

ASSESSMENT *of the* TRANS MOUNTAIN PIPELINE *and* TANKER EXPANSION PROPOSAL



TREATY, LANDS & RESOURCES DEPARTMENT
Tsleil-Waututh Nation

“WE STAND HERE TOGETHER as Tsleil-Waututh people and we say ‘no.’ We say ‘no’ the risk is too great. Our obligation is not to oil. Our obligation is to our land, our water, our people, our life, our *snəwayəł*. According to our *snəwayəł*, our law, this project represents a risk that we the Tsleil-Waututh people, are not willing to take.”¹



cover photo by Zack Embree

¹Oral Aboriginal traditional evidence given by Leah George-Wilson on October 16, 2014, during the National Energy Board's hearing for the TMEX proposal, held in Chilliwack, British Columbia.

EXECUTIVE SUMMARY

Tsleil-Waututh are the “People of the Inlet” and a distinct Coast Salish nation whose territory includes Burrard Inlet. The Tsleil-Waututh people occupied, governed, and acted as stewards of our territory prior to contact, at contact (AD 1792), at the British Crown’s assertion of sovereignty (AD 1846), and continue to do so today. Our ancestors maintained villages in eastern Burrard Inlet, exclusively occupied and defended the area, and intensively used all the natural resources there, especially marine and intertidal resources.

The Tsleil-Waututh Nation has a sacred, legal obligation to protect, defend, and steward the water, land, air, and resources of our territory. Our stewardship obligation includes the responsibility to maintain and restore conditions that provide the environmental, cultural, spiritual, and economic foundation for our nation and community to thrive.

By 1972, cumulative effects of urban, commercial, and industrial development around Burrard Inlet exceeded what is allowable under Tsleil-Waututh law as indicated by the devastation of our subsistence economy (based largely on salmon, herring, clams, and birds). It is essential to know both the historical context and the compromised environmental integrity that exists today in order to understand what our stewardship obligation requires of us.

While Tsleil-Waututh is actively involved in responsible development in our territory, our nation cannot consent to new development proposals that further contribute to cumulative effects, threaten our objectives for our Marine Stewardship Program, and delay or deny re-establishment of our subsistence economy. To do so would be contrary to our stewardship obligation.

Tsleil-Waututh has a Stewardship Policy that is an expression of our inherent jurisdiction and law. It mandates a review of all proposed water, land, and resource policies, plans, and developments inside our Consultation Area. Assessments carried out under the Stewardship Policy provide us with the information we require to make informed decisions on whether to consent to a proposal or withhold support.

In December 2013, Kinder Morgan Canada filed an application with the National Energy Board for the Trans Mountain pipeline and tanker expansion (TMEX) proposal, which would triple the volume of crude oil moved along the existing pipeline route. Approximately 70% of the diluted bitumen, or dilbit, transported would be shipped from the Westridge Marine Terminal in Burnaby, B.C. This would lead to a roughly seven-fold increase in the frequency of tanker departures from Burrard Inlet, from about once a week to at least one every day.

The Tsleil-Waututh Nation has assessed the TMEX proposal in accordance with our Stewardship Policy. The assessment was required because many components of the proposed TMEX fall inside our Consultation Area and have the potential to affect us. For example, the Westridge

Marine Terminal lies less than two kilometres across the water from Tsleil-Waututh Indian Reserve No 3.

This report provides a summary of our assessment of the components of the

TMEX proposal that lie within our Consultation Area that we carried out under our Stewardship Policy. It describes the seriousness of the potential effects of the TMEX proposal on Tsleil-Waututh title, rights, and interests.

In this report, **Table 1** provides a description of a representative set of Tsleil-Waututh title, rights, and interests threatened by the TMEX proposal. **Table 7** lists some of the effects and consequences of the TMEX proposal on those title, rights, and interests with a description of ways that our community anticipates being affected, including:

- » The likelihood of oil spills will increase if the TMEX proposal is implemented, and because spilled oil cannot be cleaned up completely, the consequences are dire for sensitive sites, habitat, and species, and for the Tsleil-Waututh subsistence economy, cultural activities, and contemporary economy.
- » Any delay in spilled oil cleanup response will decrease the total volume of oil recovered significantly and increase the negative effects and consequences.
- » The direct effects of marine shipping add to the effects and consequences of spilled oil amplifying the negative effects of the TMEX proposal.
- » The effect of the TMEX proposal on Tsleil-Waututh cultural activities is as large as if not larger than its effect on natural resources.
- » The Tsleil-Waututh Nation cannot accept the increased risks, effects, and consequences of even another small incident like the 2007 Westridge or 2015 MV *Marathassa* oil spills, let alone a worst-case spill.
- » Implementation of the TMEX proposal will 1) slow or deny achievement of the objectives of our Marine Stewardship Program and 2) violate Tsleil-Waututh law because it will undermine our stewardship obligations.

The assessment report concluded that the TMEX proposal does not represent the best use of Tsleil-Waututh territory and its water, land, air, and resources to satisfy the needs of our ancestors, and the needs of present and future generations. It has the potential to deprive past, current, and future generations of our community control and benefit of the water, land, air, and resources in our territory. The assessment recommends that Chief and Council continue to withhold Tsleil-Waututh Nation’s support for the TMEX proposal.

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²All appendices can be found at: twnsacredtrust.ca

3. INTRODUCTION

KEY POINTS

- » The Tsleil-Waututh Nation has assessed the Trans Mountain pipeline and tanker expansion (TMEX) proposal in accordance with our Stewardship Policy. This report provides a summary of that assessment.
- » The assessment was necessary because components of the TMEX proposal lie in areas where Tsleil-Waututh has Aboriginal title, rights, and interests and have the potential to affect us.
- » Westridge Marine Terminal is just across the water, 2 kilometres from our main reserve.

The Tsleil-Waututh Nation has assessed the Trans Mountain pipeline and tanker expansion (TMEX) proposal³ in the context of our history, culture, and governance. We applied our Stewardship Policy⁴ to the components of the proposed TMEX that lie within our Consultation Area. This report provides a summary of our assessment.

The Stewardship Policy is an expression of Tsleil-Waututh jurisdiction and law. It mandates a review of all proposed water, land, and resource policies, plans, and developments inside our Consultation Area. It provides us with the information we require to make informed decisions on whether to consent to a proposal or withhold support. **Section 7** provides a more detailed discussion of the Stewardship Policy.

The Tsleil-Waututh Consultation Area extends from the vicinity of Mt. Garibaldi in the north to the 49th parallel (and beyond) in the south, Gibsons in the west, and Coquitlam Lake in the east, as shown on **Map 1**.

Our Consultation Area encompasses all the waters and lands used by Tsleil-Waututh—for example, it includes the waters and lands that we use during our extensive seasonal rounds of travel and resource harvest. It encompasses both the areas exclusively occupied and governed by Tsleil-Waututh (our “territory”) as well as those where access is granted according to Coast Salish protocols (described in **Section 4**). Within our territory, this assessment had a particular focus on eastern Burrard Inlet, where the terminus of the TMEX proposal would be located. **Map 2** shows the study area boundary.

Components of the proposed TMEX fall inside the Tsleil-Waututh Consultation Area. They include portions of the pipeline and related facilities, an expanded petroleum storage facility in Burnaby, a new and expanded dock complex at Westridge Marine Terminal, two new pipelines from the storage facility to the terminal, and a roughly sevenfold increase in oil tanker traffic associated with the Westridge Marine Terminal. The physical location of these components triggered this assessment. **Section 6** provides a more detailed summary of the TMEX proposal.

Westridge Marine Terminal lies less than 2 kilometres across the water from Tsleil-Waututh Indian Reserve No. 3 (hereafter “Tsleil-Waututh Reserve”). We can see it from the windows of our houses. Every arriving or departing tanker passes in front of our homes and their wakes strike our shores. The proposal has the potential to affect the Tsleil-Waututh community profoundly.

Figure 1 shows a view of Westridge Marine Terminal from our community.



Figure 1—Westridge Marine Terminal from Tsleil-Waututh Reserve

Regional Overview



TSLEIL-WAUTUTH NATION MAP 1: CONSULTATION BOUNDARY Legend

- ★ Westridge Marine Terminal
- Tanker Route
- KMC Existing Infrastructure
- Trans Mountain System
- Jet Fuel System

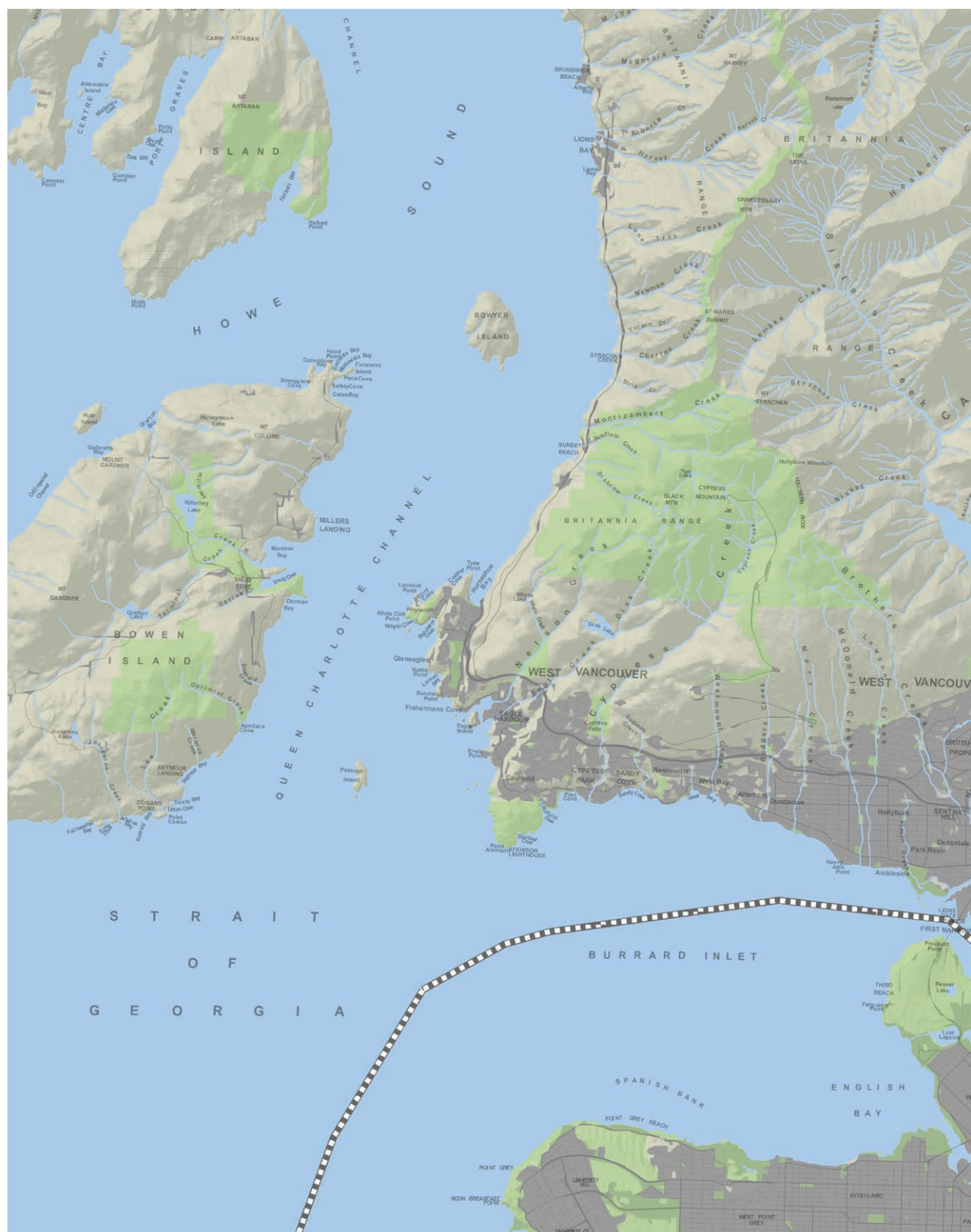
- TWN Consultation Boundary
- Tsleil-Waututh Nation Reserve
- Tsleil-Waututh Assessment Study Area
- Other Indian Reserve
- Greenspace
- Developed Area

Map Scale: 1: 175,000 Inset Map Scale: 1: 175,000
Projection: UTM, NAD 83, Zone 10

0 5 10 20 Kilometers



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TSLEIL-WAUTUTH NATION
BURRARD INLET

MAP 2: ASSESSMENT STUDY AREA BOUNDARY

Legend

★ Westridge Marine Terminal

Tanker Route

KMC Existing Infrastructure

Trans Mountain System

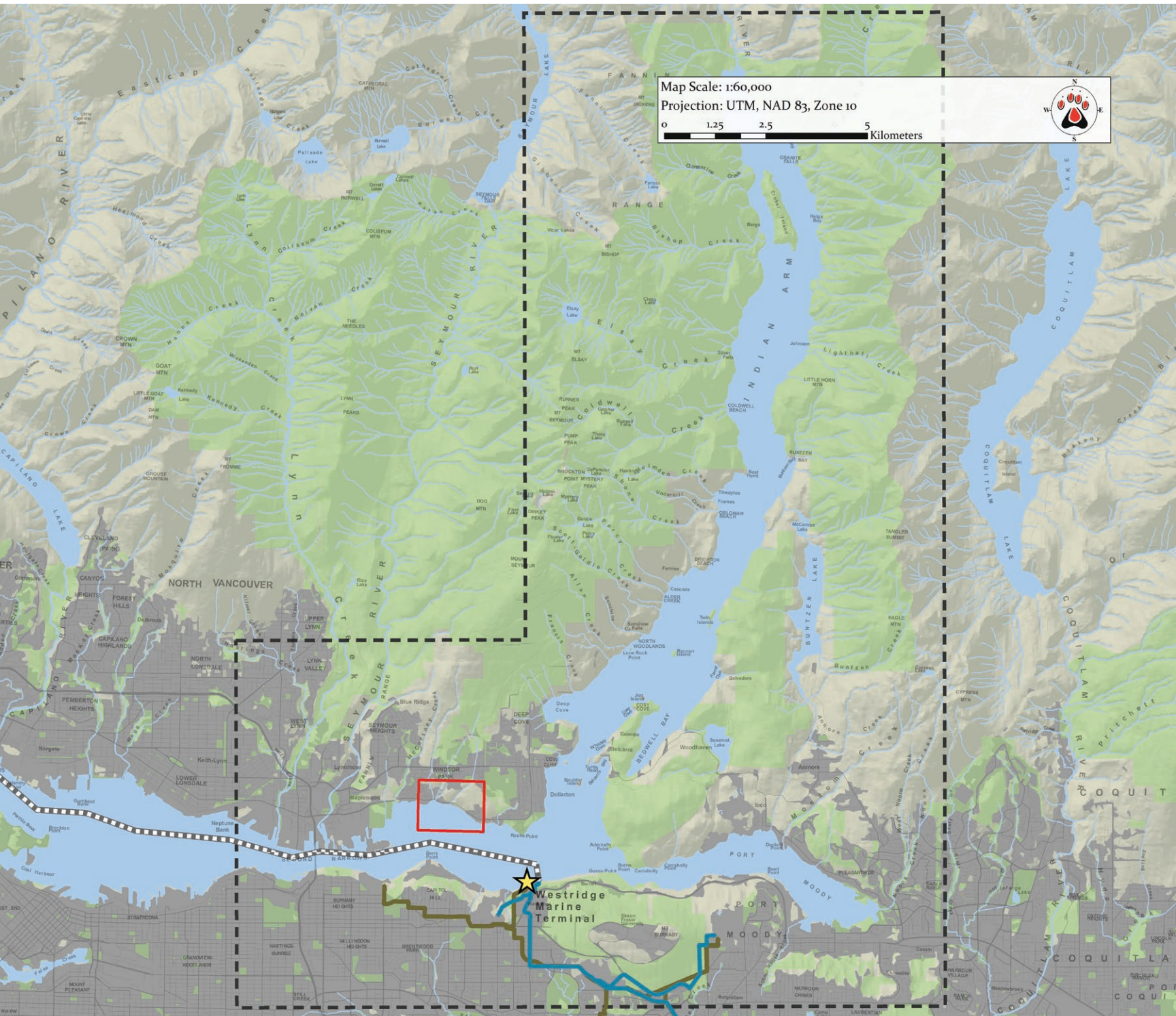
Jet Fuel System

Tsleil-Waututh Assessment Study Area

Tsleil-Waututh Nation Reserve

Greenspace

Developed Area



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TSLEIL-WAUTUTH NATION: WHO ARE WE?

KEY POINTS

- » Tsleil-Waututh, the People of the Inlet, is a distinct Coast Salish nation whose territory includes Burrard Inlet and the waters draining into it.
- » The Tsleil-Waututh people occupied, governed, and acted as stewards of our territory for thousands of years prior to contact, at contact (AD 1792), and at the time of the British Crown's assertion of sovereignty (AD 1846), and we continue to do so today.
- » Our Tsleil-Waututh ancestors maintained villages in eastern Burrard Inlet, exclusively occupied the area, and intensively used the natural resources there, especially the marine and intertidal resources.
- » Our ancestors sustained our people and culture by following a seasonal round of movement to resource harvest camps throughout and beyond Burrard Inlet, in keeping with Coast Salish protocols.
- » Other peoples harvested resources in eastern Burrard Inlet only with Tsleil-Waututh permission, and where necessary, we used military force to defend our territory.
- » As members of the Tsleil-Waututh Nation, we continue to carry out our stewardship obligations, but urban, commercial, and industrial development have restricted our access to and use of resources from Burrard Inlet, and our subsistence economy has suffered.
- » Today the Tsleil-Waututh Nation has created a contemporary economy that complements, but does not replace, our subsistence economy, and the community is undergoing a cultural renaissance.
- » Tsleil-Waututh knowledge is corroborated by the historical, archaeological, and documentary record as set out in the expert report of Dr. Jesse Morin.



TSLEIL-WAUTUTH
THE PEOPLE *of the* INLET

The Tsleil-Waututh are the “People of the Inlet.” We have occupied, governed, and acted as stewards of our territory since time immemorial. Our Tsleil-Waututh ancestors did so at contact (AD 1792)⁵ and at the time of the British Crown’s assertion of sovereignty (AD 1846), and we continue to do so today.

We have used our territory continuously throughout history and have never ceded any of it to outside groups, neither to other First Nations nor to the Crown. In particular, we have occupied eastern Burrard Inlet exclusively since time immemorial. Our leaders have a very long history of asserting Tsleil-Waututh title and rights to our territory.

One Tsleil-Waututh name for Burrard Inlet is *Tsleil-Wat* (Morin 2015). Settlers have recorded similar names. For example, **Figure 2** shows a 1932 draft map drawn by Major J.S. Matthews, the first archivist for the City of Vancouver. He used the name *Slailwit Tuth* for Burrard Inlet. This use of a name that resembles Tsleil-Wat provides external, historical evidence that the inlet was recognized as part of Tsleil-Waututh territory.

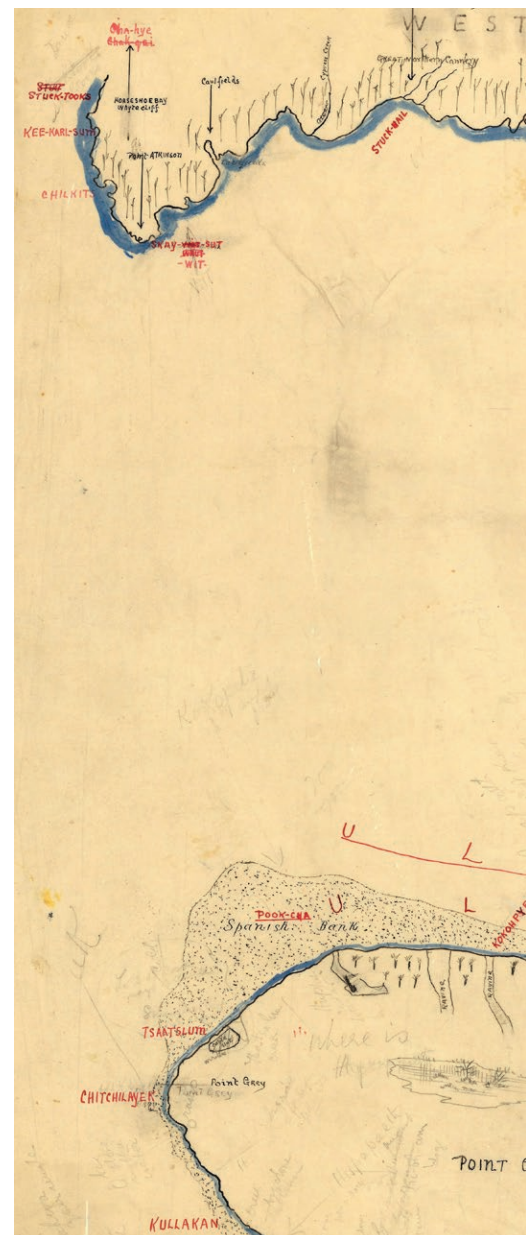


Figure 2—Maj. J.S. Matthews' 1932 Map of "Slailwit Tuth"



COAST SALISH PROTOCOLS

The Tsleil-Waututh people are Coast Salish, sharing customs and interests with other First Nations and tribes around the Salish Sea.

According to Coast Salish concepts of land tenure and territoriality, the water, land, air, and resources of Tsleil-Waututh territory are our birthright. We have a profound obligation to both our ancestors and future generations to protect and care for our water, land, air, and resources and to fulfill our stewardship responsibilities.

Our people have a sacred duty to ensure the health of our territory. The contemporary Tsleil-Waututh Nation carries this stewardship obligation forward and, according to Coast Salish law, remains the decision-making authority for Burrard Inlet. **Section 8** will explain in more detail the origin and nature of Tsleil-Waututh law.

Coast Salish people have clear concepts of water, land, and resource ownership, governance, and stewardship. While other First Nations may have occasionally harvested

resources from Tsleil-Waututh territory, they did so following Coast Salish protocols for seeking permission. Our people must do the same in territories outside our own.

Historically, as today, Coast Salish people maintained widespread kinship networks. The wives and husbands of Tsleil-Waututh leaders came from many different communities. When travelling, we always called upon relatives. Through these connections, we obtained permission to harvest resources outside our territory—for example, at the Fraser River or in Howe Sound.

When necessary, Tsleil-Waututh used military force to defend our territory. We proactively defended it and retaliated against those who did us harm. In the early historic era, our ancestors fortified key places and engaged in numerous battles with raiders from the north. **Map 3** shows the locations of our defensive network and summarizes oral history about two of the battles (Morin 2015).

VILLAGES & OUR SUBSISTENCE ECONOMY

Prior to contact, at least eight and as many as 14 villages existed in eastern Burrard Inlet. Several thousand Tsleil-Waututh people occupied these sites. The villages were strategically located in defensible, and typically sheltered, locations where rich intertidal resources were found (Morin 2015). Tsleil-Waututh people resided in villages in eastern Burrard Inlet in 1846 and up to the present day.

Map 4 shows the location of 10 such villages. **Map 5** identifies correspondences between named ancestral Tsleil-Waututh village sites and known large archaeological sites, confirming their long and continuous use by Tsleil-Waututh people.

All of Burrard Inlet was within easy daily travel distance of Tsleil-Waututh village sites. Most distant were the Indian River, at the head of Indian Arm, and the beaches west of what is now Stanley Park. Our people could travel anywhere in Burrard Inlet within two hours from the villages where Tsleil-Waututh resided in 1846, and we did so to meet our daily needs.⁶ Even reaching the Fraser River from the south shore of Burrard Inlet took less than two hours' walking time. **Map 6** shows the area covered in two hours of travel time.

Tsleil-Waututh used sophisticated technology for mass harvesting and storing abundant marine foods. We maintained a series of resource harvest camps and followed a seasonal round of travel and activity. Our ancestors took full advantage of all aspects of the natural environment. Our

seasonal round extended beyond Burrard Inlet to include other areas (Morin 2015).

Map 7 shows villages, examples of harvest camps and the resources obtained there, and patterns of seasonal movement. **Map 8** identifies a number of archaeological sites in the study area interpreted as having been resource harvest camps inhabited as part of the seasonal round.

Our Tsleil-Waututh subsistence economy was based on access to and use of natural resources as staple foods for both the living community and our ancestors. It included trade with other Coast or Interior Salish communities. It was strongly oriented toward marine resources, especially salmon, herring, clams, and birds. It also included extensive use of land and river environments for harvesting a wide range of animals, plants, and technological resources. The Tsleil-Waututh used all environments of our territory and beyond, from mountaintops to the open sea.

Feeding the ancestors is an important aspect of Tsleil-Waututh culture and tradition made possible by our subsistence economy. In order to care for our ancestors, a *shxwla:m* or Indian Doctor leads a ritual called a "burning." In this ritual, specially prepared, local food is burnt in a fire, accompanied by prayer, as an offering to the ancestors. During this event, we receive the wisdom and knowledge of our ancestors to help us address current issues.



TSLEIL-WAUTUTH NATION EASTERN BURRARD INLET

MAP 3: DEFENSIVE NETWORK

Legend

- Fortified Tsleil-Waututh Village
- Tsleil-Waututh Village
- Lookout Station
- Westridge Marine Terminal

Tanker Route

KMC Existing Infrastructure

- Trans Mountain System
- Jet Fuel System

Proposed KMC Infrastructure Expansion

- Proposed KMC Infrastructure Expansion
- Proposed KMC Alternate Pipeline Expansion
- Tsleil-Waututh Nation Reserve
- Tsleil-Waututh Assessment Study Area

Map Scale: 1:35,000

Projection: UTM, NAD 83, Zone 10

0 0.75 1.5 3 Kilometers



View from Admiralty Point

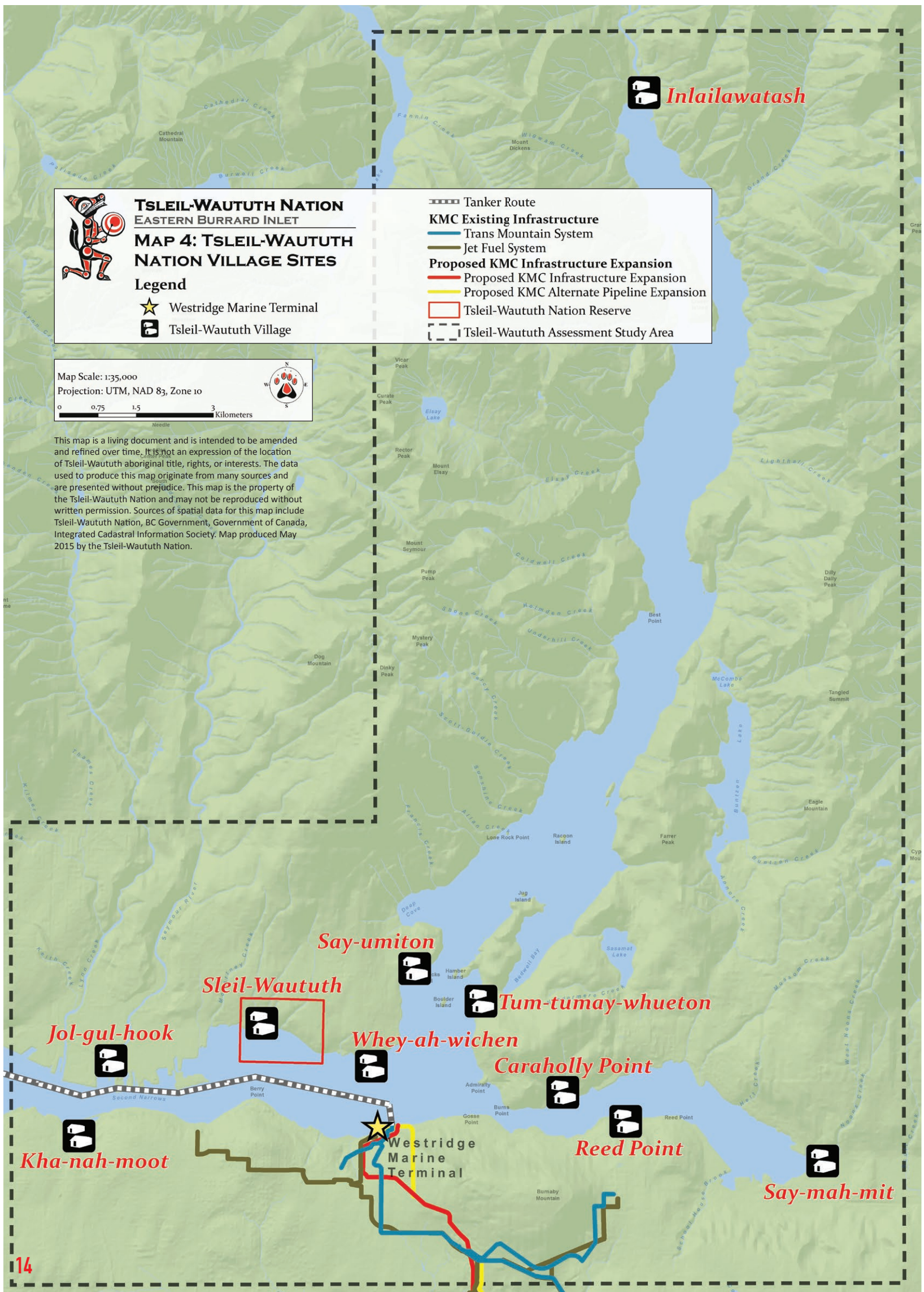
Second Narrows Battle

The Northern tribes, 'Namgis and the Haida, were in the habit of sending out raiding parties as far up the Burrard Inlet as Indian River. There were frequent battles fought and many lives were lost. At what is now the Second Narrows, a large raiding party was successfully waylaid. The canoes of the raiders were sunk when the defenders hurled rocks into them, and the raiders that survived were killed when they made it onto the shore.

Defeat of the Haida

From a hilltop near what is now Admiralty Point, the Tsleil-Waututh kept a lookout for marauding Haida who made periodic forays into the Inlet. When the invaders were spotted, the warriors of Tum-tumay-whueton crossed the water to a cliff on the southern shore. Here they lay in wait. It was the Haida's practice to paddle their canoes close to shore. The defenders took up their positions on the cliff and as the Haida paddled near the bank, they were showered with boulders from above.

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TSLEIL-WAUTUTH NATION
EASTERN BURRARD INLET

**MAP 4: TSLEIL-WAUTUTH
NATION VILLAGE SITES**

Legend

- ★ Westridge Marine Terminal
- 🏠 Tsleil-Waututh Village

- ⬜ Tanker Route
- 🔵 KMC Existing Infrastructure
 - Trans Mountain System
 - Jet Fuel System
- 🔴 Proposed KMC Infrastructure Expansion
 - Proposed KMC Infrastructure Expansion
 - Proposed KMC Alternate Pipeline Expansion
- 🟠 Tsleil-Waututh Nation Reserve
- ⬜ Tsleil-Waututh Assessment Study Area

Map Scale: 1:35,000
Projection: UTM, NAD 83, Zone 10

0 0.75 1.5 3 Kilometers



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From Whey-ah-wichen

 Inlailawatash





TSLEIL-WAUTUTH NATION
EASTERN BURREARD INLET
**MAP 5: LARGE ARCHAEOLOGY
SITES AND NAMED VILLAGE SITES**






Legend

-  Westridge Marine Terminal
-  Named Village Site
-  Tanker Route

KMC Existing Infrastructure

-  Trans Mountain System
-  Jet Fuel System

Proposed KMC Infrastructure Expansion

-  Proposed KMC Infrastructure Expansion
-  Proposed KMC Alternate Pipeline Expansion
-  Tsleil-Waututh Nation Reserve
-  Tsleil-Waututh Assessment Study Area
-  Large Archaeology Site*

*Archaeology site within Tsleil-Waututh Nation Consultation Boundary that is greater than 2700m²

Map Scale: 1:35,000

Projection: UTM, NAD 83, Zone 10

0 0.75 1.5 3 Kilometers

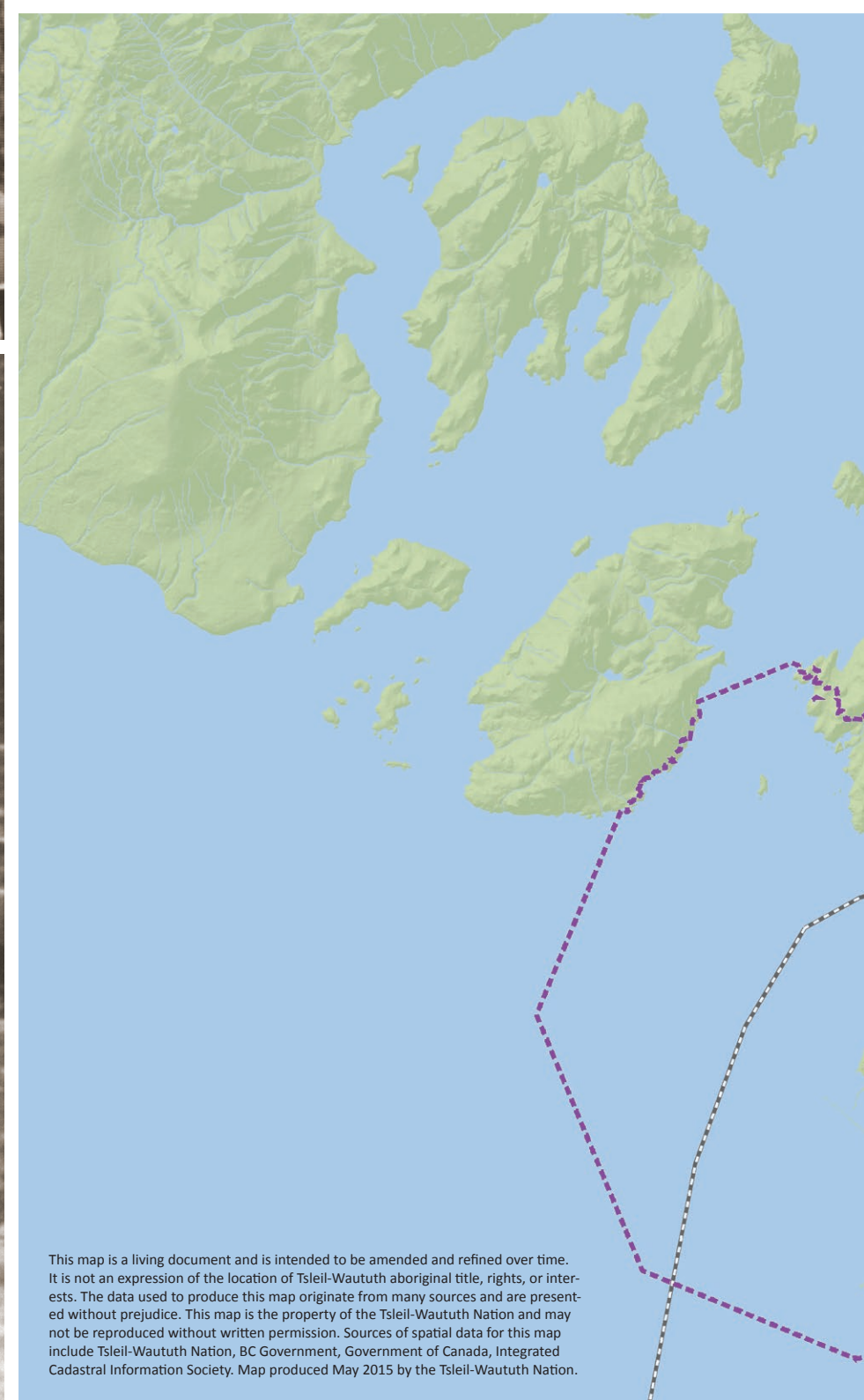


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Courtesy of Sunrays Collection



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Courtesy of Sunrays Collection



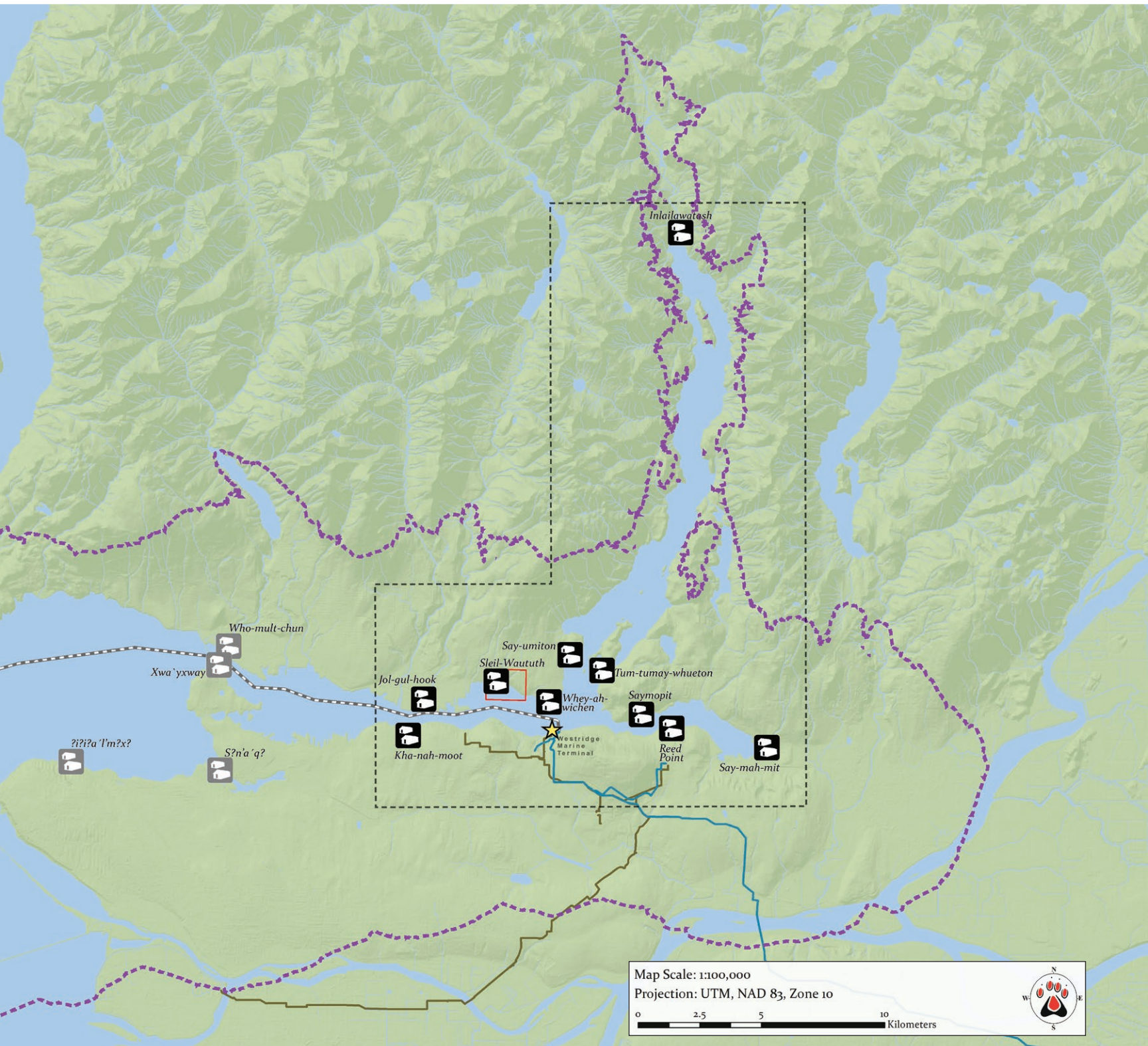
TSLEIL-WAUTUTH NATION
BURRARD INLET

MAP 6: TRAVEL TIME

Legend

- Westridge Marine Terminal
- Tsleil-Waututh Village
- Other Village
- 2 Hour Travel Time (outer boundary)

