



Summary of Results from “Assessment of Out-of-State Truck Activity in California”

CARB contract #04-328

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Presentation Outline

- **Introduction**
 - **Background, research motivation**
 - **Key research questions**
- **Survey**
 - **Survey instrument design**
 - **Sampling approach**
 - **Potential biases**
- **Findings**
 - **General characteristics of inter-state traveling trucks**
 - **Out-of-state truck mileage on California highways**
 - **Out-of-state truck population in California**
 - **Out-of-state fuel use by inter-state trucks operating in California**
- **Conclusions**

Introduction

Interstate truck activity, characteristics:

- Out-of-state trucks activity**
 - **Highway usage**
 - **Fuel usage (total volume, quality of fuel)**
 - **Truck fleet attributes (engine certification, age)**
- In-state trucks**
 - **Mileage in and out of California**
 - **Use of out-of-state fuel**
- Implications for emissions inventories**

Introduction

Potential data sources of interest:

Study / Survey	Data Form, Survey, Sampling	Limitation(s) for This Study
<i>California Motor Vehicle Stock, Travel and Fuel Forecast</i> (CalTrans, 2006b)	Based on other sources (vehicle registrations, tax receipts)	No out-of-state trucks
CARB Emissions Factor (EMFAC) Model (CARB, 2007)	Based on other sources (vehicle registrations, tax receipts)	No details on out-of-state trucks
U.S. Census' <i>Vehicle Inventory and Use Survey</i> (US Census, 2006)	Mailback survey of 2100 CA-registered truck operators (1744 CA "home base" trucks) in 2002	No out-of-state truck traveling characteristics
International Registration Plan (IRP)	DMV data on truck mileage estimations for travel in each state	Not publicly available; synthesis of IFTA and IRP data conducted by Stonebridge Assoc.(Rozsa, 2006)
International Fuel Tax Agreement (IFTA)	California Board of Equalization (BOE) records for diesel fuel tax receipts of interstate trucks	
California Annual Average Daily Traffic Counts (Caltrans, 2006a)	Periodic (every several years) electronic truck counting instrument updates on all CA routes	No data on state of registration; counts not categorized by GVWR; some counts may be unreliable
Caltrans Heavy Duty Truck Travel Survey (Caltrans, 2001)	Truck intercept survey of 8287 drivers at 33 locations throughout CA in 2001	No data on state registration or home base
Southern California Association of Governments' <i>Goods Movement Truck Count Study</i> (SCAG, 2002)	Intercept with survey mailback; 10 locations; 3219 completed surveys	Based on southern CA survey locations; mostly internal (i.e. not border) truck intercepts

Introduction

- **Total truck activity in CA (Class 8, diesel) from Caltrans and CARB:**

Year	Truck population (operating daily)		Vehicle miles traveled (millions miles/year)		Fuel use (million gallons/year)	
	MVSTAFF (Caltrans, 2006)	EMFAC (CARB, 2006)	MVSTAFF (Caltrans, 2006)	EMFAC (CARB, 2006)	MVSTAFF (Caltrans, 2006)	EMFAC (CARB, 2006)
2006	138,000	193,614*	9,037	12,141*	1,518	2,277*
2007	140,000	202,211*	9,369	12,959*	1,567	2,400*
2008	142,000	213,551	9,703	13,252	1,615	2,488
2009	144,000	216,419	9,986	13,448	1,655	2,524
2010	146,000	219,416	10,273	13,706	1,696	2,572

* 2006-2007 EMFAC numbers updated per latest CARB assumptions

Sources: Motor Vehicle Stock and Fuel Forecast (CalTrans, 2006b); EMFAC2007=Emission Factor model (CARB, 2006b)

- **Percent out-of-state activity that is included:**
 - **CARB: 25% of HHDDV activity is non-California-registered**
 - **Caltrans: none**

