



# MOTOR VEHICLE THEFT ANALYSIS USING SQL

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# INTRODUCTION

- The project involves using **SQL** to analyze 6 months stolen vehicle data collected from the **New Zealand Police** department's database.
- The database '**stolen\_vehicle\_db**' contain three tables;
  - Locations
  - Make\_details
  - Stolen\_vehicles

# DATABASE MODELING

## Locations Table

	location_id	region	country	population	density
▶	101	Northland	New Zealand	201500	16.11
	102	Auckland	New Zealand	1695200	343.09
	103	Waikato	New Zealand	513800	21.50
	104	Bay of Plenty	New Zealand	347700	28.80
	105	Gisborne	New Zealand	52100	6.21
	106	Hawke's Bay	New Zealand	182700	12.92
	107	Taranaki	New Zealand	127300	17.55
	108	Manawatū-Whanganui	New Zealand	258200	11.62
	109	Wellington	New Zealand	543500	67.52
	110	Tasman	New Zealand	58700	6.10

## Make details Table

	make_id	make_name	make_type
▶	501	Aakron Xpress	Standard
	502	ADLY	Standard
	503	Alpha	Standard
	504	Anglo	Standard
	505	Aprilia	Standard
	506	Atlas	Standard
	507	Audi	Standard
	508	Bailey	Standard
	509	Bedford	Standard
	510	Benelli	Standard

## Stolen\_Vehicles Table

	vehide_id	vehide_type	make_id	model_year	vehide_desc	color	date_stolen	location_id
▶	1	Trailer	623	2021	BST2021D	Silver	2021-11-05	102
	2	Boat Trailer	623	2021	OUTBACK BOATS FT470	Silver	2021-12-13	105
	3	Boat Trailer	623	2021	ASD JETSKI	Silver	2022-02-13	102
	4	Trailer	623	2021	MSC 7X4	Silver	2021-11-13	106
	5	Trailer	623	2018	D-MAX 8X5	Silver	2022-01-10	102
	6	Roadbike	636	2005	YZF-R6T	Black	2021-12-31	102
	7	Trailer	623	2021	CAAR TRANSPORTER	Silver	2021-11-12	114
	8	Boat Trailer	623	2001	BOAT	Silver	2022-02-22	109
	9	Trailer	514	2021	7X4-6" 1000KG	Silver	2022-02-25	115
	10	Trailer	514	2020	8X4 TANDEM	Silver	2022-01-03	114

## TOTAL POPULATION

```
-- The total population in the country
SELECT
    FORMAT(SUM(population), 'N') as total_population
FROM locations;
```

RESULT

	total_population
▶	5,123,200

## TOTAL NUMBER OF REGIONS

```
-- The total number of regions
SELECT
    COUNT(DISTINCT region) AS no_of_regions
FROM locations;
```

RESULT

	no_of_regions
▶	16

**5,123,200**

Citizens

**16**

Regions

## NUMBER OF STOLEN VEHICLES

```
-- Total number of stolen vehicles in the past six months
SELECT
    COUNT(vehicle_id) as total_stolen_vehicles
FROM stolen_vehicles;
```

RESULT

	total_stolen_vehicles
▶	4553

**4,553**

Vehicles stolen

**25**

Avg Vehicle stolen  
per day

## AVERAGE NUMBER OF VEHICLES STOLEN PER DAY

```
-- AVERAGE NUMBER OF CAR STOLEN PER DAY
SELECT
    ROUND(COUNT(vehicle_id) / DATEDIFF(MAX(date_stolen), MIN(date_stolen)), 0)
    AS avg_car_stolen_per_day
FROM stolen_vehicles;
```

