NAFTA Transportation Corridors: Approaches to Assessing Environmental Impacts and Alternatives

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Presented at the
North American Symposium on Understanding the Linkages
between Trade and Environment

Washington, DC
October 11, 2000

Abstract

With the passage of the North American Free Trade Agreement (NAFTA), trade between the three signatory countries (i.e., Canada, Mexico, and the United States) has dramatically increased, significantly shifting traditional patterns of production, distribution, and transport. Trade traffic across *all* modes of transport, including highway, rail, and air, has increased, often overwhelming the capacity of existing infrastructure, particularly along the border where 60–80 percent of goods are transported by truck. The value of "just-in-time" delivery and the cost of delay have risen sharply and in tandem, prompting analyses and assessments of the capacity of the current transportation infrastructure to absorb increased trade flows and to ensure future mobility.

The capacity of the transportation infrastructure to respond and absorb these growing trade flows has emerged as the "linchpin" of liberalized trade—with the concept of the "NAFTA trade corridor" gaining traction. Broadly defined, the corridors comprise the transportation infrastructure and systems that facilitate the flow of traffic both within and across North American borders, particularly those traffic flows prompted by the trade liberalization of NAFTA. In the absence of a uniform definition or objective indicators that coherently distinguish a NAFTA trade corridor from another segment of interstate highway, discussions of specific routes and their proposed designation as a NAFTA corridor are inherently dynamic, inextricably political, and typically, highway-centered. Various "corridors" have been put forth, with competition among routes, both extant and proposed, increasingly fierce.

While most discussions of NAFTA trade corridors have been limited to the logistical challenges of accommodating increased traffic through highway upgrades and construction, rather than a broad-based investigation and analysis of the extent to which multimodal alternatives might provide relief. As a consequence, a broad-based comparative assessment of the environmental costs, impacts, and benefits of the range of transport alternatives, is rare. Related, comprehensive consideration—much less, specific assessment—of these impacts on the communities through which the heaviest flows of traffic are expected or occurring, are rarer still.

Using the analytical methodology proposed in NACEC's *Analytic Framework*, this paper examines the environmental impacts of NAFTA-related shifts along transboundary border regions, using Nuevo Laredo, Tamaulipas (Mexico)–Laredo, Texas (US) and Detroit, Michigan (US)–Windsor, Ontario (Canada) as subjects of two case studies. Employing available, publicly accessible data, air, water, biodiversity, and "quality of life" indicators were analyzed. An aggregate presentation of these indicators, particularly as applied on the community level, are presented in a "report card" format. The ease or difficulty with which data were located and extracted, as well as gaps in publicly-accessible data, are discussed. Recognizing the unique role of NACEC, several recommendations for action are made. A listing of bibliographic resources and Internet-accessible websites are provided.

THE ENVIRONMENTAL IMPACTS OF NAFTA TRANSPORTATION: A PRELIMINARY EXPLORATION AND ASSESSMENT

In 1997, members of the City Council of Laredo, Texas discussed the merits of an unusual proposal: placing portable toilets in the median of a downtown stretch of Interstate 35 (I-35). These accommodations were not intended for large crowds at a weekend rock concert or street festival. Instead, the City Council debated the long-term placement of these facilities in response to the unprecedented numbers of freight trucks delayed and idling, often for hours, along this stretch of heavily-traveled urban highway. A mere three years after the passage of the North American Free Trade Agreement (NAFTA), Laredo had already emerged as the busiest point of entry along the US-Mexico border with freight truck crossings exceeding 3,900 per day. Although the proposal never passed, its serious consideration is a poignant reminder of the broad social and environmental impacts that the exponential growth of NAFTA-related transport, particularly truck traffic, has had on communities within the three nations (Sharp 1998, 75).

Increases in trinational trade have significantly shifted patterns of production, distribution, and transport

With the passage of NAFTA, trade between the three signatory nations has dramatically increased, exceeding previous levels significantly. From 1994 to 1998, total US trade with Mexico increased from US$101 billion to US$160 billion (CEC (b)1999, 48-50). In the same timeframe, total Mexican trade with the US increased from US$3.07 billion to $4.6 billion (CEC (b)1999, 48–50).

The United States and Canada have enjoyed long-standing, prosperous ties, beginning with the Auto Pact of 1965, which first established limited bilateral duty-free trade between the two countries. This trade relationship was further strengthened by the provisions of the United States-Canada Free Trade Act. With the passage of NAFTA, total Canadian trade with the US and Mexico has risen. Trade with the US increased from US$232 billion in 1994 to US$319 billion in 1998 (CEC (b) 1999, 48-50). Trade with Mexico increased during this time from US$3.8 billion to US$5.9 billion (CEC (b)1999, 48–50).

With liberalization and the subsequent sharp increase in trade have come both increased traffic across *all* modes of transport including highway, rail, air, and shipping, as well as broad shifts in the location of production, patterns of transport, and distribution routes for these goods. While trade between the nations has increased in the aggregate, the most dramatic changes in the transportation infrastructure have been concentrated along the border regions, where 60-80 percent of goods are transported by trucks. For instance, the busiest port of entry on the Mexico/US border, Laredo, Texas, has seen a jump in the total number of northbound and southbound border crossings from 851,690 immediately following trade liberalization to 1.3 million trucks in 1999 (Ports-to-Plains Trade Corridor 1999). Similarly, the Detroit, Michigan/Windsor, Ontario crossings on the US/Canadian border, which handle a large majority of all US/Canadian trade traffic, have seen the number of truck crossings jump by 71 percent, from just over 2 million in 1994 to 3.2 million in 1998 (Benton 2000, 1). The dramatic growth in trade and the broad shifts it has engendered have dramatically increased pressure, often overwhelming the capacity of the extant transportation infrastructure with their impacts most starkly visible in the border regions.

Transportation infrastructure emerges as the "linchpin" of liberalized trade— the concept of the "NAFTA transportation corridors" emerges

In the years since the passage of NAFTA, the capacity of the transportation infrastructure to respond to the pressures of increased commercial flows has emerged as the "linchpin" of liberalized trade. With minimal on-hand inventory, the value of just-in-time delivery and the cost of delay have risen sharply and in tandem, prompting analyses and assessments of the capacity of the current transportation infrastructure to absorb increased trade flows and to ensure future mobility for trade. With trade pressures projected to increase, the concept of the "NAFTA trade corridor" has gained traction. Broadly defined, the corridors comprise the transportation infrastructure and systems that facilitate the flow of traffic both domestically and across the North American borders, particularly those traffic flows prompted by the trade liberalization of NAFTA (Transport Canada 1999).

As straightforward as this definition appears, current discussions of NAFTA trade corridors are inherently dynamic, inextricably political, and typically, road-centered. In the absence of a uniform definition or objective indicators that coherently distinguish a "NAFTA trade corridor" from another segment of interstate, for example, various trade routes have been proposed for designation as "NAFTA corridors." Traffic flow analyses and projections have prompted proposals to retrofit entire transportation modes (e.g., rail), to construct major infrastructure facilities (e.g., new bridge construction linking binational border areas), and to upgrade and expand heavily-traveled segments (e.g., increasing the number of lanes on Interstate 35 between Laredo, Texas and Dallas, Texas) to accommodate trade traffic (Texas Department of Transportation/I-35 Steering Committee 1999, ES 1-10). Other proposals have included construction of new transboundary highway systems with connecting overlays to existing roads (e.g., the I-69 route), thereby linking additional centers of trade and manufacturing throughout the three nations (CEC (d) 1999, 14). Competition among routes, both extant and projected, has become fierce.

Despite the lack of consensus on an appropriate working definition, this paper explicitly restricts the meaning of "NAFTA trade corridors" to those *existing* transportation systems that are actually carrying the *majority* of trade traffic volume. The "NAFTA trade corridors" concept is a useful construct through which to examine, specifically, heavily-used North American trade routes, to analyze the pressures and impacts generated by this trade traffic, and to discuss strategies that might absorb or alleviate that which cannot be absorbed currently or is projected to exceed the capacity of the corridor. Most discussions, however, of strategies have been limited to the logistical challenges of accommodating increased trade traffic through upgrading existing highways and constructing new ones, rather than a broad-based investigation and analysis of the extent to which multimodal alternatives might provide relief As a consequence, a broad-based comparative assessment of the environmental costs, impacts, and benefits of the range of transport alternatives, is rare. Related, comprehensive consideration, much less specific assessment, of the impacts generated by these road-centered proposals on human and environmental health, particularly in those communities through which the heaviest flows of traffic are expected, are rarer still

The *CEC Analytic Framework* Informs This Exploration and Assessment

The approach used in this paper is that outlined by the CEC in its framework for assessing NAFTA-associated environmental impacts.[1] This paper examined physical infrastructure, one of the four critical linkages identified by the CEC through and by which NAFTA trade impacts the ambient environment (CEC (b) 1999, 65).

Macroeconomic and transborder shifts in the production and distribution of goods have led to a NAFTA-associated intermodal shift to trucks, particularly heavy-duty diesel models, as a mode for transporting and delivering goods. "Transporting goods and services may be done by sea, rail, road, or air, all of which affect the environment in different ways" (CEC (b) 1999, 69). This shift to truck transport has generated significant "environmental pressures (that) tend to increase the stress on the environment by providing a further load on its absorptive capacity" (CEC (b) 1999, 76). In the case of NAFTA transport, truck traffic has not been uniformly directed to those "geographic locations, where the existing infrastructure can absorb the new traffic and demands" (CEC (b) 1999, 67) Instead, NAFTA truck traffic has been primarily concentrated along the border regions, transforming some of its communities into "high impact locales—places where environmental pressures (have) concentrated to overwhelm the available supports" (CEC (b) 1999, 77) The extent, however, to which communities have been overwhelmed has varied.

To assess the environmental impacts of this NAFTA-related shift, this paper drew from the CEC's categories of environmental indicators, selecting for analysis: air, water, biodiversity, and an aggregate indicator defined as "quality of life." Using data as available and accessible, the environmental impacts of the NAFTA-associated shift to truck transportation were examined.

[1] *See:* Commission for Environmental Cooperation. June 1999. *Final Analytic Framework (Draft) for Assessing the Environmental Effects of the North American Free Trade Agreement (NAFTA).*

Organization of this Document

This document is organized in three segments, as described below.

Part I: Case Studies of Two "High-Impact Locales;" NAFTA Transportation's Impacts on the Ambient Environment

This report provides case studies of two of the most heavily impacted border communities: Laredo, Texas/Nuevo Laredo, Tamaulipas on the US/Mexican border and Detroit, Michigan/Windsor, Ontario on the US/Canada border. Introducing a "snapshot" of current transportation conditions in each area, the text provides an overview of the use of truck and rail for the movement of goods, particularly the operational aspects of each mode. Following the introduction, the impacts of transportation on the four major components of the ambient environment (i.e, air, water, land, and living things) are analyzed, albeit within a limited scope, using a series of indicators. Organized both by environmental media and by border region, this analysis uses both quantitative and qualitative national, state, and local data as available with data limitations noted. Text references and a bibliography of resources generally available on the Internet are provided to assist other nongovernmental and community organizations locate data more easily.

Part II: A Community-level "Report Card:" Environmental and Data Assessment

Configured as a report card, an aggregate presentation of the community-level indicators covered in the case studies, as well as the identified gaps in data, are provided. The "report card" is designed as a template for community and nongovernmental organizations to use as they seek to understand some impacts associated with NAFTA transportation.

This document also summarily describes data gathering and the ease or difficulty with which data was located and extracted bears comment and consideration. Despite approximately three months of intense efforts to locate pertinent data on environmental indicators "nationally or internationally recognized for their importance," unfettered access to the Internet, proximity to a major research university, as well as a technical advisory group of transportation professionals, data could not always be located or extracted (CEC (b) 1999, 78). Therefore, the report card also contains an assessment of data gaps and barriers to data availability, accessibility, and collection, information summarily presented which may be of use to community groups as they begin the process of identifying data resources.

Part III: Recommendations for Action by the CEC

Recognizing the unique role of the CEC as an environmental oversight institution charged with "strengthen(ing) cooperation on the development and continuing improvement of environmental laws and regulation" and encouraging effective enforcement, compliance, and technical cooperation by each signatory nation, several recommendations are made (NAAEC 1993, 10:3). These recommendations are specifically directed toward activities that fall within the purview of the Commission and the Council.

Part I: Case Studies of Two "High-Impact Locales;" NAFTA Transportation's Impacts on the Ambient Environment

Laredo/Nuevo Laredo Border Area

The first port of entry on the Mexico/US border was established by the city of Laredo in 1851. As a direct route from Mexico City and the large, northern city of Monterrey, the Laredo/Nuevo Laredo border serves as the obvious port of entry for the majority of trucks delivering goods from the interior of Mexico. The Port of Laredo has four international bridges which handle all truck crossings, as well as one international bridge for rail. In general, roads are the preferred mode of transportation, carrying 81 percent of US-Mexico exports and 68 percent of US-Mexico imports in 1996 (US Department of Commerce *and* Bureau of Transportation Statistics 1996).

In 1997, the Port of Laredo crossed 1.2 million loaded trucks, 246,000 loaded rail cars (the equivalent of another 1 million trucks) and 856 million kilograms gross landed weight (g.l.w.) of air cargo. In addition, the Port handled 1 million empty trucks and 14.3 million cars and buses. To put these numbers in perspective, in an average workday, Laredo's trade-handling community crossed 3,900 loaded trucks, 800 loaded rail cars, 1.24 million pounds g.l.w. of air cargo, and 3,400 empty trucks, not to mention 39,000 cars. These numbers represent average volumes in Laredo during the six days a week that trucks cross and represent average volumes for cars throughout the seven days of the week (LDF 2000, 2).