- Tanker Route
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
- Tsleil-Waututh Nation Reserve
- Tsleil-Waututh Assessment Study Area



Map Scale: 1:100,000
Projection: UTM, NAD 83, Zone 10

0 2.5 5 10 Kilometers







TSLEIL-WAUTUTH NATION **BURRARD INLET**

MAP 8: RESOURCE HARVESTING CAMPS

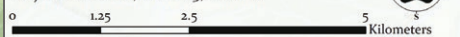
Legend

- ▲ Archaeological Site (interpreted to be the material remains of a place used as a resource harvesting camp)

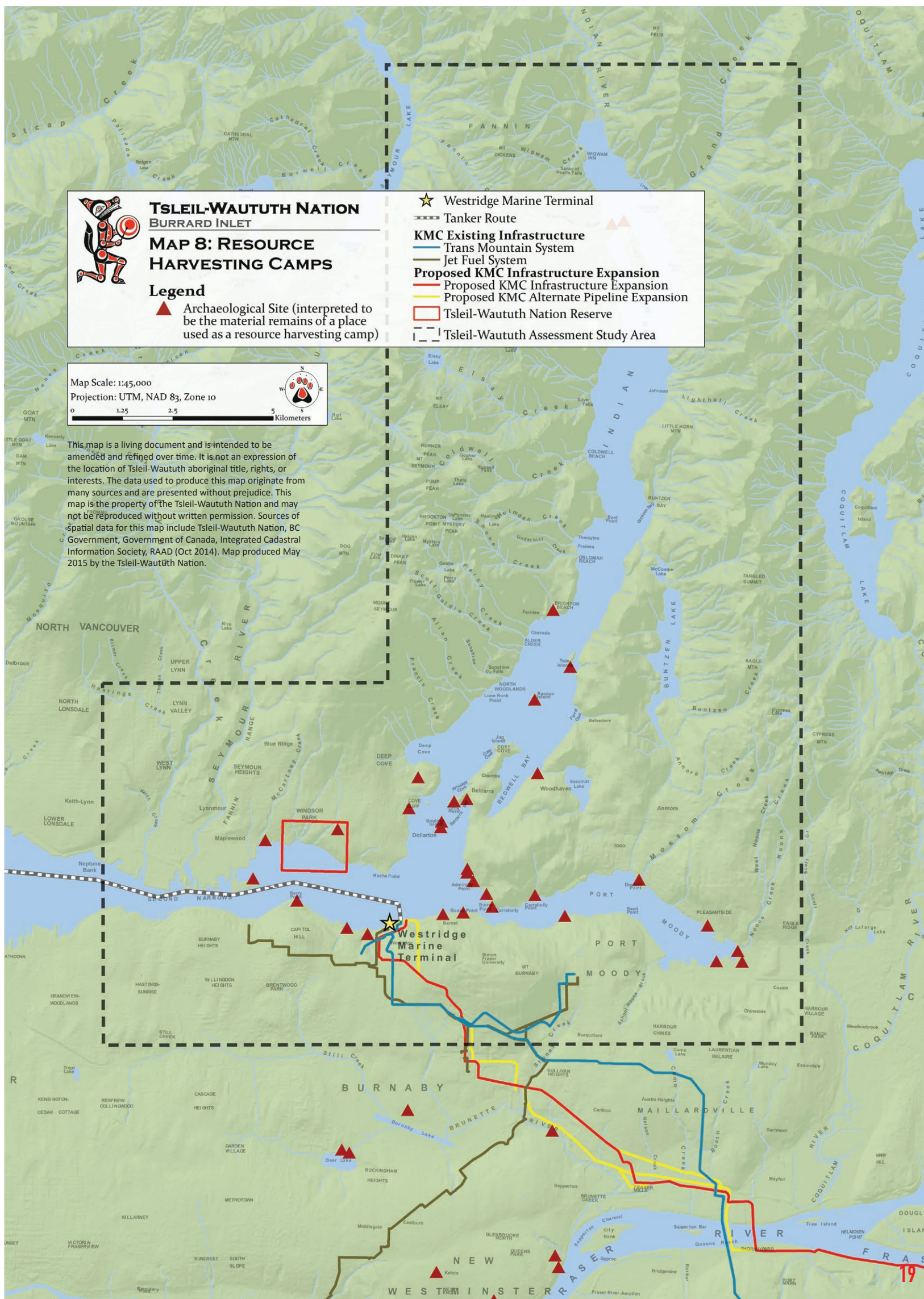
- ★ Westridge Marine Terminal
- ⚓ Tanker Route
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
- Proposed KMC Infrastructure Expansion**
 - Proposed KMC Infrastructure Expansion
 - Proposed KMC Alternate Pipeline Expansion
- ▭ Tsleil-Waututh Nation Reserve
- - - Tsleil-Waututh Assessment Study Area

Map Scale: 1:45,000

Projection: UTM, NAD 83, Zone 10



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DISTINCT GROUP

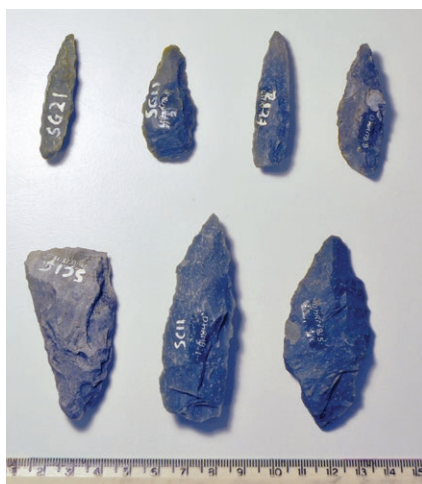
Contact-era Tsleil-Waututh culture and society was distinct from that of our Coast Salish neighbours. Our language was a distinct dialect of Downriver Halkomelem, although we were strongly affiliated, both linguistically and culturally, with other Halkomelem speakers. While our dialect distinguished us from neighbouring communities, it was mutually intelligible with the dialects of many other Halkomelem speakers (Morin 2015). **Map 9** outlines the approximate geographic boundaries of Upriver, Downriver, and Island Halkomelem.

The archaeological record also provides evidence of differences between our people—the people of Burrard Inlet—and those of adjacent areas. The record is clearly Coast Salish in its general character, but unique features identify Tsleil-Waututh as distinct from neighbouring Coast Salish communities. See **Figures 3** and **4** for explanation (Morin 2015).

Figure 3—Unique Burrard Inlet Projectile Points



Triangular side-notched projectile points occur only rarely in late prehistoric (~AD 800-1780) Coast Salish archaeological assemblages but dominate the projectile point assemblage from Tum-tumay-whueton. More triangular side-notched points have been found there than at all other excavated Coast Salish sites combined. Photo by Dr. Jesse Morin.



Green andesite is used rarely for making stone tools in the Coast Salish area, except in Burrard Inlet. This material is present in most archaeological sites there and is very common at Say-umiton (see **Map 5**). Photo by Dr. Jesse Morin.

Figure 4—Unique Burrard Inlet Rock Art



Digitally enhanced pictograph in Indian Arm. Unlike rock art in adjacent areas (Pitt Lake and Squamish Valley), rock art in Burrard Inlet shows use of curved lines and figures, a profile view, and lack of bilateral symmetry, making it unique. Photo by Chris Arnett.





TSLEIL-WAUTUTH NATION
NORTHERN SALISH SEA

MAP 9: HALKOMELEM DIALECT GROUPS

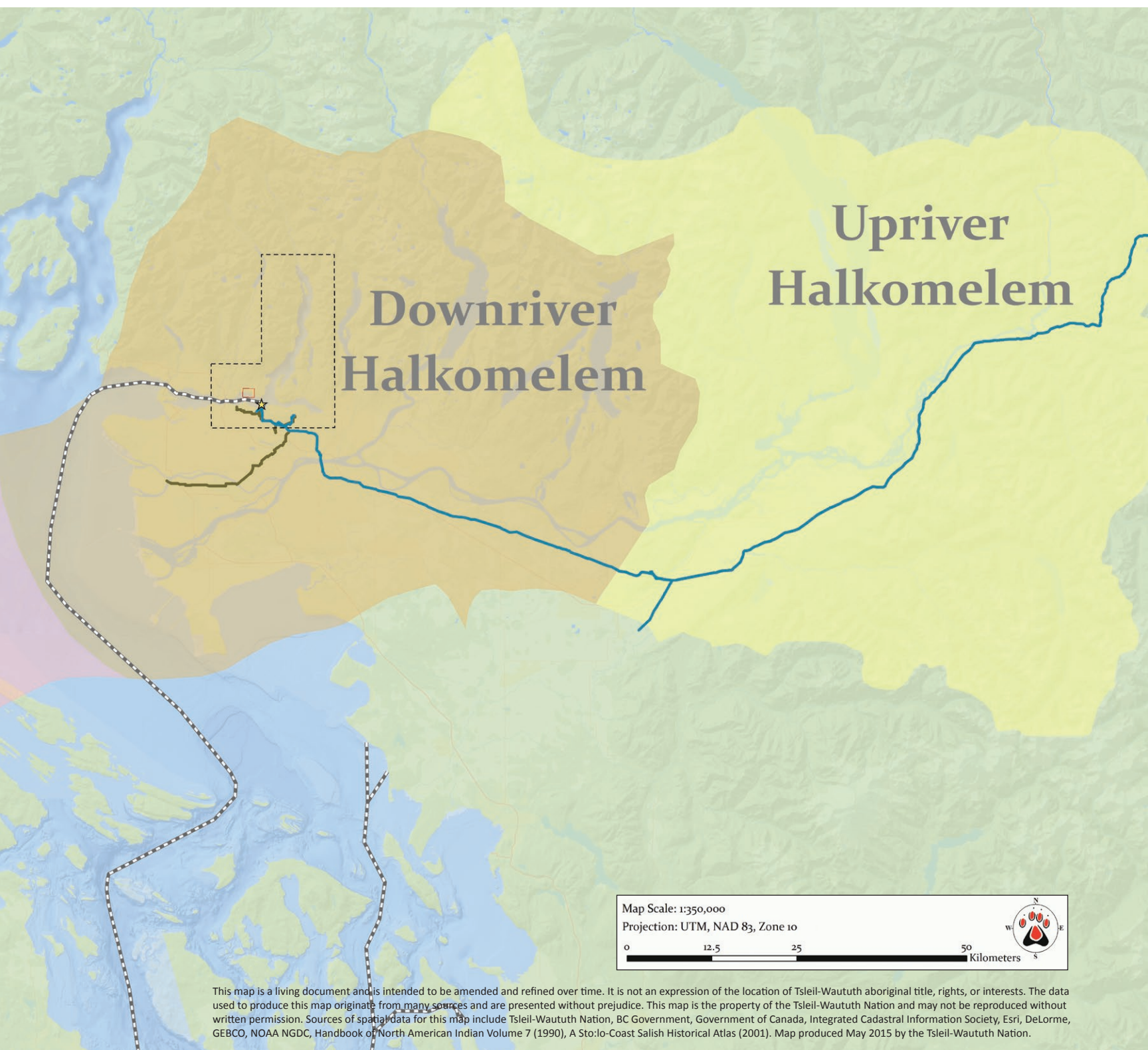
Legend

- ★ Westridge Marine Terminal
- Tanker Route
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
- Tsleil-Waututh Nation Reserve

□ Tsleil-Waututh Assessment Study Area

Halkomelem Groups

- Island Halkomelem
- Downriver Halkomelem
- Upriver Halkomelem



ORAL HISTORY

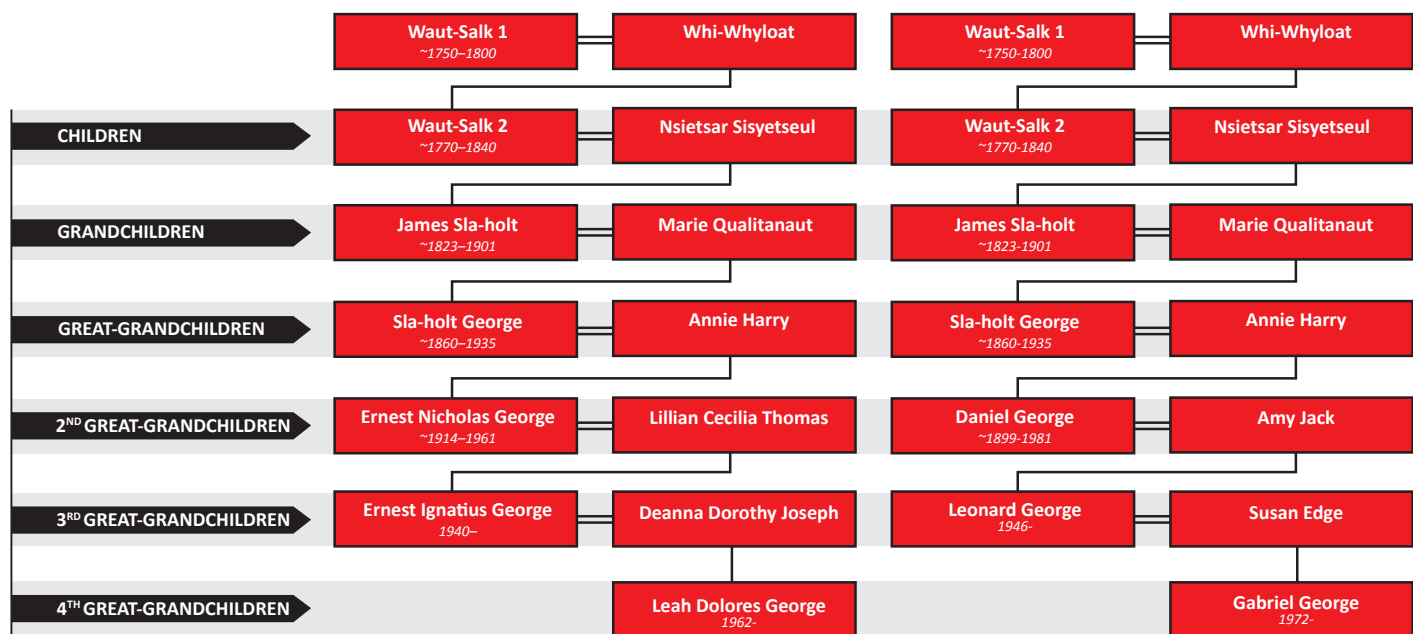
The Tsleil-Waututh Nation preserves a unique body of oral histories that place our origin and the actions of our ancestors in Burrard Inlet. **Section 8** will provide more details. Similarly, most of the recorded Aboriginal place names that refer to sites in Burrard Inlet are Tsleil-Waututh names (Morin 2015). They include the names of villages, camps, and resource harvest sites. **Map 10** shows the Tsleil-Waututh place names for some locations around eastern Burrard Inlet.

GENEALOGY

Tsleil-Waututh’s recorded genealogy reaches back to about AD 1750 and contains at least three pre-contact chiefs of named villages in Burrard Inlet. Direct lines of descent link living Tsleil-Waututh members to these chiefs. **Figure 5** provides two examples.

At the National Energy Board (NEB) hearing for the TMEX proposal, former elected chief Leah Dolores George-Wilson and Gabriel George gave oral traditional evidence supporting a simplified version of the genealogical tree shown in **Figure 5**.⁷ Their testimony was part of the oral Aboriginal traditional evidence presented on October 16, 2014, in Chilliwack, British Columbia. They are direct, living descendants of Chiefs Waut-Salk 1 and 2, as illustrated in **Figure 5**.

Figure 5—Examples of Tsleil-Waututh Lines of Descent





TSLEIL-WAUTUTH NATION **EASTERN BURRARD INLET** **MAP 10: PLACE NAMES**

Legend

- ★ Westridge Marine Terminal
- Tanker Route

KMC Existing Infrastructure

- Trans Mountain System
- Jet Fuel System

Proposed KMC Infrastructure Expansion

- Proposed KMC Infrastructure Expansion
- Proposed KMC Alternate Pipeline Expansion

- Tsleil-Waututh Nation Reserve

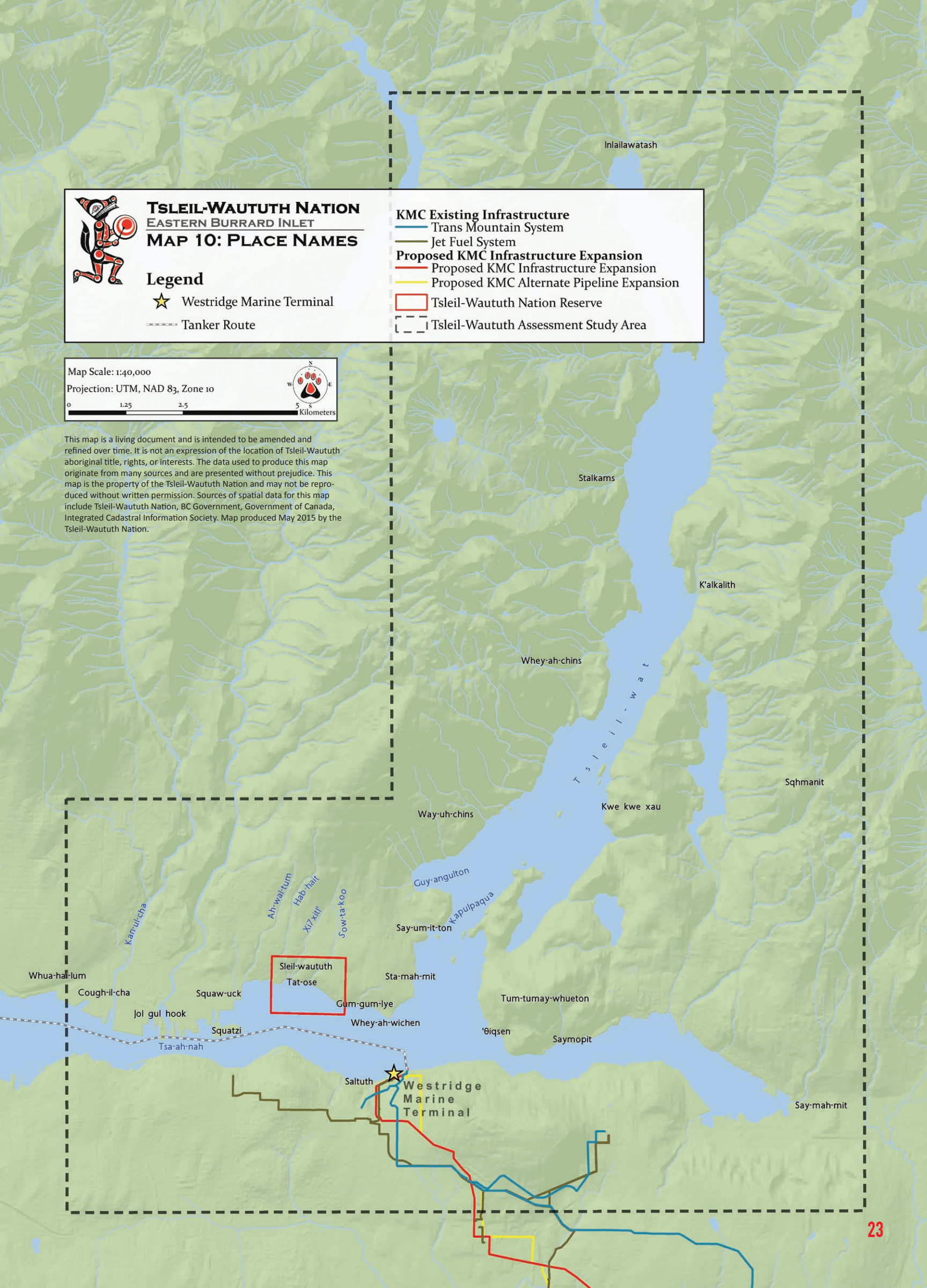
- Tsleil-Waututh Assessment Study Area

Map Scale: 1:40,000

Projection: UTM, NAD 83, Zone 10



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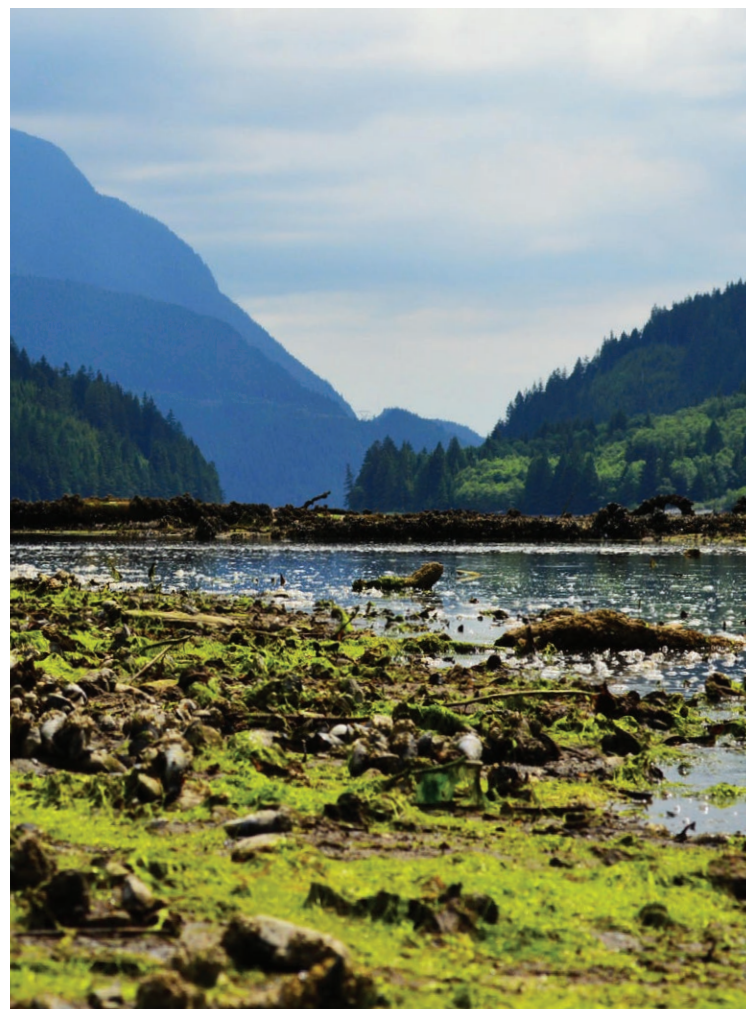
TODAY

Tsleil-Waututh has continuously occupied eastern Burrard Inlet since time immemorial. The community continues to use many resources from this area and to carry out our stewardship responsibilities. However, the abundance and cleanliness of the inlet has diminished over time.

Urban, commercial, and industrial development have threatened the foundation of the Tsleil-Waututh subsistence economy—salmon, herring, clams, and birds—making these resources scarce, contaminated, or inaccessible. Out of necessity, the nation has created a contemporary economy. It is based on real estate development, green energy, natural resource management, cultural tourism, and related business enterprises. The contemporary economy helps, but for cultural, spiritual, and health reasons, it is not a substitute for our subsistence economy.

Strong governance and the revitalization of our traditional language have brought a cultural renaissance to Tsleil-Waututh. The community maintains its obligation to our ancestors and to future generations. We regularly conduct cultural work, sometimes at shoreline locations less than a kilometre from Westridge Marine Terminal. If this work takes place out on the water in canoes, it can occur in very close proximity to tankers arriving, departing, anchored, or berthed.

As part of our stewardship responsibilities, the Tsleil-Waututh Nation is actively implementing laws, policies, and actions that aim to ensure a healthy and prosperous future for our people, water, land, air, and resources. We remain committed to enduring as a strong political, social, economic, and cultural community.



TSLEIL-WAUTUTH TITLE, RIGHTS, *and* INTERESTS

The Tsleil-Waututh Nation has a diverse set of title, rights, and interests. We have Aboriginal title to the water, land, and air in eastern Burrard Inlet and beyond, and exercise Aboriginal rights and interests potentially affected by the TMEX proposal. While not an exhaustive list, **Table 1** summarizes some of the rights that are relevant in assessing the TMEX proposal.

Table 1—Tsleil-Waututh Title, Rights, and Interests

TITLE, RIGHT, OR INTEREST	DESCRIPTION
Archaeological and Cultural Heritage Sites	The right to preserve and protect sensitive sites and to ensure they are kept physically intact
Contemporary Economy	The right to derive benefit from the territory and pursue economic development opportunities in a variety of ways, related or unrelated to natural resources
Cultural or Spiritual Practices and Places	The right to access important places with the assurance that they will be physically and culturally intact, without disturbances of the view, violation of privacy, noise intrusions, polluted water, or contaminated sediment
Cultural Transmission	The right to access sites for activities, such as resource harvest, that foster elder-youth interaction and provide elders with opportunities to share history, knowledge, traditional ways, and skills with youth
Cultural Travel	The right to safe, unobstructed travel throughout Burrard Inlet
Environmental Integrity	The right to an environment that is not significantly degraded and is well within its capacity to sustain a robust subsistence economy and the Tsleil-Waututh people as a nation
Environmental Stewardship	The right and responsibility to manage natural resources and the environment in Burrard Inlet—for example, we are currently taking steps to restore the environmental integrity of Burrard Inlet in accordance with Tsleil-Waututh law, through initiatives like the Marine Stewardship Program and by monitoring and making adjustments for cumulative effects on Tsleil-Waututh territory
Individual and Community Health	The right to conditions conducive to healthy bodies, minds, and spirits—that is, to the intertwined environmental, cultural, spiritual, social, and economic conditions that ensure the well-being of individuals and of the community as a whole
Marine Fish and Wildlife Habitat and Species	The right to a healthy, diverse, and interconnected habitat that supports diverse and abundant species free from contamination
Resource Access and Harvest or Use	The right to access and harvest or use natural resources (especially those listed below) for cultural, ceremonial, spiritual, subsistence, and economic purposes: <ul style="list-style-type: none"> » shellfish, such as crabs, clams, oysters, shrimp, mussels, and sea urchins » birds, such as ducks, grebes, and grouse, and their eggs » mammals, such as deer, bears, elk, rabbits, squirrels, and seals » fish, such as salmon, trout, cod, flounder, sole, rockfish, and herring, and their eggs » kelp, drift logs, and a variety of other plants and seaweeds
Subsistence Economy	The right to access and use natural resources (especially those listed below) as staple foods for the living community and for our ancestors, and the right to sell or trade these items: <ul style="list-style-type: none"> » shellfish, such as crabs, clams, oysters, shrimp, mussels, and sea urchins » birds, such as ducks, grebes, and grouse, and their eggs » mammals, such as deer, bears, elk, rabbits, squirrels, and seals » fish, such as salmon, trout, cod, flounder, sole, rockfish, and herring, and their eggs » kelp, drift logs, and a variety of other plants and seaweeds
Title and Governance	The right to possess our territory and exclusively occupy and use it for the benefit of the Tsleil-Waututh Nation, exercising authority and jurisdiction over its water, land, air, and resources in accordance with Tsleil-Waututh law, actively managing it, and deciding on future uses
Tsleil-Waututh Benefit	The right and responsibility to steward the territory for the benefit of past, present, and future generations
Tsleil-Waututh Reserve	The right to environmental, cultural, and socio-economic conditions that pose no harm to our reserve or its infrastructure
Water	The right to clean water, free from pollution, for drinking and for cultural, ceremonial, spiritual, subsistence, and economic purposes

Several of these rights can be grouped together and referred to as “cultural work.” They include 1) cultural and spiritual practices, 2) cultural transmission, 3) cultural travel, 4) aspects of individual and community health, and 5) elements of resource access and harvest or use.

5. BURRARD INLET PHYSICAL SETTING *and* ENVIRONMENTAL STATUS

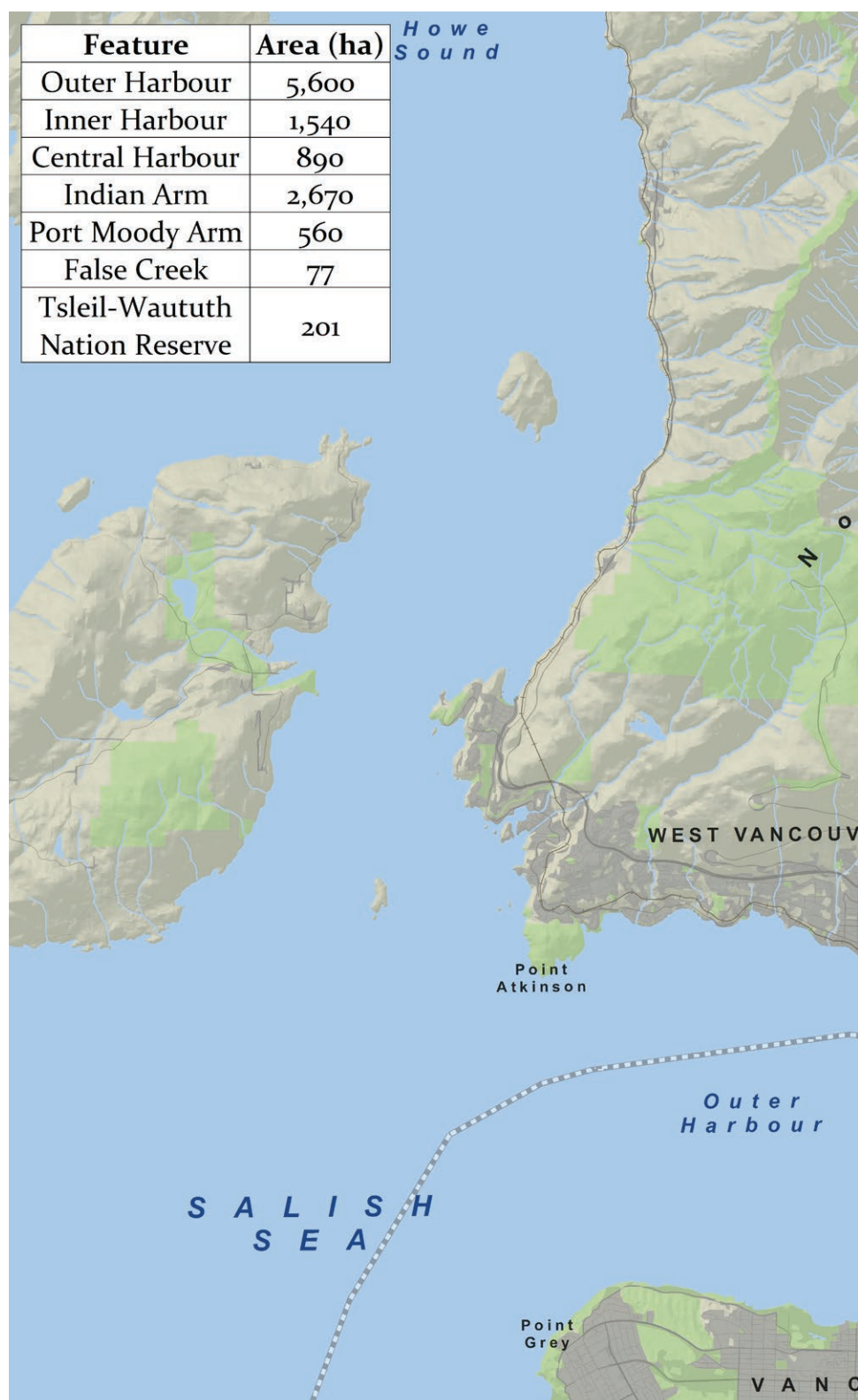
KEY POINTS

- » Burrard Inlet is a long, narrow extension of the Salish Sea surrounded by a large urban population.
- » Five basins form Burrard Inlet: the Outer Harbour, the Inner Harbour, the Central Harbour, Indian Arm, and Port Moody Arm. English Bay lies in the southeast corner of the Outer Harbour at the entrance to False Creek.
- » Urban, commercial, and industrial development has altered one-third of the shoreline and led to the construction of over 340 outfalls that discharge pollutants into the inlet—the volume of industrial discharge today is 25 times what it was in 1957.
- » Two hundred years of development have damaged the inlet: herring had vanished by 1885, the federal government banned bivalve harvest in 1972, and salmon returns and marine bird numbers have diminished. However, the inlet remains important to many species, including marine birds and mammals, rockfish, surf smelt, salmon species, and shellfish.
- » Because the marine foods that form the basis of the Tsleil-Waututh subsistence economy are now scarce, contaminated, or inaccessible, our nation is actively working to restore the environmental integrity of Burrard Inlet through a Marine Stewardship Program.

Burrard Inlet is a marine extension of the Salish Sea in British Columbia, with strong tidal currents and a large tidal range. Its long and narrow water surface covers 11,300 hectares. The surrounding natural drainage basin comprises 98,000 hectares (BIEAP 2011).

Burrard Inlet consists of major five basins, as shown on **Map 11**: 1) a western entrance called the Outer Harbour, 2) the Inner Harbour, 3) the Central Harbour, 4) Indian Arm, and 5) Port Moody Arm. A line drawn between Point Atkinson, on the north shore, and Point Grey, on the south shore, defines the western boundary of the Outer Harbour and, thus, the outer limit of Burrard Inlet.

In the southeast corner of the Outer Harbour is English Bay, which provides an entry into False Creek. First Narrows connects the Outer Harbour with the Inner Harbour. From its western limit between the mouth of the Capilano River, on the north shore, and Stanley Park, on the south, it runs eastward under the Lions Gate Bridge. Second Narrows connects the Inner Harbour with the Central Harbour. It



passes under the Ironworkers Memorial and the Canadian National Railway Bridges.

Further east, Burrard Inlet splits into two extensions. Indian Arm extends northward, as a fjord. The Port Moody Arm extends eastward, ending as a relatively shallow estuary.

The total east-west length of Burrard Inlet is about 30 kilometres. Indian Arm extends northward approximately 20 kilometres. East of (inside) First Narrows, Burrard Inlet is less than 3 kilometres wide, north to south. At First and Second Narrows, the distance is less than 500 metres.

The communities surrounding Burrard Inlet support an urban population of over 2.5 million and eight shoreline

municipalities: West Vancouver, City and District of North Vancouver, Belcarra, Anmore, Port Moody, Burnaby, and Vancouver. Burrard Inlet also falls within the jurisdiction of Port Metro Vancouver, Metro Vancouver, and the Vancouver Coastal Health District.

Tsleil-Waututh Reserve occupies about 100 hectares of land and 100 hectares of adjacent marine water on the north shore of the Central Harbour (see Map 11). On land, the District of North Vancouver surrounds the reserve. Tsleil-Waututh Reserve is located across the water from the City of Burnaby, less than 2 kilometres from Westridge Marine Terminal.



DEVELOPMENT

Urban, commercial, and industrial development takes up much of the Burrard Inlet shoreline. This development was driven by population growth and post-contact economic expansion. In recent years, Port Metro Vancouver, the port authority for the inlet, has been named Canada's Pacific Gateway,⁸ the largest port in the country.

Burrard Inlet is bounded by 190 kilometres of marine shoreline (BIEAP 2011). About 18% of the shoreline is rocky headlands or cliffs, and 33% has been altered from its natural state by human activity. The balance is a mixture of beaches, flats, estuaries, marshes, and lagoons, as shown on **Map 12**.

The shoreline of Indian Arm, an area of special importance to Tsleil-Waututh, remains relatively undeveloped, although there are small sanitary discharges there (BIEAP 2011). Upland, well away from the shoreline, conservation or park status (labelled "Greenspace" on the maps) protects about 70% of the drainage basin.

British Columbia Ministry of Environment records indicate that Burrard Inlet has 22 industrial effluent authorizations, one municipal wastewater authorization, 18 combined sewer overflow outfalls, one sanitary sewer overflow outfall, and in excess of 300 municipal stormwater outfalls (BIEAP 2011). In total, 769 million cubic metres of industrial pollution pour into Burrard Inlet each year, nearly 25 times the volume that entered the inlet in 1957 (TWN 2005).

Industrial activities that are authorized by others to discharge liquid wastes into Burrard Inlet include chemical plants, bulk petroleum storage and handling facilities, a petroleum refinery, a fish processing plant, bulk ore handling facilities, concrete plants, a sugar refinery, and a thermal power generating station. The Lions Gate Wastewater Treatment Plant is also authorized by others to discharge municipal effluent into Burrard Inlet (BIEAP 2011). None of these activities has been authorized by the Tsleil-Waututh Nation.

Map 13 shows the extent of industrial and port development around Burrard Inlet and the location of many of the outfalls.

One consequence of more industrial discharge into Burrard Inlet is increased acidity of its marine water (Marliave et al. 2011). Ocean acidification due to climate change may accelerate the effect. This change has interrupted many natural processes, such as shell formation, especially in bivalves such as oysters, and may have caused population decreases in species that are of particular concern to Tsleil-Waututh.

The marine waters between Tsleil-Waututh Reserve and Westridge Marine Terminal are used frequently by large vessels. In 2012, there were 6,858 counted vessel movements there.⁹ Of those, 5,631 were movements by tugs.