RESULT

	avg_car_stolen_per_day
▶	25

# TIME SERIES ANALYSIS OF VEHICLE THEFT

**March, 2022**

*Month with Highest  
vehicle theft*

**Monday**

*Day of Week with Highest  
vehicle theft*

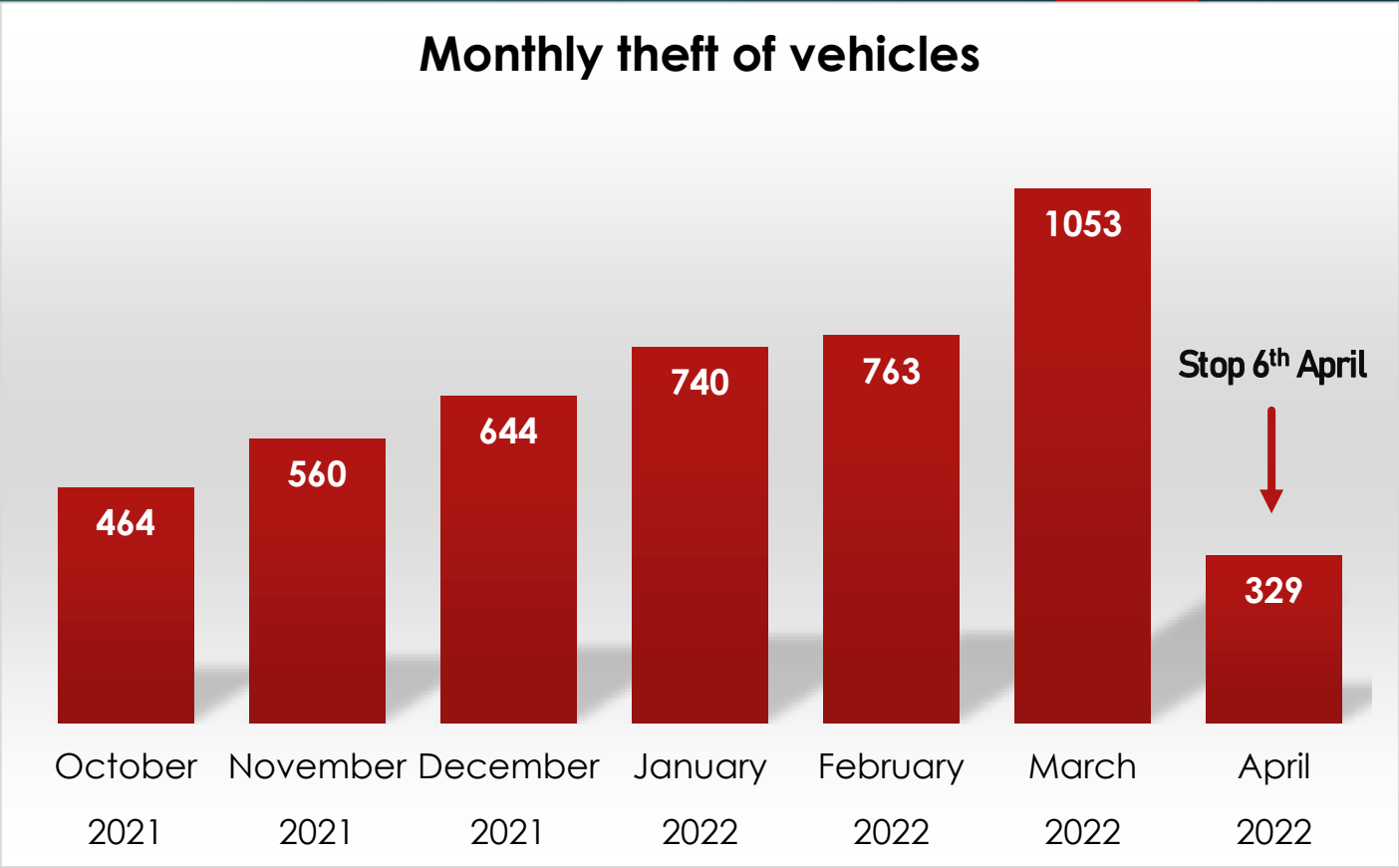


# TOTAL VEHICLES STOLEN BY MONTH

```
-- What month had the highest number of stolen vehicles
SELECT
    YEAR(date_stolen) AS year,
    MONTH(date_stolen) AS month,
    MONTHNAME(date_stolen) AS month_name,
    COUNT(vehicle_id) AS no_of_stolen_vehicles
FROM stolen_vehicles
GROUP BY 1, 2, 3
ORDER BY 1, 2;
```

## RESULT

	year	month	month_name	no_of_stolen_vehides
▶	2021	10	October	464
	2021	11	November	560
	2021	12	December	644
	2022	1	January	740
	2022	2	February	763
	2022	3	March	1053
	2022	4	April	329



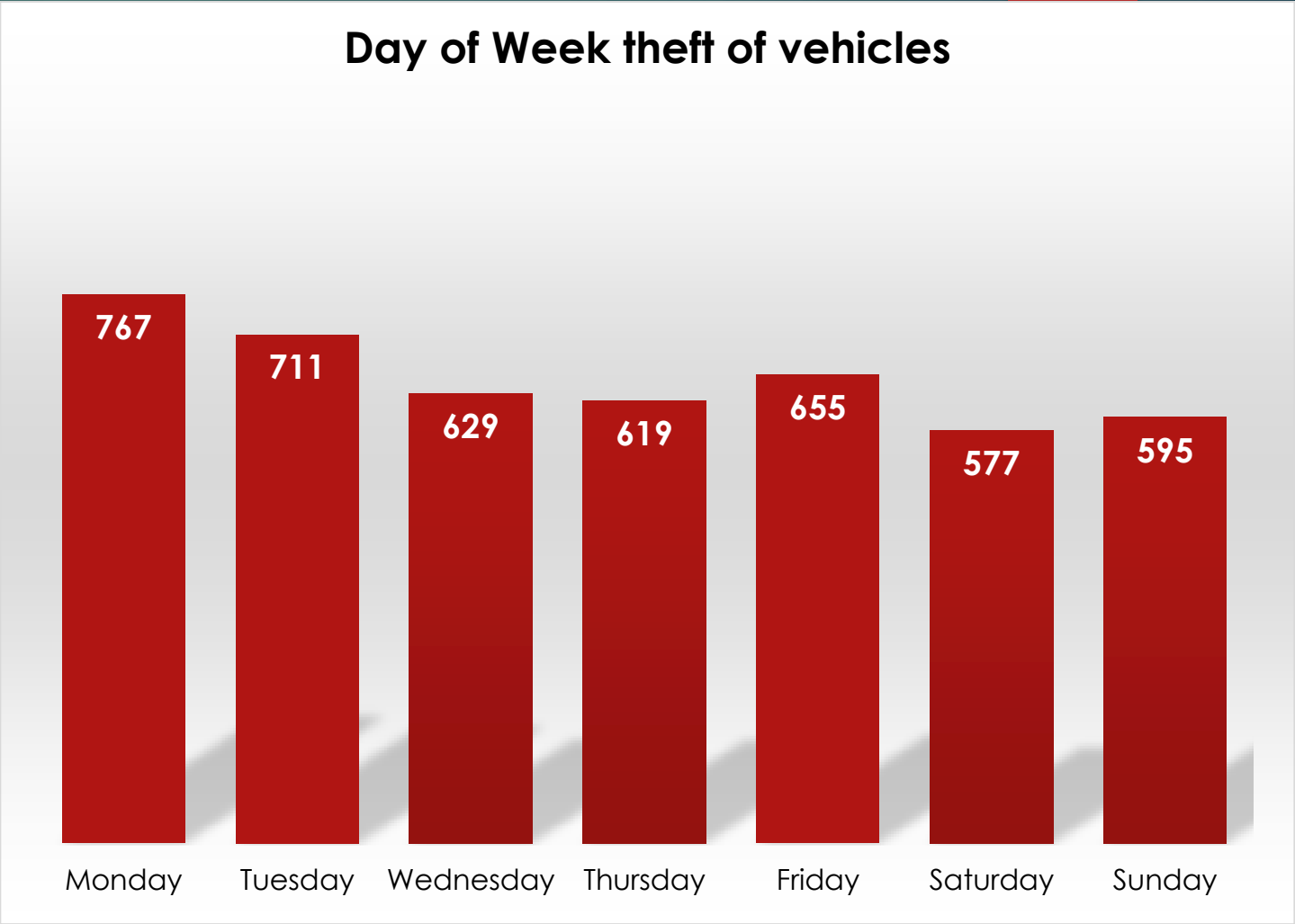
Steady rise in vehicle theft every month