In 1999, Laredo's bridges carried 1.3 million trucks (Gordetsky 2000, 21). According to data from Texas A&M International University, this number is greater than the nine other ports of entry in Texas combined (Gordetsky 2000, 21). As the Laredo Development Foundation recognizes, the exponential growth that has occurred in trade transportation is a critical issue "which impacts virtually every citizen living in *Los Laredos* and every importer and exporter using our port (LDF 2000, 1)." Laredo and Nuevo Laredo are being forced to accommodate NAFTA transportation rapidly, sometimes with unforeseen environmental and community impacts. With the trade liberalization of NAFTA, these two relatively small sister cities have been rapidly thrust into the international trade arena with no assessment of their collective capacity to respond to intense trade and transport pressures.

A Laredo-Nuevo Laredo "Snapshot:" Highway, Rail, and Air Transportation

Highways

There are four international bridges that handle all truck and auto crossings at the Laredo/Nuevo Laredo border. Since April 15, 1999, the two downtown bridges have been closed to truck traffic.[2] All truck traffic has been redirected to both the Columbia/Solidarity bridge, located 27.5 kilometers west of downtown Laredo and the new Fourth International Bridge (World Trade Bridge), located just over nine river miles north of the first international bridge. Thus far, this change has helped curtail the 8-10 kilometer- long traffic build-ups on Laredo's highways. Currently, the World Trade Bridge handles 4,200 trucks a day, while another 1,800 trucks per day cross the Columbia Bridge. While two-lane narrow roads on both sides of the border are the only arteries that currently connect to the Columbia bridge, a private toll road connecting it to I-35 will open in October of 2000 (Gordetsky 2000, 21).

Rail

This year, Laredo is expected to move 400,000 loaded rail cars (LDF 2000, 2). To meet this projection, Union Pacific, TexMex Railroads and Ferrocarriles Nacionales de Mexico, the three primary companies that operate on the Laredo/Nuevo Laredo border (Union Pacific, TexMex Railroads, and Ferrocarriles Nacionales de Mexico) will have to work cooperatively to manage an additional 154,000 more rail cars than they did just several years ago.

Table 1: **Cross-Border Loaded Rail Car Shipments, Laredo/ Nuevo Laredo - Selected Years; Cumulative Increase over Time, Expressed as a Percentage**

	1995	**1997**	**1999**	**Cumulative Impact**
Southbound Shipments	109,385	152,230	167,871	+ 65%
Northbound Shipments	59,377	93,967	115,771	+ 51
Total Loaded Car Shipments:	**168,762**	**246,197**	**283,642**	

(***Source:*** Laredo Development Foundation 2000, "*Table of Economic Activity*" < http://www.laredo-ldf.com/ecotable.html>, accessed 7 September 2000).

Just as the volume of truck traffic rapidly escalated as a consequence of NAFTA, so the Laredo International Rail Crossing has seen significant escalation in its traffic volume. (See Table 1: "Cross-Border Loaded Rail Car Shipments, Laredo/Nuevo Laredo – Selected Years; Cumulative Increase Over Time, Expressed as a Percentage") However, like their trucking counterparts, railroad transport in Laredo has also experienced significant congestion. Although a second railroad bridge has been considered to alleviate these rail choke-points, the underlying cause of this congestion points toward an issue of use, rather than capacity. According to US

[2] These two bridges include the Laredo Northwest International Bridge I, constructed in 1956, and the Juarez-Lincoln bridge, built in 1976 and marking the southern end of Interstate 35 from Duluth, Minnesota.

Federal Railroad Administrator Jolene Molitaris, “the current bridge is not yet at capacity (Mertz 1999, 1).” Indeed, the Vice President of Finance for Tex-Mex Railroads estimates that “the company could improve efficiency at the existing bridge by 300 percent if US Customs moved inspections into the Tex-Mex railyard (Mertz 1999, 1).

Air
In 1997, Laredo International Airport finished a runway improvement program costing US$11 million to handle heavy freight aircraft as well as a new Terminal Building. The private sector also invested US$5 million in new air cargo facilities. Laredo International Airport is the largest air cargo airport on the Texas/Mexico border and handles approximately the same amount of Latin American air cargo as the cities of New York, Los Angeles, Houston or Dallas (LDF 2000, 2).

Detroit-Windsor Border Area:

The US-Canada border is 8,893 kilometers long from the Atlantic to the Pacific Ocean, with 130 international crossings. Sixty-two of these crossings are on the eastern portion of the border, which extends from the Atlantic Ocean westward to Michigan and Ontario. In 1995, the eastern portion of the US-Canada border accounted for 73 percent of all US-Canada cross-border traffic and 26 percent of all vehicles crossing North American borders (Taylor 1997, 5). With approximately 8 million trucks crossing the eastern US-Canada border in 1995, this region of the border represents more than half (51 percent) of all North American truck border crossings. By way of contrast, the western US-Canada truck crossings represented only 14 percent of all North American truck border crossings and the US-Mexico truck border crossings accounted for only 36 percent (Taylor 1997, 5).

These numbers dramatically illustrate the importance of the eastern US-Canada border region in NAFTA trade. Of the surface border crossings within this region, ten are located between the state of Michigan and Ontario, Canada, with several of the busiest ports of entry for commercial traffic by rail and truck located on the Detroit, Michigan/Windsor, Ontario border, as well. Although these crossings have historically carried high volumes of trade traffic, trucks now comprise a much larger proportion of the traffic stream since the implementation of NAFTA.

A Detroit-Windsor “Snapshot:” Highway, Rail, and Air Transportation

Highway
While the Detroit-Windsor Tunnel serves as the busiest North American port of entry for auto traffic, it conveys far less truck traffic than the Ambassador Bridge that carries the highest volume of truck traffic across North American binational borders. While this paper focuses specifically on the Detroit/Windsor crossings, there are other important border crossing facilities in the area, including the Blue Water Bridge in Port Huron and the Detroit/Windsor Truck Ferry. The Blue Water Bridge, located north of Detroit, ranks second only to the Ambassador

for the volume of truck traffic, while the Ferry is primarily used for hazardous materials transport. As illustrated by the data in Table 2, this northern transboundary crossing, like its southern counterpart, has experienced a similarly dramatic increase in commercial truck flows since NAFTA's passage (Benton 2000, 1).

Table 2: Cross-Border Truck Crossings by Bridge: Detroit/ Windsor—Selected Years; Cumulative Increase Expressed in Percent

Year	Ambassador Bridge	Detroit/Windsor Tunnel
1994	1,811,602	200,816
1995	2,218,596	267,187
1996	2,476,360	269,388
1997	2,697,176	257,557
1998	2,993,292	241,271
Cumulative Increase	**+ 61%**	**+ 20%**

Rail

The Detroit-Windsor Rail Tunnel handles a significant portion of all rail traffic on the US-Canada border. While recent improvements now allow the tunnel to accommodate some larger international containers, double-stacked rail cars are still unable to pass through the structure. Instead, double-stacked cars must pass through an upgraded rail crossing further north in Port Huron. However, even with these limitations, the volume of rail traffic has increased: In 1997, the Detroit-Windsor Rail Tunnel handled 400,000 cars, a significant increase from 1994 (MDOT 1998).

Assessing NAFTA Truck Transport on the Environment

Environmental Indicators

As described in the CEC's *Analytic Framework*, the intersectoral or intermodal shifts in NAFTA-associated transportation "may produce a net move to more or less environmentally-friendly modes. Transporting goods…may be done by sea, rail, road, or air, all of which affect the environment in different ways." (CEC (b) 1999, 69) With the convenience of door-to-door delivery and the increasing use of just-in-time inventory controls, trucks have emerged as the leading mode of transport for NAFTA freight as measured by the value of trade. This net shift to truck transport has significant implications for the environment in absolute terms, both in the extent and permanence of its impacts, as well as relative to the impacts of other modes.

Analyses of the primary environmental impacts of transportation are traditionally divided between indicators which measure releases of substances into the air, water, and land, as well as those that demonstrate changes in land use patterns, as shown in the flowchart from the US Environmental Protection Agency below (EPA (d) 1999, 8). Following this traditional pattern, this document will examine the nature, extent, and permanence of the impacts of truck traffic on the primary components of the environment within the border regions.

Figure 1: “Flow of Transportation Analyses,” US Environmental Protection Agency

ACTIVITIES	OUTPUTS	OUTCOMES
INFRASTRUCTURE CONSTRUCTION **VEHICLE AND PARTS MANUFACTURE** **TRAVEL** **OPERATIONS, MAINTENANCE AND SUPPORT** **DISPOSAL OF VEHICLES AND PARTS**	**LAND USE CHANGES** -Land area taken -Changes in impervious surfaces **EMISSIONS/RELEASES TO AIR/WATER, OR LAND** -Criteria air pollutants -Toxics -Greenhouse gases **HAZARDOUS MATERIALS INCIDENTS**	**EFFECTS ON HABITAT, WILDLIFE, ECOSYSTEMS** **AMBIENT LEVELS/ POLLUTANT CONCENTRATIONS** **EFFECTS ON HUMAN HEALTH AND WELFARE**

AIR QUALITY

Background Information on Air Pollutants Associated with NAFTA Truck Transport: VOCs, NO_x, Ground-level Ozone, Particulate Matter, and their Impacts

Air pollution from truck travel comes primarily from by-products of the combustion process and the evaporation of unburned fuel. NO_x and VOCs are each emitted directly from vehicle exhaust. Formed by the reactions of VOCs and NO_x in the presence of heat and light, ground-level ozone (O_3) is the primary constituent of smog. These three components react together to form ozone concentrations. Ozone concentrations can fluctuate greatly due to yearly changing weather patterns and are usually highest during summer months.

Also emitted directly from vehicle exhaust, particulate matter (PM—US term) or total suspended particles (TSP—Canadian term), generally, refers to a mixture of solid particles, such as smoke, dust, or soot, and liquid droplets found in the air. The numerical classification (i.e., $PM_{2.5}$, PM_{10}) that follows the abbreviation refers to particle size as measured in micrometers.

In high enough concentrations, each of these air pollutants has known harmful effects on both the ambient environment and human health (US EPA (a) 1998). (See Appendix I: “Air Quality Indicators, Environmental Integrity, and Public Health.”) Of particular concern to the three trading partners are the levels of PM, VOCs and NO_x emitted, particularly as precursor contributors to ground-level ozone. High ozone levels can lead to a host of both environmental and public health problems. Similarly, particulate matter, especially of 2.5 micrometers or less (i.e., $PM_{2.5}$), has been shown to exacerbate existing respiratory conditions and may contribute to premature death.

Agencies, Criteria Pollutants, and Monitoring:

United States: Using its own National Ambient Air Quality Standards (NAAQS), the United States Environmental Protection Agency (EPA) monitors air quality based on six principal criteria pollutants: carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOCs), sulfur dioxides (SO_2), and lead (Pb). The US EPA classifies particulate matter (PM), the sixth of these pollutants, as either "fine" if the particle is smaller than 2.5 micrometers or "large" if the particle falls within the range of 2.5 to 10 micrometers. (EPA (a) 1999). To be in "compliance," levels of these pollutants must remain within NAAQS parameters; measurements for any of these pollutants above NAAQS parameters is deemed an "exceedance."

Canada: The Ministry of the Environment uses all of the criteria pollutants used by EPA, as well as several more. Air pollution is monitored and analyzed by the Ministry, not only for each province, but for most cities and towns as well. Although somewhat more stringent than those used by the EPA, Canada's ambient air quality standards vary only slightly from the NAAQS.[3]

Often a source of confusion, Canada's description of PMs differs from the system used by the US EPA. The term "PM_{10}" refers to particles less than ten microns in size, while total suspended particles (TSPs) refer to those particles ranging from .1 to 100 microns in size (Ontario Ministry of the Environment 1997, 4).

Mexico: Using standards similar to its trading counterparts, Mexico has also set quality criteria, based on Official Mexican Standards (NOMs) (Gobierno de Mexico, Instituto Nacional de Ecología 1999). Monitoring of these standards, however, is not centralized but rather done by various research organizations or universities throughout the country.

Using varying standards, all three signatory countries monitor VOCs, NO_x, ground-level ozone, and PM.

Air Quality in Laredo/Nuevo Laredo: Ozone and PM

The Texas Natural Resources Conservation Commission (TNRCC) operates two air quality monitoring stations near the Laredo/Nuevo Laredo border. The first station, located in downtown Laredo, has been in operation since February 3, 1998. The two pollution

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[3] For instance, the Canadian one-hour standard for ground-level ozone is set at 80 ppb, while the US one-hour standard is 125 ppb.

parameters currently being monitored at this site are carbon monoxide and ozone. The other monitoring station, located on one of Laredo's international bridges, has been monitoring air quality since September 1999.

Under EPA regulations, an "exceedance" of the eight-hour ozone standard is indicated by a reading of 85 parts per billion (ppb) or more. As Figure 3: "The Four Highest Daily Maximum 8-Hour Ozone Concentrations in Laredo" shows, Laredo's ozone level has never reached "nonattainment" (TNRCC (b) 2000). However, it has come within range of exceedance in both 1998 and 1999 with overall levels and trends remaining relatively static.