Introduction

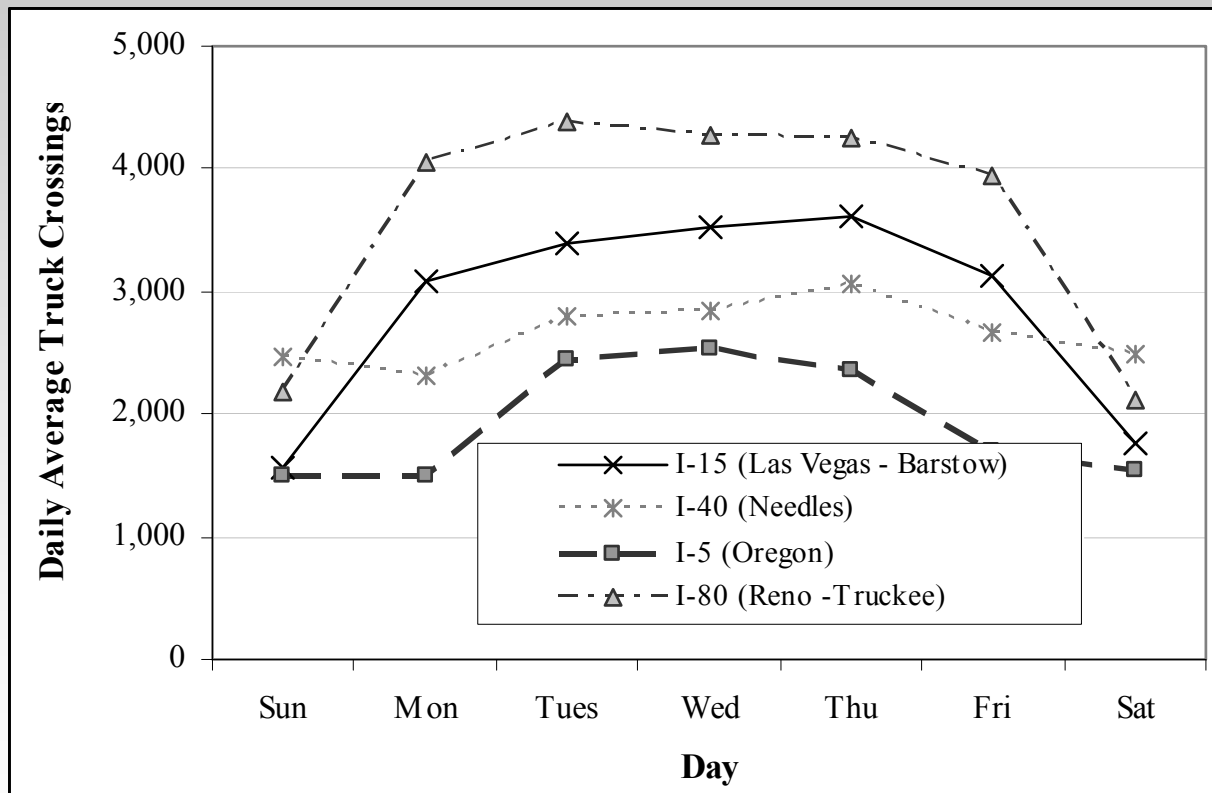
- Truck entry into California:**



Bordering region of entry into California	Route	Truck entries in 2005 (Caltrans, 2006)	
		All trucks	5+ Axle
Oregon	I-5	2,061	1,744
	SR-97	658	551
	SR-101	388	80
	SR-139	254	194
	SR-199	250	90
	SR-395	75	53
Nevada	SR-6	106	69
	I-15	3,637	2,539
	SR-50	496	54
	I-80	2,645	1,857
	SR-95	204	157
	9 others	440	302
Arizona	I-8	1,756	1,145
	I-10	5,015	4,160
	I-40	3,757	3,287
	SR-62	683	478
Mexico	I-5	1,166	363
	SR-7	936	635
	SR-111	774	191
	SR-186	257	67
	SR-188	394	172
	SR-905	2,032	1,394
Total		27,981	19,575