# TOTAL VEHICLES STOLEN BY DAY OF WEEK

```
SELECT
    DAYNAME(date_stolen) AS day_of_week,
    COUNT(vehicle_id) AS no_of_stolen_vehicles
FROM stolen_vehicles
GROUP BY 1
ORDER BY no_of_stolen_vehicles DESC;
```

## RESULT

	day_of_week	no_of_stolen_vehicules
▶	Monday	767
	Tuesday	711
	Friday	655
	Wednesday	629
	Thursday	619
	Sunday	595
	Saturday	577



Vehicle theft occurs most on Monday and Tuesday



# THEFT ANALYSIS BY VEHICLE TYPES

**25**

*Vehicle Types*

**Station Wagon**

*Most Stolen*

- **Special Purpose**
- **Articulated Truck**

*Least Stolen*

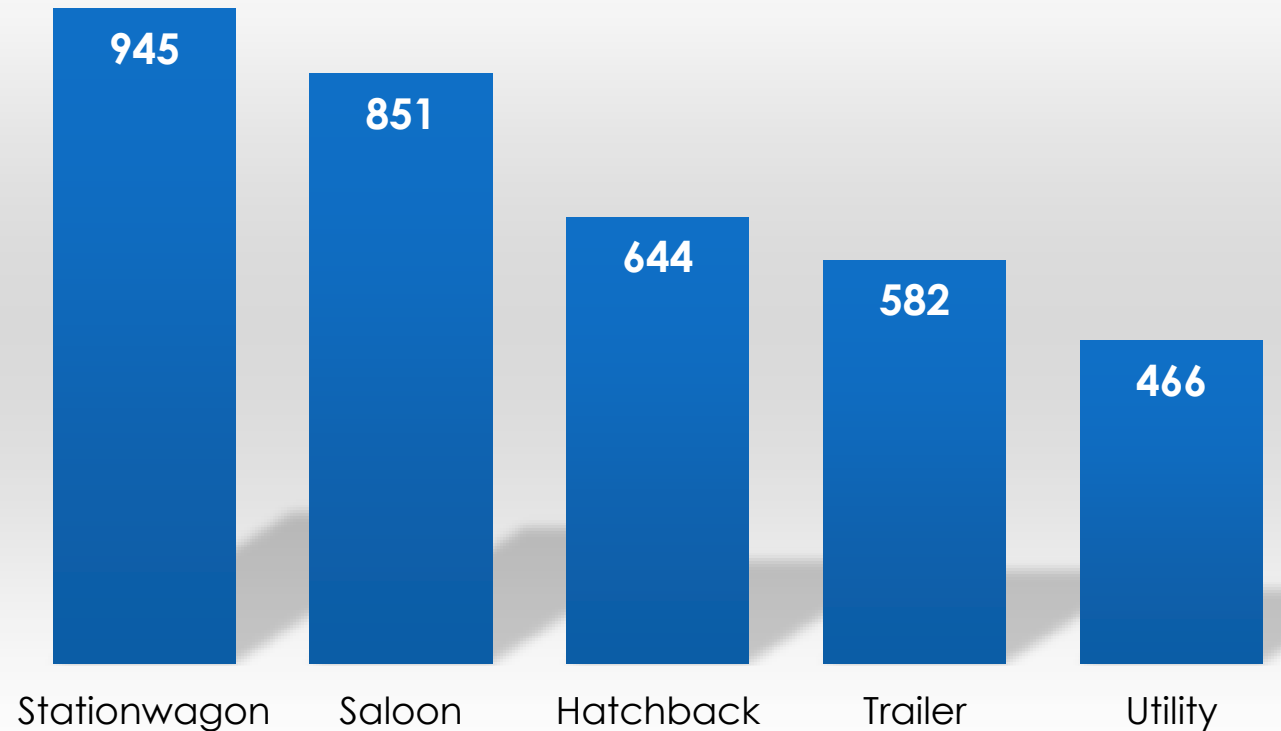
## TOP FIVE STOLEN VEHICLE TYPES

```
-- Top five most stolen vehicle types
SELECT
    vehicle_type,
    COUNT(vehicle_id) AS top_5_stolen_vehicle_types
FROM stolen_vehicles
GROUP BY vehicle_type
ORDER BY 2 DESC
LIMIT 5;
```

### RESULT

	vehide_type	no_of_vehides
►	Stationwagon	945
	Saloon	851
	Hatchback	644
	Trailer	582
	Utility	466

