State of Hawaii
2010
Ambient Air Monitoring Network
5-Year Assessment

Prepared by:
State of Hawaii
Department of Health
Environmental Management Division
Clean Air Branch

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Abbreviations and Definitions

AADT	Annual Average Daily Traffic
AQI	Air Quality Index
CBSA	U. S. Census Bureau, Core Based Statistical Area
CDP	U. S. Census Bureau, Census Designated Places
CFR	Code of Federal Regulations
CO	Carbon monoxide gas
DBEDT	State of Hawaii Department of Economic Development and Tourism
DOH	Hawaii State Department of Health
EPA	United States Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
H_2S	Hydrogen sulfide gas
HPI	Native Hawaiian/Pacific Islander
IMPROVE	Integrated Monitoring of Protected Visual Environments
MSA	U. S. Census Bureau, Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NCORE	National Core Multi-pollutant Monitoring Stations
NEI	National Emissions Inventory (2005)
NO_2	Nitrogen dioxide gas
O_3	Ozone
Pb	Lead
PM_c	Particulate matter (coarse) which equals PM_{10} minus $PM_{2.5}$
$PM_{2.5}$	Particulate matter less than or equal to 2.5 microns in aerodynamic diameter
PM_{10}	Particulate matter less than or equal to 10 microns in aerodynamic diameter
POV	Percent of individual poverty level
PPM	Parts per million; a measurement unit for gases
PWEI	Population Weighted Emissions Index, an EPA calculation that triggers SO_2 monitoring
SLAMS	State and Local Air Monitoring Stations
SO_2	Sulfur dioxide gas
SPM	Special Purpose Monitoring Stations
VOG	Haze due to volcanic emissions
WD	Wind direction
WS	Wind speed
$\mu g/m^3$	micrograms per cubic meter of air; a measurement unit for particulate matter

I. Executive Summary

A. Purpose of this Report

The U.S. Environmental Protection Agency (EPA), in the Code of Federal Regulations (CFR), promulgated a requirement for all states to conduct and submit a network assessment once every five years [40 CFR 58.10(e)].

" *The state, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For* $PM_{2.5}$*, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The first assessment is due July 1, 2010.*"

The five-year assessment differs from the annual network plan by providing a more comprehensive conceptualization of the state's air surveillance system. The annual network plan effectively updates the changes for the upcoming year, as resources allow, based in part on the recommendations in the five-year assessment.

B. Structure of the Assessment

The current air monitoring network was evaluated by answering the following questions:

- Are the current monitoring objectives being met?
- Are the minimum monitoring requirements set forth in 40 CFR 58 being met?
- What have the pollutant trends shown?
- What are the station values and ranking?
- What are the pollutant monitor values and ranking?

The assessment utilized a variety of analytical tools and information to characterize and optimize the air surveillance network. These included evaluations of:

- Site by site, monitoring objectives and pollutant prioritization;
- Trends;
- Population shifts and growth;
- Health and environmental justice issues;
- Emissions inventory;

- Meteorological and geographical factors; and,
- New NAAQS monitoring requirements.

A final conceptual model of the network was then developed by determining:

- Monitoring priorities for the state;
- Data or area gaps in the current network based on the analyses;
- Low value sites or monitors that can be discontinued or moved to a more relevant area;
- Population groups not being adequately served;
- Monitoring to comply with new NAAQS requirements;

The final network configuration is a result of the compilation and analysis of all available information as well as input from various data users and reliance on experience and a general understanding of community needs as it relates to ambient air issues.

II. Evaluation of the Current Air Monitoring Network

A. Network Description and Objectives

There are currently 13 stations statewide located on three of the seven populated islands. According to the U. S. Census Bureau, the only Metropolitan Statistical Area (MSA) in the state is the City and County of Honolulu on the island of Oahu. In addition to being the most populated island, Oahu also has the majority of industrial and mobile sources of pollution. The network reflects this by having five of six SLAMS stations located on Oahu.

The largest emission source, and consequently one of the state's highest monitoring priorities, is the Kilauea volcano on the island of Hawaii. Although considered a natural event, the volcano emits on average, more than 2,000 tons of sulfur dioxide (SO_2) per day. In addition to SO_2 as a pollutant of concern, as the plume travels away from the vents, it combines with other atmospheric constituents to form $PM_{2.5}$ which affects communities further from the volcano. There are currently six stations monitoring for SO_2 and five stations monitoring for $PM_{2.5}$ on the island of Hawaii. An additional station monitoring for both pollutants is also planned to be in operation sometime in 2010 or 2011.

The agricultural pre-harvest practice of burning sugar cane is only being conducted on the island of Maui. The monitoring station in Kihei, Maui was established to monitor the burning of cane fields near a residential area.

The current network meets all minimum monitoring requirements for the MSA according to 40 CFR 58 Appendix D for O_3, $PM_{2.5}$, PM_{10}, and Pb.

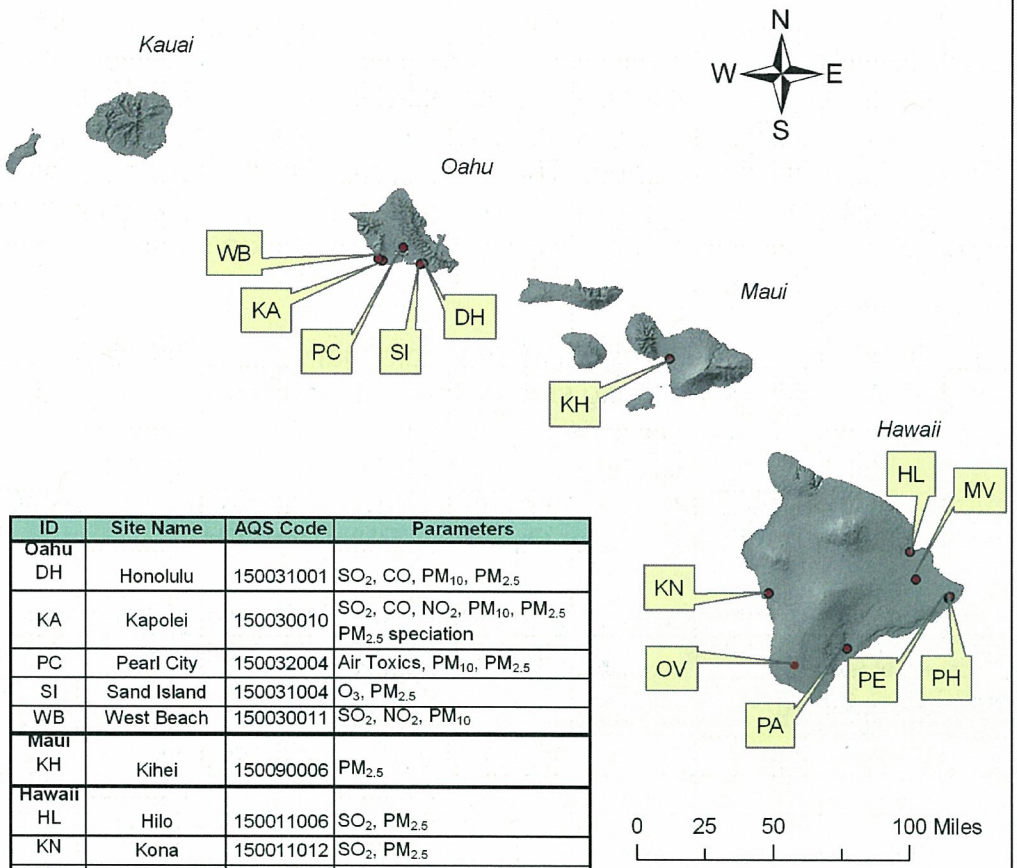
Table 1. Current Number of Monitors by Pollutant or Program

Pollutant or Program	No. of SLAMS Stations	No. of SPM Stations	Total in the MSA	No. Required for the MSA (40 CFR 58)	Total in the State
CO	2	-	2	No requirement	2
NO_2	2	-	2	No requirement	2
SO_2	5	4	3	No requirement	9
O_3	1	-	1	1	1
PM_{10}	4	-	4	1-2	4
$PM_{2.5}$	5	5	4	1	10
Pb	-	1[1]	1	1	1
Air Toxics	-	1	1	No requirement	1
$PM_{2.5}$ Speciation	-	1	1	No requirement	1
H_2S	-	2[2]	0	State standard	2

[1] Pb is being monitored as part of the Air Toxics program

[2] H_2S is not a federal criteria pollutant, however the state has a 1-hour standard of 25 ppb. H_2S is being monitored because of geothermal energy production on the Island of Hawaii

Figure 1. 2010 State of Hawaii Ambient Air Monitoring Network Locations



ID	Site Name	AQS Code	Parameters
Oahu			
DH	Honolulu	150031001	SO_2, CO, PM_{10}, $PM_{2.5}$
KA	Kapolei	150030010	SO_2, CO, NO_2, PM_{10}, $PM_{2.5}$ $PM_{2.5}$ speciation
PC	Pearl City	150032004	Air Toxics, PM_{10}, $PM_{2.5}$
SI	Sand Island	150031004	O_3, $PM_{2.5}$
WB	West Beach	150030011	SO_2, NO_2, PM_{10}
Maui			
KH	Kihei	150090006	$PM_{2.5}$
Hawaii			
HL	Hilo	150011006	SO_2, $PM_{2.5}$
KN	Kona	150011012	SO_2, $PM_{2.5}$
MV	Mountain View	150012017	SO_2, $PM_{2.5}$
OV	Ocean View	150012020	SO_2, $PM_{2.5}$
PA	Pahala	150012016	SO_2, $PM_{2.5}$
PE	Puna E	150012010	SO_2, H_2S
PH	Puna H	None	H_2S

Table 2. Description of the Current State of Hawaii Air Monitoring Network

#	ID	LOCATION	MET	POLLUTANT	TYPE	SITE	SPATIAL SCALE/ OBJECTIVE	START
OAHU (Honolulu MSA)			NOTE: Met equipment on a 10 meter tower are capitalized					
1	**DH** **150031001**	**Honolulu** 1250 Punchbowl St. Honolulu, HI	ws wd	CO SO_2 PM_{10} $PM_{2.5}$	Continuous Continuous Continuous Continuous	SLAMS SLAMS SLAMS SLAMS	Middle; max Neighborhood; pop Neighborhood; pop Neighborhood; pop	1/72 1/72 2/92 1/99
2	**KA** **150030010** **NCORE**	**Kapolei** TMK (1) 9-1-75:39 2052 Lauwiliwili St Kapolei, HI	WS WD °F	CO SO_2 NO_2 PM_{10} $PM_{2.5}$ $PM_{2.5}$ Spec.	Continuous Continuous Continuous Continuous Continuous 1 in 6 days	SLAMS SLAMS SLAMS SLAMS SLAMS SPM	Neighborhood; pop. Neighborhood; pop. Neighborhood; pop. Neighborhood; pop Neighborhood; pop Neighborhood; pop	7/29/02 7/29/02 7/29/02 7/29/02 7/29/02 10/1/09
3	**PC** **150032004**	**Pearl City** 860 4th St. Pearl City, HI	ws wd	PM_{10} $PM_{2.5}$ *$PM_{2.5}$ (Co-loc) *$PM_{2.5}$ (Co-loc) Air Toxics Pb	Continuous Continuous 1 in 6 days 1 in 12 days 1 in 6 days 1 in 6 days	SLAMS SLAMS SLAMS SLAMS SPM SPM	Neighborhood; pop. Neighborhood; pop Co-located monitor Co-located monitor Neighborhood; pop. Neighborhood; pop.	2/94 1/99 1/99 4/1/09 1//02 1/02
4	**SI** **150031004**	**Sand Island** Anuenue Fisheries 1039 Sand Island Pkwy	ws wd °f	O_3 $PM_{2.5}$	Continuous Continuous	SLAMS SLAMS	Urban; maximum Urban; transport	2/81 10/1/99
5	**WB** **150030011**	**West Beach** Ko'Olina Golf Course TMK (1) 9-1-14:27	WS WD °F	SO_2 NO_2 PM_{10}	Continuous Continuous Continuous	SLAMS SLAMS SLAMS	Neighborhood; source Neighborhood; source Neighborhood; bkgrnd	2/91 11/92 2/91
MAUI County								
6	**KH** **150090006**	**Kihei** Hale Piilani Park TMK (2)-3-9-4-28	WS WD	$PM_{2.5}$	Continuous	SLAMS	Neighborhood; source	2/99
HAWAII County								
7	**HL** **150011006**	**Hilo** 1099 Waianuenue Ave. Hilo, HI	WS WD °F	SO_2 (0-1; 0-10) $PM_{2.5}$	Continuous Continuous	SLAMS SPM	Neighborhood; pop. Neighborhood; pop.	1/97 5/1/08
8	**KN** **150011012**	**Kona** 81-1043 Konawaena School Rd.	WS WD °F	SO_2 (0-1; 0-10) $PM_{2.5}$ (BAM)	Continuous Continuous	SLAMS SPM	Neighborhood; pop Neighborhood; pop	9/05 3/15/08
9	**MV** **150012017**	**Mountain View** 17-860 Volcano Rd. Mt. View, HI 96771	WS WD	SO_2 (0-1; 0-10) $PM_{2.5}$ (BAM)	Continuous Continuous	SPM SPM	Neighborhood; other Neighborhood; pop	12/4/07 4/11/08
10	**OV** **150012020**	**Ocean View** Hawaiian Ocean View Estates	WS WD	SO_2 (0-1; 0-10) $PM_{2.5}$ (BAM)	Continuous Continuous	SPM SPM	Neighborhood; pop Neighborhood; pop	4/1/10 4/1/10
11	**PA** **150012016**	**Pahala** 96-3150 Pikake St., Pahala, HI 96777	WS WD	SO_2 (0-1; 0-10) $PM_{2.5}$ (BAM)	Continuous Continuous	SPM SPM	Neighborhood; pop Neighborhood; pop	8/10/07 4/11/08
12	**PE** **150012010**	**Puna E** 13-763 Leilani Ave. Pahoa, HI	WS WD °F	H_2S (0-1ppm) SO_2 (0-1)	Continuous Continuous	SPM SPM	Neighborhood; source Neighborhood; source	3/91 2/16/05
13	**PH** **None**	**Puna H** TMK (3)-1-3-46-75 (Lanipuna)	WS WD °F	H_2S (0-1ppm)	Continuous	SPM	Neighborhood; source	11/02

B. Pollutant Trends

1. SLAMS Stations

Hawaii is in attainment for all criteria pollutants. EPA trend charts show that CO, NO_2, SO_2, O_3 and Pb have been well below the NAAQS. Although particulates have also remained below the NAAQS, based on percentage of the NAAQS, they rank as the highest pollutants of concern for SLAMS stations.

Figure 2. CO Trend at DH (150031001) SLAMS Station

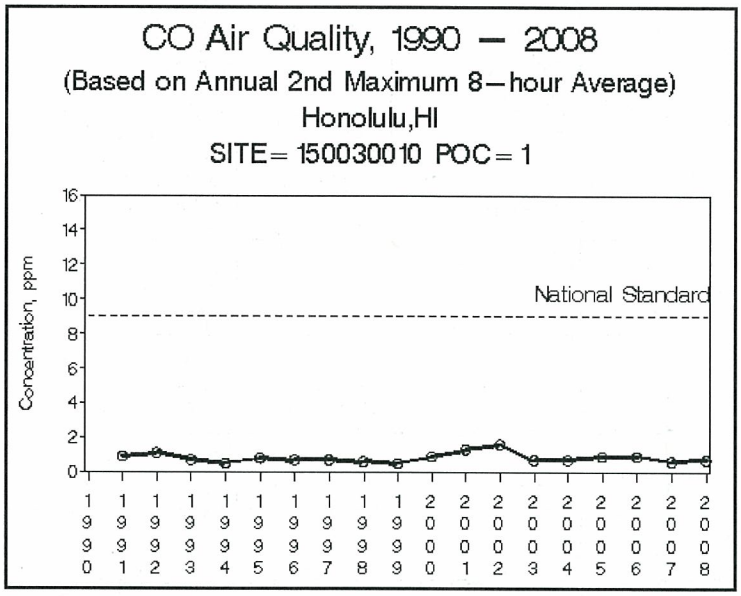


Figure 3. NO_2 Trends at KA (150030010) and WB (150030011) SLAMS Stations

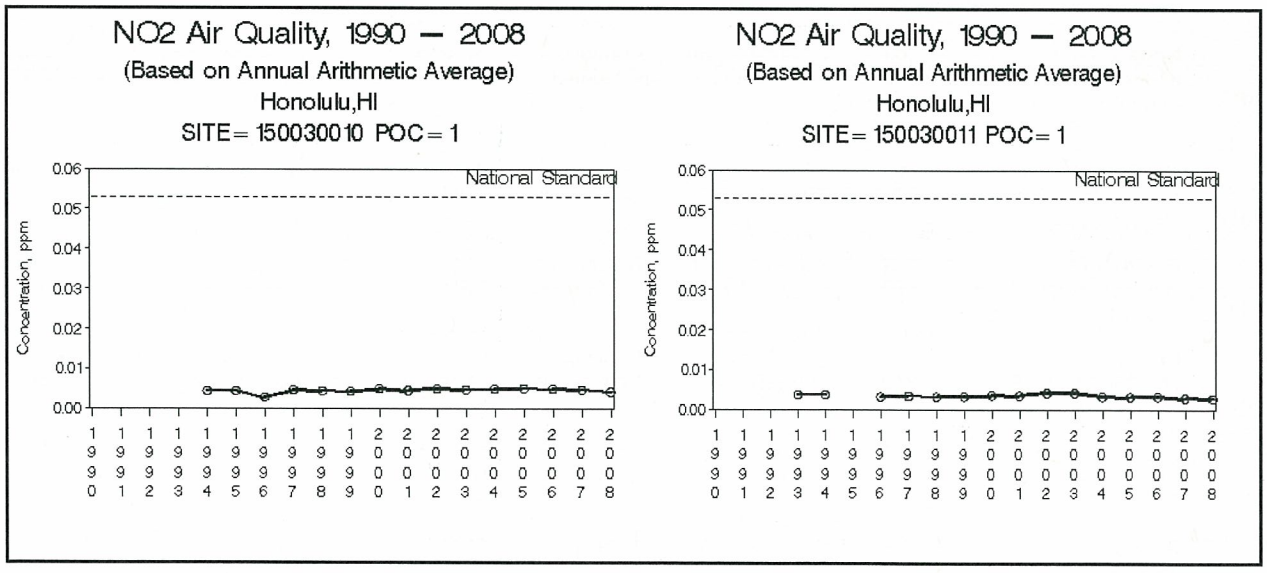


Figure 4. SO_2 Trends at DH (150031001), KA (150030010) and WB (150030011) SLAMS Stations