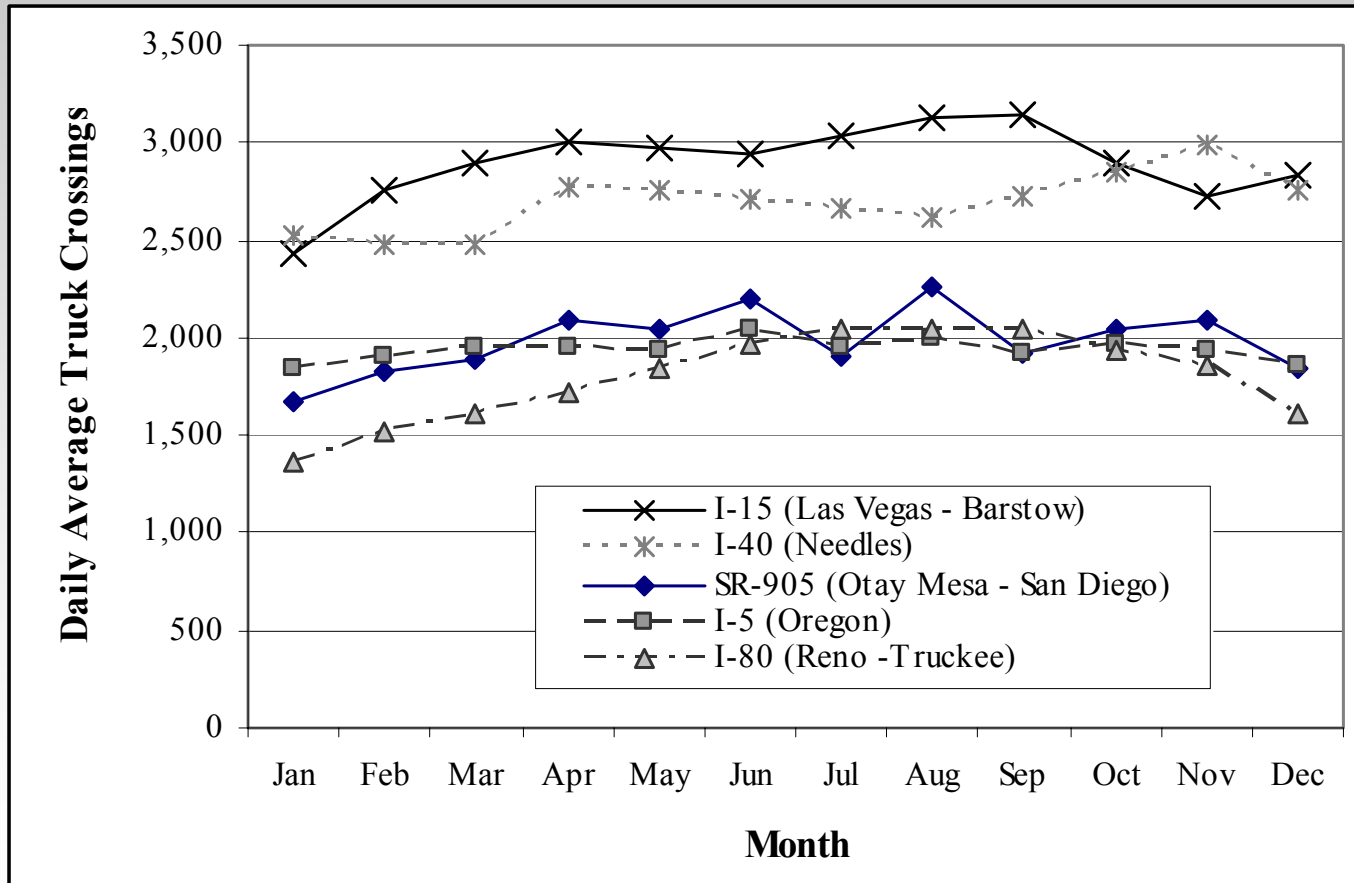
Introduction

Inter-state truck traffic by day of week:



Introduction

Inter-state truck traffic by month of year:



Introduction

Data gaps on interstate truck activity in California:

- **Number of unique interstate-traveling trucks that travel in California**
- **Trips per year into CA by interstate trucks**
- **Days per trip into CA that interstate trucks entering California (before next leaving)**
- **Amount of fuel that interstate trucks are carrying into California when entering**
- **Truck model year of interstate trucks entering California**
- **Locations, travel patterns of interstate trucks in California**
- **Breakdown of the interstate-traveling truck attributes by registration status (i.e., California or non-California)**
- **Interstate-traveling truck activity (mileage, mileage on non-California fuel) in each California Air Basin**

Survey Method

- **In-person interview survey design**
- **Inter-state highway location selection**
- **Government agency/facilities coordination**
- **Surveying**
- **Data entry**
- **Data analysis**

Survey Method

UC-Davis Truck Survey						
<i>(for staff use only)</i>						
Date: _____	Time: _____	AM/PM	ID: _____			
Location: _____	Route: _____	Direction: _____				
1.) Vehicle type (<i>check</i>):	<input type="checkbox"/> Single Unit	<input type="checkbox"/> Single Unit w/trailer	<input type="checkbox"/> Single-Trailer	<input type="checkbox"/> Multiple-Trailer	<input type="checkbox"/> Tractor	No. axles: <input type="text"/>
2.) What is the Gross Vehicle Weight (GVW) Rating of this vehicle (or tractor trailer comb.)?					<input type="text"/>	lbs
3.) What is the model year of this vehicle and engine (if different)?	Vehicle: <input type="text"/>	Engine: <input type="text"/>				
4.) Where is the home base of this vehicle?	State/Prov.: <input type="text"/>		Country: <input type="text"/>			
5.) Where is this vehicle registered?	State/Prov.: <input type="text"/>		Country: <input type="text"/>			
6.) How many miles is this truck driven per year (or month or week)?	<input type="text"/>	miles per...	<input type="text"/> week / month / year			
7.) How many total days is this truck driven per year (or month or week)?	<input type="text"/>	days per...	<input type="text"/> week / month / year			
8.) Where did you last load / unload this vehicle?	City: <input type="text"/>	State/Prov.: <input type="text"/>				
9.) Where will you next load / unload this vehicle?	City: <input type="text"/>	State/Prov.: <input type="text"/>				
10.) Name other CA destinations: (before <i>next</i> exiting CA)	<input type="checkbox"/> do not know	City: <input type="text"/>	City: <input type="text"/>			
	<input type="checkbox"/> none	City: <input type="text"/>	City: <input type="text"/>			
		City: <input type="text"/>	City: <input type="text"/>			
		City: <input type="text"/>	City: <input type="text"/>			
11.) How many total miles will this truck be driven in California (before <i>next</i> exiting CA on this trip)?	<input type="text"/>				miles	
12.) How many days will this truck travel in California (before <i>next</i> exiting CA on this trip, incl. today)?	<input type="text"/>				days	
13.) Where did you last fuel up this truck?	City: <input type="text"/>	State/Prov.: <input type="text"/>				
14.) Where will you next fuel up this truck?	City: <input type="text"/>	State/Prov.: <input type="text"/>				
15.) How many miles can you travel before refueling (from right now)?	<input type="text"/>				miles	
16.) How many times will you (or do you expect to) refuel this truck in California (before next exit)?	<input type="text"/>				times	
17.) Where and when will you exit California next?	Route/Hwy/City: <input type="text"/>		Date/day: <input type="text"/>			
18.) How many <i>times per month (or week or year)</i> does this truck enter Calif.?	<input type="text"/>	times per...	<input type="text"/> week / month / year			
19.) How many <i>days per month (or week or year)</i> does this truck travel in Calif.?	<input type="text"/>	days per...	<input type="text"/> week / month / year			
20.) What is the total fuel capacity of this vehicle's fuel tank(s)?	<input type="text"/>		gallons	<input type="text"/> diesel / gasoline		
21.) What is this truck's average fuel economy (in mpg)?	<input type="text"/>	.	<input type="text"/> miles per gallon (mpg)			
22.) If you had up-to-the-minute information about parking areas and spaces available when you were deciding where to rest, would you use it?			<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unsure	
-- If so, how would you like to receive parking info?	<input type="checkbox"/> Road signs	<input type="checkbox"/> Radio in truck	<input type="checkbox"/> Cell phone	<input type="checkbox"/> Internet		
	<input type="checkbox"/> GPS-based	<input type="checkbox"/> Other: <input type="text"/>				
-- If this info indicated there was a space available where and when you wanted to park and rest, would you use a reservation service to secure the space?			<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Unsure	
-- If so, how would you like to reserve the parking spot?			<input type="checkbox"/> Cell phone	<input type="checkbox"/> Internet	Other: <input type="text"/>	

