

4. Vocalizations

The following is a list of vocalizations based on past and present felid literature, many of which are documented in Sunquist and Sunquist (2002). Additional information regarding the context of each call, as well as the species in which it has been recorded, is provided under each definition (however, this information is limited in some cases). Although many cats do share a number of vocalizations, the sounds they produce can vary tremendously, and so many more species-specific vocalizations exist which are not included here. Thus, while this list is incomplete, it contains some of the more common and recognizable felid vocalizations, and is encouraged for use and future expansion.

Table 3. List of vocalizations based on felid literature.

Vocalization	Definition	Context	Species
Caterwaul	Loud, drawn out whine. May be similar to the yowl .	Reproductive (female advertisement call)	Bobcat, domestic cat, puma snow leopard
Chatter	Cat rhythmically clashes the jaws, creating a low-amplitude, smacking sound.	When desiring prey which is out of reach; displacement .	Domestic cat, Eurasian lynx
Chirp	A short, high-pitched call described as similar to a bird chirping.	Contact call; used to locate conspecifics; when something is desired.	Cheetah, domestic cat
Copulatory Cry	Cry emitted by female cat during successful intromission. In “small cats” it is described as a low, barely audible growl (Mellen, 1993).	Reproductive (female)	Recorded in some small cats (Mellen, 1993), although variations are likely to exist in most (if not all) species.
Growl	A low-pitched, throaty, rumbling noise produced while the mouth is closed.	Aggressive; agonistic	Most (if not all) cats
Grunt	Short, throaty, atonal call.	Calling to cubs; searching for group members; part of roaring sequence	Jaguar, leopard, lion
Gurgle	Short, pulsed sound, described as similar to a person gargling their throat.	Affiliative; friendly; females with kittens	Most (if not all) “small cats”
Hiss	A drawn-out, low-intensity hissing sound produced by rapid expulsion of air from the cat’s mouth, usually during exhalation.	Agonistic	Most (if not all) cats
Mew	The distinctive “meow” call that is typical of cats. Mews can differ considerably between species, and vary in tone, duration, pitch, and structure.	Many (social; reproduction; contact call)	Most (if not all) cats, however sound varies in intensity and differs between species

Prusten (Chuff)	Cat expels jets of air through the nose creating a low-intensity, soft, pulsed sound, described as being similar to the snorting of a horse.	Affiliative; friendly	Clouded leopard, jaguar, snow leopard, tiger
Puff	Cat expels short, explosive jets of air through the nose and lips in rapid, rhythmic sequence of 2-4 sounds. Described as a bout of stifled sneezing.	Affiliative; friendly	Leopard, lion
Purr	Low, continuous rhythmical tone produced during respiration while the cat's mouth is closed. Creates a murmuring sound.	Friendly; contentment	Most (if not all) "small cats"
Roar	High intensity call that differs between species but consists of a "main call" and grunting sounds. In the lion, the call may be described as moaning, full-throated and thundering.	Long distance; contact or spacing call; possibly more	Jaguar, leopard, lion, tiger
Snarl	Cat bared teeth while emitting a sound similar to a growl , however the mouth is open and the sound is usually louder, shorter and higher in pitch than a growl .	Aggressive; agonistic	Most (if not all) cats
Spit	Cat makes a sudden, short, explosive exhalation resulting in a burst of noise and is often accompanied by a violent movement.	Aggressive	Most (if not all) cats
Stutter (Stutter-barking)	Soft, throaty repetitive call typically emitted by a male when interested in female in estrus.	Reproductive; affiliative	Cheetah
Wah-wah	Cat makes a "wah-wah" sound, where each "wah" is muffled, short, atonal, and of low amplitude.	Approach of two individuals; displacement ; may be a mild threat	Some "small cats" (e.g. African golden cat, Asian golden cat, bobcat, caracal, Eurasian lynx, jaguarundi, puma)
Yowl	A long, drawn-out vocalization of variable pitch, intensity, duration and tonality.	Reproductive; mild threat	Bobcat, cheetah, domestic cat, Eurasian lynx, Geoffrey's cat jungle cat, lion

5. Behavioral Categories

Some typical behavioral categories used in felid research have been identified and defined here. If desired, these categories can act as a guide when researchers are designing their own study. This list of categories and the behaviors within them are nonexclusive, and many more categories can be created based on the requirements of a study. Additionally, the examples of behaviors listed within each behavioral category may not be exhaustive; many more behaviors may exist which are not listed within them. The behavioral categories and list of examples are merely suggestions that may assist researchers in the beginning stages of their study, and possibly help standardize felid research.

Table 4. Descriptions of behavioral categories.