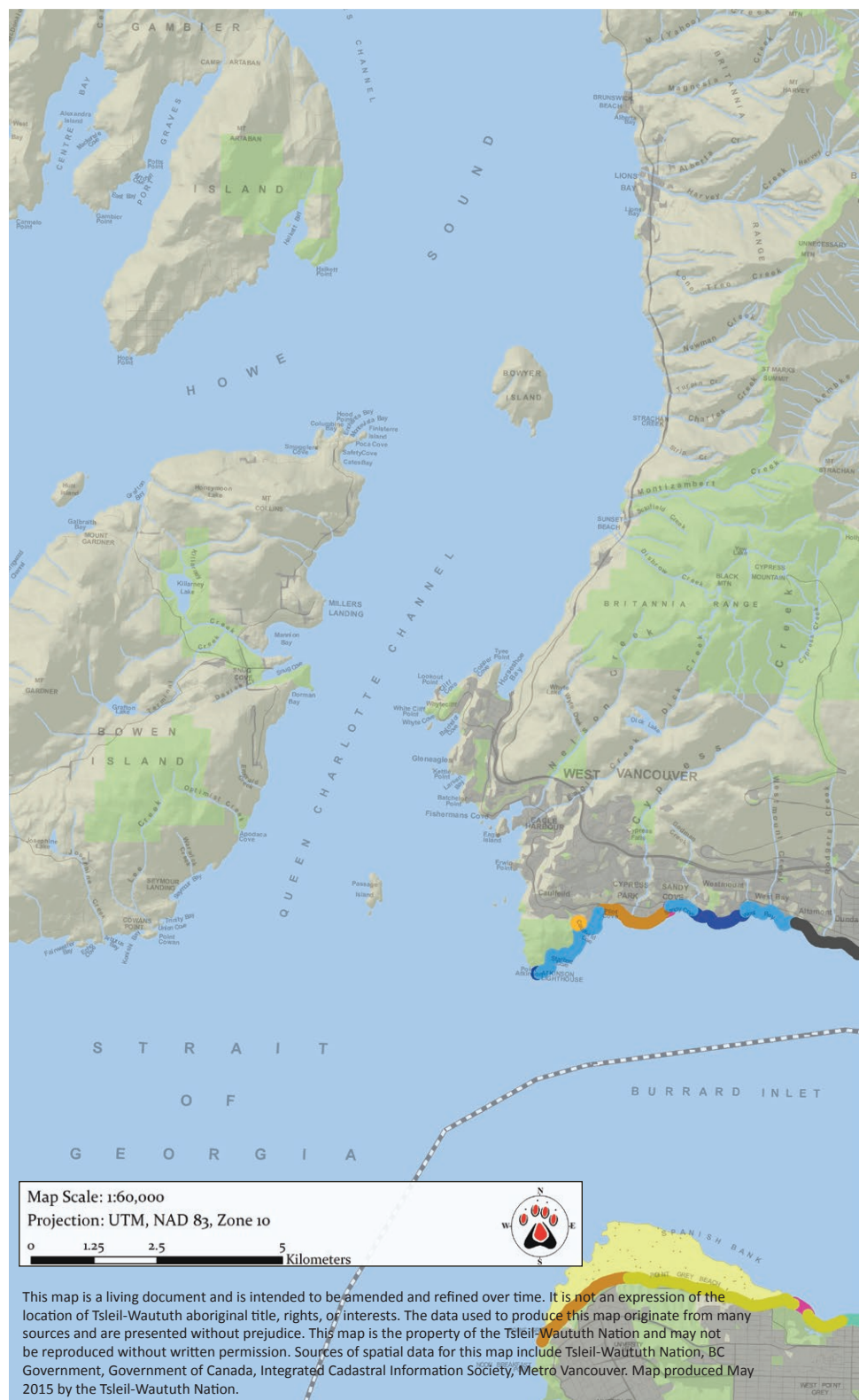


TSLEIL-WAUTUTH NATION BURRARD INLET







MAP 12: SHORELINE CHARACTERISTICS


Legend

- ★ Westridge Marine Terminal
- Tanker Route



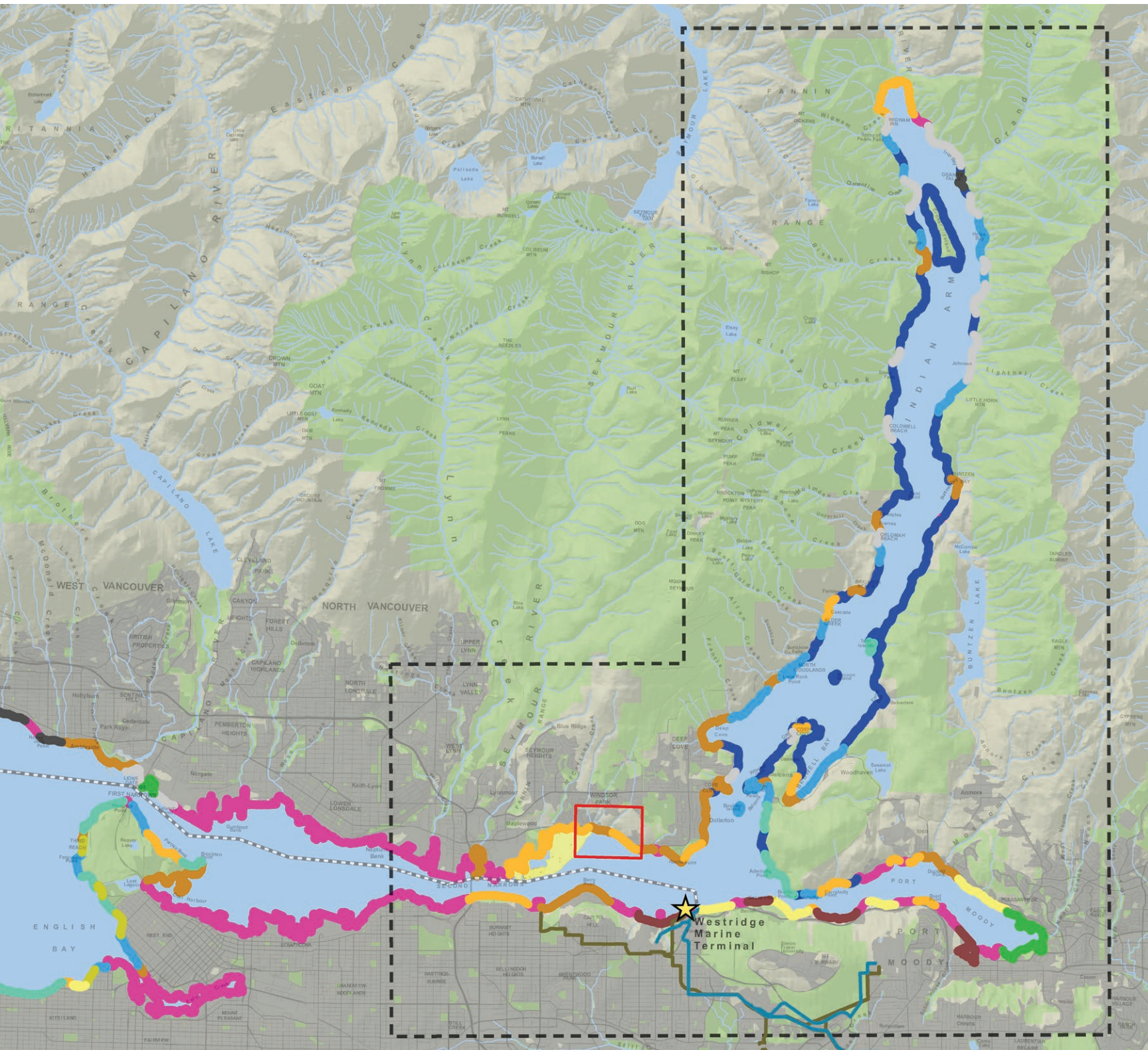
KMC Existing Infrastructure

-  Trans Mountain System
-  Jet Fuel System
-  Tsleil-Waututh Nation Reserve
-  Tsleil-Waututh Assessment Study Area
-  Greenspace
-  Developed Area

 Sand Flat*

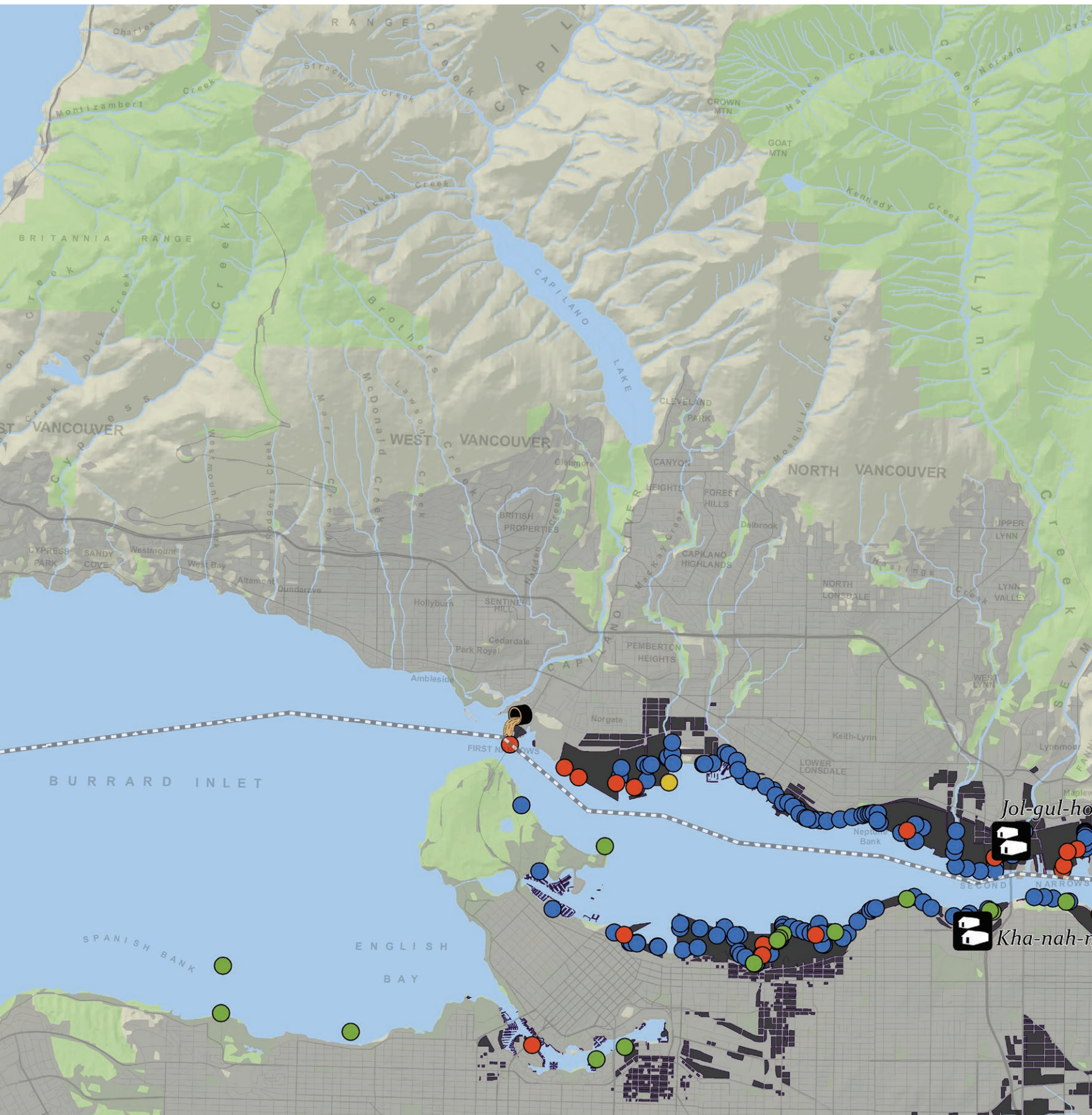
Shorezone Class (Percent of Total Length)*

-  Estuary, Marsh or Lagoon: 2%
-  Gravel Beach: 5%
-  Gravel Flat: 2%
-  Altered: 33%
-  Mud Flat: 2%
-  Rock Cliff: 18%
-  Rock with Gravel Beach: 9%
-  Rock, Sand and Gravel Beach: 4%
-  Sand Beach: 3%
-  Sand Flat: 2%
-  Sand and Gravel Beach: 8%
-  Sand and Gravel Flat: 12%





TSLEIL-WAUTUTH NATION
BURRARD INLET
**MAP 13: OUTFALLS AND
INDUSTRIAL USE**



Legend

Outfall

- Authorized Industrial Effluent Outfall
- Combined Sewer Outfall
- Sanitary Sewer Outfall
- Stormwater Outfall



Westridge Marine Terminal



Wastewater Treatment Plant



Tseil-Waututh Major Village



Tanker Route

KMC Existing Infrastructure

- Trans Mountain System
- Jet Fuel System
- Tseil-Waututh Nation Reserve
- Industrial and Port Use
- Greenspace
- Developed Area

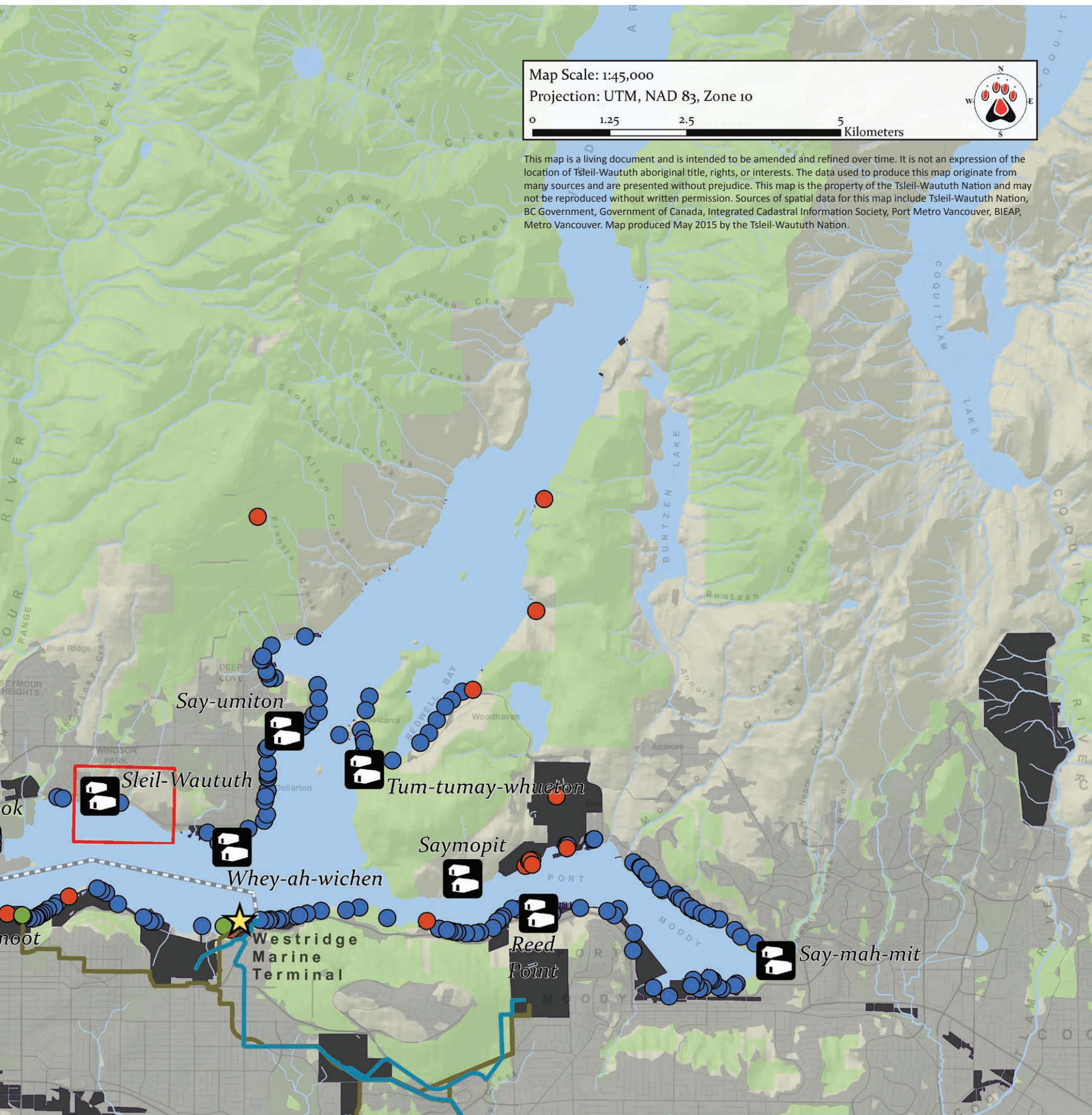
Map Scale: 1:45,000

Projection: UTM, NAD 83, Zone 10

0 1.25 2.5 5 Kilometers



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FISH AND WILDLIFE

Burrard Inlet was historically one of Canada's most productive locations for fish and wildlife species. It is a stop on the Pacific Flyway, a major north-south migratory path for birds in the western hemisphere. Today it retains designations as an Important Bird Area and an Important Bird Habitat. It also hosts three Rockfish Conservation Areas. **Map 14** shows where these designations apply.

The Important Bird Area¹⁰ was designated to protect western grebe, Barrow's goldeneye, surf scoter, and great blue heron. While the first three species were once found in Burrard Inlet in large numbers, in the recent past their visits have declined steeply. Other birds that make regular use of the marine waters, such as cormorants, other ducks, geese, gulls, and loons, also benefit from the designation.

The Rockfish Conservation Areas were established to prevent further population declines. Rockfish form an important part of the food chain in Burrard Inlet, but their long life and slow reproduction make them a species vulnerable to population fluctuations. As **Map 14** shows, one of the Rockfish Conservation Areas is right next to Westridge Marine Terminal and underneath the TMEX marine shipping lane.

Marine mammals, including blackfish (orca or southern resident killer whale), reside in or visit Burrard Inlet. **Map 15** shows the areas used by select marine mammal species and the location of some recent sightings.

Finfish species that have historically used the inlet include salmon, trout, and forage fish such as herring, surf smelt, sardines, sand lance, eulachon, and anchovy. Salmon and trout species that are still present include pink, chum, coho, chinook, and steelhead. Several rivers and creeks host wild runs. Hatchery runs are found in the Capilano and Seymour Rivers. **Map 16** shows the major rivers and creeks in Burrard Inlet and the species of salmon that use them.

The most abundant stocks of wild salmon spawn in the Indian River. There, annual returns of chum and odd-year returns of pink are the largest. There is also a small coho stock. See **Figure 6** for an example.

Figure 6—2013 Indian River



TSLEIL-WAUTUTH NATION BURRARD INLET

MAP 14: IMPORTANT BIRD AREAS AND ROCKFISH CONSERVATION AREAS

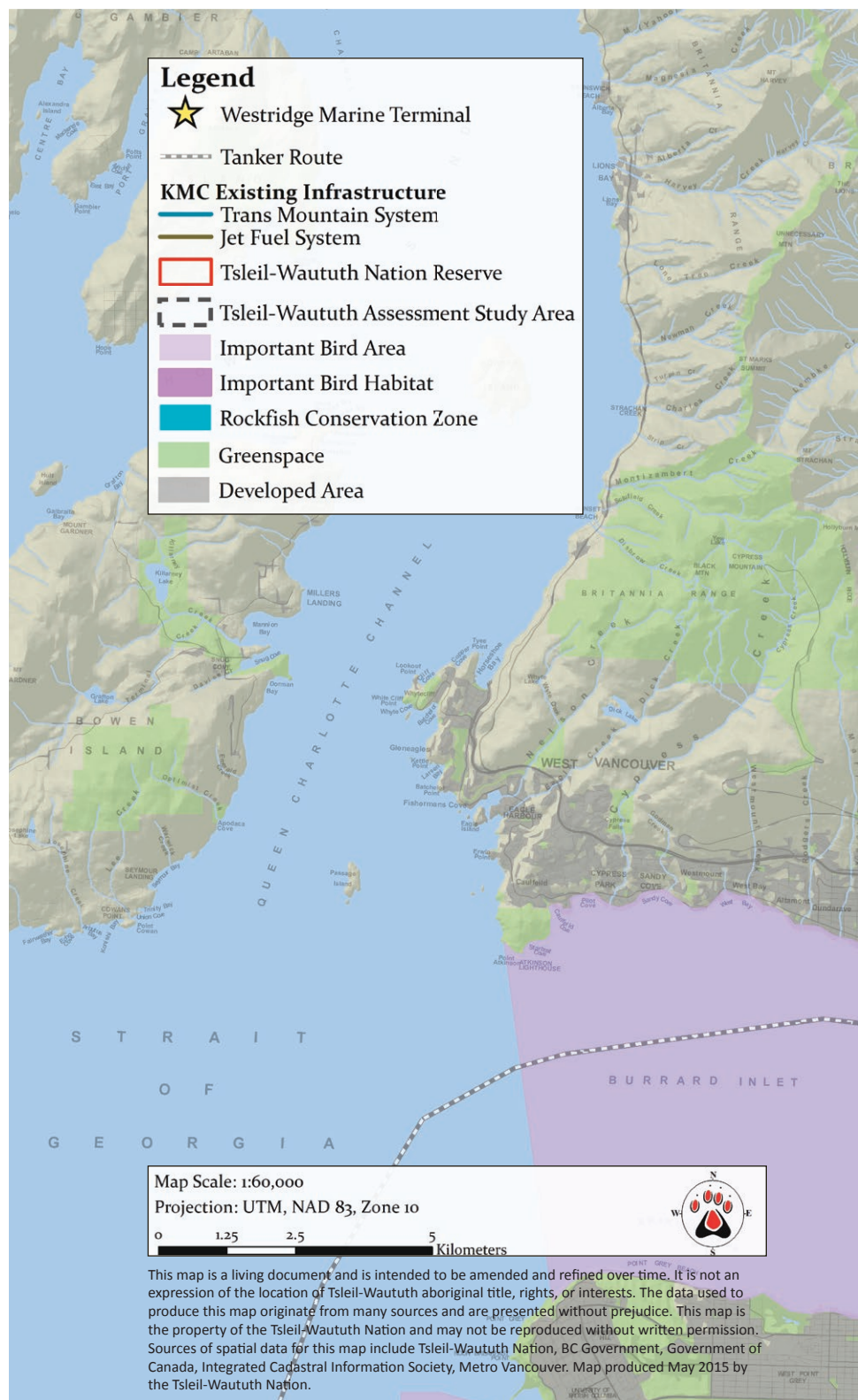
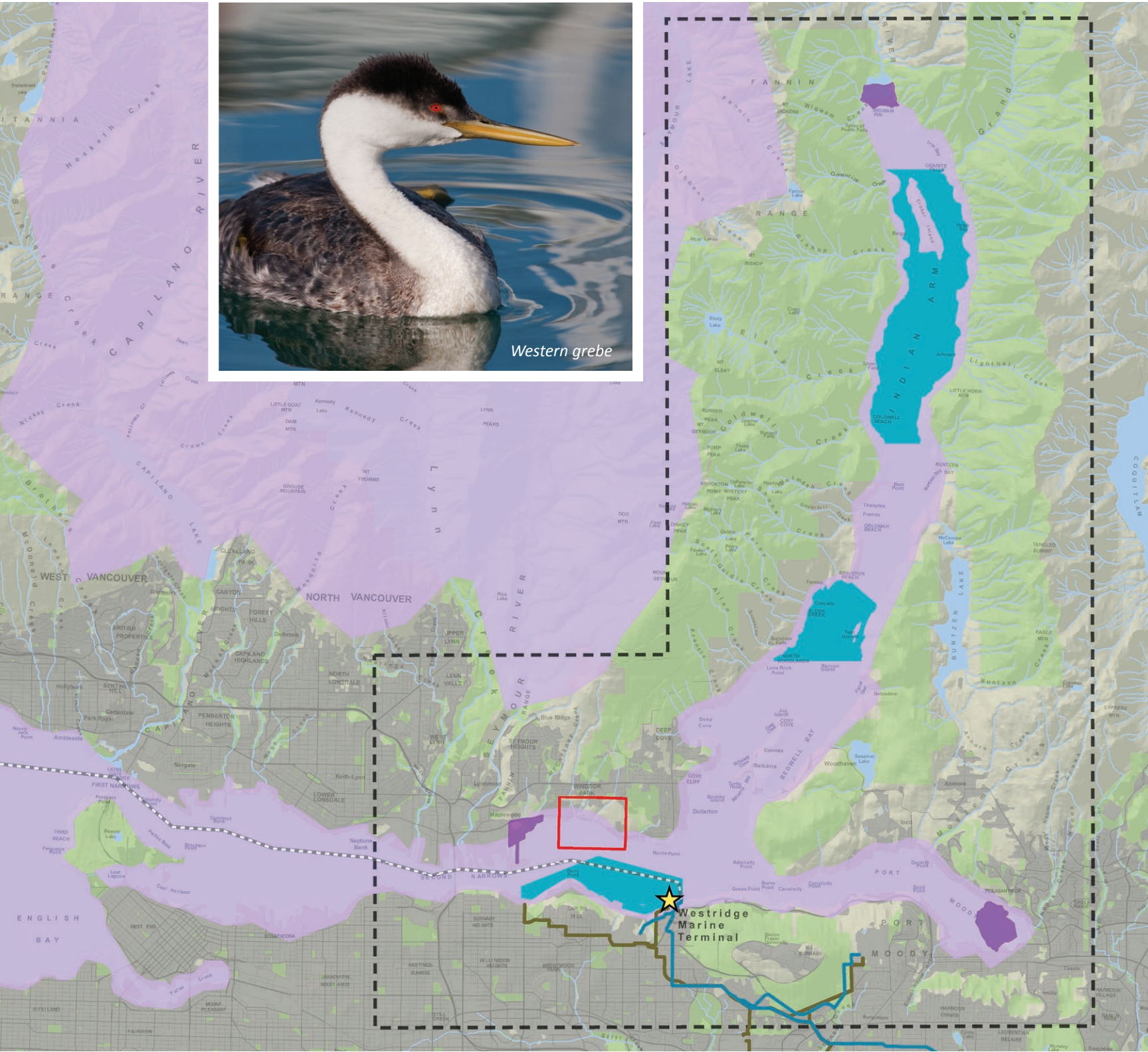


Table 2—Average Annual Return of Adult Salmon to Indian River

YEAR	PINK RETURNS	CHUM RETURNS	COHO RETURNS
pre-contact ¹¹	~1,000,000	~750,000	~10,000
1934-1982	67,300	14,700	1,300
1987-2013	94,500	76,500	1,050

Table 2 provides a comparison of pre-contact returns with the 20th-century returns of adult salmon in the Indian River (Fedorenko and Shepherd 1984; Knudson 2000; TWN 2014). While returns for pinks and chum have recovered somewhat from the mid-20th century, they remain low compared to pre-contact numbers. At least a portion of the recent increase may be the result of habitat restoration actions in the Indian River undertaken by the Tsleil-Waututh Nation in accordance with our Marine Stewardship Program.



¹¹ E. Eric Knudson (2000) suggests a multiplier of 10 to estimate historic magnitudes. This multiplier was applied to the 1987-2013 returns.



TSLEIL-WAUTUTH NATION BURRARD INLET

MAP 15: MARINE MAMMALS

Legend

- ★ Westridge Marine Terminal
- Tanker Route

Sightings^{1,2}

- Blackfish Sighting
- Gray Whale Sighting
- Harbour Porpoise Sighting

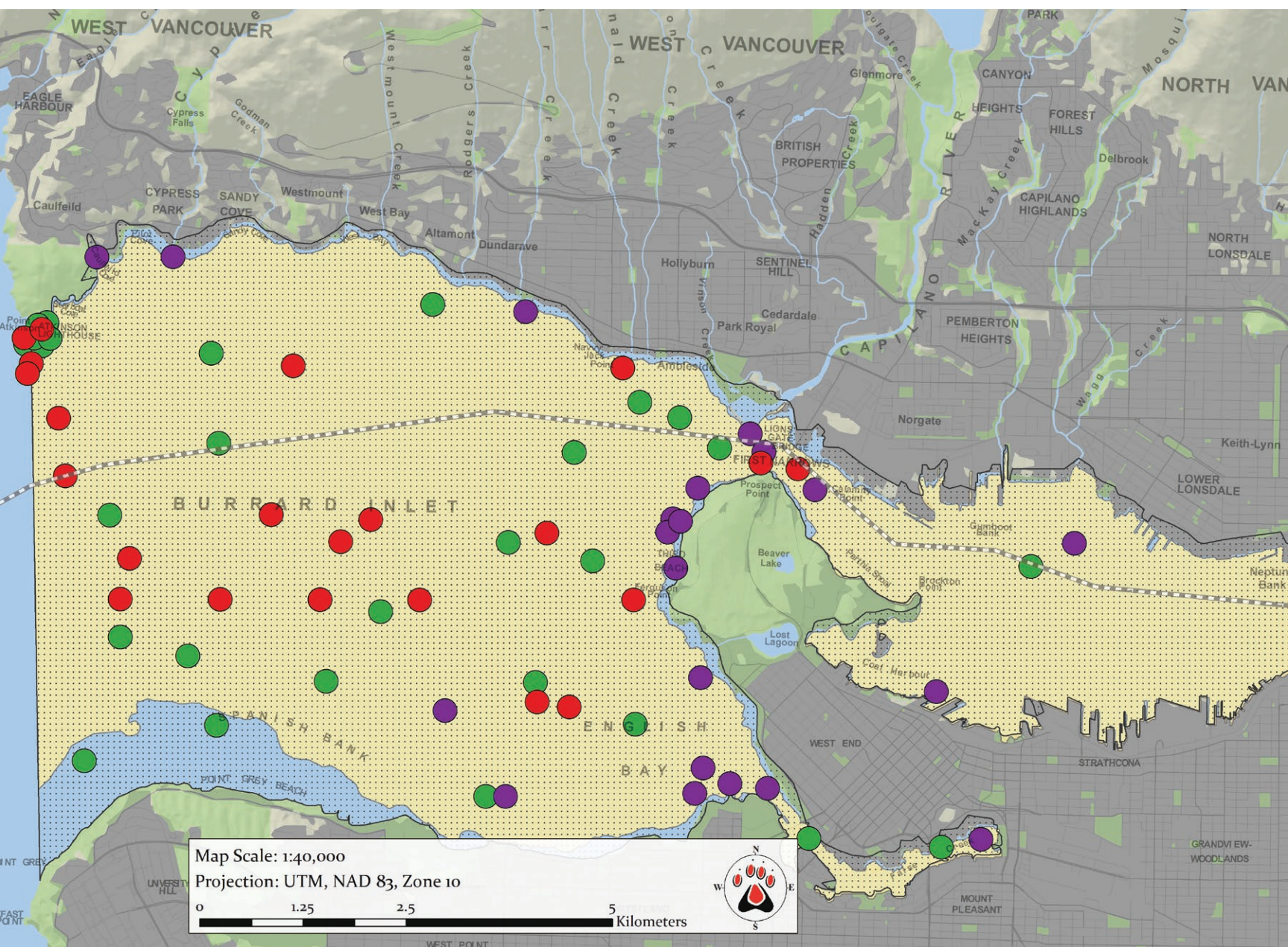
- Greenspace
- Developed Area

KMC Existing Infrastructure

- Trans Mountain System
- Jet Fuel System
- Tsleil-Waututh Nation Reserve
- ▨ Harbour Seal and River Otter²
- Blackfish and Dall's Porpoise²

¹Sightings data from the B.C. Cetacean Sightings Network, 2013. Vancouver Aquarium Marine Science Centre and Fisheries and Oceans Canada. Data not corrected for effort. Used with permission.

²Data outside of Burrard Inlet is not depicted on the map.



Grey whale



Picture taken by Peter Schultz

Harbour Seal



Picture taken by Rob Ronconi

Blackfish

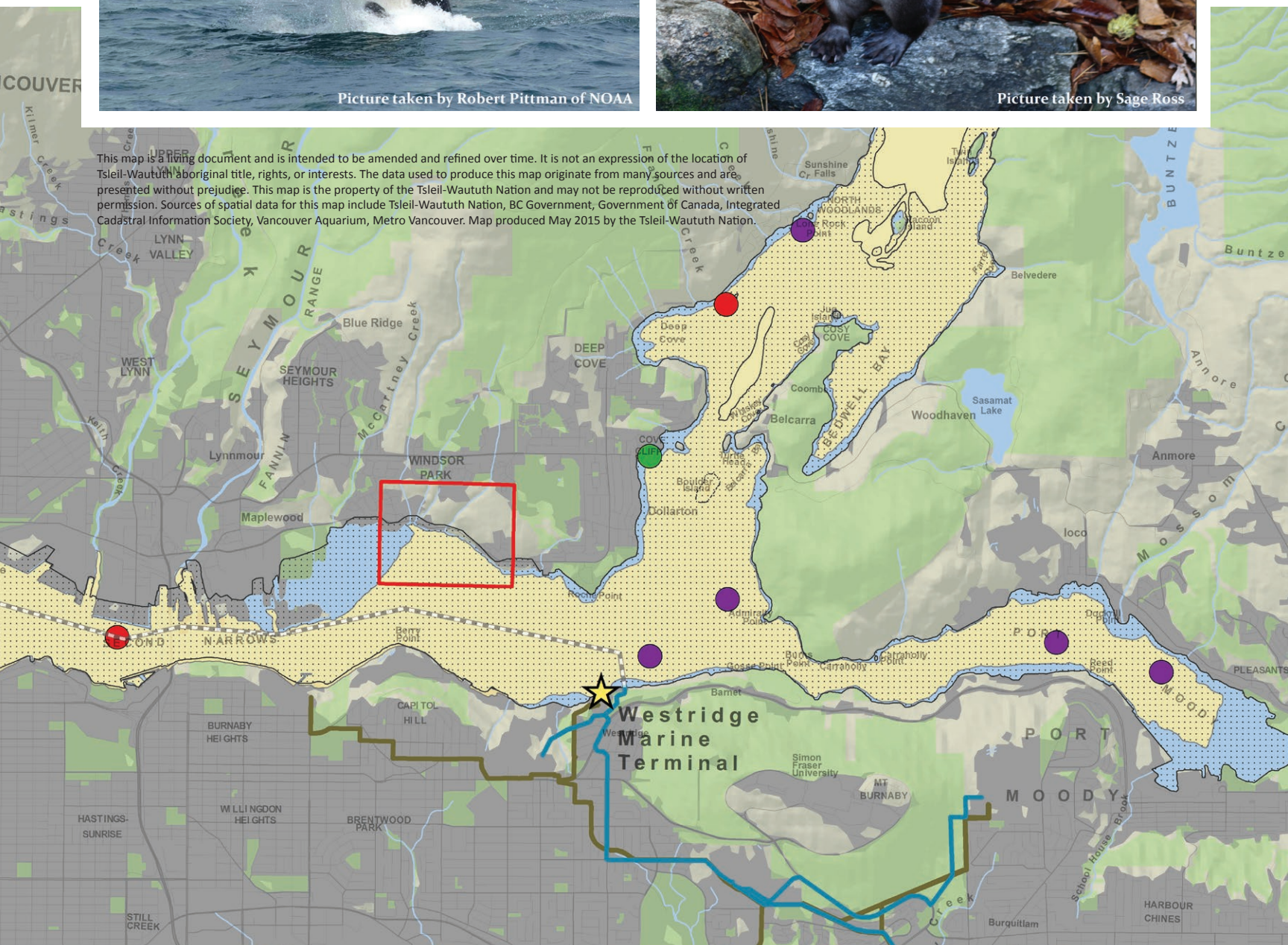


Picture taken by Robert Pittman of NOAA

River Otter



Picture taken by Sage Ross



FISH AND WILDLIFE *continued*

Herring and other forage fish species are a primary food source for salmon and some marine birds and mammals. Forage fish play a key role in the food chain by converting energy from plankton and krill to fat and protein needed by predators. While surf smelt still spawn on the beaches in the Outer Harbour,¹² other forage fish are now scarce.

For example, Burrard Inlet once supported tremendous schools of herring (Matthews 1955), the species depicted in **Figure 7**. However, between 1882 and 1884 Joseph Sprat massively overharvested these fish for his fish-rendering plant located in what is now Stanley Park. They were extinct in Burrard Inlet by 1885 (Kheraj 2013). Only recently have small populations returned (Hume 2009).

Figure 7—Herring





TSLEIL-WAUTUTH NATION
BURRARD INLET AND FRASER DELTA
MAP 16: MAJOR SALMON-BEARING RIVERS AND STREAMS

Legend

- ★ Westridge Marine Terminal
- Tanker Route
- Salmon-Bearing Streams**
 - Coho
 - Chinook
 - Chum
 - Pink
 - Sockeye
- Tsleil-Waututh Nation Reserve
- Tsleil-Waututh Assessment Study Area
- Greenspace
- Developed Area
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System

Map Scale: 1:80,000

Projection: UTM, NAD 83, Zone 10

0 1.25 2.5 5 Kilometers



SALISH SEA

Burrard Inlet
 English Bay

Westridge Marine Terminal

Boundary Bay

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FISH AND WILDLIFE *continued*

Shellfish are present throughout Burrard Inlet. Species include crab, prawn, and bivalves such as clams, mussels, and oysters.

Clams are present, but invasive ones (soft-shelled and varnish) have replaced the once-common native ones (littleneck and butter), as depicted in **Figure 8**. Likewise, Olympia oysters were once common at certain locales around Burrard Inlet. Pacific oysters, which were introduced in the 1920s, gradually replaced them. Today neither oyster is commonly found.

While crab and prawn are still harvested in Burrard Inlet, in 1972 the federal government banned the gathering of bivalves because of their sensitivity to contamination from so much pollution in the inlet, which could then cause illness or disease in the people who ate them. **Map 17** shows shellfish-gathering sites identified in Tsleil-Waututh's traditional knowledge studies and the area affected by the bivalve harvest closure.

Tsleil-Waututh is very concerned that 200 years of development around Burrard Inlet has resulted in the loss of herring and other forage fish and a decline in marine bird and salmon species. With the closure of bivalve harvest and a provincial government prohibition against hunting on the water¹³ (which made the remaining birds off limits), all the key marine elements of our subsistence economy are now scarce, contaminated, or inaccessible.

