NECHAKO WHITE STURGEON
RECOVERY INITIATIVE

The Nechako Watershed

Nature Guide and Educational Resource

www.nechakowhitesturgeon.org

The Nechako Watershed
Nature Guide and Educational Resource

With a central focus on the endangered **Nechako white sturgeon**, this guide provides a comprehensive overview of the natural history of the **Nechako watershed**. Facts, concepts and key features are presented for habitats, animal, plant and invertebrate species that are commonly found in the Nechako watershed and that would be accessible to students and teachers through field trips or walking excursions from school. This nature guide is intended to encourage **outdoor exploration and education**, and inspire **inquiry based projects** for further learning by students.

This guide is geared toward high-school grade students, however it is still an informative guide for teachers of elementary classes. This guide is also a great complimentary resource to the **Nechako White Sturgeon Curriculum and Sturgeon School Kits**.

Note, there are references to specific locations in and near to Vanderhoof in this guide, as sturgeon research is focussed out of this community. However, sturgeon are found throughout the Nechako watershed, and the concepts and activities presented pertain to all areas of the watershed.

For more information on the topics covered in this guide, please contact the Nechako White Sturgeon Recovery Initiative Coordinator at info@nechakowhitesturgeon.org.

How to use this Guide

This guide is divided into colour-coded sections related to a particular big concept theme (eg. Woodlands). Within each theme, specific topics are presented (eg. Mammals in Woodlands). Within the text, some terms or concepts are **highlighted orange**. Definitions and links to further learning for these are provided on pages 40-41.

At the top of all the even numbered pages are suggestions for **field trips or hands-on activities** classes can do together, or students can do outside of school time, to further explore the region's natural history.

NECHAKO WHITE STURGEON

RECOVERY INITIATIVE

Key Concepts

This guide provides opportunities for students to learn about aspects of the Nechako watershed by placing them in their learning environment. By being hands-on and outdoors, students can develop a sense of self and connectedness to their community and the environment. This can lead to meaningful life-long learning.

Key Concepts include:

> the Nechako watershed, and many of the organisms present here today including humans and the Nechako white sturgeon, have been here over geological time. Understanding this history is important for moving forward.

> the Nechako watershed is a web of small and large rivers, lakes and wetlands connected on the landscape that culminate into the Nechako River.

> the Nechako watershed is home to a wide diversity of plant and animal species including humans that all interact on the landscape.

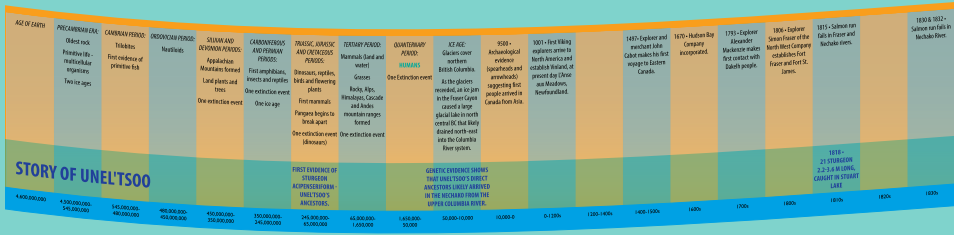
> human actions within the watershed have implications to land and water resources, as well as plant and animal behaviour and survival.

> Nechako white sturgeon are an endangered species within the Nechako watershed and as such are directly affected by changes to the watershed.

Reference to specific BC Curriculum Competencies can be found online at www.nechakowhitesturgeon.org/education.

Contents

Nechako Watershed



Timeline and History

During the last ice age 50,000-10,000 years ago, British Columbia was covered in ice one kilometre deep. When the ice receded it left in its wake new waterways across North America. **Dakelh** Elders tell the story of when the river flowed backwards - when the Stuart River flowed north instead of south into the Nechako River as it does today. These kinds of ancient water connections and pathways allowed fish species to move great distances between continents and over mountains. The white sturgeon likely made their way to the Nechako River from the **Upper Columbia River** over 10,000 years ago.

Rightly called a pre-historic species, white sturgeon *(Acipenser transmontanus)* ancestors lived during the time of the dinosaurs, 170-245 million years ago! Physically, not much has changed. Their large, flat cartilaginous body covered in sharp bony plates are features that developed a time long ago.

1913 • Salmon runs collapse due to rock slide in Fraser River caused from railway construction, negative affect on future salmon runs.

1914 • CPR railway completed. High immigration.

1916 • First bridge over Nechako River built.

1918 • PERMITS FOR STURGEON COMMERCIAL FISHING BEGAN

1910s

1920 • O.K. Cafe built.

1926 • Village of Vanderhoof established. Land clearing for housing, industry and agriculture expand.

1928 • First airplane lands in Vanderhoof.

1920 • UNEL'TSOO HATCHES!

1920s

1934 • Moose move into Nechako Valley and become main part of First Nation diet.

1930 • UNEL'TSOO IS 1 METRE LONG

1930s

1940 built o to a

1942 of Va

1948 over N

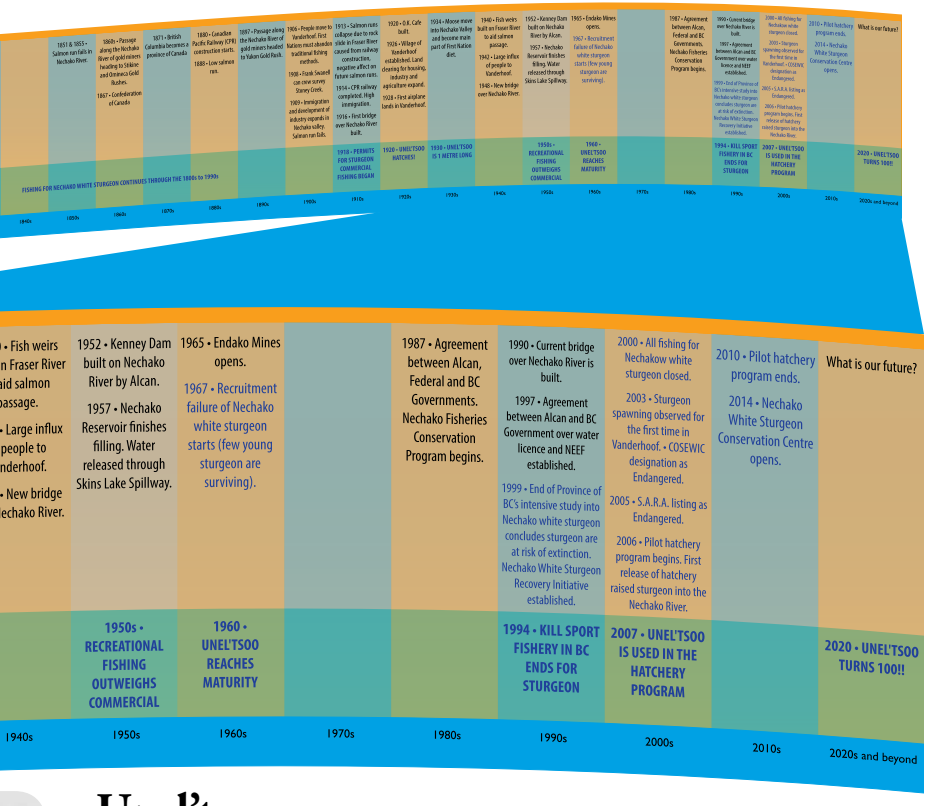
DID YOU KNOW?

Sturgeon were fished in the Nechako watershed, first by First Nations, and then more intensly by settlers. One record from the Hudson's Bay Company states 21 adult sturgeon were caught in one day (see 1818).

Sturgeon 1950s. *(Courtesy Jim Simonson)*

TRY THIS!

What is older than a sturgeon? Head over to the Nechako White Sturgeon Conservation Centre to take a closer look at the **timeline** shown below. The timeline starts at the beginning of the earth and tracks the amazing **story of sturgeon** over time. Where do you fit in the timeline, and what do you predict for the future of our watershed and the Nechako white sturgeon?



Unel'tsoo

Focussing in on the last 100 years, which is equivalent to the normal life span of a Nechako white sturgeon, we can follow the life of Unel'tsoo (Dakelh word for "Grandmother to All"). Staff working at the Nechako White Sturgeon Conservation Centre caught one of the largest and oldest sturgeon in recent years. That sturgeon they named Unel'tsoo. Based on her age, Unel'tsoo could have spawned up to 20 times in her life. That equates to upwards of 10,000,000 eggs! We know that **recruitment failure** was happening in young sturgeon by the late 1960s. So how many of Unel'tsoo's eggs do you think have survived?

