The Evolutionary Journey of Methow Wildlife

by Dana Visalli

The animals that populate the Methow Valley reflect to a surprising degree the long evolutionary history of animal life in North America and on the planet as a whole. It is as if we are living in science lab devoted to the study of evolution. For example, the lampreys in our river system are considered to be the oldest fish on the planet. In fact they are so old they lack bones, jaws and scales--they are barely a fish at all. A 360 year-old fossil lamprey was recently found in South Africa, and it differs hardly at all from a modern lamprey, because this taxonomic group has changed little over the intervening vast period of time.

Coyote pups at Pipestone Canyon--one of 72 mammal species that have traveled the long, winding evolutionary road to the Methow.

Another old-timer in the Methow is the mountain beaver (which is not a beaver), a large rodent that lives in the montane forest throughout the watershed, although it is nocturnal and rarely seen. It is thought to be the most primitive rodent on earth, with poorly developed teeth and weak jaw musculature.

And among our amphibians, both the spadefoot toad and tailed frog are considered to be examples archaic living anurans (the amphibians lacking true tails). At the same time of course we have numerous representatives of recent evolution. For example most of our avian species pairs like common and Barrow's goldeneyes, downy and hairy woodpeckers, and mountain and western bluebirds evolved during the last two million years, in the course of the glacial advances. The evolutionary story is woven into the fabric of wildlife in the Methow.

The biological trail winds all the way back to single-celled organisms, which were of course invisible and therefore unknown to humans through most of our own long history. The Dutchman Anton Leeuwenhoek was the first human to view the tiny cells known as prokaryotes, or bacteria, in 1676, because he had been able to build a simple microscope. He called them 'animalcules', or little animals. This fired up the imagination of others so much that another researcher, Nicolaus Hartsoecker, was convinced he saw 'tiny preformed men' in sperm cells. He called the little beings 'homuncules' and for some time many people believed that all humans—indeed all creatures—were simply vast, inflated versions of tiny but complete beings.

After the emergence of 'animalcules' and other 'little beings,' there were several other critical evolutionary steps before wildlife started arriving in the Methow. One important one was the evolution of cells with nuclei—a sort of cellular central command post. Bacteria, which are composed of cells known as prokaryotes (from Greek, translating 'before the seed'), do not have a nucleus. The other four kingdoms of life—animals, plants, fungi and protists—are all composed of much larger cells than bacteria, cells

Some of the 'homuncules' seen by Nicholus Hartsoecker in the 1600s, here resting in the eye of a needle.

Pacific lamprey, the world's oldest and most primitive fish, inhabits the Methow River. They lack bones, true fins, and jaws.

that all do have a nucleus. These cells are called eukaryotes ('true seed'). The favored theory for how eukaryotes arose is the failed attempt of one prokaryote to engulf and digest another. Apparently the two cells, one now inside the other, began to work together in a symbiotic ('life together') relationship.

A related evolutionary advance was the emergence of multicellular organisms. This is not a trivial proposition; a large whale can be made up of as many 100 quadrillion cells (100,000,000,000,000,000), all of which work together, and none of which could survive alone, or make another whale. It is not known how multicellular life arose, but plant and animal life typically begin as a single cell (a fertilized egg), so the evolutionary process is reiterated frequently.

Small steps towards multicellularity can be observed in nature, such as in simple animals called sponges, in which every cell in a sponge retains the ability to form a new creature. Once multicellularity did emerge, it flourished and diversified, resulting in the case of the Animal Kingdom in 36 distinct phyla ('tribes') of creatures, from worms to wombats.

All early life was in the oceans, and by 400 million years ago fish had become dominant in those seas. The most primitive Class of fish is the Agnatha ('without jaws'), which includes lamprey and hagfish. They are the 'oldest' fish on the planet, appearing in the fossil record in the Cambrian Period, 550 million years ago. They not only lack jaws, but also lack bones, scales, true fins and a stomach.

As fate would have it we have a lamprey species in the Methow, called the Pacific lamprey. It spends most of its life , four to seven years, in a larval form known as an ammocoete (from Greek words meaning 'to lie in bed'). These larvae live in accumulated piles of organic debris in the backwaters of mountain rivers. Here they survive as filter-feeders, taking in fine organic matter through their mouth, and filtering out consumable material such as bacteria and diatoms at the gill slits. At this stage they are only 2-5 inches long.

When they have had enough of living in debris, they migrate to the ocean, where they become parasites. They develop rasping and sucking mouthparts, which they then use to attach to fish and extract body fluids. After one or two years in the ocean, during which time they can grow to thirty inches in length, they return to clear streams (although not necessarily their natal stream) to spawn. Females may lay as many as 100,000 eggs, after which they die. In spite of their exceptional durability, lamprey numbers have plummeted in the Methow in recent years and are approaching zero.

There is a total of 26 species fish in the Methow; all the rest of them have real jaws, unlike lamprey. Each species utilizes a different portion of the available aquatic environment, from fast-moving, cold-water mountain streams to seasonally warm ponds and lakes. Among them are five species of salmon. Before their decline over the past 150 years, 16 million salmon migrated up the Columbia River in an average year, carrying millions of tons of ocean nutrients back upstream and uphill from the sea to the mountains. This amounted to a sort of anti-gravity machine that enhanced

Pacific salmon die after spawning, and the enormous quantity of ocean nutrients in their bodies serve to fertilize the nutrient-poor uplands.

