New Zealand drone research

June 2020

CIVIL AVIATION AUTHORITY OF NEW ZEALAND

Ministry of Transport
TE MANATŪ WAKA

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

COLMAR BRUNTON
A Kantar Company

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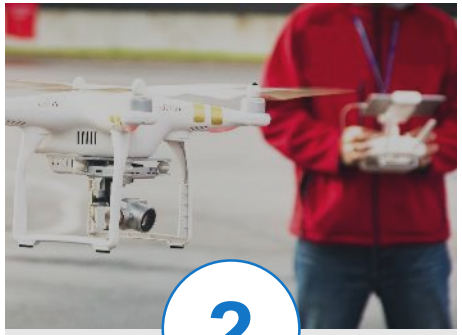

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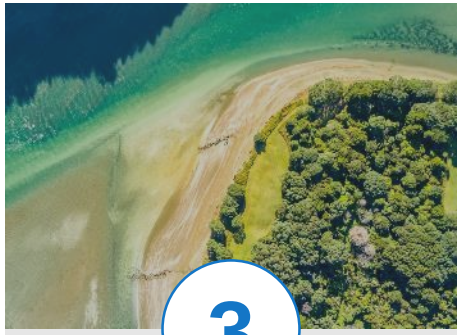

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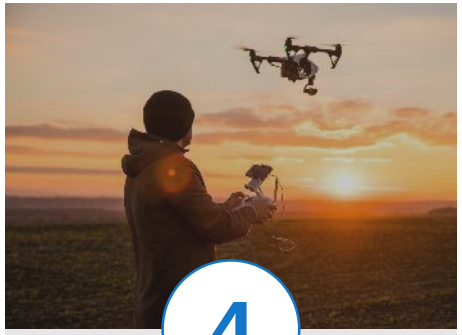

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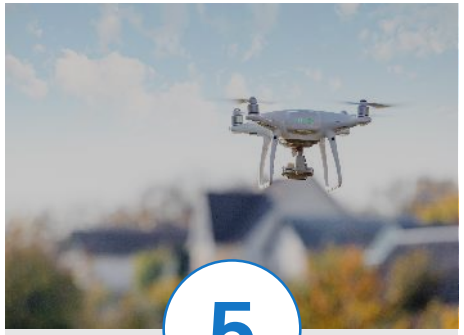

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Problems encountered around drone use and what, if any, action is taken

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Why drone research was needed

There was a knowledge gap

Three government agencies wanted to know more about drone use in New Zealand. The Civil Aviation Authority of New Zealand (CAA), the Ministry of Transport (MoT), and the Ministry of Business, Innovation and Employment (MBIE) all needed to understand drone usage in New Zealand, they had both common information needs, but also some differences.

The common end goal was to ensure the safety and security of all New Zealanders, while helping commercial drone users to thrive for the economic benefits of the country, and supporting recreational users as they pursue their hobby.

What we aimed to discover

- The incidence of recreational and commercial drone use in the New Zealand population
- The number and types of drones currently being operated in New Zealand
- How drones are being used in New Zealand, and potential future uses
- Knowledge about and attitudes towards drone use
- Problems encountered around drone use and what, if any, action is taken

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Summary of key findings

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What we did

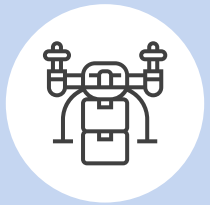
WHO WE SPOKE WITH AND HOW

Three different groups of respondents took part

NZ based recreational drone users aged 15+ years

Online survey,
1,441 completed interviews

Pages which only contain results from recreational users have a green triangle in the top right corner



NZ based commercial drone users aged 15+ years

Online and telephone survey,
450 completed interviews

Pages which only contain results from commercial users have a red triangle in the top right corner

Non-drone users aged 15+ years

Online survey,
1,038 completed interviews

Pages which only contain results from non-users have a yellow triangle in the top right corner

Further details about the research approach can be found in the appendix

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Notes to the reader: Only statistically significant differences at the 95% confidence level are reported.
Percentages in the charts may not always add to 100%, this is either because the question was multiple response, or due to rounding.
Nett percentages may not always add to the sum of their individual parts displayed in the charts, this is also due to rounding (for example 40.4% and 40.3% both round down to 40% but added together they round up to 81% not 80%).

