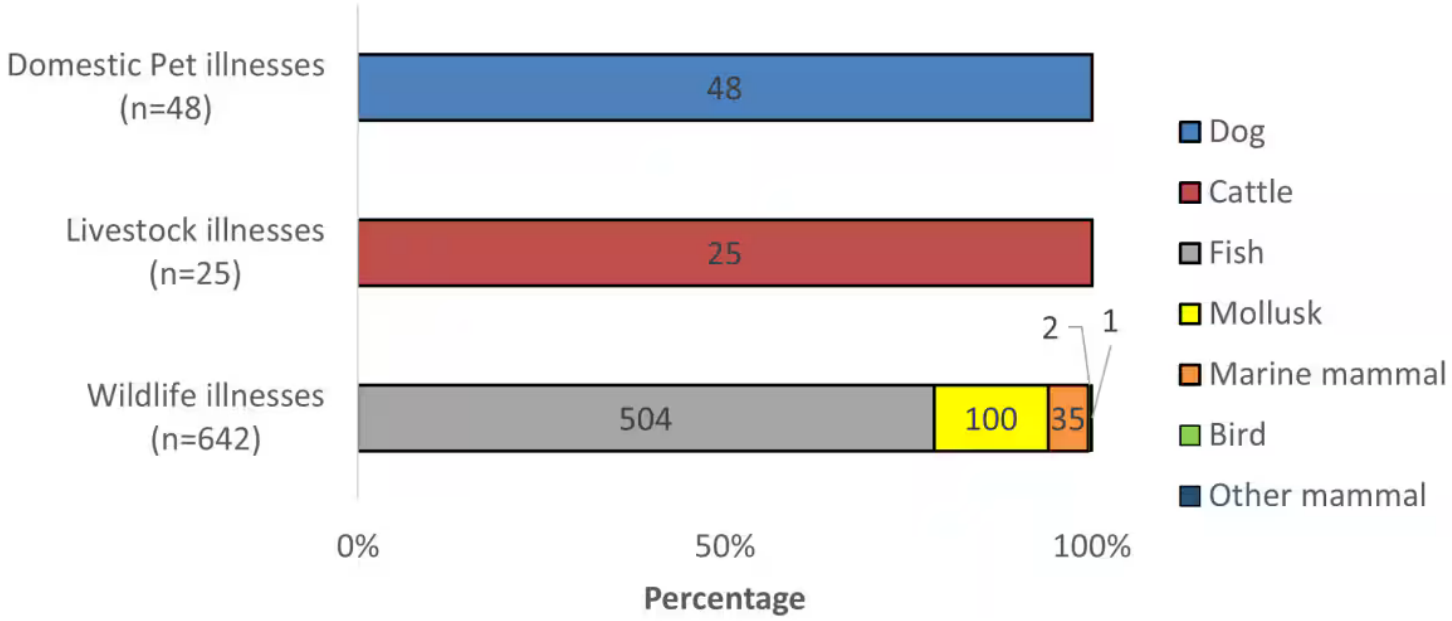
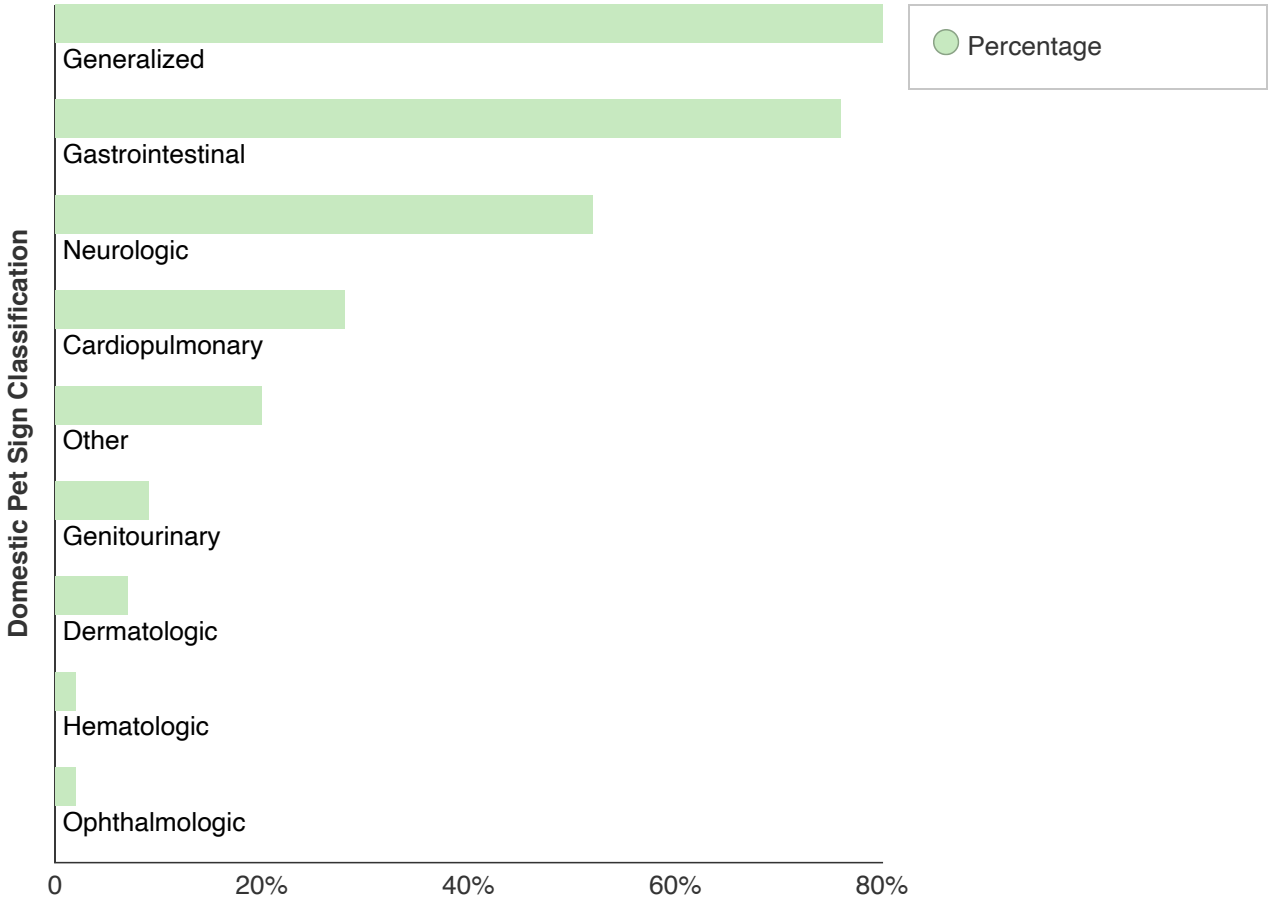