A tiger salamander, one of seven species of amphibians in the Methow.

the fertility and carrying capacity of the glacier-scoured, nutrient-poor uplands.

In the Devonian Period (410-360 million years ago), two groups of fish were numerous, the 'ray-finned fish' and the 'fleshy-finned fish.' The latter group was less adept at swimming, because their fins were fleshy, but they could support themselves on these appendages. When in shallow water they could clamber up onto dry land for short periods. Their air sac, which had originally evolved in fish as a floatation and stabilization device, over time developed into lungs.

A few of these fleshy-finned fish survive today as lungfish in Australia, Africa and South America. They live in areas subject to severe drought, and some can even survive conditions where the water they live in dries out completely; the lungfish remain encased in mud and estivate. These fish breathe with lungs, and while they have gills, the gills are too atrophied to be functional. The shift from an aquatic to a terrestrial creature is evident in this group.

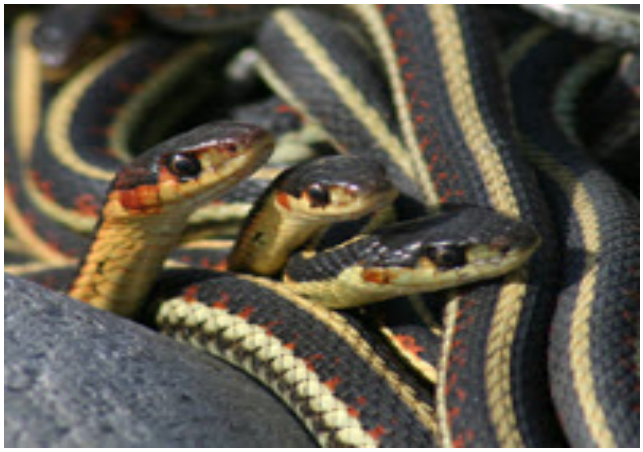
If all life up to the Devonian Period lived in the sea, there would be an obvious advantage to being able to spend increasing amounts of time near the water's edge or out of the water—there would be no predators. There are however a few serious problems with spending time on land. One is that it is an extremely desiccating (drying) environment. Terrestrial organisms are composed of about 65% water, so retaining it is critical to survival. Other problems with life on land include the greatly increased impact of gravity compared to an aquatic environment, obtaining oxygen from dry air, disposing of metabolic toxins (emitted as a liquid in aquatic organisms), bringing together male and female gametes in reproduction, keeping eggs moist, and finding food.

One possible evolutionary step towards living on land would be to in a sense live 'two lives,' existing out of the water when possible but returning when necessary, such as to lay eggs. As it happens the meaning of the word 'amphibian' translated from the Greek is 'both lives,' and indeed most amphibians live both in and out of water.

Amphibians are generally unable to retain moisture in dry conditions, so on land they usually reside in damp environments. They obtain oxygen on land both by gills and by absorbing it through their skin. They resolve reproductive problems by returning to water to mate and lay their eggs. The Methow's seven species of amphibians all live part of their adult lives on land, but all of them must return to water to reproduce.

The first amphibians appear in the fossil record about 370 million years ago (at the end of the Devonian Period). They could colonize new habitats at the water's edge, but they could not penetrate the vast inland areas of dry habitat.

Amphibians are carnivores as adults, and they would not have colonized land if there were not animal nutrients available. But in fact insects and other arthropods preceded them onto land. Insects were pre-adapted to life on land. Being small, gravity had little affect on them, and being covered by a tough exoskeleton made of chitin prevented water loss. The first insects to venture onto land would have arrived to eat plants—which of course make their own food via photosynthesis. Plants had emerged on land 450 million



Valley garter snakes, one of two species of garter snakes in the Methow.

years ago, and insects followed by about 400 million years ago.

It would be fascinating to know how many species of ants, bees, wasps, beetles, flies, moths, dragonflies, grasshoppers, crickets, caddisflies, mayflies, and stoneflies there are in the Methow, but experts able to identify such creatures are rare. As a place to start with the observation of insects, there is a key to Washington and Methow bumblebees available at the *Methow Naturalist* web site, and a list of the Methow's butterflies.

Meanwhile vertebrates had evolved characteristics that allowed them stand on their limbs (legs instead of fins) and obtain oxygen from the air (lungs instead of gills, in fact most amphibians have gills when they are young and lungs when the grow to adulthood). But they were confined (and still are) to the water's edge because water loss through their skin is high, and their eggs need to be laid in water. With the uplands of entire continents devoid of vertebrate life because their relative aridity, over time natural selection fashioned the characteristics that made life away from water possible. Some groups of amphibians drifted genetically towards scaly skin, which retarded moisture loss, and a leathery egg shell, which allowed eggs to retain moisture and therefore could be laid on land. This new class of organisms arose about 300 million years ago; we call them reptiles (which means 'crawling' or 'creeping').

Reptiles became the dominant animals on land, including the Age of Dinosaurs 150 million to 65 million years ago. The dinosaurs went extinct 65 million years ago, probably because of a very dramatic asteroid strike that ejected so much dust and smoke into the atmosphere that photosynthesis almost ceased for a period of months or years, and ecosystems collapsed. All large terrestrial reptiles perished, but smaller ones lived on in the form of both modern reptiles and as today's birds. Presently there are 8000 species of reptiles in the world, with eleven species in the Methow. One of them, our painted turtle, effects a role reversal with amphibians; it lives in the water but comes to shore to lay its eggs.