While a rigorous analysis of ozone in this region of the US/Mexico border has yet to occur, the relative decrease in ozone thus far recorded throughout 2000 has been largely attributed to the opening of the fourth international bridge and related, the reduction of congestion at the border. Despite the reductions captured in Laredo's most current ozone readings, the congestion relief provided by the opening of this additional bridge and thus, the ozone reductions are likely to be temporary as truck crossings are not likely to decrease significantly in the future and may, in fact, continue to rise in response to the recent addition of the bridge.[4]

Figure 3: "The Four Highest Daily Maximum 8-Hour Ozone Concentrations in Laredo"

Year	Highest	2nd Highest	3rd Highest	4th Highest
1998	72 ppb 10 May	72 ppb 7 May	67 ppb 11 May	67 ppb 30 April
1999	70 ppb 7 May	69 ppb 6 June	67 ppb 22 October	67 ppb 30 April
2000	65 ppb 25 April	64 ppb 8 June	62 ppb 7 April	62 ppb 8 February

As mentioned earlier, while the monitoring of Laredo's ozone levels has been a recent event, what little baseline data on air pollution trends exists prior to 1999 is not publicly accessible from the TNRCC. [5] However, extrapolations from that limited data which is accessible suggests that with increases in truck traffic and changes in freight operations, both NOx and VOCs emissions have increased, leading one to infer that, to some extent, ozone has most likely increased, as well. *(See: Appendix II: "NOx and VOCs Emissions," excerpted from TNRCC Commercial Truck Survey in Laredo, 1999)* According to TNRCC's 1999 Commercial Truck Survey, "Interstate 35 is the primary highway that extends from Laredo, Texas to Chicago, Illinois and from Nuevo Laredo, Tamaulipas through Mexico City, Mexico

[4] The Fourth International Bridge in Laredo opened for travel in April, 2000. Its opening has significantly reduced the level of traffic congestion at the border, in part because this bridge has been designated for use by international truck traffic only. Auto traffic has been re-directed to the two older bridges in the downtown area, while the third bridge north of downtown is also handling truck traffic.
[5] Data has been collected by TNRCC, but is not publicly accessible on the Internet or in a library. Instead, it must be obtained through the TNRCC Data Department for a fee.

to the Panama Canal Zone making Laredo and Nuevo Laredo the largest inland port-of-entry into either country (Snow 1999, 1).” To take advantage of these voluminous trade flows, the report explains, many freight forwarding companies operate within both cities, resulting “in a number of vehicles moving through the port and (an) increased volume of trucks operating within city boundaries (Snow 1999, 2). ” The direct and cumulative impacts of these freight operations and current NAFTA-related drayage activity are compounded, yet again, by the increasing prevalence of heavy-duty diesel vehicles in the region, the leading source of VOCs and NOx emissions throughout the border region.

The flow of air pollution honors no political boundaries. So, while local air pollution levels in Laredo appear positive, one can easily temper the enthusiasm such data seems to inspire by considering the broader context of air pollution and NAFTA-related transportation along the I-35 corridor.[6] The segment of I-35 from Laredo to Dallas remains the single most heavily-used route by NAFTA trucks traveling north from the US/Mexico border (TX DOT 1998, 18). According to the Texas Department of Transportation (TX DOT), the state agency charged with interstate construction, maintenance, and tracking within the state’s boundaries, “the segment of I-35 north of Laredo, between San Antonio and Dallas/Fort Worth is the segment of highway most heavily impacted by NAFTA in the state of Texas. On average, each mile of this segment carries over 4,000 NAFTA trucks per day (TXDOT 1998, 18).” Looking at changes in air quality along this trade corridor post-NAFTA rather than those exclusively recorded in Laredo, therefore, may provide a more accurate and comprehensive assessment of the impact NAFTA truck transportation has had on air quality.

While Laredo has been able to maintain its ozone levels within the NAAQ parameters as a result of its moderately-sized population and frequently favorable wind conditions, San Antonio, located approximately 96 kilometers north, has experienced a dramatic increase in the number of exceedances since 1994. Although the city had no exceedances of NAAQ standards in 1994 and 1995, three exceedances occurred in 1996 and, again, in 1998 (US EPA (d) 1999). Currently, San Antonio is facing designation by the EPA as an area “in nonattainment” for the new 8-hour ozone standard because of its repeated failures to remain within NAAQ parameters. Similarly, north of San Antonio on I-35, the Dallas/Fort Worth Metroplex has experienced a dramatic increase in exceedances, increasing from no exceedances in 1994 to 8 in 1995. While the area had made significant improvements with only 5 exceedances in 1999, the area has been designated “in nonattainment” with NAAQ standards (US EPA (d) 1999).

[6] Just as the broader context of air pollution prompts examination of a longer segment of the I-35 corridor through Texas, so the broader context of trade transport demands that one acknowledge that the increase in truck traffic along the I-35 corridor cannot be attributed solely to NAFTA-related trade. As the CEC’s framework explains, however, “the environmental impact of an activity will often be determined by a range of forces, many unconnected to NAFTA… (it) is necessary to identify and take into account… environmental, economic, social, geographic, and political factors that have an important effect.” Clearly, the economic boon the US has experienced, as well as the economic recovery of Mexico have contributed to the increase in non-NAFTA-related consumer goods being transported through this same corridor. The economic growth and improvements experienced by both countries, clearly, have significant impacts on NAFTA truck transport, as well as the environment.

While one cannot assertively state the extent to which NAFTA trucks have contributed to the upsurge in ozone exceedances recorded in these cities further north on the I-35 trade route, the dramatic increase in the number of exceedances post-NAFTA suggests, at a minimum, an area for further research and study.

With the heavy volume of heavy-duty trucks traveling through Laredo, PM levels are of particular concern. However, PM monitoring data is not yet available as the TNRCC and EPA began its collection as recently as 1999. Further, with no baseline data collected, there will be no accurate method by which to judge the increase of PM since the passage of NAFTA.

Across the border, Nuevo Laredo has not yet been monitored for specific ground-level ozone or PM. While air quality modeling has been conducted for segments of the US/Mexico border, full-scale monitoring activities have not yet been implemented (Lozano 2000).[7] However, given the proximity of the sister cities and the nearly equal number of southbound trucks entering Mexico from the United States, emission levels may likely to be similar to those newly documented in Laredo, with similar health and environmental outcomes also facing that community.

Air Quality in Detroit, Michigan and Windsor, Ontario

Because data on ozone levels in Detroit were not easily accessible throughout the research process, one can only provide a limited picture of air quality in the area. Gauged by the number of exceedances, the Detroit metropolitan area has significantly improved its air quality since its recorded peak of 15 incidences of "nonattainment" with NAAQS in 1987. With only two recorded incidences of exceedance in 1997, Southeastern Michigan (which includes the Detroit metro area) has met all NAAQ standards since the fall of 19999 (MDEQ 1999, 7; US EPA (c), 1) No PM data, specific to the Detroit metropolitan area, were found. [8]

In sharp contrast to the availability of air quality data in the Detroit area, there has been extensive monitoring, data collection, and research on the air pollution challenges that face the province of Ontario and to a lesser extent, Windsor. Employing a one-hour standard of 80 ppb, a parameter more stringent than that employed by the US EPA, the Ministry of Environment characterizes ground-level ozone as Ontario's greatest air pollution challenge as it is this "pollutant that exceeds its provincial ambient air quality criteria most often." Emissions from vehicles are the primary source of the pollutant. Not surprisingly, vehicle emissions are also the primary source of the precursor pollutants associated with ozone: thirty percent of VOCs and

[7] In addition to Dr. Lozano's comments, the authors of this report was unable to locate any other entities currently known to be monitoring air quality in or near the city of Nuevo Laredo.
[8] Data collection processes by the Michigan Department of Environmental Quality differ from those used by the TNRCC, thus, information presented in this section is not directly comparable to that provided in the previous section of this paper.

63 percent of NOx are attributed to transportation sources (Ontario Ministry of the Environment 1999, 5-6,9).[9]

While the role of vehicle emissions in Ontario's ground-level ozone exceedances is significant, transboundary flows also contribute to these environmental pressures on air quality. With the hours of elevated ozone readings consistently higher in the southwestern region of the province where Windsor is located along the US/Canada border, the Ministry of the Environment estimates that "...more than 50 percent of provincial ozone levels during widespread ozone episodes are due to long-range transport of ozone and its precursors from neighboring US states (Ontario Ministry of the Environment 1999, 9-10)." While data was not available on the discrete sources of this transboundary ozone flow or the extent, specifically, to which the transportation sector contributes, it is likely that emissions from NAFTA-related trucks comprise one discrete source of these transboundary flows.

The similarities between the sources of Ontario's ground-level ozone and PM levels are striking. As with ozone, the primary sources are vehicle emissions with significant contributions provided by transboundary flows. In 1997, approximately 17% of all PM_{10} emissions in Ontario came from vehicles (Ontario Ministry of the Environment 1999, 15). As with ozone, the Ministry of the Environment attributes a large share of particulates measured in Ontario as originating in Detroit (Ontario Ministry of the Environment 1999, 16). Given the high levels of PM emitted from heavy-duty diesel trucks, both those in Detroit and those that enter Ontario, NAFTA transportation, no doubt, contributes to these levels, although the extent of this contribution has not been calculated.

Located along the southwestern border of Ontario, Windsor consistently exceeds both the one-hour criterion for ozone, as well as the parameters for PM. In 1997 alone, Windsor exceeded ozone parameters 56 times with the highest one-hour ozone concentration (107ppb) in the province recorded at a monitoring site on the campus of Windsor University (Ontario Ministry of the Environment 1999, 9).

"Following A Path to Environmental Stress:"
Framework Links Between NAFTA Truck Transport and Air Quality

Air pollution, as generated by NAFTA truck transportation, provides, perhaps, the most dramatic example of the interconnection between the CEC Framework elements, an interweaving that is, unfortunately, generating environmental stress with few environmental supports currently employed to offset these pressures. As identified by the Framework, physical infrastructure is a critical linkage through which one may "consider how the specific changes

[9] Although still a significant contributor to ozone, Ontario's VOC emissions have decreased by 9.4 percent since 1989 due to the introduction of lower gasoline volatility. *See*: Ontario Ministry of the Environment, 1999, 10.

associated with NAFTA may be transferred into environmental pressures, supports, and changes that can ultimately determine their environmental impacts" (CEC (a) 1999, 12). In general, "transportation patterns will vary and have different environmental effects" with NAFTA trade either "directed toward sectors and geographic locations, where the existing infrastructure can absorb the new traffic and demands" or "generate production that follows a path leading to environmental stress" (CEC (b) 1999, 66, 67).

In response to the dramatic increase in trade between the three signatory countries and the accompanying shift in production and distribution, truck transportation has emerged as the dominant mode for delivering NAFTA-associated goods. These NAFTA-associated changes have translated into environmental pressures as measured by its impact on air quality. As trade "has increased and concentrated more rapidly than the infrastructure could be constructed to serve it," chokepoints have been created, particularly in "high-impact locales," such as the border region (CEC (b)1999, 68, 77). The increasing use of heavy-duty diesel trucks in this sector have led to a substantial increase in the emissions of VOCs and NOx, precursors to ground-level ozone, increasing the environmental pressures already associated with the combustion. The shift toward truck transport- an intermodal movement which show no sign of abating—has produced a net move to a less environmentally-friendly mode, one with little potential for "creating movement toward sustainability (CEC (b)1999, 77).

WATER QUALITY

Background Information on Water Pollutants Associated with NAFTA Trucks:

Absent an easily-identified pollutant source, such as the tell-tale discharges associated with a nearby industrial plant or a sewage treatment facility, pinpointing the sources of most water pollution, particularly nonpoint water pollution, is difficult, if not impossible. As the US EPA confirms, "It is important to understand the difficulties in identifying causes and, in particular, sources of pollution in impaired waters. For many waters, states and other jurisdictions classify the causes and sources as 'unknown' (US EPA (b) 1998, ES-3)." With no point source water pollution discharges generally associated, discerning the exact nature and extent of NAFTA truck transportation's contributions to water pollution is a difficult and imprecise task.

In part, the difficulty of assessing NAFTA truck transportation's contribution to nonpoint source water pollution stems from the diffuse nature of the pollution itself. As suggested by its name, nonpoint source pollution, typically, refers to a ever-changing fusion of pollutants and sources of pollutants, including land run-off (e.g., pesticides, phosphates, sediments, etc.), atmospheric deposition (e.g., particularly, "acid rain,"), and drainage or seepage of toxic contaminants. The nonpoint source contributions associated with vehicle travel are typically those pollutants deposited on road surfaces, moved or carried away during precipitation events (e.g., rainfalls, snowmelts, etc.) and re-deposited.

Vehicles, as well as the structures that support them, contribute significantly to nonpoint source runoff. Both the heavy metals that are released by car and truck exhaust, as well as the oils, greases, and toxic chemicals leaked from car and truck engines are deposited into the air and on road surfaces. Because impervious surfaces, such as roads and parking lots, generate more than nine times more runoff than, for example, a pervious surface such as an intact forested area, these surfaces very efficiently transport these material deposits into the fusion of pollutants moved during a precipitation event (US EPA (k) 1998). Land disturbances, such as the clearing, grading, and cut fills, associated with road construction and bridge structures also contribute significantly to the vehicle-related nonpoint source runoff (US EPA (k) 1998).

Mounting evidence shows that air pollution can contribute significantly to water pollution, thus, the increased emissions of pollutants, particularly PMs, associated with heavy-duty diesel trucks may prove to be an important contributing link between NAFTA truck transport and water pollution. As pollutants emitted into the atmosphere can be transported and deposited to aquatic ecosystems at great distances from their original sources, the environmental impacts associated with diesel trucks and increased PMs may no longer be restricted to the immediate location of emission (US EPA (g) 2000).