Nechako Watershed

Map & Land Use

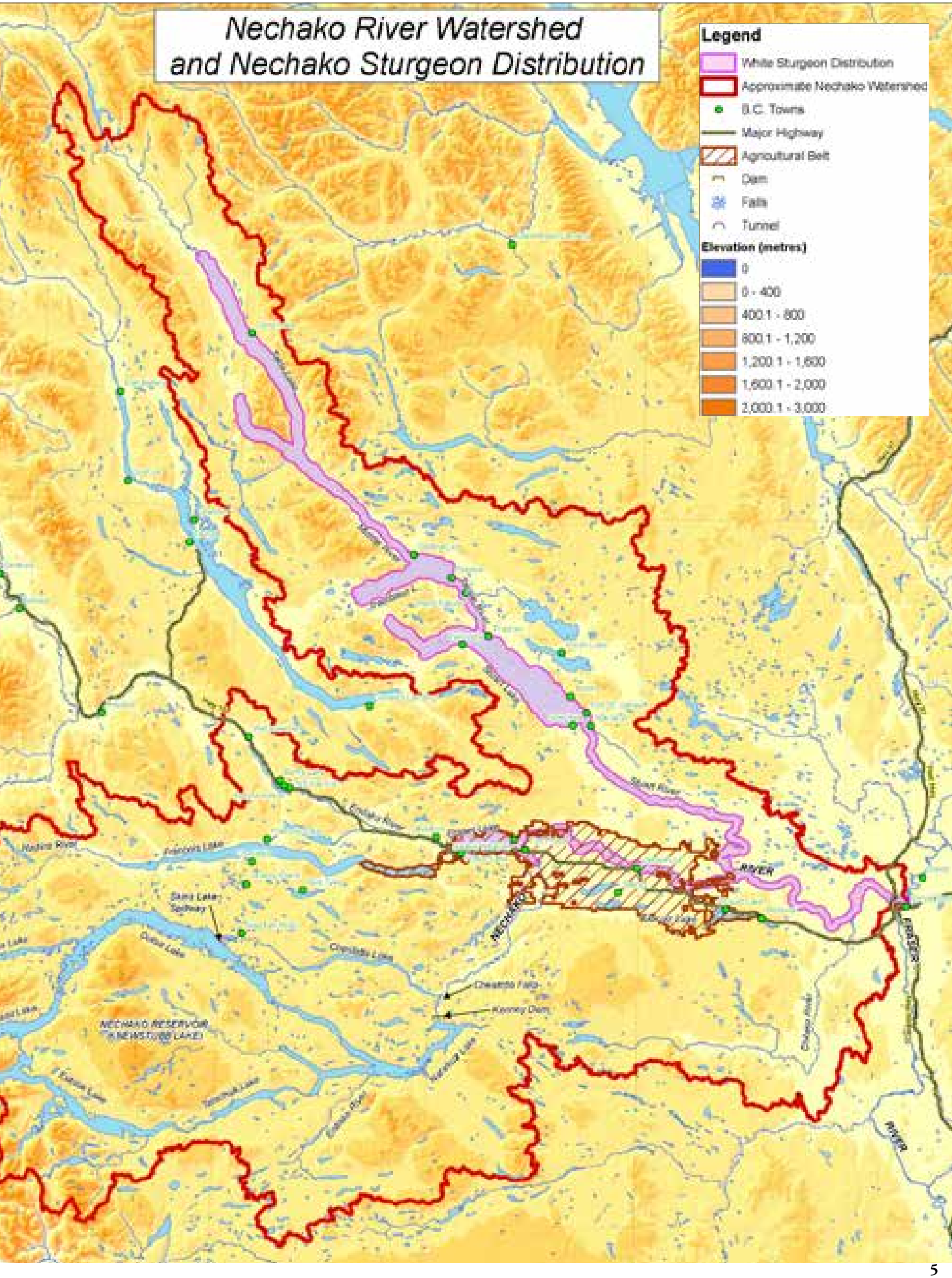
The Nechako watershed is home to many animals big and small, including Nechako white sturgeon, moose, elk, deer, bear, salmon and many small mammals, plants and invertebrates. It is also home to many different trees, shrubs, and other plants, algae, moss, lichen and countless organisms too small to see.

Human activity within the watershed has an impact on the amount of habitat and the quality of habitat for all species.

Human-led changes over the past 200 years:

- Water - Kenney Dam diverted water from the Nechako watershed and changed flow in the river
- Forestry - tree removal over the landscape and along water drainages
- Agriculture - replacing the natural ecosystem with crops, erosion along creek banks, chemicals into the water from fields
- Urbanization - removal of the riparian zone, pollution from urban runoff
- Recreation - chemical and noise pollution from boats, planes etc., overfishing

The cumulative effects of all these changes can dramatically alter ecosystems and the ability for plants and animals to survive.


Nechako River Watershed
and Nechako Sturgeon Distribution
Legend
White Sturgeon Distribution
Approximate Nechako Watershed
B.C. Towns
Major Highway
Agricultural Belt
Dam
Falls
Tunnel
Elevation (metres)
0
0 - 400
400.1 - 800
800.1 - 1,200
1,200.1 - 1,600
1,600.1 - 2,000
2,000.1 - 3,000
Stuart River
Endako River
Fraser Lake
NECHAKO
RIVER
FRASER
RIVER
Skins Lake Spillway
Cheslatta Falls
Kenney Dam
NECHAKO RESERVOIR
(KNEWSTUBB LAKE)

Nechako River

Aerial of the Nechako River at Vanderhoof. *(Courtesy Rio Tinto)*

Ecology of the Nechako River

The Nechako River is a major tributary to the Fraser River, which is the largest river in BC. The Nechako River joins the Fraser River in Prince George. The Nechako River is 290 km long and many large and small rivers flow into it. The two largest tributaries to the Nechako River include the Stuart River and the Nautley River, both of which have large lakes as part of their own watersheds that are home to many fish species, including sturgeon.

The Nechako River is made up of a variety of different river sections, including a canyon, rapids, wide slow flowing areas, and sections with islands and many side channels.

Over twenty species of fish and hundreds of invertebrate species and plants inhabit the Nechako River. Fishing is permitted, however some special regulations apply (**GoFishBC.com**).

DID YOU KNOW?

There are over 30 sub-basins within the Nechako watershed. A sub-basin is a smaller watershed or river system that feeds into the larger river. The largest sub-basins are the Nautley River system (including Fraser Lake, the Stellako River and Francois Lake), and the Stuart River system (including Stuart, Trembleur and Takla lakes). The whole Nechako watershed is 52,000 km^2.

View of the Stuart River. *(FSJ)*

FIELD TRIP

Take a bus to **Kenney Dam**, and if time permits **Cheslatta Falls**. Kenney Dam is one of the largest earth-filled dams in the world. **It is 95m high and 474m wide.** It took over four years to construct. There is a trail at Cheslatta Falls from the road to the falls. It can be slippery, so please take caution.

Aerial of the Kenney Dam and the east end of the Nechako Reservoir. *(Courtesy Rio Tinto)*

The Nechako Reservoir

Reservoirs are designed to store water, especially during spring snowmelt, and release it slowly throughout the year. Kenney Dam was built in the early 1950s to create the Nechako Reservoir to allow for the diversion of water from the Nechako watershed through tunnels to Kemano. This water generate power that is used to generate power for **aluminium smelting** in Kitimat.

No water is released at Kenney Dam. As a result there is a 9 km section of the Nechako River between Kenney Dam and Cheslatta Falls that no longer has water flowing through it. The Skins Lake Spillway was built to release water into the Cheslatta River system that flows into the Nechako River at Cheslatta Falls. It takes between 2 and 5 days for water from the Spillway to reach Vanderhoof.

See the map on page 5.

IMPACT BY DAMS

Hydrograph: Releasing water slowly throughout the year changes the natural seasonal flow pattern of the river. Freshet (seasonal high flow) is often diminished and flooding is reduced.

River Size: The overall width, depth, strength and speed of a river is often reduced once a reservoir is built.

Sediment: Sand and silt tend to accumulate in the river, because the amount of water flow is no longer strong enough to wash fine sediment away.

Fish Migration: Dams are often barriers to fish migration. Fish ladders and other techniques are used at dams to help fish pass to habitat upstream.

Development: Flooding is reduced by dams, and development of houses and farms downstream of a reservoir tend to increase.

Nechako River

Chinook and Sockeye Salmon

Two species of Pacific salmon spawn in large numbers in the Nechako watershed—**Chinook salmon** *(Oncorhynchus tswhawytscha),* and **sockeye salmon** *(O. nerka).* Chinook spawn in the main channel of the Nechako River and its tributaries during September each year. The young salmon emerge from the gravel in the early spring, and stay in the river for a few months to a year before migrating to the Pacific Ocean. The adult salmon do the return migration from one to four years later. The migration is approximately 1,500 **river kilometres**.

Sockeye salmon tend to spawn in tributary streams and then rear in lakes for one year before migrating to the ocean.

A small number of **coho salmon** *(O. kisutch)* spawn upstream of Vanderhoof.

Adult sockeye salmon. *(WS)*

DID YOU KNOW?

Spawning salmon are a major food source for sturgeon, bears and other mammals and birds. After they spawn, salmon die and decay releasing nutrients into the water that are important for maintaining a productive river system. Dead salmon also get carried into woodlands by larger animals, and their bodies add nutrients to the soil, which contribute to forest health.

Decaying salmon in the Nechako River. *(AG)*

TRY THIS!

Rainbow trout are known for their **beauty, strength, and large size**. Spend an exciting day **fishing in one of the many rivers or lakes in the Nechako watershed**, for this tasty sport fish. **Fishing licenses**, tackle and gear are available at local sporting stores—all you need is an excuse. Go to your local Visitor Centre for more information on where to go to **catch a big fish!**

Rainbow trout. *(RN)*

Rainbow and Bull Trout

Rainbow trout *(Oncorhynchus gairdneri)* reside year round in the Nechako River. Rainbow trout can grow to a half a meter in length and are prized for their size, fight and good taste. It is unlikely to catch a **bull trout** *(Salvelinus confluentus)* in the Nechako River during the summer, as they prefer the colder water in the upper Fraser River. But, in the winter, a population of bull trout migrate roughly 400 km from the upper Fraser River to the Nechako River where they are fished for as catch-and-release.