Top 5 stolen vehicle types



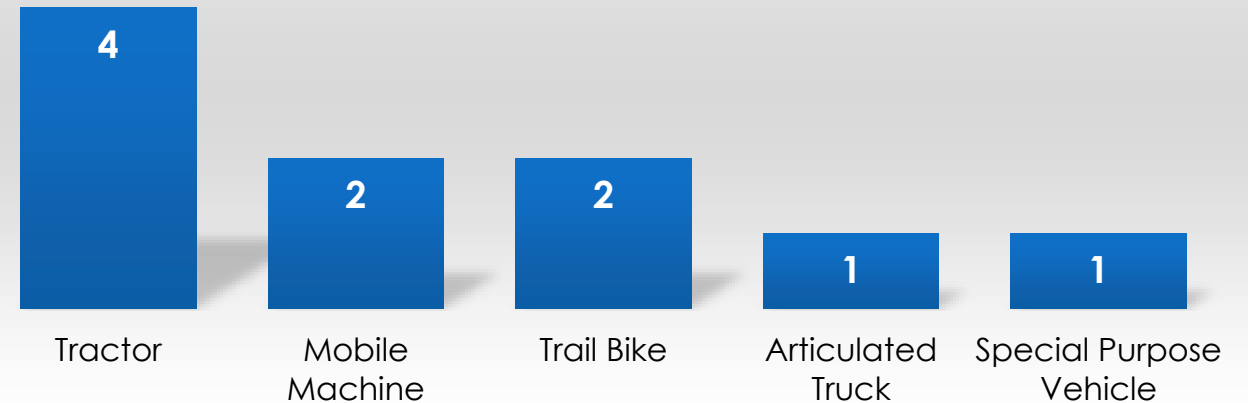
# LEAST FIVE STOLEN VEHICLE TYPES

```
-- Least five stolen vehicle types
SELECT
    vehicle_type,
    COUNT(vehicle_id) AS least_5_stolen_vehicle_types
FROM stolen_vehicles
GROUP BY vehicle_type
ORDER BY 2 ASC
LIMIT 5;
```

## RESULT

	vehicle_type	no_of_vehicles
▶	Articulated Truck	1
	Special Purpose Vehicle	1
	Mobile Machine	2
	Trail Bike	2
	Tractor	4

## Least 5 stolen vehicle types

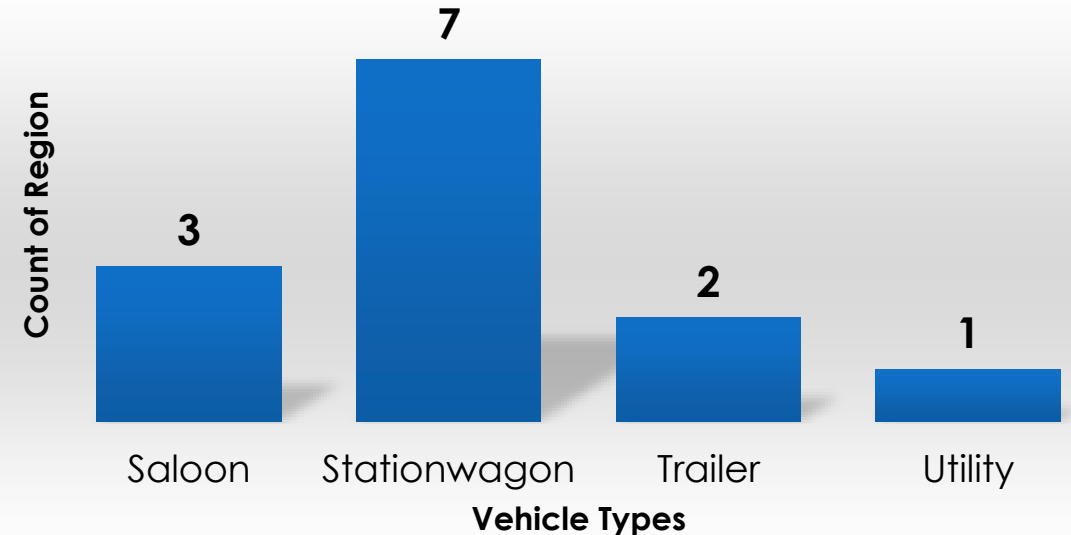


# TOP VEHICLE TYPES STOLEN BY REGION

```
133 -- Which vehicle type rank top as stolen by region
134 • WITH cte1 AS (
135     SELECT
136         l.region,
137         s.vehicle_type,
138         COUNT(s.vehicle_id) AS no_of_vehicles
139     FROM stolen_vehicles s
140     JOIN locations l
141         ON s.location_id = l.location_id
142     GROUP BY 1, 2
143     ORDER BY 1, 3 DESC)
144 SELECT
145     region,
146     vehicle_type,
147     no_of_vehicles
148 FROM (SELECT
149     region,
150     vehicle_type,
151     no_of_vehicles,
152     ROW_NUMBER() OVER(PARTITION BY region) AS ranking
153 FROM cte1) sub
154 WHERE ranking < 2
155 ORDER BY no_of_vehicles DESC;
```

	region	vehicle_type	no_of_vehicles
▶	Auckland	Saloon	327
	Canterbury	Stationwagon	165
	Bay of Plenty	Utility	100
	Wellington	Stationwagon	92
	Waikato	Saloon	80
	Northland	Stationwagon	69
	Gisborne	Saloon	41
	Otago	Stationwagon	31
	Manawatū-Whanganui	Stationwagon	29
	Hawke's Bay	Trailer	23
	Taranaki	Stationwagon	23
	Nelson	Trailer	19
	Southland	Stationwagon	9