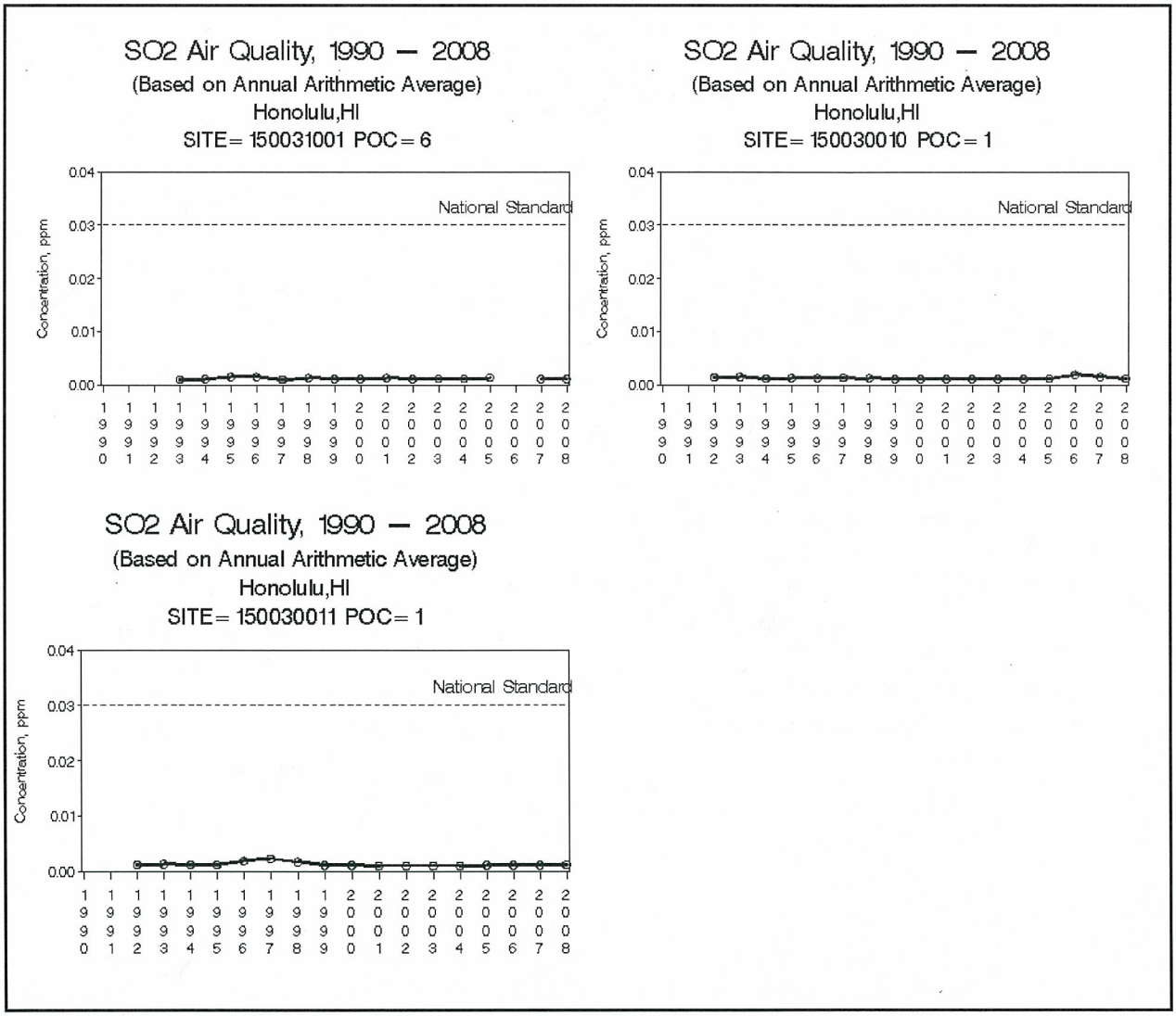


Figure 5. O_3 Trend at SI (150031004) SLAMS Station

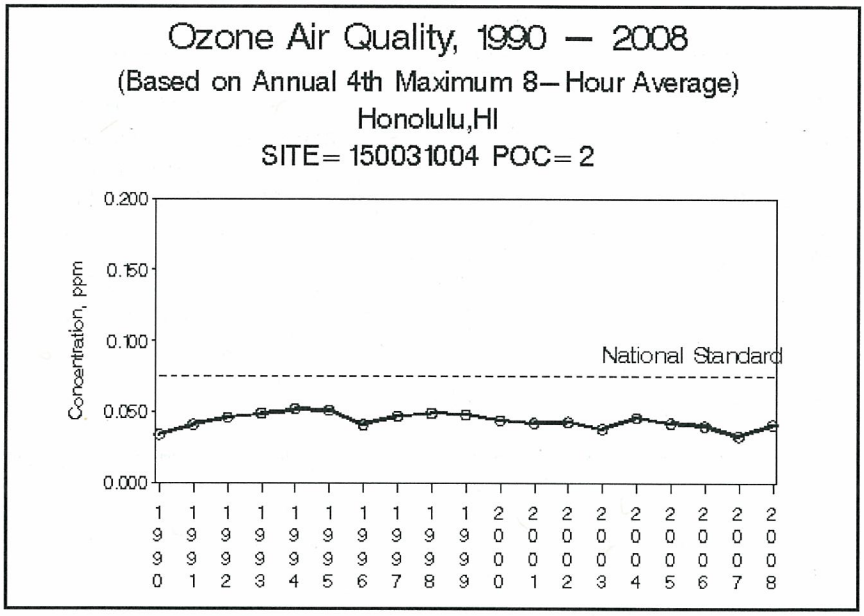


Figure 6. PM_{10} Trends at DH (150031001), KA (150030010), PC (150032004), and WB (150030011) SLAMS Stations

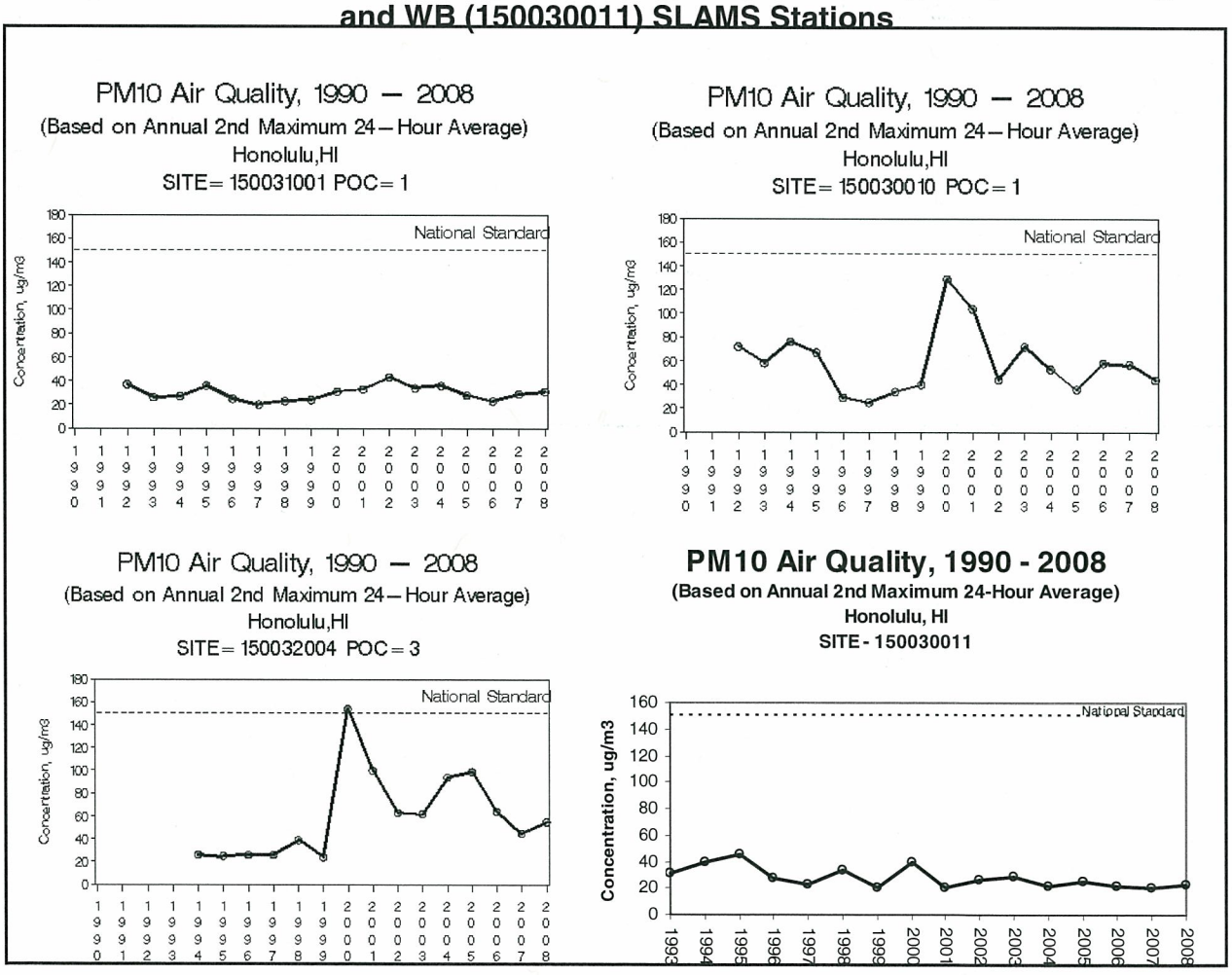


Figure 7. $PM_{2.5}$ Trends at DH (150031001), KA (150030010), PC (150032004), SI (150031004), and KH (150090006) SLAMS Stations

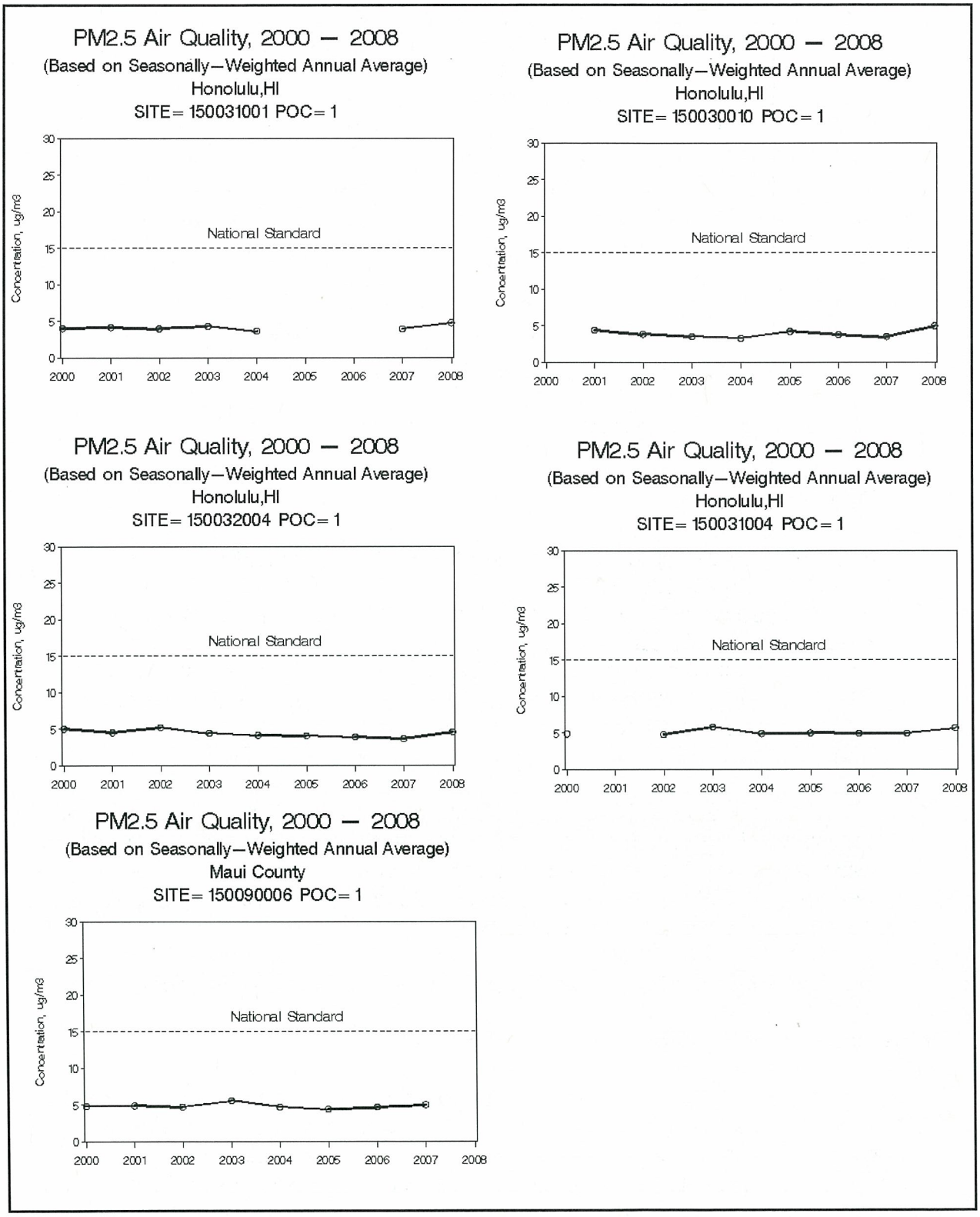
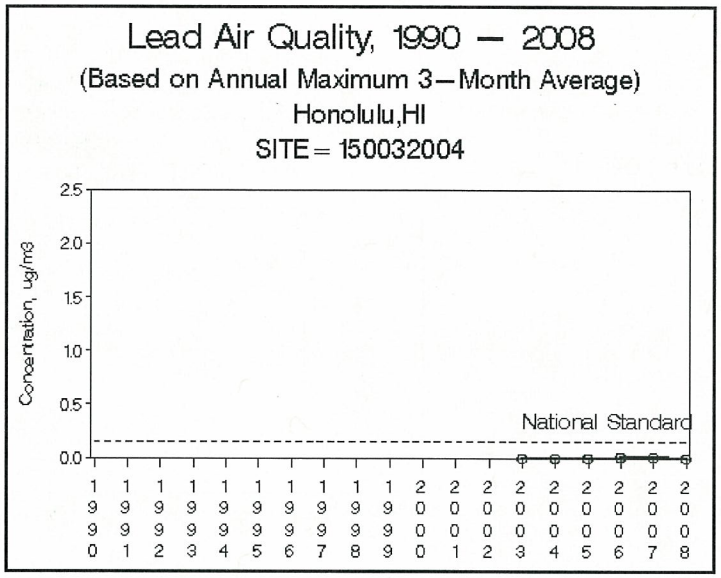


Figure 8. Pb Trend at PC (150032004) SLAMS Station



2. SPM Stations

The Kilauea volcano eruption on the island of Hawaii has been ongoing since 1983 emitting almost 2,000 tons per day of SO_2. In March 2008, a second vent opened which more than doubled the SO_2 emissions, increasing at one point to over 9,000 tons per day. Although a natural event, the volcano is unquestionably the largest single SO_2 emission source in the state. As the SO_2 gas moves through the atmosphere and combines with moisture and other compounds, the gas converts to fine particles, primarily acid aerosols and sulfates.

There are six SO_2 and five $PM_{2.5}$ monitoring stations currently operating on the island of Hawaii. From March 2008 until April 2010, there have been 96 exceedances of the 24-hour SO_2 and 68 exceedances of the 24-hour $PM_{2.5}$ health-based standards. Additionally, in 2008, the Pahala station (PA 150012016) exceeded the annual SO_2 standard.

SO_2 and $PM_{2.5}$ continue to be the pollutants of concern for the SPM stations.

C. Value Ranking of SLAMS Stations and Pollutants

There are only six SLAMS stations in the statewide ambient air monitoring network. Most of the stations were established for regulatory compliance and trends tracking and have been operating for at least a decade. As the historical ambient air data shows, excluding exceptional and natural events such as fireworks and the volcano, most of the time, Hawaii is fortunate to have clean air. The following table summarizes each pollutant's relative importance in the state's SLAMS network.

Table 3. Pollutant Specific Summaries

CO				
	Violates NAAQS	Near NAAQS	Used as an Indicator	Well below NAAQS
Importance relative to other pollutants:				✓
Current SLAMS stations monitoring for CO:	KA (NCORE) 150030010	DH (Trends) 150031001		
Maintain CO monitoring for the following reasons:	NCORE requirement			
	NAAQS compliance			
	Upcoming NAAQS review			
Design Value (2006-2008):	**KA (NCORE)**		**DH (Trends)**	
Maximum 1-hour average:	2.5 ppm; 7% of standard		2.2 ppm; 6% of standard	
Maximum 8-hour average:	0.8 ppm; 9% of standard		1.1 ppm 12% of standard	
Recommendation: 1. Maintain current CO monitoring sites, do not add new sites unless required by new NAAQS revision 2. Re-evaluate scale for DH station, probe has been moved and no longer meets middle scale requirements. Monitoring at this station should be for area-wide impact. 3. Start trace level monitoring at the NCORE station (KA) by January 1, 2011				

NO_2				
	Violates NAAQS	Near NAAQS	Used as an Indicator	Well below NAAQS
Importance relative to other pollutants:			✓	✓
Current SLAMS stations monitoring for NO_2:	KA (NCORE) 150030010	WB 150030011		
Maintain NO_2 monitoring for the following reasons:	NCORE requirement			
	NAAQS compliance			
	New NAAQS monitoring requirement			
Design Value (2006-2008):	**KA (NCORE)**		**WB**	
Maximum daily 98th percentile 1-hour average:	0.025 ppm; 25% of standard		0.022 ppm; 22% of standard	
3-year annual average:	0.005 ppm; 9% of standard		0.003 ppm; 6% of standard	
Recommendation: 1. Consider NO_2 in place of SO_2 at downtown Honolulu station (DH); continue monitoring at KA (NCORE) station and start trace level monitoring by January 1, 2011. 2. Stop monitoring at WB station in favor of new near-road monitoring requirement. WB is a low-value site.				

O_3				
	Violates NAAQS	Near NAAQS	Used as an Indicator	Well below NAAQS
Importance relative to other pollutants:				
Current SLAMS stations monitoring for O_3:	SI 150031004			
Maintain O_3 monitoring for the following reasons:	NAAQS compliance; required for the MSA			
	Required at NCORE			
Design Value (2006-2008):	**SI**			
3-year average of 4th highest daily max:	0.039 ppm; 52% of the standard			
Recommendation: 1. Station has siting problems. Consider using NCORE station for O_3 monitoring and close station after 3 years of data comparison.				

SO_2				
	Violates NAAQS	Near NAAQS	Used as an Indicator	Well below NAAQS
Importance relative to other pollutants:				✓
Current SLAMS stations monitoring for SO_2:	KA (NCORE) 150030010	DH (Trends) 150031001	WB 150030011	
Maintain SO_2 monitoring for the following reasons:	NCORE requirement NAAQS compliance			
Design Value (2006-2008):	**KA (NCORE)**	**DH**	**WB**	
2^{nd} Maximum 3-hour average:	0.007 ppm; 1% of standard	0.014 ppm; 3% of standard	0.008 ppm; 2% of standard	
2^{nd} Maximum 24-hour average:	0.003 ppm; 2% of standard	0.004 ppm; 3% of standard	0.003 ppm; 2% of standard	
3-year annual average:	0.002 ppm; 6% of standard	0.001 ppm; 2% of standard	0.001 ppm; 3% of standard	
Recommendation: 1. Maintain current SO_2 monitoring as SLAMS and NCORE at KA station 2. Stop SO_2 monitoring at DH and WB stations. WB is a low-value site.				

$PM_{2.5}$					
	Violates NAAQS	Near NAAQS	Used as an Indicator	Well below NAAQS	
Importance relative to other pollutants:			✓		
Current stations monitoring for $PM_{2.5}$:	KA (NCORE) 150030010	DH (Trends) 150031001	PC 150032004	SI 150031004	KH 150090006
Maintain $PM_{2.5}$ monitoring for the following reasons:	NCORE requirement NAAQS compliance Pollutant of concern in urban areas				
Design Value (2006-2008):	**KA**	**DH**	**PC**	**SI**	**KH**
3-yr average of 98^{th} percentile 24-hr. values:	12 $\mu g/m^3$	10 $\mu g/m^3$	10 $\mu g/m^3$	11 $\mu g/m^3$	12 $\mu g/m^3$
Maximum annual average:	4.1 $\mu g/m^3$	4 $\mu g/m^3$	4 $\mu g/m^3$	5.2 $\mu g/m^3$	5 $\mu g/m^3$
Recommendation: 1. Close $PM_{2.5}$ at SI, does not meet background objective, DH site within 1 mile 2. Maintain $PM_{2.5}$ at KA as SLAMS and NCORE					

PM_{10}				
	Violates NAAQS	Near NAAQS	Used as an Indicator	Well below NAAQS
Importance relative to other pollutants:		✓	✓	
Current SLAMS stations monitoring for PM_{10}:	KA (NCORE) 150030010	DH (Trends) 150031001	PC 150032004	WB 150030011
Maintain PM_{10} monitoring for the following reasons:	NAAQS compliance Pollutant of concern for the MSA Monitor construction activities in populated areas			
Design Value (2006-2008):	**KA**	**DH**	**PC**	**WB**
Maximum 24-hour average:	75 $\mu g/m^3$	33 $\mu g/m^3$	87 $\mu g/m^3$	52 $\mu g/m^3$
Number of exceedances averaged over 3 yrs:	0	0	0	0
Recommendation: 1. Stop monitoring at WB station. WB is a low-value site. 2. Use DH and PC as NAAQS compliance sites 3. Change PM_{10} monitoring at KA (NCORE) to PM_c				

Pb				
	Violates NAAQS	Near NAAQS	Used as an Indicator	Well below NAAQS
Importance relative to other pollutants:				✓
Current stations monitoring for Pb:	PC 150032004 (Air Toxics SPM)			
Maintain Pb monitoring for the following reasons:	Possible NCORE requirement			
	NAAQS compliance			
Design Value (2006-2008):	**PC**			
Number of exceedances averaged over 3 yrs:	0			
Max 3-month mean concentration:	0.01 µg/m^3; 7% of the standard			
Recommendation: 1. Maintain current Pb monitoring station (PC) 2. Add Pb monitoring at NCORE if required				

Based on the SLAMS network evaluation, following are the station and pollutant value ranks:

Table 4. Value Ranking of SLAMS Stations and Pollutants

RANK	Station ID	No. of Parameters Monitored	Years of Continuous Operation	Highest Design Value of all Pollutants Measured	Pollutant Rank of Priority for SLAMS
1	KA [1] (NCORE)	6	19 [4]	PM_{10}	PM_{10}
2	DH (Trends)	4	38	PM_{10}	$PM_{2.5}$
3	PC	3 [3]	31	PM_{10}	O_3
4	SI	2	29	O_3	NO_2
5	KH [2]	1	11	$PM_{2.5}$	CO
6	WB	3	19	PM_{10}	Pb
7					SO_2