Figure 8—Common Clam Species in Burrard Inlet



Butter clam



Soft-shelled clam



Littleneck clam



Varnish clam



TSLEIL-WAUTUTH NATION BURRARD INLET

MAP 17: KNOWN SHELLFISH GATHERING SITES

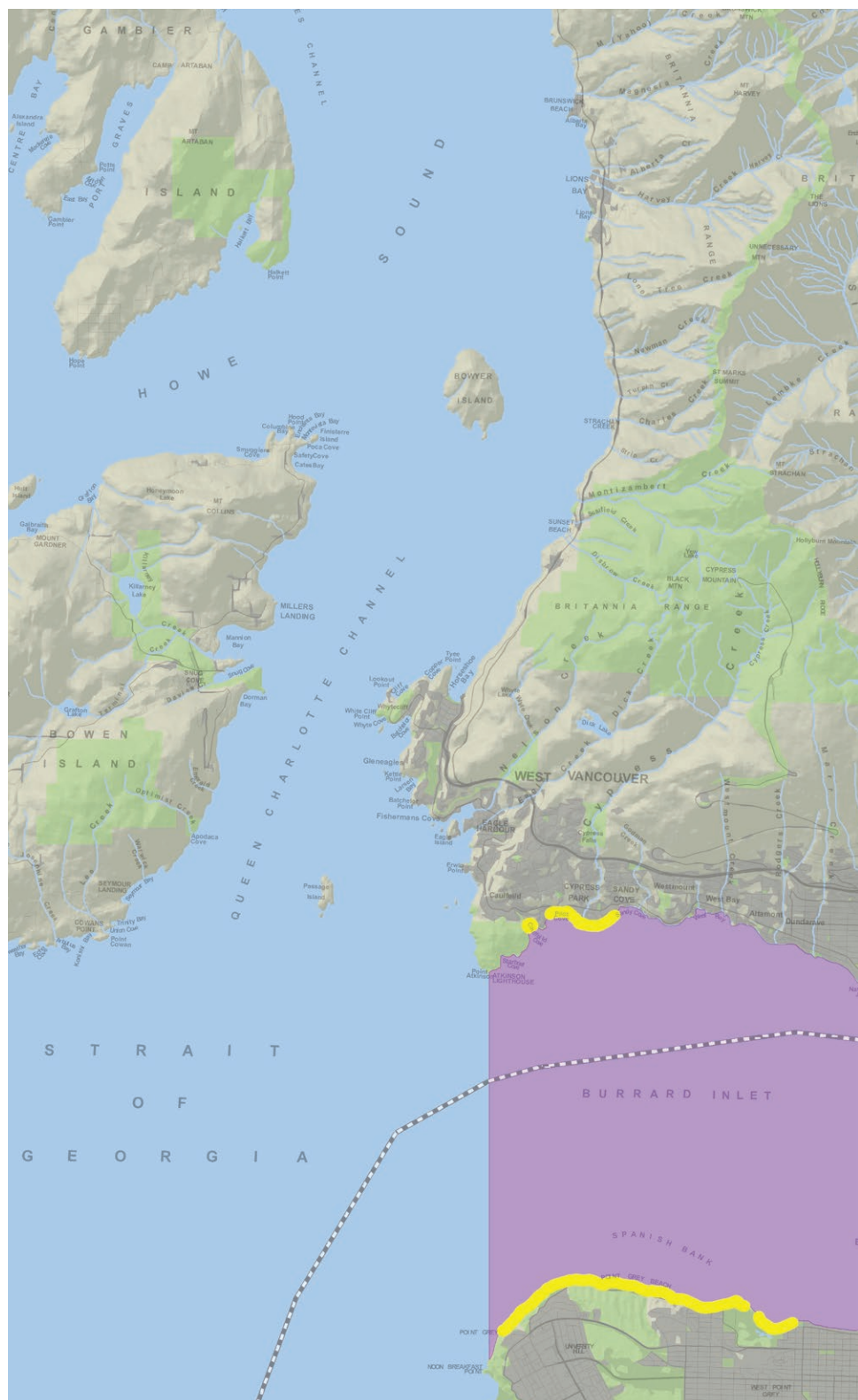
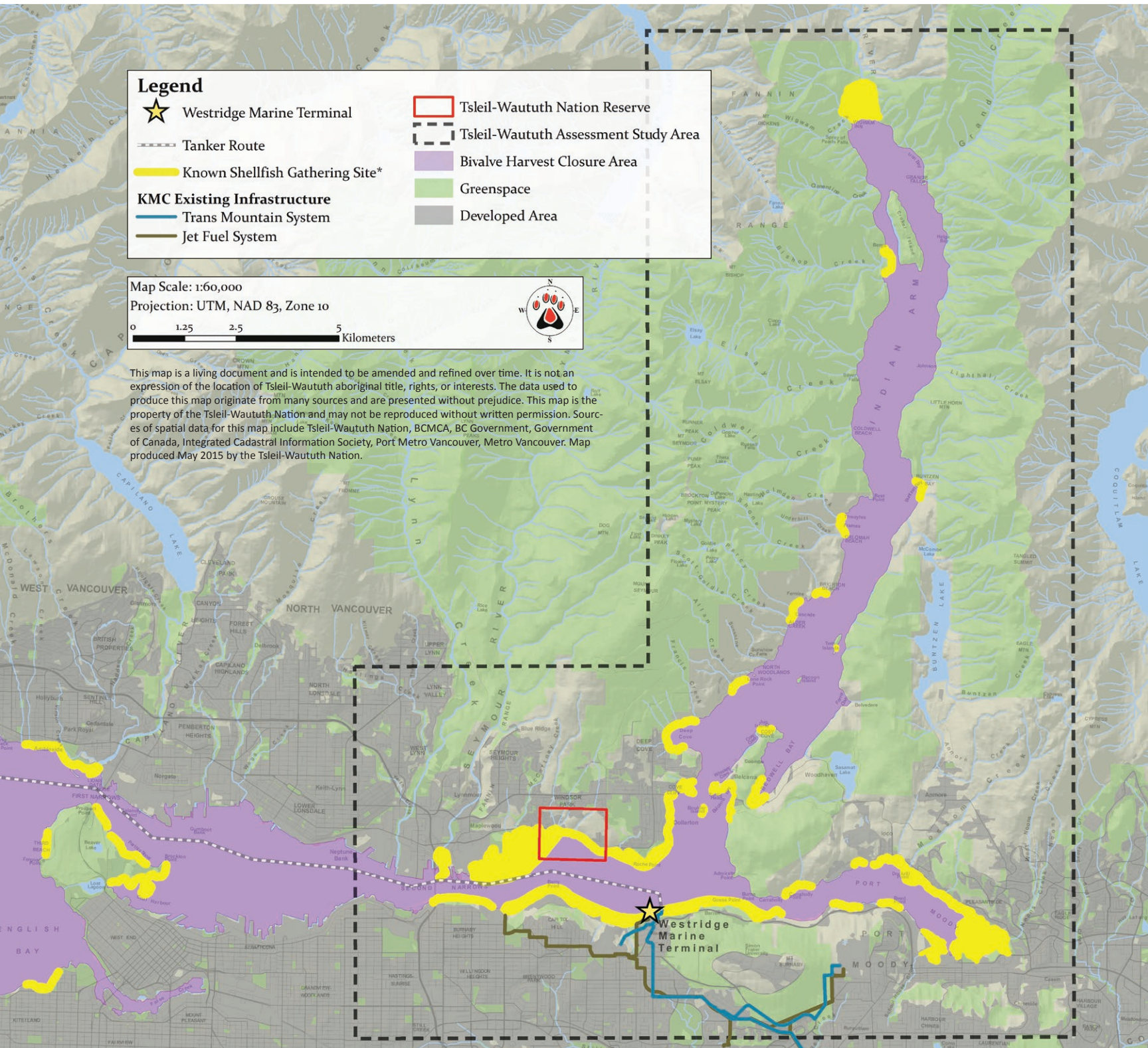




photo by Zac Fennese



MARINE STEWARDSHIP PROGRAM

At Tsleil-Waututh, a key measure of legally acceptable environmental conditions in Burrard Inlet is whether we are able to maintain a vibrant subsistence economy. Current levels of pollution, loss of habitat and species, and reduced abundance of remaining species indicate that the environmental integrity of Burrard Inlet is compromised. Restored access to abundant, safe salmon, herring, clams, and birds would be one important indicator of environmental conditions in Burrard Inlet that could once again support the meaningful exercise of Tsleil-Waututh title, rights, and interests as described in **Table 1**.

Tsleil-Waututh stewardship responsibilities dictate that all projects provide a tangible environmental improvement (“net environmental benefit” rather than “no net loss”), as explained in **Section 8**. Tsleil-Waututh law mandates a return to environmental conditions that would support the full range of Tsleil-Waututh title, rights, and interests.

To support gradual environmental improvement in Burrard Inlet, in 2005 Tsleil-Waututh developed a Marine Stewardship Program. It has three facets:

- » Recognition of Tsleil-Waututh legal authority, which brings with it a corresponding level of governance over stewardship planning and implementation
- » On-the-ground Tsleil-Waututh regulatory action, and habitat and species restoration
- » Long-term commitment from all governments to oversight, monitoring, and capacity building

These three facets are all important elements of Tsleil-Waututh’s environmental stewardship rights and responsibilities as described in **Table 1**.

The Marine Stewardship Program sets out two desired environmental outcomes:

- » Restoring Burrard Inlet to a condition where wild marine foods are abundant and safe to eat and a subsistence economy may be re-established
- » Restoring Burrard Inlet to a condition where cultural work may occur in clean water, without exposure to contaminated sediment, at sites that are physically intact and free from impaired views, violations of privacy, and noise intrusions

The extent of Tsleil-Waututh reliance on the subsistence economy is a measurable indicator of restoration success. The near-term objective is to achieve a level of environmental improvement that will allow us to obtain 10% of our food (measured as a portion of our protein requirements) from Burrard Inlet by 2040.

One achievement of the Marine Stewardship Program has been the identification and designation of 2,600 hectares of Burrard Inlet as sensitive marine fish and wildlife habitat. Included are shoreline sites of archaeological or cultural significance. **Map 18** shows the area that comes under the designation. Tsleil-Waututh law mandates that these sensitive areas receive heightened protection from environmental harm or damage as set out in the Marine Stewardship Program in accordance with Tsleil-Waututh stewardship obligations and responsibilities.

The sensitive designation includes all estuaries, potential forage fish spawning beaches, known shellfish harvest beaches, and the Rockfish Conservation Areas. Any shoreline archaeological or cultural heritage sites outside those sensitive areas are included. Altogether, the designation covers about 23% of Burrard Inlet.

One very sensitive area is Maplewood Flats, just east of Second Narrows on the north shore of the Central Harbour. It is the most extensive intertidal area in close proximity to Tsleil-Waututh Reserve, and its location is highlighted on **Map 18**.

Maplewood Flats has a long history of use for resource harvest, both for finfish and shellfish. It has an archaeological feature that has been identified as a fish trap and dated to the period around AD 569 to AD 809 (Morin 2015). A portion of the trap is shown in **Figure 9**. The area remains important for crab harvest today. Because of this, it has been the focus, under the Marine Stewardship Program, of a Tsleil-Waututh initiative called “Bringing It Back.”

Another element of the Marine Stewardship Program is more active assertion of Tsleil-Waututh stewardship responsibilities on the lands around Burrard Inlet. Our leadership is moving to put the “Tsleil-Waututh face” back on the territory. One way our nation has met this responsibility is by entering into co-management agreements for areas of our territory that are now parks.

One is Whey-ah-wichen, also known as Cates Park, located on the north shore of the Central Harbour, in the District of North Vancouver. Another is Say Nuth Khaw Yum Provincial Park, located on both sides of Indian Arm. Together they make up over 6,700 hectares of uplands and about 35 kilometres of shoreline. **Map 19** shows the park locations.

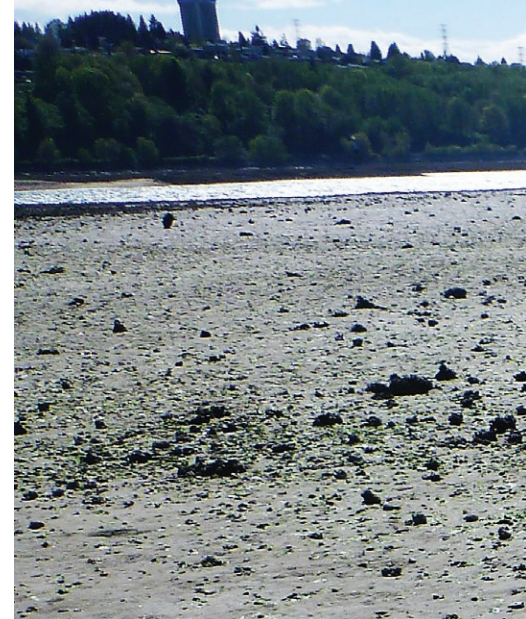
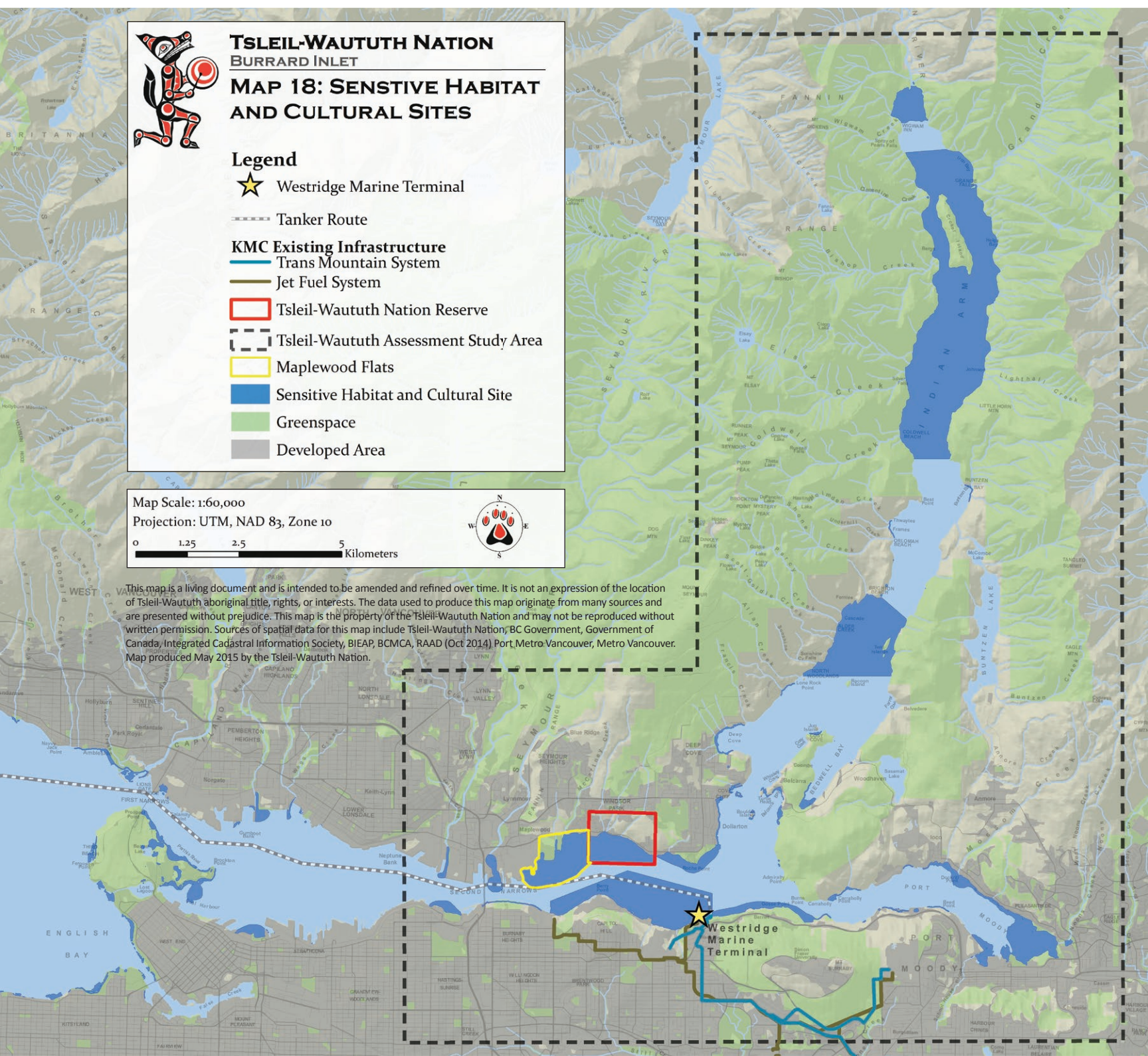




Figure 9—Portion of a Fish Trap at Maplewood Flats





TSLEIL-WAUTUTH NATION EASTERN BURRELL INLET

MAP 19: WHEY-AH-WICHEN AND SAY NUTH KHAW YUM PROVINCIAL PARK

Legend

- ★ Westridge Marine Terminal
- ⋯ Tanker Route
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
- Proposed KMC Infrastructure Expansion**
 - Proposed KMC Infrastructure Expansion
 - Proposed KMC Alternate Pipeline Expansion
- Tsleil-Waututh Nation Reserve
- Tsleil-Waututh Assessment Study Area
- Say Nuth Khaw Yum Provincial Park
- Whey-ah-wichen / Cates Park
- Greenspace
- Developed Area

Length of Shoreline:
Whey-ah-wichen / Cates Park: 1.5km
Say Nuth Khaw Yum Provincial Park: 33.8km

Map Scale: 1:40,000

Projection: UTM, NAD 83, Zone 10

0 0.75 1.5 3 Kilometers



This map is a living document and is intended to be amended and refined over time. It is not an expression of the location of Tsleil-Waututh aboriginal title, rights, or interests. The data used to produce this map originate from many sources and are presented without prejudice. This map is the property of the Tsleil-Waututh Nation and may not be reproduced without written permission. Sources of spatial data for this map include Tsleil-Waututh Nation, BC Government, Government of Canada, Integrated Cadastral Information Society, Wilderness Committee, Metro Vancouver. Map produced May 2015 by the Tsleil-Waututh Nation.

Whey-ah-wichen/ Cates Park

Westridge
Marine
Terminal

Say Nuth Khaw Yum Provincial Park

6. TRANS MOUNTAIN PIPELINE and TANKER EXPANSION PROPOSAL

KEY POINTS

- » In December 2013, Trans Mountain filed an application with the NEB for review of a pipeline and tanker expansion proposal to move more diluted bitumen, or dilbit, from Alberta to British Columbia and beyond.
- » The application proposes building a second 987-kilometre pipeline from Edmonton to Burnaby, the last 28 kilometres of which would fall within the Tsleil-Waututh Consultation Area.
- » The application proposes additional infrastructure in our Consultation Area, including the following:
 - An expanded petroleum storage facility in Burnaby with triple the storage capacity
 - Two new pipelines from the storage facility to Westridge Marine Terminal
 - A new and expanded dock complex at Westridge Marine Terminal
- » Total volume of crude oil moved will nearly triple, from 48,000 to 142,000 cubic metres per day (300,000 to 890,000 barrels).
- » Most of the crude oil will be exported, which will lead to a roughly sevenfold increase in the frequency of tanker arrivals, from about once a week to at least one every day.
- » The expanded dock complex will require 1) realignment of the vessel traffic corridor in front of Westridge Marine Terminal, bringing the corridor closer to Whey-ah-wichen, and 2) relocation of the tanker anchorages now located at the junction of the Central Harbour, Indian Arm, and Port Moody Arm, bringing the anchorages closer to Tum-tumay-whueton.

WHAT IS DILBIT?

Dilbit is short for diluted bitumen. One component, bitumen, is old, extensively weathered oil. *Weathering* refers to a series of physical and chemical changes that over time may increase stickiness, making oils like bitumen too thick to readily flow. Because of weathering, the bitumen must be diluted with another component, in this case a gas condensate. The result is called *dilbit*. This combination allows the oil to flow through a pipeline or to be loaded into a tanker.



THE PROPOSAL

The Trans Mountain pipeline was originally built in 1952 and 1953, between Edmonton, Alberta, and Burnaby, British Columbia, to ship crude oil to refineries in the Lower Mainland and Washington State. Kinder Morgan Canada purchased the pipeline in 2005 and now uses it to ship dilbit from Alberta's oil sands.

On December 16, 2013, Trans Mountain, a subsidiary of Kinder Morgan Canada, applied to the NEB to expand the pipeline and tanker system. **Map 20** provides an overview of the expansion infrastructure proposed in our Consultation Area. It shows the very close proximity of Westridge Marine Terminal and marine shipping lanes to Tsleil-Waututh Reserve.

The company is proposing to build a second 987-kilometre pipeline, mostly alongside the existing one. About 28 kilometres of the new pipeline will fall within the boundaries of the Tsleil-Waututh Consultation Area. The existing pipeline will be used to carry refined products, synthetic crude oils, and light crude oils, while the new line, 90 centimetres in diameter, will carry dilbit.

The proposed expansion will triple the capacity to move crude oil, from 48,000 to 142,000 cubic metres per day (300,000 to 890,000 barrels).¹⁴ Most of the product (~70%) is for export by tanker or barge. This will require a significant increase in marine shipping activity.

Westridge Marine Terminal currently receives approximately five Aframax-class tankers per month (60/year). With expansion, the number of tankers loaded will increase sevenfold, to about 34 per month (408/year). **Map 21** shows how tanker traffic will increase.

Aframax ships are medium-sized oil tankers. They average 245 metres long and 34 metres wide and have a draft of 20 metres. Their holds are divided into 10 to 18 compartments for transporting oil or dilbit. Total capacity is around 100,000 cubic metres, sometimes more. For safety reasons, in order for their hulls to clear the floor of Burrard Inlet, these vessels, on average, can carry only 70% of their

load capacity. This limitation raises the spectre that an overloaded vessel may become grounded and cause a large oil spill.

Each tanker departure requires escort through Burrard Inlet by up to three tugs. That means 102 additional vessels will arrive at Westridge Marine Terminal each month (1,224/year), and tug traffic in the Central Harbour will increase 40% over the baseline reported in **Section 5**.

The increase in tankers will require expansion of Westridge Marine Terminal from one berth to three. The change will in turn force several other changes for reasons of safety (LANTEC 2014; Moffat and Nichol 2014; Transport Canada 2014).

The new docks will jut about 175 metres farther into the Central Harbour than the current dock. To provide adequate separation from tankers at the dock, the travel corridor for other large, passing vessels will be moved toward the north shore, closer to Whey-ah-wichen.

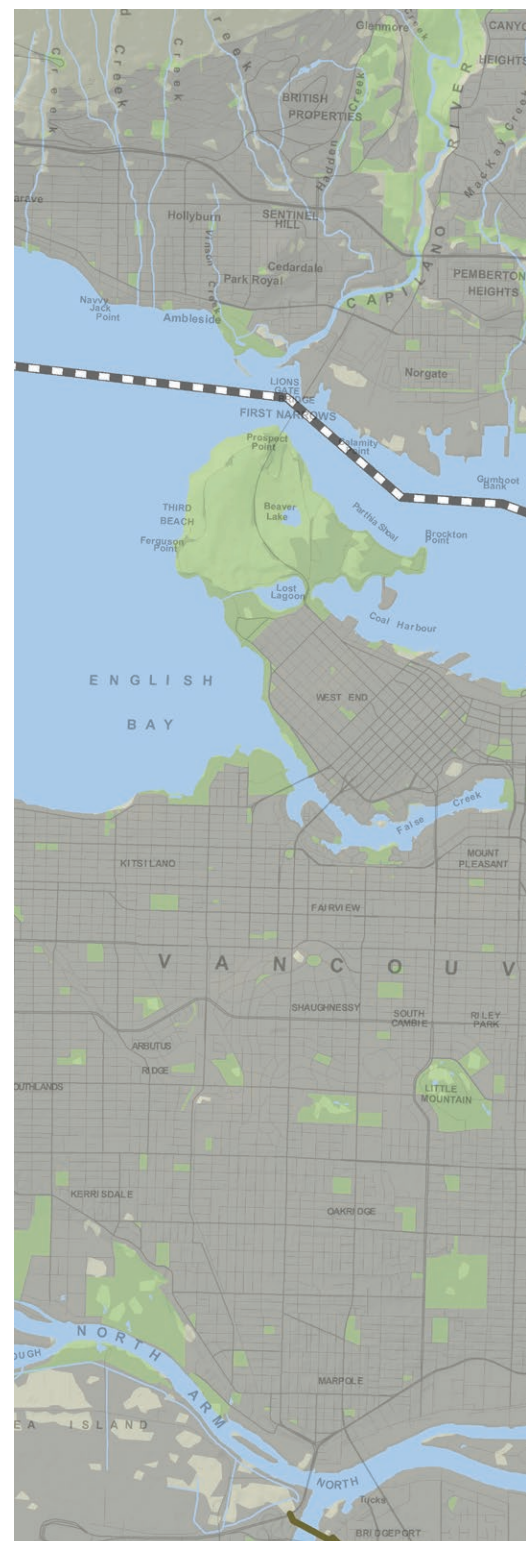
The change in location of the vessel travel corridor will force relocation of the tanker anchorages located at the junction of the Central Harbour, Indian Arm, and Port Moody Arm. They will move northward into Indian Arm closer to the area between Whey-ah-wichen and Tum-tumay-whueton.

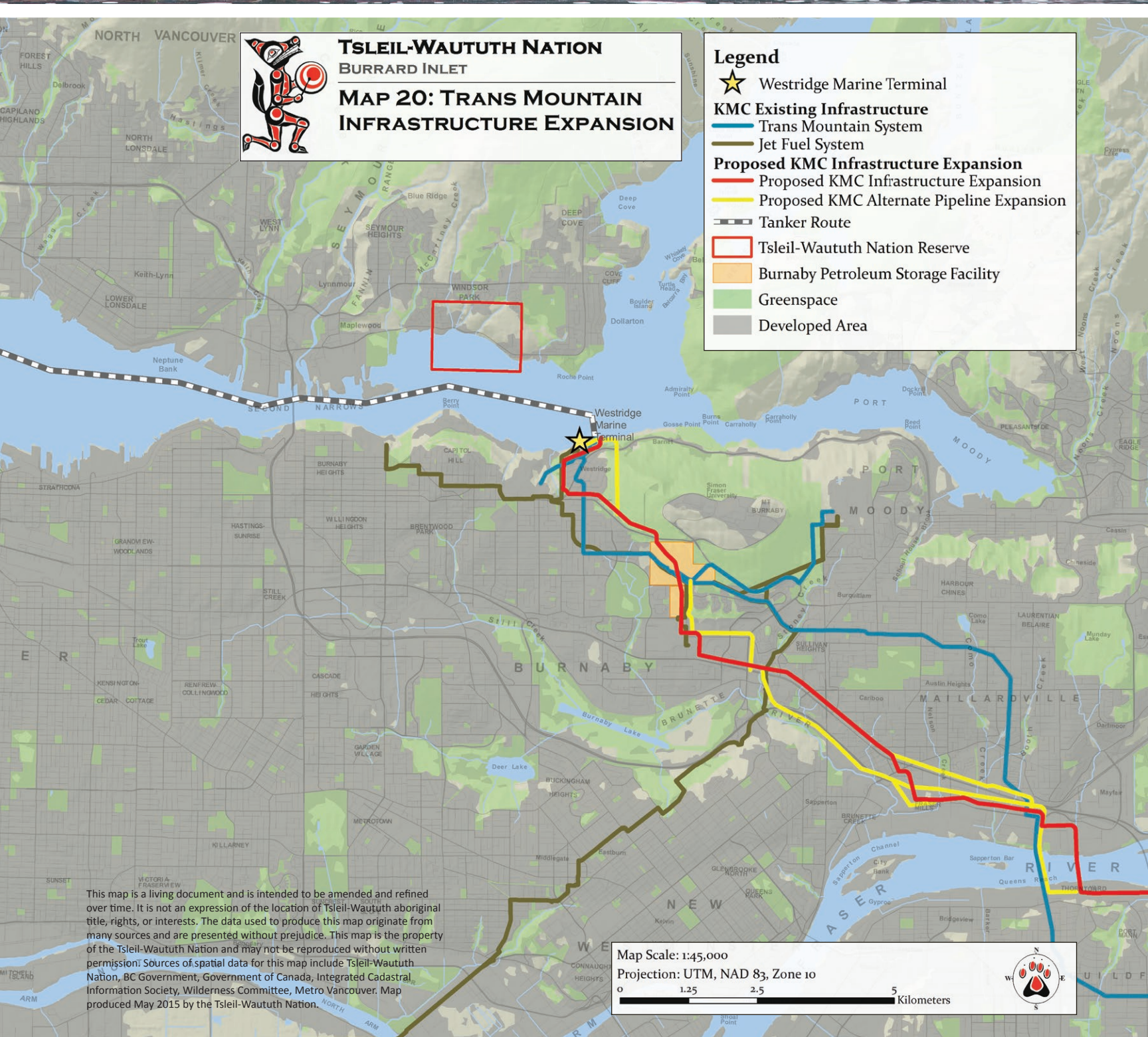
Map 22 provides a schematic for the proposed changes to Westridge Marine Terminal, the vessel travel corridor, and the tanker anchorages.

Additional infrastructure inside the Consultation Area includes more storage at the Burnaby Tank Farm: there will be 27 large tanks instead of 13. Capacity will more than triple, from 255,000 to 875,000 cubic metres.

In addition, two new pipelines will be built between the Burnaby Tank Farm and Westridge Marine Terminal. The lines may follow the existing pipeline corridor or be tunnelled through Burnaby Mountain.

WITH EXPANSION,
THE NUMBER OF
TANKERS LOADED
WILL INCREASE
SEVENFOLD, TO
ABOUT 34 PER
MONTH.

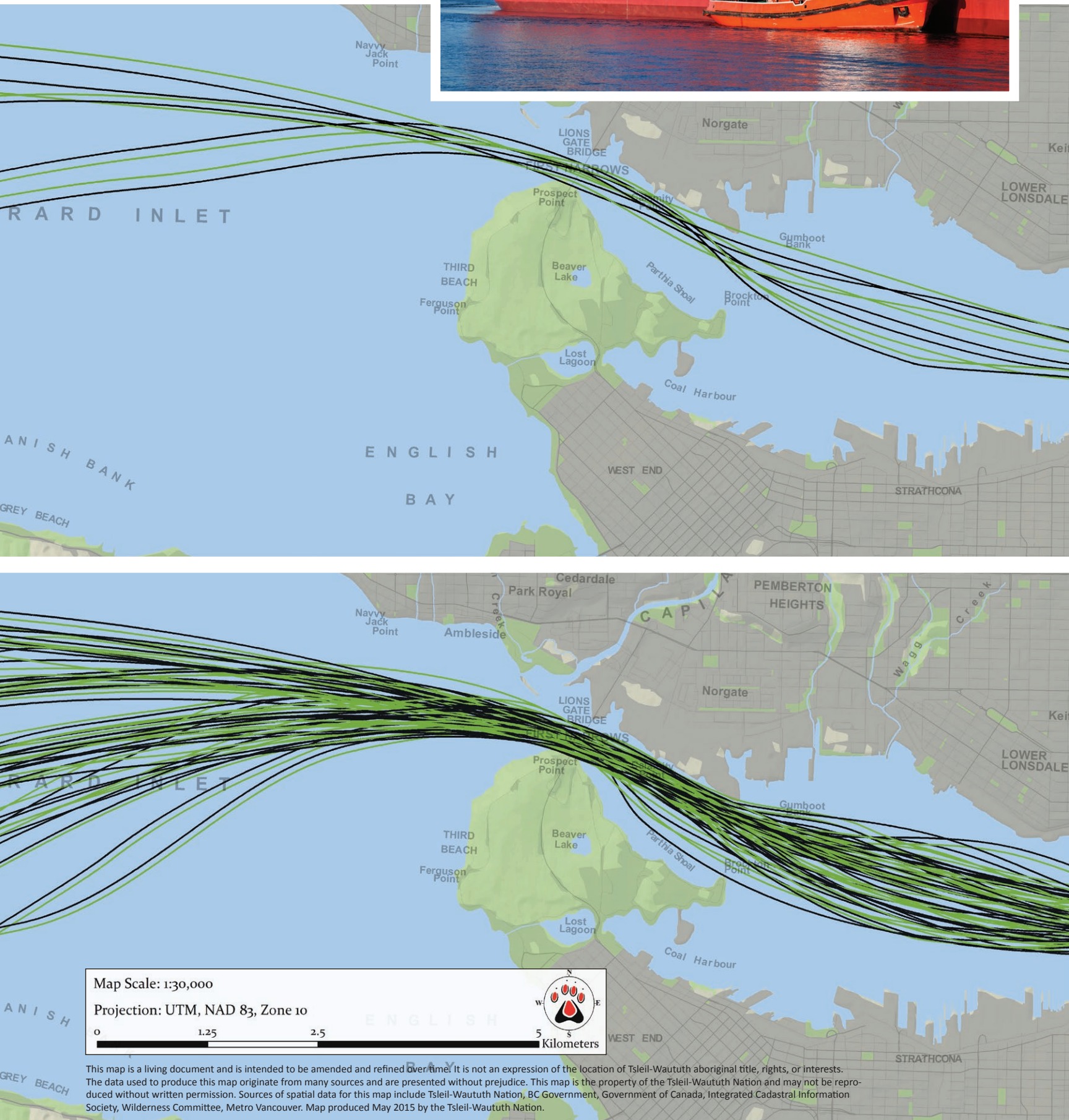






TSLEIL-WAUTUTH NATION
BURRARD INLET

**MAP 21: INCREASE IN
TANKER AND TUG
TRAFFIC**



Legend

★ Westridge Marine Terminal

— Arriving Tanker

— Departing Tanker

KMC Existing Infrastructure

— Trans Mountain System

— Jet Fuel System

Proposed KMC Infrastructure Expansion

— Proposed KMC Infrastructure Expansion

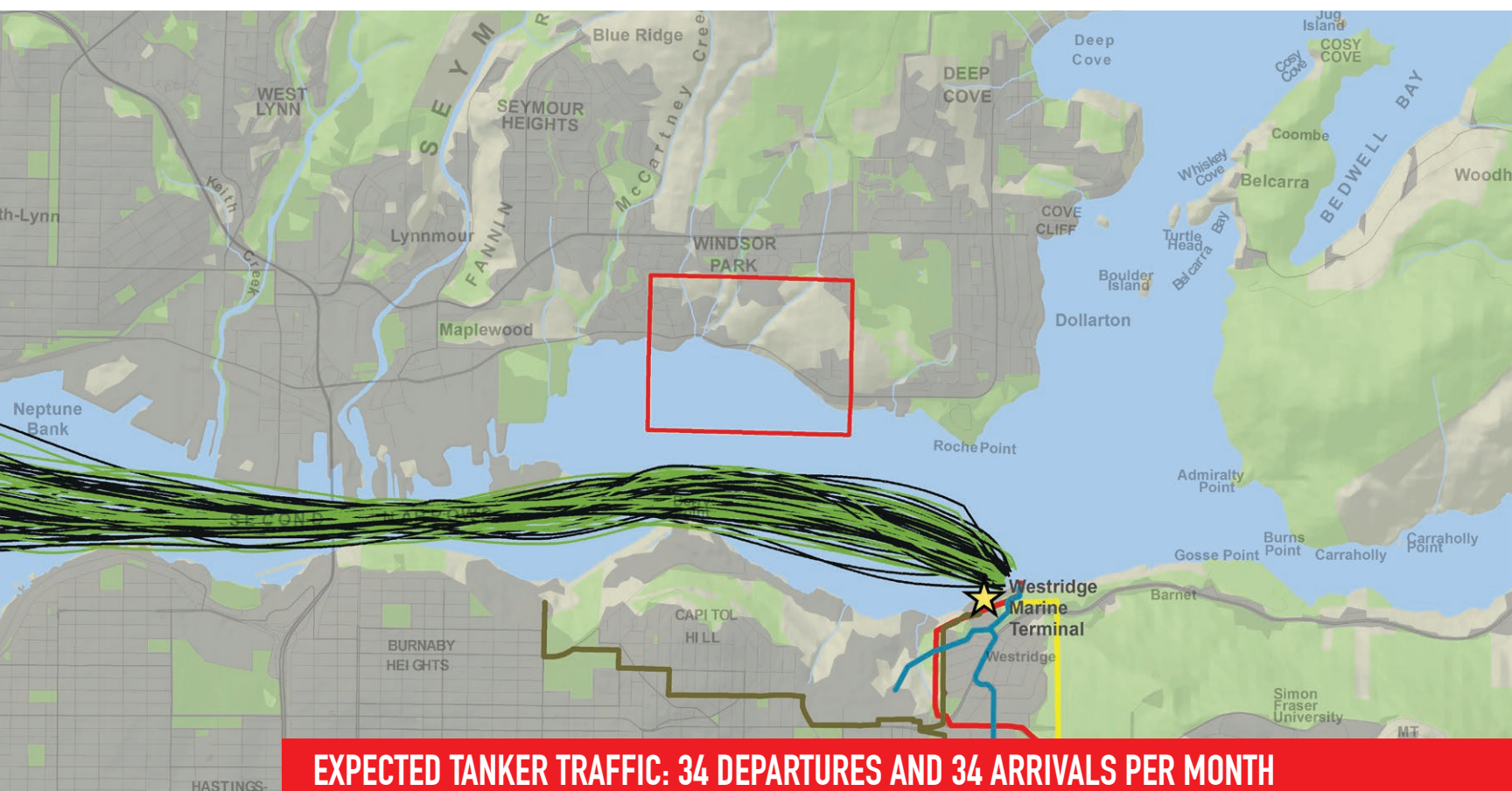
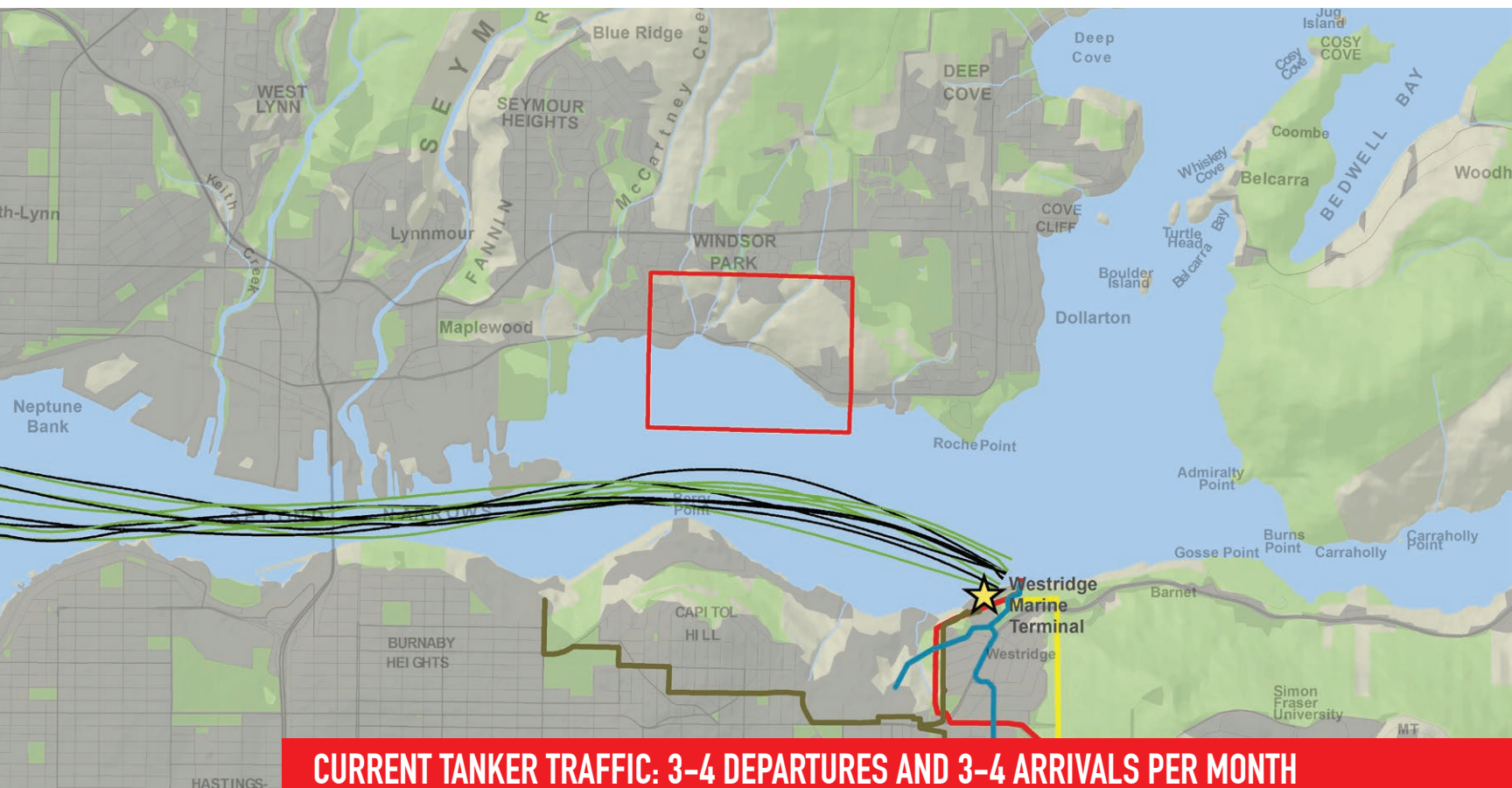
— Proposed KMC Alternate Pipeline Expansion