There are some obvious similarities between modern lizards and modern birds. Both lay eggs, both have scales (birds have scales on their feet, and feathers are produced by the same tissue as scales), and both have large orbit (eye openings in the skull) and two holes behind the skull (a signature characteristic of a particular line of reptiles and dinosaurs before them). It was first suggested that birds had evolved from reptiles in general and dinosaurs in particular in 1862, soon after the famous 'oldest bird' fossil, called Archaeopteryx was found in Germany. The idea was largely dismissed until the 1990s, when non-avian feathered dinosaur fossils were discovered in China. At present 34 dinosaur species have been found with feathers, and it is generally accepted that the world's 10,000 bird species, including the Methow's 265 species, are all descendants of a particular line of dinosaurs .

It is interesting to ponder how we can have 265 species of birds in this one small valley, when there is an ecological rule that two species cannot occupy the exact same habitat or niche (niche is a somewhat more all-encompassing word than habitat, as it includes all aspects of an individual or species, including behavior, seasonality, etc). It follows that if there are 265 bird species in the Methow, there must be 265 different niches.

A survey of any the Methow's various groups of birds would illustrate how birds partition available habitat. For example there are seven species of 'diving ducks' in the Methow, birds capable of swimming under water to procure food. Six of the seven species are species pairs: the bufflehead and hooded merganser (which have been known to hybridize), common and Barrow's goldeneyes, and common and red-breasted mergansers. In all three cases, the first bird of each pair nests north of the second bird, so the habitat is partitioned by season. The first pair of birds listed above utilizes ponds. The second and third pairs utilize similar habitat but eat different prey types. Harlequin ducks are the only one of the seven species to regularly feed on the bottom of riffles and rapids.

Anyone who doubts that mammals evolved from reptiles needs to spend some time with the duck-billed platypus, a mammal common in Australia. The platypus has fur and gives milk like a proper mammal, although it has no nipples, so milk is simply released through pores and lapped up by the young. But as is the case with reptiles, it reproduces by laying eggs, and has only a single opening for reproduction, urination and defe-

cation, called a cloaca (platypuses are in the Subclass Monotreme, which means 'one opening'). These traits are shared with reptiles and birds, but not other mammals. In further resemblance to birds, it has a bill and webbed feet much like a duck. It has a reptilian gait, with legs that are on the side of the body, lizard-like, rather than underneath. And, the platypus is ancient, a 'living fossil.' Fossils 110 million years old have been found that look very much like today's platypus.

There are three subclasses of mammals: Monotremes, Marsupials ('pouched'), and Placentals (from the Greek for 'flat' or 'cake'). Monotremes evolved in Australia, where the five extant species live today. Marsupials appear to have evolved in East Asia before the super-continent Pangaea split up, but became dominant only in Australia because the few placental mammals present there died out 55 million years ago. The earliest placental mammals also appear in China, 160 million years ago, and over time they became the dominant mammals in Eurasia and the Americas.

There are 72 mammals known to exist in the Methow, all of them placental mammals. They range in size from small (the masked shrew weighs as little as 1/16th of an ounce) to large (moose can weigh over 1100 pounds), and in habitat from semi-aquatic (muskrats can stay submerged for up to 15 minutes) to aerial (the Methow has 13 species of bats).

Wildlife populations are constantly shifting, and the species present in the Methow today are not necessarily the same ones that were here prior to the last glacial advance, 18,000-13,000 years ago. In fact there was a remarkable die-off of at least fifty large mammals throughout North America between 13,000 and 10,000 years ago. Many of those now-extinct species are known from Washington and would certainly have inhabited the Methow in the not-too-distant past.

That die-off was extreme enough to induce Charles Darwin to write in 1839, "It is impossible to reflect on the state of the American continent without astonishment. Formerly it must have swarmed with great monsters; now we find mere pygmies compared with the antecedent races."

The list of extinctions includes mammoths, mastodons, the Mexican horse, four horse species, the western camel, a llama, two genera of deer, two genera of pronghorn, the long-horned bison, woodland musk-ox, the shrub-ox and stag moose, a giant beaver (the size of a black bear), the Shasta ground sloth, and, among the carnivores, the dire wolf, sabertooth cat, scimitar cat, American lion, American cheetah, and the giant short faced bear (which was as big as a moose).

In the Americas, most of the potential large domesticates, such as horses and camels, were driven to extinction, mostly by being killed and eaten by humans. Thus when agrarian civilizations developed on these continents they had no draft animals. (Horses evolved in North America; they had migrated across the Bering Land Bridge long before they went extinct in North America, which was only about 10,000 years ago; they returned to North America post-extinction in 1519 with Hernan Cortez). Surprisingly, many of the large mammal species that we think of as characterizing North American wilderness today only arrived from Siberia by traversing the Bering Land Bridge during the last glacial advance. These species include moose, elk, grizzly bears, and our modern species of bison.

Studies of geology, botany and zoology all indicate that the earth and life upon it are in constant flux. The Roman Marcus Aurelius must have been aware of this fact when he wrote, in 150 AD, "Time is a river of passing events, and strong is its current. No sooner is a thing brought into sight than it is swept by and another takes its place, and this too will be swept along."