Bull trout are not actually a trout—they are a charr. Both charr and trout are related to salmon and are called salmonids. Charr have light cream pink or red spots, while salmon and trout have black spots. All salmonids have a small fin near the tail, called an adipose fin.

Bull trout with red spots. *(EK)*

Adipose fin.

FISH ID

Fish with an adipose fin.

Chinook Salmon: Grey-green to red body.

Sockeye Salmon: Bright red with green head and large hump.

Coho Salmon: Strongly hooked nose, red sides.

Rainbow Trout: Black spotted body, red (or rainbow) stripe on side.

Bull Trout: Green-yellow body with red spots on sides and belly.

Lake Trout: Green-yellow body with many white spots.

Mountain Whitefish: Silvery with olive or brown back. Short head.

Fish without an adipose fin.

Sucker species: Mouth on underside of head. Mouth looks like a suction cup.

Northern Pikeminnow: Dark green backs, may have orange on fins. Large mouth.

Burbot: Eel-like. Long.

Prickly Sculpin: Small. Flat belly, bottom fish.

Redside shiner, dace and chub species not described here.

Nechako River

Reed grass an emergent aquatic plant. *(MR)*

Aquatic and Riparian Vegetation

Aquatic vegetation are plants that are rooted or floating in either flowing or still water. These plants provide protection (cover) for invertebrates, small fish, birds, and small mammals. Aquatic plants are a food source for many invertebrates, fish and birds.

Algae are like plants in that they conduct **photosynthesis**, but are different in the types of cells they are made of. Algae are a feature of all aquatic ecosystems. In some parts of the Nechako watershed a type of **blue-green algae** can grow to toxic levels killing fish in the lake and stream below.

Riparian vegetation are the plants and trees that grow along the banks of rivers, streams and lakes. Riparian vegetation is very important for bank stability (roots hold the banks in place and prevent erosion), shade and water temperature regulation, and terrestrial food source for fish (insects fall off shrubs into water).

DID YOU KNOW?

The Nechako River is frozen over for approximately four months of the year, and the flowing water below the ice is at a temperature near freezing. In the winter, fish metabolism slows down considerably to conserve energy and reduce the need for food. For example, sturgeon move to the large lakes, or deepest pools in the river for the winter, and do not eat.

Ice over the Nechako River. *(AG)*

TRY THIS!

Bug hunting! Head down to the **river's edge and flip over a rock**. Underneath, you may find a variety of invertebrates—**tiny animals that cling to submerged rocks using suction, sticky secretions, or sharp claws**. Make sure to put the rock back in the river the way you found it! Field 'Bug-ID Cards' along with bug microscopes are part of the **Sturgeon School Kit**.

Caddis fly larvae on an overturned river rock. This species uses twigs and sand to make a house for itself. *(WS)*

Aquatic Invertebrates

Invertebrates are animals that have an **exoskeleton** and no backbone.

Aquatic invertebrate live for at least part of their life cycle in water. Those that live on the bottom of the river or lakes on the rocks and in the mud are called benthic invertebrates. These include beetles, worms, snails, flies, crayfish and molluscs, and are classified in one of four groups: shredders, collectors, grazers or predators. Each group has a specific role in the river ecosystem, and are preyed upon by fish and many birds.

Microscopic aquatic invertebrates that float through the water column in wide rivers, such as the Nechako River, are called **zooplankton**. You can catch zooplankton with fine meshed nets, however they are often too small to see without a microscope.

Aquatic invertebrates are a critical component of river ecology, and can be an indicator of river health.

BENTHIC INVERTEBRATE GROUPS

Shredders: Physically break down organic debris on the bottom of streams such as leaves, twigs, and animal matter. They turn the course organic material into fine organic material that floats downstream.

Collectors: Filter out of the water column fine organic material. They further reduce this material into smaller elements for use by other animals. They are present in all river types.

Grazers: Scrape algae off rocks. Streams with more light have proportionally more grazers as there is more algae production.

Predators: Prey on other invertebrates. There are fewer predator species.

Nechako White Sturgeon

Nechako white sturgeon, roughly 5-10 years old. *(NWSRI)*

Pre-historic Giant

Sturgeon have lived since the time of the dinosaurs, roughly 170-245 million years ago. In the Nechako watershed, Nechako white sturgeon likely arrived after the last ice age, approximately 10,000 years ago. Nechako white sturgeon reach up to 3 m in length and weigh over 140 kg!

Over the past 50 years, the number of Nechako white sturgeon have declined. This has led to the species being listed as an endangered species in Canada. The Nechako White Sturgeon Recovery Initiative (NWSRI) was formed in 2000 to lead the recovery efforts for this population, through research and outreach. In 2014, the Nechako White Sturgeon Conservation Centre (NWSCC) was built with the purpose of conserving the **genetic diversity** of Nechako white sturgeon and rebuilding the population to a **self-sustaining level**.

It is illegal to fish for Nechako white sturgeon!

DID YOU KNOW?

Sturgeon do not build a nest for their eggs, but rather release them in the water. The eggs and **milt** mix in the **turbulent** water before the eggs sink to the bottom. The eggs are sticky and will adhere to whatever they fall onto.

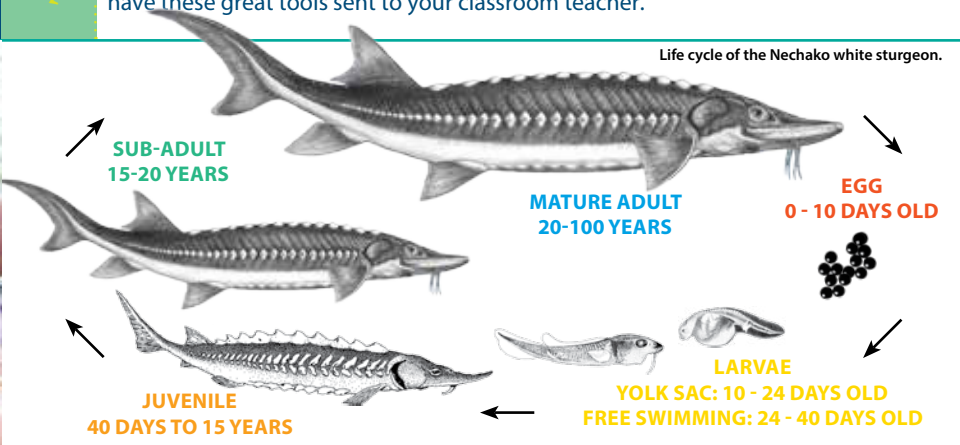
Adult sturgeon do not die after spawning, but will return to spawn every 2-5 years. Sturgeon don't spawn until they are between 20-35 years old!

Bio-balls used in the NWSCC to simulate gravel in the river for larval sturgeon. *(NWSRI)*

TRY THIS!

Sturgeon Anatomy: Because it is hard to see a live sturgeon up close, the NWSRI has two great ways to help you learn up close about sturgeon anatomy - the **life-sized sturgeon stuffie**, and the **juvenile-sized silicon sturgeon**. Both are available to classrooms in SD91 - just email **info@nechakowhitesturgeon.org** to have these great tools sent to your classroom teacher.

Life cycle of the Nechako white sturgeon.



Sturgeon Biology

The shape of an animal's body or 'body form', is directly related to its function. The relationship between form and function tell us a lot about an animal's preferred habitat, how and what it eats, protects itself, and moves through its environment.

The sturgeon's tail and head tell us that it lives at the bottom of rivers and lakes. The **head** is wide and flat with **barbels** and the mouth underneath the head to feel around for food on the bottom. The **tail** has an asymmetrical shape which helps to force the sturgeon downwards in the water. The tail and other fins are large and strong, telling us that the sturgeon can swim fast and swim against strong currents.

Sturgeon have **no teeth or bones**! Their mouth protrudes out of the body and sucks up food. The skeleton is made of cartilage only.

The body is covered in 5 rows of sharp **scutes**. The scutes protect the sturgeon from predators.

STURGEON FACTS

Distinctive Markings: Bony plates (no scales) in rows down its body. Broad, flattened head, tiny eyes and shark-like tail. No teeth.

Size: Largest freshwater fish in North America—over three meters in length.

Habitat: Deep river pools, slower backwater, below rapids, and large lakes.

Food: Adults eat mostly fish.

Behaviour: Migrate for spawning in May-June. Mature after 20–35 years of age and spawn roughly every 2–5 years.

Nechako White Sturgeon

Researchers use radio-telemetry to track sturgeon location in the river. *(ZS)*

Sturgeon Habitat

Eggs and young sturgeon need **clean gravel substrate** to hide from predators and stay out of the fast flowing water. Being sticky, if eggs settle in sand or silt filled gravels, the eggs can suffocate.

Adult sturgeon move to the spawning grounds in April and May to spawn by June. After, they leave to spend much of their time in either big pools of the Nechako River or one of the large lakes within the Nechako watershed.

Habitat preference and behaviour of juvenile sturgeon are less known, because there are so few in the river. Work is being done to study juvenile sturgeon that are released from the NWSCC to improve our understanding of this life stage.