Top vehicle types stolen by regions



# VEHICLE THEFT ANALYSIS

## BY

## REGION

**16**

*Total Regions*

**AUCKLAND**

*Most Populated Region*

**WEST COAST**

*Least Populated Region*

**AUCKLAND**

*Region with most theft*

**Tasman | Marlborough | West Coast**

*Regions with no theft*

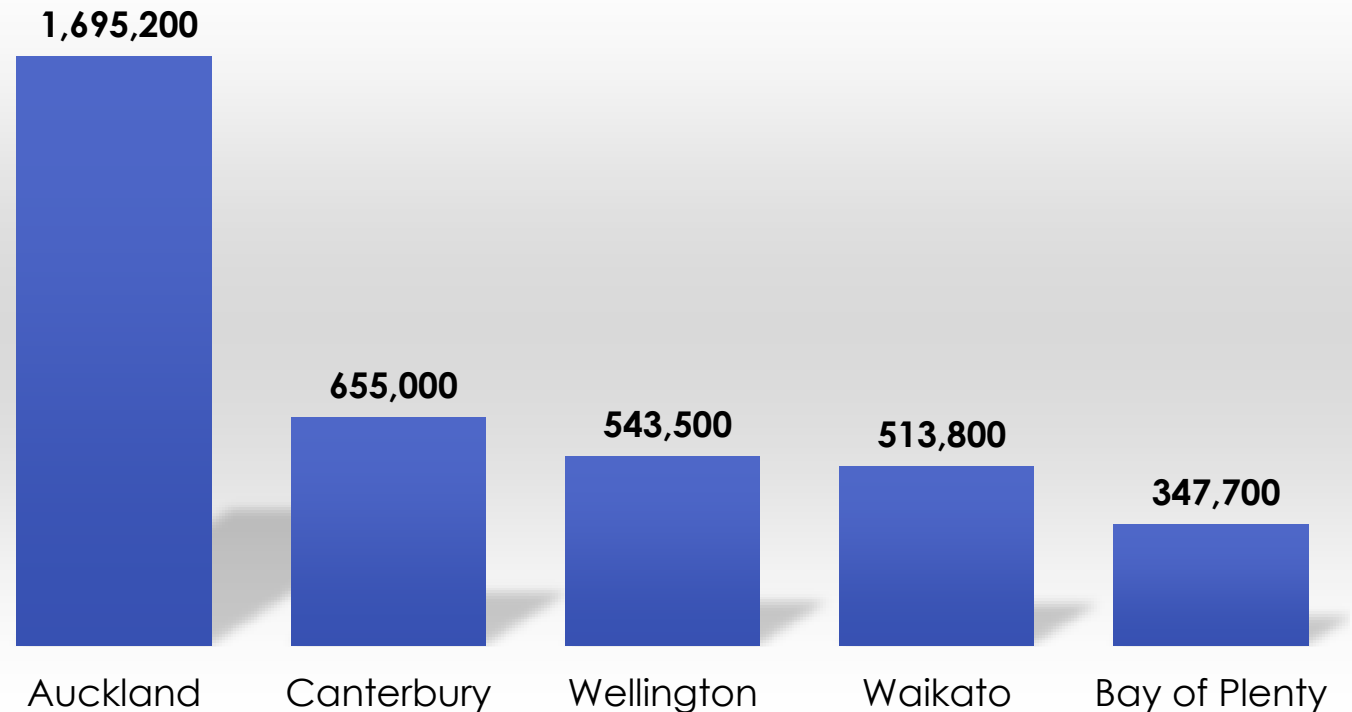
# TOP 5 POPULATED REGIONS

```
-- The five top populated regions
SELECT
    region AS top_5_regions,
    population
FROM locations
ORDER BY 2 DESC
LIMIT 5;
```

## RESULT

	top_5_regions	population
▶	Auckland	1695200
	Canterbury	655000
	Wellington	543500
	Waikato	513800
	Bay of Plenty	347700

Top 5 most populated regions



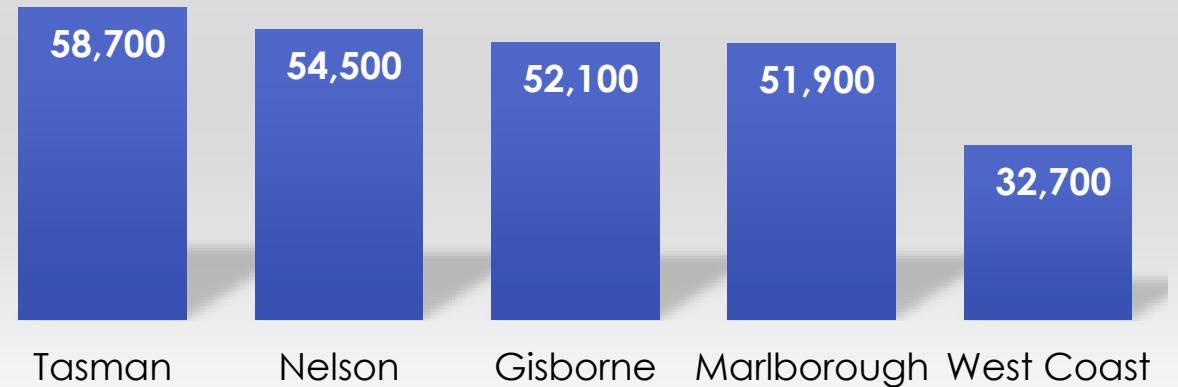
# LEAST 5 POPULATED REGIONS

```
-- The five least populated regions
WITH cte2 AS (
    SELECT
        region,
        population,
        ROW_NUMBER() OVER(ORDER BY population DESC) AS ranking
    FROM locations)
SELECT
    region AS bottom_5_regions,
    population
FROM cte2
WHERE ranking > 11;
```

## RESULT

	bottom_5_regions	population
▶	Tasman	58700
	Nelson	54500
	Gisborne	52100
	Marlborough	51900
	West Coast	32700

## 5 least populated regions





## REGION WITH MOST STOLEN VEHICLES

```
-- Which location has the most number of stolen vehicles
SELECT
    l.region,
    COUNT(s.vehicle_id) AS no_of_vehicles_stolen
FROM locations l
    LEFT JOIN stolen_vehicles s
        ON l.location_id = s.location_id
GROUP BY 1
ORDER BY 2 DESC
LIMIT 1;
```