Birds of the Methow Watershed

Methow Naturalist/www.methownaturalist.com- Year 2014 List

#	Ab	Common Name	Scientific Name
1	2	Common Loon	Gavia immer
2	2	Horned Grebe	Podiceps auritus
3	2	Eared Grebe	Podiceps nigricollis
4	2	Red-necked Grebe	Podiceps grisegena
5	2	Pied Billed Grebe	Podilymbus podiceps
6	2	Western Grebe	Aechmophorus occidentalis
7	5	Clark's Grebe	Aechmorphorus clarkii
8	5	American White Pelican	Pelecanus erythrorhynchos
9	5	Double-crested Cormorant	Phalacrocorax auritus
10	1	Great Blue Heron	Ardea herodias
11	5	Great Egret	Ardea alba
12	5	Cattle Egret	Bubulcus ibis
13	5	Black-crowned Night Heron	Nycticorax nucticorax
14	4	Tundra Swan	Cygnus columbianus
15	4	Trumpeter Swan	Cygnus buccinator
16	5	Greater White-fronted Goose	Anser albifrons
17	4	Snow Goose	Chen caerulescens
18	1	Canada Goose	Branta canadensis
19	5	Cackling Goose	Branta hutchnisii
20	1	Wood Duck	Aix sponsa
21	1	Mallard	Anas platyrhnchos
22	2	Northern Pintail	Anas acuta
23	1	Gadwall	Anas strepera
24	1	American Widgeon	Anas americana
25	5	Eurasian Widgeon	Anas penelope
26	1	Northern Shoveler	Anas clypeata
27	2	Blue-winged Teal	Anas discors
28	1	Cinnamon Teal	Anas cyanoptera
29	1	Green-winged Teal	Anas crecca
30	1	Ring-necked Duck	Aythya collaris
31	1	Greater Scaup	Aythya marila
32	1	Lesser Scaup	Aythya marila
33	5	Tufted Duck	Aythya fuligula
34	2	Canvasback	Aythya valisineria
35	1	Redhead	Aythya americana
36	2	Harlequin Duck	Histrionicus histrionicus
37	5	Surf Scoter	Melanitta perspicillata
38	5	White-winged Scoter	Melanitta fusca
39	1	Common Goldeneye	Bucephala clangula
40	1	Barrow's Goldeneye	Bucephala islandica
41	1	Bufflehead	Bucephala albeola
42	1	Common Merganser	Mergus merganser
43	5	Red-breasted Merganser	Mergus serrator
44	1	Hooded Merganser	Lophodytes cucullatus
45	1	Ruddy Duck	Oxyura jamaicensis
46	1	Turkey Vulture	Cathartes aura
47	1	Northern Harrier	Circus cyaneus
48	5	White-tailed Kite	Elanus leucurus
49	2	Cooper's Hawk	Accipiter cooperii
50	1	Northern Goshawk	Accipiter gentilis
51	1	Sharp-shinned Hawk	Accipiter striatus
52	5	Broad-winged Hawk	Buteo platypterus
53	1	Red-tailed Hawk	Buteo jamacensis
54	5	Swainson's Hawk	Buteo swainsoni
55	5	Ferruginous Hawk	Buteo regalis
56	2	Rough-legged Hawk	Buteo lagopus
57	2	Osprey	Pandion haliaetus
58	2	Golden Eagle	Aquila chrysaetos
59	1	Bald Eagle	Haliaeetus leucocephalus
60	1	American Kestrel	Falco sparverius
61	4	Prairie Falcon	Falco mexicanus
62	4	Peregrine Falcon	Falco peregrinus
63	3	Merlin	Falco columbarius
64	5	Gyrfalcon	Falco rusticolus
65	2	Ring-necked Pheasant	Ring-necked Pheasant
66	2	Gray Partridge	Perdix perdix
67	1	Chukar	Alectoris chukar
68	1	Ruffed Grouse	Bonasa umbellus
69	1	Dusky (Blue) Grouse	Dendragapus obscurus
70	1	Spruce Grouse	Falcipennis canadensis
71	3	White-tailed Ptarmigan	Lagopus leucurus
72	3	Wild Turkey	Meleagris gallopavo
73	1	California Quail	Callipepla californica
74	2	Virginia Rail	Rallus limicola
75	1	Sora	Porzana carolina
76	1	American Coot	Fulica americana
77	2	Sandhill Crane	Grus canadensis
78	5	Black-bellied Plover	Pluvialis squatarola
79	5	American Golden Plover	Pluvialis dominica
80	5	Semi-plamated Plover	Charadrius semiplamatus
81	1	Killdeer	Charadrius vociferous
82	5	American Avocet	Recurvirostra americana
83	4	Greater Yellowlegs	Tringa melanoleuca
84	4	Lesser Yellowlegs	Tringa flavipes
85	4	Solitary Sandpiper	Tringa solitaria
86	1	Spotted Sandpiper	Actitis macularia
87	4	Long-billed Curlew	Numenius americanus
88	5	Western Sandpiper	Calidris mauri
89	4	Least Sandpiper	Calidris minutilla
90	5	Dunlin	Calidris alpina
91	5	Baird's Sandpiper	Calidris bairdii
92	5	Semipalmated Sandpiper	Calidris pusilla
93	5	Pectoral Sandpiper	Calidris melanotos
94	5	Stilt Sandpiper	Calidris himantopus
95	4	Long-billed Dowitcher	Limnodromus scolopaceus
96	5	Short-billed Dowitcher	Limnodromus griseus
97	1	Wilson's Snipe	Gallinago delicata
98	4	Wilson's Phalarope	Phalaropus tricolor
99	4	Red-necked Phalarope	Phalaropus lobatus
100	5	Parasitic Jaeger	Stercorarius parasiticus
101	5	Sabine's Gull	Xema sabini
102	4	Bonaparte's Gull	Larus philadelphia
103	1	Ring-billed Gull	Larus delawarensis
104	5	California Gull	Larus californicus
105	2	Herring Gull	Larus argentatus
106	5	Thayer's Gull	Larus thayeri
107	5	Glaucous-winged Gull	Larus glaucescens
108	3	Black Tern	Chlidonias niger
109	4	Caspian Tern	Sterna caspia
110	5	Common Tern	Sterna hirundo
111	5	Forster's Tern	Sterna dougalli
112	1	Rock Dove	Columba livia
113	4	Band-tailed Pigeon	Patagioenas fasciata
114	1	Mourning Dove	Zenaida macroura
115	5	Eurasian Collared Dove	Streptopelia decaocto
116	5	Barn Owl	Tyto alba
117	3	Long-eared Owl	Asio otus
118	3	Short-eared Owl	Asio flammeus
119	2	Flammulated Owl	Otus flammeolus
120	2	Western Screech Owl	Megascops kennicotti
121	5	Northern Hawk-owl	Surnia ulula
122	1	Great Horned Owl	Bubo virginianus
123	5	Snowy Owl	Bubo scandiacus
124	5	Great Gray Owl	Strix nebulosa
125	4	Spotted Owl	Strix occidentalis
126	2	Barred Owl	Strix varia
127	2	Northern Pygmy-owl	Glaucidium californicum
128	5	Burrowing Owl	Athene cunicularia
129	3	Boreal Owl	Aegolius funereus
130	1	Northern Saw-whet Owl	Aegolius acadicus
131	1	Common Nighthawk	Chordeiles minor
132	2	Common Poorwill	Phalaenoptilus nuttallii
133	1	Belted Kingfisher	Ceryle alcyon
134	2	White-throated Swift	Aeronautes saxatalis
135	2	Black Swift	Cypseloides niger
136	2	Vaux's Swift	Chaetura vauxi