□ Tsleil-Waututh Nation Reserve

■ Greenspace

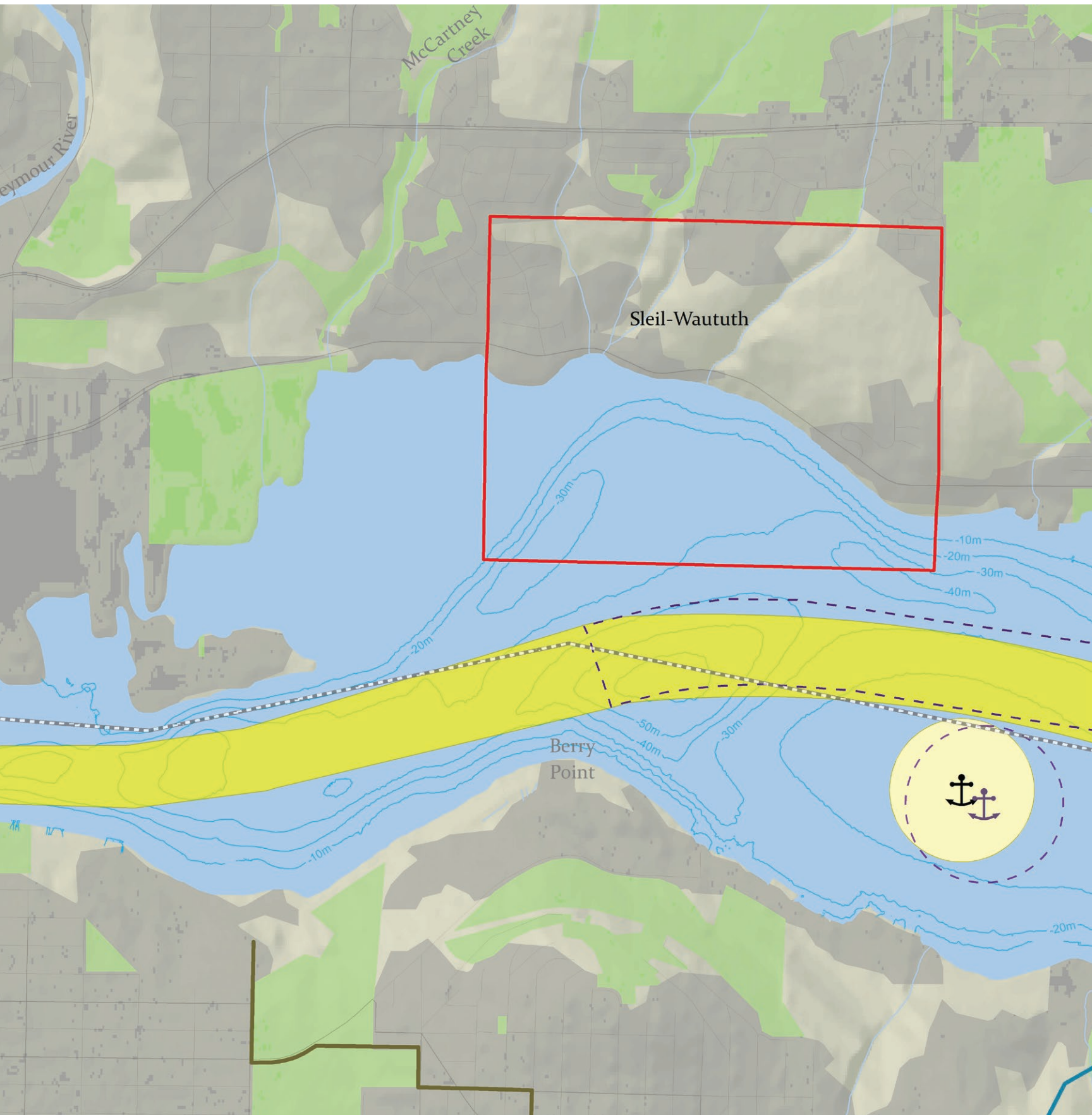
■ Developed Area

*Each line represents one tanker and three tugs.







TSLEIL-WAUTUTH NATION
CENTRAL HARBOUR
**MAP 22: WESTRIDGE
MARINE TERMINAL
CHANGES**





Legend

 Tanker*


 Tanker Route

KMC Existing Infrastructure

 Trans Mountain System


 Jet Fuel System

Proposed KMC Infrastructure Expansion


 Proposed KMC Infrastructure Expansion


 Proposed KMC Alternate Pipeline Expansion


 Bathymetric Contour (10m intervals)


 Tsleil-Waututh Nation Reserve


 Approximate Proposed Westridge Marine Terminal Footprint*


 Approximate Proposed Vessel Corridor*

 Approximate Proposed Anchorage Location*

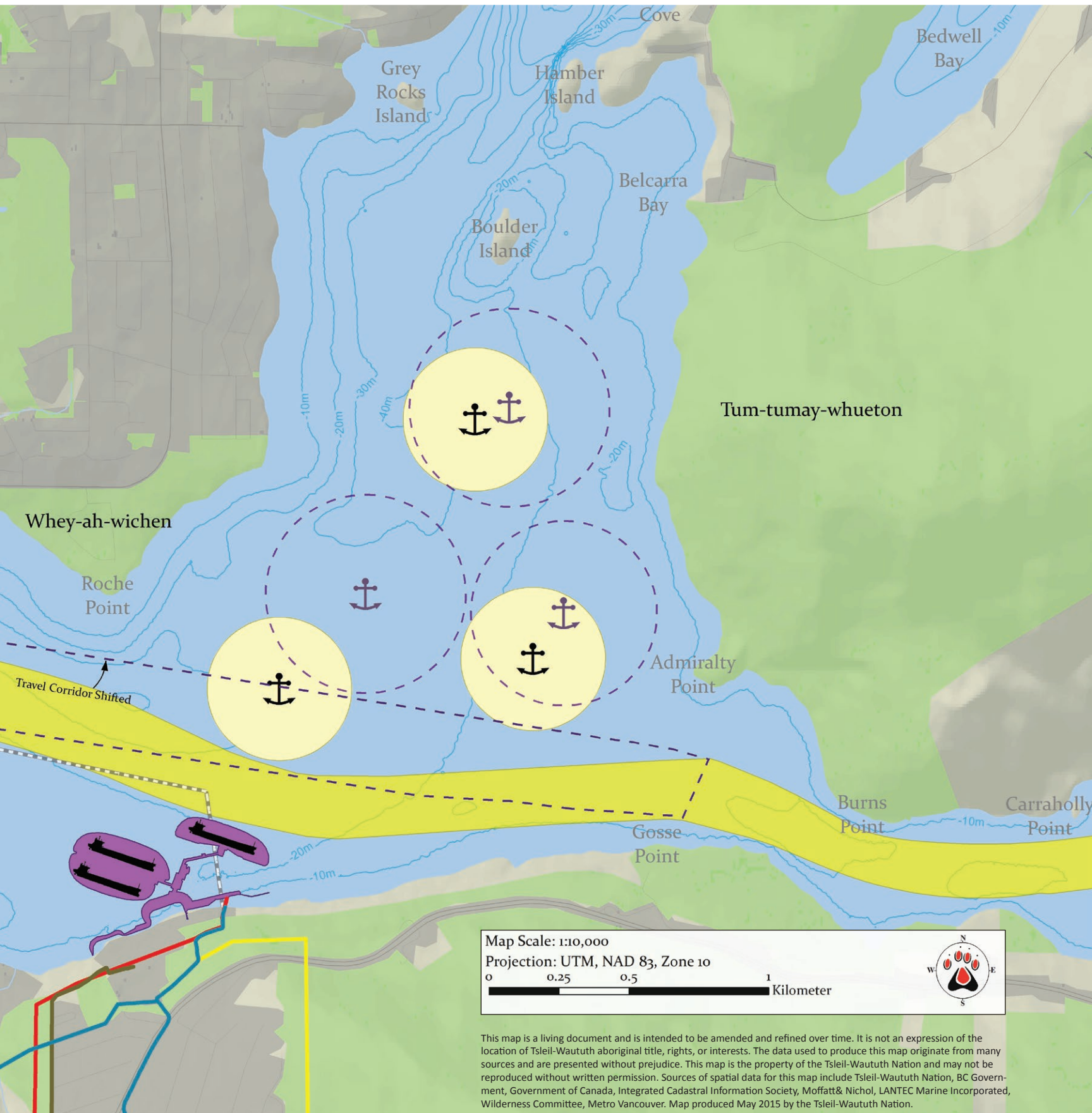
 Estimated Current Vessel Corridor*

 Current Anchorage Location

 Greenspace

 Developed Area

*Not to scale. For illustrative purposes only.





7 TSLEIL-WAUTUTH ASSESSMENT PROCESS *and* SCOPE *of the* ASSESSMENT

KEY POINTS

- » Tsleil-Waututh assessed the proposal as it is described in the TMEX application and other materials filed with the NEB.
- » The assessment was carried out in accordance with the Tsleil-Waututh Stewardship Policy, which requires 1) evaluation of the potential negative effects of proposed development on the natural and cultural resource base and 2) if potential negative effects do not exceed Tsleil-Waututh legal limits, a further evaluation of the potential benefits to our community.
- » The present assessment looked at the proposal through the first lens and the results are documented in this report.
- » Tsleil-Waututh commissioned five expert reports to provide technical analysis of the TMEX proposal.
- » The assessment evaluated the potential adverse effects of the TMEX proposal on Burrard Inlet and corresponding negative impacts on Tsleil-Waututh Aboriginal title, rights, and interests in our Consultation Area, with a focus on eastern Burrard Inlet.
- » Effects were considered holistically. They included effects on the biophysical environment but also on interconnected cultural, spiritual, legal, and governance rights and responsibilities of the Tsleil-Waututh Nation.
- » Tsleil-Waututh Chief and Council will review the assessment to decide whether the proposal meets the test for the first lens of the Stewardship Policy—if it does, we will proceed with an assessment using the second lens; if it does not, the review will end.

PROCESS AND SCOPE

Tsleil-Waututh assessed the TMEX proposal as it is described in the facilities application and other materials filed with the NEB. The assessment focused on impacts in our Consultation Area following procedures described in our 2009 Stewardship Policy. In particular, the assessment evaluated potential effects in eastern Burrard Inlet, where Tsleil-Waututh Reserve, Westridge Marine Terminal, and marine shipping lanes are all located.

Tsleil-Waututh also participated in the NEB's Information Request No. 1. However, Trans Mountain failed to provide full and adequate responses to many of our questions. As a follow-up in a letter dated November 14, 2014, Tsleil-Waututh asked Trans Mountain to identify documents and information relevant to our assessment, but the company failed to comply.

TMEX proposal effects were considered holistically. They included effects not only on the biophysical environment but also on the interconnected cultural, spiritual, legal, and governance rights and responsibilities that are sustained by the environmental integrity and health of our waters and lands. Climate change was also considered, but no comprehensive analysis was conducted.

EXPERT REPORTS

Tsleil-Waututh engaged five experts to provide technical analysis of the TMEX proposal:

- » Drs. Thomas Gunton and Sean Broadbent, Simon Fraser University—oil spill risk assessment (**Appendix 1**)
- » Dr. Jerry Galt, Genwest Systems—oil spill trajectory analysis (**Appendix 2**)
- » Dr. Jeffrey Short, JWS Consulting—behaviour, fate, and consequences of spilled dilbit (**Appendix 3**)
- » Nuka Research—oil spill response gap and capacity analysis (**Appendix 4**)
- » Levelton—oil spill air quality assessment (**Appendix 5**)

Details of Drs. Thomas Gunton and Sean Broadbent's oil spill risk assessment and Dr. Jerry Galt's oil spill trajectory analysis are presented in **Section 11**. Findings and conclusions from other reports are presented in **Section 12**.

In addition to drawing on the analyses of experts, this assessment relied on the traditional knowledge of Tsleil-Waututh members. Relevant knowledge has been described, as needed, in the body of the assessment.



STEWARDSHIP POLICY

Tsleil-Waututh assessed the TMEX proposal through the first lens set out in the Stewardship Policy. This lens looks at potential negative effects. The second lens assesses whether potential benefits outweigh those effects.

The first lens is a threshold lens, meaning Tsleil-Waututh will only assess the TMEX proposal through the second lens if the first lens assessment concludes that potential effects do not violate Tsleil-Waututh legal principles as described in **Section 8**.

FIRST LENS

Tsleil-Waututh assessed the TMEX proposal through the first lens to determine whether the project is a good land-use decision from the perspective of potential effects in the Consultation Area and under the terms of the Stewardship Policy.

The assessment was guided by a number of key questions set out in the Stewardship Policy:

- » What impact will the TMEX proposal have on the natural and cultural resource base of the proposed project area?
- » What impact will the TMEX proposal have on the socio-economic and cultural conditions of Tsleil-Waututh and our members?
- » Will the TMEX proposal interfere with Tsleil-Waututh stewardship and restoration efforts?
- » What will the TMEX proposal contribute to the cumulative effects of past land-use decisions?
- » Does the TMEX proposal have the potential to deprive future Tsleil-Waututh generations of the control and benefit of our waters and lands?
- » Does the TMEX proposal jeopardize, prejudice, or otherwise compromise Tsleil-Waututh title, rights, or interests?
- » Does the TMEX proposal represent the best use of lands and resources for the present and for the future?

Gaps in information or uncertainty in causal relationships identified in this assessment were resolved in a precautionary manner that errs on the side of safeguarding Tsleil-Waututh title, rights, and interests.

SECOND LENS

If the TMEX proposal satisfies the requirements of the first lens, Tsleil-Waututh will continue our assessment using the second lens. The second lens asks whether the TMEX proposal will provide benefits to the community that outweigh its negative effects.

DECISION-MAKING PROCESS

The Tsleil-Waututh decision-making process has two parts. Each reflects one aspect of the two-lens approach set out in the Stewardship Policy.

For the completed portion of the assessment, which used the first lens and is summarized in this report, Tsleil-Waututh staff took the following steps: 1) we reviewed available information, including the expert reports commissioned by Tsleil-Waututh, 2) we assessed the relevance of that information to key questions, 3) we applied the relevant information to answer each of the key questions, and 4) we gave our findings as to whether the TMEX proposal is a good land-use decision.

In preparing the report, staff convened a community meeting on April 21, 2015, to review the evidence and discuss potential effects. Feedback from that meeting is summarized in **Section 14**.

In letters addressed to Kinder Morgan Canada and the NEB, dated April 23, 2015, and to Natural Resources Canada, dated April 27, 2015, Tsleil-Waututh offered these parties the opportunity to comment on the assessment prior to its submission to Chief and Council. None of the parties provided comments in advance of Chief and Council review of this assessment.

After fully considering the report, Chief and Council could either 1) decide that the TMEX proposal satisfies the requirements of the first lens of the assessment and direct staff to complete an assessment using the second lens, or 2) decide that the TMEX proposal does not satisfy the requirements of the first lens of the assessment and end the review.

8. TSLEIL-WAUTUTH LEGAL PRINCIPLES



“This is our truth. What we have told you about what we know about our people and our land is our *snəwəyət*. It’s our law. It’s our truth.”¹⁵

KEY POINTS

- » In 2009, Tsleil-Waututh adopted a Stewardship Policy founded on Tsleil-Waututh and Coast Salish legal principles.
- » These legal principles include Tsleil-Waututh’s sacred obligation to protect, defend, and steward the water, land, air, and resources of our territory.
- » Our stewardship obligation includes the responsibility to maintain and restore conditions in our territory that provide the environmental, cultural, spiritual, and economic foundation our nation requires to thrive.
- » Living Tsleil-Waututh are responsible to both our ancestors and future generations for maintaining and restoring conditions for these activities:
 - Cultural transmission and training
 - Spiritual preparation and power
 - Harvest and consumption of safe, abundant wild foods from Tsleil-Waututh water and land to feed the present community, our ancestors, and other beings
 - Control over and sharing of resources according to Tsleil-Waututh and Coast Salish protocols
- » Failure to act responsibly toward the people, the earth, the ancestors, or any other being has serious consequences, potentially including loss of physical sustenance, of access to resources, of cultural knowledge, and of social status.

The Tsleil-Waututh Stewardship Policy rests on the foundation of our ancestral laws and is interpreted in accordance with them. The following section of the assessment provides an overview of applicable legal principles as laid out by Tsleil-Waututh teachings and other traditional and contemporary Coast Salish sources.¹⁶

¹⁵ Oral Aboriginal traditional evidence given by Leah George-Wilson on October 16, 2014, during the National Energy Board’s hearing for the TMEX proposal, held in Chilliwack, British Columbia.

¹⁶ Just as Canadian common law consists of a body of case law developed over the centuries, Coast Salish stories express the ancestral laws of the Tsleil-Waututh. Tsleil-Waututh elders have told us that in light of substantially common legal traditions on matters of stewardship throughout the Coast Salish world, the principles contained in stories from all Coast Salish peoples are also applicable to Tsleil-Waututh. These expressions of Tsleil-Waututh law are referred to interchangeably here as stories, *traditional narratives*, or *teachings*. See **Appendix 9** for a list of the stories cited.

PRINCIPLE 1:

TSLEIL-WAUTUTH HAS A SACRED OBLIGATION TO PROTECT, DEFEND, AND STEWARD THE WATER, LAND, AIR, AND RESOURCES OF THE TERRITORY.

Our stewardship obligation is to act with respect for all beings, human and non-human, and for all elements of the natural and spirit worlds. This responsibility is reflected in the principle of *ḡaxʷastəl'* (reciprocal giving/reciprocity). If respect is shown, the *syəwenəʔ* (collectively, the spirits of those who came before us; the ancestors; our brethren—all creatures that live on the earth with us) will also care for and support us in return. However, if respect is not shown, negative or even disastrous consequences for the Tsleil-Waututh may be expected.

1.1 Sources of Tsleil-Waututh's stewardship obligations

Cicəʔ siʔeṛṇ (the Creator). Cicəʔ siʔeṛṇ is the ultimate source of Tsleil-Waututh law. The Tsleil-Waututh *Creation Story* recounts how Cicəʔ siʔeṛṇ transformed the first Tsleil-Watt man, created the first Tsleil-Watt woman, and ensured that they were instructed in their responsibilities of reciprocal respect and caring for each other and for all elements of *təməxʷ* (the earth, the entire world, the territory, the environment).

Tsleil-Waututh's spiritual connections and close relationship to other species and beings present throughout the territory, dating back to time out of mind. In the Tsleil-Waututh *Creation Story*, Cicəʔ siʔeṛṇ transforms a wolf into the first Tsleil-Watt man, who travels the territory learning from his relatives around him, including the birds, black bear, and salmon, all he needs to know in order to live. They teach him how to look after the land. The close relationship between Tsleil-Waututh and our non-human brethren is likewise demonstrated in the *Story of Waut-Salk*, which recounts Chief Waut-Salk's ability to speak to fish and his special relationship with all marine life. These stories recount how the territory came to be ours, as well as describing the stewardship responsibilities placed upon the first ancestors by Cicəʔ siʔeṛṇ.

The physical and spiritual presence of the ancestors in the territory. Burrard Inlet is the "womb" of Tsleil-Waututh, where Cicəʔ siʔeṛṇ, with the help of the cedar tree, brought the first Tsleil-Watt woman to life from earth, rock, and sediment beneath the salt water. This intimate connection to Burrard Inlet gives rise to an obligation of stewardship and respect; we must care for it because our ancestors are part of the landscape. Through the centuries, we have returned our ancestors to the earth, where they have become part of the environment for the birds, fishes, and other species, contributing to the spiritual connection between us and

to our stewardship obligation. Our *snəwəyəʔ* tells us that if something is alive, it must be respected and that not just the animals but also the rivers, the sand bars, and the rocks are alive and are beings with spirits.

Sacred locations associated with the time of transformation, supernatural beings, and historical events. Coast Salish traditional narratives also make clear the importance of respecting spiritually and historically significant places and objects. Such places are present throughout Tsleil-Waututh territory. For example, the *Story of the Two-Headed Sea Serpent* describes the locations where the serpent's heads were lodged, one on either side of Indian Arm, and the pathway this *stla'leqem* (supernatural being) followed as it made its way to die in Buntzen Lake. The story also describes the rock into which the serpent's fangs were thrust to bring fresh water to our Tsleil-Waututh ancestors during a time of drought. Geological formations in Indian Arm marked with *tumulh* (red ochre) rock paintings preserve knowledge of these places and of the related teachings from these ancient narratives for future generations (see **Figure 4**).

Similarly, another traditional narrative recounted by Gabriel George describes how Xe:í's transformed the beloved daughters of a great Tsleil-Waututh chief into the twin peaks known as "the lions." These peaks overlook what is today Vancouver and Burrard Inlet.¹⁷ The presence of transformed ancestors in the territory means that we are not just "of" our territory; we *are* the places and beings of the territory.

Inherited stewardship responsibilities placed upon caretakers of particular resources or resource harvest locations. Individuals may carry special responsibilities in upholding Tsleil-Waututh's stewardship obligations, serving as caretakers of particular resources or resource harvest locations. Selected based on their aptitude, ancestry, and merit, these individuals have spirit power, technical expertise, and receive training/apprenticeship from elders or from other relations. They may also have inherited ancestral names. These individuals' "good name" and status depends on their ability to manage the resource sustainably.

¹⁷ Xe:í's was a supernatural being sent by Cicəʔ siʔeṛṇ "to help our people, to right wrongs" and to "make things right" in the territory.

PRINCIPLE 2:

TSLEIL-WAUTUTH'S STEWARDSHIP OBLIGATION INCLUDES MAINTAINING AND RESTORING CONDITIONS IN OUR TERRITORY THAT PROVIDE THE ENVIRONMENTAL, CULTURAL, SPIRITUAL, AND ECONOMIC FOUNDATION FOR THE FOLLOWING:

2.1 Cultural transmission and training that will allow Tsleil-Waututh individuals to reach their full potential and for Tsleil-Waututh, as a people, to thrive

Coast Salish traditional narratives lay out a cycle of knowledge acquisition and training going back to the time of the first ancestors. Animals, other beings, spirits, and knowledgeable relatives assist individuals who invest personal effort and follow appropriate protocols to acquire the skills, knowledge, and spiritual powers they need to reach their full potential. This cycle depends on a functioning ecosystem and on other conditions, described below, that ensure continued access to these sources of knowledge and sites of training.

2.2 Spiritual preparation and power

Tsleil-Waututh law requires that the territory be maintained and restored so as to ensure the presence of elements such as cold, clear water for ritual bathing; isolated, undeveloped locations away from noise or contamination (e.g., power places in Indian Arm inhabited by *stla'leqem* such as the two-headed serpent Say Nuth Kway); and traditional medicines used in spiritual preparation. The significance of these elements is addressed in traditional narratives that recount the years of discipline and preparation that individuals undergo "to get something to help our people, to be something for our people, whatever their gift may be."¹⁸ For example, "The Big Serpent" story recounted by John L. George and Ta-ah describes how a young Tsleil-Watt man spent almost a decade preparing before successfully leading his people to slay the serpent and avenge the death of his family and neighbours: remaining in seclusion, bathing every morning at sunrise, walking long hours in the forest, and eating special foods and herbs from the land and sea.

2.3 Harvest and consumption of safe, abundant wild foods from Tsleil-Waututh waters and lands to feed the present community, our ancestors, and other beings

Our elders say, referring to the historical natural abundance of our territory:

"When the tide went out, the table was set."

Traditional narratives show that "Tsleil-Waututh's role in all of this is to be the protector and the steward—stewards of our traditional territory, of our land and our resources and our water."¹⁹ For example, in the *Story of Waut-Salk*, Chief Waut-Salk teaches two young boys who are throwing rocks at salmon about the *snəwəyət* of the salmon: "about

respecting the salmon, about not killing them for no reason, about allowing enough of them to get up the river before we start to take what we need and only taking what we need" as well as sharing if we have more than we need.

The story also recounts that at that time "our people wouldn't do anything in the waters without checking with Waut-Salk to make sure that our relatives in the water were going to be okay." This story demonstrates our responsibility to steward the salmon and their habitat in order to maintain access to an abundant food source, and it underscores the role of individuals with specific gifts and cultural training in doing so. Other resources in the territory, from clams, mussels, and crabs, to birds and mammals, to berries, kelp, and a variety of food, specialty, and medicinal plants, require similar care and respect in order to flourish.

2.4 Control over and sharing of resources according to Tsleil-Waututh and Coast Salish protocols

Traditional narratives, and in particular our creation stories, demonstrate the special connection Coast Salish peoples have had to our territories since the time of the first ancestors. Our stories contain guidance about who may use resources as well as the procedures and protocols users must follow (e.g., asking permission of the appropriate Tsleil-Waututh person, articulating one's familial and ancestral claim to the resource's use, showing generosity to one's relations provided the rules governing resource use are followed).

Our stewardship obligation thus requires us to maintain and restore conditions in the territory which ensure that the ability of individuals to live up to these protocols is not diminished, either directly (e.g., access to resources is lost or reduced) or indirectly (by affecting the environmental conditions under which they can acquire appropriate cultural training and spiritual preparation to take full advantage of these rights and understand their reciprocal obligations to others).

Furthermore, should appropriate permissions not be sought or protocols not respected, enforcement action may be taken. Our protocols and teachings inform the process and nature of the response, which will reflect the scale, persistence, and nature of the threat and may involve a collective response with our Coast Salish relatives.



¹⁸ Oral Aboriginal traditional evidence given by Gabriel George on October 16, 2014, during the National Energy Board's hearing for the TMEX proposal, held in Chilliwack, British Columbia.

¹⁹ Oral Aboriginal traditional evidence given by Leah George-Wilson on October 16, 2014, during the National Energy Board's hearing for the TMEX proposal, held in Chilliwack, British Columbia.



“In our *snəwəyət* we each come here with a gift, and if we bring this gift out then we—our journey to our ancestors ... is shorter, but if we struggled a bit and we didn’t bring out that gift, maybe the journey is hard.”²⁰

PRINCIPLE 3:

FAILURE TO BE “HIGHLY RESPONSIBLE” IN ONE’S ACTIONS TOWARD THE PEOPLE, THE EARTH, THE ANCESTORS, AND ALL BEINGS HAS SERIOUS CONSEQUENCES, WHICH MAY INCLUDE THE FOLLOWING:

3.1 Loss of physical sustenance

This consequence of failing to respect the principle of *ṭaxwəstəl* is exemplified by the story of Waut-Salk in which some young boys act disrespectfully toward the salmon by throwing rocks at them. The consequence of this disrespect is that all the salmon leave the area, endangering Tsleil-Waututh survival by causing our ancestors to lose a critical food resource.

3.2 Loss of access to resources or social status

Failure to respect the direction of Tsleil-Waututh individuals who have stewardship obligations toward a particular resource or resource-management location (e.g., regarding when to access a resource or how extensively to harvest it) could damage or destroy the resource over time and may in turn affect their social status or “good name.”

In order to preserve and pass down Tsleil-Waututh knowledge of how to steward our territory and of the protocols governing resource use, the environmental integrity of the water and land and the species they sustain must

be conserved. They are a source of learning and strength. If a resource is depleted significantly or becomes extinct, the cultural knowledge and relationships surrounding that resource are also at risk of being lost.

3.3 Loss of the tools and training that allow Tsleil-Waututh individuals to reach their full potential and the related social and cultural impacts of this loss

Each Tsleil-Watt person is born with a gift that enables them to contribute to a thriving family, community, and nation. The natural landscape provides opportunities for transformative learning and growth, offering the potential for learning from the water, the land, the ancestors, and other beings. However, if we fail to maintain healthy environmental, spiritual, and cultural conditions, people will lose the opportunity to uncover and nurture their gifts. Negative personal, societal, and cultural impacts flow from this loss.

²⁰ Oral Aboriginal traditional evidence given by Gabriel George on October 16, 2014, during the National Energy Board’s hearing for the TMEX proposal, held in Chilliwack, British Columbia.



9 TSLEIL-WAUTUTH BASELINE CONDITIONS

KEY POINTS

- » Tsleil-Waututh stories, traditions, and knowledge describe baseline conditions from which we can assess and measure cumulative effects on our title, rights, and interests over time.
- » Baseline conditions of Burrard Inlet pre-contact and at the time of the Crown's assertion of sovereignty:
 - Tsleil-Waututh people comprised a sovereign nation with the full right and power to govern our territory without interference.
 - As both our oral history and the archaeological record confirm, Tsleil-Waututh people lived on the bounty obtained from Burrard Inlet for thousands of years.
 - Over 90% of the protein in ancestral Tsleil-Waututh diets came from abundant marine foods harvested from Burrard Inlet, such as salmon, herring, clams, and birds.
 - Careful stewardship of this rich region by our ancestors maintained conditions that supported many villages and thousands of people.
 - Our cultural vitality and our economy were sustained through an annual cycle of resource harvest, winter ceremonial gatherings, potlatches, and trade with our Coast and Interior Salish relatives.
 - Cultural work was carried out in quiet, unpolluted, remote settings.
 - Tsleil-Waututh social structure was very resilient, surviving many calamities, including the Ice Age, floods, wars, serpents, epidemics, and occasional famines.
- » Conditions of Burrard Inlet in the 20th century:
 - The Tsleil-Waututh people continued to make use of Burrard Inlet—interviews of community members covering the period 1919 to 1972 identified thousands of sites where resources were harvested or cultural work was performed.

“...[W]e know that the inlet—there was a richness. There was abundance. If the people took care of the environment and themselves, they would survive. There was enough richness available that if you knew how to take care of it and how to harvest and not overuse the resources, then it would always be there.”²¹



Our stories, traditions, and knowledge describe environmental, cultural, spiritual, and economic conditions that persisted in our territory for thousands of years prior to contact. These conditions provide a standard or baseline from which cumulative effects on our title, rights, and interests over time can be assessed and measured.

Historical conditions in the territory were the result of proactive management by Tsleil-Waututh as a sovereign nation with the full right and power to govern our territory. For thousands of years, from time immemorial to contact and beyond, Tsleil-Waututh people have relied on the bounty of Burrard Inlet for physical nourishment, cultural vitality, and economic benefit. Resource harvest for food, clothing, shelter, cultural work, and trade is an enduring legacy of our origin and history as a people. Our rich waters and lands benefited from the exercise, in accordance with Coast Salish protocols, of our sacred stewardship obligations, as described in **Sections 4, 5, and 8**.

Our oral history speaks of the abundance and wealth Burrard Inlet gave us. It tells of our ancestors' seasonal use of various resource harvest sites and of canoeing or walking to visit or trade with Coast and Interior Salish relatives. All the while, our elders told stories and shared skills and traditional ways with our youth as a means of transmitting the culture to the next generation. During the annual cycle, artistic endeavours flourished and stores of food sufficient to feed thousands of Tsleil-Waututh in many villages were put away in preparation for winter ceremonial gatherings and potlatches.

Feeding 1,000 individuals from Burrard Inlet required about 450,000 kilograms of salmon annually (Morin 2015)—about 90,000 chum or 225,000 pinks—in addition

to herring, clams, birds, and so forth. While some of the protein requirement was met by sockeye taken from the Fraser River, the bounty of pre-contact Burrard Inlet must have been rich and giving to feed so many people. To feed 3,000 individuals, Tsleil-Waututh needed to fish half or less of the pre-contact salmon returns to the Indian River described in **Section 5**.

One key aspect of the pre-contact era was the lack of urban, commercial, or industrial development. Our waters and lands were pristine. For cultural work, there were plenty of suitable places in scenic, remote, and quiet settings without threat of exposure to pathogens, hazardous chemicals, or other types of pollution.

While abundance and bounty were the norm, occasionally there were calamities. The Ice Age, floods, serpents, epidemics such as smallpox, and occasional famines tested us. We survived all those events because of the resilience of our teachings, cultural traditions, social structure, and governance—including our stewardship of Burrard Inlet.

²¹ Oral Aboriginal traditional evidence given by Gabriel George on October 16, 2014, during the National Energy Board's hearing for the TMEX proposal, held in Chilliwack, British Columbia.



TSLEIL-WAUTUTH NATION
EASTERN BURRARD INLET

MAP 23: PRE-CONTACT RESOURCE USE

Legend

- Westridge Marine Terminal
- Tsleil-Waututh Nation Settlement Site (with Archaeological Information)
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
- Proposed KMC Infrastructure Expansion**
 - Proposed KMC Infrastructure Expansion
 - Proposed KMC Alternate Pipeline Expansion
 - Tanker Route

Finfish Bones



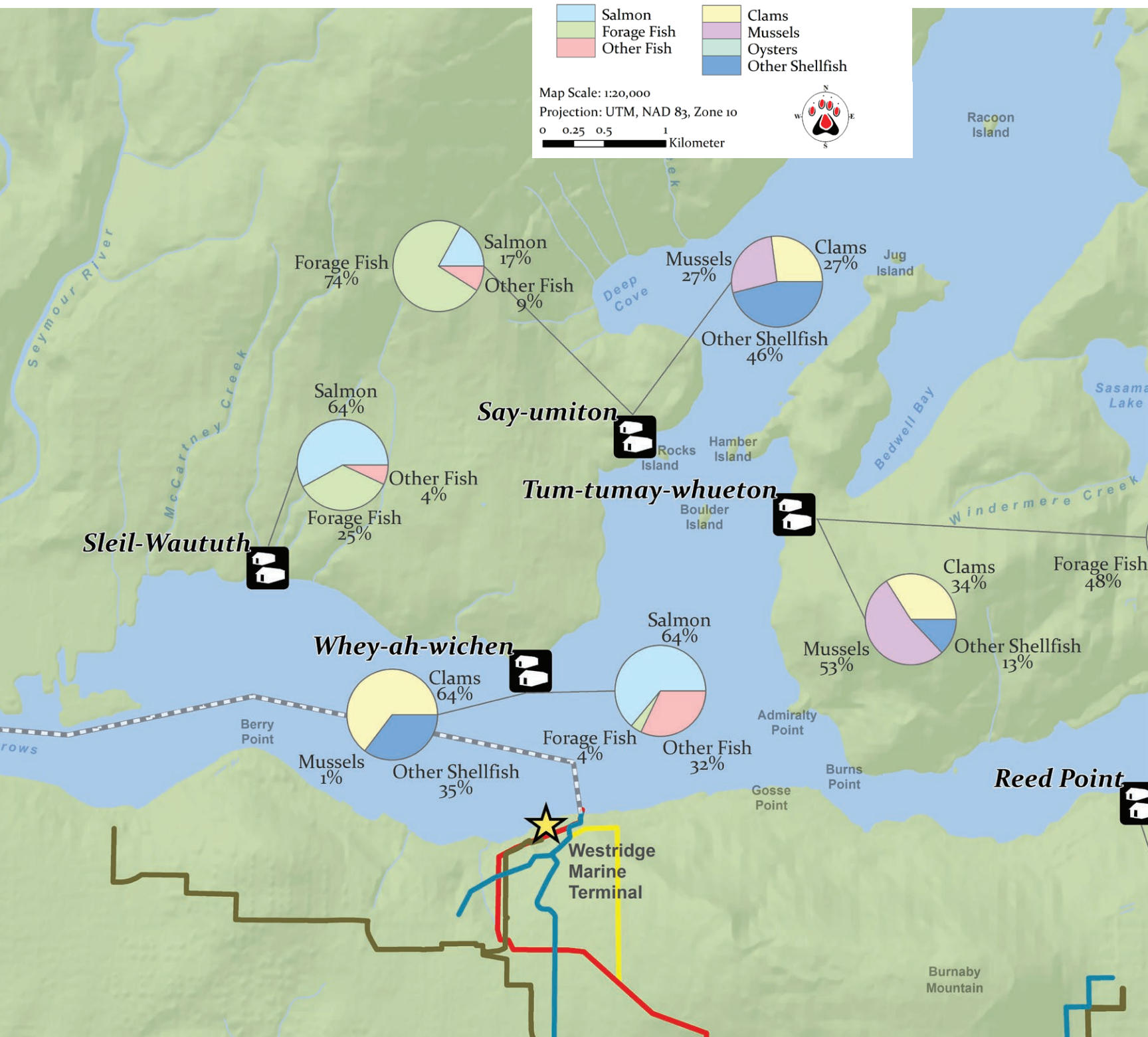
- Salmon
- Forage Fish
- Other Fish

Shellfish Shells



- Clams
- Mussels
- Oysters
- Other Shellfish

Map Scale: 1:20,000
Projection: UTM, NAD 83, Zone 10
0 0.25 0.5 1 Kilometer



²² Each site was investigated independently, so the available data cannot easily be compared. While the data does not allow comparison between classes of species, it provides relative numbers within each class. For example, forage fish and salmon bones comprised the vast majority of all finfish bones. Their relative abundance varied by location, but their combined total was at least 75% of all finfish bones in each midden. Other finfish bones, found in smaller numbers, included sculpins and flatfish such as sole and flounder. Likewise, in the case of bivalves, clam species such as butter and littleneck were far more common than native oysters.