We know however, that a river is a complex ecosystem that fish, land animals and humans require for survival. Changes to river habitat impact sturgeon at every life stage.

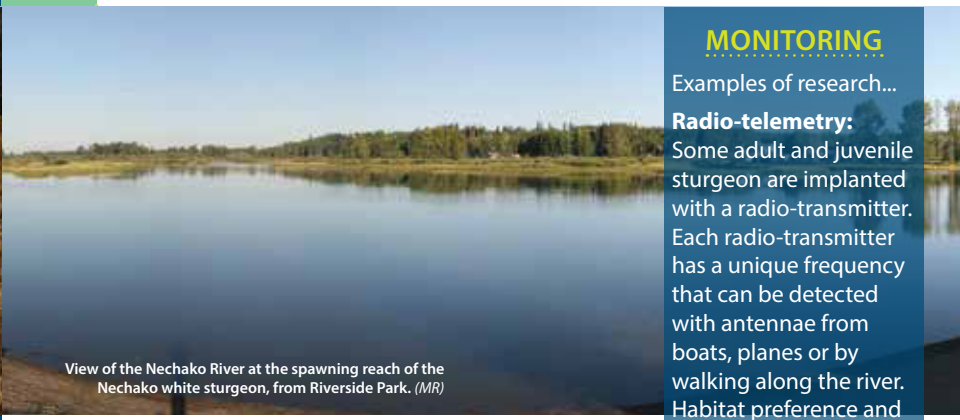
DID YOU KNOW?

Stoney Creek and Murray Creek are two important tributaries to the Nechako River just upstream of Riverside Park. Stoney Creek joins on the south bank, and Murray Creek on the north bank. These creeks flow directly into the known spawning reach of the Nechako white sturgeon. Habitat changes in these creeks, such as bank erosion or water pollution, can impact the habitat of the spawning reach.

View of Murray Creek joining the Nechako. *(WS)*

TRY THIS!

Where is My Fish? Go to **nechakowhitesturgeon.org/where-is-my-fish** and search for any juvenile sturgeon that has been released by students or staff in the past several years. You can **search for your own fish** (by your name or your fish's name), all the sturgeon in your school, or even by any fish that have been recaptured (caught one than once). **Check back** each fall and spring for new data!



View of the Nechako River at the spawning reach of the Nechako white sturgeon, from Riverside Park. *(MR)*

Sturgeon Spawning

Nechako white sturgeon have only been observed spawning in the wild once. That location was upstream of the Burrard Ave. bridge in Vanderhoof, within the Migratory Bird Sanctuary (see page 16).

Sturgeon are **broadcast spawners** - they release their eggs and milt into the water column. Up to 750,000 eggs can be released by a single large adult female!

Spawning occurs during the May and June **freshet**, after the ice melts off the river and the water level rises. River water temperature needs to be between 11-13°C to trigger spawning, and sturgeon can spawn in water up to 18°C.

Monitoring and research projects occur every year to fine-tune details about the habitat sturgeon prefer for spawning. This information can lead to habitat enhancement projects to improve spawning habitat and to help increase survival of eggs and larval sturgeon.

MONITORING

Examples of research...

Radio-telemetry: Some adult and juvenile sturgeon are implanted with a radio-transmitter. Each radio-transmitter has a unique frequency that can be detected with antennae from boats, planes or by walking along the river. Habitat preference and large-scale migration patterns are determined using this method.

Acoustic Telemetry: Acoustic tags can determine fine-scale sturgeon movements within the spawning reach. This helps determine where to rehabilitate spawning habitat.

Egg Mats: Because sturgeon eggs are sticky and sink, mats are placed on the river bottom downstream of the spawning area to 'catch' wild spawned sturgeon eggs. These eggs help determine success rate of wild spawning, and possible new spawning locations.

Nechako White Sturgeon

Students volunteering to tag juvneile sturgeon before release. *(NWSRI)*

Nechako White Sturgeon Conservation Centre

The Nechako White Sturgeon Conservation Centre (NWSCC) is one step in the recovery of the Nechako white sturgeon population. This **conservation fish culture program** grows sturgeon to 1-year old, past the riskiest life stage, to hopefully increase survival in the river. An important goal of the hachery is to conserve the **genetic diversity** of the natural population.

There are many tasks involved with raising healthy young sturgeon. **Fish culturists** need to keep water clean and oxygenated, temperatures within a steady range, and provide the right amount of food for each life stage. Once the sturgeon are large enough, staff and volunteers collect biological data and tag each fish before release, to be able to monitor them in the river later.

Guided and self-guided tours are available year-round at the NWSCC.

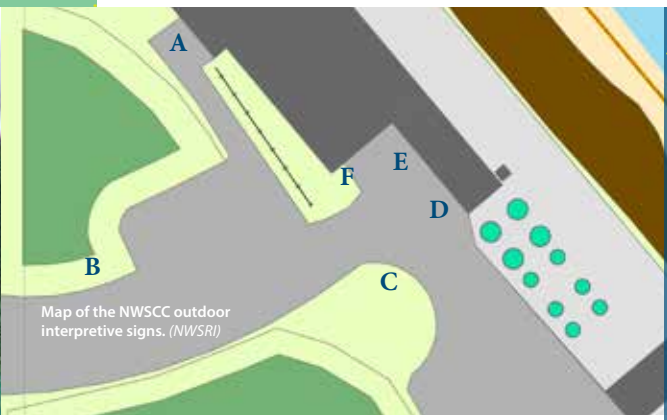
DID YOU KNOW?

The NWSCC can house up to 1,800 kg of fish. That much fish eats up to 27 kg of feed per day! The hatchery recirculates up to 99.6% of the water it uses at a maximum rate of 3000 litres per minute! The complex recirculation system uses as little as 25-30 litres per minute of new water to save energy. The hatchery can safely care for sturgeon up to 3m in length.

Inside the NWSCC. *(DP)*

TRY THIS!

Will you survive to 100 years old? Head over to the Nechako White Sturgeon Conservation Centre and play the **Wheel of Life**. The wheel shows risks that sturgeon face at each life stage. Most tries you will die, as the chances of a sturgeon reaching even 1 year old in the wild is less than 1%.



Map of the NWSCC outdoor interpretive signs. *(NWSRI)*

SELF-GUIDED TOUR

A: History of this pre-historic animal, and how it relates to changes in the Nechako over the past 200 years.

B: Wood carved sturgeon - study the body shape and think of how it relates to its environment.

C: A series of signs talking about all aspects of sturgeon biology and ecology.

D: The Wheel of Life - Sturgeon face many threats at each life stage - in particular the egg-larvae stages. Learn about the risks sturgeon face at each life stage.

E: A 15 year old sturgeon is 6 kg and 1 m long. Compare yourself to this sturgeon to see what age sturgeon you would be.

F: The life cycle carving gives a visual representation of the complex interactions sturgeon face during their life cycle.

Endangered Status

Very few sturgeon have survived past the age of one in the past 50 years, making the current population in the watershed mostly older adults. Within the next 20 years, those adults will die from old age and there will not be enough younger adults to take over. This realization led to the endangered listing of this population, and the creation of the NWSRI.

Based on research, the first year of life is the most risky for Nechako white sturgeon.

Main threats in the first year of life include:

- **Predation from fish, mammals and birds**
- **Suffocation of the eggs by sand and silt**
- **Wide changes in water temperature**
- **Lack of suitable habitat**
- **Water pollution**
- **Disease**

Migratory Bird Sanctuary

Aerial photo of the bird sanctuary and Nechako River. *(WM)*

History and Significance

Established in 1944 the Nechako River Migratory Bird Sanctuary, 180 hectares of braided channel between small, shrub and grass covered islands, is a federally designated protected area for migrating bird species. Considered *Important Bird Habitat*, this sanctuary is a stopping ground for many species of birds on their way to and from **breeding grounds**. The highest concentration of birds here is in the early spring and fall.

The sanctuary happens to also be the only known spawning ground of the endangered Nechako white sturgeon.

Four bird species migrate to the Nechako region during the winter months only. They are snow bunting *(Plectrophenax nivalis)*, redpoll *(Carduelis flammea)* and occasionally snowy owls *(Nyctea scandiaca)* and Northern shrike *(Lanius excubitor)*.

DID YOU KNOW?

Up to 20,000 waterfowl can be seen migrating through Vanderhoof each year, the majority being Canada Geese.

People are welcome to boat within the sanctuary, however, the taking, injuring, destructing, molesting, or hunting of migratory birds, their nests, or eggs within the sanctuary is prohibited.

Other recognized *Important Bird Habitat* areas include Nulki and Tachick lakes.

Observation Tower at Riverside Park. *(AG)*

TRY THIS!

Swallow watching! In spring and summer, **5 different swallow species** swoop and dart around the Burrard Avenue bridge. Cliff and barn swallows make nests under the bridge, while bank swallows build nests in the muddy banks of the Nechako River. Take a **walk along the Riverside Nature Trail**, or have a **picnic at the Peter Rodseth Memorial Park** to watch these amazing birds in action.

White-crowned sparrow. *(MR)*

SONGBIRD ID

A subset of songbirds common to the area. Listed smallest to largest.

Wilson's Warbler: All yellow body, large black eye, dark patch on top of head.