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#	Ab	Common Name	Scientific Name
137	1	Northern Flicker	Colaptes auratus
138	1	Lewis' Woodpecker	Melanerpes lewis
139	1	Downy Woodpecker	Picoides pubescens
140	1	Hairy Woodpecker	Picoides villosus
141	2	White-headed Woodpecker	Picoides albolarvatus
142	2	Three-toed Woodpecker	Picoides tridactylus
143	2	Black-backed Woodpecker	Picoides arctus
144	1	Pileated Woodpecker	Dryocopus pileatus
145	2	Williamson's Sapsucker	Sphyrapicus thyroideus
146	5	Red-breasted Sapsucker	Sphyrapicus ruber
147	1	Red-naped Sapsucker	Sphyrapicus nuchalis
148	1	Olive-sided Flycatcher	Contopus cooperi
149	1	Western Wood Pewee	Contopus sordidulus
150	3	Willow Flycatcher	Empidonax traillii
151	5	Least Flycatcher	Empidonax minimus
152	1	Dusky Flycatcher	Empidonax oberholseri
153	1	Hammond's Flycatcher	Empidonax hammondii
154	3	Gray Flycatcher	Empidonax wrightii
155	2	Pacific Slope Flycatcher	Empidonax dificillis
156	1	Say's Phoebe	Sayornis saya
157	1	Western Kingbird	Tyrannus verticalis
158	1	Eastern Kingbird	Tyrannus tyrannus
159	2	Northern Shrike	Lanius excubitor
160	2	Loggerhead Shrike	Lanius ludovicianus
161	1	Cassin's Vireo	Vireo cassinii
162	1	Warbling Vireo	Vireo gilvus
163	2	Red-eyed Vireo	Vireo olivaceus
164	1	Steller's Jay	Cyanocitta stelleri
165	5	Blue Jay	Cyanocitta cristata
166	5	Western Scrub Jay	Aphelocoma californica
167	1	Gray Jay	Perisoreus canadensis
168	1	Clark's Nutcracker	Nucifraga columbiana
169	1	Black-billed Magpie	Pica hudsonia
170	1	American Crow	Corvus brachyrhyncos
171	1	Common Raven	Corvus corax
172	2	Horned Lark	Eremophila alpestris
173	1	Tree Swallow	Tachycineta bicolor
174	1	Violet-green Swallow	Tachycineta thalassina
175	1	Northern Rough-winged Sw	Stelgidopteryx serripennis
176	1	Bank Swallow	Riparia riparia
177	1	Barn Swallow	Hirundo rustica
178	1	Cliff Swallow	Petrochelidon pyrrhonota
179	1	Black-capped Chickadee	Poecile atricapilla
180	1	Mountain Chickadee	Poecile gambeli
181	4	Chestnut-backed Chickadee	Poecile rufescens
182	3	Boreal Chickadee	Poecile hudsonica
183	1	White-breasted Nuthatch	Sitta carolinensis
184	1	Red-breasted Nuthatch	Sitta canadensis
185	2	Pygmy Nuthatch	Sitta pygmaea
186	2	Brown Creeper	Certhia americana
187	5	Marsh Wren	Cistothorus palustris
188	2	Black-chinned Hummingbird	Archilochus alexandri
189	5	Anna's Hummingbird	Calypte anna
190	1	Calliope Hummingbird	Stellula calliope
191	1	Rufous Hummingbird	Selasphorus rufus
192	5	Bewick's Wren	Thryomanes bewickii
193	1	House Wren	Troglodytes aedon
194	1	Winter Wren	Troglodytes troglodytes
195	2	Rock Wren	Salpinctes obsoletus
196	2	Canyon Wren	Catherpes mexicanus
197	1	American Dipper	Cinclus mexicanus
198	1	Golden-crowned Kinglet	Regulus satrapa
199	1	Ruby-crowned Kinglet	Regulus calendula
200	1	Mountain Bluebird	Sialia currucoides
201	1	Western Bluebird	Sialia mexicana
202	1	Townsend's Solitaire	Myadestes townsendi
203	2	Varied Thrush	Ixoreus naevius