Truck classification

Truck use, travel characteristics

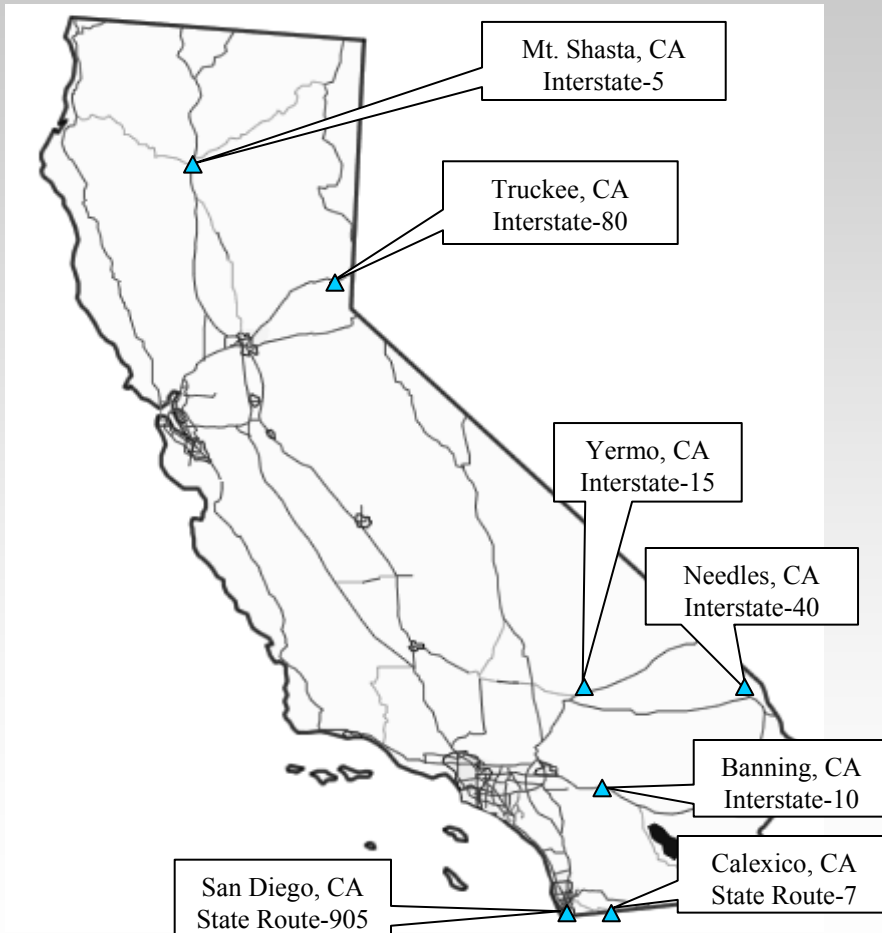
Origin, destinations, fueling for specific California trip

Annual California travel

Parking information

Survey Method

Survey location selection:



Borderin g region	Route	Truck entries in 2005	
		All trucks	5+ Axle
Oregon	I-5	2,061	1,744
	SR-97	658	551
	SR-101	388	80
	SR-139	254	194
	SR-199	250	90
	SR-395	75	53
Nevada	SR-6	106	69
	I-15	3,637	2,539
	SR-50	496	54
	I-80	2,645	1,857
	SR-95	204	157
	9 others	440	302
Arizona	I-8	1,756	1,145
	I-10	5,015	4,160
	I-40	3,757	3,287
	SR-62	683	478
Mexico	I-5	1,166	363
	SR-7	936	635
	SR-111	774	191
	SR-186	257	67
	SR-188	394	172
	SR-905	2,032	1,394
Total		27,981	19,575

Survey sampling coverage:
72% of all trucks
80% of 5+ axle trucks

Survey Method

- **Survey alongside inspection personnel**
 - **California Highway Patrol (CHP) facilities**
 - **California Air Resources Board (CARB)**
 - **California Department of Food and Agriculture (CFDA)**
- **5-15 minute interview-style survey**
- **433 total collected surveys**



Survey Method

Survey administration:

Location, Highway and City	Facility Type(s)	Date(s) in 2006	Completed Surveys	Description
I-80 (Truckee, CA)	CHP, CDFA	8/16, 8/17	68	In CHP commercial vehicle inspection bays, surveys conducted while CHP Commercial Vehicle Inspection Specialists conducted truck and trailer inspection.
I-5 (Mt. Shasta, CA)	CHP	8/22, 8/23	66	In CHP commercial vehicle inspection bays, surveys conducted while CHP Commercial Vehicle Inspection Specialists conducted truck and trailer inspection.
SR-905 (San Diego, CA)	CHP	9/5, 9/6	71	After CHP inspection terminal, trucks were flagged for CARB pollution equipment inspection. Surveys conducted concurrent with CARB inspection.
SR-7 (Calexico, CA)	CHP	9/7	33	After CHP inspection terminal, trucks were flagged for CARB pollution equipment inspection. Surveys conducted concurrent with CARB inspection.
I-10 (Banning, CA)	CHP	9/13, 9/14	73	Before the CHP terminal, the drivers from the truck queue were flagged into staging area, where the survey was conducted. At the conclusion of the interview, trucks were immediately installed back into the truck queue.
I-40 (Needles, CA)	CDFA	9/18	72	After the CDFA station, trucks were flagged over into coned-off area where interview was conducted.
I-15 (Yermo, CA)	CDFA	9/19	50	After the CDFA station, trucks were flagged over into coned-off area where interview was conducted.

Survey Method

Potential sampling biases, limitations:

- **Sampling on Monday-Thursday, Sept-Aug of 2006**
- **Pre-Pass trucks bypass the CHP inspection facilities**
- **Some trucks were flagged for inspection due to registration status or visual equipment issues**
- **Survey method – in-person interview, language barrier**
- **A few drivers (~2%) declined to participate**
- **Sampling at major interstate highways routes – may not accurately represent travel from trucks on smaller, rural routes (and data correspondingly is *not* extrapolated to all inter-state truck traffic)**

Analysis

- **Data entry to MS Excel**
- **Data quality/consistency checking**
 - e.g., for mileage per “California trip”
- **Analysis**
 - **Extrapolation according to Caltrans’ annual average daily truck counts**
 - **Apportioning “California trip” according to California Air Basins**
 - **Maintaining vehicle distinctions for truck registration basis (CA vs. non-CA) and truck origin (OR, NV, AZ, MX) for extrapolations**
 - **“Net Change” – impact of interstate trucks includes**
 - **Adding non-CA-registered truck activity inside CA**
 - **Subtracting CA-registered truck activity outside CA**

Findings

- **General interstate truck characteristics**
- **Interstate traffic, by registration status**
- **Impacts of interstate truck activity**
 - **Mileage by non-CA-registered trucks in CA**
 - **Mileage by CA-registered trucks outside CA**
 - **Net mileage impact of interstate trucks in CA**
 - **Mileage in CA fueled by out-of-state fuel**
 - **Mileage of interstate trucks by Air Basin**
 - **Truck population impact of non-CA-registered trucks**
- **Mexico-based truck impacts**
- **Truck age characteristics**

Findings

General truck characteristics, by place of truck registration:

Place of Registration	Average Truck Age (years)	Median Model Year	Fuel Capacity (gallons)	Fuel Economy (mpg)	Annual Mileage (mi/yr)	Annual Operation (day/yr)	Average Miles per Day of Operation (mi/day)	Average Annual Operation (mi/day)
California	7.1	2000	229	6.1	126,000	258	496	345
US, Non-California	4.8	2004	247	6.2	149,000	280	556	407
Canada	3.3	2004	263	5.9	158,000	247	641	432
Mexico	14.3	1993	213	5.2	28,000	264	114	76
All surveyed trucks	7.5	2000	236	6.1	115,000	271	439	316

Findings

Truck entries into California, by registration status:

Place of Origin	Total Trucks Entering CA on Primary Commercial Truck Routes (entry/day) ^a	Trucks Entering CA That Are <i>Not Registered</i> in California		Trucks Entering That <i>Are Registered</i> in California	
		Percent	Number (entry/day)	Percent	Number (entry/day)
Oregon	2,061	70.6%	1,455	29.4%	606
Nevada	6,282	72.4%	4,549	27.6%	1,733
Arizona	10,527	79.3%	8,349	20.7%	2,178
Mexico	2,968	1.0%	29	99.0%	2,939
All	21,838	65.9%	14,381	34.1%	7,456

^a Caltrans (2006a) highway traffic counts

Findings

Activity of non-California-registered trucks inside California:

Bordering Region	Average Total Annual Mileage (mi/yr/truck)	Trucks Entering CA on Primary Commercial Truck Routes (entry/day)	Activity Within California		
			Average Annual Mileage (mi/yr/truck)	Average CA Trip (mi/truck entry)	Total Mileage (million mi/yr)
Oregon	144,450	1,455	43,631	828	440
Nevada	147,905	4,549	32,268	510	847
Arizona	158,289	8,349	27,274	558	1,701
Mexico	-	29	-	-	-
Weighted Averages	153,595		30,515	570	
Total		14,381			2,988

Findings

Activity of California-registered trucks outside California:

Bordering Region	Average Total Annual Mileage (mi/yr/truck)	Trucks Entering CA on Primary Commercial Truck Routes (entry/day)	Activity Outside California		
			Average Annual Mileage (mi/yr/truck)	Average CA Trip (mi/truck entry)	Total Mileage (million mi/yr)
Oregon	124,253	606	58,210	631	140
Nevada	135,592	1,733	79,338	592	375
Arizona	137,489	2,178	107,178	1,621	1,289
Mexico	26,866	2,939	11,446	19	21
Weighted Averages	92,368		58,992	670	
Total		7,456			1,825