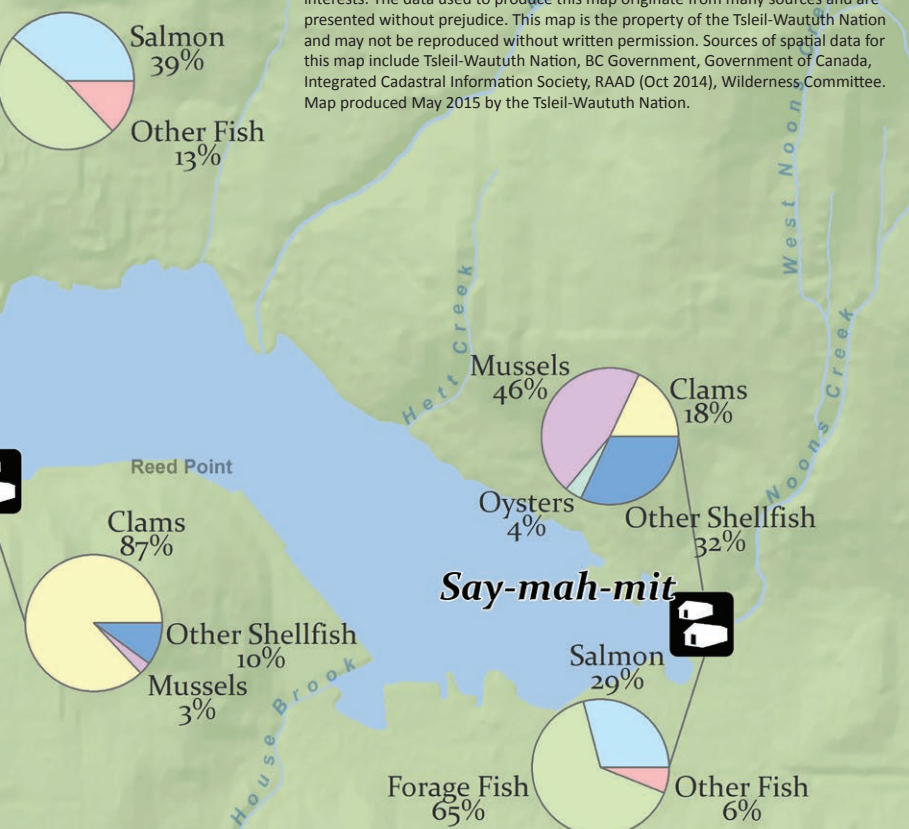
Figure 10 —Relative Percentage of Finfish Bones in Shell Midden at Tum-tumay-whueton



Summary of Archaeological Record 750 BC to 1850 AD

CLASS	SPECIES	RANGE OF RELATIVE ABUNDANCE
Finfish Bones	Forage Fish	35-74%
	Salmon	17-64%
Shellfish Shells	Clams	18-87%
	Mussels	1-53%
	Oysters	0-4%
Mammal Bones	Deer	1-50%
	Elk	0-21%
	Seals	0-5%
Bird Bones	Present	

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ARCHAEOLOGY

The archaeological record confirms elements of resource harvest spoken of in our oral history. The record spans more than 2,500 years, from approximately 750 BC to around AD 1850. It shows that for physical nourishment prior to contact, Coast Salish people, including Tsleil-Waututh, obtained 90% or more of our protein from marine species (Chisholm, Nelson, and Schwarcz 1983).

Tsleil-Waututh protein sources can be identified from the rich array of discarded bones and shells found in the shell middens excavated around eastern Burrard Inlet (see Morin 2015; Pierson 2011; Stantec 2011; Lepofsky et al. 2007; Trost 2005; Ham and Yip 1992; Charlton 1974; Williams 1974). Finfish such as salmon and various species of forage fish were all abundant in Burrard Inlet. While salmon are a well-recognized food source, forage fish, in particular herring but also to some extent surf smelt, sardine, sand lance, eulachon, and anchovy, were a more important food source at some places and times.

Reports from Captain Vancouver's 1792 expedition corroborate the archaeological record of forage fish consumption. He wrote that his crew both were given and bought "smelt" from the people in Burrard Inlet (Morin 2015). Even earlier, in Ortelius's *Third Atlas of the Northwest Coast*, Point Grey was called *P. de Sardines* (Morin 2015), another indicator of forage fish abundance.

Shells from bivalve shellfish species such as clams and mussels, and bones from mammals and birds, including marine species such as seals, are also present in the archaeological record. These resources provided the protein necessary to feed our people. In an ancient human bone fragment from Tum-tumay-whueton, 96% of the protein was found to be marine in origin, confirming that marine life formed the basis of our subsistence economy (Chisholm, Nelson, and Schwarcz 1983).

Map 23 summarizes some of the archaeological data available for eastern Burrard Inlet. It shows the location of six excavated sites and includes figures describing the types of finfish bones and shells frequently found at each location and in what proportion. A final, larger table, which provides a summary of the data, includes common mammal and bird bones.²²

The archaeological record also confirms that the wealth of our subsistence resources was relatively uninterrupted. Active management of marine resources sustained and generally made them regularly available over thousands of years (Morin 2015), as depicted in **Figure 10**.

At the Tum-tumay-whueton archaeological site, salmon made up one-third to one-half of the finfish bones in the midden, and forage fish comprised one-third to two-thirds. Those proportions were consistent across 14 sampling points in a 2,000-year archaeological record (Pierson 2011). This data corroborates that active resource management led to a sustained bounty of finfish from Burrard Inlet for the Tsleil-Waututh people.

20TH CENTURY

With the exception of herring, as noted in **Section 5**, Burrard Inlet continued to supply Tsleil-Waututh people with resources in the 20th century. In interviews about their memories of the period from 1919 to 1972, community members identified thousands of sites where resources were harvested or cultural work continued.

Table 3 provides a tabular account of the types of resources and activities cited by community members and the number of responses for each. **Map 24** outlines the areas of concentrated use, in the Central Harbour, but also around the Capilano River and up Indian Arm, both the estuary and the river.

Figure 11 is an example of continuity of resource use. It shows a Tsleil-Waututh member digging clams on Tsleil-Waututh Reserve.



TSLEIL-WAUTUTH NATION
BURRARD INLET
MAP 24: RESOURCE
HARVEST AND CULTURAL
SITES 1919-1972

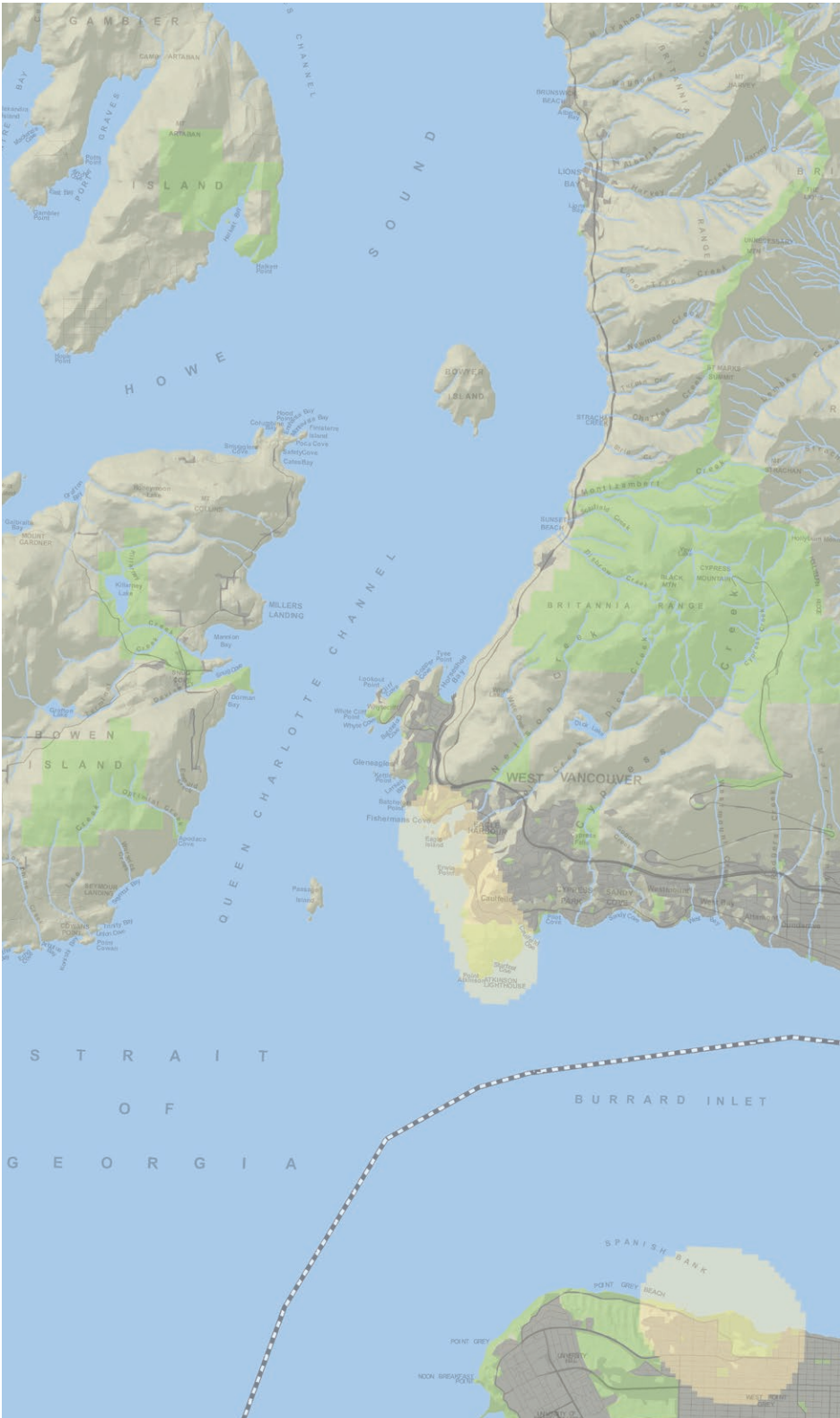
Legend

- Tsleil-Waututh Major Village
- Tanker Route
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
- Proposed KMC Infrastructure Expansion**
 - Proposed KMC Infrastructure Expansion
 - Proposed KMC Alternate Pipeline Expansion
- Tsleil-Waututh Nation Reserve
- Tsleil-Waututh Assessment Study Area
- Concentrated Resource Use (Number of Sites/km²)**
 - Moderate (1 to 18)
 - High (18.01 to 68)
 - Very High (68.01 to 140)
- Greenspace
- Developed Area

Map Scale: 1:60,000
Projection: UTM, NAD 83, Zone 10
0 1.25 2.5 5 Kilometers



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SPECIES OR ACTIVITY	NUMBER OF RESPONSES
Shellfish	817
Cultural Work	436
Finfish and Eggs	396
Birds and Eggs	217
Plants and Seaweeds	170
Mammals	19

Table 3—Resource Use in the Burrard Inlet Watershed Reported by the Tsileil-Waututh Community, 1919–1972

Figure 11—Alfred Michael George (1901–1976) Digging Clams.

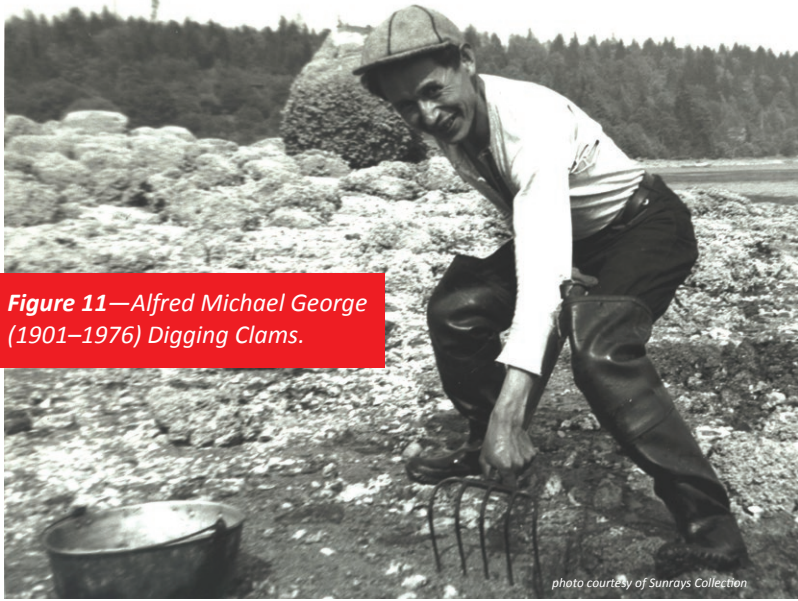
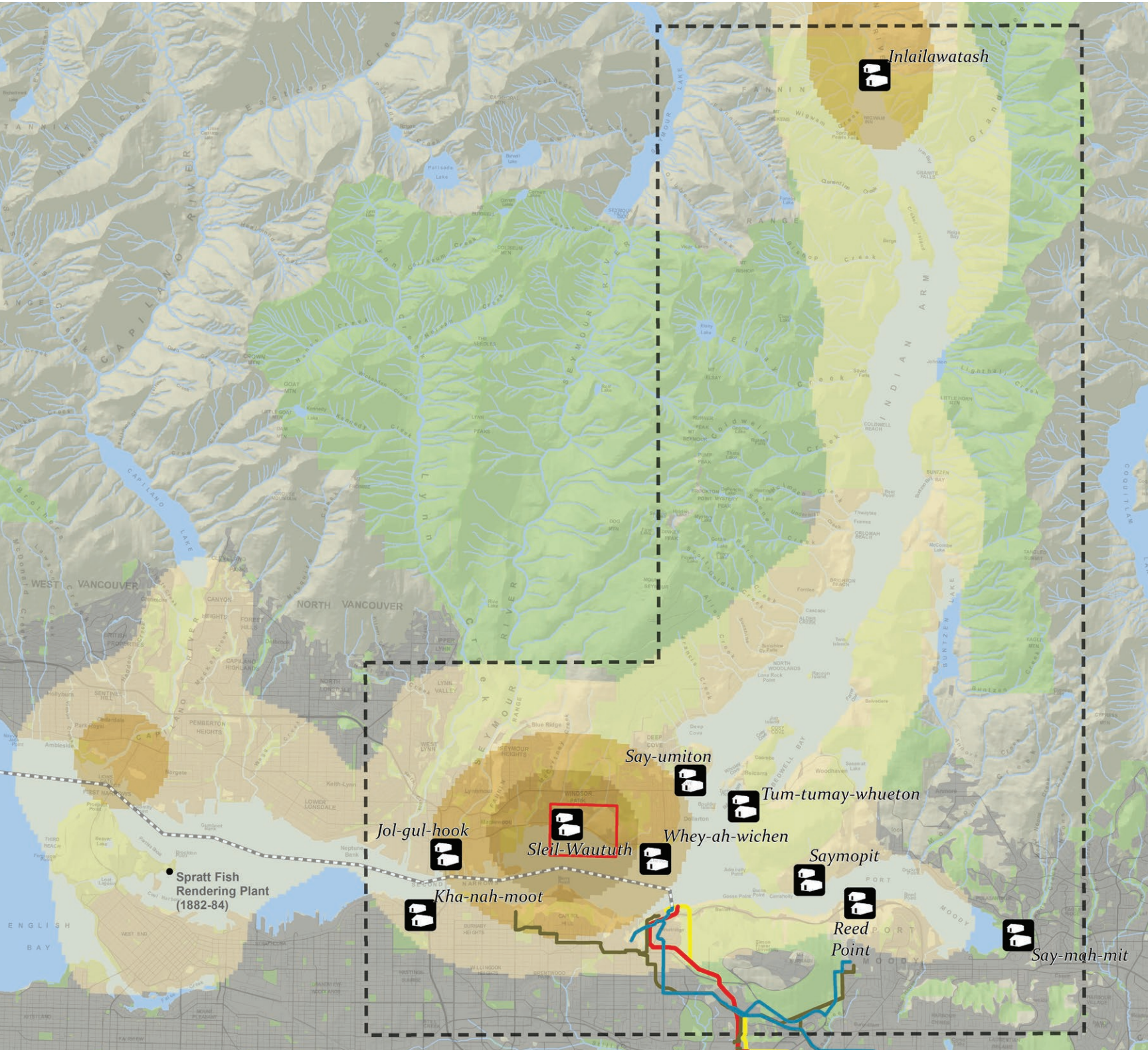


photo courtesy of Sunrays Collection.



10. **CURRENT CONDITIONS** *and* **CUMULATIVE EFFECTS**

KEY POINTS

- » Principles governing cumulative effects in Tsleil-Waututh territory:
 - Conditions in our territory must be maintained or restored to the levels required by Tsleil-Waututh law.
 - The health of our subsistence economy is a key indicator of cumulative effects, which is to say, of the current environmental integrity of Burrard Inlet.
 - If conditions do not permit the harvest, use, sale, or trade of safe, abundant wild foods such as salmon, herring, clams, or birds from Burrard Inlet, then the environmental integrity of the inlet is compromised and cumulative effects have exceeded what is allowable under Tsleil-Waututh law.
- » 20th Century:
 - The environmental effects of urban, commercial, and industrial development led to a gradual reduction in our use of Burrard Inlet's natural resources and cultural sites for physical nourishment, cultural work, and economic benefit.
 - Incrementally, our subsistence economy was replaced by a wage-based economy, and store-bought items progressively became our primary source of nutrition, introducing to our community the health problems associated with them.
 - By 1972, cumulative effects had exceeded what is allowable under Tsleil-Waututh law. Our subsistence economy had been devastated.

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present, or foreseeable actions. Tsleil-Waututh evaluates them within the framework of environmental carrying capacity, or the environment's ability to absorb pollution, compensate for habitat destruction, and adjust to species loss or invasion without compromising its integrity and overall health.

For the Tsleil-Waututh Nation, cumulative effects are, at the simplest level, assessed by measuring their impact on our subsistence economy. Lack of a robust subsistence economy is a fundamental indicator that many other elements of our title, rights, and interests as described **Table 1** are damaged, harmed, or diminished. Threats to our subsistence economy are determined by the level of diminishment from pre-contact baseline conditions as described in **Section 9**.

20TH CENTURY

Section 9 describes the continuity of our resource and cultural use of Burrard Inlet into the 20th century. However, as described in **Section 5**, the environmental effects of urban, commercial, and industrial development gradually reduced the inlet's capacity to provide physical nourishment, places for cultural work, and economic benefit. In particular, whereas before contact, Burrard Inlet supplied over 90% of our protein needs, by the end of the 20th century, it supplied almost none.

Loss of resources affected more than the nourishment of living community members. An important component of

Tsleil-Waututh cultural work is offering and feeding traditional foods to our ancestors and to other spirit beings. Lack of appropriate natural resources to carry out this duty is extremely detrimental to our community, interfering with our access to the knowledge and

wisdom of our ancestors as described in **Section 4**.

Exceeding the environmental carrying capacity of Burrard Inlet and eroding its environmental integrity affected everything, from marine vegetation and plankton communities to finfish, shellfish, birds, and marine mammals. Damage to streams, estuaries, shorelines, and intertidal habitat resulted in the decrease, loss, or contamination of native species, in the degradation of water and sediment quality, and in the spread of invasive species. The result was the devastation of our Tsleil-Waututh subsistence economy, which is fundamentally based on salmon, herring, clams, and birds.

Salmon and herring were once a mainstay of Tsleil-Waututh economy and culture. As described in **Section 5**, before contact nearly a million salmon or more returned each year to the Indian River. As described in **Section 9**, we harvested maybe half of those fish to feed our people.

Today, Tsleil-Waututh has to negotiate every year with the federal government for an Indian River harvest quota, and we have to subtract whatever is harvested there from our Fraser River food, social, and ceremonial allocation. In the Fraser River, we have an active communal license

for 7,000 sockeye. This provides less than one kilogram of salmon per week per Tsleil-Waututh member,²⁴ whereas our baseline condition as described in **Section 9** was more than one kilogram per person every day.

The situation for herring is far worse. Herring bones were numerous in our shell middens, as described in **Section 9**, and they were a major part of our diet. Today very few herring survive in Burrard Inlet and no harvest is possible.

Cumulative effects have also harmed clams and birds, the other major components of our subsistence economy. As described in **Section 5**, clams are still found in Burrard Inlet, but they are unsafe to eat. Bird numbers are in decline, and even if they were not, the provincial government has imposed restrictions on hunting them.

The gradual decline in the Tsleil-Waututh subsistence economy led to the rise of a wage-based economy in our community. Store-bought foods replaced much of the traditional diet and became the primary source of nutrition for our community members. Associated with the change in diet and economy, diseases like diabetes and cancer now afflict our people, and we have experienced a decline in physical, mental, and community health (see **Section 14**).

Our Tsleil-Waututh traditional diet is deeply entwined with our social fabric, cultural work, and law, as described in **Sections 4** and **8**. Faced with a wage-based economy and declining local marine resources, we increased our reliance on our ties with other communities to maintain some connection with traditional foods. Sometimes we got clams from relatives in Sliammon or other coastal communities, and we have placed greater emphasis on Fraser River sockeye.

The transition from a subsistence economy to a wage-based one led to subtle shifts in the social and cultural dynamics of our families. Cultural transmission decreased because there were fewer resource harvest opportunities. Furthermore, development destroyed many of the remote and quiet settings critical for cultural work. The remaining sites were disturbed or polluted and became less desirable or more dangerous to use. The net result was that the relationships between our elders and youth became weaker and the sharing between them of history, knowledge, traditional ways, and skills diminished.

During this period, Tsleil-Waututh governance was challenged by oppressive legislation and by the residential school initiative. Our language was suppressed and we lost many language holders. Although these events are beyond the scope of this assessment, they provide important

context in which to understand our analysis of cumulative effects.

Using the health of our Tsleil-Waututh subsistence economy as a key indicator of environmental and cultural integrity, it is clear that by the time the federal government closed Burrard Inlet to bivalve harvest in 1972, Tsleil-Waututh cumulative effects thresholds had been exceeded, in violation of Tsleil-Waututh stewardship laws. Devastation of our subsistence economy signalled that Burrard Inlet's carrying capacity had been exceeded and that the inlet could not and should not absorb any more effects from urban, commercial, or industrial development.

The loss of herring in 1885 and the closure of bivalve harvest in 1972 bookend the collapse of Burrard Inlet's environmental integrity. After thousands of years of supporting our Tsleil-Waututh way of life, in less than 200 years key marine resources in Burrard Inlet were exterminated, contaminated, or made inaccessible. Our subsistence economy was shattered.

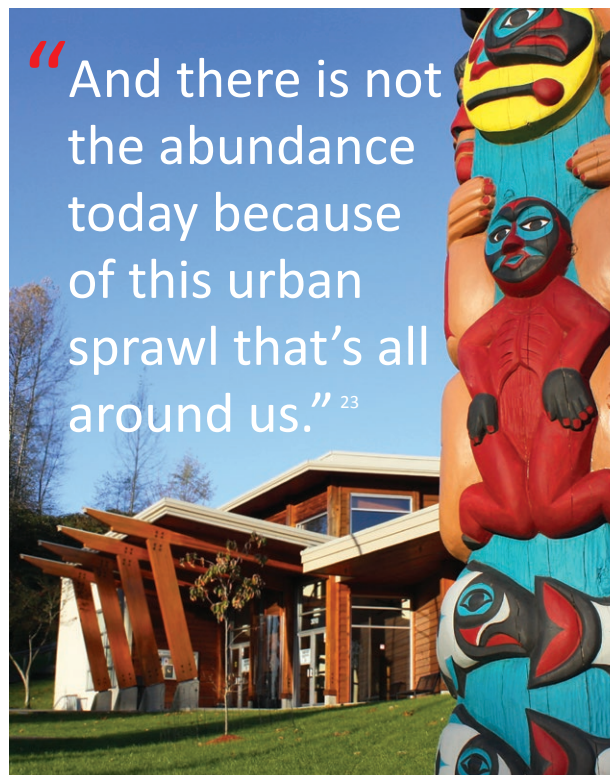
Since 1972, cumulative effects have continued to accrue, pushing Burrard Inlet further beyond its environmental carrying capacity in violation of Tsleil-Waututh law. It is essential to know both the historical context and the compromised environmental integrity that exists today in order to

understand the seriousness of the potential effects of the proposed TMEX on Tsleil-Waututh title, rights, and interests.

Given these circumstances, the nation takes a precautionary approach to assessing any new project and only consents to those new development proposals that are consistent with restoring the territory to the conditions prescribed in Tsleil-Waututh law and the objectives of the Marine Stewardship Program. To do otherwise would ignore the existing state of affairs, further contribute to negative cumulative effects, and continue to deny Tsleil-Waututh a subsistence economy.

Map 25 summarizes current conditions in Burrard Inlet. It identifies, by stream, the salmon species that still return and the extent of the shellfish closure. It also shows the magnitude of industrial development along the shoreline and that a number of streams have been lost, endangered, or threatened by this development.

Having identified historic and current conditions, the assessment then proceeded to examine potential project-related effects on Tsleil-Waututh title, rights, and interests in conjunction with the cumulative effects of past and present development in our territory. **Sections 11** to **13** summarize this evidence.



²⁴ 7,000 sockeye x 3 kg = 21,000 kg, which provides 42 kg to each of Tsleil-Waututh's approximately 500 members.



TSLEIL-WAUTUTH NATION BURRARD INLET

MAP 25: CURRENT RESOURCE USE AND INDUSTRIAL DEVELOPMENT

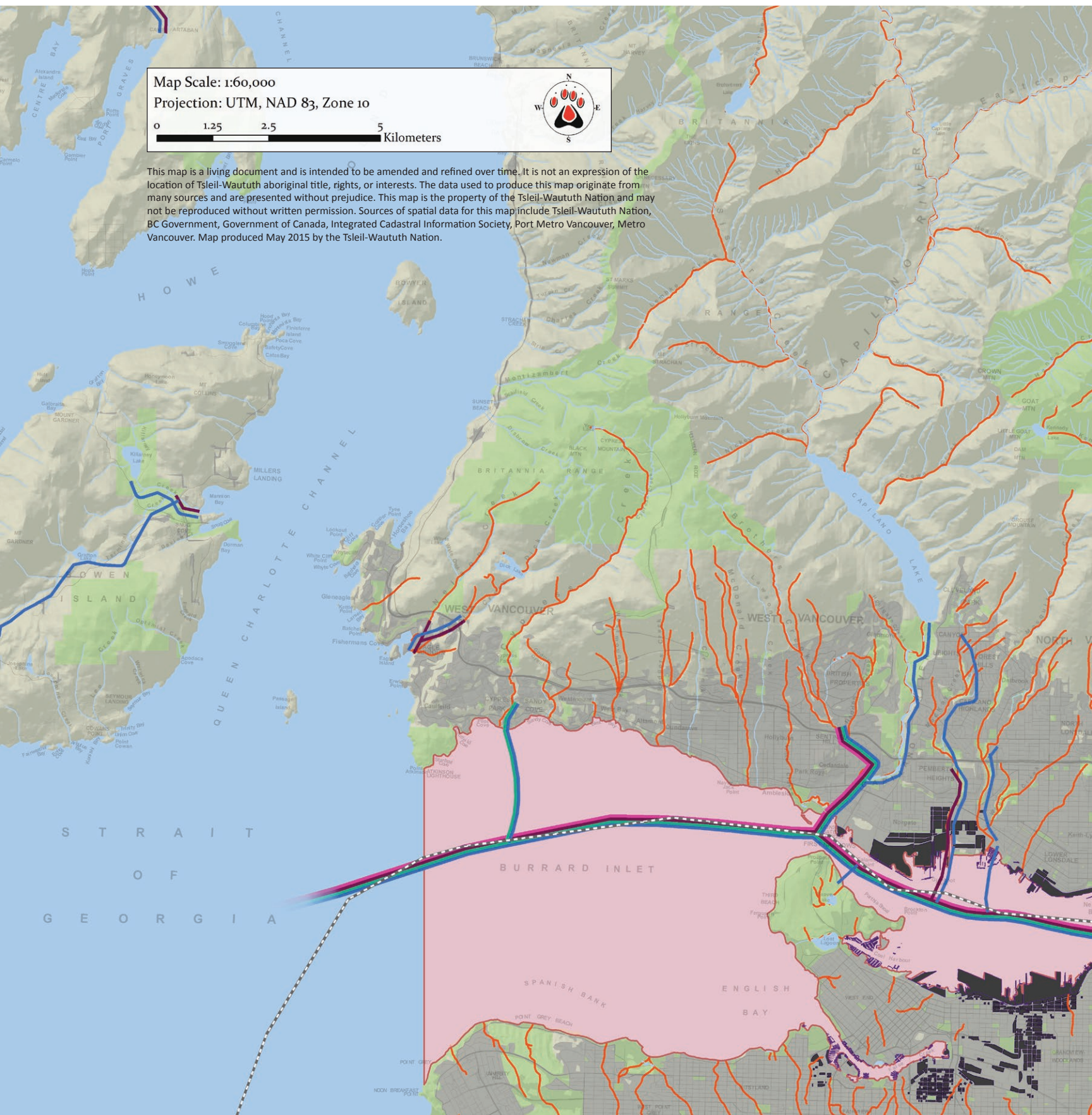
Map Scale: 1:60,000

Projection: UTM, NAD 83, Zone 10

0 1.25 2.5 5 Kilometers



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Legend

★ Westridge Marine Terminal

⋯ Tanker Route

KMC Existing Infrastructure

— Trans Mountain System

— Jet Fuel System

— Lost, Endangered, or Threatened Streams

Salmon-Bearing Streams

— Coho

— Chinook

— Chum

— Pink

▭ Tsleil-Waututh Nation Reserve

▭ Tsleil-Waututh Assessment Study Area

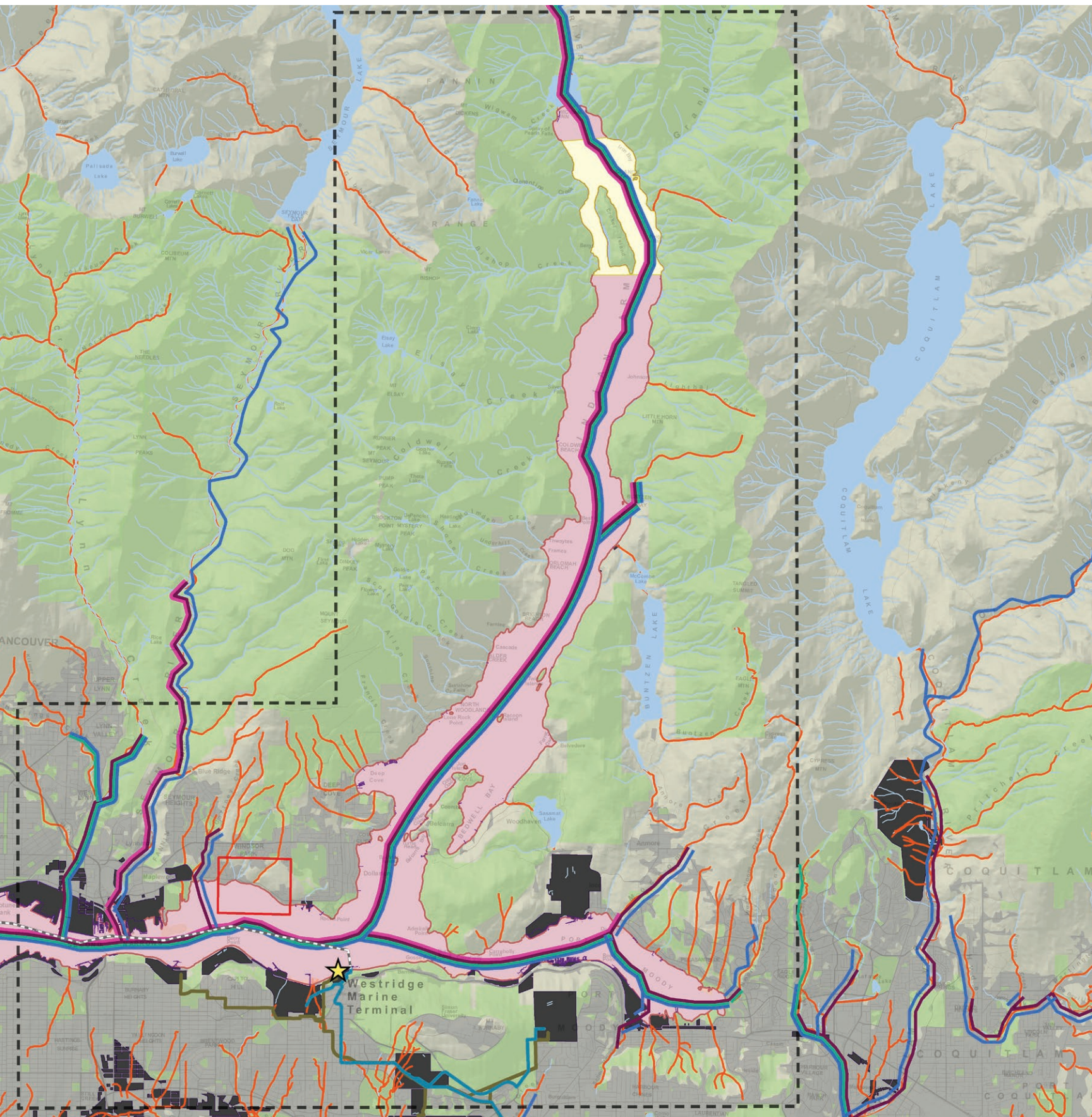
▭ Potential Bivalve Harvest Area

▭ Bivalve Harvest Closed

▭ Industrial and Port Use

▭ Greenspace

▭ Developed Area



11. BURRARD INLET SPILL TRAJECTORY ASSESSMENT: IS A SPILL INEVITABLE? WHERE WILL IT GO?

KEY POINTS

- » In their 2015 expert report on risk assessment, Drs. Thomas Gunton and Sean Broadbent concluded that oil spills are more likely if the TMEX proposal is implemented.
- » Dr. Jerry Galt concluded the following in his 2015 expert report on oil spill trajectory modelling:
 - Oil spreads quickly in the confined setting of Burrard Inlet and has the potential to foul water in all basins.
 - Following a spill, a substantial amount of oil lands on the shoreline and acts as a secondary spill source through cycles of stranding, refloating, and restranding.
 - While most oil spilled in Burrard Inlet strands, the portion remaining on the water can cover tens of square kilometres.

Is a spill inevitable in Burrard Inlet?

As noted in **Section 7**, Tsleil-Waututh engaged Drs. Gunton and Broadbent from Simon Fraser University, leading experts in risk assessment, to evaluate the likelihood of oil spills from the TMEX proposal. Their full report is available in **Appendix 1**. Their major conclusions included:

- » There is a 79-87% likelihood of a spill at the Westridge Marine Terminal or in Burrard Inlet over fifty years.
- » Smaller spills are very likely (~160 cubic metres, or 1,000 barrels), but larger spills (~1600 cubic metres, or 10,000 barrels) also have a 37% likelihood over fifty years.
- » A reasonable worst-case spill of 16,000 cubic metres (100,000 barrels) somewhere along the marine shipping route has a 29% likelihood over fifty years.

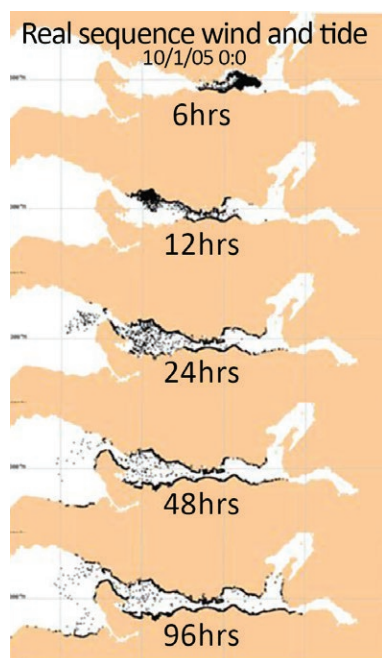


Figure 12—A Second Narrows Model Run by Dr. Galt

Where will spilled oil go?

As noted in **Section 7**, Tsleil-Waututh engaged Dr. Jerry Galt of Genwest Systems, a leading international authority on oil spill modelling, to develop an oil spill trajectory model for Burrard Inlet. We asked Dr. Galt to describe the spread over time of oil spilled at four locations. Dr. Galt was also asked to develop instructions for further use of the model by Tsleil-Waututh. The full report is available in **Appendix 2**, and a brief summary is presented here.

The volume of the modelled spills was intended to represent reasonable worst-cases.²⁵ The locations and volumes modelled were as follows:

- 1) an oil spill of 8,000 cubic metres (~50,000 barrels) at Westridge Marine Terminal
- 2) an oil spill of 16,000 cubic metres (~100,000 barrels) at Second Narrows under the Canadian National Railway Bridge
- 3) an oil spill of 16,000 cubic metres at First Narrows under the Lions Gate Bridge
- 4) an oil spill of 16,000 cubic metres in the Outer Harbour, at Anchorage #8

Map 26 shows the locations of these scenarios.