[1] KA (Kapolei 150030010) monitoring includes $PM_{2.5}$ speciation
[2] KH (Kihei 150090006) is not in the MSA
[3] PC (Pearl City 150012004) parameters monitored includes Air Toxics
[4] Station was moved in 2002 approximately 200 yards of the previous location but maintained the same AQS number because the siting was the same

III. Assessment

A. Population

1. State Population Characteristics

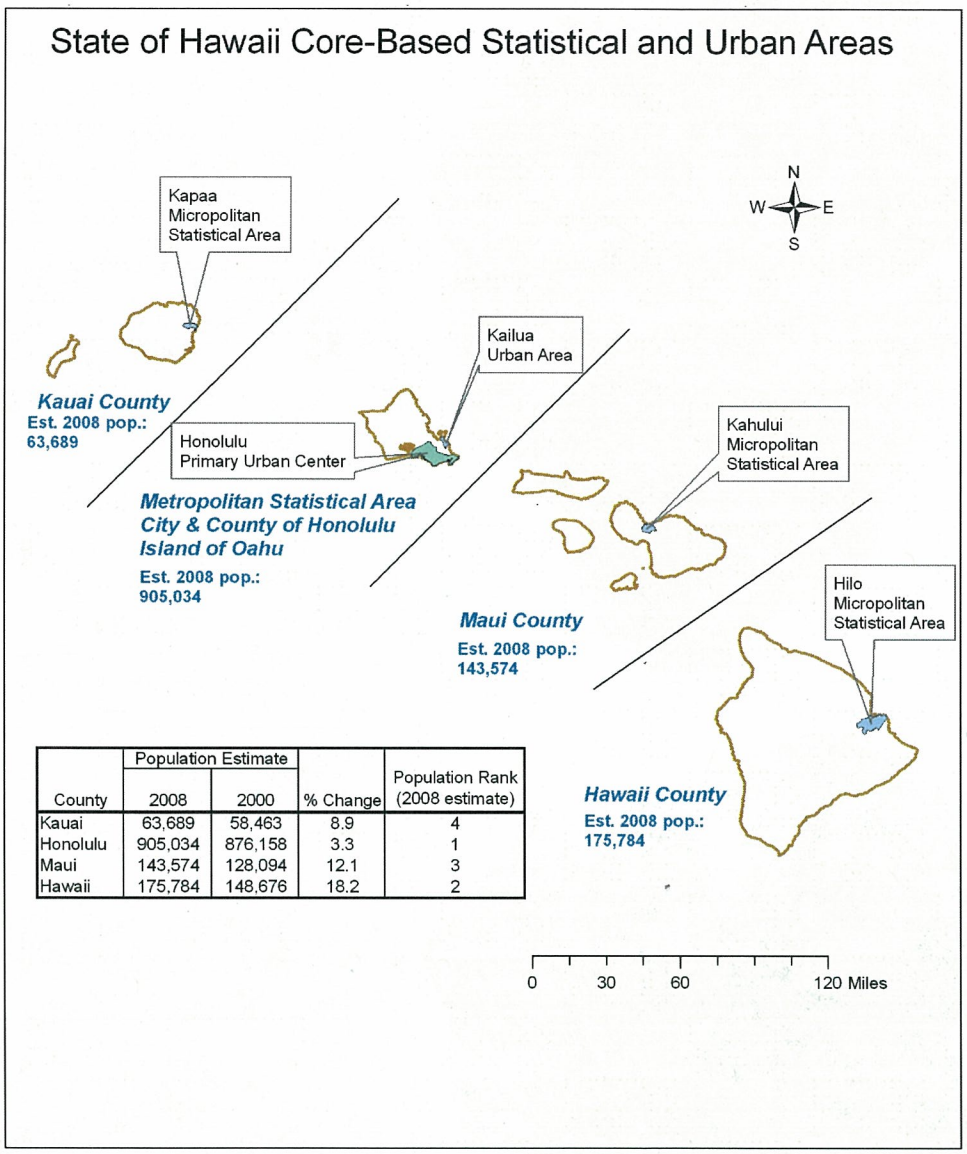
- 2000 census population of 1,211,537
- Ranked 42 out of the 50 states in total population
- Although small in land mass (ranked 47th), Hawaii ranked 13th in overall population density at 188.6 persons per square mile
- There are four counties: Kauai; City and County of Honolulu; Maui; and Hawaii
- The City and County of Honolulu is the state capital, encompasses the entire island of Oahu, and has the largest population of all counties
- Honolulu is the only Metropolitan Statistical Area (MSA) in the state
- There are three Micropolitan Statistical Areas: Kapaa, Kauai; Kahului, Maui; and Hilo, Hawaii
- There are two Urban areas: Honolulu and Kailua, both on the island of Oahu
    - Urban area of Honolulu had a total 2000 census population of 718,182 and was ranked 45 out of 465 urban areas
    - Urban area of Kailua had a total 2000 census population of 117,730 and was ranked 226 out of 465 urban areas
- As shown in Figure 9, the county population rankings based on 2008 population estimates are:
    1. Oahu
    2. Hawaii
    3. Maui (includes Lanai, Molokai, Kahoolawe)
    4. Kauai (includes Niihau)

As expected, the population of "sensitive" groups follows the county population ranking, with Oahu having the largest population and percentage of children and elderly.

Table 5. Resident Population by Age of "Sensitive" Groups

	<5 years		5 to 13 years		≥65 years	
	Population	% of state	Population	% of state	Population	% of state
State	87,207		134,025		221,748	
Kauai	3,974	5%	6,687	5%	11,167	5%
Oahu	61,903	71%	93,532	70%	162,406	73%
Maui	9,566	11%	15,445	11%	20,182	9%
Hawaii	11,764	13%	18,361	14%	27,993	13%

Figure 9. State of Hawaii Population



County	Population Estimate 2008	Population Estimate 2000	% Change	Population Rank (2008 estimate)
Kauai	63,689	58,463	8.9	4
Honolulu	905,034	876,158	3.3	1
Maui	143,574	128,094	12.1	3
Hawaii	175,784	148,676	18.2	2

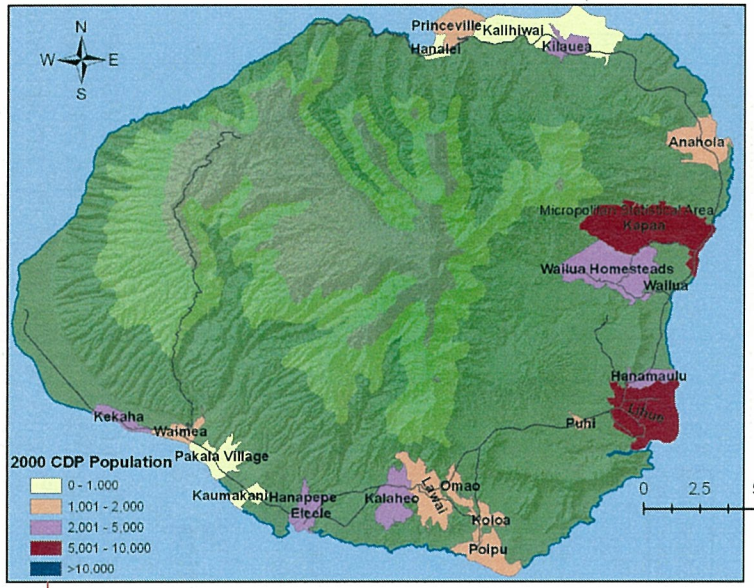
2008 population estimates from the 2008 State of Hawaii Data Book: Hawaii State Department of Business Economic Development and Tourism

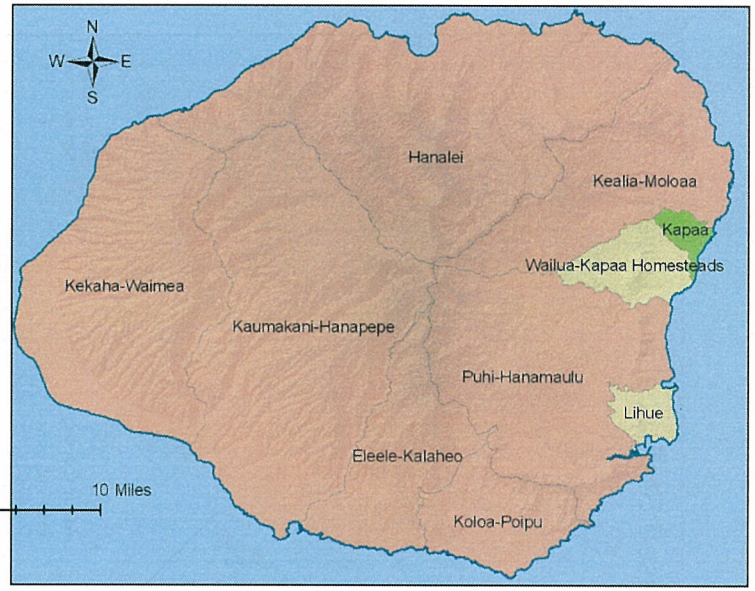
2. County Population Characteristics

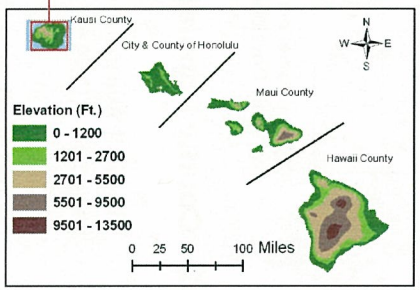
The following figures depict the population characteristics in Census Designated Places (CDP) of the four major populated islands based on the 2000 census. Additionally, the county planning departments on Oahu, Maui, and Hawaii have developed population growth projections of planning areas on those islands (Figures 12, 14, and 16). These projections aid in determining where the population increases are anticipated to occur within the next five years.

Figure 10.

Island of Kauai: Population Characteristics





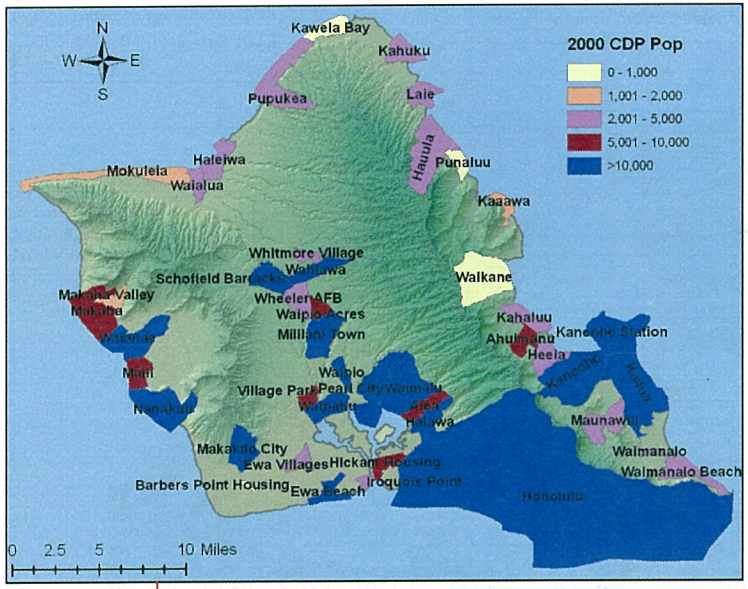


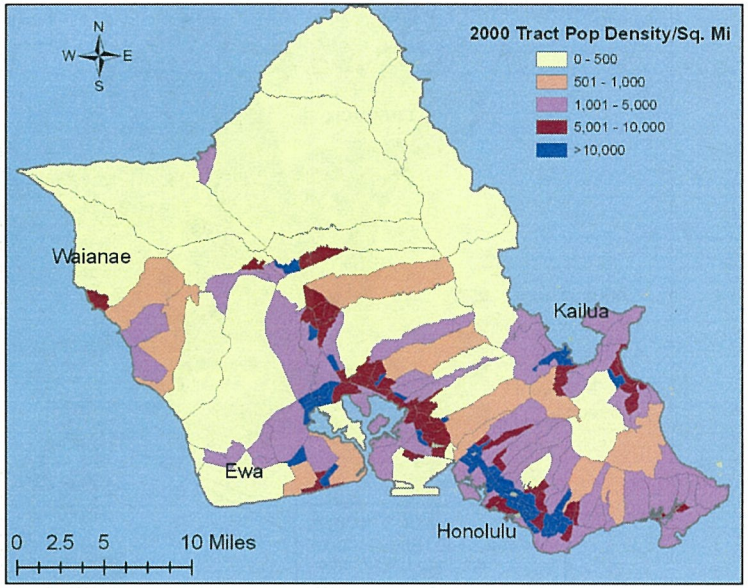
CDP	1990 POP	2000 POP	Change	% Change
Kauai	50,947	58,303	7,356	14.4%
Anahola	1,181	1,932	751	63.6%
Eleele	1,489	2,040	551	37.0%
Hanalei	461	478	17	3.7%
Hanamaulu	3,611	3,272	-339	-9.4%
Hanapepe	1,395	2,153	758	54.3%
Kalaheo	3,592	3,913	321	8.9%
Kalihiwai	435	717	282	64.8%
Kapaa	8,149	9,472	1,323	16.2%
Kaumakani	803	607	-196	-24.4%
Kekaha	3,506	3,175	-331	-9.4%
Kilauea	1,685	2,092	407	24.2%
Koloa	1,791	1,942	151	8.4%
Lawai	1,787	1,984	197	11.0%
Lihue	5,536	5,674	138	2.5%
Omao	1,142	1,221	79	6.9%
Pakala Village	565	478	-87	-15.4%
Poipu	975	1,075	100	10.3%
Princeville	1,244	1,698	454	36.5%
Puhi	1,210	1,186	-24	-2.0%
Wailua	2,018	2,083	65	3.2%
Wailua Homesteads	3,870	4,567	697	18.0%
Waimea	1,840	1,787	-53	-2.9%

Island of Kauai	
Total 2000 Population:	58,463
2008 Population Estimate:	63,689
Percent Change:	8.9%
State (County) Ranking in Total Population:	4th
State (County) Ranking in % Change:	3rd

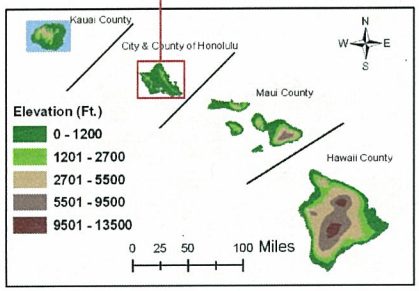
Figure 11.

Honolulu MSA (Island of Oahu): Population Characteristics





City and County of Honolulu (Oahu)	
Total 2000 Population:	876,158
2008 Population Estimate:	905,034
Percent Change:	3.3%
State (County) Ranking in Total Population:	1st
State (County) Ranking in % Change:	4th

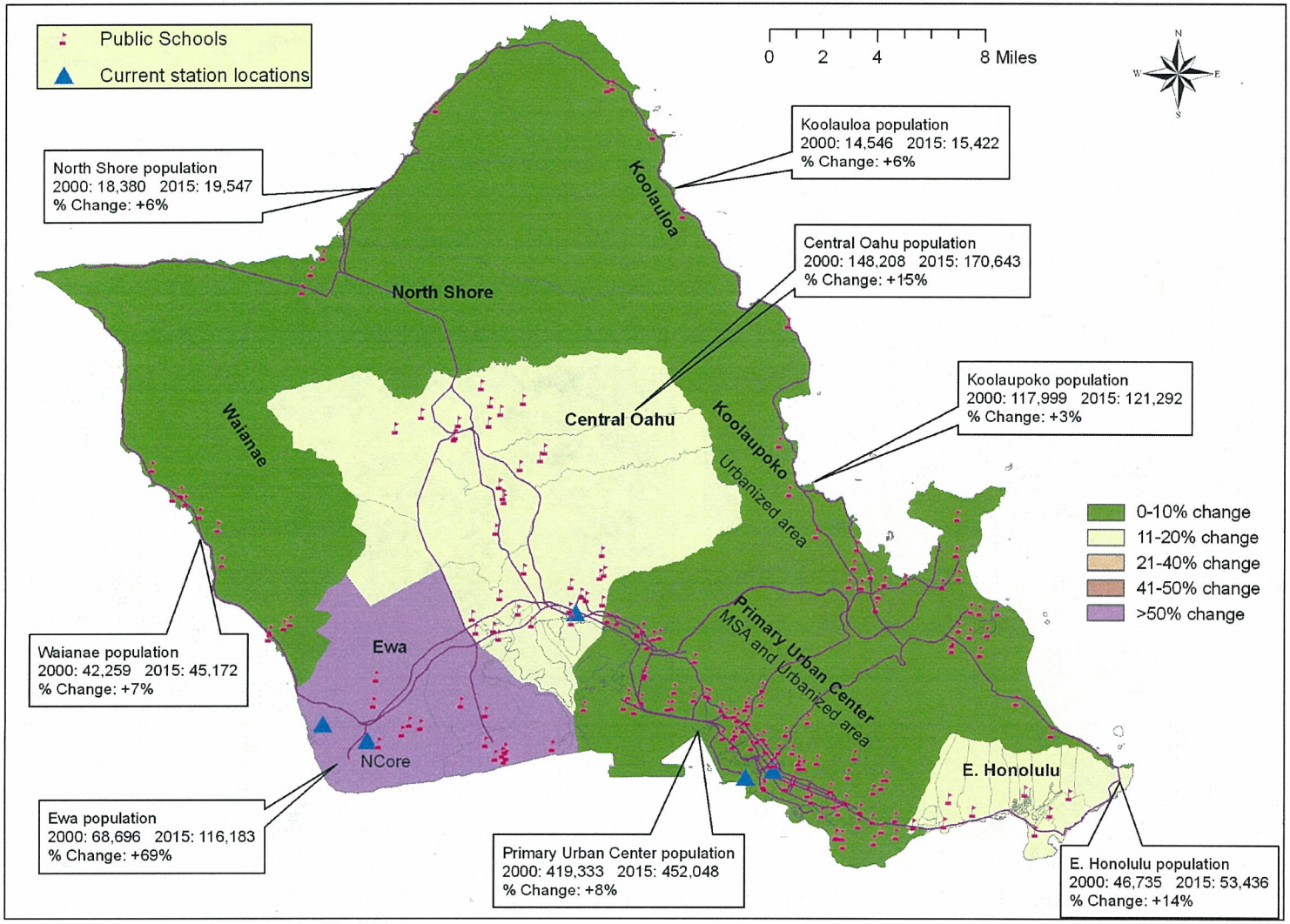


CDP	1990 POP	2000 POP	Change	% Change
Oahu	836,231	876,156	39,925	4.8%
Ahuimanu	8,387	8,506	119	1.4%
Aiea	8,906	9,019	113	1.3%
Barbers Point Housing	2,218	67	-2,151	-97.0%
Ewa Beach	14,315	14,650	335	2.3%
Ewa Gentry	1,992	4,939	2,947	147.9%
Ewa Villages	3,780	4,741	961	25.4%
Halawa	13,408	13,891	483	3.6%
Haleiwa	2,442	2,225	-217	-8.9%
Hauula	3,479	3,651	172	4.9%
Heeia	5,010	4,944	-66	-1.3%
Hickam Housing	6,553	5,471	-1,082	-16.5%
Honolulu	377,059	371,657	-5,402	-1.4%
Iroquois Point	4,188	2,462	-1,726	-41.2%
Kaawa	1,138	1,324	186	16.3%
Kahaluu	3,068	2,935	-133	-4.3%
Kahuku	2,063	2,097	34	1.6%
Kailua	36,818	36,513	-305	-0.8%
Kaneohe	35,448	34,970	-478	-1.3%
Kaneohe Station	11,662	11,827	165	1.4%
Kawela Bay	366	410	44	12.0%
Laie	5,577	4,585	-992	-17.8%
Maili	6,059	5,943	-116	-1.9%

CDP	1990 POP	2000 POP	Change	% Change
Makaha	7,990	7,753	-237	-3.0%
Makaha Valley	1,012	1,289	277	27.4%
Makakilo City	9,828	13,156	3,328	33.9%
Maunawili	4,847	4,869	22	0.5%
Mililani Town	29,359	28,608	-751	-2.6%
Mokuleia	1,776	1,839	63	3.5%
Nanakuli	9,575	10,814	1,239	12.9%
Pearl City	30,993	30,976	-17	-0.1%
Punaluu	672	881	209	31.1%
Pupukea	4,111	4,250	139	3.4%
Schofield Barracks	19,597	14,428	-5,169	-26.4%
Village Park	7,407	9,625	2,218	29.9%
Wahiawa	17,386	16,151	-1,235	-7.1%
Waialua	3,943	3,761	-182	-4.6%
Waianae	8,758	10,506	1,748	20.0%
Waikane	717	726	9	1.3%
Waimalu	29,967	29,371	-596	-2.0%
Waimanalo	3,508	3,664	156	4.4%
Waimanalo Beach	4,185	4,271	86	2.1%
Waipahu	31,435	33,108	1,673	5.3%
Waipio	11,812	11,672	-140	-1.2%
Waipio Acres	5,304	5,298	-6	-0.1%
Wheeler AFB	2,600	2,829	229	8.8%
Whitmore Village	3,373	4,057	684	20.3%

Figure 12.