Findings

Impacts of non-CA-registered interstate truck activity on total Class 8 truck activity in California:

		Vehicle Miles Traveled (millions miles/yr)	
		Based on MVSTAFF ^a (CalTrans, 2006)	Based on EMFAC2007 ^a (CARB, 2006)
Heavy-Duty Diesel Truck (Class 8, GVWR 33,000+ lbs) Activity in 2006	CA-Registered	9,037	9,128
	Non-CA-Registered	na	3,012
	Total	9,037	12,141
Interstate Trucks from Primary Commercial Interstate Routes on Average Day (From This Study)	Non-CA-Registered, in CA	2,988	
	CA-Registered, Outside CA	1,825	
New Estimated Annual Heavy-Duty Truck Activity		10,200 ^b	10,292 ^c
Percent Correction Due to Interstate Truck Activity		13%	-15%
Percent of Activity by Non-California-Registered Trucks		29%	29%

a MVSTAFF= Motor Vehicle Stock and Fuel Forecast (CalTrans, 2006b); EMFAC2007=Emission Factor model (CARB, 2006b)

b MVSTAFF estimation, plus non-CA-registered trucks in CA, minus CA-registered trucks operated outside CA

c EMFAC estimation, divided by 1.33, plus non-CA-registered trucks in CA, minus CA-registered trucks operated outside CA

Findings

Inter-state truck fueling characteristics:

Place of Origin	Percent of Trucks that...				Average CA Trip Distance ^a (mi)	Average CA Trip Mileage with Non-CA Fuel ^a (mi)	Percent of Miles in CA with Non-CA Fuel ^a
	Start Trip with CA Fuel	Consume Mix of CA and non-CA fuel	Never Use CA Fuel in CA	Unknown			
Oregon	14.7%	75.0%	7.4%	2.9%	858	487	57%
Nevada	22.4%	44.0%	32.8%	0.9%	532	339	64%
Arizona	4.1%	47.6%	45.5%	2.8%	576	516	89%
Mexico	17.3%	12.5%	57.7%	12.5%	66	40	77%
All Trucks	13.9%	42.5%	39.0%	4.6%	492	357	73%

^a unweighted survey averages

Findings

Total mileage on out-of-state fuel:

Bordering Region	Non-California-Registered Trucks		California-Registered Trucks	
	Percent of California Mileage on Non-CA Fuel	Mileage on Non-CA Fuel (million mi/yr)	Percent of California Mileage on Non-CA Fuel	Mileage on Non-CA Fuel (million mi/yr)
Oregon	53%	233	64%	102
Nevada	70%	593	38%	101
Arizona	88%	1,499	88%	323
Mexico	-	-	78%	22
Weighted Averages	78%		67%	
Total		2,325		547

Findings

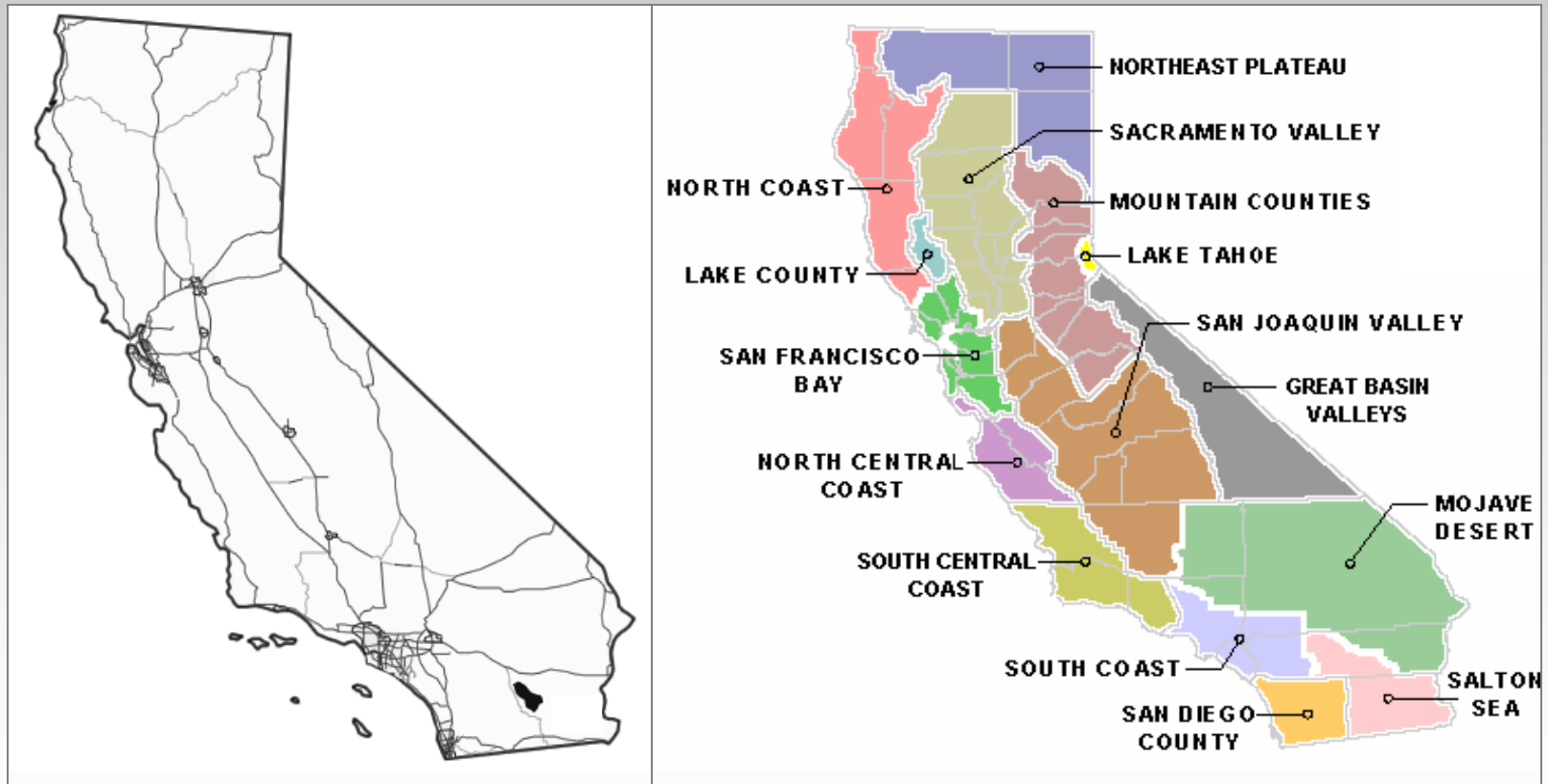
- **Mileage on out-of-state fuel, compared with total Class 8 truck mileage:**