### RESULT

	region	no_of_vehicles_stolen
►	Auckland	1638

## REGIONS WITH NO VEHICLE THEFT

```
-- Which region has not recorded car theft
SELECT
    l.region,
    COUNT(s.vehicle_id) AS no_of_stolen_vehicles
FROM locations l
    LEFT JOIN stolen_vehicles s
        ON l.location_id = s.location_id
GROUP BY 1
HAVING no_of_stolen_vehicles = 0;
```

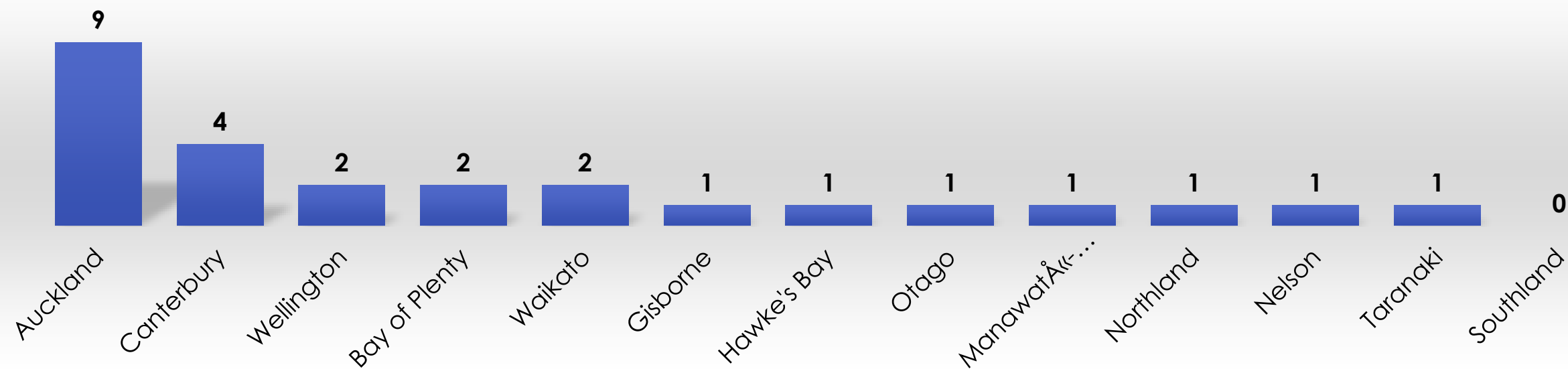
### RESULT

	region	no_of_stolen_vehicles
►	Tasman	0
	Marlborough	0
	West Coast	0

# AVERAGE NUMBER OF VEHICLE STOLEN PER DAY BY REGION

-- AVERAGE NUMBER OF CAR STOLEN PER DAY IN EACH REGION		region	avg_car_stolen_per_day
SELECT		Auckland	9
1.region,		Canterbury	4
ROUND(COUNT(s.vehicle_id) / DATEDIFF(MAX(s.date_stolen), MIN(s.date_stolen)), 0)		Wellington	2
AS avg_car_stolen_per_day		Bay of Plenty	2
FROM stolen_vehicles s		Waikato	2
JOIN locations l		Gisborne	1
ON s.location_id = l.location_id		Hawke's Bay	1
GROUP BY 1		Otago	1
ORDER BY 2 DESC;		Manawatū-Whanganui	1
		Northland	1
		Nelson	1
		Taranaki	1
		Southland	0

Average number of vehicle stolen per day by region



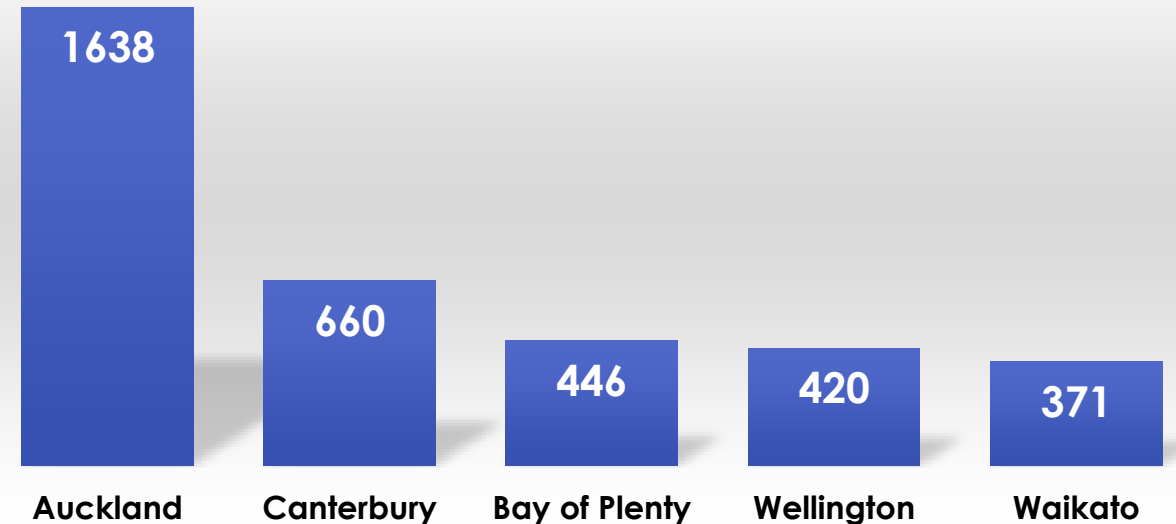
# TOP FIVE **REGIONS** WITH MOST THEFT

```
-- Top five locations that has the most number of stolen vehicles
SELECT
    l.region,
    COUNT(s.vehicle_id) AS no_of_vehicles_stolen
FROM locations l
    LEFT JOIN stolen_vehicles s
        ON l.location_id = s.location_id
GROUP BY 1
ORDER BY 2 DESC
LIMIT 5;
```