Category	Definition
Active	Alert behaviors in which the cat is in motion or engaged in an activity.
Affiliative	“Friendly” behaviors that may communicate the cat’s intention to associate with other individuals in a peaceful manner.
Aggressive	Offensive behaviors communicating an intent to cause injury or engage in physical combat. <ul style="list-style-type: none">- Can be scored when the cat’s status is solitary or social.
Agonistic	Hostile behaviors associated with the confrontation of two or more individuals. <ul style="list-style-type: none">- Can include both offensive and defensive behaviors.- Can only be scored when the cat’s status is social.
Calm	Tranquil behaviors that may indicate that the cat is comfortable and relaxed.
Exploratory	Investigative behaviors associated with the cat’s general interest in its environment or with a specific stimulus. <ul style="list-style-type: none">- May be useful for studies involving enrichment implementation.
Fear	Anxious behaviors associated with uneasiness or uncertainty of the cat’s environment or of a specific stimulus. <ul style="list-style-type: none">- Can include submissive behaviors.
Feeding	Any behavior associated with the acquisition and ingestion of food.
Inactive	Behaviors in which the cat is at rest and stationary or performing minimal movements.
Locomotion	Behaviors that enable the directional movement from one location to another.
Maintenance	Behaviors associated with the physiological requirements of the cat. <ul style="list-style-type: none">- For example: urinate, defecate, eat, drink
Marking	Communicative behaviors that result in a physical change to the cat’s environment. <ul style="list-style-type: none">- Most often, these behaviors involve olfactory or visual signals.
Reproductive	Sexual behaviors associated with mating and reproduction.

Stereotypic	Repetitive, unchanging behaviors with no apparent goal or function. - Animal must perform a behavior two or more times in succession for it to be considered stereotypic.
Vocalization	Sounds and/or calls produced by the cat using its vocal apparatus.

Table 5. Base behaviors that fall within each behavioral category.

Active	Affiliative	Aggressive	Agonistic	Calm	Exploratory	Fear
Carry	Anogenital Sniff	Attack	Approach	Ears Erect	Chew	Avoid
Clawing	Follow	Bare Teeth	Arch Back	Groom	Dig	Crouch
Crouch	Gurgle*	Bite	Avoid*	Kneading	Drag	Ears Back
Defecate	Head Butt*	Charge	Bare Teeth*	Lying*	Ears Erect	Excess Salivation
Drag	Huddling*	Chase	Bite	Purr	Ears Forward	Flee
Drink	Lick	Crouch	Chase	Scratching	Explore	Flinch*
Ears Erect (alert)	Nuzzle	Cuff	Cuff	Sitting	Flehmen	Freeze *
Ears Forward (alert)	Play	Ears Back*	Displace	Stretching	Investigate	Groom
Eat	Prusten*	Ears Flat	Ears Back	Yawn*	Lick	Head Shake
Explore	Puff*	Fight	Fight		Manipulate object	Hiding
Fight	Play Roll on Back*	Ground Slap *	Flee		Paw	Hiss
Forage	Sniff Nose	Growl	Ground Slap *		Rear*	Retreat
Groom	Social Groom/Allogroom	Kill Bite *	Growl		Sniff (all types)	Tail Under
Hunt	Social Roll	Piloerection	Hiss		Watch *	Trembling
Investigate (all types)	Social Rub/Allorub	Pounce	Piloerection*			
Locomotion (all types)	Social Sniff	Rake *	Raise Paw *			
Play	Stutter*	Rear*	Retreat			
Rear	Tail Up *	Snarl	Roll on Back			
Roll (Solitary)	Touch Noses	Spit	Snap bite			
Rub (object)		Strike At	Snarl			
Scratching		Tail Slap*	Social Stare			
Sniff (all types)		Tail Swish	Strike At *			
Allogroom		Tail Twitch	Tail Over			
Standing		Threaten	Tail Under			
Stretching		Yawn *	Yowl			
Urinate						
Vocalize						
Wrestle						

Feeding	Inactive	Locomotion	Maintenance	Marking	Reproductive	Stereotypic	Vocalizations
Bite	Groom	Approach	Defecate	Clawing	Allogroom*	Fur-plucking	Caterwaul
Carry	Lying	Chase	Drink	Defecate	Anogenital Groom*	Head-rolling *	Chatter
Chase	Sitting	Climb	Eat	Hind Feet scraping	Caterwaul*	Pacing	Chirp
Chew	Sleeping	Flee	Groom	Solitary Roll	Cheek Rub*	Self-biting	Copulatory Cry
Drag	Standing	Flirting Run *	Clawing	Rub (object)	Clawing*	Self-mutilation*	Growl
Drink	Stretching	Follow	Urinate	Urine Spray	Copulation		Grunt
Eat		Jumping		Urine Walk*	Copulatory Cry*		Gurgle
Forage *		Pacing			Flirting Run *		Hiss
Hunt *		Patrol*			Flehmen*		Mew
Kill Bite		Retreat*			Intromission		Prusten/Chuff
Lick		Running			Lordosis*		Puff
Nursing		Stalk*			Mount		Purr
Pounce		Swimming*			Nape Bite		Roar
Sniff		Trotting			Pelvic Thrust		Snarl
Stalk		Walking			Social Roll*		Spit
Vomiting *					Stutter*		Stutter
					Treading		Wah-wah
					Urine Spray*		Yowl
					Yowl*		

*Behaviors that the authors have placed in categories based on the general felid literature.