Definition of a drone

All respondents were shown the following definition of a drone.

In this survey when we refer to drones we generally mean, **small, powered aircraft** that are remotely controlled by someone on the ground.

The images below show what we mean by drones in this survey.





Note that when respondents were asked about new or potential future uses of drones they were asked to think beyond this definition.

Key survey results

Recreational drone users

271,121 recreational users.

156,610 drones used for recreational purposes.

The most common reason for using drones is fun or entertainment.

2.5 out of every 10 users has very little or no idea of the rules about drone use.

1 in 5 flights may occur in restricted airspace without permission and unshielded.

Commercial drone users

7,939 businesses using drones.

Drones are used in many sectors, but the greatest numbers are in the scientific, professional, and technical services sector (mainly photographers) and the agriculture and forestry sector.

15,322 drones used for business or scientific purposes.

44% of businesses who currently use, plan on using drones more in the future and 31% are planning new uses.

1 out of every 10 commercial users has little understanding of the rules about drone use.

1 in 5 flights may occur in restricted airspace without permission.

Non-drone users

Their views about drones are more shaped by what they see and hear in the media than by their personal experiences.

Are generally comfortable with drones being used for the public good – e.g., firefighters assessing a fire, local councils checking out problems.

Are generally uncomfortable with drones being used for transport (goods or people) and being photographed.

Are more concerned about the risks to their safety and property posed by recreational users than commercial users.

1

Incidence of drone use in New Zealand

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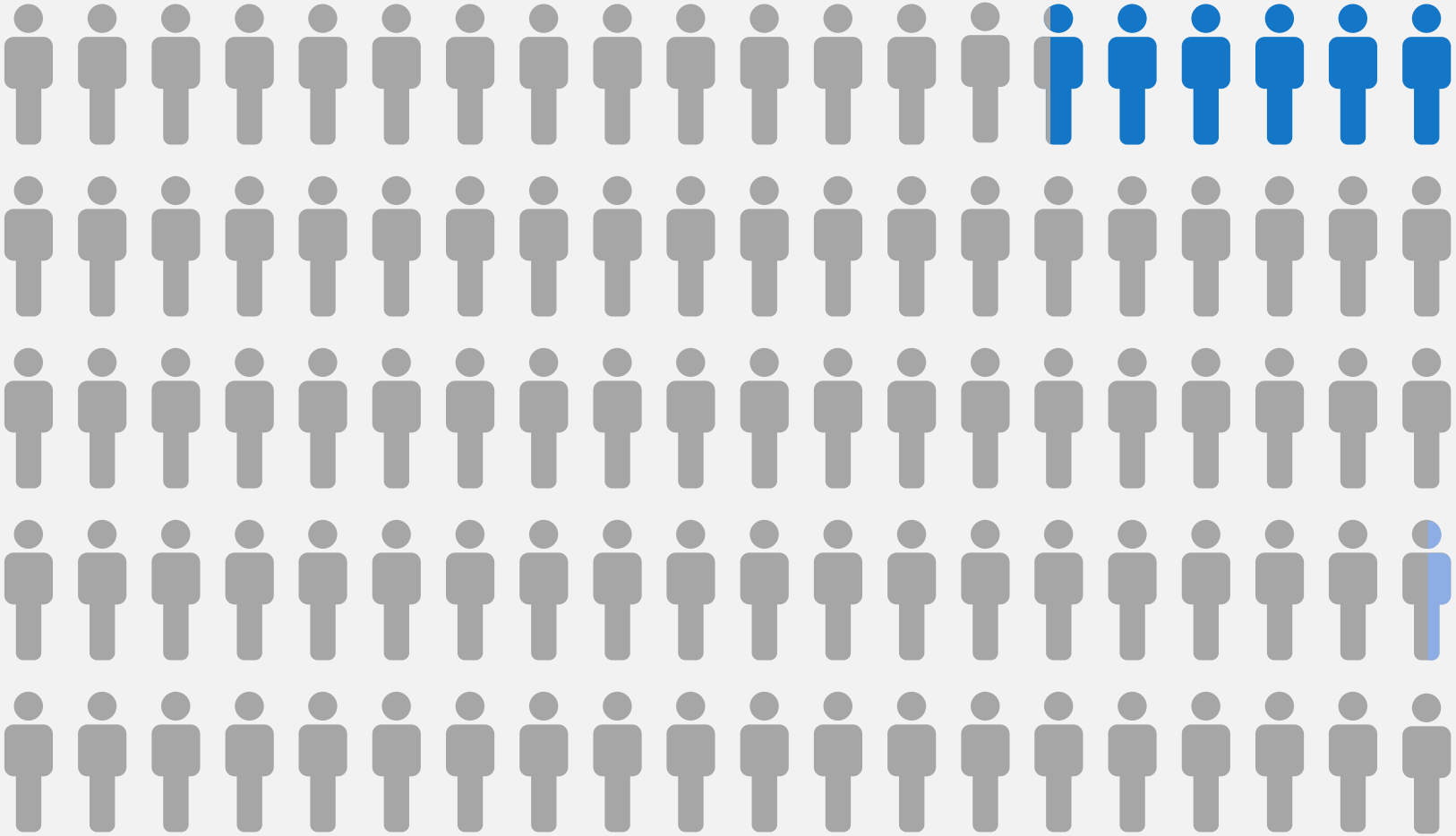
If we reduce New Zealand to a village of 100 people then…