## RESULT

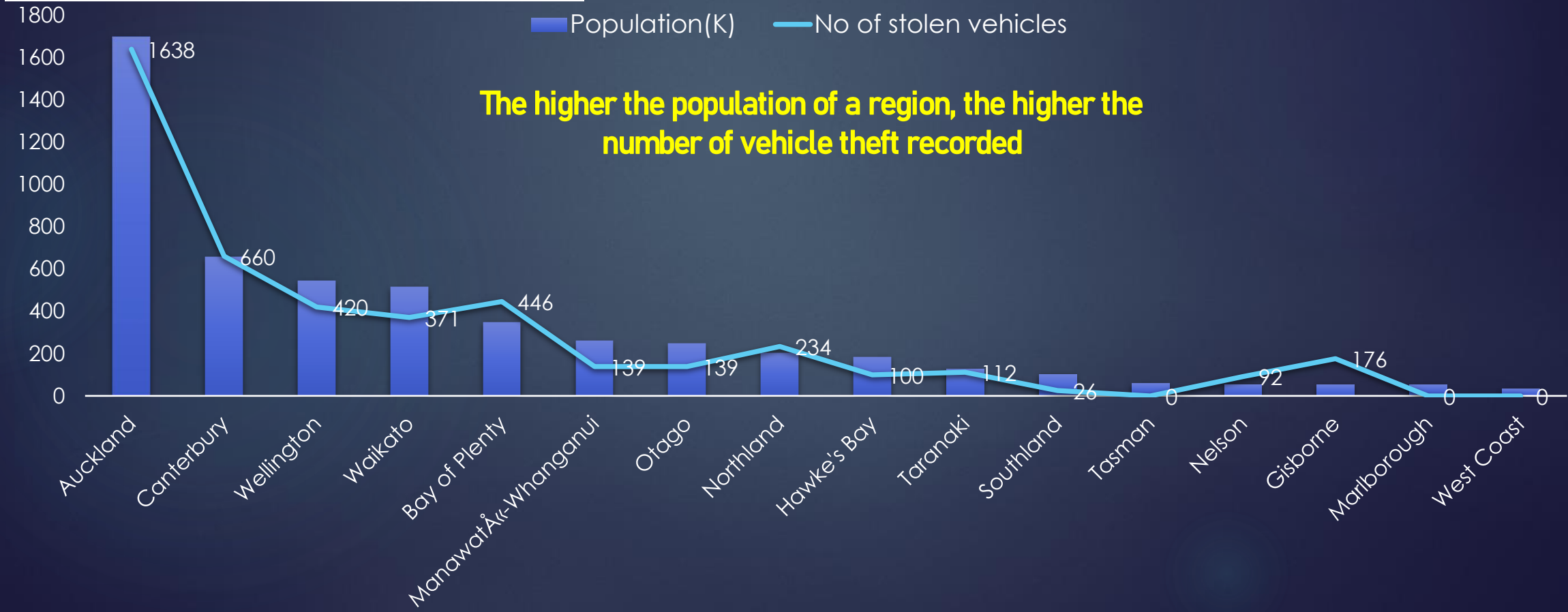
	region	no_of_vehicles_stolen
►	Auckland	1638
	Canterbury	660
	Bay of Plenty	446
	Wellington	420
	Waikato	371

## Top 5 regions with most vehicle theft



# POPULATION AND NUMBER OF VEHICLES THEFT BY **REGIONS**

```
SELECT
  l.region,
  l.population,
  COUNT(s.vehicle_id) AS no_of_stolen_vehicles
FROM locations l
LEFT JOIN stolen_vehicles s
  ON l.location_id = s.location_id
GROUP BY 1, 2
ORDER BY 3 DESC;
```



# VEHICLE THEFT ANALYSIS

## BY

### CAR MAKE

**138**

*Car Makes*

**Toyota**

*Most stolen*

# TOP 10 STOLEN CAR MAKE

```
-- Top 10 most stolen car make
```

```
SELECT
```

```
    m.make_name,
```

```
    COUNT(s.vehicle_id) AS no_of_stolen_vehicles
```

```
FROM make_details m
```

```
    JOIN stolen_vehicles s
```

```
        ON m.make_id = s.make_id
```

```
GROUP BY 1
```

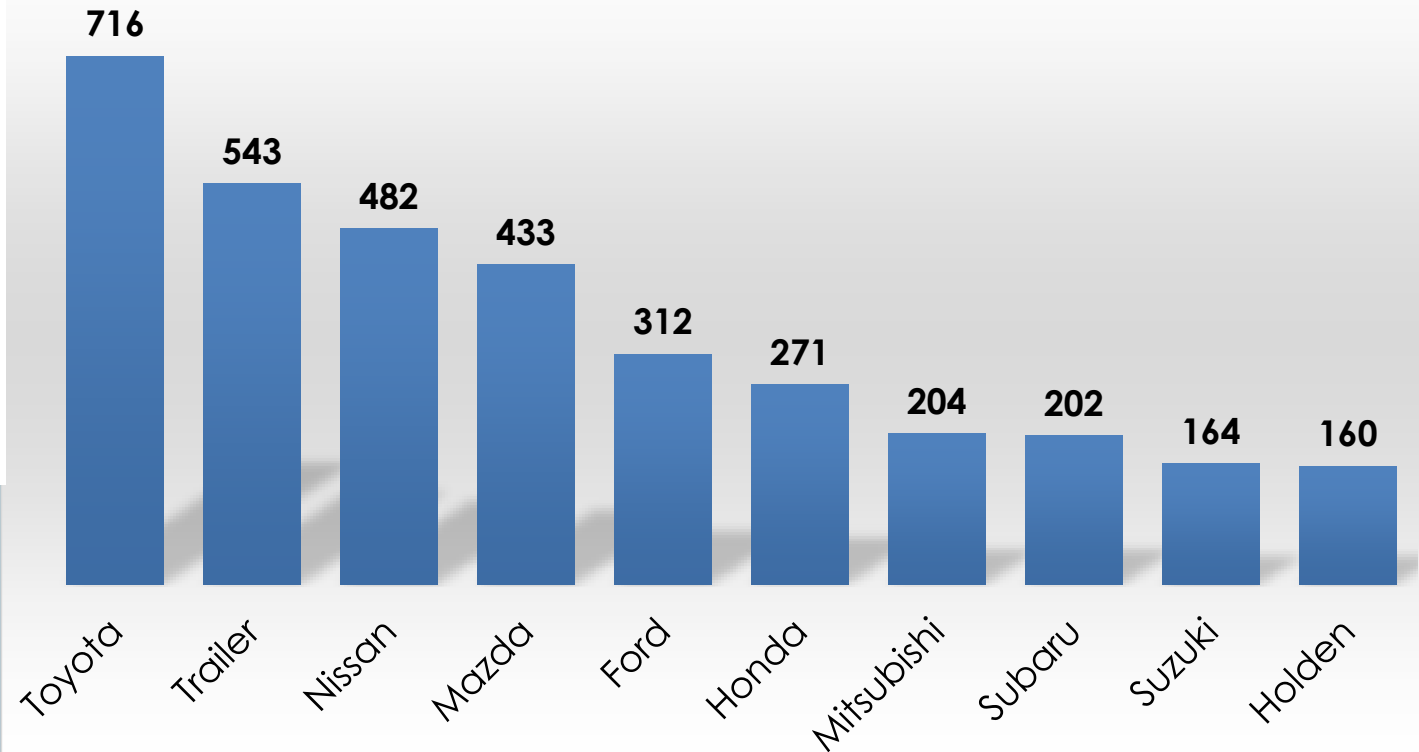
```
ORDER BY 2 DESC
```

```
LIMIT 10;
```