Honolulu MSA (Island of Oahu): Actual (2000) and Projected (2015) Populations

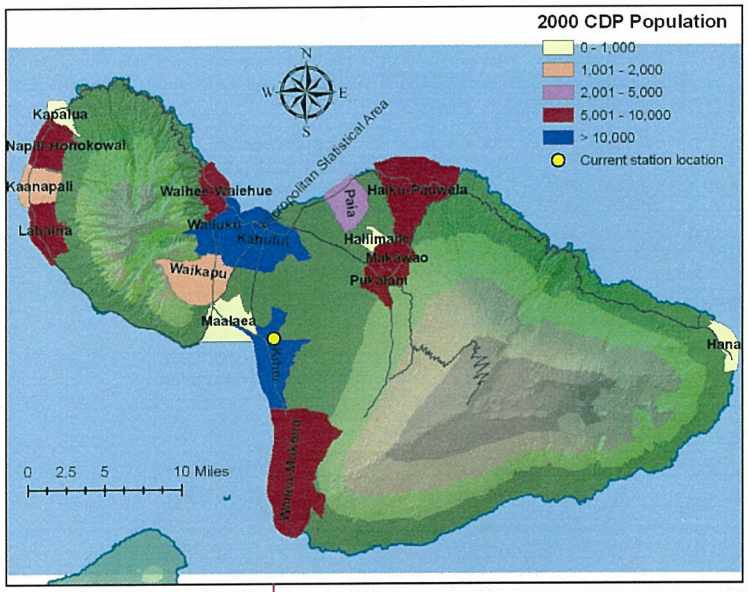


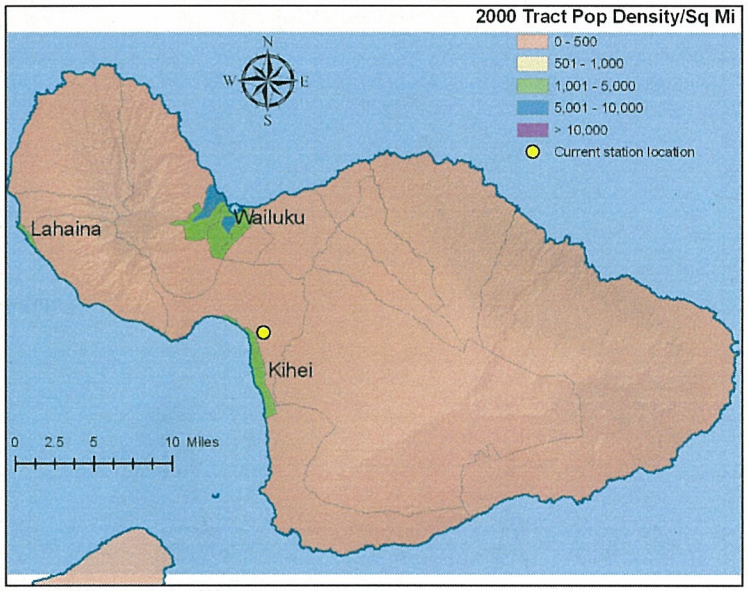
Source: City and County of Honolulu Dept. of Planning and Permitting
Population projections by planning areas

Urbanized area: densely settled territory which consists of:
1) core census block groups that have a population density of >=1,000/sq. mile and,
2) surrounding census blocks that have an overall density of >=500/sq. mile

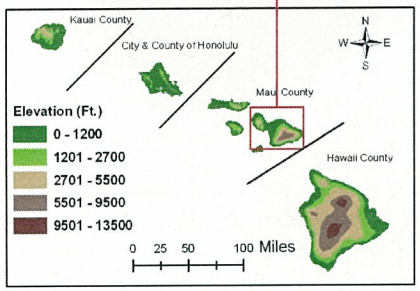
Figure 13.

Island of Maui: Population Characteristics



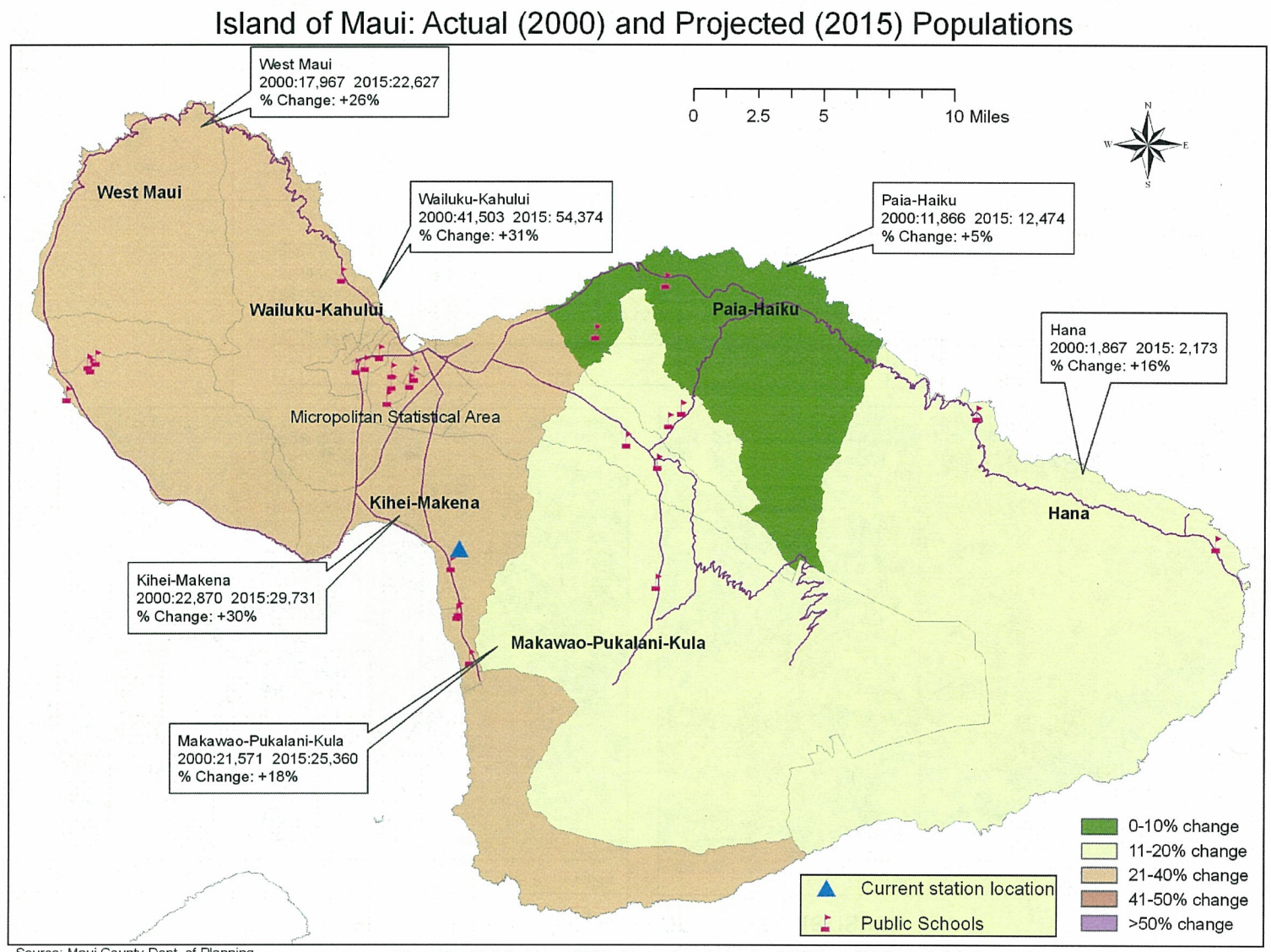


Maui County	
Total 2000 Population:	128,094
2008 Population Estimate:	143,574
Percent Change:	12.1%
State (County) Ranking in Total Population:	3rd
State (County) Ranking in % Change:	2nd



CDP	1990 POP	2000 POP	Change	% Change
Maui	91,361	117,644	26,283	28.8%
Haiku-Pauwela	4,509	6,578	2,069	45.9%
Haliimaile	841	895	54	6.4%
Hana	683	709	26	3.8%
Kaanapali	579	1,375	796	137.5%
Kahului	16,889	20,146	3,257	19.3%
Kapalua	408	467	59	14.5%
Kihei	11,107	16,749	5,642	50.8%
Lahaina	9,073	9,118	45	0.5%
Maalaea	443	454	11	2.5%
Makawao	5,405	6,327	922	17.1%
Napili-Honokowai	4,332	6,788	2,456	56.7%
Paia	2,091	2,499	408	19.5%
Pukalani	5,879	7,380	1,501	25.5%
Waihee-Waiehu	4,004	7,310	3,306	82.6%
Waikapu	729	1,115	386	52.9%
Wailea-Makena	3,799	5,671	1,872	49.3%
Wailuku	10,688	12,296	1,608	15.0%

Figure 14.

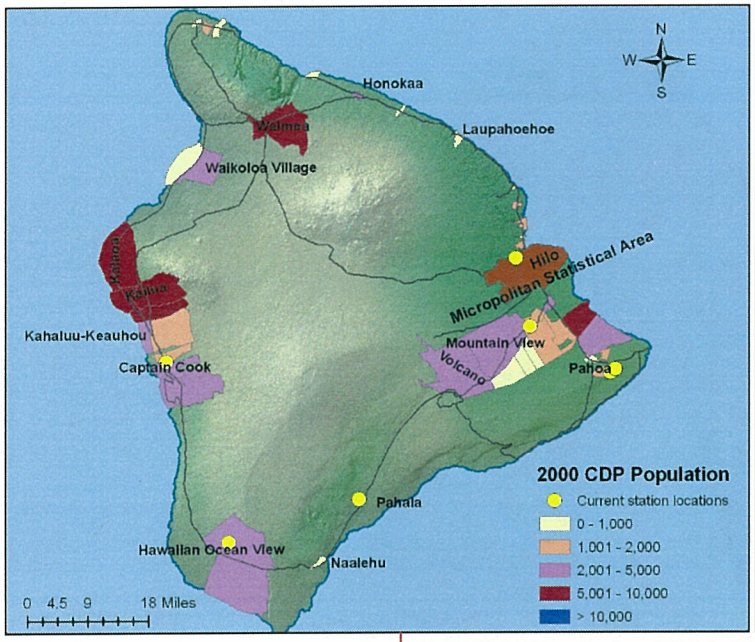


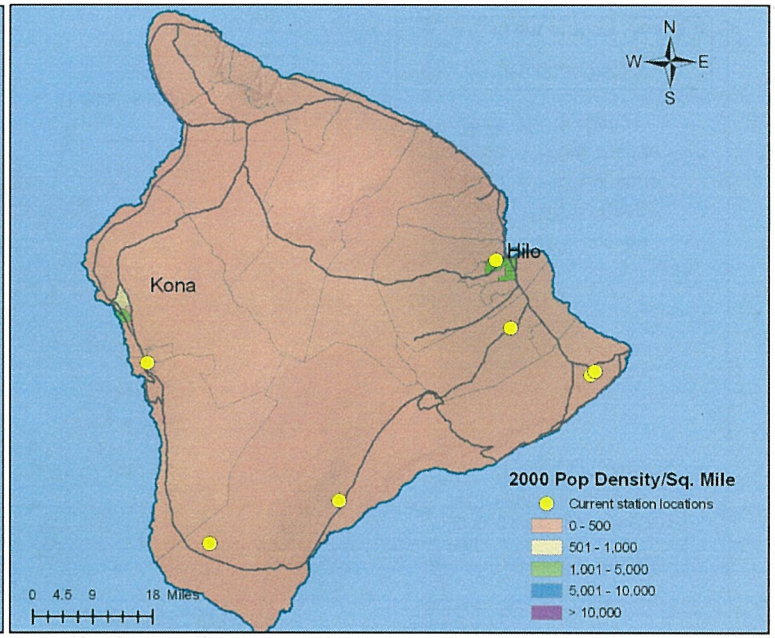
Source: Maui County Dept. of Planning
Population projections by planning areas

Micropolitan Statistical Area: CBSA with >= urban cluster of >=10,000 to <=50,000 population plus adjacent territory with a high degree of social & economic integration with the core

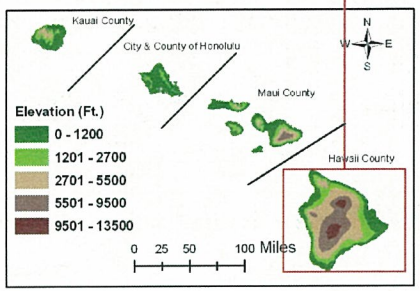
Figure 15.

Island of Hawaii: Population Characteristics





Hawaii County	
Total 2000 Population:	148,676
2008 Population Estimate:	175,784
Percent Change:	18.2%
State (County) Ranking in Total Population:	2nd
State (County) Ranking in % Change:	1st

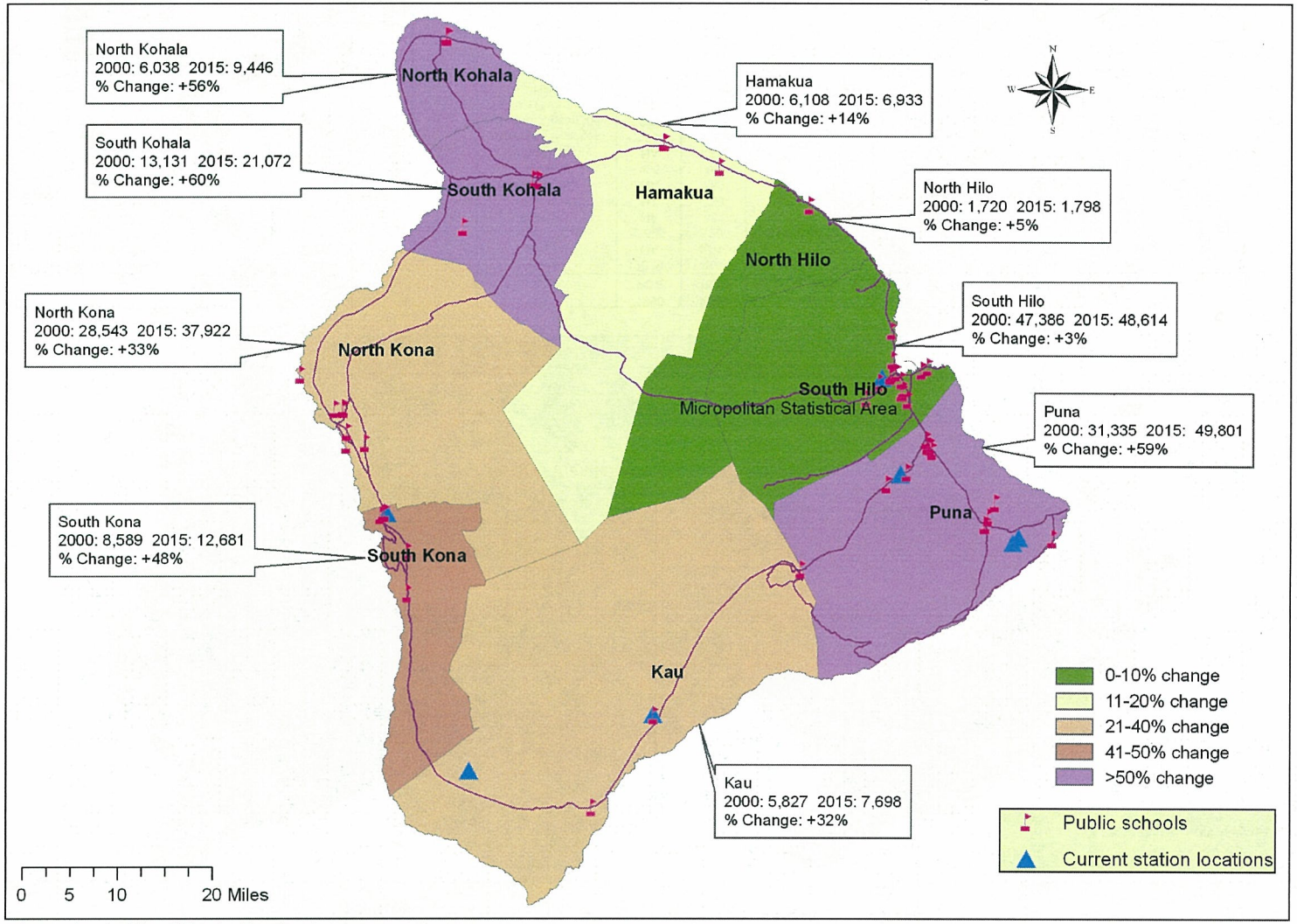


CDP	1990 POP	2000 POP	Change	% Change
Hawaii	120,317	148,677	28,360	23.6%
Ainaloa	NA	1,910		
Captain Cook	2,595	3,206	611	23.5%
Eden Roc	NA	451		
Fern Acres	NA	756		
Fern Forest	NA	480		
Halaula	496	495	-1	-0.2%
Hawaiian Acres	NA	1,776		
Hawaiian Beaches	2,846	3,709	863	30.3%
Hawaiian Ocean View	969	2,178	1,209	124.8%
Hawaiian Paradise Park	3,389	7,051	3,662	108.1%
Hawi	924	938	14	1.5%
Hilo	37,808	40,759	2,951	7.8%
Holualoa	3,834	6,107	2,273	59.3%
Honalo	1,926	1,987	61	3.2%
Honaunau-Napoopoo	2,373	2,414	41	1.7%
Honokaa	2,186	2,233	47	2.2%
Honomu	532	541	9	1.7%
Kahaluu-Keauhou	1,990	2,414	424	21.3%
Kailua	9,126	9,870	744	8.2%
Kalaoa	4,490	6,794	2,304	51.3%

CDP	1990 POP	2000 POP	Change	% Change
Kapaau	1,083	1,159	76	7.0%
Keeau	1,584	2,010	426	26.9%
Kealakekua	1,453	1,645	192	13.2%
Kukuihaele	316	317	1	0.3%
Kurtistown	910	1,157	247	27.1%
Laupahoehoe	508	473	-35	-6.9%
Leilani Estates	NA	1,046		
Mountain View	3,075	2,799	-276	-9.0%
Naalehu	1,027	919	-108	-10.5%
Nanawale Estates	NA	1,073		
Orchidlands Estates	NA	1,731		
Paauilo	620	571	-49	-7.9%
Pahala	1,520	1,378	-142	-9.3%
Pahoa	1,027	962	-65	-6.3%
Papaikou	1,634	1,414	-220	-13.5%
Paukaa	495	495	0	0.0%
Pepeekeo	1,813	1,697	-116	-6.4%
Puako	397	429	32	8.1%
Volcano	1,516	2,231	715	47.2%
Waikoloa Village	2,248	4,806	2,558	113.8%
Waimea	5,972	7,028	1,056	17.7%
Wainaku	1,243	1,227	-16	-1.3%

Figure 16.

Island of Hawaii: Actual (2000) and Projected (2015) Populations



Source: County of Hawaii Planning Department
County of Hawaii General Plan: 2005

Micropolitan Statistical Area: CBSA with >=urban cluster of >=10,000 and <=50,000 population, plus adjacent territory with a high degree of social and economic integration with the core

3. Population Conclusions

- KAUAI
  - o Kapaa is the largest population center, most densely populated and is a Micropolitan Statistical Area.

- OAHU
  - o Honolulu is the capital, most populated primary urban center, and only MSA in the state;
  - o Kailua, on the windward side of the island, is the only other urban area in the state;
  - o The highest population growth is occurring in the Ewa planning area. The NCORE station will be established in this community.
  - o Although ranked first in total population, Oahu had the least percent population increase of the four major islands.

- MAUI
  - o The most populated areas are in the communities of Wailuku-Kahului and Kihei;
  - o The highest density area is in Wailuku-Kahului, which is also a Micropolitan Statistical Area;
  - o Other than on Oahu, Wailuku-Kahului and Kihei are the only communities in the state with populations >10,000.

- HAWAII
  - o The island is the second highest in total population but because of the large land area, it has relatively low population densities;
  - o The most populated areas are in Hilo, Puna and North Kona;
  - o The areas with the highest expected growth are Puna and Kohala;
  - o Hilo is a Micropolitan Statistical Area.