5.8 have used a drone solely or mainly for recreational purposes in the last six months

0.4 have used a drone solely or mainly for business or scientific purposes

Note. The 100 people is based on all New Zealanders and was calculated by dividing the population projections presented on the next slide by the total population according to the 2018 census.
Source: S3, S4, S5, S5a, S6, S7b, A1a, A2.
Base: Recreational users (n=1,441), Commercial users (n=450), Non-users (n=1,038).

When we project the incidence of drone use and drone ownership found in the research to the New Zealand population, it means…

271,121 New Zealanders have used a drone solely or mainly for **recreational** purposes in the last six months

There are **156,610** drones used solely or mainly for **recreational** purposes

7,939 New Zealand **businesses or organisations** have used a drone in the last six months

20,721 New Zealanders have used a drone solely or mainly for **business or scientific** purposes

There are **15,322** drones used solely or mainly for **business or scientific** purposes

Note 1. The population projections are based on the number of New Zealanders aged 5 to 74 according to the 2018 census and the number of enterprises in New Zealand (excluding property operators) according to Statistics New Zealand as at February 2019. Note 2. The definition of 'recreational user' used to project to the population was narrower than the definition used elsewhere in this report – it was based on those who fly the drone their household owns more than once in the last six months.
Source: S3, S4, S5, S5a, S6, S7b, S15, A1a, A2.
Base: Recreational users (n=1,441), Commercial users (n=450), Non-users (n=1,038).

The 156,610 recreational drones currently used in New Zealand are mainly small and cheap ones.

NUMBER OF RECREATIONAL DRONES CURRENTLY IN USE IN NEW ZEALAND BY WEIGHT AND COST OF DRONE

Caution: Recreational users made mistakes estimating the weight of their drone(s) and as such these projections should be regarded as indicative – see note below for more detail.	**Less than 250g**	**250g-499g**	**500g-1kg**	**1kg-4kg**	**5kg or more**
Less than $249	**34,204**	**20,465**	**7,633**	**2,060**	**85**
$250-$499	**2,608**	**8,456**	**4,453**	**3,967**	**889**
$500-$999	**2,983**	**7,637**	**7,970**	**4,076**	**213**
$1,000 or more	**1,642**	**12,108**	**15,186**	**19,644**	**331**

Note. Not all people were able to estimate the weight of their drone(s) accurately. Where we were able to check the weight of the drone with the manufacturer's specifications (this was possible when people provided sufficient details about the brand and model of their drone(s)); 16% under-estimated the weight of their drone, 17% over-estimated the weight, and 67% estimated it correctly. Most of the under and over-estimations were small, i.e., if someone under or over-estimated, the true weight was likely to be in a close weight category.
Base: Recreational users (n=1,441),

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Most of the 15,322 drones used for commercial or scientific purposes tend to weigh between 500 grams and four kilograms.