Agencies, Criteria Pollutants, and Monitoring:

Water quality standards have been adopted by all of the signatory countries to protect public health and aquatic life.

United States: The US EPA monitors and regulates the nation's water bodies, often in coordination with state departments of environmental protection, such as the TNRCC. Water quality standards have three basic elements, each of which is interrelated. Each water body is assigned a "designated use," as defined by the US EPA's regulatory framework. Criteria, the second element, are those standards used to protect the quality of those water bodies with the degree of stringency dictated, in part, by the category of designated use assigned to the specific water body. To prevent waters from deteriorating, water quality standards contain the third element, anti-degradation policies.

Canada: The Canadian Ministry of the Environment measures and assesses water quality through its own set of standards, similar to those established in the United States.

Mexico: Most water management control is vested at the federal level in the National Water Commission (CNA). This agency has jurisdiction over hydraulic issues and most of the country's water planning, permitting, management and enforcement issues. It is responsible for ensuring compliance with national water laws and regulations (UT Austin 1999, 30).

Water Quality in Laredo and Nuevo Laredo

The Rio Grande/Rio Bravo is the life-force of the majority of all the sister cities along the US/Mexico border. Spanning approximately 3,059 kilometers in length, the international reach of the river is about 2,053 kilometers. The watershed, or hydrologic region, encompasses approximately 924,300 square kilometers across the United States and Mexico (IBWC 1998, 1: 1). Many cities on both sides of the border obtain water from the Rio Grande/Rio Bravo to meet a wide variety of needs, including drinking supplies, agricultural needs, and recreational purposes. Over the years, however, there has been much concern about the increasing presence of toxic substances, often originating from various sources near the border. Indeed, water quality has been a growing concern among the majority of the cities along the US/Mexico border, with *Los Laredos* proving no exception to the issue.

The cities of Laredo and Nuevo Laredo are located in the Middle Rio Grande/Rio Bravo sub-basin, which represents the portion of the river below International Amistad Reservoir downstream to International Falcon Dam (IBWC 1998, 1: 1). As noted by the IBWC Texas Clean Rivers Program, "sister cities located in this reach struggle to stay ahead of development and to provide the infrastructure to minimize the pollution going into the Rio Grande (IBWC-Texas Clean Rivers Program 2000, 8)." After testing water at stations along the entire length of the river, the binational toxic substances study indicated that much of the pollution in the section of the river near Laredo/Nuevo Laredo had come from untreated wastewater.[10] However, the relatively recent construction of a modern, secondary wastewater treatment plant in Nuevo Laredo has significantly contributed to better water quality and a mitigation of the pollution sources originally identified. Less easily remedied, however, are the findings of a 1994 joint study of the Rio Grande by Mexican and US agencies which found that several sites, including areas just downstream from downtown Laredo/Nuevo Laredo, demonstrated a high potential for toxic chemical impacts (Borderlines 1996 6(3): 2).

A primary concern for Laredo is the management of its hazardous materials along the border, substances typically transported by truck. With the increase in NAFTA-related, cross-border trade, the number of warehouses, or storage facilities used by companies shipping products across the border, has exploded from approximately 600 in 1996 to well over 1,000 today.[11] Until recently, these warehouses, which, typically, serve as storage-transfer points for NAFTA goods, were not monitored. Sitting in close proximity to the Manadas Creek in Laredo, these warehouses have become a threat to the creek, which is currently being infiltrated by nonpoint source pollution. The IBWC binational study identified Manadas Creek as a potential conduit for contaminants to the Rio Grande/Rio Bravo, describing it as carrying "stormwater and urban runoff from a heavily industrialized area of Laredo (IBWC 1998, 1: 20)." In addition to Manadas Creek, several other creeks in Laredo are among the most polluted in the city and are listed as being influenced by stormwater/urban runoff, including Chacon Creek and Zacate Creek (IBWC 1998, 1: 20).

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[10] Station 11b.3, Station 11c, Ustation 12, and Station12.1 in Table 11, p. 20-21, of Phase II in the IBWC Binational Study, Volume 1, all indicate the presence of wastewater discharge into the Rio Grande/Rio Bravo.

[11] Based upon interview with Steve Niemeyer, TNRCC Border Affairs office on 7/15/00 and with Jose Garza, TNRCC Laredo Office on 7/24/00.

In response, the TNRCC has recently funded through an EPA nonpoint source grant provided to the City's Fire Department activities to implement a hazardous waste ordinance. This ordinance will regulate the warehouses which store 55-gallons or more of hazardous materials (TNRCC (a) 2000).

However constructive such regulation may prove, root challenges remain unaddressed. As described by Jose Garza, director of the TNRCC Laredo office, although products are currently shipped to the warehouses as goods in transit, some do not leave once they arrive. If a company decides that it does not want a product or requires only a certain amount of it, no regulatory measures or prescriptions currently exist to require the safe transport and removal of these unwanted hazardous goods. With the increases in NAFTA-spurred trade and cross-border traffic, tracking and controlling the delivery and movement of these toxic substances is a monumental task. According to the Texas attorney general's office, "compliance with proper hazardous materials documentation requirements at Laredo, the border's busiest trade crossing, was estimated at a mere 2%" (Texas Office of the Attorney General 1997)." Hazardous materials, transported and stored in warehouses along waterbodies in Laredo, remain indefinitely undocumented and unsupervised with little opportunity afforded or mandate provided to ensure their safe, long-term storage.[12]

Water Quality in Detroit, Michigan and Windsor, Ontario

As with the Rio Grande/Rio Bravo, the two countries that border the Great Lakes draw and use its waters to meet a wide variety of needs. Spanning a large section of the border between Canada and the United States, the Great Lakes contain 18 percent of the world's freshwater supply, and 95 percent of the surface freshwater within the United States. Over the years, however, its sensitive ecosystem has become disturbed by pollution, impaired by those contaminants directly discharged as well as by those pollutants that after release into the air, have been deposited in its waters. Given the size of the Lakes and the proximity of several large cities to its shores, many with extensive industrial, manufacturing, and transportation sectors, the integrity of the Great Lakes' ecosystem is particularly vulnerable to the negative environmental impacts that the interrelated processes of air-borne pollution and aquatic pollutant deposition present.

On the US side, Michigan struggles with the quality of its surface waters. The leading sources of pollution in Michigan's surface water include unspecified nonpoint sources, combined sewers, agriculture, contaminated sediments, municipal and industrial discharges, and urban runoff. While Michigan has taken many positive steps to eliminate discharges into the Great Lakes, especially those from industrial sources, there is broad recognition that expanded efforts are needed to control nonpoint source pollution, a persistent problem for the state (US EPA (b) 1998, 320–321).

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[12] Based upon interview with Jose Garza, TNRCC Laredo Office on 7/24/00.

Within Detroit, the Clinton and Rouge Rivers, show ongoing contamination problems from nonpoint sources. Southeastern Michigan's Clinton River is located just north of Detroit and flows 128 kilometers from its headwaters to Lake St. Clair, flowing south through the Detroit area. According to the EPA, "Although historical industrial and municipal discharges were the primary causes of environmental degradation in the Clinton River, and thus its designation as an Area of Concern, ongoing contamination problems are almost exclusively of nonpoint source origin" (US EPA (f) 2000)" No industrial discharges into the river or its tributaries can be currently discerned and most municipalities have adequate sewer control plans and industrial pretreatment plans. However, "stormwater runoff...(poses) the single greatest source of water quality degradation" to the integrity of the Clinton with rapid urban expansion and the subsequent loss of habitat identified as the second significant contributor (US EPA (f) 2000).

Spanning 1,210 square kilometers, the Rouge River watershed encompasses the city of Detroit. The sources of degradation, which include "combined sewer overflows, urban storm water discharges, nonpoint source pollution, and municipal and industrial discharges" are typical of those identified for waterbodies found in the urban areas within the Great Lakes Basin (US EPA (h) 2000).

Windsor is confronted by many of the same environmental pressures and challenges as those faced by Detroit, including commercial truck emissions found within stormwater runoff. Currently, however, Windsor and its surrounding communities are well within compliance for water quality standards on pollutants.

"Components Are Interrelated in Complex Ways:"
Framework Links Between NAFTA Truck Transport, and Water Quality

Replicating the challenges of identifying the diffuse components and their sources in nonpoint water pollution, the exact interaction between NAFTA truck transport and water quality is not particularly well defined or understood. However, the potential impact and relationship which exists between air-borne pollution, particularly those toxics released via the combustion process, and their deposition in waterbodies is, clearly, an issue that needs further monitoring, research, and response.

HABITAT / WILDLIFE

Background Information: Agencies, Regulation, and Monitoring:

United States: The Fish and Wildlife Service (FWS), an agency of the US Department of the Interior, is the federal entity responsible for the management of terrestrial and freshwater wildlife and their habitat.[13] Specifically charged with the administration of the Endangered Species Act (ESA), the FWS has responsibility for determining which species require the legal protections and active conservation measures of a "threatened" or "endangered" designation, for assessing the "reasonable and predictable" impacts of proposed activities (e.g., road construction) on species' survival, habitat condition, and range, and for developing reasonable and prudent alternatives that mitigate the impact of a proposed activity on a species or habitat deemed at-risk.[14] To fulfill its mandates, FWS actively collaborates with parallel state agencies, such as the Texas Parks and Wildlife Department, to monitor and manage critical wildlife habitat areas.[15] Charged with responsibility for monitoring illegal trafficking of species protected through treaties, FWS, often, works, additionally, with federal, state, and local law enforcement agencies.[16]

Canada: Operating under the auspices of Environment Canada, the overarching government agency responsible for environmental protection, the Canadian Wildlife Service (CWS) has primary jurisdiction over those wildlife and habitat matters for which the federal government is responsible. Although some wildlife issues are managed regionally, CWS' primary duties include the protection of the nation's migratory bird population, the conservation of nationally significant wildlife habitat, and the monitoring and enforcement of Canada's participation in international treaties, such as the Convention on the International Trade of Endangered Species (CITES). [17]

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[13] While the USFWS has primary responsibility for terrestrial and freshwater organisms, the National Marine Fisheries Service has jurisdiction mainly over marine species, such as salmon and whales. US Fish and Wildlife Service. < www.fws.gov/r9endspp/endspp.html> 29 August 2000.

[14] "The purpose of the ESA is to conserve 'the ecosystems upon which endangered and threatened species depend" and to conserve and recover listed" endangered or threatened species. As defined by the ESA, an "endangered" species is one in danger of extinction throughout all or a significant portion of its range, while a species designated as "threatened" refers to one likely to become endangered within the foreseeable future." To implement their mission, the ESA designates that "federal agencies or those projects funded with federal dollars must consult with the USFWS to ensure that the actions they authorize, fund, or carry out will not jeopardize listed species." <www.fws.gov/r9endspp/endspp.html.> 29 August 2000.

[15] The USFWS offers states federal financial assistance and other incentives to secure state participation and collaboration through its Partnership program." US Fish and Wildlife Service. <www.fws.gov/r9endspp/endspp.html.> 29 August 2000.

[16] The ESA is the law that implements the US participation in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

[17] For example, the Ontario Region of Environment Canada implements the Great Lakes 2000 program and the Canada-Ontario Agreement Respecting the Great Lakes. Environment Canada. <www.on.ec.gc.ca/aboutus.html>
9 August 2000.

Mexico: The Secretariat of Environment, Natural Resources, and Fisheries, Semarnap (Secretaría de Medio Ambiente, Recurscos Naturales e Pesca), oversees wildlife and habitat issues. Under its auspices, several agencies responsible for wildlife and habitat protection operate. The Commission for the Knowledge and Use of Biodiversity, Conabio, created in 1992, sought to shift the focus of the numerous local governmental, nongovernmental, and academic conservation efforts to a broader federal conservation and protection agenda (Gobierno de Mexico, Conabio 2000). Similarly, on June 5, 2000, the National Commission of Protected Areas (Comisión Nacional de Áreas Protegidas) was created to coordinate and initiate a broad, federal approach to the conservation of critical wildlife habitat.

Operating independently from Semarnap, the Federal Attorney General for Environmental Protection, Profepa (Procuraduría Federal para la Protección al Ambiente) has jurisdiction over enforcement.

Laredo/Nuevo Laredo

Once referred to as a badlands (*malpais*) by area settlers, the Mexico-US border landscape is comprised of several distinct ecosystems, each of which features indigenous flora and fauna (Kourous 1998, 1). Centered along the border, Laredo/Nuevo Laredo are located in the Tamaulipan brushland, an ecosystem that has historically been home to more than 600 vertebrate species and more than 1,100 species of plants. Of these, approximately 70 are considered endangered or threatened by the FWS.

The urban development spawned by NAFTA-associated transport investment and the environmental pressure it exerts has, in fact, directly and significantly encroached on the range of habitats for these species, "spelling disaster for biodiversity" (CEC (b) 1999, 91–93). While many of the area's native species have been entirely displaced, some remnant native species remain, able to sustain their nesting and/or migration requirements despite the fragmentation of their habitat. Two species, designated as "endangered" or "threatened," amply demonstrate the impact NAFTA transportation has had on the area's wildlife and their habitat—these species are the Interior Least Tern and the Ocelot.