Figure 13b Data Table

	Frequency	(%)
Individual Number of Animals Affected	715	(100)
Domestic Pet	48	(7)
Dog	48	(100)
Livestock	25	(3)
Cattle	25	(100)
Wildlife	642	(90)
Fish	504	(79)
Mollusk	100	(16)
Marine Mammal	35	(5)
Bird	2	(0)
Other	1	(0)

Figure 14a: Signs in HAB-associated domestic pet cases, 2021

Generalized, gastrointestinal, and neurologic signs were the most frequently reported signs for domestic pet illnesses during 2021 (n=46).



Multiple options could be selected.

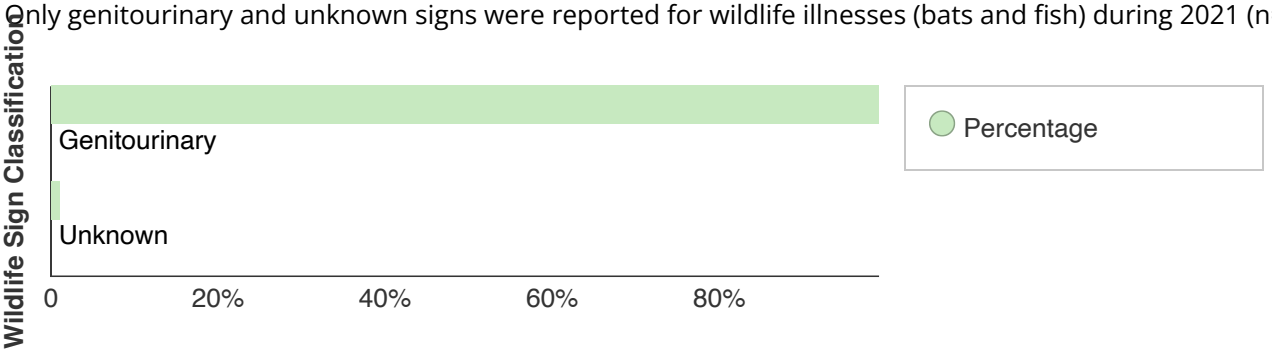
Download Data (CSV)

Data Table

	Generalized	Gastrointestinal	Neurologic	Cardiopulmonary	Other	Genitourinary
Percentage	80%	76%	52%	28%	20%	9%

Figure 14b: Signs in HAB-associated wildlife cases, 2021

Only genitourinary and unknown signs were reported for wildlife illnesses (bats and fish) during 2021 (n=134).



Multiple options could be selected.