B. Health and Environmental Justice

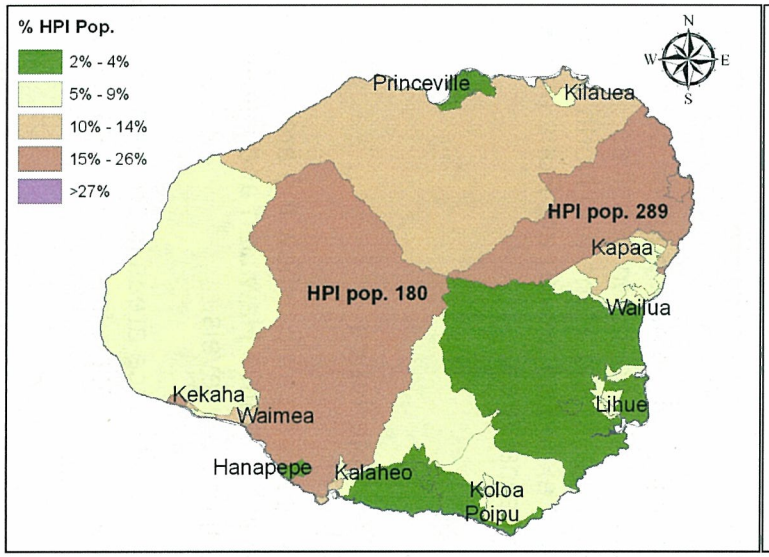
1. County Health and Poverty Characteristics

Based on the 2000 census, the following maps show the areas on each of the four major islands with the percent of Native Hawaiian and Pacific Islander populations as well as individual poverty levels.

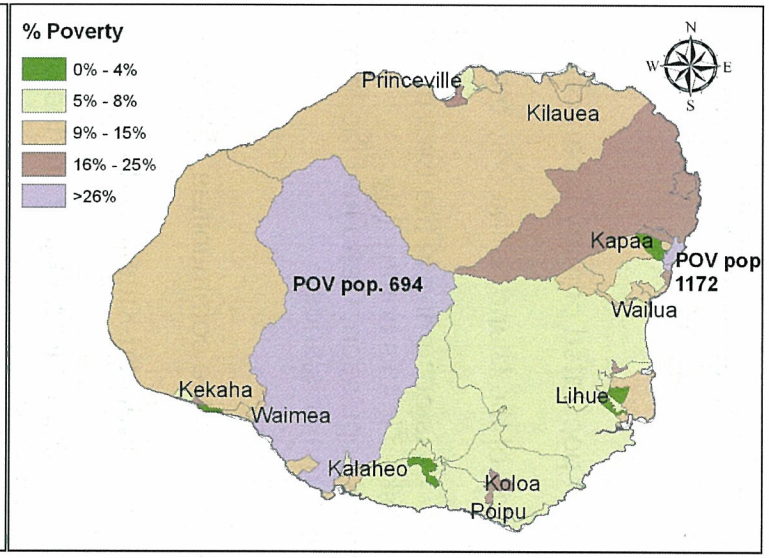
Also shown are maps of asthma prevalence areas in children and adults. Information was provided by the state's Department of Health, Asthma Control Program.

Figure 17. Island of Kauai: HPI Population, Poverty Level, and Asthma Prevalence

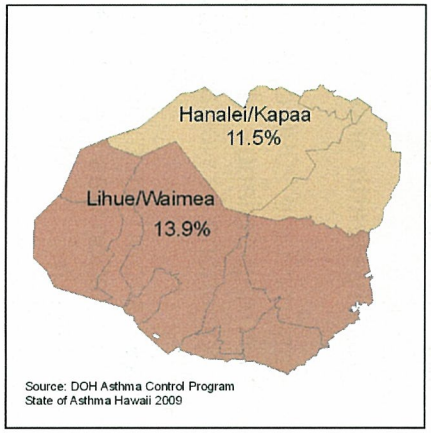
Island of Kauai: Population of Native Hawaiians and Pacific Islanders (HPI): 2000 Census



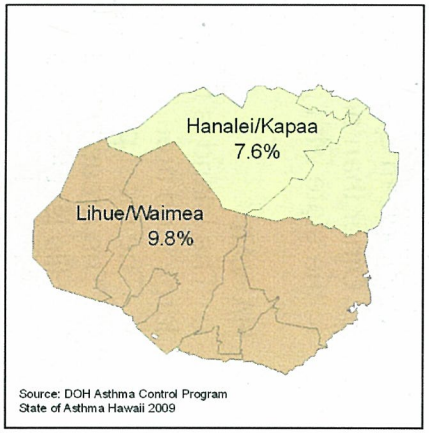
Island of Kauai: Percent Poverty Level (POV): 2000 census



2005-2006 Childhood Asthma Prevalence



2005-2006 Adult Asthma Prevalence



Kauai Public Schools

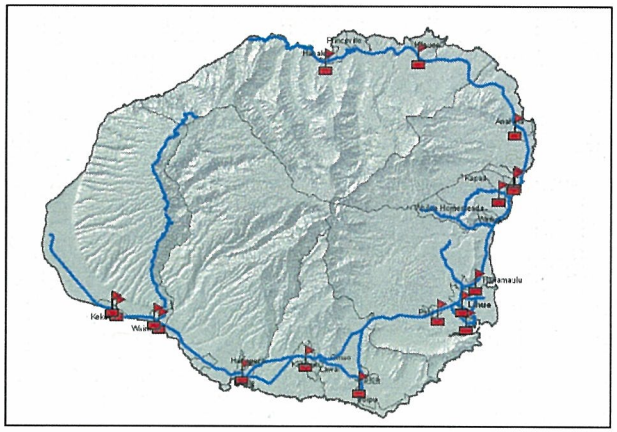


Figure 18. Island of Oahu: HPI Population, Poverty Level, and Asthma Prevalence

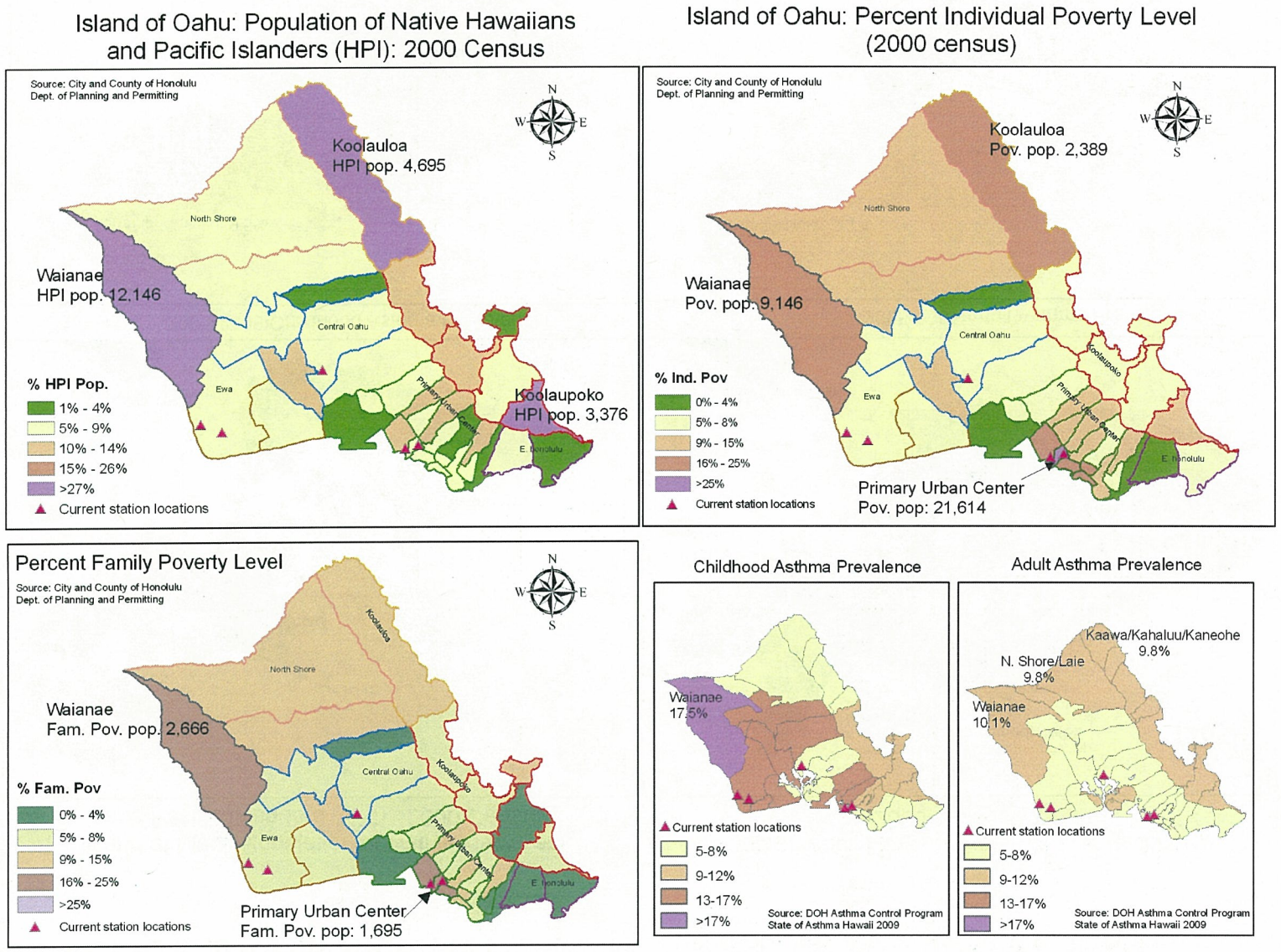


Figure 19. Island of Maui: HPI Population, Poverty Level, and Asthma Prevalence

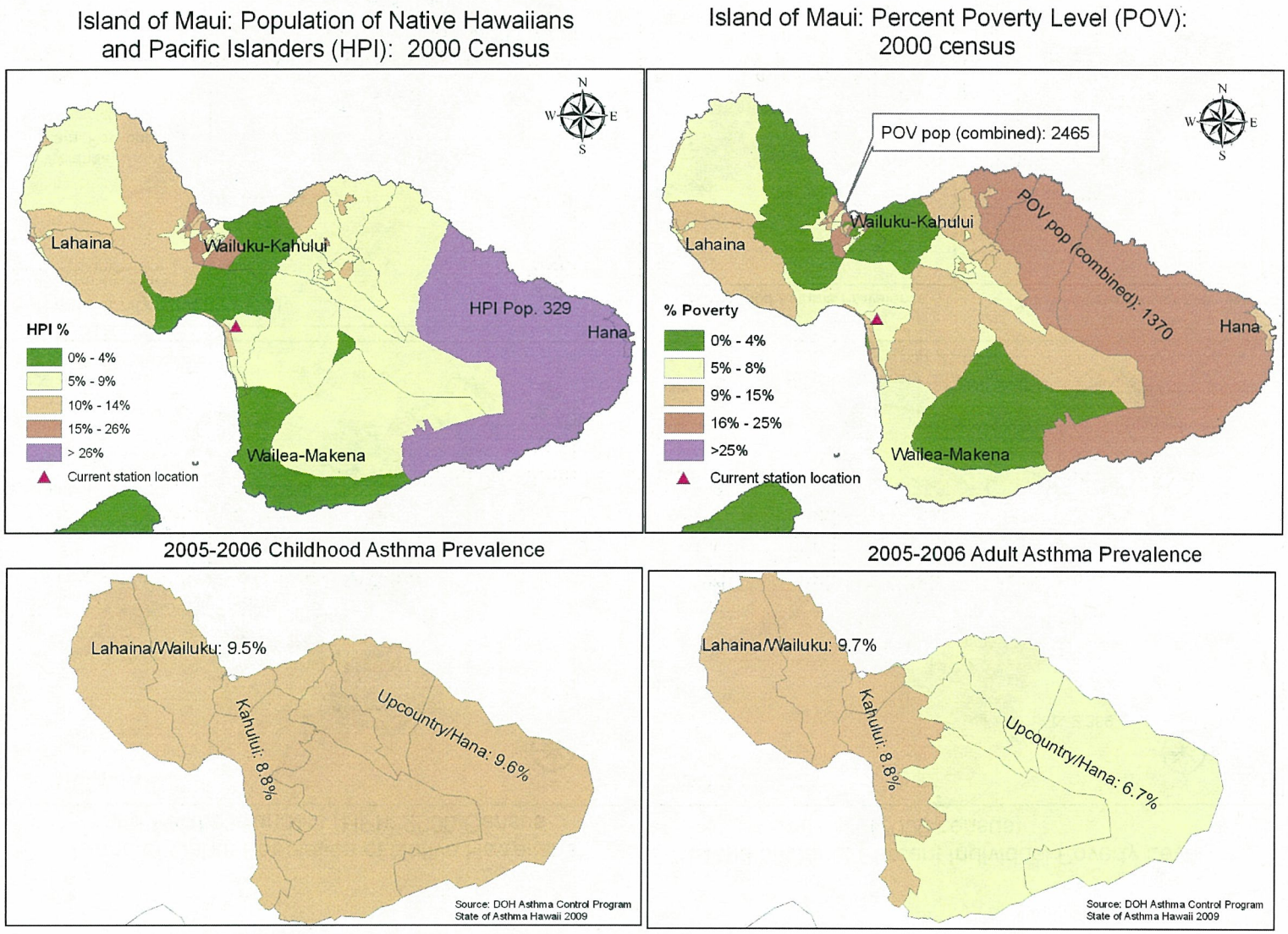
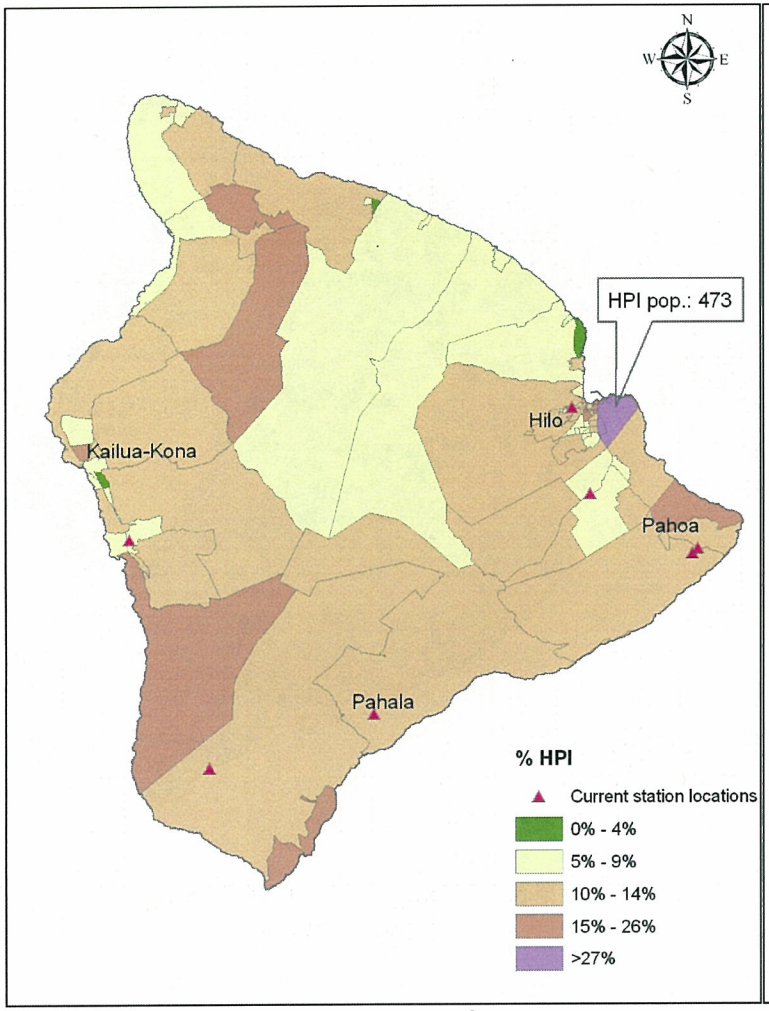


Figure 20. Island of Hawaii: HPI Population and Poverty Level

Island of Hawaii: Population of Native Hawaiians and Pacific Islanders (HPI): 2000 Census



Island of Hawaii: Percent Poverty Level (POV): 2000 census

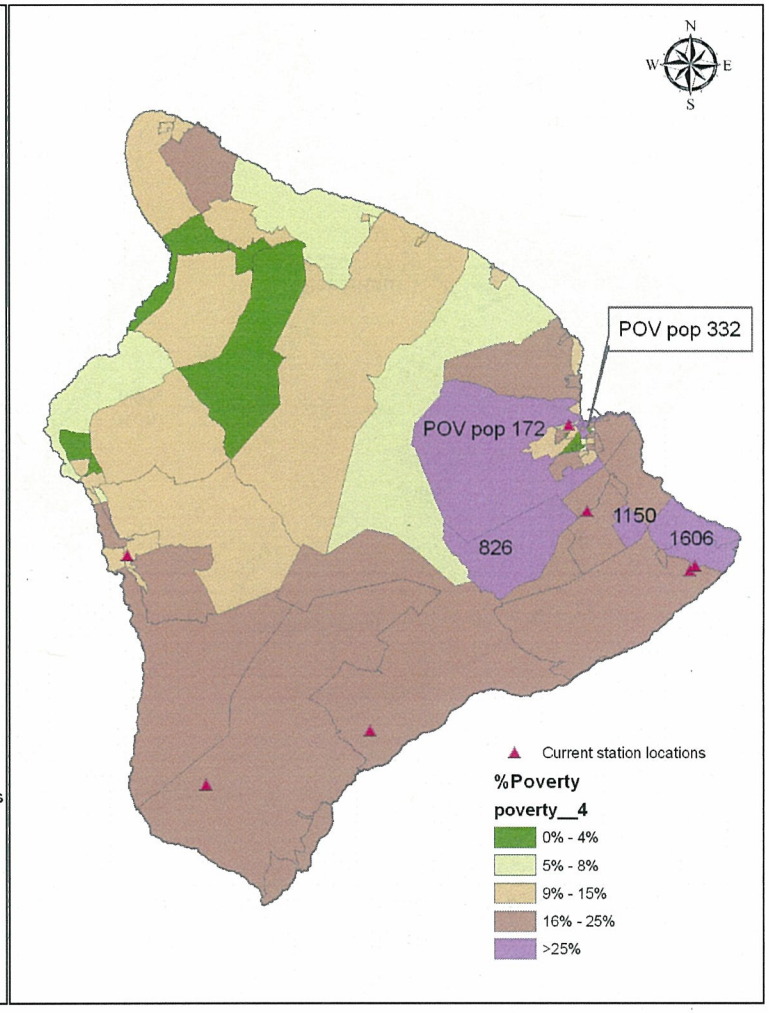
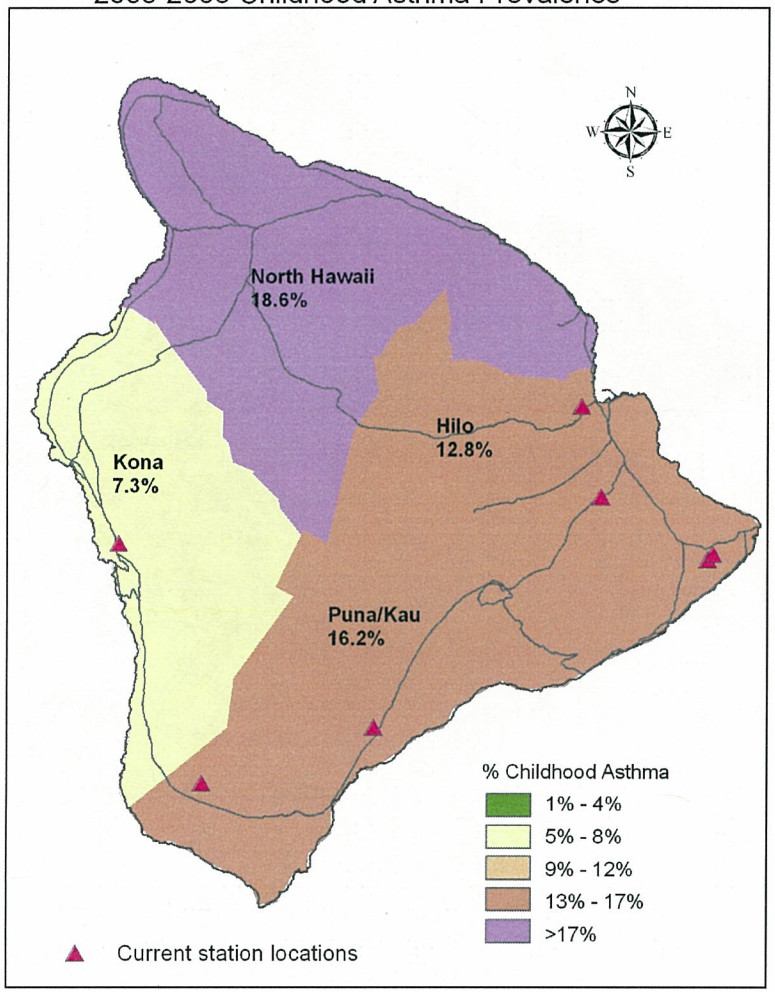