Red- breasted Nuthatch: Blue-grey back and wings, orange belly, short tail, climbs down a tree trunk.

Brown Creeper: Black and brown back and wings, long tail, climbs up a tree trunk.

Black-capped Chickadee: Round body, wide white cheek stripe, black-head.

White-crowned Sparrow: Dull brown with wing stripes, white eye strip.

Mountain Bluebird: All blue body.

Cedar Waxwing: Smooth sleek brown body, black face, tuft on head.

American Robin: Grey-brown back and wings, red breast.

Songbirds

Songbirds come in all shapes, sizes and colours. Included in this broad group of birds are flycatchers, vireos, jays and thrushes, swallows, chickadees, warblers, sparrows, creepers and nuthatches, pipits, waxwings, tanagers, grosbeaks, buntings, blackbirds, and finches. The Nechako watershed is home to approximately 30 species that migrate to the area each year.

Often heard before they are seen, songbirds are found in a variety of habitats including: forest understory shrubs and plants; stream- and lake-side vegetation; wetlands; agricultural fields, backyard feeders and gardens; and under bridges, or in barns.

The best time of day to look for these small elusive birds is in the early morning or at dusk. It is helpful to bring binoculars, a bird identification field guide, and **bird song recordings**.

Migratory Bird Sanctuary

Trumpeter swans in a field in Vanderhoof. *(AG)*

Trumpeter and Tundra Swans

Trumpeter swans *(Cygnus buccinator)* are commonly seen in and over Vanderhoof during migration each spring and fall. The largest swan in North America, the trumpeter swan can reach 183cm in height with a 259cm wingspan. This beautiful all white bird has a distinctive raspy *ko-ho* honk while flying.

Comparatively, the smaller tundra swan *(C. columbianus)* can reach 147cm tall with a wingspan of 213cm. Although they are the most abundant and widespread swan species in North America, tundra swans are less commonly seen in the Nechako watershed.

You can distinguish the two species from one another by the colour of their lores—the space in front of the eye. The tundra swan has a yellow lore, whereas the lore of the trumpeter swan is black.

DID YOU KNOW?

The red seen on the trumpeter swan necks in the above picture is caused from the iron-rich soils surrounding Vanderhoof. Swans are dabblers, meaning they graze in water on terrestrial and aquatic plants. When feeding in flooded fields, the heads of the birds rub against the soil and they can become stained from the iron.

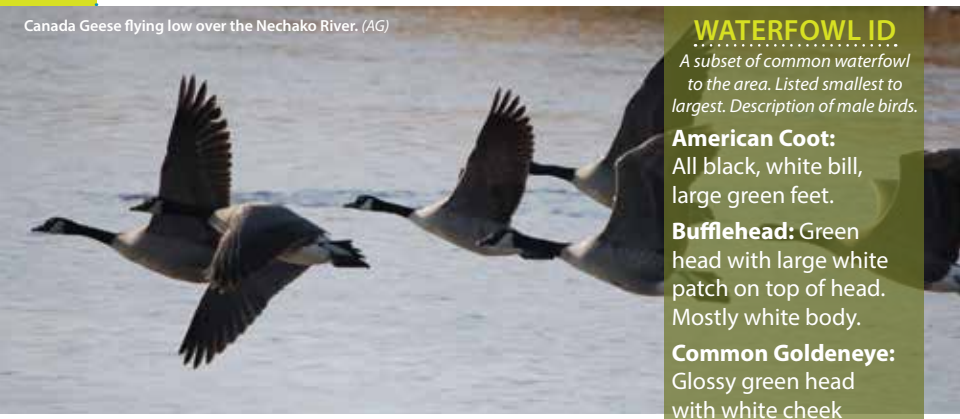
Trumpeter Swan

Tundra Swan

View of Migratory Bird Sanctuary. *(MR)*

FIELD TRIP!

Bird watching! Grab a **local map and a bird species list** from the Visitor Centre and spend an afternoon **exploring the roads and back roads of the area** in search of waterfowl, songbirds, raptors, and other wildlife. Good spots include the **Migratory Bird Sanctuary, country roads along farmer's fields, Nulki Lake, Tachick Lake, and Sinkut Lake.**



Canada Geese flying low over the Nechako River. *(AG)*

Canada Geese

Canada Geese *(Branta canadensis)*, a Canadian icon, have come to be the symbol of Vanderhoof as it is a stopping ground on their migration route. Their distinctive call can be heard each spring and fall, as thousands of Canada Geese descend on the fields, lakes and major rivers in the area.

The size of Canada Geese ranges from 63–108cm tall. Canada Geese nest on the ground near sources of water. They feed in fields, lakes and rivers on terrestrial and aquatic plants.

Canada geese fly for the majority of their migration in a V-formation, as do other **waterfowl**. These formations are aerodynamically beneficial as the birds in front create 'lift' that reduces the amount of wind resistance for the birds in the back. The lead bird moves to the back of the V-formation when it is tired, and a new bird takes its place.

WATERFOWL ID

A subset of common waterfowl to the area. Listed smallest to largest. Description of male birds.

American Coot: All black, white bill, large green feet.

Bufflehead: Green head with large white patch on top of head. Mostly white body.

Common Goldeneye: Glossy green head with white cheek patch. White sides.

Ruddy Duck: Dark head with large white cheek patch, red body.

American Wigeon: White strip on top of head, green over eyes, tan sides.

Mallard: Glossy green head, white neck-ring, tan sides with brown breast.

Common Merganser: Green head, white sides, spike-like red bill.

Northern Pintail: Brown head with white breast, needle pointed tail.

Common Loon: Black head, neck-ring, dark sides with white speckling.

Migratory Bird Sanctuary

American white pelicans at the Migratory Bird Sanctuary. *(MR)*

American White Pelican

A spectacular sight to see, the American white pelican *(Pelecanus erythrorhynchos)* is an immense white bird reaching 155 cm tall with a wingspan of 274 cm and a distinctive long bill. During breeding, adults have a 'centreboard' on the ridge of their bills, as seen in the above photograph.

American white pelicans are fish eaters and catch small trout and suckers by swimming together as a group and scooping up fish with their bills.

The only breeding colony of American white pelican in BC is at Stum Lake in White Pelican Provincial Park, west of Williams Lake. Stum Lake has no fish, so the pelicans feed at other lakes in the region. Pelican will fly over 400 km round trip to feed in shallow lakes in the Nechako watershed. These birds can be spotted on Sinkut, Nulki, and Finger lakes, to name a few, as well as occasionally in the Migratory Bird Sanctuary at Riverside Park.

DID YOU KNOW?

Spring and fall are not the only times to see birds. Although the number of bird species in the area more than doubles during migration, approximately 35 species are residents to the area.

Owls, woodpeckers, some songbirds, grouse, crows, ravens, and jay species can be seen and heard in the woodlands and fields, along the river, and in our backyards year round.

Black-capped chickadee in winter. *(AG)*

TRY THIS!

Berry picking! Head out for an **afternoon of sweet adventures** berry picking in the woodlands in your community. An excellent resource on local native plants is late Saik'uz Elder Sophie Thomas' book about medicinal plants of the area called ***'Plants and Medicines of Sophie Thomas'***. **Always use a guide when picking wild berries and fruit.**

Sandpiper.

SHOREBIRD ID

A subset of common shorebirds to the area. Listed smallest to largest. Description of male birds.

Spotted Sandpiper: Dark back and wings, round broad breast spots. White line over eye.

American Dipper: Chunky all dark grey, bob and dive into flowing water.

Wilson's Phalarope: Dark wings, cinnamon neck patch, white throat.

Killdeer: Brown wings, two black breast-bands, white line over eye.

Greater Yellowlegs: Back and wings checkered with black, grey and white. Black bill. Bright yellow legs.

Long-billed Curlew: Light sandy brown with dark checkered back and wings. Very long, down-curved bill.

Herring Gull: Grey back and wings. White belly. Pale pink legs. Yellow bill with red spot.

Sandhill Crane: Over a meter tall. Grey body, red head patch.

Shorebirds

Many shorebird species spend the spring and summer in the woodlands, fields, lake shores and river banks in the Nechako Region. For example, killdeer *(Charadrius vociferus)* may build their nests on the ground in farmer's fields or along gravelly roads. Sandhill cranes *(Grus canadensis)*, greater yellowlegs *(Tringa melanoleuca)* and sometimes long-billed curlews *(Numenius americanus)* can be seen among the tall grasses in fields and along the shore of the Nechako River.

The shape and strength of their bills indicates what foods they eat (another example of **form and function**). Shorebirds feed on molluscs, worms, aquatic insects, and plankton by digging in the sand and soil or hunting through shallow water.

A number of gull species can be seen foraging for small fish and dead salmon along the shore wherever salmon spawn.

Migratory Bird Sanctuary

Bat box located along the Riverside Nature Trail. *(MR)*

Bats and Bat Boxes

Bats, the only true flying mammal, migrate to the Nechako watershed each year to breed. They prefer tight, narrow places to **roost**, such as behind tree bark and loose roof shingles and siding. They may also be found in caves, barns and attics.

Bats are an important part of the ecology of the area. Bat boxes can be found throughout the region, including along the Riverside Nature Trail, to help increase the local population, and to help reduce conflicts with humans by providing alternate housing outside of human homes.