An endangered bird, the interior least tern breeds during the spring in Texas along sandbars of the Rio Grande, Canadian, Pecos, and Red Rivers. Important characteristics of its breeding habitat include: the presence of bare or nearly bare ground particularly along sandbars for nesting, the availability of food (primarily small fish), and the existence of favorable water levels during the nesting, so nests remain above water. Terns construct their nests by scraping a depression in the surface of sandbars along riverbanks or reservoirs, including those alluvial islands found in Lake Casa Blanco near Laredo.

Despite an official "Finding Of No Significant Impact" (FONSI) by the FWS in consultations on the construction of the third international bridge built near Laredo, the FWS "expressed concern that the Ocelot and Interior Least Tern [were] two endangered species potentially affected by the [Columbia-Solidarity Bridge] project (Parsons Brinkerhoff 1989, 44).” While recreational “draw-downs” and ill-time reservoir releases have also been acknowledged as threats to the survival of the Interior Least Tern, bridge-related construction and the run-off associated with the heavy traffic flows over the now-completed bridge have accelerated “the alteration of natural river or lake dynamics… causing unfavorable vegetational succession on many remaining islands (Parsons Brinkerhoff 1989, 44).” The cumulative impact of these environmental pressures—some of which are directly associated with NAFTA transportation—has been the reduction or “curtailing… use (of this habitat range) as nesting sites by terns (Parsons Brinkerhoff 1989, 44).”[18]

Similarly, the ocelot, the other species referenced by the FWS in its FONSI report, has also experienced significant reduction in its numbers and habitat. A small to medium-sized field mammal associated with the native thornbrush habitat that once dominated South Texas in dense thickets, the ocelot, too, finds its survival compromised by the encroachment of urban development spawned by NAFTA-associated investment and development. Since the FONSI released by the FWS and the construction of the third bridge, the city of Laredo has annexed the 27.5 kilometers that lay between the city center and the Columbia/Solidarity Bridge. With annexation has come development, growth that has irrevocably fractured the once nearly impenetrable thornbrush habitat that has traditionally secluded the ocelot.

The impacts of the third “NAFTA bridge” and the subsequent development on these two species, while direct, have hardly been isolated—other environmental pressures related to the confluence of urbanization and development in response to NAFTA, are prevalent in Laredo. Once-unoccupied land within the city’s limits has been developed specifically to accommodate increased NAFTA trade and traffic flows. According to one description, “a few exits up I-35 from downtown [Laredo], warehouses and trailer lots built by customs brokers, freight forwarders and trucking companies flow over miles of acreage that once was scrubland. The fact that nothing man-made existed five years ago where these structures now stretch out of sight illustrates how the growth of NAFTA trade has affected the city (Gordetsky 2000, 20).” Although the substantive transformation of “miles of acreage that once was scrubland” has generated significant economic benefit to the city and many of its businesses, this commercial success has come at a significant cost for the area’s indigenous wildlife and their habitat.[19]

Detroit/Windsor

While there are parts of land within and around Laredo/Nuevo Laredo that were unoccupied as recently as six years ago but which have become highly developed due to NAFTA, the Detroit Metro Area has been defined by industry and growth for many years. Described as a “highly disturbed environment,” little of the area’s native habitat patterns remain (MDOT & SEMCOG

[18] Recreational use is also a major threat to the tern’s reproductive success, and release of reservoir water and annual spring floods often inundates nests (Parsons Brinkerhoff 1989, 44).”
[19] Phrase in quotes is taken from Gordetsky 2000, 22.

1997, 3:19). In completing an Environmental Assessment for a construction project on the US side of the Ambassador Bridge, the Southeast Michigan Council of Governments (SEMCOG) and the Michigan Department of Transportation (MDOT) found that the heavy urbanization of land and the associated disruption of the terrestrial and aquatic habitat have limited the ecological resources within the area (MDOT & SEMCOG 1997, 3:19). The only wildlife assumed to survive in this urban landscape, other than "typical species of urban and suburban environments" is the eastern fox snake (MDOT & SEMCOG 1997, 3:19).

With a population of approximately 200,000 compared to Detroit Metro Area's 4.3 million, Windsor's landscape and wildlife resources are markedly different. The city has over 2,000 acres of parkland, including a riverside recreational trail that begins at the Ambassador Bridge. However, while much of the area's original habitat no longer exists— a regional assessment of southwestern Ontario found that "less than 0.5% of (its) original prairies and savanna" remain- Windsor is home to the one of the region's few remaining "natural areas," the Ojibway Prairie Complex (Bakowsky and Riley 1994, 1). Comprised of five closely situated natural areas, the complex hosts wetlands, forest, savanna and prairie, all of which provide habitat for a great number of rare plants, insects, reptiles, birds and mammals.

With more than 238 species of birds recorded at Ojibway, Windsor appears to be a particularly important area for migratory birds in addition to other species (City of Windsor). Although previous analyses of 12 migratory species common to the area suggested persistent population declines, recent data through 1997 suggests that half of these species have since recovered to former population levels (Environment Canada 1999, 4). The rich, intact resources act as a magnet to a wide variety of wildlife not only destined for Ojibway, but for the area as a whole. Eight of the 20 species of bats indigenous to Canada have been observed and 50 species of butterflies counted in the Complex, in the five nearby cities, or in Essex County where Windsor is located (City of Windsor 1999, 2).

Preliminary evidence is emerging that recent increases in air pollution and degradation of water quality, a portion of which is attributable to NAFTA transportation, is producing negative impacts on Windsor. Of the twelve avian species documented as declining, six species have not recovered and an additional eight have been documented s declining in number (Environment Canada 1999, 7). Further, the proposed construction of another bridge between Detroit and Windsor, the number of commercial trucks may well increase, further stressing the border region's ability to sustain wildlife.

"Small Increases in Pressures Can Have A Major Catalytic and Potentially Irreversible Effect… A Small Amount of Environment-Enhancing Intervention Can Generate Large Gains:" Framework Links Between NAFTA Truck Transport and Wildlife

As the CEC Framework distinguishes, "the impact of pressures, combined with supports, will vary according to the existing state of the natural environment in the geographic area they affect"

(CEC (b) 1999, 77)" This assertion is, perhaps, best demonstrated by the impact of NAFTA truck transport on the wildlife and habitat of the two border areas being analyzed. In Laredo, the combined forces of annexation and the economic demand for warehouses, support facilities, and other structures to accommodate NAFTA trade have eliminated the stretches of brushland that once comprised an abundant ecosystem. Without open land preservation initiatives or city planning designed to provide intact habitat, the rapid increase in the number of species now deemed "threatened" or "endangered" attest to "major catalytic and potentially irreversible effect" of these urbanization and development pressures (CEC (b) 1999, 77).

In sharp contrast, the relatively vibrant ecosystem of the Ojibway Complex and the surrounding communities provides a poignant reminder of the importance of "a small amount of environment-enhancing intervention" (CEC (b) 1999, 77. Despite the documented decline of certain avian species, the Complex and indeed, Windsor, remain an important destination along the migratory route even as the community experiences major transportation-related pressures. With an unexpectedly rich wildlife population, including indigenous bats, butterflies, and others, Windsor, as well as its still intact wildlife populations and habitat, enjoy the "benefits" of its "intervention."

QUALITY OF LIFE

Background Information

A constellation of transportation-related factors can contribute or detract from a community's quality of life. However, "quality of life" is a subjective assessment that reflects the values and cultural context of those judging. Acknowledging openly that "quality of life" indicators do not enjoy the broad scientific consensus of, for example, VOCs or NOx levels, this paper looks at several indicators that explicitly link NAFTA-related transportation and community impacts: traffic congestion, the prevalence of truck transport on urban streets, and noise pollution.

Each of the indicators chosen have significant environmental or human health impacts. Traffic congestion, to the extent that NAFTA trucks idle, increases emissions of heavy metals and PM, emissions linked to respiratory distress and illness. Examining travel by NAFTA trucks within urban boundaries (rather than on interstate highways) as an indicator of quality of life is not intended to diminish the importance of the economic benefits or tax revenues trucks and their drivers often bring to local businesses within the urban core. Instead, this indicator gauges "quality of life" by focusing on the proximity of the releases of heavy metal and PMs in the densely populated areas that typically surround urban roadways. Finally, noise pollution, not only obviously impacts the comfort level of individuals living within a community, but can lead to incremental hearing loss.

Laredo/Nuevo Laredo

Traffic Congestion

With the opening of the World Trade Bridge on 15 April 2000, the oppressive congestion that once characterized Laredo has been significantly eased. The opening of this bridge, along with the redirection of trucks to only two of the four international bridges, has significantly reduced the wait on both sides of the border. According to a recent article in Transport Topics, "trucks are still omnipresent [in Laredo] but they no longer dictate the flow of traffic in the heart of the city (Gordetsky 2000, 20)."

While the opening of the bridge has reduced the congestion in the city, the relief it provides is likely temporary as the number of trucks is expected to grow. According to Laredo Mayor Elizabeth Flores, "'the management of international trade and trucking is a critical issue - keeping up with the flow is unquestionably a challenge.' A fifth bridge, also focused on accommodating NAFTA truck transport, is currently being designed and planned. However, this new bridge will not be open for use for, at least, six years (Gordetsky 2000, 21)."

Traffic on city streets

Despite the opening of the bridge earlier this year, commercial trucks carrying international trade continue to dominate the downtown streets of Laredo. As a recent article on Laredo states, "On almost any city street and in the parking lots of many businesses you'll find truck tractors (Gordetsky 2000, 21)."

While building transborder bridges offers some relief to congestion, the capacity and condition of the city's infrastructure to accommodate the rapidly growing number of companies involved in the transportation structure has not kept pace. Trucking companies that started out in Laredo with only a shack and telephone now have thousands of feet of warehouse space and run major operations. Thus, the character of Laredo has been affected.

Noise Pollution

No readily available noise pollution data in the cities of Laredo and Nuevo Laredo exists.

Detroit/Windsor

Traffic Congestion

With a fifty percent increase in its commercial truck traffic volume since the passage of NAFTA, the Ambassador Bridge remains the busiest commercial border crossing in the United States (Cole 2000, 1). This sharp upsurge has manifest itself in a "snaking line of commercial trucks at the bridge in recent years," congestion with implications for air quality, nonpoint source pollution, and increased community impacts (Cole 2000, 2).

A recent study completed by Windsor Area Transportation projected that the period before both the Ambassador Bridge and Detroit-Windsor Tunnel bridges reach the outer limits of their capacity is, at most, fifteen years. Similar findings were echoed, as well, in reports commissioned by the SEMCOG.[20] As a consequence, an exploratory study is underway to determine the feasibility of building a new transboundary bridge between these points. While such a bridge might provide some measure of temporary congestion relief, its long-term impact on air pollution impacts have yet to be fully considered

NAFTA Traffic on City Streets

All of the border crossings in Detroit, both road and railway, have been privately owned since they were constructed in the early 1900's. As a result, MDOT was, until quite recently, prohibited from making direct interstate connections with these crossings (Benton 2000, 2). The absence of these infrastructure connections has meant that all trade traffic between Canada and the United States has had to traverse city streets in order to eventually reconnect with the US interstate system. As a consequence, according to Kris Wisniewski of MDOT, the Ambassador Bridge currently "dumps into a neighborhood" on the Michigan side of the crossing.[21]

The primarily Latino residential community located just over the Ambassador Bridge in Detroit has borne the brunt of this outcome since the implementation of NAFTA.[22] As the director of the Southeast Michigan Council of Governments, Carmine Palomba describes, currently, it is very easy for trucks to get lost when heading toward the bridge. Searching for the access to the US interstate system, these heavy-duty diesel trucks will often wander through this residential neighborhood, traveling on city roads ill-equipped to accommodate the additional weight and stress of these trucks.[23]

The recent federal passage of the Transportation Equity Act for the 21st Century has changed this scenario dramatically. Michigan, now permitted to link its interstate system to privately-owned crossings, has embarked on the Ambassador Bridge/Gateway Project which will offer a direct link from the interstate system to the international crossing. Leadership in the affected neighborhood are proving active participants in the planning of this project (MDOT & SEMCOG 1999, 3-19).

Noise Pollution

The US Federal Highway Administration (FHWA), an agency of the US Department of Transportation (US DOT) has established a one-hour parameter of 67 decibels for noise associated with highway structures. Under FHWA guidelines, should this level be routinely approached or exceeded at the exterior of residences, churches, hospitals, parks and libraries, noise abatement measures must be considered. According to SEMCOG and MDOT, noise levels in the Detroit community living near the Ambassador Bridge currently exceed 67 decibels in nine of sixteen sites identified in the region (MDOT and SEMCOG 1999, 3: 29).

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[20] Based upon interview with Carmine Palomba, Southeast Michigan Council of Governments, 8/1/00.
[21] Based upon telephone conversation with Kris Wisniewski, MDOT, on 7/25/00.
[22] Based upon Interview with Carmine Palomba, Southeast Michigan Council of Governments, 8/1/00.
[23] Ibid.

Part II: A Community-level "Report Card:" Environmental and Data Assessment

The Community-level "Report Card" follows.