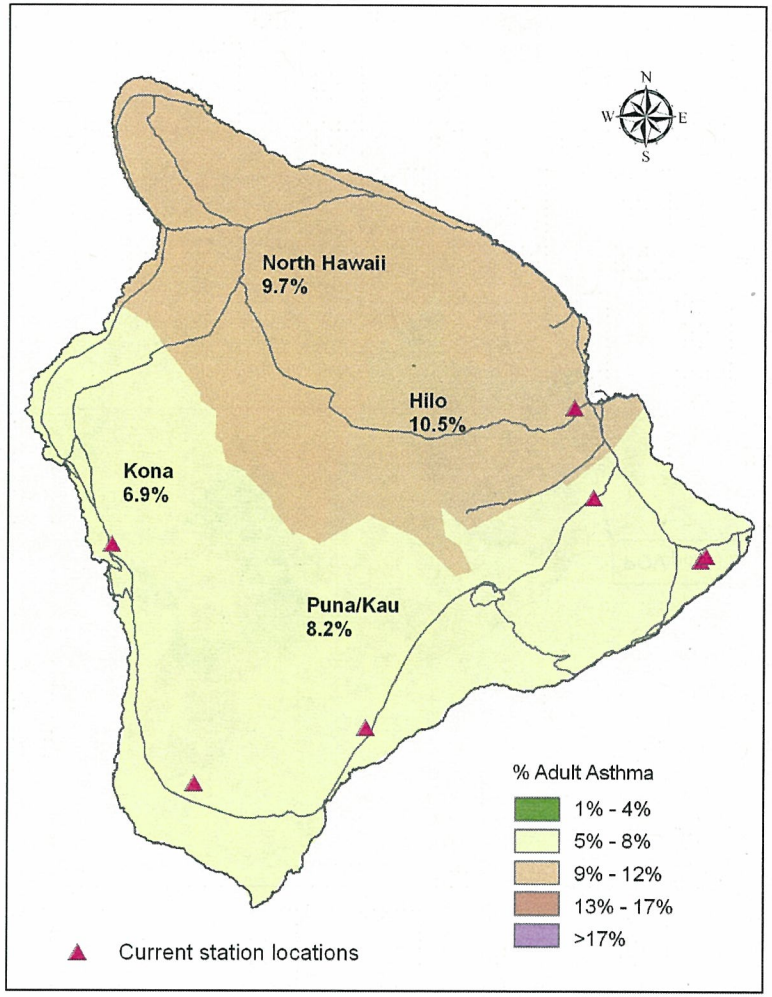
Figure 21. Island of Hawaii: Asthma Prevalence

Island of Hawaii:
2005-2006 Childhood Asthma Prevalence



Source: DOH Asthma Control Program
State of Asthma Hawaii 2009

Island of Hawaii:
2005-2006 Adult Asthma Prevalence



Source: DOH Asthma Control Program
State of Asthma Hawaii 2009

2. Health and Environmental Justice Conclusions

- KAUAI
  - Highest HPI population is in the Kapaa area;
  - Highest poverty levels occur in a small portion of Kapaa and in the Waimea area;
  - A slightly higher percentage of both childhood and adult asthma occurs in the Lihue/Waimea area.

- OAHU
  - Highest HPI population both on Oahu and in the state is on the Waianae coast on the leeward side of the island;
  - Highest levels of individual and family poverty also occur on the Waianae coast;
  - Highest percentage of both childhood and adult asthma prevalence occurs on the Waianae coast.

- MAUI
  - Of all the four major islands, Maui has the least number of HPI population;
  - The majority of HPI on Maui reside in the Hana district;
  - Individual poverty levels are the highest in a small area of Wailuku-Kahului;
  - There is no statistical difference in childhood asthma prevalence among all areas of Maui;
  - There is a slightly higher percentage of adult asthma prevalence in the Lahaina/Wailuku area.

- HAWAII
  - The highest population of HPI and areas of poverty are all on the east side of the island, from Hilo to Puna;
  - Although the least vog-impacted area on the island, by percentage of population, North Hawaii has the highest rate of childhood asthma on the island and in the state;
  - Similarly, North Hawaii including Hilo has the highest rate of adult asthma on the island.

C. Emissions Inventory

1. Source Emissions Characteristics

All data are from the state's 2005 emissions inventory. Figures 22 to 27 show the total and source category emissions in tons per year. Figures 28 to 33 show the amount of criteria pollutants and VOCs by island.

Figure 22.

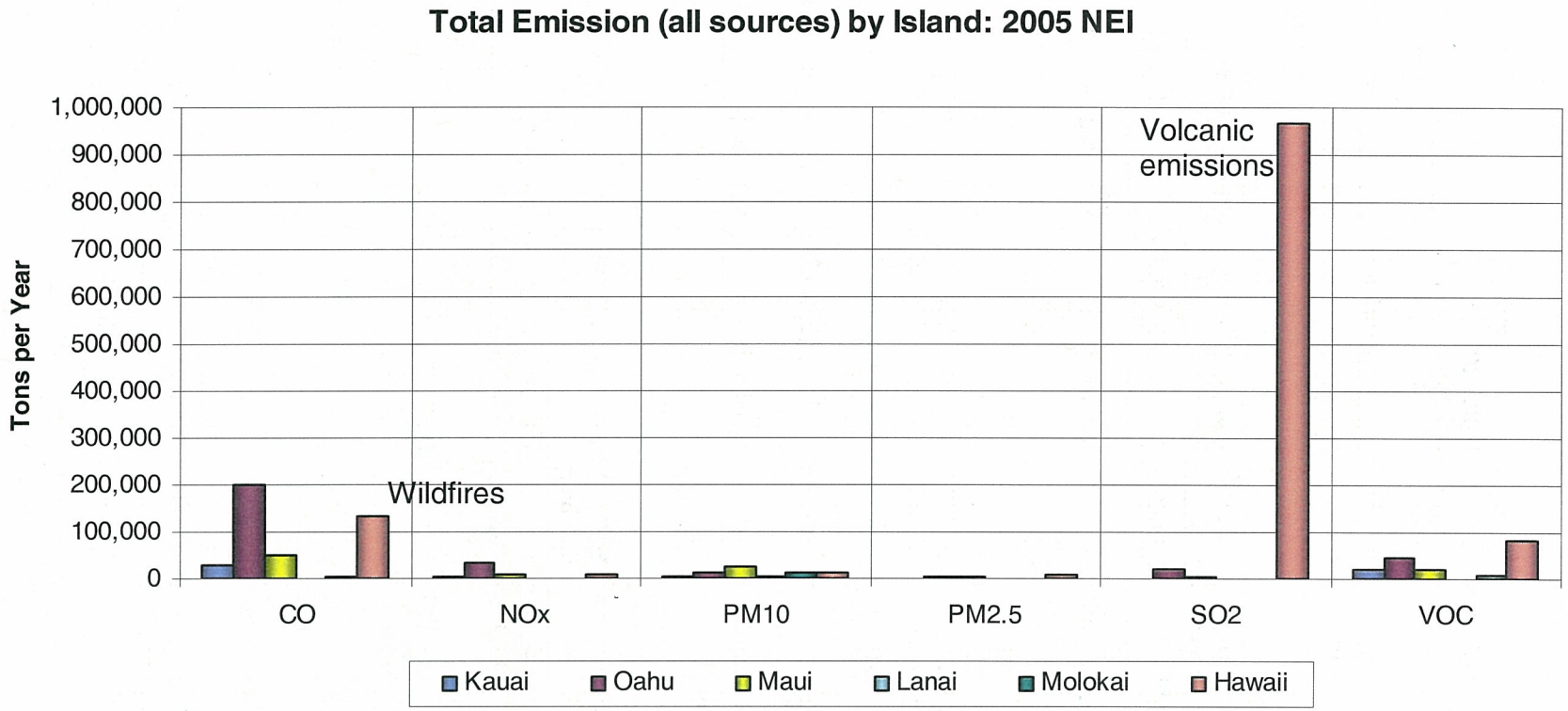
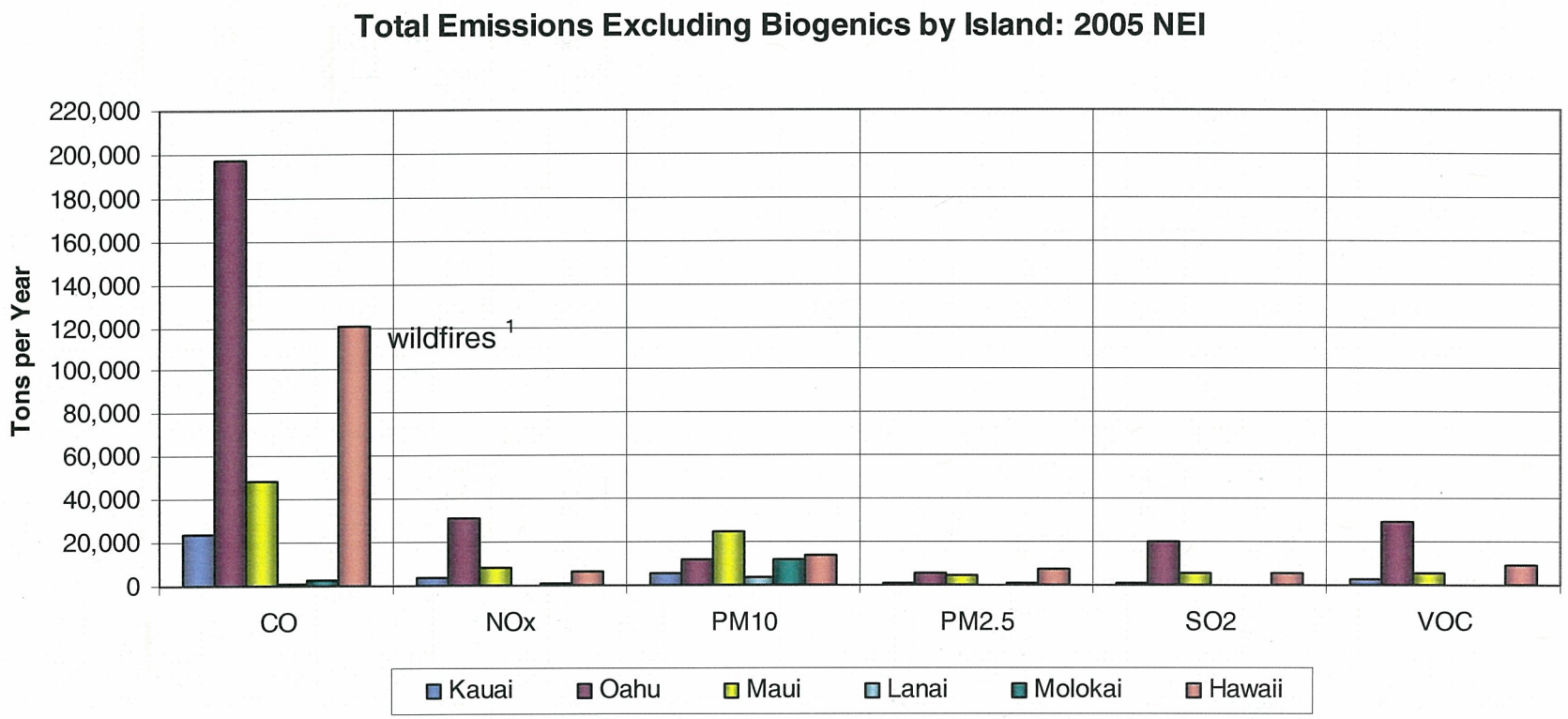

Total Emission (all sources) by Island: 2005 NEI
Tons per Year
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Wildfires
Volcanic emissions
CO
NOx
PM10
PM2.5
SO2
VOC
Kauai
Oahu
Maui
Lanai
Molokai
Hawaii

Figure 23.



[1] In 2005, Hawaii county experienced a number of wildfires which contributed to the increase in CO. Comparatively, in 2002, the CO emission for the county was 676 tons per year.

Figure 24. On Road NEI

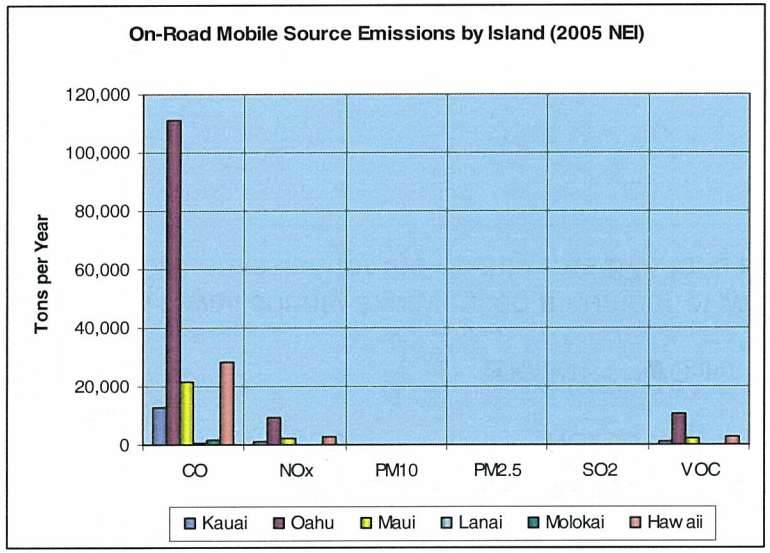


Figure 25. Non-Road NEI

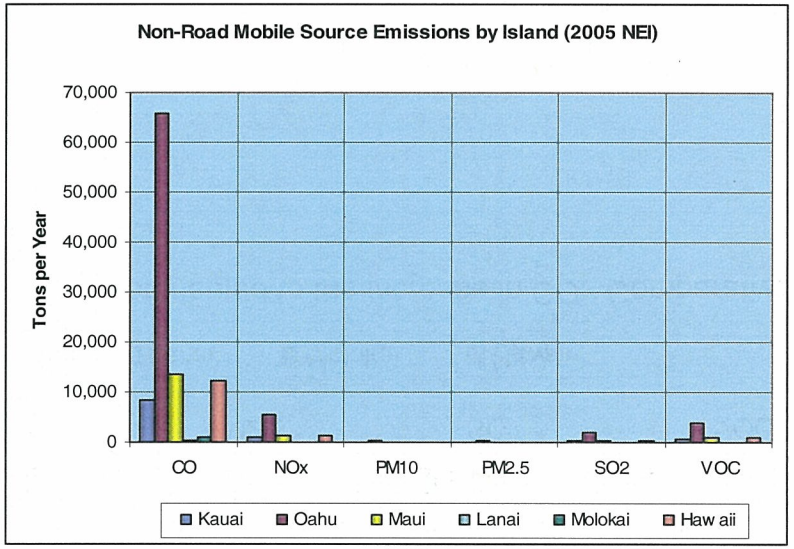


Figure 26. Area and Point Source NEI

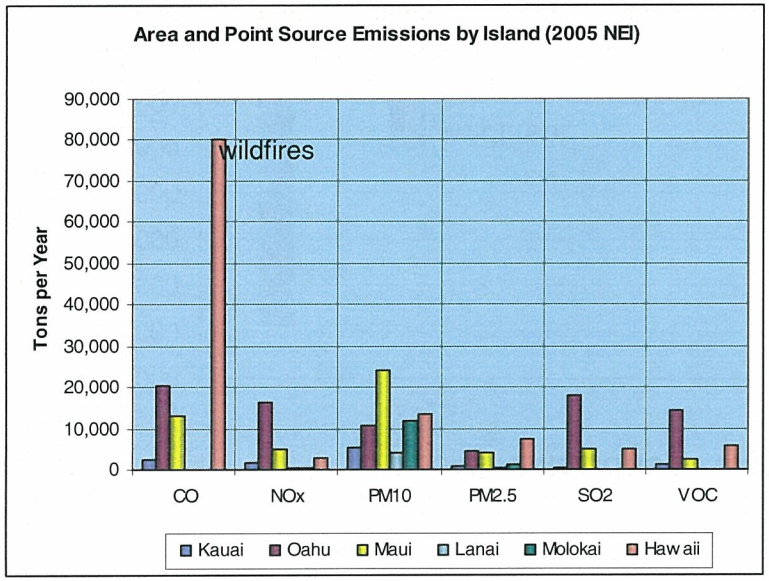


Figure 27. Biogenic NEI

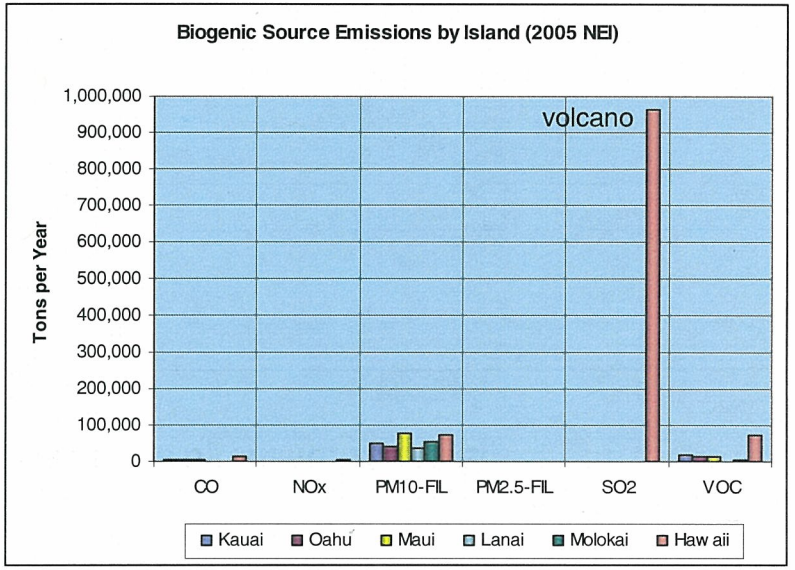
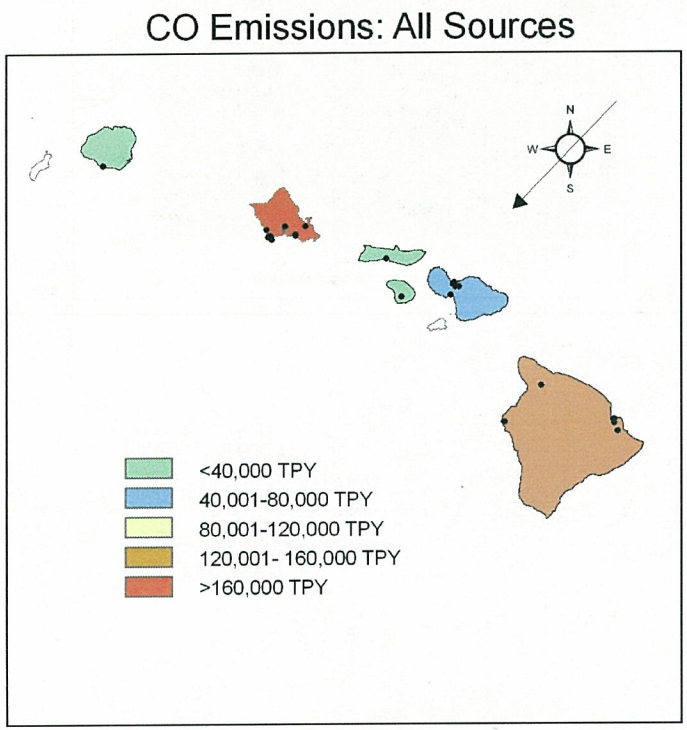
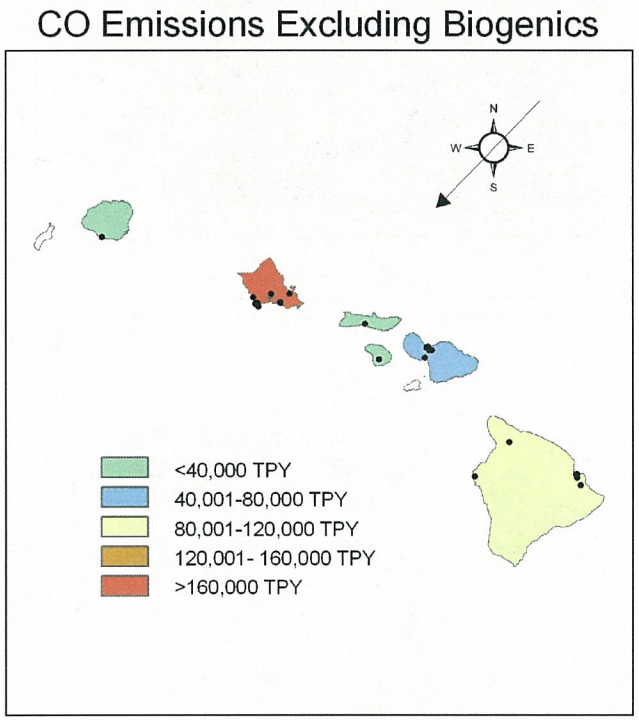
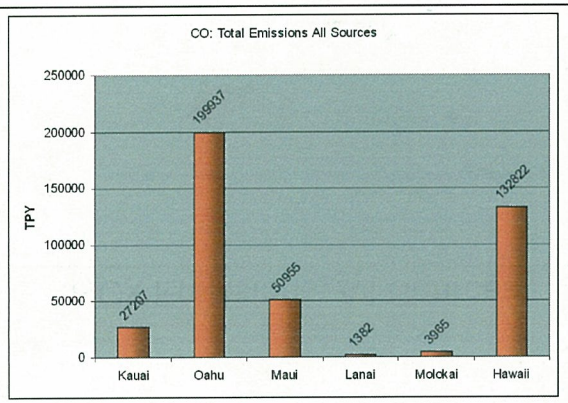