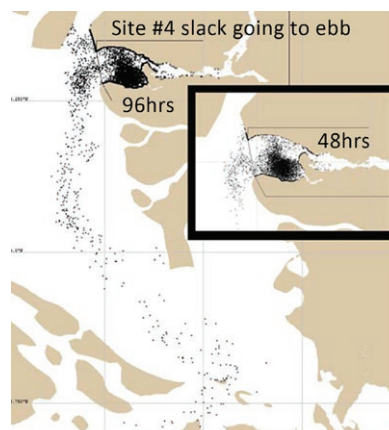


Figure 13—An Outer Harbor Model Run by Dr. Galt



²⁵ According to Nuka Research projections (**Appendix 4**), a reasonable worst-case spill has a volume of 8,000 cubic metres (~50,000 barrels) at Westridge Marine Terminal and 16,000 cubic metres (~100,000 barrels) elsewhere in Burrard Inlet. This analysis is based on conditional probabilities presented in the TMEX facilities application filed with the NEB.

Table 4—Location of Oil (%) by Scenario at 24/48 Hours After a Spill

LOCATION OF SPILLED OIL AT 24/48 HRS (%)	OUTER HARBOUR	INNER HARBOUR	CENTRAL HARBOUR	INDIAN ARM	PORT MOODY ARM
Westridge	Trace / Trace	1% / 2%	91% / 80%	8% / 12%	1% / 6%
Second Narrows	5% / 6%	67% / 63%	27% / 29%	1% / 1%	1% / 1%
First Narrows	59% / 54%	39% / 42%	2% / 2%	Trace / Trace	Trace / Trace

From the four scenarios, Dr. Galt concluded that oil spreads quickly in the physical setting of Burrard Inlet described in **Section 5** and has the potential to foul all the basins of the inlet, including Indian Arm, a place of special importance to Tsleil-Waututh. A reasonable worst-case spill has the potential to cover quickly many square kilometres of the water surface with oil. For example, in **Figure 12** a spill modelled at Second Narrows on October 1, 2005, spread into the Outer Harbour and Central Harbour within 24 hours. In **Figure 13**, a spill modelled in the Outer Harbour on August 19, 2007, spread into the Strait of Georgia within 48 hours.

For a full range of model examples, see the **Oil Spill Time Progression Atlas** in **Appendix 6**.

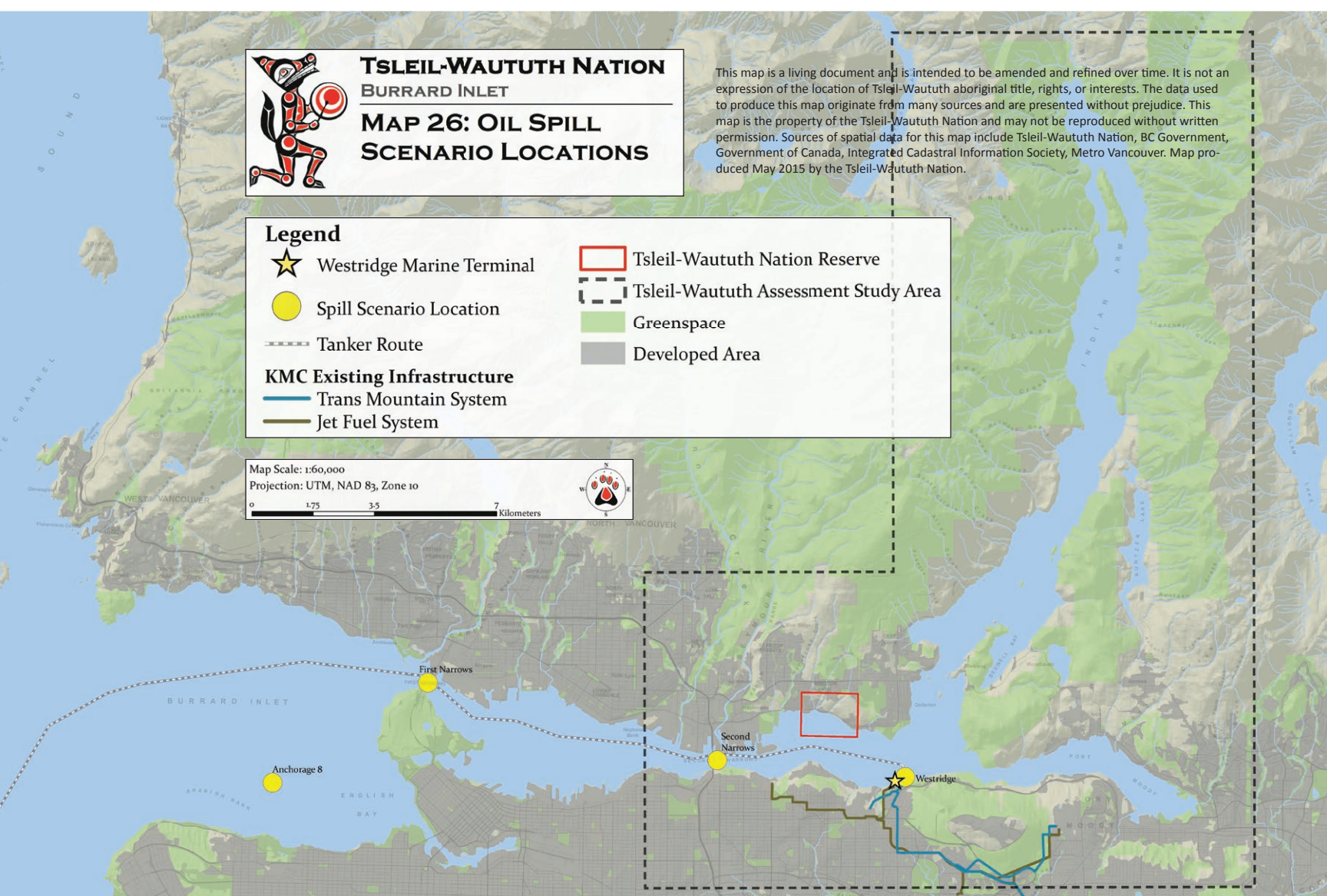
Once Dr. Galt finished his work, Tsleil-Waututh used the model and his directions to further develop the scenarios. For each of the three spill locations at or inside First Nar-

rows, an ensemble of runs was compiled for calendar year 2005.²⁶ Using a stochastic approach, we developed data on oil location, stranding, and length of fouled shoreline.

Additional analysis by Tsleil-Waututh found that spills tended to concentrate in the nearest basin or two, as illustrated in **Table 4**. The Central Harbour and Indian Arm are at particular risk from a spill at Westridge Marine Terminal.

For example, on average 91% (7,280 cubic metres) of the oil from an 8,000 cubic metre spill at Westridge Marine Terminal remains in the Central Harbour at 24 hours, with the balance moving primarily into Indian Arm. At 48 hours, more oil has moved into Indian and Port Moody Arms, leaving on average only 80% (or 6,400 cubic metres) in the Central Harbour.

For a full range of model examples, see the **Oil Spill Ensemble Location Atlas** in **Appendix 7**.



²⁶ Dr. Galt used calendar year 2005 because a sophisticated analysis of wind speed, direction, and variability was available for the entirety of Burrard Inlet and could be incorporated into the oil spill trajectory model, making it a more reliable predictor of spill spread.



Figure 14—Stranded Oil, 2007 Westridge Oil Spill

OIL STRANDING

Dr. Galt concluded that most oil strands quickly on shorelines after a spill in Burrard Inlet. Stranding occurs when oil moves along the water surface to the shoreline and grounds or beaches, staying there for some period, as illustrated in **Figure 14**. Generally, winds push the spilled oil forward until it encounters the leeward shore. When the tide recedes, the oil lands on the exposed foreshore. Depending on the nature of the surface and environmental conditions, stranded oil may remain there for hours, days, weeks, months, or years.

Sometimes stranded oil moves again by refloating at high tide. Then the oil either moves nearby and restrands as the tide recedes, or, if wind conditions are right, it moves toward the opposite shore. Each cycle of stranding and refloating acts as a new, secondary oil spill.

Additional analysis by Tsleil-Waututh confirmed that stranding is highly likely in Burrard Inlet. Nearly all the oil spilled at or inside First Narrows ends up stranded, fouling many kilometres of shoreline within 24 hours and persisting there at 48 hours and longer.

Table 5—Location of Stranded Oil (%) by Scenario at 24/48 Hours After a Spill

STRANDED OIL AT 24/48 HRS (%)	MIN	MAX
<i>Westridge</i>	93% /92%	100% /100%
<i>Second Narrows</i>	91% /87%	100% /100%
<i>First Narrows</i>	22% /69%	97% /99%

Table 6—Fouled Shoreline (km) by Scenario at 24/48 Hours After a Spill

FOULED SHORELINE AT 24/48 HRS (km)	MIN	MAX
<i>Westridge</i>	0.4/0.6	7.6/10.9
<i>Second Narrows</i>	4.7/4.5	19.6/24.4
<i>First Narrows</i>	3.3/8.7	17.3/19.9

Table 5 shows that almost all the spilled oil can strand by 48 hours. The exception is spills at First Narrows: if winds are blowing strong enough from the east, the oil tends to stay in the water of the Outer Harbour.

The minimums and maximums represent, for each scenario location, the highest and lowest values recorded over 12 runs, one in each month of 2005.

Table 6 shows the linear extent of potential shoreline oiling. A spill at Second Narrows will foul the greatest length of shoreline, up to 20 kilometres at 24 hours and up to 25 kilometres at 48 hours.

The minimums and maximums represent, for each scenario location, the highest and lowest values recorded over 12 runs, one in each month of 2005.



12. ADDITIONAL EXPERT FINDINGS & CONCLUSIONS

KEY POINTS

- » All experts concluded in their reports that the TMEX environmental assessment is inadequate and should not be relied upon to assess the potential effects of the proposal.
- » Nuka Research concluded in their 2015 expert report on oil spill response that even under the best of circumstances less than half the volume of spilled oil can be recovered in a cleanup response in Burrard Inlet, leaving considerable oil in the air, on the shoreline, or in the water.
- » Dr. Short concluded the following in his 2015 expert report on dilbit behaviour and environmental consequences:
 - Spilled dilbit is likely to submerge in the conditions found in Burrard Inlet and will be very difficult to clean up.
 - Larger spills will cause an environmental catastrophe and smaller spills will cause significant environmental damage.
- » Levelton concluded in their 2015 expert report on air quality effects of oil spills that over a one million residents around Burrard Inlet (including Tsleil-Waututh Reserve) are at risk of acute health effects from toxic air emissions from a worst-case oil spill.

The expert reports described in **Section 7** contain the following additional findings and conclusions regarding the TMEX application and its environmental effects in Burrard Inlet:

Did Trans Mountain provide an adequate environmental assessment of the TMEX proposal in their application?

Drs. Gunton and Broadbent—

- » The tanker and terminal oil spill risk assessments completed by Trans Mountain did not provide an accurate and complete evaluation of the degree of risk associated with the proposal.
- » The tanker spill risk estimates in the TMEX application should not be relied upon as an accurate estimate of tanker spill risk.

Dr. Galt—The Trans Mountain trajectory model underestimated the extent and duration of spills in Burrard Inlet because it did not allow stranded oil to refloat.

Dr. Short—There are fundamental deficiencies with the TMEX ecological risk assessment and it should not be relied upon to assess the environmental risk of the project.

Can spilled oil be cleaned up in Burrard Inlet?

Nuka Research—

- » The ability to mount a marine cleanup response within the first three days is critical to mitigating spill impacts because after 72 hours, spilled oil is difficult to recover.
- » Even under the most favourable conditions, less than half the volume of a reasonable worst-case spill can be recovered in the Outer Harbour during the first 72 hours of a marine cleanup response.
- » Theoretical oil recovery efficiency is higher in the

Central Harbour than in the Outer Harbour, but conditions will not be favourable because of the strong tendency for spilled oil to strand there.

- » Any delay in spill cleanup response will decrease the total volume of oil recovered significantly.

Will dilbit submerge in Burrard Inlet? What cleanup challenges does submergence pose?

Dr. Short—

- » When spilled into the environment, the volatile condensate in dilbit tends to evaporate. This returns the remaining bitumen to near its original density, which is about the same as saltwater. If salinity decreases and becomes brackish, dilbit is likely to submerge because in its evaporated form it can be heavier than the water. If sediment is present in the water and mixes with dilbit it is even more likely to submerge.
- » Surface water in Burrard Inlet is often brackish, making dilbit more likely to submerge, perhaps within 24 hours, when the Fraser River discharge plume circulates freshwater and sediment through the inlet in the spring and summer.

Figure 15 is a satellite picture of an example of the Fraser River plume. The discharge of sediment and its movement into Burrard Inlet is evident in the photograph.

Nuka Research—Weathering of spilled dilbit in the first few days may render cleanup equipment ineffective and if spilled dilbit submerges, location and recovery may be less effective, both making cleanup very difficult.



Figure 15—Fraser River Plume, September 7, 2011 (NASA)

What are the environmental consequences of spilled oil or dilbit?

Dr. Short—

- » An oil spill because of TMEX could lead to major environmental catastrophe.
- » A reasonable worst-case spill could result in the mortality of 100,000 to 500,000 birds and trigger major disruptions of food-web dynamics, resulting in environmental collapse.
- » Stranded oil along the shoreline of Burrard Inlet will provide a long-term reservoir of contamination, and intertidal communities may take years to recover.
- » Embryos of finfish and shellfish that develop in the intertidal zone may die from the toxic effects of stranded oil.
- » Even oil spills smaller than the reasonable worst-case scenario can have substantial adverse effects on birds, marine mammals, and intertidal communities.

What are the effects of spilled dilbit on air quality?

Dr. Short—Dilbit is a mixture of condensate and bitumen, and once spilled, the condensate rapidly evaporates, creating inhalation and safety hazards.

Levelton—A reasonable worst-case spill at Westridge Marine Terminal has the potential to expose over 1,000,000 residents (including on Tsleil-Waututh Reserve) to acute health effects from toxic air emissions.



13. EFFECTS OF THE TMEX PROPOSAL ON TSLEIL-WAUTUTH TITLE, RIGHTS, *and* INTERESTS

KEY POINTS

- » Implementation of the TMEX proposal will harm Tsleil-Waututh title, rights, and interests and will violate Tsleil-Waututh law. Potential effects include:
 - Adding to negative cumulative effects in Burrard Inlet, thereby further compromising the environmental integrity of Burrard Inlet and undermining the Marine Stewardship Program
 - Undermining Tsleil-Waututh's ability to once again be able to harvest and eat abundant, safe marine foods from Burrard Inlet
 - Preventing recovery of a subsistence economy based on harvest, use, sale, and trade of salmon, herring, clams, and birds
 - Undermining Tsleil-Waututh's ability to engage in cultural work in clean water with visual quality, privacy, and quiet
 - Jeopardizing contemporary Tsleil-Waututh economic initiatives, such as real estate development, cultural tourism, and other business enterprises

OIL SPILL EFFECTS

Tsleil-Waututh has further assessed the consequences of an oil or dilbit spill and has drawn the following conclusions about potential harm or damage to our title, rights, and interests and to the Tsleil-Waututh community.

The probabilities calculated by Drs. Gunton and Broadbent indicate that one or more oil spills in Burrard Inlet are inevitable over the lifespan of the TMEX project. Dr. Short concluded that even if the spills are smaller than worst-case, they will have serious and lasting environmental consequences.

The expert conclusions described in **Section 12** refer to the inaccuracies of the Trans Mountain environmental assessment, leading us to the conclusion that the mitigation measures proposed in the TMEX application and other materials filed with the NEB cannot be relied upon to adequately address the harm or damage from spilled oil or its lingering effects in Burrard Inlet.

As described in **Section 5**, in order to conserve and restore the environment in our territory, Tsleil-Waututh has designated 2,600 hectares of Burrard Inlet as extremely sensitive, requiring special protection from harm or damage. An inquiry using the spill model developed by Dr. Galt and following his directions for stochastic analysis, as described in **Section 11**, led to estimates of how much oil from a spill would end up in sensitive sites.

Following a reasonable worst-case spill at Westridge Marine Terminal, 89% of the oil on average will be in sensitive sites at 24 hours, decreasing to 79% at 48 hours. **Map 27** shows the location of oil in relation to sensitive sites 24 hours after a reasonable worst-case spill.

For a full range of model examples, see the **Oil Located in Sensitive Marine and Cultural Sites Atlas** in **Appendix 8**.

A large volume of spilled oil in any site designated as sensitive by Tsleil-Waututh has the potential to harm forage fish and their spawning beaches as well as juvenile salmon

and the estuaries, marshes, and lagoons they use. Spilled oil in intertidal areas such as Maplewood Flats will further contaminate sediment and the tissue of shellfish species, especially bivalves, as it did after the 2007 Westridge spill²⁷ (see below).

Any marine birds near a spill risk oiling and probable death. Dr. Jeffrey Short concluded that a major spill from TMEX could result in one of the top bird mortality events ever caused by oil because of the exceptional abundance and diversity of birds in Burrard Inlet (and in the Fraser Delta), as described in **Section 5**. He also concluded that bird deaths on a large scale might have cascading effects, changing species composition and densities in Burrard Inlet and disrupting food-web dynamics.

Any oil spill in Burrard Inlet puts key components of the Tsleil-Waututh subsistence economy—salmon, herring, clams, and birds—at risk and poses the threat of harm or damage that may persist for years. For example, prior to the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska, herring populations there were increasing. Following the spill, the fishery collapsed. More than 25 years later, herring, which have never rebounded, have “not recovered” from the effects of the oil spill.²⁸ The situation is similar in the case of marbled murrelets, pigeon guillemots, and the local blackfish population.²⁹ Similar long-term effects to a variety of species and habitat will occur after a reasonable worst-case oil spill in Burrard Inlet.

In addition to environmental consequences, oil spills have cultural consequences. Being able to conduct cultural work is vital to the Tsleil-Waututh community. An oil spill will likely pollute the water or contaminate the sediment at places important for cultural work, preventing the community from accessing both the knowledge and wisdom of our ancestors and the wealth of the waters and lands of our territory. Even the perception of pollution can keep

²⁷ See www.transmountain.com/uploads/pages/1374960812-2012-Summary-2007-Spill-Clean-Up—Effects-REV2.pdf

²⁸ See www.evostc.state.ak.us/index.cfm?FA=status.herring

²⁹ See <http://www.evostc.state.ak.us/index.cfm?FA=status.injured>

community members away from the places we use for cultural work because we fear for our health or safety.

One of our important cultural and spiritual activities is feeding the ancestors, as described in **Section 4**. At a Tsleil-Waututh burning ceremony, the ritualist was told by our ancestors that non-local, substitute foods do not suffice. The ancestors want to be offered local foods, and since the TMEX proposal has the potential to delay recovery of our subsistence economy, it compromises our ability to meet our responsibilities to our ancestors (Morin 2015).

As for our contemporary economy, some of our business enterprises, such as cultural tourism, are water based and depend on clean water. Other enterprises, such as our real estate developments (market housing), are close to Burrard Inlet and depend upon both clean water and visual quality for their value and competitive edge. An oil spill or the perception of pollution has the potential to harm these business initiatives.

The full range of oil spill effects is summarized in **Table 7** at the end of this section. From this summary, we conclude that the likelihood of oil spills is high and that the consequences are dire for the sensitive sites described in **Section 5** and for our subsistence economy, cultural work, contemporary economy, and ultimately, our community.



TSLEIL-WAUTUTH NATION BURRARD INLET MAP 27: SENSITIVE HABITAT AND POTENTIAL OIL SPREAD FROM OIL SPILL AT WESTRIDGE MARINE TERMINAL

Legend

- ★ Westridge Marine Terminal
- ==== Tanker Route
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
- Tsleil-Waututh Nation Reserve
- Tsleil-Waututh Assessment Study Area
- Maplewood Flats
- Location of oil 24 hours after spill at Westridge Marine Terminal
- Sensitive Habitat and Cultural Site (89% of oil located in sensitive areas)
- Greenspace
- Developed Area

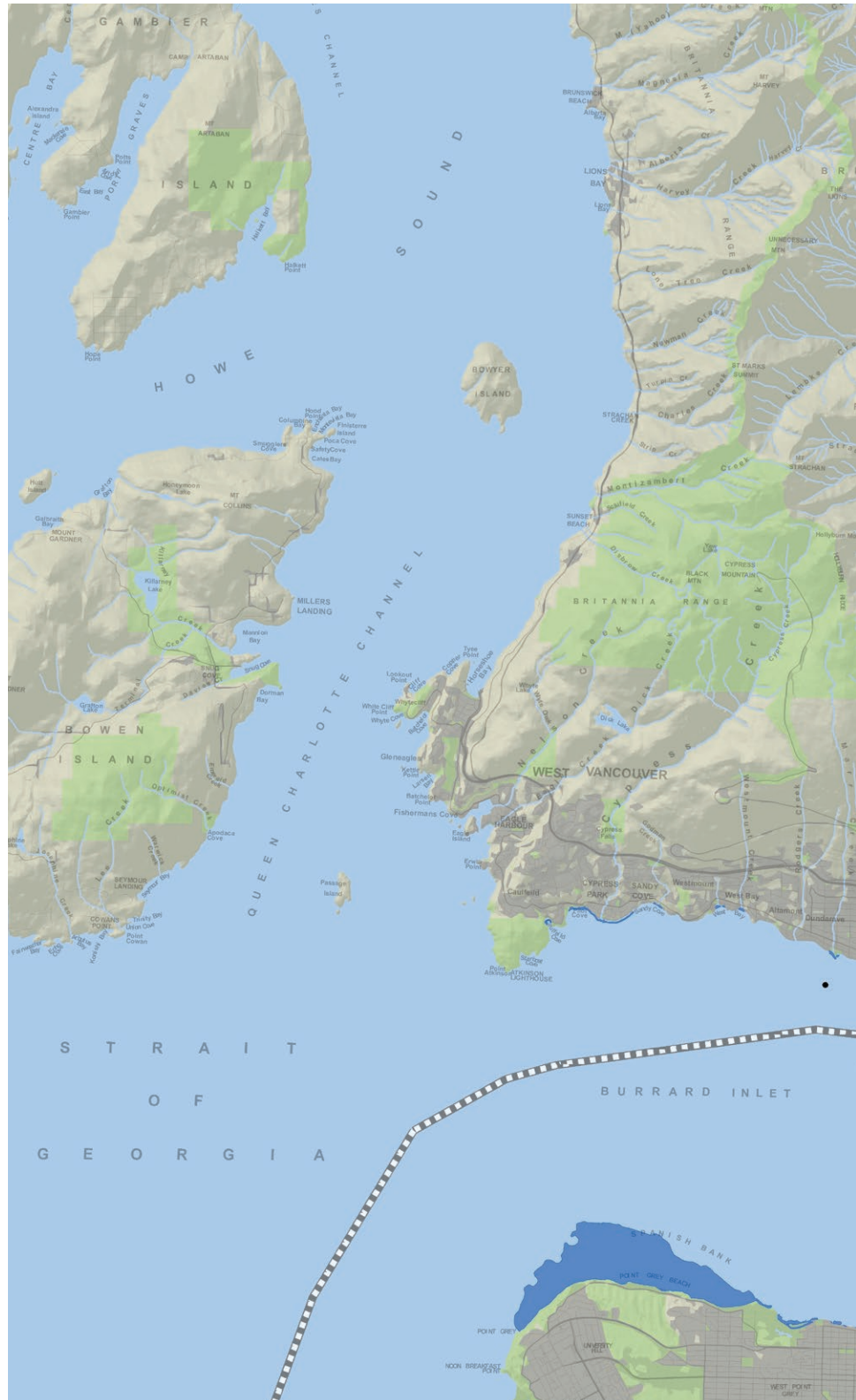
Map Scale: 1:60,000

Projection: UTM, NAD 83, Zone 10

0 1.25 2.5 5 Kilometers

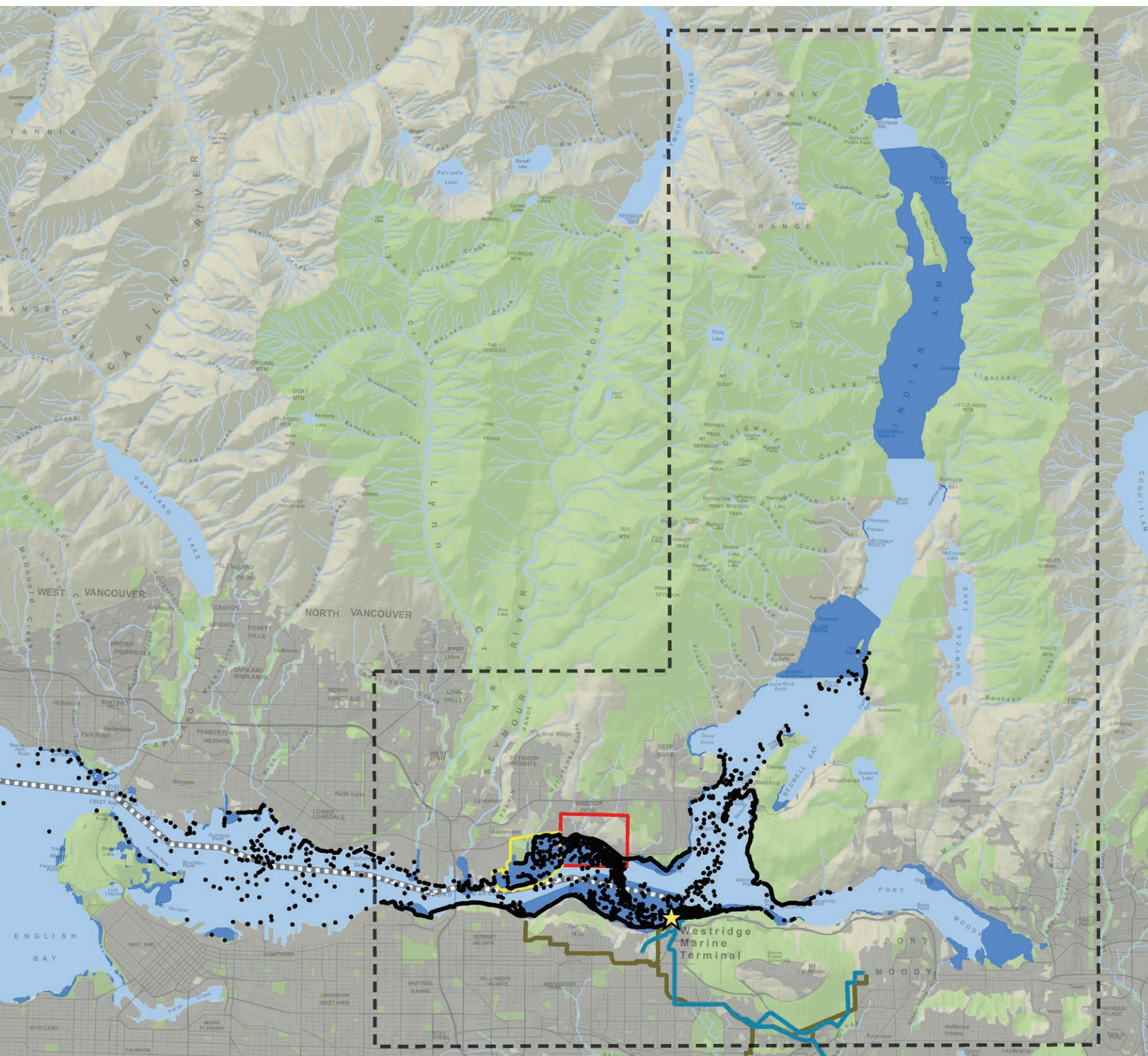


This map is a living document and is intended to be amended and refined over time. It is not an expression of the location of Tsleil-Waututh aboriginal title, rights, or interests. The data used to produce this map originate from many sources and are presented without prejudice. This map is the property of the Tsleil-Waututh Nation and may not be reproduced without written permission. Sources of spatial data for this map include Tsleil-Waututh Nation, BCMCA, BC Government, Government of Canada, Integrated Cadastral Information Society, Port Metro Vancouver, BIEAP, RAAD (Oct 2014), Metro Vancouver. Map produced May 2015 by the Tsleil-Waututh Nation.





photos by Zack Enbace



PRACTICAL EXAMPLES OF OIL SPILLS

2007 Westridge Oil Spill³⁰

Tsleil-Waututh's concerns about the potential for oil spills resulting from the TMEX proposal and their effects on Burrard Inlet and our title, rights, and interests are not hypothetical in nature. For example, on July 24, 2007, a backhoe operated by a third-party contractor accidentally ruptured the Trans Mountain pipeline that currently runs between the Burnaby petroleum storage facility and Westridge Marine Terminal. Approximately 100 cubic metres (600 barrels) of oil spilled into Burrard Inlet.

Tsleil-Waututh observed on a first-hand basis how Trans Mountain and others were ill prepared to respond promptly to an oil spill in Burrard Inlet. Tsleil-Waututh community members accurately predicted where the oil would spread long before results from an oil spill trajectory model were available. We were also the ones to identify and protect at-risk archaeological and intangible cultural heritage resources from the spill.

As Dr. Galt's oil spill model generally predicts (see **Section 11**), oil fouled the shorelines of the Central Harbour, both near Westridge Marine Terminal and across the water between Maplewood Flats and Tsleil-Waututh Reserve. The fouled shorelines are identified on **Map 28** and the degree of oiling based on information in the TMEX facilities application.

The oil spill caused a number of adverse effects in Burrard Inlet and corresponding impacts on Tsleil-Waututh title, rights, and interests, including the following:

- » Contamination of lands in our territory
- » Contamination of the marine environment in Burrard Inlet, including its waters, sediment, and marine habitat and the marine organisms we harvest
- » Elevated levels of toxic polycyclic aromatic hydrocarbons (PAH) that originated from the spilled oil in sediment and tissue samples taken from Burrard Inlet
- » Ongoing elevated levels of contaminants in sediment at Westridge Marine Terminal and in shellfish tissue taken from Maplewood Flats and Whey-ah-wichen
- » Termination after the spill of federally unsanctioned Tsleil-Waututh bivalve harvest in front of Tsleil-Waututh Reserve and next to Maplewood Flats because of perceived and actual bivalve contamination
- » Reversal of our work and progress toward officially opening shellfish beaches so that Tsleil-Waututh members might once again be able to exercise our Aboriginal right to harvest bivalves
- » Greater difficulty finding places where our members could safely harvest bivalves
- » Delay in the repair of the marine ecosystem and in the opening (in coordination with the federal government) of additional areas where Tsleil-Waututh members can harvest

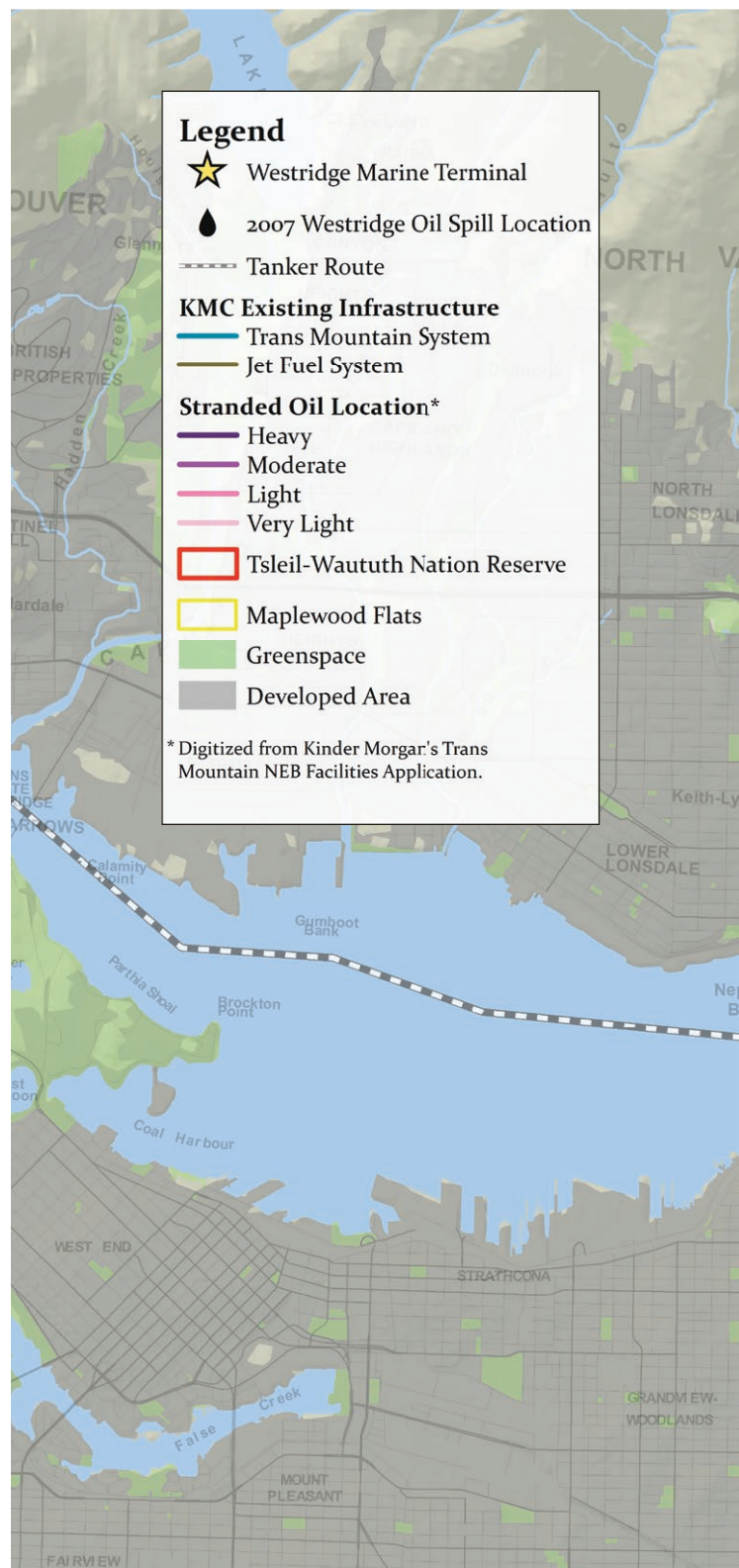
Cleanup efforts lasted over a year. However, Tsleil-Waututh never accepted or approved the cleanup standards employed. Our nation strongly disagreed that end points for environmental recovery had been reached when, with contamination still evident, environmental monitoring was halted in 2012. The incident and the response to it have had lingering effects and consequences and were clear violations of Tsleil-Waututh law.

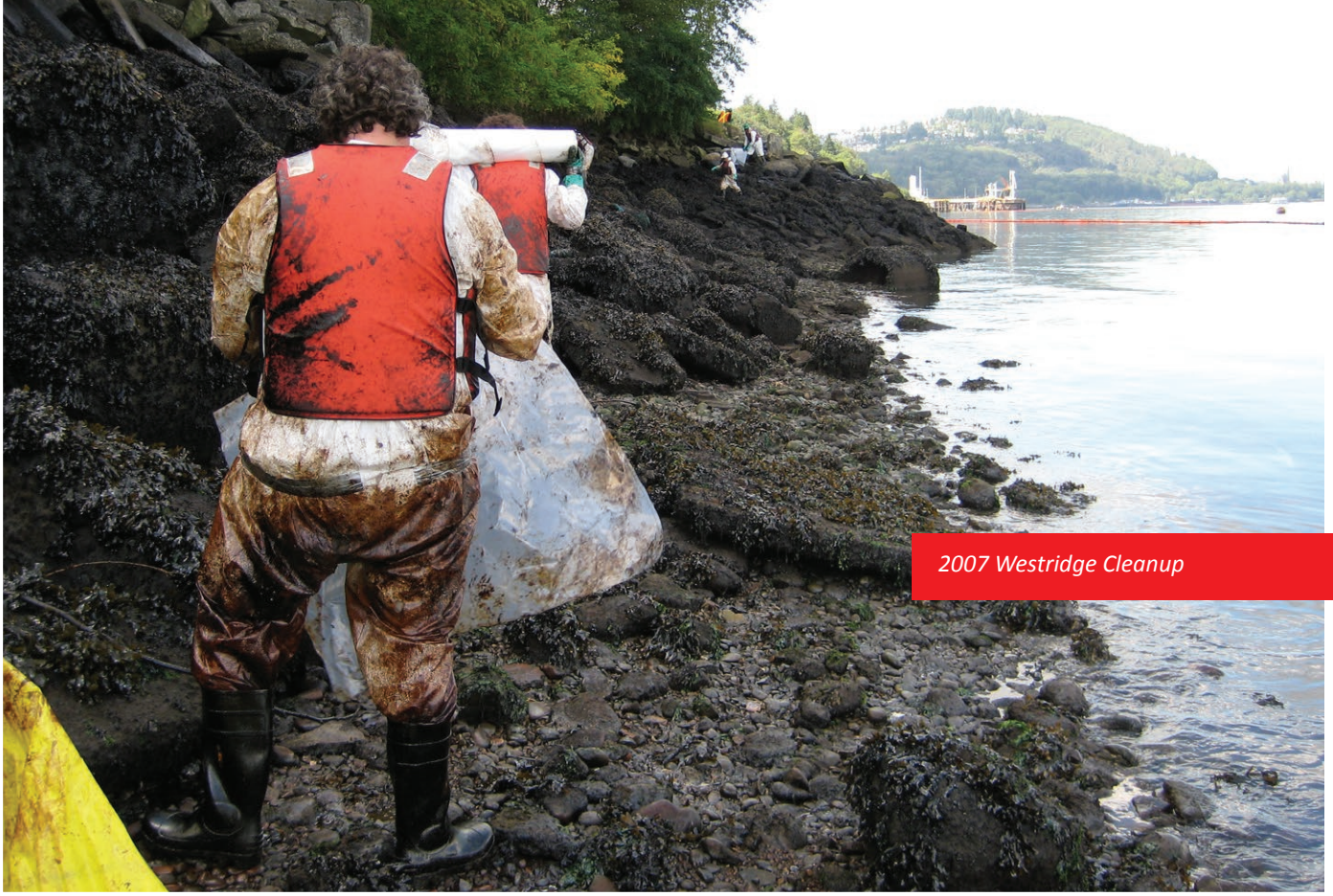
The spill has contributed to the perception that Burrard Inlet is polluted. Eight years later, many Tsleil-Waututh members are still reluctant to go down to the beach on the reserve for any activity, a situation that perpetuates for our community some of the spill's unfortunate effects and consequences.