Part III: Recommendations for Action by the CEC

Recommendation One: ***Inventory the existing intermodal resources, capacity parameters, and overall transportation infrastructure of the three signatory nations; investigate the transportation decision-making process used in each of the three countries, identifying those forces or pressures that support or oppose intermodal transportation resources and networks; develop a consensual protocol to be used in siting, planning, and designing intermodal transboundary "NAFTA Trade Corridors"***

"Environmental protection does not—regardless of one's opinion of the role of economic expansion, liberalization, and integration—occur automatically" (CEC (c) 2000, 3). Choices must be made, either to calibrate and adjust carefully and deliberately the forces of trade loosed with liberalization with the biological limitations that characterize the ambient environment or to disregard the acknowledged limits of natural systems in favor of the economic benefits that unconstrained trade may provide, regardless of future consequences. Where and how one chooses to calibrate the economic forces of trade, no doubt, "depends in large measure on what one considers the importance of the contribution of underlying factors to environmental degradation to be" (CEC (c) 2000, 3-4).

These critical questions and issues underlie discussions of NAFTA transportation. As the CEC Framework points out,

> "NAFTA may direct trade toward sectors and toward geographic locations, where the existing infrastructure can absorb the new traffic and demands, thereby obviating the need for new investments, new routes, and associated impacts on the environment….However, NAFTA-associated trade may generate production that follows a path to environmental stress (CEC (b)1999, 67)."

There is a growing sense, particularly in the communities experiencing the heaviest flows of trade traffic, that NAFTA-associated trade with its growing use of truck transport is veering down the "path to environmental stress" and that "unprecedented rates of economic growth are (not) entirely separate and disconnected from unprecedented rates of environmental degradation" (CEC (c) 2000, 4)

The pace of environmental protection related to NAFTA transportation has clearly lagged behind that of economic trade. To assure environmental protection in this context, therefore, will "require change and innovation" (CEC (c) 2000, 4) However, deliberate calibrating and balancing the forces of trade and the limits of the environment will require that options for transport be clearly defined and understood, particularly as the number of "corridor coalitions" increases.

Task One: Inventory the existing intermodal resources, capacity parameters, and overall transportation infrastructure of the three signatory nations; Investigate the transportation decision-making process used in each of the three countries, identifying those forces or pressures that support or oppose intermodal transportation resources and networks

Discussion of continued investment in and construction of major NAFTA-related highway infrastructure is underway in Laredo (i.e., a fifth international bridge) as well as in the Detroit-Windsor area (i.e., another bridge for use by vehicles to supplement the Ambassador Bridge). These discussions are clearly prompted by current congestion pressures, as well as by projected capacity limits.

However, within these same communities, the capacity and utility of an alternative mode, such as rail, to offset these pressures is limited only by contingencies that can be altered.[24] For example, relocating US Customs to the Tex-Mex Railyards in Laredo would allow the three operating rail companies to meet more readily, if not exceed, their 2000 target of an additional 154,000 loaded freight cars processed. Similarly, retrofitting the Detroit-Windsor Rail Tunnel to accommodate double-stacked freight cars, rather than diverting these rail cars north to Port Huron, would provide a direct rail route for these cars to Windsor, thereby altering the economic and logistic calculation that currently determines that transporting goods by truck to Windsor is more cost-effective and efficient than transporting these same goods via rail through diversion to Port Huron and then, to Windsor.

Why these highway expansion activities, rather than rail improvements, are being pursued first is not clear. Gaining an understanding, therefore, of the criteria by which

[24] As cited earlier in the paper, in Laredo: "the underlying cause of rail congestion points toward an issue of use, rather than capacity. According to US Federal Railroad Administrator Jolene Molitaris, "the current bridge is not yet at capacity (Mertz 1999, 1)." Indeed, the Vice President of Finance for Tex-Mex Railroads estimates that "the company could improve efficiency at the existing bridge by 300 percent if US Customs moved inspections into the Tex-Mex Railyard (Mertz 1999, 1)."

communities are judging the need for and projected efficiency of new NAFTA-related public investments in highway infrastructure, as well as the barriers (e.g., economic, regulatory, etc.) which limit the use of alternative modes is crucial, should innovation and change occur in coordination with environmental protection and economic growth.

Should a comprehensive accounting of those intermodal alternatives which already exist in the NAFTA corridors, particularly those under the greatest trade pressures, already exist, it could not be identified or located. To the extent that such an accounting can provide estimates of capacity, used and unused, and barriers impeding full capacity, such an analysis would be invaluable when considering proposals for new transportation infrastructure. Analysis of those forces or pressures operating within the transportation decision-making process of the three signatory countries that encourage or stifle intermodal investment, or consistently orient decision-making to one mode over another, would also be crucial in understanding external pressures that may be directing investment and decision-making.

Task Two: Through recommendations developed by the Council of the CEC and a wide range of stakeholders, forge an agreement that specifies the protocol to be used in siting, planning, and designing intermodal transboundary "NAFTA Trade Corridors"

As evidenced in the deposition of far-flung airborne pollutants in the waters of the Great Lakes and the transboundary impacts of ground-level ozone in Ontario and Windsor, the substantive environmental impacts of transportation decision-making are often diffused to distant communities. If the three countries are to avoid continuing their forward movements on the "path to environmental stress," the capacity limits of the environment require that decisions on transportation infrastructure, particularly interstate highway investments, no longer be made in isolation.

The NAAEC provides that "the Council (of the CEC) may consider, and develop recommendations regarding… transboundary and border environmental issues, such as the long-range transport of air and marine pollutants; … environmental matters as they relate to economic development." (NAAEC 1993, 10:2 (g), (l)) Further, "recognizing the significant bilateral nature of many transboundary environmental issues, the Council shall…consider and develop recommendations with respect to…assessing the environmental impacts of proposed projects subject to decisions by a competent government authority and likely to cause significant adverse transboundary effects… notification, provision of relevant information and consultation between Parties with respect to such projects; and mitigation of the potential adverse effects of such projects" (NAAEC 1993, 10:7 (a), (b), (c).

Through the auspices of the Council, the CEC should develop a series of NAFTA transportation related recommendations that could form the foundations of an agreement to be forged between the three nations to guide the siting, planning, and development of transboundary NAFTA transportation corridors. As the CEC points out, the importance of

NAFTA trade “can induce the federal governments in North America to engage in communication, capacity building, regional regulatory convergence, and cooperation” (CEC (a) 1999, 12). Not only will the early involvement and broad-based collaboration of government representatives, transportation and logistics service providers, community representatives, and nongovernmental organizations be essential if such recommendations are to gain the necessary political support and momentum for transformation into a binding protocol, but this coalition will afford “social organizations and civil society groups to present governments with demands for enhanced environmental performance” (CEC (a) 1999, 12).

Recommendation Two: Promote the Availability of, Public Access to, and Usefulness of Environmental Data

One of the principal challenges in creating a document that effectively assesses the impact of a NAFTA corridor is the identification and location of complete environmental data sets for each country. As indicated in the text, the barriers to assessment of specific environmental indicators are substantive. As experienced in our research, barriers to data, generally, took one of three forms:

- **Difficulty in access**: Specific data on key indicators, particularly at the regional or community level, were often difficult to find. Searching a multitude of locations was often required with the usefulness of the data located often minimal, relative to the time spent in search.

- **Public inaccessibility:** Information was often inaccessible to the public. Data was often completely unavailable in a publicly-available format, such as via Internet or through traditional public information repositories, such as public libraries, state agency libraries, or publicly-funded education and research institutions.

  In other cases, where information was, in fact, available, it was only accessible at the request of another state agency or through a faculty member at a public university. Similarly, fees assessed were often exorbitant-- thus, while data was, in theory, available, its public accessibility was limited to those exclusively with the means to pay

- **Uncollected data:** Information was often simply not collected either in the absence of a mandate requiring its compilation or in the absence of a monitoring source.

Task One: Enhance the CEC’s central environmental database

Barriers to data are important to eliminate as a lack of information, whether a consequence of difficulty in access or in non-collection, stifles the informed, vibrant public exchange to which the CEC is committed. While identifying sources for gathering “hidden” data, eliminating distribution barriers, and/or implementing collection are each direct resolutions to the data barriers identified, the cumulative impact these “data gaps” may have in impeding and stifling informed public participation in NAFTA transport decision-making must also be recognized. Enhancing the central data bank resources of the CEC to include a wider range of environmental indicators would be of substantial benefit to many community and nongovernmental organizations struggling to assess, understand, and respond to NAFTA-related pressures.

Task Two: Initiate process for the standardization of data by prioritizing the identification of key environmental indicators, standardizing their collection methods and parameters, and providing a standard framework for reporting

Data collected on environmental indicators across the three signatory nations is rarely comparable. Ground-level ozone data provides a powerful example of the limitations of data that is collected and assessed differently in each of the three countries. For example, data collected in the US must now be "adjusted" as the US EPA transitions from a one-hour to eight-hour criterion. While Canada has traditionally used a one-hour standard, comparisons of one-hour data formerly collected by the EPA are not comparable as the parameters for these readings differ. Because Mexico has monitored a limited number of areas for ozone and only "modeled" other regions, ground-level ozone data from this country cannot be used as a point of comparison. For NGOs and community groups struggling to understand the impacts of transboundary transportation on the ambient environment of their community, this lack of comparability among similar indicators is often a hurdle too high to surmount.[25]

In addition, gaps in baseline data, should it exist, make it exceedingly difficult to gauge the impact of NAFTA-related transportation on many communities. For example, the US EPA has historic data for ozone levels only from those cities that have consistently exceeded NAAQ standards over time. However, even in the presence of acknowledged environmental stressors that might compel collection of data in the public interest, the EPA has not always quickly responded. For example, US EPA only has ozone data from Laredo beginning in 1999, a full five years after the passage of NAFTA – this, despite early and clear indications that this small city had emerged as a major "choke point" for transboundary traffic.

The NAAEC provides that "the Council may consider and develop recommendations regarding comparability of techniques and methodologies for data gathering and analysis, data management," as well as "establishing a process for developing recommendations on greater compatibility of environmental technical regulations, standards and conformity assessment" (NAAEC 1993, 10:2: (a); 10:3: (b)).

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[25] Even within nations, inconsistency in data collection makes it difficult to assess and compare accurately the extent to which environmental pressures are increasing or decreasing over geographic regions. For example, while the TNRCC collects some air quality data, some of which is publicly accessible, the MDEQ uses different data collection methods and parameters, making it very difficult to compare, even domestically.

Given these provisions, the Council should initiate a collaborative process with the three signatory nations by which key environmental indicators are prioritized and a standard method of data collection and parameters established. This process is not an attempt to supplant current domestic environmental standards or methods. Instead, the identification, standardization, and reporting of data for key environmental indicators is a process designed to provide the necessary foundation for assessing and comparing, rather than guessing, NAFTA's environmental impacts.

Additional Specific Recommendations by Indicator

Air Quality Recommendation for CEC Action:

- Following identification and standardization of key environmental indicators, data gathering on air quality indicators should be implemented for each city and region located along major NAFTA trade corridors.

Habitat/Wildlife Recommendation for CEC Action:

- Development of a best practices protocol for use in NAFTA transportation infrastructure projects

A promising start in the development of such a protocol can be found in the 1993 work of Tewes and Blanton in the construction of a NAFTA-associated bridge for the Port of Brownsville, Texas. Incorporating a variety of changes in construction blueprints, their proposal made specific design provision for wildlife, particularly the movements of the endangered ocelot. The components of this innovative design included:

- Construction of a 500 feet span from the center line of the Rio Grande over the north bank, rather than a bank-to-bank span of the bridge, allowing wildlife movements to occur under the bridge.
- Creation of an interconnected system of "upland corridors" located parallel to and under the roadway
- Development of a five-acre habitat tract on each side of the river corridor to serve as a staging area for migratory wildlife and to provide cover for species with substantive habitat range requirements.
- Minimizing the impacts of the structures built around the bridge by locating them away from the river corridor, the upland corridor network, staging areas, and crossing.
- Innovative use of pervious surface for parking areas to eliminate the discharge of vehicle-related nonpoint source contributions

These design changes were "intended to produce post-construction conservation benefits (for wildlife) that exceed the pre-construction benefit levels (Tewes and Blanton, p. 137)." Given its organizational objectives and goals, the Commission has a unique ability to develop and distribute widely best practices tools and protocols that not only minimize the impact of NAFTA transportation on wildlife and habitat, but which raise the standard for conservation in a given region.