Figure 28. CO NEI







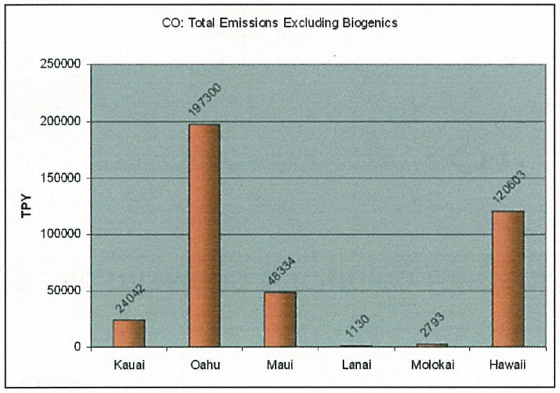


Figure 29. NOx NEI

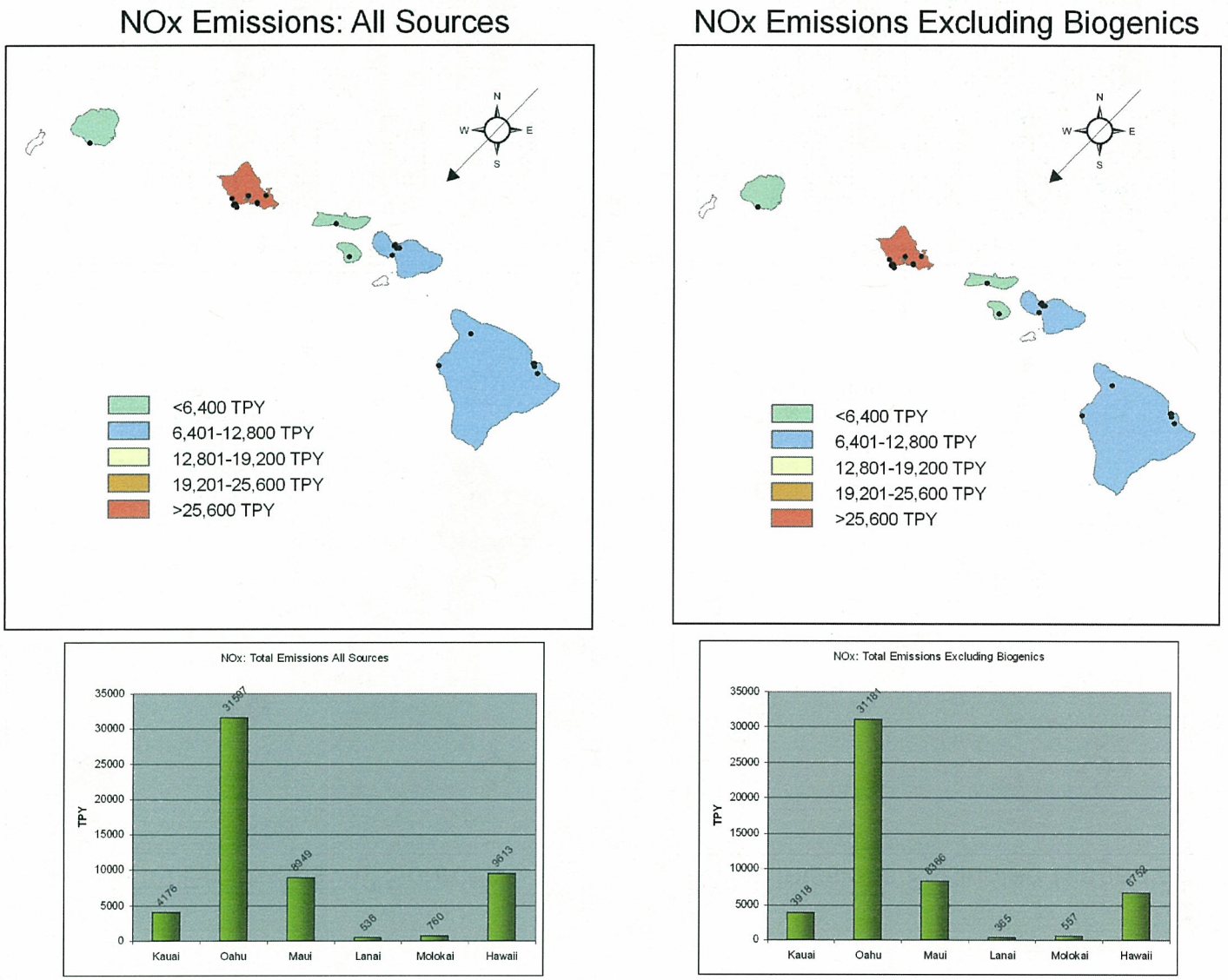


Figure 30. SO2 NEI

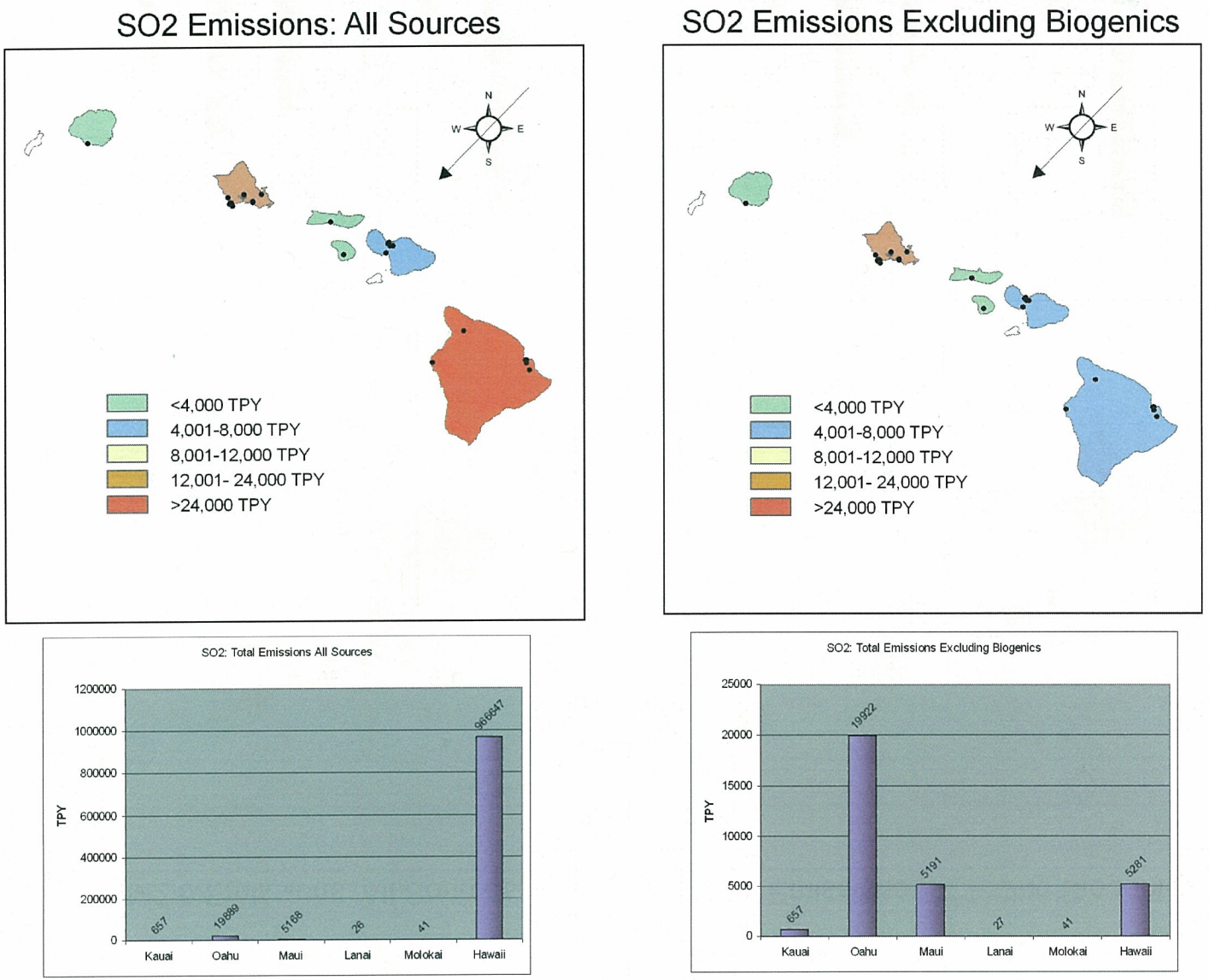
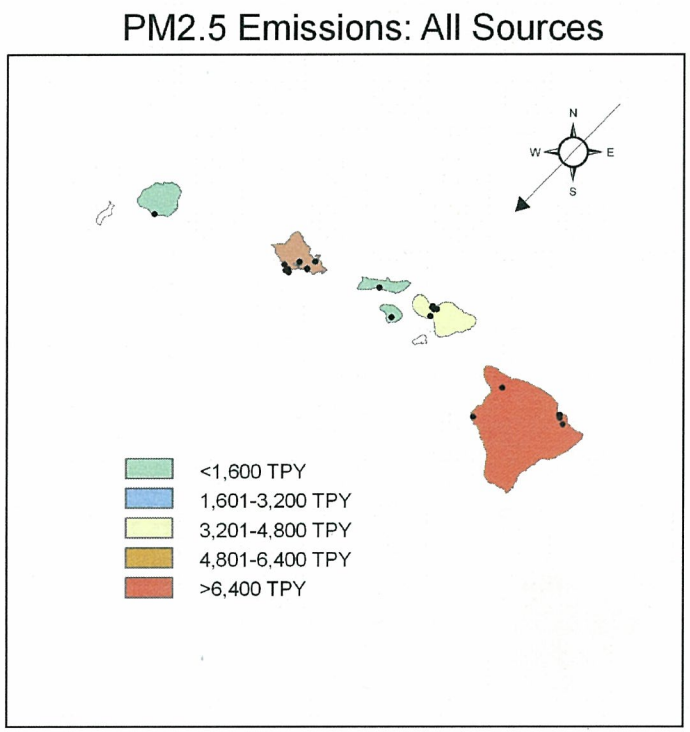
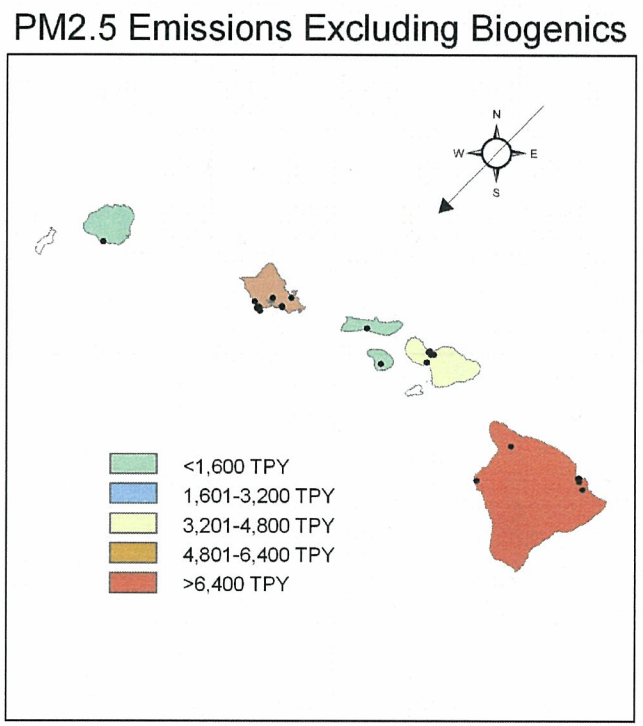
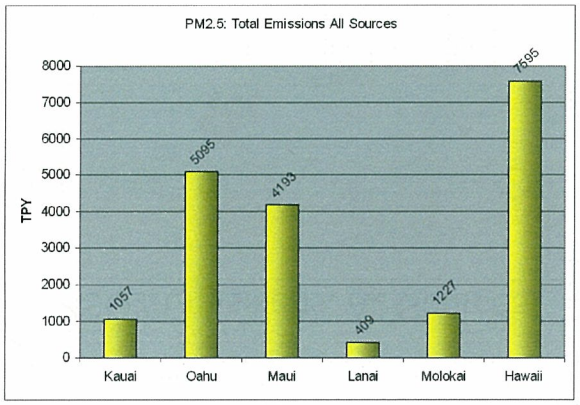


Figure 31. $PM_{2.5}$ NEI







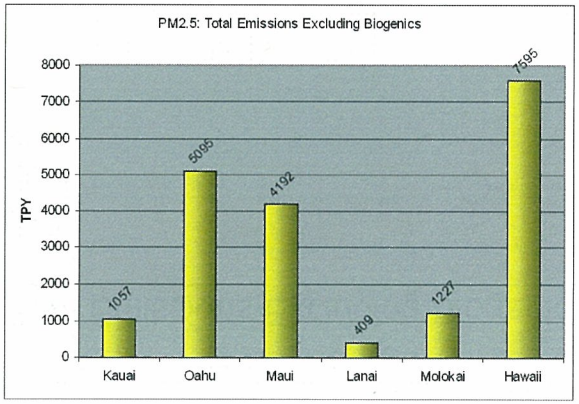


Figure 32. PM_{10} NEI

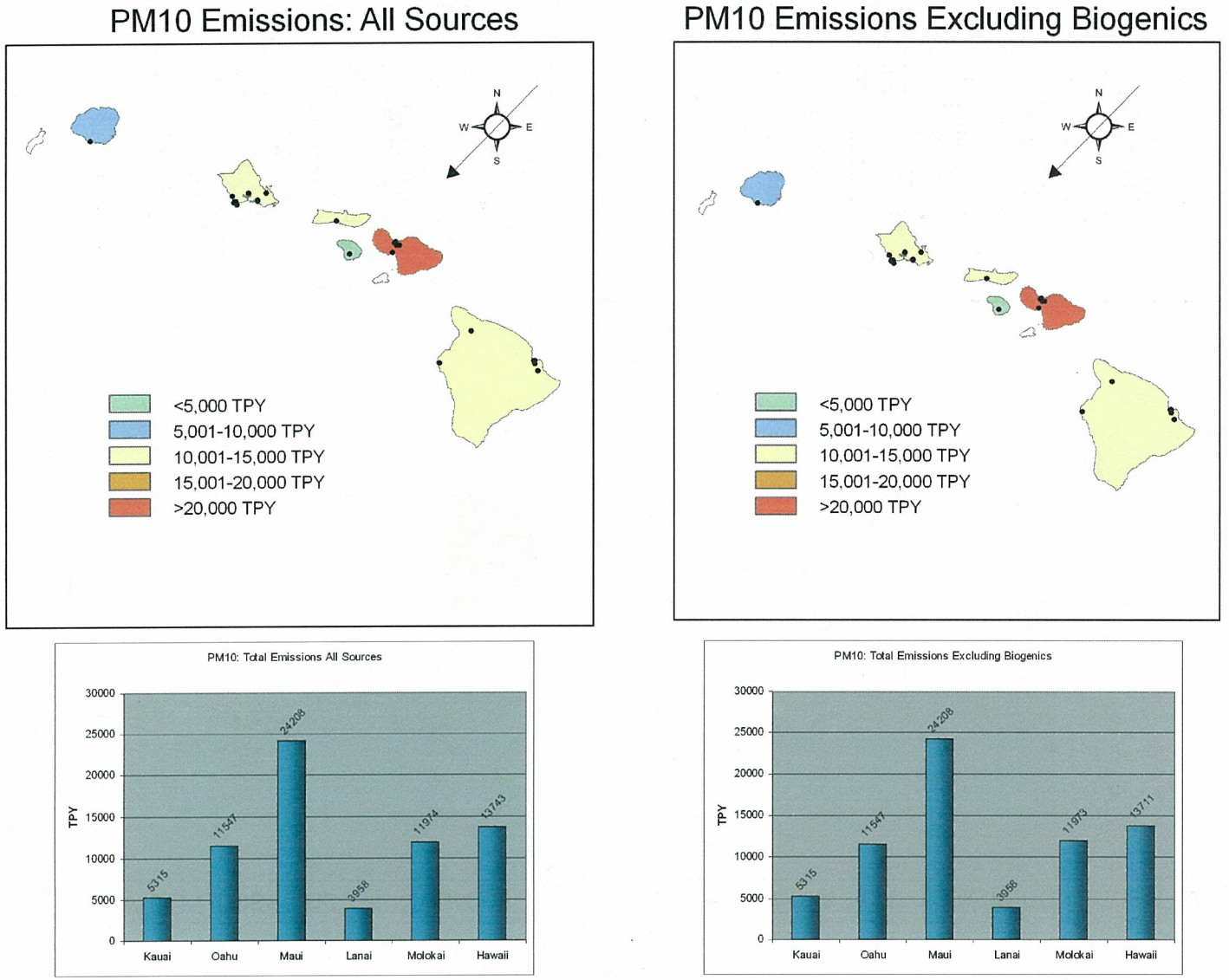
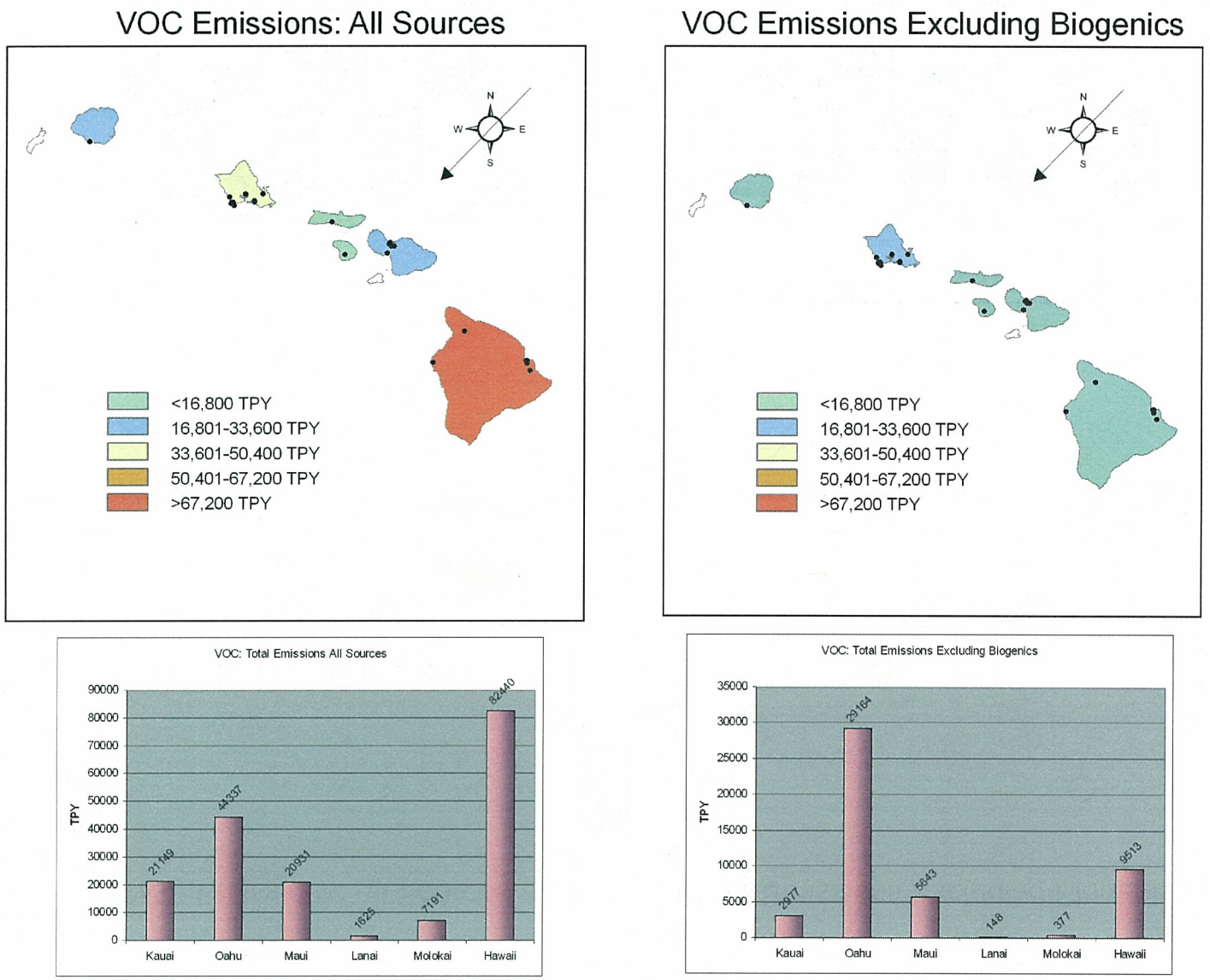


Figure 33. VOC NEI



2. Source Emissions Conclusions

- KAUAI
  - Of the four counties, Kauai has the least number of NEI sources;
  - Of the four counties, Kauai has the least amount of emissions.