204	1	American Robin	Turdus migratorius
205	1	Veery	Catharus fuscescens
206	1	Swainson's Thrush	Catharus ustulatus
207	1	Hermit Thrush	Catharus guttatus
208	2	Gray Catbird	Dumetella carolinensis
209	2	American Pipit	Anthus spinoletta
210	1	Bohemian Waxwing	Bombycilla garrulus
211	1	Cedar Waxwing	Bombycilla cedrorum
212	1	European Starling	Sturnus vulgaris
213	2	Orange-crowned Warbler	Vermivora celata
214	1	Nashville Warbler	Vermivora ruficapilla
215	1	Yellow Warbler	Dendroica petechia
216	1	Townsend's Warbler	Dendroica townsendi
217	5	Magnolia Warbler	Dendroica magnolia
218	5	Black-throated Gray Warbler	Dendroica nigrescens
219	1	Yellow-rumped Warbler	Dendroica coronata
220	5	Hermit Warbler	Dendroica occidentalis
221	5	Yellow-throated Warbler	Dendroica dominica
222	4	American Redstart	Setophaga ruticilla
223	5	Northern Waterthrush	Seiurus noveboracensis
224	1	MacGillivray's Warbler	Oporornis tolmiei
225	5	Common Yellowthroat	Geothlypis trichas
226	1	Wilson's Warbler	Wilsonia pusilla
227	3	Yellow-breasted Chat	Icteria virens
228	1	Western Tanager	Piranga ludoviciana
229	2	Lazuli Bunting	Passerina amoena
230	5	Indigo Bunting	Passerina cyanea
231	1	Black-headed Grosbeak	Pheucticus melanocephalus
232	5	Rose-breasted Grosbeak	Pheucticus ludovicianus
233	1	Spotted (Rufous-s) Towhee	Pipilo maculates
234	2	Chipping Sparrow	Spizella passarina
235	5	Clay-colored Sparrow	Spizella pallida
236	1	Brewer's Sparrow	Spizella breweri
237	3	American Tree Sparrow	Spizella arborea
238	1	Vesper Sparrow	Pooecetes gramineus
239	4	Lark Sparrow	Chondestes grammacus
240	2	Savannah Sparrow	Passerculus sandwichensis
241	2	Fox Sparrow	Passerella iliaca
242	1	Song Sparrow	Melospiza melodia
243	2	Lincoln's Sparrow	Melospiza lincolnii
244	1	Dark-eyed Junco	Junco hyemalis
245	5	Harris Sparrow	Zonotrichia querula
246	1	White-crowned Sparrow	Zonotrichia leucophrys
247	2	Golden-crowned Sparrow	Zonotrichia atricapilla
248	5	White-throated Sparrow	Zonotrichia albicollis
249	4	Lapland Longspur	Calcarius lapponicus
250	3	Snow Bunting	Plectrophenax nivalis
251	1	Bullock's Oriole	Icterus bullockii
252	1	Western Meadowlark	Sturnella neglecta
253	5	Bobolink	Dolichonyx oryzivorus
254	1	Red-winged Blackbird	Agelaius phoeniceus
255	1	Yellow-headed Blackbird	X. xanthochephalus
256	1	Brewer's Blackbird	Euphagus cyanocephalus
257	1	Brown-headed Cowbird	Molothrus ater
258	2	Gray-crowned Rosy Finch	Leucosticte tephrocotis
259	1	Red Crossbill	Loxia curvirostra
260	4	White-winged Crossbill	Loxia leucoptera
261	1	Evening Grosbeak	Coccothraustes vespertinus
262	1	House Finch	Carpodacus mexicanus
263	1	Purple Finch	Carpodacus prupureus
264	1	Cassin's Finch	Carpodacus cassinii
265	1	American Goldfinch	Carduelis tristis
266	1	Pine Siskin	Carduelis pinus
267	5	Hoary Redpoll	Carduelis hornemanni
268	3	Common Redpoll	Carduelis flammea
269	2	Pine Grosbeak	Pinicola enucleator
270	1	House Sparrow	Passer domesticus