TSLEIL-WAUTUTH NATION
BURRARD INLET

MAP 28: 2007 WESTRIDGE OIL SPILL IN BURNABY





2007 Westridge Cleanup



PRACTICAL EXAMPLES OF OIL SPILLS

2015 MV *Marathassa* Oil Spill³¹

- » On April 8, 2015, the MV *Marathassa*, a bulk grain carrier sailing under the flag of Cyprus, leaked what Transport Canada has preliminarily estimated to be 2.7 cubic metres (~16 barrels) of bunker fuel into the Outer Harbour near English Bay.
- » The spill was reported to the Canadian Coast Guard (CCG) at 16:48 on April 8, 2015 and at 04:36 on April 9, 2015 Western Canada Marine Response Corporation (WCMRC), the response lead hired by the CCG, deployed a floating barrier around the MV *Marathassa* to contain the spill.
- » Under favorable environmental conditions and in close proximity to spill response resources, there still was a delay of approximately 12 hours from spill notification to response action.
- » On April 16, 2015, WCMRC reported that 1.4 cubic metres (~8 barrels) of oil was recovered during the cleanup operation, a potential recovery rate of 52%.
- » A portion of the oil stranded and fouled beaches on the north and east shores of the Outer Harbour, closing them to public access for days to weeks.
- » Fisheries and Oceans Canada closed the Outer Harbour to fishing for crab, prawn, and groundfish for weeks.

The Westridge and Marathassa oil spills provide practical examples of the effects summarized in **Table 7** at the end of this section. Given these experiences, the Tsleil-Waututh Nation cannot accept the risk, effects, or consequences of even another small incident, let alone a reasonable worst-case spill.

Figure 16 includes a photo of the Marathassa oil slick and photos of other oil spills in Burrard Inlet since 1959.



Stanley Park, 1973, cleanup following a ship incident and freighter collision



Tsleil-Waututh Reserve, 2011, source of the oil is unknown



Outer Harbour, 2015, after MV Marathassa oil spill



Stanley Park, 1973

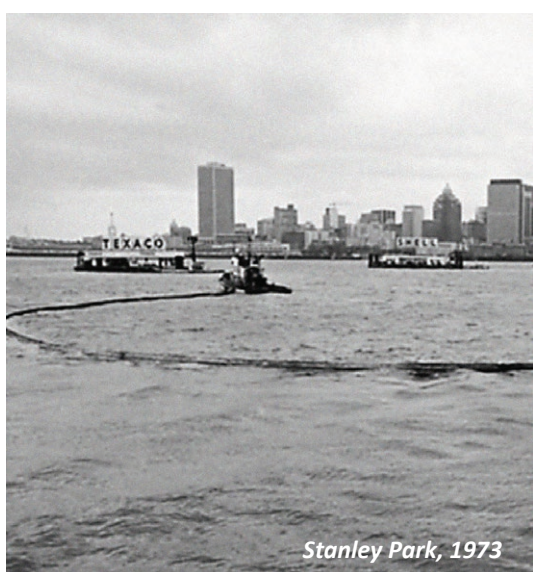


1959 Dollarton oil spill

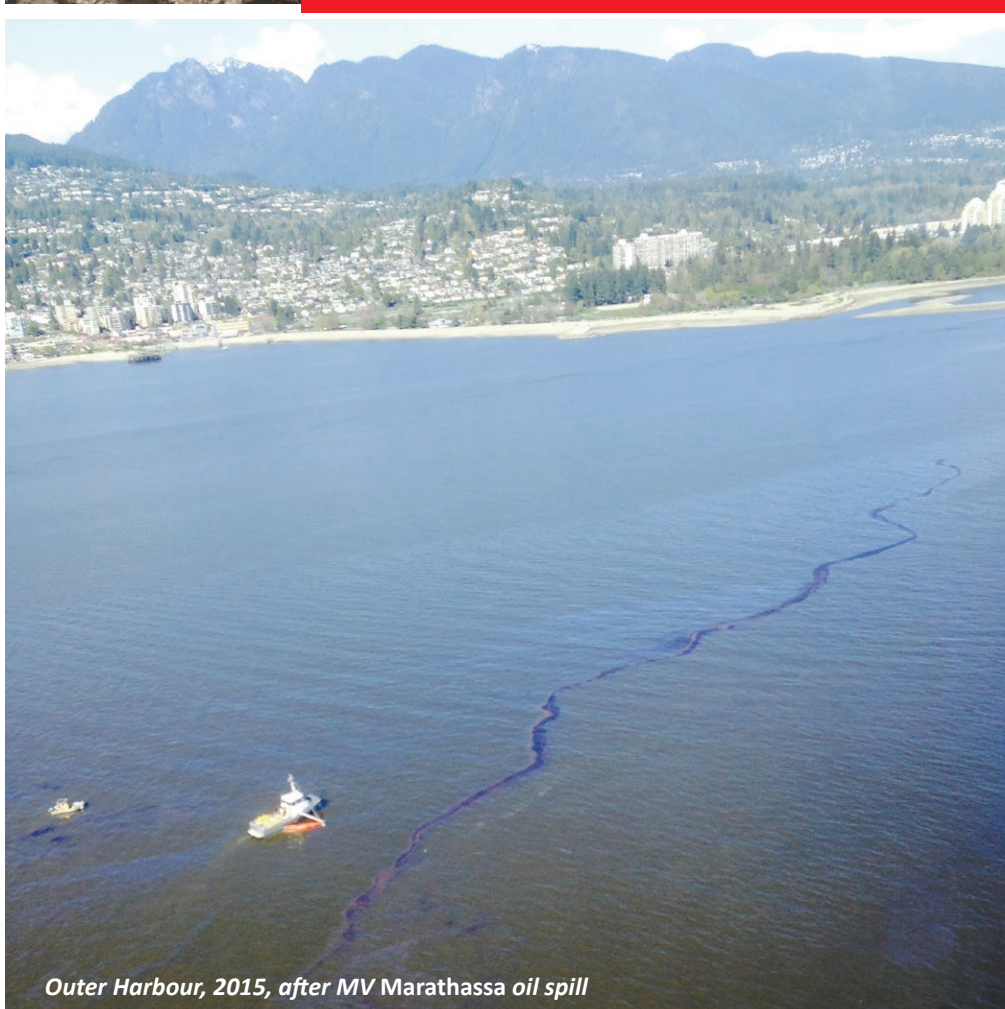
Figure 16—A Pictorial History of Oil Spills in Burrard Inlet



Stanley Park, 1973



Stanley Park, 1973



Outer Harbour, 2015, after MV Marathassa oil spill

DIRECT EFFECTS OF MARINE SHIPPING

In addition to the effects of an oil spill, there are direct effects from Westridge Marine Terminal and marine shipping activities. The direct effects fall into eight categories: 1) acoustic disturbance, 2) impaired views, 3) loss of quiet and privacy, 4) on-water hazards, 5) perceived pollution, 6) physical obstruction, 7) shoreline erosion, and 8) undermined legal authority.

Acoustic Disturbance—Loud, underwater noises change animal behaviour. Running tanker or tug engines can disturb the senses of animals. This is especially true of whales (like blackfish), which rely on sonar to communicate and forage for food. The blackfish sonar system is critical for their survival.

While the TMEX facilities application acknowledges that there will be acoustic disturbance in the Strait of Georgia, Fisheries and Oceans Canada found the analysis in their application to be deficient.³² Furthermore, the application does not consider the effects of acoustic disturbance in Burrard Inlet.

The increase in tanker and tug traffic described in **Section 6** will lead to greater acoustic disturbance in Burrard Inlet. The effects of additional disturbance are likely to change marine mammal behaviour. Changes in the behaviour of blackfish—a culturally important species for Tsleil-Waututh—could include ceasing visits to Burrard Inlet. This would deprive the Tsleil-Waututh community of the benefit of blackfish presence.

Impaired Views—As mentioned in **Section 4**, Tsleil-Waututh members traditionally engaged in cultural work in remote, quiet places without much development. Additional activity at Westridge Marine Terminal and increased tanker and tug traffic will disturb the views necessary for cultural work. It will also make the visual landscape on the reserve less attractive, especially the view from our market housing development. Potential consequences include hindrance of cultural work and loss of revenue from contemporary businesses.

Loss of Quiet and Privacy—As mentioned in **Section 4**, Tsleil-Waututh members have traditionally engaged in cultural work in remote, quiet places. Additional activity at Westridge Marine Terminal and increased tanker and tug traffic will make it harder to find the privacy and quiet our community members need to carry out their cultural obligations. Potential consequences include hindrance of cultural work and the associated negative repercussions for the health of our community.

On-Water Hazards—The additional tankers and tugs described in **Section 6** pose elevated safety risks. Both in transit and when at anchor, ships have the potential to create safety hazards for cultural work and for business enterprises. While accessing cultural, spiritual, or resource sites, or while conducting on-water cultural tours of Burrard Inlet, Tsleil-Waututh people will face greater risk of accident or incident that might lead to injury or death. Potential consequences include hindrance of cultural work, fewer opportunities to access natural resources, and loss of revenue from contemporary businesses.

Perceived Pollution—Spilled oil will pollute water or contaminate sediment at specific locations. However, the effect on human behaviour and on our relationship with Burrard Inlet may be larger and last longer than the physical effects on the environment. Perceived pollution leads to general avoidance of contact with Burrard Inlet, which in turn may hinder cultural work, erode our connection to our territory, harm contemporary businesses, and reduce harvest activities.

Physical Obstruction—The additional tankers and tugs described in **Section 6** will prevent access to cultural, spiritual, and resource sites and to the travel routes used for cultural tourism. The potential consequences include hindrance of cultural work, loss of our connection to our territory, and loss of revenue from contemporary businesses.

Shoreline Erosion—Tsleil-Waututh knowledge holders tell us that the waves caused by tanker and tug traffic contribute to wearing away the shore and to removing beaches. They have identified shoreline recently lost between Wheyah-wichen and Maplewood Flats, part of it on Tsleil-Waututh Reserve. In a February 17, 2014, interview, a Tsleil-Watt informant offered the following observation:

Informant: *With the increased [vessel] traffic, you know, it's cutting into everyone's shoreline.*

Interviewer: *Oh, you mean like waves, that kind of thing?*

Informant: *Yeah, and erosion on the shoreline. My father-in-law's house, you know. He has a rock that's thirty feet out in the [Burrard] inlet [now] when the tide comes in, which used to be a part of his backyard...*

The increased tanker and tug traffic described in **Section 6** will contribute to ongoing shoreline erosion and in turn lead to loss of important archaeological and cultural heritage sites, damage to important forage fish habitat, and loss of land on Tsleil-Waututh Reserve. Consequences include loss of the knowledge and wisdom of our ancestors, further decreases in forage fish populations, delay in bringing back our subsistence economy, negative repercussions for the health of our community, and loss of contemporary businesses.

Climate change and associated sea level rise and storm surge effects can increase shoreline erosion. A projected rise in sea level of 0.11 to 0.96 metres³³ by 2100 will add to the effects of shoreline erosion caused by the TMEX proposal.

Map 29 identifies sites of particular concern to Tsleil-Waututh. The map also includes the location of erosion identified by BIEAP (2011). **Figure 17** shows the extent of erosion at Wheyah-wichen.

The full range of oil spill, direct, and cumulative effects are summarized in **Table 7**. From this table, we conclude that the direct effects of marine shipping add to the effects and consequences of potential oil spills, amplifying the negative environmental and cultural effects of the TMEX proposal.





TSLEIL-WAUTUTH NATION CENTRAL HARBOUR

MAP 29: CENTRAL HARBOUR SHORELINE EROSION

Legend

- ★ Westridge Marine Terminal
- BIEAP Survey of Shoreline Erosion
- Traditional Knowledge of Erosion
- KMC Existing Infrastructure**
 - Trans Mountain System
 - Jet Fuel System
 - Tanker Route
- ▭ Tsleil-Waututh Nation Reserve
- ▭ Developed Area



Map Scale: 1:30,000
Projection: UTM, NAD 83, Zone 10
0 0.25 0.5 1 Kilometer



This map is a living document and is intended to be amended and refined over time. It is not an expression of the location of Tsleil-Waututh aboriginal title, rights, or interests. The data used to produce this map originate from many sources and are presented without prejudice. This map is the property of the Tsleil-Waututh Nation and may not be reproduced without written permission. Sources of spatial data for this map include Tsleil-Waututh Nation, BC Government, Government of Canada, Integrated Cadastral Information Society, BIEAP, Northwest Hydraulic Consultants, Metro Vancouver. Map produced May 2015 by the Tsleil-Waututh Nation.

Table 7—Summary of Tsleil-Waututh Title, Rights, and Interests and of Proposal Effects and Consequences

TSLEIL-WAUTUTH TITLE, RIGHTS, AND INTERESTS	MARINE SHIPPING DIRECT EFFECTS	OIL SPILL EFFECTS	CONSEQUENCES	
<i>Archaeological and Cultural Heritage Sites</i>	Shoreline erosion	Water and air pollution; sediment contamination; shoreline cleanup damage	Loss, damage, or contamination of important places and archaeological resources; loss of the knowledge and wisdom of the ancestors	
<i>Contemporary Economy</i>	On-water hazards; perceived pollution; physical obstruction; disturbances to views	Water and air pollution; sediment contamination	Loss of business or economic opportunities and revenues; drop in property values (including Tsleil-Waututh's commercial real estate development on our reserve)	
<i>Cultural or Spiritual Practices and Places</i>	Perceived pollution; physical obstruction; loss of quiet or privacy; shoreline erosion; disturbances to views	Water and air pollution; sediment contamination; shoreline cleanup damage	Loss, damage, or contamination of important places; hindrance of and failure to provide conditions for cultural work; interference with ceremonies for our ancestors; loss of the knowledge and wisdom of the ancestors; loss of connection to our waters and lands; risk to the health and safety of our cultural practitioners	
<i>Cultural Transmission</i>	Perceived pollution; physical obstruction; loss of quiet or privacy; disturbances to views	Water and air pollution; sediment contamination	Loss of traditional knowledge; hindrance of and failure to provide conditions for cultural work; loss of language skills; loss of connection to our waters and lands; opportunities for cultural transmission reduced or eliminated	
<i>Cultural Travel</i>	On-water hazards; perceived pollution; physical obstruction	Water and air pollution; sediment contamination	Hindrance of and failure to provide conditions for cultural work; loss of connection to our waters and lands; risk to the health and safety of our cultural practitioners	
<i>Environmental Integrity and Stewardship Responsibility</i>	Acoustic disturbance; on-water hazards; perceived pollution; physical obstruction; loss of quiet or privacy; shoreline erosion; disturbances to views	Water and air pollution; sediment contamination; loss, harm, or contamination of habitat or species; shoreline cleanup damage	Disruption of biophysical processes and food-web dynamics; loss of connection to our waters and lands	
<i>Individual and Community Health</i>	On-water hazards; physical obstruction; loss of quiet or privacy; disturbances to views	Water and air pollution; sediment contamination; loss, harm, or contamination of habitat or species	Dietary change and health effects from lack of resources, including traditional staple foods; hindrance of and failure to provide conditions for cultural work	
<i>Marine Fish and Wildlife Habitat and Species; Resource Access and Harvest or Use; Subsistence Economy</i>	Acoustic disturbance; perceived pollution; physical obstruction; shoreline erosion	Water and air pollution; sediment contamination; loss, harm, or contamination of habitat or species; shoreline cleanup damage	Decrease in habitat quality or quantity and in species abundance; local extinction of culturally important species; change in species composition and behaviour; fewer available resources and traditional staple foods, leading to dietary change, health problems, and fewer opportunities to trade or sell harvested resources; forced transition to a wage-based economy; loss of livelihood options; interference with ceremonies for our ancestors; loss of the knowledge and wisdom of the ancestors; loss of connection to our waters and lands	
<i>Title, Governance, and Future Benefit</i>	Violation of Tsleil-Waututh law	Violation of Tsleil-Waututh law	If implemented without Tsleil-Waututh consent, the TMEX proposal denies the right of current and future generations to control and benefit from our waters and land	
<i>Tsleil-Waututh Reserve</i>	Shoreline erosion, perceived pollution; disturbances to views	Water and air pollution; sediment contamination; shoreline cleanup damage	Damage to infrastructure and to visual quality; loss of land base; loss of business or economic opportunities or revenues	
<i>Water</i>	Perceived pollution	Water or air pollution; sediment contamination	Hindrance of and failure to provide proper conditions for cultural work; risk to the health or safety of cultural practitioners	

CUMULATIVE EFFECTS	DURATION	EFFECTS ON TSLEIL-WAUTUTH COMMUNITY
More physical damage to sites already harmed by past development; setback to Tsleil-Waututh cultural renaissance	Irreversible, permanent effects of great impact on Tsleil-Waututh community	Disturbance of our ancestors will harm our community cohesion; without the knowledge and wisdom of the ancestors, we cannot recover from the residential school era nor carry out our environmental stewardship responsibilities
Further negative economic impacts on Tsleil-Waututh Nation and its members	Effects for the duration of the project or longer in the case of an oil spill	Diminished ability to participate in the contemporary economy and corresponding adverse impacts on Tsleil-Waututh Nation and its members
More physical damage to sites already harmed by past developments; further interruption of our obligations to our ancestors; setback to Tsleil-Waututh cultural renaissance	Places = irreversible, permanent effects of great impact on Tsleil-Waututh community Practices = effects of great impact on Tsleil-Waututh community for the duration of the project or longer in the case of an oil spill	Without the knowledge and wisdom of the ancestors and the spirit world, we cannot recover from the residential school era nor carry out our environmental stewardship responsibilities; important gains we have achieved in enhancing our culture would be lost or substantially reduced
Further alienation of Tsleil-Waututh youth from Tsleil-Waututh elders and their knowledge of history, traditional ways and skills; setback to Tsleil-Waututh cultural renaissance	Irreversible, permanent effects of great impact on Tsleil-Waututh community	Failure to care for and educate our youth will deny Tsleil-Waututh a healthy and prosperous future; a reduction in the number of family or community gatherings will leave individuals feeling isolated and the community without cohesion
Additional obstacles to free movement throughout Burrard Inlet; reduced access to harvest and cultural sites; reduced connection to our waters and lands	Effects for the duration of the project	Activities such as our canoe races are very important to our community, and having even more tankers parked in the way will seriously detract from our cultural work
Further exceedance of Burrard Inlet's environmental carrying capacity and greater delay in achieving Tsleil-Waututh stewardship objectives; additional impediments to the restoration of our subsistence economy; setback to Tsleil-Waututh culture renaissance	Effects for the duration of the project as well as irreversible, permanent effects of great impact on Tsleil-Waututh	Failure to care for our waters and lands will deny future generations the benefit of our territory and of the wisdom of our ancestors
Additional risk of disease or illness; further reduction in quality of life	Effects for the duration of the project of great impact on Tsleil-Waututh	Diabetes and cancer rates are high in the community and the proposal will only make them worse; the proposal threatens many elements of community health—natural resources, security, community cohesion and well-being, and self-determination
Further delay in achieving Tsleil-Waututh stewardship objectives; additional impediments to restoration of our subsistence economy and to our livelihood options; further interruption of obligations to the ancestors	Effects for the duration of the project as well as irreversible, permanent effects of great impact on Tsleil-Waututh	Failure to care for our waters and lands will deny future generations the benefit of our territory and the wisdom of our ancestors
Further compromises Tsleil-Waututh's ability to uphold our stewardship obligations in Burrard Inlet	Irreversible, permanent effects of great impact on Tsleil-Waututh community	Failure to care for our waters and lands will deny future generations the benefit of our territory and the wisdom of our ancestors
More physical damage to sites already harmed by past development	Effects for the duration of the project as well as irreversible, permanent effects of great impact on Tsleil-Waututh and its community	
More contamination of already polluted water, making it even more hazardous	Effects for the duration of the project (and potentially beyond) of great impact on Tsleil-Waututh	Clean water is the foundation of our community and culture, and we cannot accept a proposal that will make it dirtier

14. TSLEIL-WAUTUTH COMMUNITY FEEDBACK

KEY POINTS

- » The health of the Tsleil-Waututh community before and after implementation of the TMEX proposal was evaluated using metrics based on Tsleil-Waututh title, rights and interests of Natural Resources Access and Use, Cultural Work and Community Well-Being, Environmental Stewardship Obligation, and Governance and Self-Determination.
- » The overall health of the Tsleil-Waututh community has been reduced by cumulative effects.
- » Implementation of the TMEX proposal will have additional, negative effects on the health of the community.

Tsleil-Waututh staff held a meeting with 32 community members on April 21, 2015, to review a draft of the assessment. About two-thirds of the participants were female and one-third male, and their ages spanned from 21 to 80 years old.

The focus of the meeting was community health, how current conditions in Burrard Inlet have affected the community, and what additional effects the TMEX proposal might bring.

Indicators of community health were used as a way to assess effects on a broad array of intertwined environmental, cultural, spiritual, social, and economic aspects of life that influence the overall well-being of individuals and of the Tsleil-Waututh community. Community health is not just a measure of individual physical health but also incorporates mental health, cultural transmission, community cohesiveness, and overall quality of life from an Aboriginal perspective (Donatuto et al. 2014).

At the meeting, the Tsleil-Waututh participants was asked to rate current conditions, including cumulative effects, based on overall community health (CH) and four indicators taken from the summary of title and rights presented in **Table 1**:

- Natural Resource Access and Use (NR)**
Objective: the water in Burrard Inlet is clean, and natural resources are abundant, accessible, and safe to eat
- Cultural Work and Community Well-Being (CW)**
Objective: cultural work and youth education continue in ways that allow TWN to thrive as a community
- Environmental Stewardship Obligations (ES)**
Objective: in accordance with TWN stewardship obligations, the health of Burrard Inlet is improving
- Governance and Self-Determination (G)**
Objective: xʷənitəm (non-Aboriginal people) respect Tsleil-Waututh title and our right to actively manage our territory to benefit past, present, and future generations

The community was given a four-point scale to provide feedback: great (4), pretty good (3), not good (2), and very bad (1).

After providing feedback on current conditions, listening to a presentation on the findings in this assessment, and answering questions, the community was asked to provide feedback on anticipated community health in 2025, if the TMEX proposal is implemented. A summary of results is presented in **Table 8**.

Table 8—Tsleil-Waututh Qualitative Feedback on Community Health Changes

INDICATOR	CURRENT CONDITIONS WITH CUMULATIVE EFFECTS (2015)	CURRENT CONDITIONS WITH CUMULATIVE EFFECTS, PLUS EFFECTS OF TMEX PROPOSAL (2025)	CHANGE
CH	2.5	1.4	-1.1
NR	1.4	1.2	-0.2
CW	2.2	1.3	-0.9
ES	2.1	1.7	-0.4
G	2.0	1.6	-0.4



RESULTS

- » The results demonstrate that cumulative effects in Burrard Inlet have already had a large effect on the health of the Tsleil-Waututh community. Overall, community members rated current conditions as only 2.5, with most saying conditions are “not good.” This result is consistent with the assessment’s overall finding that urban, commercial, and industrial development have already exceeded the environmental carrying capacity of Burrard Inlet in violation of Tsleil-Waututh law and negatively affected Tsleil-Waututh title, rights, and interests.
- » Implementation of the TMEX proposal will have an additional large, negative effect on overall **Community Health**. For the year 2025, the overall rating is 1.4, a decrease of 1.1. Most respondents anticipate that conditions will be “very bad.” The negative effects include impacts from both an increased likelihood of oil spills and the direct effects of marine shipping on such things as shoreline erosion and acoustic disturbance.
- » The community anticipates that the largest effect of the TMEX proposal will be on **Cultural Work and Community Well-Being**. They anticipate that the rating of 2.2 for current conditions will decrease by 0.9 to 1.3 after TMEX proposal implementation. A majority anticipated that in 2025 conditions will be “very bad” if the TMEX proposal is implemented. This result is consistent with the assessment’s finding that cultural work is vital to the health of the Tsleil-Waututh community and will further suffer from implementation of the TMEX proposal.
- » While **Natural Resource Access and Use** is very important to the Tsleil-Waututh community, its rating did not change much. The majority rated it as “very bad” both currently and in anticipation of the TMEX proposal, likely because, as described in the assessment, so many natural resources are already compromised.
- » Cumulative effects in Burrard Inlet have already had a large effect on the Tsleil-Waututh **Environmental Stewardship Obligations** and on our **Governance and Self-Determination** objective. Current conditions were rated as “not good” for both. The ratings decreased in anticipation of the TMEX proposal, but the resolve of the Tsleil-Waututh community to assert our title and rights was evident at the meeting, and the community anticipates less change in these two indicators than in **Cultural Work and Community Well-Being**.



15. EFFECTS OF THE TMEX PROPOSAL ON TSLEIL-WAUTUTH'S ABILITY TO SATISFY ITS ENVIRONMENTAL RESTORATION OBLIGATIONS

KEY POINTS

- » Restoration of the natural resources of our territory is a legal imperative for Tsleil-Waututh, and we are working to recover the environmental integrity of Burrard Inlet through our Marine Stewardship Program.
- » The TMEX proposal, if implemented, will slow or deny achievement of the goals and objectives of the Tsleil-Waututh Marine Stewardship Program.

Section 8 describes legal principles related to our Tsleil-Waututh obligation to steward the water, land, air, and resources of our territory. Section 5 outlines the Marine Stewardship Program, a contemporary initiative through which we continue to carry out our sacred responsibilities.

The Marine Stewardship Program is based on Tsleil-Waututh legal principles. Archaeological investigations corroborate our oral histories, which tell us that when Burrard Inlet was under exclusive Tsleil-Waututh management, it was a vibrant ecosystem with abundant natural resources. At that time, balance and reciprocity governed respectful relations among all beings, human and non-human, and among all elements of the natural and spirit worlds. When the Crown imposed limits on Tsleil-Waututh's right and obligation to manage our territory, our interconnected world was harmed and we began losing the full benefit of our water, land, air, and resources.

As described in Section 10, eventually the imposed harm and loss surpassed the inlet's environmental carrying capacity, in violation of our laws. The harm and loss of environmental integrity have had severe, unacceptable consequences for our people.

Today, cumulative effects have made restoration of Burrard Inlet a legal imperative for Tsleil-Waututh, in keeping with our stewardship obligations. Through the Marine Stewardship Program, the nation is restoring and rehabilitating the environmental integrity of Burrard Inlet, as Tsleil-Waututh law commands.

To date, progress and success include the following:

- » Monitoring and improving water quality in Indian Arm—we are on the verge of the federal government approving the first sanctioned shellfish harvest there since 1972 (the location is indicated on Map 25).
- » Improving salmon habitat in Burrard Inlet—as described in Section 5, while salmon returns to the Indian River are much lower today than in pre-contact times, they have been increasing over the last three decades because of renewed Tsleil-Waututh stewardship.

If the TMEX proposal is implemented, can Tsleil-Waututh achieve the goals of the Marine Stewardship Program?

As described in Section 10, cumulative effects already exceed an acceptable threshold for environmental integrity, in violation of Tsleil-Waututh law. As described in Section 13, the TMEX proposal, if implemented, will contribute to these cumulative effects, further harming Burrard Inlet, our community, our culture, and our economy. Given these circumstances, we conclude that 1) implementation of the TMEX proposal would slow or deny achievement of the objectives of the Marine Stewardship Program and 2) approving the TMEX proposal would violate Tsleil-Waututh law, because it undermines our stewardship obligations.



16. TSLEIL-WAUTUTH STEWARDSHIP POLICY TEST

STEWARDSHIP POLICY TEST QUESTIONS

What impact does the TMEX proposal have on the natural and cultural resource base of the project area?

As described in **Section 13**, the TMEX proposal physically threatens and potentially restricts access to important sites where natural or cultural resources reside and where cultural work takes place. The resources themselves risk loss, damage, or contamination from both oil spills and marine shipping. The following examples illustrate:

- » By far, most of the oil in a reasonable worst-case spill at Westridge Marine Terminal will quickly strand on the shoreline and harm sites in Burrard Inlet designated by Tsleil-Waututh as sensitive, and the damage may be irreparable.
- » Tsleil-Waututh's natural resource base would be significantly and, potentially, irreparably harmed by any oil spill in Burrard Inlet, further compromising its environmental integrity in violation of Tsleil-Waututh law.
- » Tsleil-Waututh knowledge holders have observed the direct effects of marine shipping and believe that increased tanker and tug activity will accelerate erosion of important shoreline sites.

What impact does the TMEX proposal have on the socio-economic conditions of Tsleil-Waututh and our members?

If implemented, the TMEX proposal will undermine the Tsleil-Waututh contemporary economy. Environmental damage, safety hazards, the perception of pollution, and impaired views will dissuade business partners, customers, and potential customers. The result will be loss of business and corresponding decreases in revenues, of business enterprises, and of new opportunities to support financially the Tsleil-Waututh community.

The TMEX proposal also threatens Tsleil-Waututh's efforts to bring back even a modest subsistence economy based on wild foods harvested in Burrard Inlet.

Does the TMEX proposal jeopardize, prejudice, or otherwise compromise Tsleil-Waututh title, rights, or interests?

Yes. A representative list of title, rights, and interests is presented in **Table 7** along with the potential effects and consequences of the TMEX proposal. Consequences that jeopardize, prejudice, or otherwise compromise Tsleil-Waututh title, rights, or interests include the following:

- » Interference with Tsleil-Waututh's rights and responsibilities to manage our territory in a manner consistent with our own laws and to determine how the territory will be used
- » Interference with, hindrance of, or additional impediments to the restoration of our subsistence economy. The TMEX proposal will:
 - Decrease habitat quality or quantity and species abundance—it could also cause the local extinction of culturally important species
 - Prevent or impede Tsleil-Waututh members from gathering or harvesting preferred resources, in preferred locations, or otherwise interfere with gathering or harvesting activities
 - Decrease opportunities for Tsleil-Waututh members to eat safe, abundant, wild foods harvested from Burrard Inlet
 - Indirectly force economic and dietary change and cause health effects from loss of natural resources, including traditional staple foods such as salmon, herring, clams, and birds
- » Interference with, hindrance of, and additional impediments to cultural work. The TMEX proposal will:
 - Compromise conditions required for cultural work
 - Result in damage or destruction of environmental values essential to cultural work or otherwise interfere with cultural work
 - Prevent or impede Tsleil-Waututh members from engaging in cultural work in clean and healthy environments
 - Interfere with ceremonies for our ancestors, which could result in the loss of their knowledge and wisdom
 - Interfere with Tsleil-Waututh members' travel and our use of traditional corridors
- » Loss of, damage to, or contamination of important places
- » Reduction in opportunities for cultural transmission of traditional knowledge and teachings from Tsleil-Waututh elders to our youth
- » Loss of our connection to the waters and lands of our territory
- » Loss of contemporary business and economic opportunities
- » Delay, reversal, or obstruction of the achievement of Tsleil-Waututh's environmental stewardship objectives

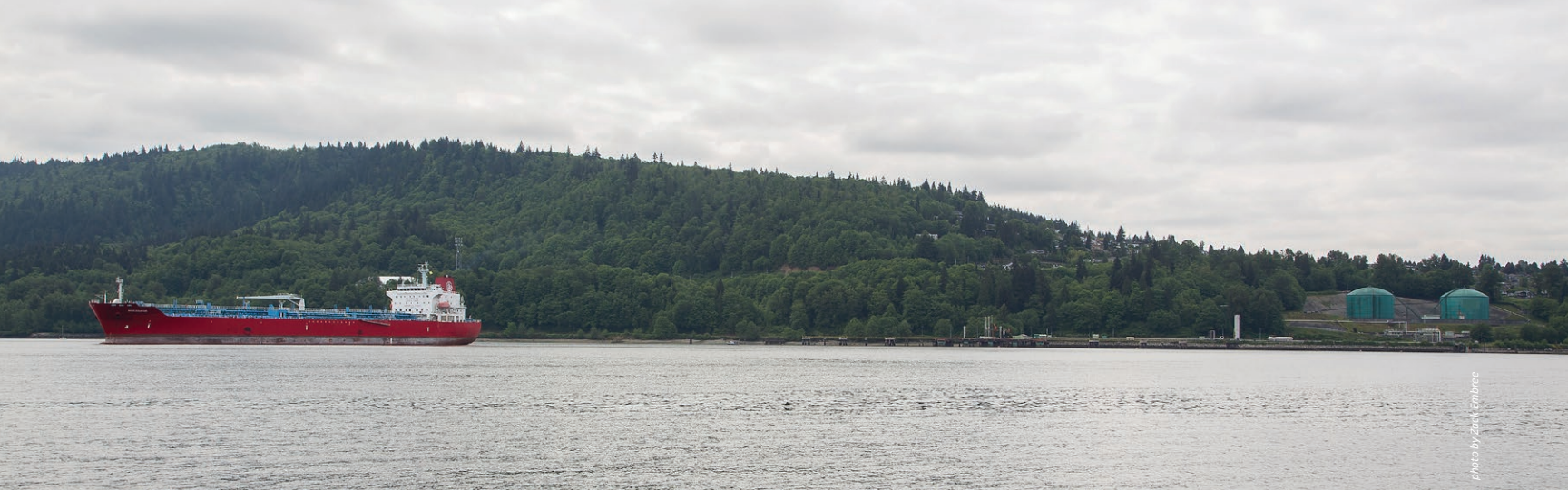


Photo by Zack Embree

What does the TMEX proposal contribute to the cumulative effects of past land-use decisions?

As described in **Section 13**, the TMEX proposal will negatively affect Burrard Inlet. As described in **Section 10**, Burrard Inlet has already exceeded its environmental carrying capacity for urban, commercial, and industrial development. Implementation of the TMEX proposal has the potential, especially should a reasonable worst-case oil spill occur, to cause a catastrophic disruption of food-web dynamics in Burrard Inlet from which it may never recover.

Does the TMEX proposal have the potential to deprive future generations of Tsleil-Waututh the control and benefit of our waters and lands?

Yes. Implementation of the TMEX proposal would deny current and future generations of Tsleil-Waututh the benefit of our water, land, air, and resources and would violate Tsleil-Waututh's stewardship obligations.

In its present state, Burrard Inlet cannot provide the resources necessary for current and future generations of Tsleil-Waututh to thrive and benefit as a nation and as a people. The TMEX proposal will further compromise the environmental integrity of Burrard Inlet, thereby further depriving current and future generations of Tsleil-Waututh of the ability to benefit from the use of Burrard Inlet.

Moreover, if implemented without Tsleil-Waututh consent, the proposal denies Tsleil-Waututh and our future generations control over a critical decision about our territory, in violation of Tsleil-Waututh law.

Implementation will further undermine the ability of Tsleil-Waututh to uphold our stewardship obligations in Burrard Inlet. Failure to care for our water, land, air, and resources will deny future generations the benefit of our territory and the wisdom of our ancestors.

Future benefit will accrue only if the Marine Stewardship Program is successful. Failure of or a setback to the Marine Stewardship Program will deprive future generations of the benefit of Burrard Inlet's restored environmental integrity, including the abundance of resources and the food safety required for our subsistence economy and the cleanliness, quiet, and privacy necessary for cultural work. Any proposal that increases the chance of the Marine Stewardship Program's failure violates Tsleil-Waututh law.

As Dr. Short concluded, spilled oil or dilbit seriously threatens all components of the Tsleil-Waututh subsistence economy, especially salmon, herring, clams, and birds and their habitats. A reasonable worst-case oil spill threatens to disrupt the dynamics of the food web in Burrard Inlet and could lead to large-scale environmental catastrophe. Much more common smaller spills will have significant and long lasting, negative environmental effects on Burrard Inlet.

Does the TMEX proposal represent the best use of lands and resources for the present and for the future?

No. If implemented, the TMEX proposal puts Burrard Inlet at risk of frequent smaller oil spills and a catastrophic oil spill, both of which have serious, long-term consequences. The direct environmental and cultural effects of marine shipping amplify the adverse effects of spilled oil. Both add to cumulative effects that already exceed the environmental carrying capacity of Burrard Inlet and have compromised environmental integrity to the point where a subsistence economy currently is not possible.

Implementation of the TMEX proposal will delay or prevent us from achieving the goals of the Marine Stewardship Program, including that of re-establishing a subsistence economy.

Tsleil-Waututh law includes both 1) the obligation to protect, defend, and steward our territory and 2) the responsibility to restore the conditions that provide the foundation our nation requires to thrive. These obligations and responsibilities require us to think about more than today. We must ensure that future generations have the benefits of our territory and access to the wisdom of our ancestors.

All these conditions and circumstances lead to the conclusion that the TMEX proposal does not represent the best use of our territory or its water, land, air, and resources for the present or the future.

RECOMMENDATION

Tsleil-Waututh staff concludes that the TMEX proposal fails the first lens test of the Stewardship Policy as described in **Section 7**. We therefore recommend that Chief and Council continue to withhold Tsleil-Waututh Nation's support for the TMEX proposal.



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18. GLOSSARY

Bitumen—old, weathered oil, such as that produced in the Alberta’s oil sands

Contemporary economy—the right to derive benefit from the territory and pursue economic development opportunities in a variety of ways, related or unrelated to natural resources

Cultural work—engaging in one or more of the following: 1) cultural or spiritual practices, 2) cultural transmission, 3) cultural travel, 4) aspects of individual or community health, 5) elements of resource access and use associated with the subsistence economy

Dilbit—bitumen that has been diluted with condensate

Dilsynbit—a blend of bitumen, condensate, and synthetic crude oil

Environmental carrying capacity—the human population density and level of development an area can support without compromising environmental integrity

Environmental integrity—the health, resilience, diversity, and purity of the ecosystem, which is the life support system of nature, including plant and animal life, air, water, and soil, and the human populations that depend on them

Fish trap—a fence-like structure consisting of a row of wooden stakes with a latticework woven through them, which was built in estuaries, streams, and shallow rivers to trap migrating salmon

Leeward shore—the shoreline downwind from a point of reference

Shell midden—a deposit of domestic debris which may consist of animal bones, botanical material, shells, pottery fragments, beads, stone tools, or other items associated with ancient human occupation

Stochastic approach—a technique used to create a generalized model of spilled oil behaviour. It includes combining the results of multiple model runs for a scenario to generate a representative range of possible results. The key is that the start times for each scenario run must be randomly assigned.

Subsistence economy—the right to access and use natural resources as staple foods for the living community and the ancestors, and the right to sell or trade them

Weathering (oil)—a series of physical and chemical changes that over time may increase oil stickiness, making it too thick to readily flow







Sacred Trust
INITIATIVE



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