Download Data (CSV)

Data Table

	Genitourinary	Unknown
Percentage	99%	1%

Table 3: Signs reported for HAB-associated animal cases, 2021

Vomiting (59%), lethargy (37%), and ataxia (33%) were the most commonly observed signs in reported domestic pet illnesses (n=46). Dark urine (99%) was the sign observed for wildlife illnesses (n=134).

Category	Classification	Sign	Number	(%)
Domestic pet	**Generalized**		37	(80)
		Anorexia (loss of appetite)	8	(17)
		Anxiety	1	(2)
		Collapse (unable to stand)	4	(9)
		Dehydration (refusing water)	2	(4)
		Fatigue	1	(2)
		Fell over	1	(2)
		Fever	3	(7)
		Foaming at the mouth	4	(9)
		Lethargy	17	(37)

	Muscle tremors	11	(24)
	Panting	2	(4)
	Stumbling	4	(9)
	Tremors	1	(2)
	Weakness	10	(22)
Gastrointestinal		**35**	**(76)**
	Diarrhea	4	(9)
	Drooling/Salivation	9	(20)
	Fecal incontinence	1	(2)
	Regurgitation	1	(2)
	Vomit with bile	1	(2)
	Vomiting	27	(59)
Neurologic		**24**	**(52)**
	Ataxia (stumbling, loss of balance)	15	(33)
	Behavior change	6	(13)
	Coma (non-reponsive to stimuli)	1	(2)
	Confusion	1	(2)
	Seizure/Convulsions	5	(11)
Cardiopulmonary		**13**	**(28)**
	Cardiac Arrest	7	(15)
	Cough	1	(2)
	Labored breathing	9	(20)
	Pale gums	1	(2)
	Rapid breathing	3	(7)
Other		**9**	**(20)**

		Head shaking	1	(2)
		Other	7	(15)
		Stiff limb	1	(2)
	Genitourinary		**4**	**(9)**
		Bladder incontinence	4	(9)
	Dermatologic		**3**	**(7)**
		Hair loss	1	(2)
		Itching	1	(2)
		Licking body	1	(2)
		Skin lesion	1	(2)
	Hematologic		**1**	**(2)**
		Unusual bleeding	1	(2)
	Ophthalmologic		**1**	**(2)**
		Dilated pupils	1	(2)
Wildlife	**Genitourinary**		**132**	**(99)**
		Dark urine	132	(99)
	Unknown		**2**	**(1)**
		Unknown	2	(1)

Limitations

Data reported in OHHABS for 2021 are not representative of HAB event or illness occurrence in the United States because reporting is voluntary and not all states are currently reporting to this system. States may not report information for all HAB events or illnesses due to variability in surveillance capacity, surveillance program scope, or limitations to the environmental or health data available for HAB events. Environmental testing might have been limited by availability of testing for one or more toxins. Additionally, the total number of individual animals described in this report underrepresents the total affected or that died during these events because some group animal reports did not provide these numbers or indicated that the number was an underestimate. Summarized data therefore underrepresent the total number of HAB events and illnesses that occurred within or across states. Similarly, relative contributions of HAB events in salt water, toxins identified in fresh water, and types of illnesses (e.g., domestic pets versus wildlife species), may also be affected. The effects of the COVID-19 pandemic on surveillance of HAB events (e.g., bloom detection and monitoring) and illnesses (e.g., exposure to HABs, healthcare seeking behavior) are not known.

Conclusion

Sixteen states reported to OHHABS for 2021. The findings from this annual data summary indicate that HAB events and associated illnesses occur throughout the United States. HAB event and illness reporting primarily characterized environmental data, exposures, and outcomes associated with freshwater cyanobacterial blooms. Affected people primarily reported gastrointestinal, generalized, and dermatologic signs and symptoms, while affected animals—specifically dogs—presented with generalized, gastrointestinal, and neurologic signs. A mortality event involving at least 2,000 bats demonstrated the potential for HAB events to impact wildlife populations. Data from environmental sampling, human illnesses, and animal illnesses highlight the diversity of HAB species, toxins, and health effects associated with HAB events. A One Health approach to surveillance increases the scientific understanding and data available to characterize HAB events and inform illness prevention efforts.

Acknowledgements

CDC would like to thank state and local waterborne disease coordinators, epidemiologists, environmental health practitioners, laboratorians, toxicologists, and animal health practitioners, as well as other partners who were involved in investigating or reporting these data to OHHABS.

Suggested Citation

Centers for Disease Control and Prevention (CDC). Summary Report – One Health Harmful Algal Bloom System (OHHABS), United States, 2021. Atlanta, Georgia: U.S. Department of Health and Human Services, CDC, 2023.

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Last Reviewed: September 12, 2023
Source: Centers for Disease Control and Prevention