Bats eat mosquitoes and other insects. They can be seen at twilight, swooping through the air in search of food using echo-location. Echo-location is a pulse of sound sent from their mouth and if an insect flies within the pulse, the pulse reflects back to the bat, indicating to the bat the location of the insect.

DID YOU KNOW?

There are seven species of woodpecker that live in the watershed. The most common, seen in the community year round, are the downy woodpecker *(Picoides pubescens)*, the hairy woodpecker *(P. villosus)* and the large red-capped pileated woodpecker *(Dryocopus pileatus)*. The Northern flicker *(Colaptes auratus)* is a migratory woodpecker to this area and is often seen in town and woodlands.

Hairy woodpecker. *(AG)*

TRY THIS!

Climb the stairs of the Observation Tower at Riverside Park for a great view of the Migratory Bird Sanctuary. From this high vantage point, you may be lucky enough to watch some of our **expert fish catching bird species** in action. **Osprey**, a large fish eating raptor, make dramatic dives from height, while the **belted kingfisher** hovers over the water until the right moment to dive.

Canadian tiger swallowtail butterflies. *(AG)*

BUTTERFLY ID

General description of common butterfly groups in the area. Listed smallest to largest.

Blues: Bright to dark blue.

Coppers: Iridescent orange or copper.

Skippers: Wide heads, stout bodies. Most are black, dark brown, some with yellow.

Sulfurs: BC is home to the most sulfur species of butterfly of anywhere else in the world. Orange, yellow or some are pale green.

Brush-footed: Orange and brown, various patterns and sizes.

Nymphs: Diversity of colours and patterns, rough-edged wings, resemble bark.

Whites: White, some black or yellow patterning. White indicates bad taste to predators.

Swallowtails: Bright yellow and black, with some blue, red and orange along the wing edges. Wings have 'tails' (see picture above).

Butterflies

With over 60 species of butterfly in the Nechako watershed, butterflies of all colours (yellow, white, blue, orange, or a mixture) can be seen flying in meadows and fields, along rivers and lakes, in woodlands, and in high elevation areas.

The flying season here is from April to October. Depending on the species, the entire life cycle—from egg to caterpillar to adult—can take the whole season. Some species, however, have several **generations** in one season. The pupa (stage between a caterpillar and adult butterfly) hibernate during the winter, often buried within leaf litter.

Butterfly species are distinguished from one another by their colour, and also by their flight pattern. Some species fly fast and low to the ground, while others flit about clumsily in the open. The combination of flight pattern and colour can tells predators if they are bad tasting or not.

Woodlands

View of valley from Sinkut Mountain. *(RW)*

Ecology of Woodlands

The Nechako watershed is located at the centre of the Sub-Boreal Spruce **Biogeoclimatic Zone**. Simply put, this area is dominated by a variety of coniferous (evergreen) species of trees; it lies on the Fraser Plateau that is mostly low rolling hills at an altitude of roughly 1,000m; and, has moderate precipitation with a high snow pack. This combination of factors results in a productive woodland, with a diverse ecology of understory plants.

Due to the frequent forest fires and removal of trees by the logging industry, the resulting woodlands in this area are of a mixed age.

Deciduous trees (trees that lose their leaves), are most noticeable on the landscape during the fall when their leaves turn brilliant yellow and orange.

DID YOU KNOW?

The red conifer trees seen in the above picture are dead lodgepole pine that were infested by the **Mountain Pine Beetle** *(Dendroctonus ponderosae)*. The pine beetle infestation of BC has had a major impact on the forest ecology and economy of this region. The dead trees also increase the fire risk of the area.

Mountain Pine Beetle actual size.

Cedar waxwing chicks are hidden by leaf cover. *(MP)*

FIELD TRIP!

Hiking! There are a number of **scenic hiking trails** of variable lengths and difficulty levels throughout the Nechako watershed. In Vanderhoof, pick up a hiking guide from the Visitor Centre to get directions to these popular trails: **Omineca Trail, Waterlily Lake Trail, Telegraph Trail, Sinkut Mountain, Greer Creek Falls, Cutoff Butte Trail**.

Black cottonwood trees and leaf litter in fall. *(AG)*

DECIDUOUS ID

In order from most to least common.

Alder species: Bark smooth with horizontal lenticels (raised markings). Leaves oval 5–10cm.

Trembling Aspen: Bark smooth to furrowed. Leaves kidney-shaped 3–7cm.

Paper (White) Birch: Bark thin smooth, dark-red to creamy white. Bark sheds in large sheets, inner bark dies and turns black. Leaves triangular 5–10cm.

Black Cottonwood: Dark greyish-brown bark with ridges and V-shaped furrows. Leaves oval 7–12cm.

Tamarack: Bark thin, redish-brown and smooth to scaly. 2–5cm needles 15–60 per tuft.

Deciduous Trees

Deciduous trees provide nesting habitat for a variety of songbirds, such as yellow-rumped warblers, that are commonly seen along woodland trails in the Nechako watershed. Woodpeckers make cavities in these trees in search of food and nesting sites. Some waterfowl, such as goldeneyes, also use tree cavities for their nests.

The leaf litter is broken down by invertebrates, and adds important nutrients to the forest soil.

Common Plant Species Combinations by Area

Along Large Rivers and Streams
Black Cottonwood and Spruce

Wet Areas
Spruce, Subalpine Fir, Queen's Cup, Black Gooseberry, and other berry producing shrubs

Moist Well Drained Areas
Spruce, Subalpine Fir with Alder and berry producing shrubs

Moist to Dry Upland Areas
Trembling Aspen and Paper Birch

Dry Areas
Lodgepole Pine with Blueberry, Kinnikinnick, Black Huckleberry

Woodlands

Kinnikinnick, is a species used by First Nations as a "women's medicine" as well as a diuretic. *(AG)*

Understory Vegetation

Sophie Thomas, a late Saik'uz First Nation Elder and Healer, based her book, *Plants and Medicines of Sophie Thomas*, on the understory plants that grow in the Nechako watershed. Berry producing plants can be found in the forests throughout the region. Many of these plants, along with **lichen**, certain wildflower species, and even trees such as alder and tamarack, offer medicinal properties.

Mammals, birds, and reptiles make their homes in, and from understory plants. Lichen is eaten by cariboo, and birds and bears feed on berries from plants such as wild raspberry, blueberry, wild black current, kinnikinnick, and black huckleberry. Small mammals make their home within the dense forest floor cover.

DID YOU KNOW?

Forest fires are a natural part of the forest ecology of the interior of BC. In this area, forest fires are caused primarily by lightening strikes during hot weather. Fireweed, aspen, birch and logdepole pine are the first species to grow on a burnt landscape. Strict fire restrictions are put in place during the hottest periods in the summer to help prevent unnecessary forest fires.

A burnt landscape south of Vanderhoof. *(RN)*

TRY THIS!

Owl search! Spend an evening looking for owls along the country roads in your community. Pack a flashlight and some warm clothes along with your bird identification field guide, and head out when the sun sets, as owls are active at night. There are **seven owl species** that inhabit the Nechako watershed all year.

Spruce tree branch. *(WS)*

Hybrid White Spruce

Engelmann spruce *(Picea engelmannil)* and white spruce *(P. glauca)* naturally **hybridize** in this region to produce what is referred to as the Hybrid White Spruce *(P. glauca x engelmannil)*. This hybrid is thought to dominate the central interior forests of BC. Walking through the forest one can find individual trees that are more characteristic of either parent species, however most trees are intermediate in characteristics between the Englemann and the white spruce.

There are a few characteristics that can distinguish a white spruce from an Engelmann spruce. White spruce are shorter (40m compared to 50m), and have a straighter trunk. The young twigs of the white spruce are smooth and shiny, whereas the Engelmann are usually hairy. White spruce needles are shorter (3.5cm compared to 5cm) and are more stiff and blunt.

CONIFER ID

In order from most to least common.

Lodgepole Pine: 30m tall, 60cm diameter. Bark thin orange-brown to grey. Needles in bundles of 2, 3-7cm long.

Hybrid White Spruce: 30-40m tall, 60-90cm diameter. Bark thin, scaly. Large rough scales that break off easily. Exposed bark. Needles aromatic when handled. Dominant tree species on landscape.

Subalpine Fir: 30m tall, 75cm diameter. Smooth, ash-grey bark with irregular scales. Needles 25-40mm, rounded tip.

Black Spruce: 20m tall, 30cm diameter. Bark reddish- or greyish-brown with scales. New exposed bark olive- or yellowish-green. Needles 8-15cm long, dull greyish-green.

Douglas Fir: 60m tall, 200cm diameter. Bark deep furrows with irregular ridges. Needles flat flexible 2-3cm long.

Woodlands

Female spruce grouse. *(RN)*

Grouse

Grouse are primarily found in woodland areas and are related to turkeys. Grouse are not strong fliers and are often seen walking along gravel roads. When startled, they make short bursts of flight and return to the ground fairly quickly.

The plumage of these birds can be quite ornamental, which is easily seen when **males display** to females during the breeding season.

The three species of grouse found here are Spruce grouse *(Falcipennis canadensis)* that inhabit dense conifer forests, ruffed grouse *(Bonasa umbellus)* that inhabit mixed to deciduous forests, and a recent immigrant into the region due to a warming climate, the sharp-tailed grouse *(Tympanuchus phasianellus)*.

DID YOU KNOW?