Compiled by Dana Visalli/The Methow Biodiversity Project, with advice from Victor & Libby, Dave Chantler & Kent Woodruff PO Box 175, Winthrop, WA 98862, dana@methownet.com, www.methownaturalist.com

Mammals of the Methow Watershed

Known (72 species) and *Possible (5 species)-2014

The Methow Naturalist/www.methownaturalist.com/dana@methownet.com

Common Name	Scientific Name	Abundance in the Methow	Habitat
Shrews & Moles	**Insectivora**		
Masked Shrew	Sorex cinereus	common	Forests, ponderosa pine to subalpine fir
Montane (Dusky) Shrew	Sorex monticolus (obscurus)	unknown	Forests, Douglas fir to subalpine fir
Water Shrew	Sorex palustris	unknown	Cold, clear water with abundant cover
Vagrant Shrew	Sorex vagrans	common	Widespread, usually near water
Bats	**Chiroptera**		
California Myotis	Myotis californicus	common	Shrub-steppe and lower forests
Small-footed Myotis	Myotis ciliolabrum	common	Dry, open country
Long-eared Myotis	Myotis evotis	common	Wide-ranging, dry steppes to subalpine fir
Little Brown Bat	Myotis lucifugus	common	Wide-ranging, dry steppe to subalpine fir
Fringed Myotis	Myotis thysanodes	rare	Shrub-steppe to pondersoa pine
Long-legged Myotis	Myotis volans	common	Primarily montane coniferous forest
Yuma Myotis	Myotis yumanensis	common	Lower elevations, closely associated w water
*Northern Long-eared Myotis	Myotis septentrionalis	no records	Montane forests
Hoary Bat	Lasiurus cinereus	uncommon	Lower elevation dry forests
*Western Red Bat	Lasiurus blossevellii	no records	Riparian forests, orchards
Silver-haired Bat	Lasionycteris noctivagrans	uncommon	Forests, ponderosa pine to subalpine fir
Big Brown Bat	Eptesicus fuscus	common	Wide-ranging, shrub-steppe to subalpine fir
Spotted Bat	Euderma maculatum	rare	Shrub-steppe to pondersoa pine, near cliffs
Townsend's Big-eared Bat	Corynorhinus townsendii	uncommon	Shrub-steppe and lower elevation forests
Pallid Bat	Antrozous pallidus	common	Arid river canyons and cliffs, shrub-steppe
Pikas, Hares & Rabbits	**Lagomorpha**		
Pika	Ochotona princeps	common	Talus, rock or boulder slides down to 2000'
Snowshoe Hare	Lepus americanus	common	From sea level to subalpine in coniferous forests
Nuttall's (Mountain) Cottontail	Sylvilagus nuttallii	rare (1 record)	Sagebrush and lower elevation riparian thickets
Rodents	**Rodentia**		
Mountain Beaver	Aplodontia rufa	common	Upper elevation riparian areas
Hoary Marmot	Marmota caligata	common	Above timberline near rock slides & meadows
Yellow-bellied Marmot	Marmota flaviventris	common	Drylands (inc cult fields) up to 3000'
Columbian Ground Squirrel	Spermophilus columbianus	uncommon	From lowlands to alpine meadows in grasslands
Cascade Golden-mantled Gr Sq	Spermophilus saturatus	common	Ponderosa pine to subalpine fir coniferous forests near rock outcrops
Yellow-pine Chipmunk	Tamias amoenus	common	Open pine forest
*Townsend's Chipmunk	Tamias townsendii	unconfirmed	Upper elevation coniferous forest (in the Methow)
Western Gray Squirrel	Sciurus griseus	uncommon	Associated with oaks; ponderosa in the Methow
Chickaree (Douglas Squirrel)	Tamiasciurus douglasii	uncommon	Coniferous forests, mostly on the west side of crest
Red Squirrel	Tamiasciurus hudsonicus	common	Coniferous forests, only on the east side of crest
Northern Flying Squirrel	Glaucomys sabrinus	common	All coniferous forests; present in Seattle
Beaver	Castor canadensis	common	Along permanent streams and lakes with woody veg
Great Basin Pocket Mouse	Perognathus parvus	uncommon	Not confirmed in the Methow but widespread in the shrub-steppe
Northern Pocket Gopher	Thomonys talpoides	common	In open areas to 7000'; absent west of the crest
Bushy-tailed Wood Rat	Neotoma cinerea	common	Ubiquitous, from sea level to alpine zone
Forest Deer Mouse	Peromyscus keeni (oreas)	rare	Dominant deer mouse in alpine zone of Cascades
Deer Mouse	Peromyscus maniculatus	common	Occurs in almost all terrestrial habitats in the state