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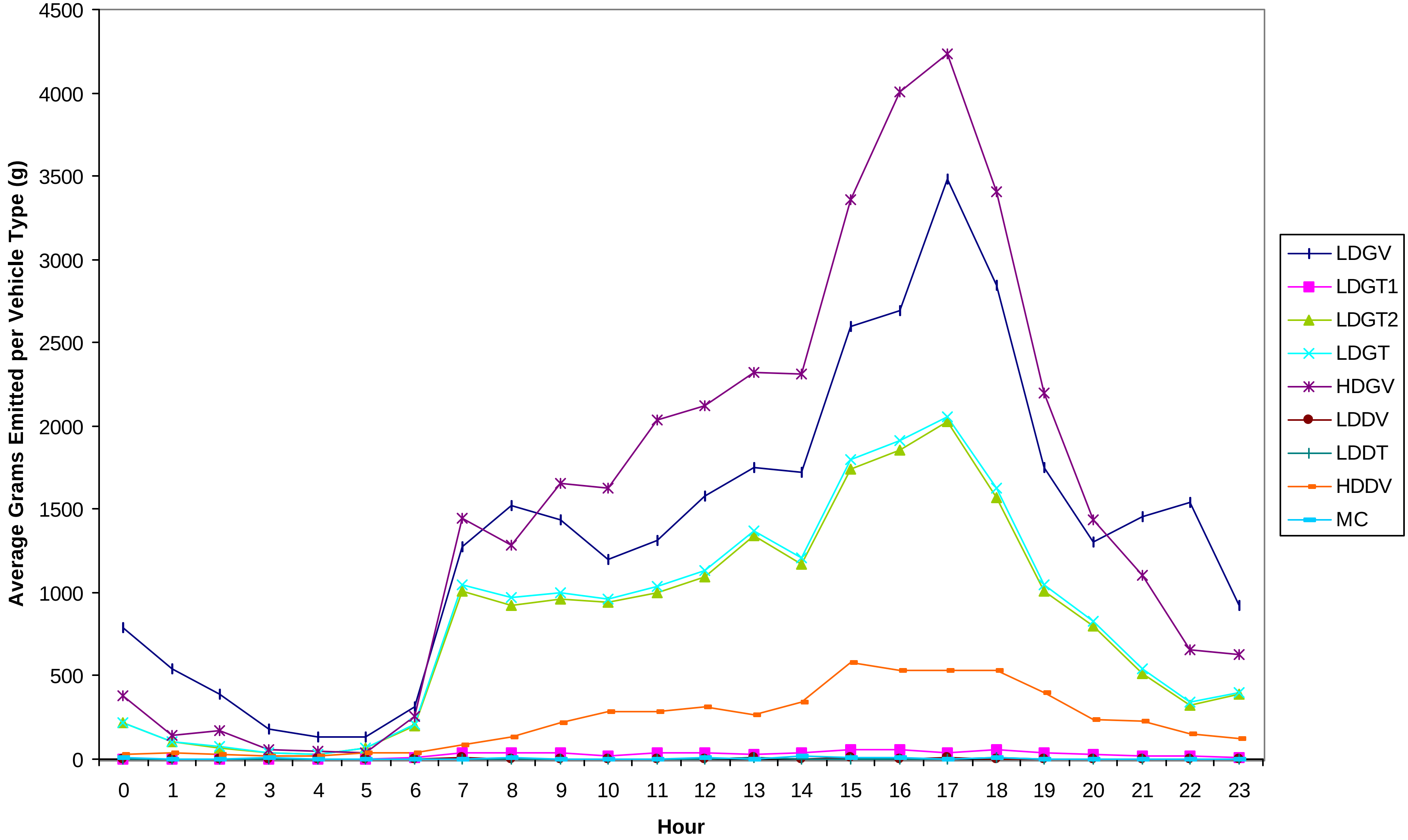
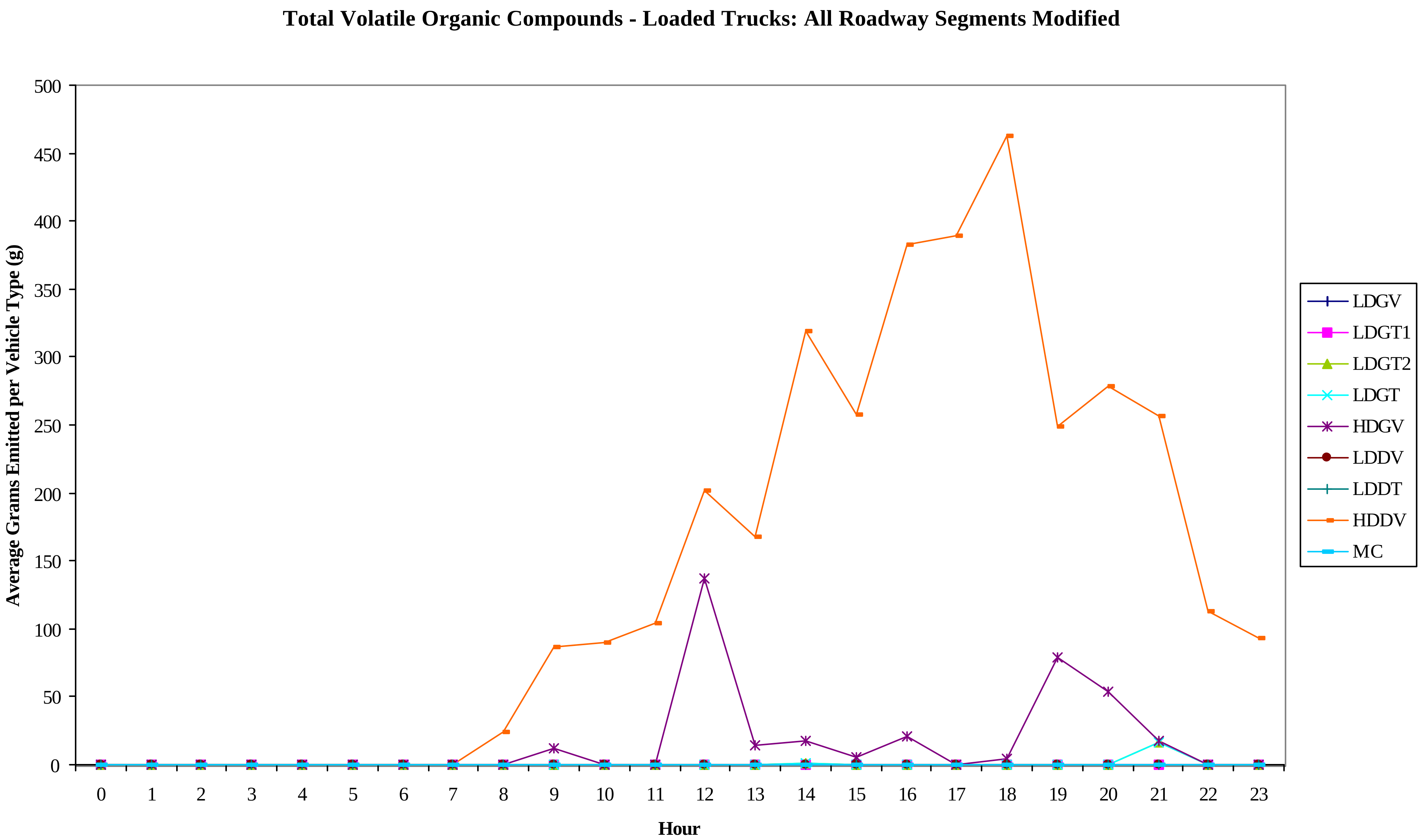
APPENDICES

Appendix I
Air Quality Indicators, Environmental Integrity, and Public Health

Pollutant	Type of monitoring Canada, United States, & Mexico	Source of pollutant relative to truck operation	Exacerbated by	Environmental Impact	Pubic Policy Considerations	Human Health Concern	Laredo/Nuevo Laredo	Detroit/Windsor
VOCs	Canada consistent; US varies by region/state; MX dependent upon resources.	Fuel combustion and fuel evaporation	Heat and sunlight	Reacts with oxides of nitrogen, heat and sunlight to form ground-level ozone (O3)	Inconsistency, inaccessibility, or non-collection of data	Contributes to formation of O3, with resulting health impacts	Local and regional air quality impact and resulting health concerns	Regional decreases, but still a concern due to its contribution to ozone
NOx	Canada consistent; US dependent on region; MX dependent upon resources	High-temperature combustion. Diesel vehicles emit much higher rates than gasoline vehicles	Heat and sunlight	Contributes to acidification of fresh water, toxic increases that threaten aquatic life, visbility impairment, and explosive algae growth leading to depletion of oxygen in estuarine and coastal waters	Inconsistency, inaccessibility, or non-collection of data	contributes to formation of O3, with resulting health impacts	Local and regional air quality impact and resulting health concerns	Local and regional air quality impact and resulting health concerns
Ozone (VOCs &NOx)	<u>Standard in CA</u>: 80 ppb, 1-hour average; <u>Standard in US</u>: 125 ppb, 1-hour standard - cannot be exceeded more than three times in three consectuive years. Recent attempt to change to 8-hour standard of 85 ppb, which is exceeded if an area's 3-year avg. of each fourth highest 8-hr. reading equals or exceeds 85 ppb	Formed through reaction of VOCs and NOxs in the presence of heat and sunlight	yearly weather pattern	Reductions on agricultural yields, reductions in the growth and survivability of tree seedlings, increases in plant susceptibility to disease, pests and other env. stresses, damage to foliage of trees and plants	Can be transported by prevailing weather patterns to an area hundreds of miles away from pollution sources	Irritation of the lungs, difficulty in breathing, tightness of chest, exacerbation of asthma and other respiratory problems	Local air quality and resulting health effects are a concern, as well as impact on neighboring areas	Windsor O3 levels higher than most other parts of Ontario, transboundary flow of pollutants a concern
Particulate Matter	Consistently monitored in CA; No historical measurement of PM-2.5 (fine particles) by US EPA, local and regional data dependent upon collection by state agencies; Monitoring in MX dependent upon resources. Standard in CA for particles less than 10 microns (PM-10): 24 h average, 50 micrograms per cubic meter CA Standard for TSP (total suspended particles, size range .1-100microns): 24 h average, 120 micrograms per cubic meter; 1 y average, 60 micrograms per cubic meter; Standard in US for PM-2.5 (particles less than 2.5 micrometers): 1 y standard, 15 micrograms per cubic meter; 24 h standard, 65 micrograms per cubic meter	Combustion process; emissions are highest in the transportation sector from diesel engines, so heavy-duty motor vehicles (trucks) are largest source of emissions. larger partilces also come from fugitve dust due to road construction projects and roads	diesel engine operation	reduced visibility in locations with high concentrations of fine and coarse particles	Standardization of data collected; Lack of historical data.	PM-10: aggravation of respiratory conditions; PM-2.5: heart and lung disease, decreased lung function, premature death, increased respiratory symptoms and disease	Major health concern due to high number of heavy-duty, diesel-burning trucks	Major health concern due to high number of heavy-duty, diesel-burning trucks; Windsor PM levels higher than many other parts of Ontario