Trapping is a long-lived trade in the region, peaking for the fur trade in the 1800-1900s. Although still done for food and clothing, today trapping is also used as a tool for wildlife population management. Fox, wolf, beaver, lynx, pine marten, otter, muskrat, coyote, and mink are just some of the species trappers target.

Coyote in winter. *(WS)*

TRY THIS!

Take a walk along any one of the local trails and **search for wildlife clues** such as: vertical gouges on a tree trunk about 1–2 metres up the tree indicate a bear was scratching; fireweed and other tall plants with their tops nipped off, and shrubs that look severely pruned indicate moose and deer have been in the area eating; gnawed sticks or tree trunk indicate a beaver is nearby.

Black bear. *(WS)*

MAMMAL HABITAT

Animals are organized by their most typical habitat, yet most species listed below are found in more than one habitat.

Woodlands:
grizzly bear • black bear • mule deer • white-tailed deer • elk • fisher • wolverine • northern flying squirrel • porcupine • pine marten • striped skunk • deer mouse • jumping mouse species • chipmunk • grey wolf • red fox • coyote • lynx • cougar • snowshoe hare • packrat

Rivers, Streams, and Wetlands:
moose • river otter • beaver • mink • muskrat

Grasslands and Farms:
long-tailed vole • meadow vole • packrat • long-tailed vole • meadow vole

Urban Areas:
bats • red squirrel • mice species

Mammals

Even in the patches of woodlands within the town boundaries in the Nechako watershed, bear, moose, and deer will pass through, particularly in close proximity to rivers and lakes.

There are over 30 species of mammals in the Nechako watershed, and they fall into two categories: predator or prey. Although wolves, cougars and bear are sometimes taken by another animal, these species are predator species, while herbivores (plant eaters), such as mice, squirrels and moose, are prey species. A balance exists between the number of predators and prey in a region. When there are lots of prey to eat, predator numbers increase, causing prey numbers to dwindle. When prey numbers get too low it causes starvation in predators, which reduces their numbers and thus there are fewer predators to hunt prey. The prey species then rebound and the **predator-prey cycle** starts over.

Wetlands

View of WL McLeod Wetland. *(MR)*

Ecology of Wetlands

A wetland ecosystem is a transition zone between open water and land. Wetlands form when organic material accumulates and specific species of plants, trees, mosses and algae establish. The different wetland ecosystems are defined by their location and water supply. The common wetland ecosystems in this region include marshes, fens, bogs, and swamps. Each is important for fish and wildlife.

Fens are the typical wetland, and are home to a great diversity of animals and plants. Comparatively, bogs have very acidic soil and are fed by rainfall. As a result fewer plant and animal species grow in bogs.

Beaver activity on small streams often flood tree stands and create swamps, which are important habitat for fish and wildlife. Tamarack trees are often found in swamps. Marshes are formed at the edges of lakes and larger rivers. Horsetails and sedges are common marsh plant species.

DID YOU KNOW?

The WL McLeod Wetland is located in the middle of Vanderhoof. As part of the Vanderhoof Community Trails network, the trail around the wetland offers different vantage points to view a variety of plant, bird, mammal and invertebrate species. The wetland was once a side channel of the Nechako River. It is fed by groundwater and rainfall.

WL McLeod Wetland. *(MR)*

FIELD TRIP!

There are a number of **wetlands** in the Nechako watershed. In Vanderhoof, the **WL McLeod Wetland, and the Redmond Pit Wetland** serve as excellent examples of wetland habitat.

Red-winged blackbird perched on a cattail. *(AG)*

Blackbirds and Cattails

A perennial herb, **cattail** *(Typha latifolia)* is a common wetland plant. These tall plants can grow to 2.0 metres in height. Cattails grow in slow-flowing or standing water, in marshy areas, ponds and even in wet ditches. Animals that use cattails for food and habitat include wrens, various waterfowl, muskrats, and most commonly, the red-winged blackbird.

Male **red-winged blackbirds** *(Agelaius phoeniceus)* are often seen perched on the fuzzy head of the cattail, belting out a loud, distinctive call that is synonymous with wetland-marshy habitat. Males puff out their wings to show their bright red wing patches to defend their territory against other males. Red-winged blackbirds are also very defensive of their nests, and may swoop or hit an invader. Female red-winged blackbirds are not black at all, but a dark brown bird.

BLACK BIRDS

Listed smallest to largest.

Brown-headed cowbird: All black with dark brown head.

Red-winged blackbird: All black with red or red and yellow wing patch.

Brewer's blackbird: All black with a whitish eye.

Rusty blackbird: All black with a yellow eye, rusty looking only in the fall and winter.

Yellow-headed blackbird: All black with bright yellow head and neck. The Nechako Valley is home to one of the few populations of this species in Northern BC.

American Crow: All black with wide wing span and a short tail.

American Magpie: Black with white belly. Extremely long tail and harsh call.

Common Raven: All black with long narrow wings. Long wedge-shaped tail. Live here all year.

Wetlands

Dragonfly species.

Dragonflies

Adult dragonflies resemble miniature helicopters by the way they hover and maneuver in flight.

The brightly coloured male insects do only two jobs, defend territories and attract females. Females choose their mate. After mating, females deposit their eggs on aquatic vegetation or directly into the water of a swamp, marsh or stream. Each egg develops and hatches into a nymph or larva. The nymph stays underwater and feeds on other invertebrates. The nymph will molt several times as it grows. Once it is big enough a nymph will come to the surface and undergo one last molt, from which the adult dragonfly unfolds. The newly emerged dragonfly must stay still until it is dry. During that time it is vulnerable to being eaten by birds. Once dry, the dragonfly takes off to find a mate and start the cycle over again. They may live only a few days or weeks as an adult.

DID YOU KNOW?

Wood frogs *(Rana sylvatica)*, Western toads *(Bufo boreas)* and the common garter snake *(Thamnophis sirtalis)* are the only amphibians and reptiles that live in the Nechako watershed. Because these animals are cold blooded—rely on the environment to warm and cool their bodies—not many species have adapted to our cold Northern climate. These animals hibernate during the winter months.

Western toad. *(WS)*

TRY THIS!

Animal tracks! Going on an **animal track treasure hunt** is an easy and fun way to spend an afternoon. Sandy or muddy shores of streams and lakes are a great place to hunt for tracks or try looking after a new snow fall. See how many **different animal tracks you can find**.

Moose and calf. *(DS)*

Moose

Moose *(Alces alces)* are the largest and most common **ungulate** in the Nechako region, despite the fact that they first moved into the region in the early 1930s. Before that time, Dakelh people traded with far away villages for moose hide, which today is still important to their culture.

This massive animal, standing nearly two meters tall, is a herbivore. Moose are found in both wetlands and woodlands foraging primarily on wetland plants in the summer, and twigs, bark, and saplings in the winter. Moose are well adapted for life near water and using their long legs, can swim as fast as 56 km/hr and can hold their breath for long periods for feeding underwater. Their long legs also help them in the winter to walk through deep snow.

Moose are most active at night, and are a common concern for drivers along the roads and highways.

WETLAND PLANTS

Emergent Plants: Plants that are rooted underwater and the stem and leaves grow above the surface of the water, or float on the surface. Examples, cattails, reeds, horsetails, water lilies.

Submergent Plants: Entire plant is underwater. Example, pond weed.

Floating: The stem and leaves float on the surface of the water, while the roots hang from the surface. Example, duckweed.

Agricultural Lands

Cattle ranging. *(DM)*

Agricultural Land

Agricultural lands are made up of naturally open areas and previously forested lands that have been cleared. A large area of the Nechako watershed has been cleared for cultivation of crops or grazing lands. Although agricultural lands are regularly worked by humans and house domestic animals, they remain important areas for wildlife.

Agricultural lands provide food and shelter for many species of birds, mammals, and invertebrates. They are also passage ways between forested or wetland areas.

Streams flow through agricultural lands, and the health and variety of species of plants, fish, wildlife and birds that live in or use these waterways are influenced by agricultural practices.

Good land stewardship needs to consider the importance of these areas to ecosystem health.

DID YOU KNOW?

Each year for three days in August, the Nechako Valley Exhibition takes over the community. The weekend draws equestrian riders and jumpers, draft horse farmers, ranchers, sheep dog competitors, artisans, bakers, musicians and lots and lots of children to this true country fair. Education about agriculture and its importance to the local economy is showcased at the fair.

Goats at the fair. *(MR)*

FOOD!

Every year from June-September, **farmers' markets** pop up in many communities of the Nechako watershed, including Vanderhoof, Fort St. James, Fraser Lake, and Burns Lake. Pick-up fresh baking, local meats and vegetables, cut flowers, honey, crafts and other 'make it, bake it, or grow it' items produced locally.

Field of round bales of alfalfa (hay) with Sinkut Mountain in the background. *(AG)*

Farmer's Fields

Known for producing quality hay, the vast agricultural lands in the Nechako watershed have been in cultivation for nearly 100 years. Cleared by settlers and First Nations in the early part of the 1900s, these fields produce a variety of grain and forage crops for livestock and human use. These lands are also used as rangelands for livestock.

Domestic animals are not the only ones who **forage** in open fields. Mule deer and elk are frequent visitors to fields in the summer and fall. Some farmers in the area leave a strip of wheat or alfalfa at the end of the harvest specifically for mule deer, white-tailed deer and elk to feed on before winter.