- OAHU
  - Oahu has the most NEI emission sources;
  - Oahu has the most on and off road emissions;
  - Oahu has the highest amount of CO, SO_2, NO_2, and VOCs due to anthropogenic sources;
  - The majority of NEI emission sources are on the leeward side of the island, mainly at Campbell Industrial Park west of Honolulu.

- MAUI (includes Molokai and Lanai)
  - Maui has the highest amount of PM_{10} emissions and a relatively high amount of $PM_{2.5}$ emissions;
  - Maui's emission sources are located in the central valley, unlike the other islands where the majority of sources are located along the coasts.

- HAWAII
  - Hawaii has the highest amount of biogenic SO_2 emissions;
  - Hawaii has the second highest amount of CO emissions due to on-road mobile sources;
  - Hawaii has relatively high particulate levels.

D. Meteorological and Geographical Characteristics

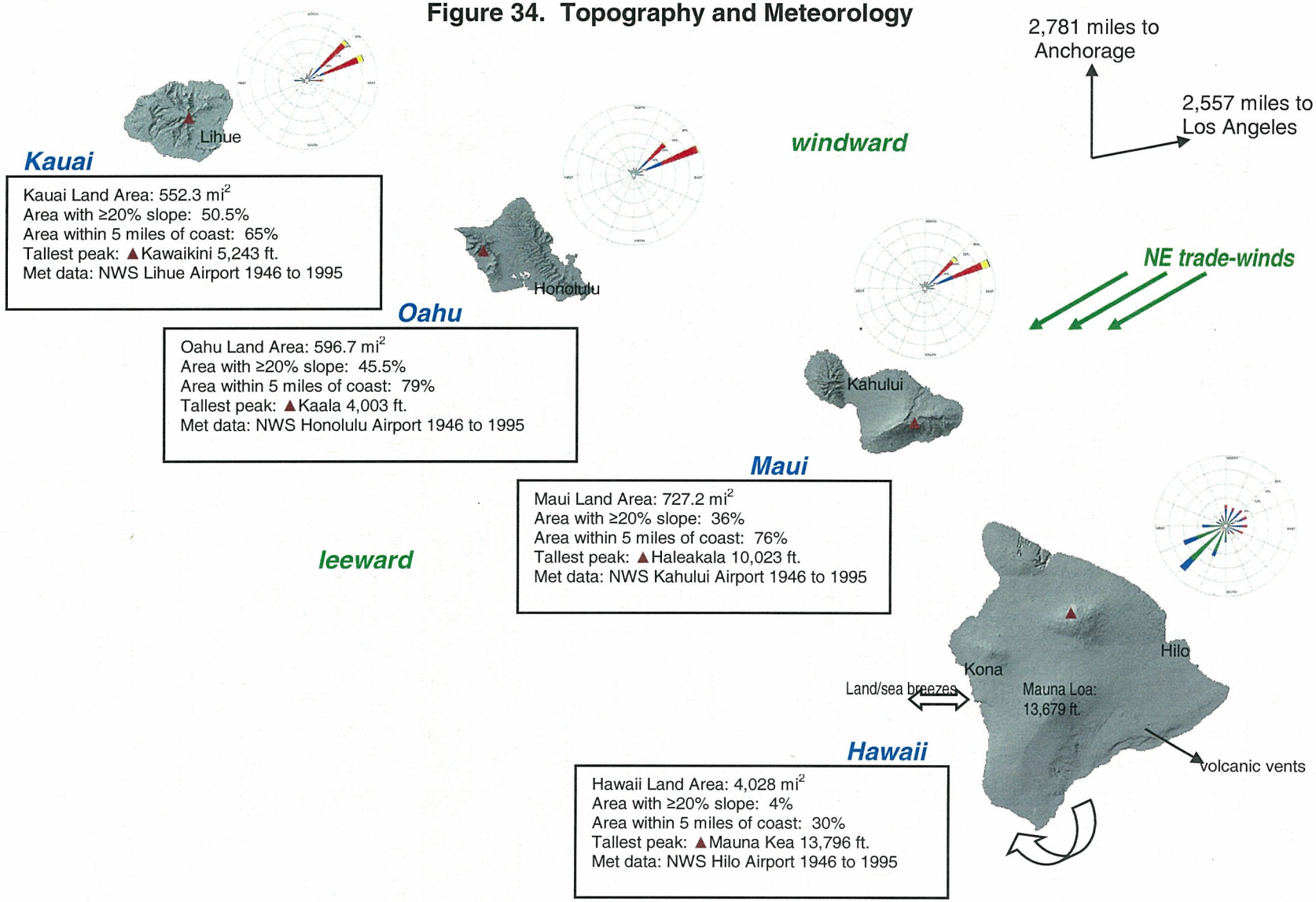
Hawaii is the only state surrounded by ocean and in the tropics. The land masses in the Hawaiian Archipelago are summits of a volcanic chain totaling 6,423 square miles.[1] The four main populated islands of Kauai, Oahu, Maui and Hawaii total 5,904 square miles. Kauai, farthest north, is the oldest island as evidenced by highly eroded valleys.[2] Hawaii island, farthest south, is the youngest and largest island, and contains the active Kilauea volcano. Generally, Hawaii experiences:

- moderate tropical weather;
- northeast trade-winds from the central Pacific high pressure system (Pacific High);
- basically two seasons [2]:
  - May to September with trade-winds 80-95% of the time;
  - October to April with trade-winds 50-80% of the time.

Figure 34 provides topographical and meteorological summaries of the four main populated islands in the state.

[1] State of Hawaii Dept. of Business, Economic Development and Tourism: 2008 State of Hawaii Data Book
[2] Western Regional Climate Center Desert Research Institute

Figure 34. Topography and Meteorology



Kauai

Kauai Land Area: 552.3 mi^2
Area with ≥20% slope: 50.5%
Area within 5 miles of coast: 65%
Tallest peak: ▲Kawaikini 5,243 ft.
Met data: NWS Lihue Airport 1946 to 1995

Oahu

Oahu Land Area: 596.7 mi^2
Area with ≥20% slope: 45.5%
Area within 5 miles of coast: 79%
Tallest peak: ▲Kaala 4,003 ft.
Met data: NWS Honolulu Airport 1946 to 1995

Maui

Maui Land Area: 727.2 mi^2
Area with ≥20% slope: 36%
Area within 5 miles of coast: 76%
Tallest peak: ▲Haleakala 10,023 ft.
Met data: NWS Kahului Airport 1946 to 1995

Hawaii

Hawaii Land Area: 4,028 mi^2
Area with ≥20% slope: 4%
Area within 5 miles of coast: 30%
Tallest peak: ▲Mauna Kea 13,796 ft.
Met data: NWS Hilo Airport 1946 to 1995

Geographic information from State of Hawaii DBEDT:
2008 State of Hawaii Data Book

When the winds shift to the south/southeast direction, volcanic haze (vog) can be transported as far up the island chain as Kauai. During these periods when the normal trade-winds cease, the windward side of the islands are impacted by the vog in combination with pollutants from the leeward side. Figures 35 and 36 are models from the National Weather Service that show how the vog can be transported up the island chain during non-prevalent, or southeasterly wind conditions.

Figure 35. National Weather Service Haze Projection Model during SE Winds

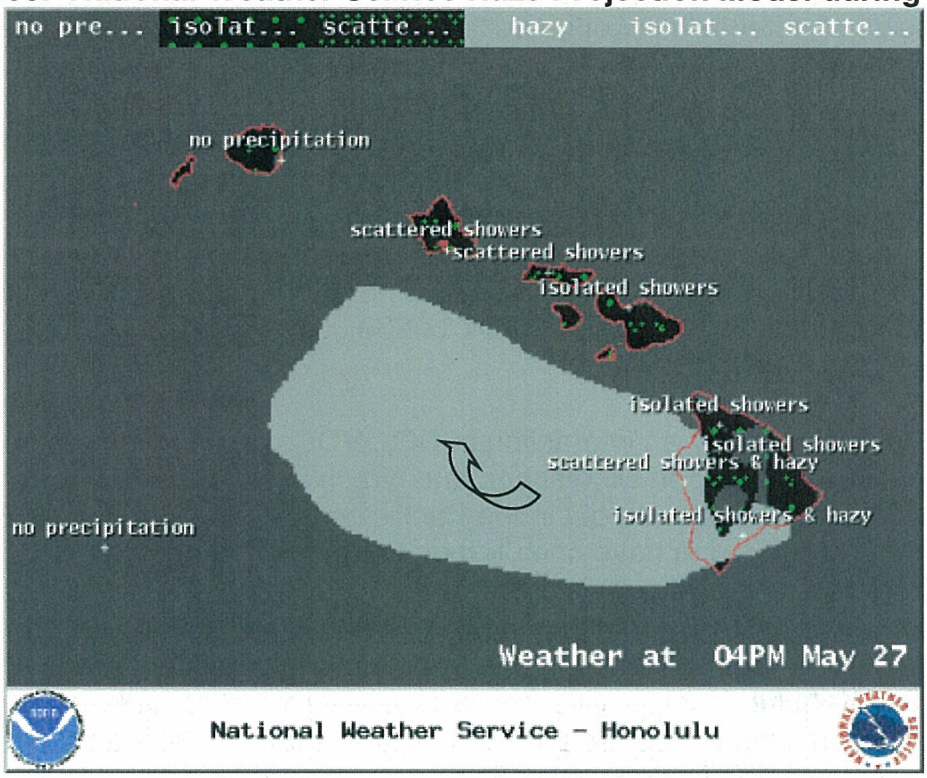
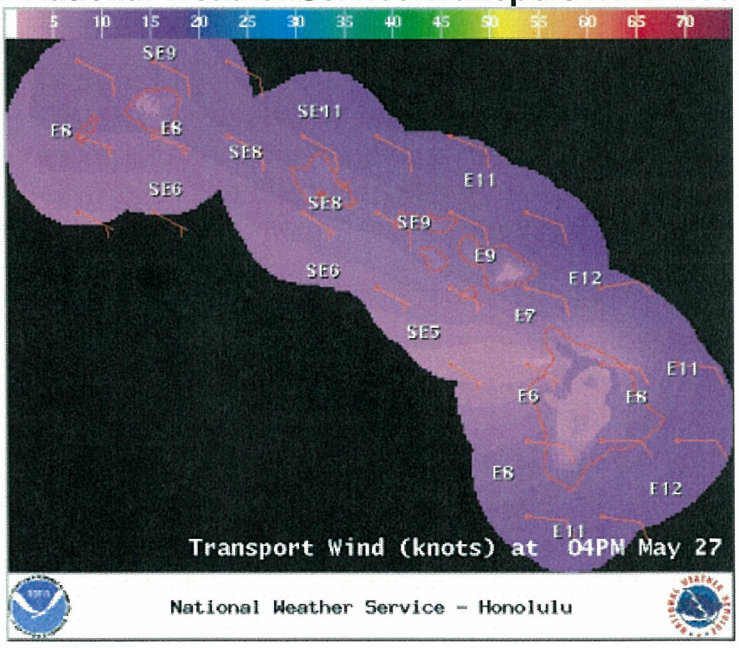


Figure 36. National Weather Service Transport Wind Model: SE Winds



E. New NAAQS Monitoring

1. Anticipated NAAQS Revisions

Over the next few years, all of the current NAAQS will be re-evaluated and possibly updated. Therefore, changes to the monitoring network largely depend upon any revised or new monitoring requirements promulgated as a result of the NAAQS reviews. Based upon preliminary EPA information, following is a discussion of potential network modifications for NO_2, O_3, SO_2, Pb, and CO.

NO_2

- There will be a near-roadway monitoring requirement for the Honolulu MSA. Currently neither of the two NO_2 monitors are near roadway, therefore new monitoring will have to be established;
- The second monitoring requirement for roadways that have >250,000 average annual daily traffic (AADT) will not be required as the most traveled road in Honolulu had a 2009 AADT of 230,000.

O_3

- O_3 is formed by an interaction of NO_2, VOCs and sunlight and the area of impact depends upon wind speed and direction. For the Hawaiian islands, that impact zone occurs out in the Pacific ocean. The Honolulu MSA is currently required to have one O_3 monitor and that is not expected to change with the O_3 monitoring revisions;
- If EPA requires monitoring in Micropolitan Statistical Areas, then the state will establish O_3 monitoring in one or all three micropolitan areas of Kapaa, Kauai; Kahului, Maui; or Hilo, Hawaii, depending upon the final rule;
- If monitoring will be required in federal or state wilderness areas, the state will work with the National Park Service to possibly establish O_3 monitoring in Haleakala National Park on Maui or Volcanoes National Park on Hawaii.

SO_2

- One monitor will be required in the Honolulu MSA in the area of maximum 1-hour SO_2 concentration based on modeling;
- One monitor will also be required in the area of maximum 1-hour SO_2 concentration in the state. If biogenic sources are included, this area will be on the island of Hawaii where there are already six SO_2 monitors.

Pb

- Using the 2005 emissions inventory, there were no sources in the state with Pb emissions > 0.5 tons per year (tpy), therefore Hawaii is not expecting to do source monitoring. However, if the latest validated 2008 NEI shows any source at >0.5 tpy of Pb, Hawaii will comply with the source monitoring requirement.

CO

- If there is a near roadway monitoring requirement, the state will probably incorporate this component with the near roadway NO_2 monitoring, pending guidance.

2. Discussion of Monitoring Impacts

Since monitoring guidance for any NAAQS revisions is not likely to be issued in time for this assessment, compliance with new monitoring requirements will be dependent upon final siting guidance for each revised NAAQS.

Following are preliminary ambient monitoring plans based on proposed changes to the criteria pollutant NAAQS.

NO_2 and CO Near Roadway Monitoring

The Pearl City station (PC) 150032004 is located between two heavily traveled roadways in a populated area. It is less than 30 meters downwind during prevalent northeasterly winds from a major thoroughfare and is also approximately 1.5 km upwind from a freeway having the highest AADT in the Honolulu MSA.

Unless the station does not meet the promulgated guidance, PC will be considered for near roadway monitoring.

O_3 Urban and Non-urban Monitoring

Urban Monitoring

The proposed modification for urban O_3 monitoring in MSAs of populations from 50,000 to <350,000 will not impact Hawaii since there is only one MSA in the state. Therefore, one O_3 monitor is still expected to be the requirement in the Honolulu MSA.

Non-Urban Monitoring

Hawaii may be required to establish a new O_3 monitoring site based on EPA's proposal of establishing at least one monitor in areas such as federal or state parks or wilderness areas. The state will await final rulemaking before addressing this objective. If required, Haleakala National Park on Maui and Hawaii Volcanoes National Park on Hawaii will be considered.

The second objective calls for possible monitoring in Micropolitan Statistical Areas. There are three micropolitan areas in the state: Kapaa, Kauai; Kahului, Maui; and Hilo, Hawaii that can be considered for new non-urban O_3 monitoring. However, because of the state's unique geographical and meteorological situation whereby O_3 is formed over the ocean, consultations with EPA will be pursued prior to implementation of any supplemental O_3 monitoring.

The third objective requiring O_3 monitors to be located in areas of expected maximum concentration outside of the MSA to detect far downwind transport zones, again this will have to be negotiated with EPA. The Hawaiian island chain is the most isolated land mass in the world and O_3 transport issues would most likely not affect any other state in the nation.

SO_2 1-hour NAAQS

Population Weighted Emissions Index (PWEI) Triggered Monitoring

Hawaii will be required to have one PWEI triggered SO_2 monitoring site in the area of maximum expected 1-hour concentrations. This will most likely be in Kapolei or Makakilo on the island of Oahu, based on location of emission sources and population. The site will be selected based on final siting guidance but the NCORE station in Kapolei may be considered. Updated SO_2 modeling will be conducted to ensure proper placement of the monitor.

Monitoring based on state-level SO_2 contributions

EPA is proposing a second objective of monitoring for SO_2 based on the percent contribution of each state to the national anthropogenic SO_2 emission inventory. For Hawaii, this would equate to one additional required monitor. Since the placement of this second monitor will be independent of PWEI or CBSAs, it will most likely be one of the already established SO_2 monitors on the island of Hawaii. Although SO_2 emissions on Hawaii are not due to anthropogenic sources, but rather due to a volcano, the highest levels of SO_2 in the state are found on this island.

Pb Monitoring

There is currently one Pb monitor associated with the Air Toxics monitoring program. Additionally, if required, there will be an additional Pb monitor at the NCORE station in Kapolei.

Based on the current rule, states would have to establish source monitoring for facilities emitting one or more tons per year of Pb. Based on the 2005 NEI, there are no sources in the state that will require monitoring.

The Pb source monitoring requirement is under EPA review and the proposal is to lower the emission trigger level to those facilities emitting 0.5 or more tons per year. If this is promulgated, the state will re-evaluate the latest NEI to determine if there are any sources that would require monitoring.

IV. Final Conceptual Model of the Air Monitoring Network

Bringing together all of the assessment elements, the following table and map depict the vision for the state's ambient air monitoring network over the course of the next five years. Many factors, such as funding, resources and final monitoring guidance for any new or revised NAAQS, must be considered prior to the network modifications becoming a reality.

Table 6. Final Recommendations for the State of Hawaii Ambient Air Monitoring Network: 2011 to 2015

Assessment	Recommendation
State monitoring priorities	1. Monitoring volcanic emissions (HL, MV, PE, PA, OV, KN, new Waikaloa) 2. NAAQS compliance (DH, PC, KA, HL, KN) 3. NCORE (KA) 4. Monitoring for new or revised NAAQS (PC, KA, HL, new Lihue, new Kahului) 5. Special purpose monitoring for geothermal and cruise ship emissions (PE, PH, new Lihue)
Area or data gaps	1. Environmental justice, high asthma rates on the Waianae coast 2. High particulate emissions in Maui's central valley 3. Particulates in urban area of Kailua on the windward side of Oahu
Low value/problem sites	1. Close the West Beach station (150030011): data of low value 2. Kihei station (150090006): - subdivision is scheduled to be built next to the station; - cane-burning may be phased out over the next 5 years as sugar may be replaced with other crops (see Appendix 2); - maintain station for cane-burning but consider closing if/when cane-burning is no longer an issue or if the subdivision becomes an obstacle to the station 3. Close Sand Island station (150031004): improper siting for O_3 and is within 1 mile of $PM_{2.5}$ monitoring at DH (150031001) - location is downwind and near a large body of water (Honolulu Harbor), a large utility source (Honolulu Electric Company), and peak downtown traffic, all of which may cause O_3 interference; - $PM_{2.5}$ monitoring is redundant since DH is approximately 1 mile from Sand Island; - land owner agreement allows the station to be located at the site on a month-to-month basis only - O_3 monitoring to start at the NCORE station (150030010); data can be compared for three years to determine feasibility of closing O_3 monitoring at the SI station
New or revised NAAQS monitoring	1. Near roadway monitoring for NO_2 and possibly CO. May be able to use the PC station (150032004) for both, depending upon EPA siting guidance for both pollutants 2. SO_2 monitoring in area of maximum 1-hour concentration in the Honolulu MSA. Might be located in the Kapolei/Makakilo area of Oahu, possibly at NCORE 3. O_3 monitoring in micropolitan statistical areas of Kapaa, Kauai; Kahului, Maui; and/or Hilo, Hawaii will be based on final EPA monitoring requirement

Figure 37. Proposed State of Hawaii Ambient Air Monitoring Network for 2011 to 2015