		Annual Mileage (million mi/yr), by Fuel Origin	
		Based on MVSTAFF (CalTrans, 2006)	Based on EMFAC2007 (CARB, 2006)
Heavy-Duty Diesel Truck (Class 8, GVWR 33,000+ lbs) Activity in 2006	CA fuel	9,037	12,141
	Non-CA Fuel	-	-
	Total	9,037	12,141
Heavy-Duty Diesel Truck Activity in 2006, Updated from This Study	CA fuel	7,329	7,420
	Non-CA Fuel	2,872	2,872
	Total	10,200 ^b	10,292 ^c
Percent Heavy-Duty Mileage Using Non-CA Fuel		28%	28%

- **Where the out-of-state fuel is from**
 - **Arizona: 52%**
 - **Nevada: 15%**
 - **Oregon: 9%**
 - **Texas: 9%**
 - **Mexico: 0.2%**
 - **All others: 15%**

Findings

Apportioning out-of-state mileage to Air Basins



Findings

Interstate trucks' mileage, by California Air Basin:

Area from which trucks enter California	California Mileage by Interstate Trucks (million mi/yr)	Annual Miles Within California, by CA- and Non-CA-Registered Interstate Trucks in Each Air Basin (million mi/yr)				
		Sacramento Valley	San Joaquin Valley	South Coast	Mojave Desert	All Others
Oregon	599	277	152	38	10	123
Nevada	1,113	74	176	307	388	169
Arizona	2,066	37	257	1,053	674	45
Mexico	28	0	3	14	9	1
Total	3,805	387	588	1,412	1,080	337
Percent of CA- and non-CA-registered interstate truck mileage that is in each Air Basin		10%	15%	37%	28%	9%

Note: These percentages are for all mileage of interstate-traveling trucks that travel in California, regardless of their registration status or what fuel they are operating on. Percentages by Air Basin differ somewhat for non-CA-registered truck mileage, CA-registered truck mileage, and non-CA-fueled truck mileage

Findings

Impacts of interstate truck activity on California truck population:

		Truck Population in CA on a Given Day	
		Based on MVSTAFF ^a (CalTrans, 2006b)	Based on EMFAC2007 ^a (CARB, 2006b)
Heavy-Duty Diesel Trucks (Class 8, GVWR 33,000+ lbs) in 2006	CA-Registered	138,000	145,575
	Non-CA-Registered	-	48,040
	Total	138,000	193,614
Interstate Trucks from Primary Interstate Routes on Average Day (From This Study)	Non-CA-Registered, in CA	26,564	
	CA-Registered, Outside CA	5,016	
New Estimated Truck Population		159,548 ^b	167,123 ^c
Percent Correction Due to Interstate Truck Activity		16%	-14%
Percent of Population that is by Non-California-Registered Trucks		17%	16%

^a MVSTAFF= Motor Vehicle Stock and Fuel Forecast (CalTrans, 2006b); EMFAC2007=Emission Factor model (CARB, 2006b)

^b MVSTAFF estimation, plus non-CA-registered trucks in CA, minus CA-registered trucks operated outside CA

^c EMFAC estimation, divided by 1.33, plus non-CA-registered trucks in CA, minus CA-registered trucks operated outside CA

Findings

Truck age characteristics:

Vehicle Age (yrs)	Percent of Trucks		Percent of California Mileage	
	Interstate Trucks (This study)	California Registered Class 8 Trucks (US Census, 2006)	Interstate Trucks (This study)	California Registered Class 8 Trucks (US Census, 2006)
0-2	31.5%	12.1%	36.6%	13.8%
3-5	16.9%	22.2%	16.3%	27.4%
6-8	17.2%	18.2%	25.1%	22.1%
9-11	13.8%	15.0%	11.4%	13.4%
12-14	6.8%	13.1%	9.8%	11.4%
15+	9.4%	19.5%	0.8%	12.0%
Truck count-weighted average (yr)	6.6	8.7		
Mileage-weighted average (yr)			5.4	7.5