Other animals use these fields: raptors fly overhead looking for small mammals that live underground in the fields; and fox and coyote travel hidden from view within the tall grasses, also searching for prey. Farmer's fields are a good place to view wildlife.

CROP PLANTS

In order from most to least common in this area.

Alfalfa: Grown as a forage crop for cattle. Harvested as hay and used to feed livestock over the winter months. Straw, the dried stalk, is used as bedding for livestock.

Barley: Grown as a forage crop for cattle, also can be processed for its seed and used in foods for human consumption. Used to make beer and other distilled beverages.

Oats: Grown for the seeds, wild oats are a forage crop for livestock, in particular horses. The seeds are also good for human consumption.

Wheat: Grown for its grain, this grass species is used for human consumption and is processed into flour or whole grains.

Canola: Grown as a forage crop for cattle. It is also processed into canola oil for human consumption.

Agricultural Lands

Honeybee on dandelion.

Bees

Bees are a critical component of the ecosystem. There are thousands of bee species worldwide and they are responsible for pollinating the majority of plants on earth. In the Nechako watershed, honeybee farmers (apiarists) make homes for tens-of-thousands of honeybees that in turn pollinate many of the agricultural crops in the area, including alfalfa and canola.

Honeybees use a complex communication system of dance to direct each other to new sources of nectar—the sweet liquid in flowers that bees collect to eat and feed to the queen bee. Bees unintentionally pollinate flowers as they move between flowers in search of nectar.

Many honeybee populations around the world are disappearing, due to many factors, including habitat loss and the use of herbicides and other chemicals in agricultural practices.

DID YOU KNOW?

The Nechako watershed is home to several honeybee farmers, otherwise known as apiarists. There are over 500 hives, each containing up to 65,000 bees, producing over 18,000 kg of honey here each year. Worldwide, over a billion kilograms of honey are produced each year. For perspective, it takes 12 honeybees their entire lifespan to produce just 21 grams of honey.

A local apiarist with his necklace of bees. *(JA)*

TRY THIS!

Raptors are big birds, and therefore make big nests. Most raptors come back to the same nest each year. There are nests scattered around the Nechako watershed. One that is **easy to see** is an **osprey nest** at the L&M Lumber yard, located just 5 minutes west of Vanderhoof on Highway 16. Contact the Visitor Centre for directions and the best time of year to see ospreys on the nest.

Female Northern harrier.

RAPTOR ID

In order from smallest to largest.

American Kestrel: Long wings and tail, orange-red back.

Merlin: Short pointed wings, dark back and wings.

Sharp-shinned Hawk: Small head and bill. Broad wings. Dark back and wings, orange belly.

Northern Harrier: Slender. White patch on rump during flight.

Red-tailed Hawk: Red tail. Body varies dark to light.

Swainson's Hawk: Slender. Belly varies dark to light.

Rough-legged Hawk: Small bill and feet. Belly varies dark to light.

Northern Goshawk: Broad tail, long wings, broad body. Grey.

Osprey: Long narrow wings. White belly, neck and underwing.

Golden Eagle: Dark body, with yellow on shoulders and neck.

Bald Eagle: White head, black body.

Northern Harrier

Northern harrier *(Circus cyaneus)* are raptors, or in other words, birds of prey. Raptors hunt for their food, which includes small mammals and even small birds.

The Northern harrier is one of the few raptor species to have different looking males and females. Males are grey backed while females are brown and slightly larger. Both have an obvious white rump when in flight, which distinguishes them from all other raptors. Northern harriers usually hunt by flying slowly and low over fields.

On a drive along an open field in the spring when the snow has just melted and the ground is thawed, you will see a number of raptor species perched on fence posts, power lines, tree branches and power poles searching for a meal. Raptors have excellent vision, and are able to detect the slightest movement on the ground.

Definitions and Links

Note - go to www.nechakowhitesturgeon.org and download the digital version of this guide to click on these direct and credible links to additional learning.

Aluminium Smelting: Smelting is a process of using heat and melting to extract metal from ore. The aluminium smelter in Kitimat uses large amounts of electricity to heat the ore to 1000 degrees Celsius.

Barbels: A fleshy filament that grows from the mouth of a fish that is used to feel and taste its surroundings. Often found in species that are bottom dwellers or that live in murky water.

Bees: Bees are an exceptional species, with complex communication and social structure. Link to more information about Bees in BC.

Biogeoclimatic Zones: Large geographic areas that share a similar climate within the province. Link to see all 14 zones in BC.

Bird Songs: Birds each have a unique call or song, and you can identify a bird by ear only. Link to hear bird songs. There are Apps too!

Blue-Green Algae: Also known as cyanobacteria, is not an algae. It is a photosynthetic bacteria, and can cause toxic conditions when conditions are good and they increase in number rapidly. Link to Factsheet.

Breeding Grounds (in the North): Birds migrating through our area are on their way to the Yukon, NWT, Alaska, and the Arctic ocean to breed. Link to learn where swans go when they go north for the summer.

Clean Gravel Substrate: Gravel substrate is large and allows for gaps between pieces. These gaps provide hiding spaces for eggs, larval and young fish. Silt and sand can infill these gaps which eliminates the hiding spaces. Clean gravel substrate has no or very little fine sediment in it.

Conservation Fish Culture Program: Where the focus of the hatchery program is to conserve genetic diversity in the population. It is not for food production or stocking for recraational fishing purposes.

Cumulative effects: Changes to the environment that are caused by an action in combination with other past, present and future human actions.

Dakelh: Carrier First Peoples of the Nechako watershed. Link to the Carrier Sekani Tribal Council website to learn about many of the local First Nation territories and traditions.

Exoskeleton: An external 'shell' or rigid external covering, usually of an invertebrate.

Fish Culturist: A person who works in a hatchery and rears fish.

Fishing Licences: Go to GoFishBC.com.

Forage: Search for food.

Form and Function: The relationship between the shape of an animals body and their habitat or environment. Some animals are very specialized based on where they evolved overtime. Link to more info.

Freshet: Highwater event in rivers, usually associated with snowmelt, but can be caused by heavy rainfall.

Generation: A complete life cycle (birth to death).

Genetic Diversity: The ability for a species to react to changes in their environment based on their DNA (unique features). The more genetic diversity in a population or species, the more likely it is that there will be enough individuals to survive through change. Read more.

GoFishBC.com: For everything related to freshwater fish in BC, including how to fish, where to fish, and the rules and regulations.

Hybridize: When a plant (or animal) species/variety breeds with another species/varieties. The outcome is the combination of the two species/varieties (the hybrid).

Lichen: Lichens are comprised of both fungae and algae. Link to more on lichens.

Male Display (in birds): Male birds are most often colourful, have large feathers or have complex songs and flies to attract females for mating. Link to examples.

Milt: Semen of a fish.

Mountain Pine Beetle: Link to MPB Factsheet.

Nechako White Sturgeon Curriculum: Download more lessons about Nechako white sturgeon.

Predator-Prey Cycle: Link to the lynx and snowshoe hare as a perfect example.

Recruitment Failure: When young fish do not survive to become adults.

River Kilometre: The distance when following the bends of a river.

Roost: Where bats and birds congregate to sleep or rest.

Photosynthesis: The process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water. Photosynthesis in plants generally involves the green pigment chlorophyll and generates oxygen as a by-product.

Self-sustaining Level: There needs to be a certain number of breeding individuals in a population to ensure successful pairings and limited risk of inbreeding. For Nechako white sturgeon, having over 1,000 mature adults in the population, along with suitable habitat, would allow for the population to continue without assistance from the hatchery.

Sophie Thomas: Sophie Thomas was a respected Elder from Saik'uz First Nation.

Sturgeon School Kit: Stream-side tools to help increase learning about sturgeon, water and watersheds.

Turbulent: Water flow that is does not flow evenly, but that fluctuates and causes mixing of the water.

Ungulate: An animal with hooves.

Upper Columbia River: White sturgeon are found in the Fraser River, as well as the Columbia River in the south east corner of the province. The Columbia River sturgeon also have a conservation plan for recovery.

Waterfowl: Duck and geese species.

Watershed: An area of land where all of the water that falls on the land drains into the same place.

Where is My Fish: Online search for tagged sturgeon.

NECHAKO WHITE STURGEON

RECOVERY INITIATIVE

Nechako White Sturgeon Recovery Initiative

info@nechakowhitesturgeon.org

www.nechakowhitesturgeon.org

Facebook @NWSRI

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

Canada

District of Vanderhoof

SCHOOL DISTRICT 91 NECHAKO LAKES

Photo Credits:
AG • Annerose Georgeson
DM • Debra Montgomery
DP • Don Petersen
DS • Daniel Stanyer
EK • Ernest Keeley (www.zoology.ubc.ca/~keeley/)
FSJ • District of Fort St. James
JA • Jon Aebischer
MP • Mathieu Pilon
MR • Michelle Roberge
NWSRI • Nechako White Sturgeon Recovery Initiative
RN • Rod Nelson
RW • Ryan Wagner
WM • WD McIntosh Land Surveying Ltd.
WS • Wayne Salewski
ZS • Zsolt Sary

For a complete list of references for this guide, please visit www.nechakowhitesturgeon.org/education.

With thanks to the District of Vanderhoof, and in partnership with School District 91.