## RESULT

	make_name	no_of_stolen_vehicles
►	Toyota	716
	Trailer	543
	Nissan	482
	Mazda	433
	Ford	312
	Honda	271
	Mitsubishi	204
	Subaru	202
	Suzuki	164
	Holden	160

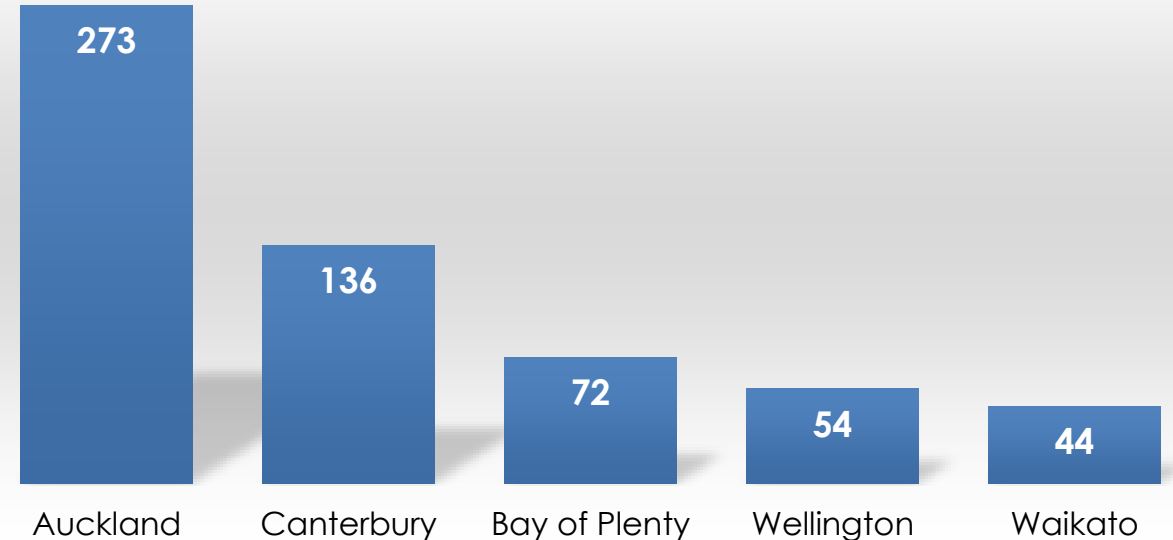
Top 10 stolen car make



# TOP 5 LOCATION WITH HIGH THEFT OF TOYOTA

```
-- Top five location that had the highest number of Toyota stolen
SELECT
    l.region,
    COUNT(s.vehicle_id) AS no_of_toyota_stolen
FROM locations l
    JOIN stolen_vehicles s
        ON l.location_id = s.location_id
    JOIN make_details m
        ON m.make_id = s.make_id
WHERE m.make_name = 'Toyota'
GROUP BY 1
ORDER BY 2 DESC
LIMIT 5;
```

Top 5 regions with Toyota theft



## RESULT

	region	no_of_toyota_stolen
▶	Auckland	273
	Canterbury	136
	Bay of Plenty	72
	Wellington	54
	Waikato	44



# ANALYSIS INSIGHTS

- A total of **4,553** Vehicles were reported stolen, with **25** vehicles stolen everyday on average.
- The monthly rate of vehicle theft rose gradually, reaching a peak of **1053** in **March 2022**.
- Monday and Tuesday saw the highest rates of theft

## By Vehicle Type & Car Make

- Saloons are the **second** most stolen vehicle type and rank top in three regions, while **Station Wagons**, the **most stolen** vehicle type, rank top in seven regions.
- **Toyota** cars are the most stolen vehicle make

# ANALYSIS INSIGHTS

## By Region

- The most populous region, **Auckland**, had the highest rate of vehicle theft with roughly **1638** incidents reported.
- In Auckland, **nine** vehicles are stolen on average every day.
- There was no vehicle theft in the West Coast, Marlborough, or Tasman regions.
- Vehicle thefts and population density in a given region are correlated. There were more car thefts in regions with a higher population