Total Volatile Organic Compounds - Non-Loaded Trucks: Roadway Segment 4 Modified




Total Volatile Organic Compounds - Loaded Trucks: All Roadway Segments Modified
Average Grams Emitted per Vehicle Type (g)
0
50
100
150
200
250
300
350
400
450
500
Hour
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
LDGV
LDGT1
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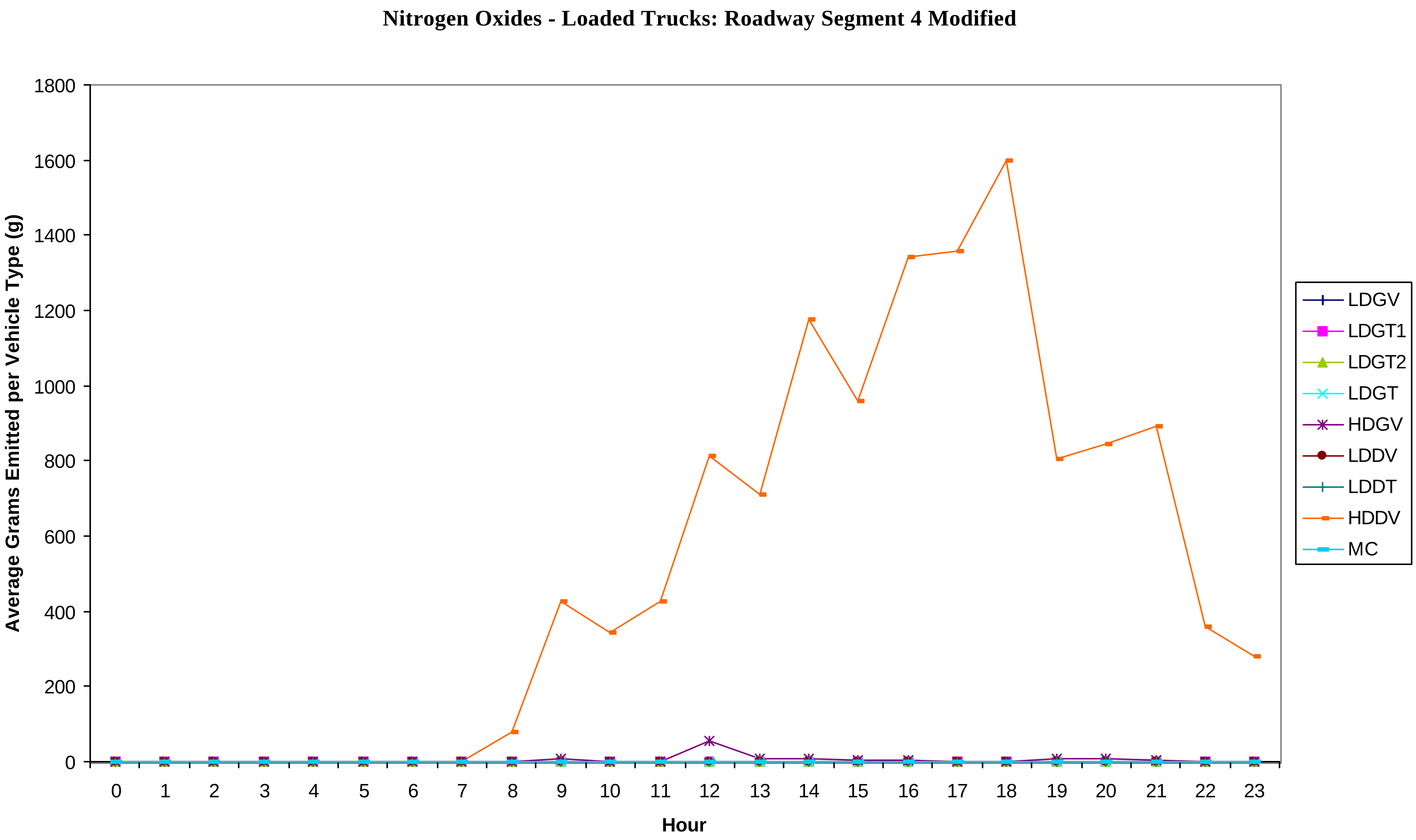
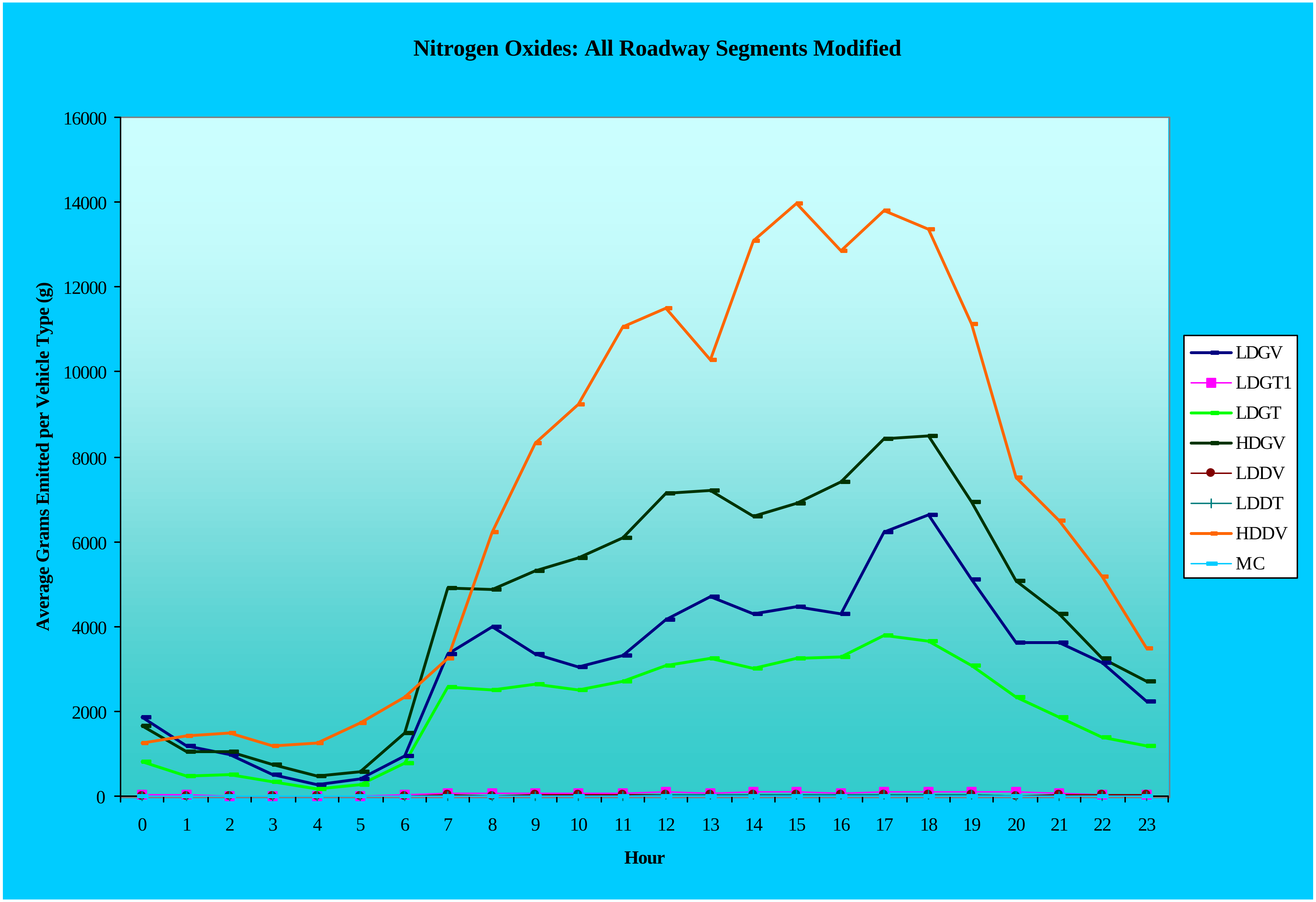
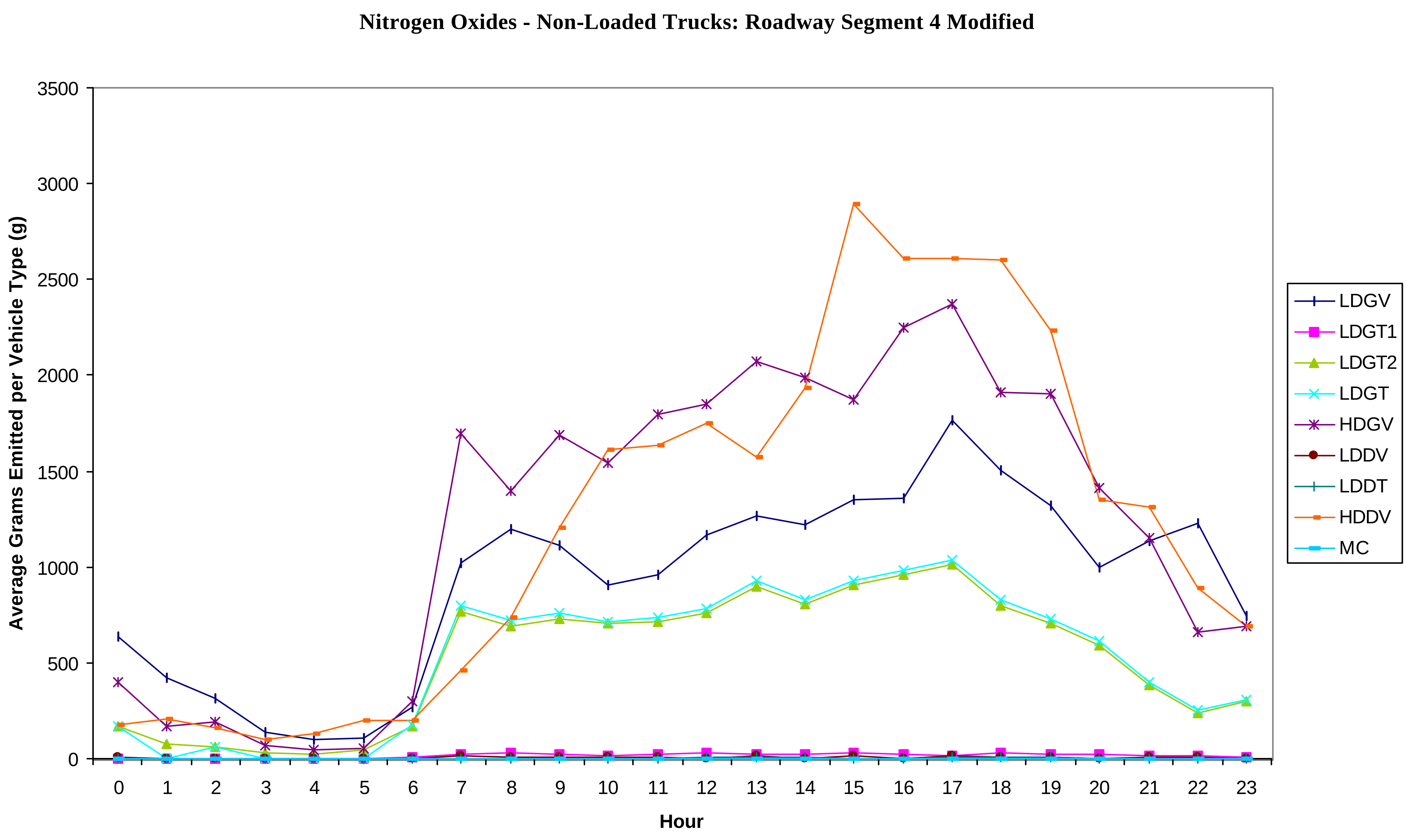
LDGT
HDGV
LDDV
LDDT
HDDV
MC



Nitrogen Oxides - Loaded Trucks: Roadway Segment 4 Modified
Average Grams Emitted per Vehicle Type (g)
0
200
400
600
800
1000
1200
1400
1600
1800
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour
LDGV
LDGT1
LDGT2
LDGT
HDGV
LDDV
LDDT
HDDV
MC


Nitrogen Oxides: All Roadway Segments Modified
Average Grams Emitted per Vehicle Type (g)
16000
14000
12000
10000
8000
6000
4000
2000
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Hour
LDGV
LDGT1
LDGT
HDGV
LDDV
LDDT
HDDV
MC



Nitrogen Oxides - Non-Loaded Trucks: Roadway Segment 4 Modified
Average Grams Emitted per Vehicle Type (g)
0
500
1000
1500
2000
2500
3000
3500
Hour
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
LDGV
LDGT1
LDGT2
LDGT
HDGV
LDDV
LDDT
HDDV
MC

Environmental and Data Assessment

Aggregate Indicators	Specific Indicators	US/Mexico Border Region		US/Canada Border Region		Aggregate Monitoring, Data Collection, and Public Accessibility
		Nuevo Laredo	Laredo	Detroit	Windsor	
Air Quality	Ozone Levels	No monitoring of ground level ozone;	Increased truck emissions since 1994	Significant improvement in air quality, as measured by days in nonattainment. Several surrounding counties remain in nonattainment.	Numerous criteria exceedence; the extent of transboundary flows on air pollution may be significant. Significant VOCs reduction reported	US (Laredo, Texas): Although data has been gathered on ozone, TNRCC data prior to 1998 is not publicly accessible. (Detroit, Michigan): Data not readily accessible to the public; what data is collected is limited in scope. Different methods of data collection and non-standardized pollutant parameters limit comparisons between states. US EPA: Monitoring of ozone levels is restricted to those cities in non-attainment with NAAQS. Despite significant risk factors, as in the case of Laredo, US EPA did not monitor ozone for several years, thereby missing the opportunity to collect baseline data. In transition between 1 and 8 hours ozone standards. Mexico: Limited monitoring of air quality overall. Canada: Data is widely available and accessible.
	NOx Levels	No monitoring of NOx	No publicly accessible information available from TNRCC or EPA on this criteria pollutant	No specific data on this criteria pollutant publicly available	Criteria exceedence	
	VOCs Levels	No monitoring of VOCs	No publicly accessible information available from TNRCC or EPA on this criteria pollutant	No specific data on this criteria pollutant publicly available	Criteria exceedence; significant VOCs reduction reported for the province in 1997 as a consequence of conversion to reformulated fuels beginning in 1989	
	PM10	No monitoring of PM	Monitoring of PM began in 1999; no data currently available	No specific data on this criteria pollutant publicly available	Criteria exceedence for PM-10; the extent of transboundary flows may be significant	
Water Quality	Contamination	No indication of stormwater or urban runoff monitoring; recent construction of a secondary treatment plant may reduce discharges of untreated wastewater	Limited monitoring by the IBWC	Nonpoint source pollution remains the source of chronic impairments of water quality in the region	No indication of current exceedances	US (Laredo, Texas): Water quality data on hazardous materials leakage collected by IBWC. While TNRCC also collects water quality information, the data collected by the two agencies was inconsistent. US (Detroit, Michigan): Limited water quality information available through the MDEQ. US EPA: Limited water quality data, hazardous waste leakage monitoring is restricted to those waterbodies designated as meriting "concern." Mexico: Localized data collection; difficult to access information. Canada: Data widely available and accessible.
	Leakage of Haz. Mat.	Those indications of haxardous materials leakage are not calibrated sufficiently to assert the source of materials--may be a function of downstream flows from Laredo	IBWC reported leakage of hazardous materials into Las Manadas Creek, cited hazardous waste stored for truck transfer	No current indications, specifically attributed to transportation	No current indications	
Wildlife/Habitat	Endangered or Threatened Species	Limited monitoring. Data not easily accessible.	Extensive habitat loss associated with NAFTA transport with an increasing loss of species.	Highly-developed area with few wildlife resources.	Ojibway Complex, surrounding areas home to vibrant wildlife communities. Some reductions, some increases reported in avian species. Sightings of indigenous bats and butterflies.	US (Laredo): Pressures of urbanization and NAFTA-related transportation directly impacting habitat. US (Detroit): Little change. US FWS: Limited scope of predictable impacts, particularly related to transportation projects, appear to underestimate impact on wildlife and habitat. Mexico: Limited monitoring, recent creation of the Commission for National Protected Areas may signal change. Canada: Data widely available and accessible.
	Changes in land use patterns	Urbanization of previously undeveloped land	Urbanization of previously undeveloped lands accelerated by transportation-related impacts	Already highly-developed environment	Data on land use changes limited	
Quality of Lif	Traffic congestion	No specific data available	With opening of fourth bridge, congestion is decreasing--relief may be temporary. Soon to consider the construction of a fifth international bridge	Continued congestion associated with Ambassador Bridge and the Detroit-Windsor Tunnel; Consideration of an additional bridge	No current indications	No general consensus currently exists regarding indicators that capture "quality of life" and that are both measurable and culturally appropriate. Where regulations and parameters exist, localized and/or baseline data is often unavailable.
	NAFTA traffic on city streets	No specific data available; however, "quality of life" assessments may not be culturally appropriate.	Prevalent; May be attributable to location of transportation-related businesses and transfer points within city limits	Extreme; No interstate access between Ambassador Bridge and the US Interstate system.	No specific data available	
	Noise pollution	No specific data available	Limited data; exceedances were indicated in both EA studies for bridge construction; however, may not be generally applicable to city as a whole	Extreme, particularly in the Ambassador Bridge area	No specific data available	