Gapper's Red-backed Vole	Clethrionomys gapperi	uncommon	Coniferous forests from sea level to timberline
Long-tailed Vole	Microtus longicaudus	?	A wide variety of habitats from sea level to timberline
Montane Vole	Microtus montanus	rare	Riparian sagebrush to meadows below timberline
Meadow Vole	Microtus pennsylvanicus	common	Wet areas from lowlands to timberline on east slope
Richardson's Vole	Microtus richardsoni	rare	Along cold, clear streams in the Cascades down to 4000'
Muskrat	Ondatra zibethicus	common	In slow-moving water in every county in the state
Heather Vole	Phenacomys intermedius	rare	Most abundant in sub-alpine forests and moist meadows
Northern Bog Lemming	Synaptomys borealis	rare	In cold wet bogs at the edge of boreal forests
Western Jumping Mouse	Zapus princeps	rare	Sea level to alpine in forests, moist meadows and marshes
Pacific Jumping Mouse	Zapus trinotatus	rare	Nearly identical to *Z. princeps* but west of crest
Porcupine	Erethizon dorsatum	common	Widespread from sea level to tree line inc lush sagebrush
House Mouse	Mus musculus	common	Probably in every town and city in the state
Norway Rat	Rattus norvegicus	rare	Along marshes and streams near settlements.
Monkeys & Apes	**Primates**		
Human	Homo sapiens	common	Sea level to Montane forest, usually near water
Carnivores	**Carnivora**		
Coyote	Canis latrans	common	Common over most of state, absent on most islands
Gray Wolf	Canis lupus	rare	First pack in state in 40 years appeared in the Methow in 2008
Red Fox	Vulpes vulpes	rare	Indigenous but rare in the east Cascades
Black Bear	Ursus americanus	common	Lowland forest to subalpine parkland
*Grizzly Bear	Ursus arctos	extirpated	Vanishingly rare in the Methow
Raccoon	Procyon lotor	common	Occurs along nearly all bodies of water in state to 3000'
Marten	Martes americana	common	State-wide in forested mountainous areas
*Fisher	Martes pennanti	extirpated	Forests; extirpated from the state, reintroduced in the Olympics in 2008
Short-tailed Weasel	Mustela ermina	common	Sea level to alpine in forested areas
Long-tailed Weasel	Mustela frenata	common	Sea level through all life zones to into alpine zone
Mink	Mustela vison	common	Common throughout state near water
Wolverine	Gulo gulo	uncommon	Lower coniferous forests (winter) to alpine zone
Badger	Taxidea taxus	rare	In open habitats in eastern Washington
Striped Skunk	Mephitis mephitis	rare	Sea level to about 2000'; prefers open habitat
River Otter	Lutra canadensis	uncommon	Streams, lakes, ponds
Mountain Lion (Cougar)	Felis concolor	common	Sea level to timberline, absent in the interior steppe of WA
Lynx	Lynx canadensis	uncommon	In coniferous forest, 3000' to timberline
Bobcat	Lynx rufus	common	Throughout Washington, except the islands
Hoofed Animals	**Artiodactyla**		
Elk	Cervus elaphus	uncommon	Widespread in state from shrub-steppe to subapline
Mule Deer	Odocoileus hemionus	common	Throughout Washington including most islands
White-tailed Deer	Odocoileus virginianus	common	Riparian and mixed woodlands east of the crest
Moose	Alces alces	uncommon	Primarily seen along major watercourses in northern WA
Mountain Goat	Oreamnos americanus	uncommon	Rocky, mountainous terrain
Bighorn Sheep	Ovis canadensis	rare	Steep, rocky terrain adjacent to grasslands

Vertebrate Animal Species Known to Have Decreased in the Methow Watershed 1900-2012:

from *The Methow Naturalist*, Vol 3 #4, Winter 1998, updated 2012; Methow Biodiversity Project, PO Box 175, Winthrop, WA 98862

Species	Current Condition	Pre-settlement Condition	Cause of Decline
Fish			
Coho salmon	reintroduced	abundant	Overfishing; dams
Chinook salmon	common	abundant	Overfishing, dams
Steelhead	common	abundant	Overfishing, dams
Bull trout	uncommon	common	Overfishing, habitat loss, introduced species
Native cutthroat trout	uncommon	common	Overfishing, habitat loss, introduced subspecies
Native rainbow trout	uncommon	common	Overfishing, habitat loss, introduced subspecies
Reptiles			
Western rattlesnake	common	common	Feared, often killed
Birds			
Peregrine falcon	rare	rare	DDT
Cooper's hawk	uncommon	common	DDT, shooting
American kestrel	common	common	DDT & other pesticides
Sharptail grouse	extirpated	common	Habitat loss
Sage grouse	extirpated	rare	Habitat loss
Burrowing owl	extirpated	uncommon	Loss of grasslands, rodent control, pesticides
White-headed woodpecker	uncommon	common	Loss of old-growth ponderosa pine
Black-backed woodpecker	uncommon	uncommon	Suppression of forest fires
Lewis' woodpecker	common	common	
Western wood pewee	common	common	Sensitive to forest fragmentation
Olive-sided flycatcher	common	common	May be due to loss of tropical wintering habitat
Barn swallow	uncommon	common	Unknown
Rough-winged swallow	uncommon	common	Unknown
Western bluebird	common	common	Habitat loss (snags for nesting), introduced species (starlings)
Mountain bluebird	uncommon	common	Habitat loss (fire suppression: loss of snags for nesting, openings for feeding
Swainson's thrush	common	common	Habitat loss (riparian areas logged and grazed)
Mammals			
Pygmy rabbit	extirpated	uncommon	cats, habitat loss (prior presence reported by early ranchers)
Whitetailed jackrabbit	extirpated	common	Habitat loss, killed on high-speed roads
Hoary marmot	common	common	Possible competition with Columbia ground squirrels
Badger	uncommon	uncommon	First recent den reported in 2008, seen increasingly by 2012
Fisher	extirpated	rare	Habitat loss, trapping
Pine marten	common	common	Habitat loss, trapping
Striped skunk	uncommon	common	Winter kill
Bighorn sheep	reintroduced	uncommon	Disease transferred from domestic sheep
Mountain goat	uncommon	common	Warming trend over the last 13,000 years (e.g. used to extend to California)
Lynx	rare	uncommon	Habitat loss (fire suppression, loss of young conifers)
Grizzly bear	extirpated	rare	Human depredation
Wolf	rare	uncommon	Human depredation; a small pack from Canada appeared in the Methow in 2008

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