Findings: Mexico-Based vs. Non-Mexico-Based

Characteristic		Mexico-Based	Non-Mexico-Based
Surveys collected		104	329
Annual average daily truck entries (truck/day)		2,968	18,870
Vehicle Attributes	Average truck age	14.3	5.4
	Median truck model year	1993	2002
	Fuel capacity (gal)	211	248
	Fuel economy (mpg)	5.2	6.1
Annual Operation	Annual mileage	26,866	139,704
	Days of operation per year	266	270
	Average miles/day (when operating)	113	531
	Average miles/day	76	382
California Operation	Miles per California trip	26	548
	Days per California trip	<1	2.6
	California entries per year per truck	596	70
	Annual California mileage	15,669	40,289
	Percent of annual mileage in California	56.5%	29.3%
	Annual operation in California (day/yr)	265	147
	Percent of annual days in California	99.8%	54.5%
Population	Population of interstate-traveling trucks in given year	3,113	116,034
	Population of interstate-traveling trucks on given day	1,309	36,316
Impact	Annual miles in California (million mi/yr)	28	3,777
	Annual miles in California on non-CA fuel (million mi/yr)	22	2,850

Findings

- **Non-California-registered interstate-traveling trucks in California make up...**
 - **16-17% of the Class 8 truck population**
 - **28% of total Class 8 mileage**
- **Non-California-originating fuel in interstate trucks in California represents...**
 - **73% of interstate-traveling trucks' mileage**
 - **29% of total Class 8 mileage**
- **The effects of these interstate trucks are concentrated in four air basins:**
 - **South Coast (30-40%)**
 - **Mojave Desert (26-29%)**
 - **San Joaquin Valley (15-17%)**
 - **Sacramento Valley (8-15%)**
- **The resulting emissions impacts of these effects is unknown**

Conclusions

- **Key conclusion: include and analyze impacts of interstate-traveling trucks**
 - **Truck activity**
 - **Total mileage by non-CA-registered trucks**
 - **Out-of-state fuel usage**
 - **Out-of-state mileage, fuel use by CA Air Basin**
 - **Truck attributes (age)**
- **Disseminate findings**
 - **Presentation at Transportation Research Board in Washington, D.C. (January 2008)**
 - **Publish in technical journal**

Conclusions

- **Acknowledgements**

- **Funding and research guidance by California Air Resources Board (Hector Maldonado and Dr. Todd Sax)**
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- **Questions?**

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Extra Slides

- **Truck sample age, by home-base and registration status**
- **Truck population data (non-CA-registered)**
- **Truck population data (CA and non-CA-reg)**

Findings

Truck Age:

Truck Age (years)	Number of Survey Responses of Given Truck Age that are...						
	California Home-Based	California Registered	US, Non-CA-Homebased	US, Non-CA-Registered	Canada Registered	Mexico Registered	All Trucks
0-2	13	9	97	101	3	3	116
3-5	15	13	39	41	4	4	62
6-8	43	38	50	54	0	6	98
9-11	18	13	22	23	1	24	61
12-14	11	7	12	15	0	19	41
15-17	7	1	2	2	0	19	22
18-20	2	0	1	1	0	21	22
20+	0	0	0	0	0	9	9
(blank)	1	1	1	1	0	0	2
Total, All Ages	110	82	224	238	8	105	433
Average Model Year	1999	2000	2002	2002	2004	1993	1999
Average Age (yr)	7.8	7.1	4.7	4.8	3.3	14.3	7.5
Median Age (yr)	8.0	7.0	3.0	3.0	3.0	14.0	7.0
Standard Deviation (yr)	4.2	3.3	3.9	4.0	2.8	5.7	5.9

Findings

Truck population data – non-California-registered:

Place of origin	Total trucks entering CA on primary routes (entry/day)	Percent non-CA-registered truck entries	Non-CA-registered entries (entry/day)	Average annual operation in CA (day/yr/ unique truck)	Days in CA per truck entry (day/ entry)	Average population operating in CA on a given day (trucks)	Average population operating outside CA on a given day (trucks)
Oregon	2,061	70.6%	1,455	119	2.3	3,283	3,439
Nevada	6,282	72.4%	4,549	108	1.7	7,791	11,320
Arizona	10,527	79.3%	8,349	91	1.9	15,490	28,154
Mexico	2,968	1.0%	29	-	-	-	-
All	21,838	65.9%	14,381	99	1.9	26,564	42,914

Findings

Truck population data:

Category	Trucks entering CA on primary routes (truck entries/day)	Average CA trip, weighted (day/entry)	Average annual CA entries per unique truck (entries/yr)	Total annual CA truck entries on primary routes (truck entries/year)	Population of unique trucks in year	Population on At Given Time Operating...		
						In CA	Outside CA	Not Operating
Non-CA-Registered	14,381	1.9	54	5,252,803	96,877	26,564	42,914	27,398
CA-Registered	7,456	1.7	122	2,723,344	22,271	11,061	5,016	6,194
All	21,838	1.8	67	7,976,147	119,147	37,625	47,930	33,592