NUMBER OF COMMERCIAL DRONES CURRENTLY IN USE IN NEW ZEALAND BY WEIGHT AND COST OF DRONE

Caution: Commercial users made mistakes estimating the weight of their drone(s) and as such these projections should be regarded as indicative – see note below for more detail.	**Less than 500g**	**500g-1kg**	**1kg-4kg**	**5kg or more**
Less than $1,000	**1,840**	**1,115**	**907**	**927**
$1,000-$1,999	**746**	**1,127**	**1,632**	**340**
$2,000-$4,999	**222**	**1,329**	**2,664**	**308**
$5,000 or more	**8**	**142**	**1,548**	**468**

Note. Not all people were able to estimate the weight of their drone(s) accurately. Where we were able to check the weight of the drone with the manufacturer's specifications (this was possible when people provided sufficient details about the brand and model of their drone(s)); 15% under-estimated the weight of their drone, 21% over-estimated the weight, and 64% estimated it correctly. Most of the under and over-estimations were small, i.e., if someone under or over-estimated, the true weight was likely to be in a close weight category.
Base: Commercial users (n=450),

Profile of drone users

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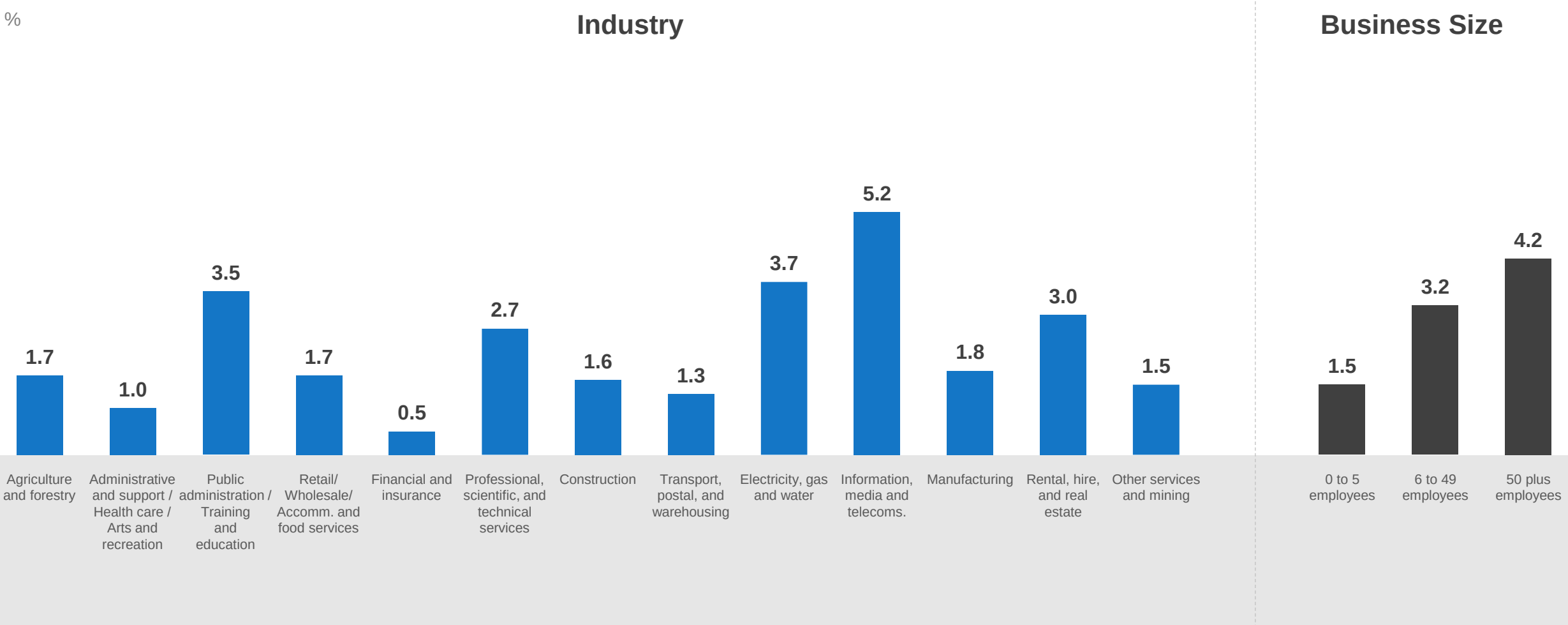
The incidence of drone use is highest in the Information, media, and telecommunications industry.

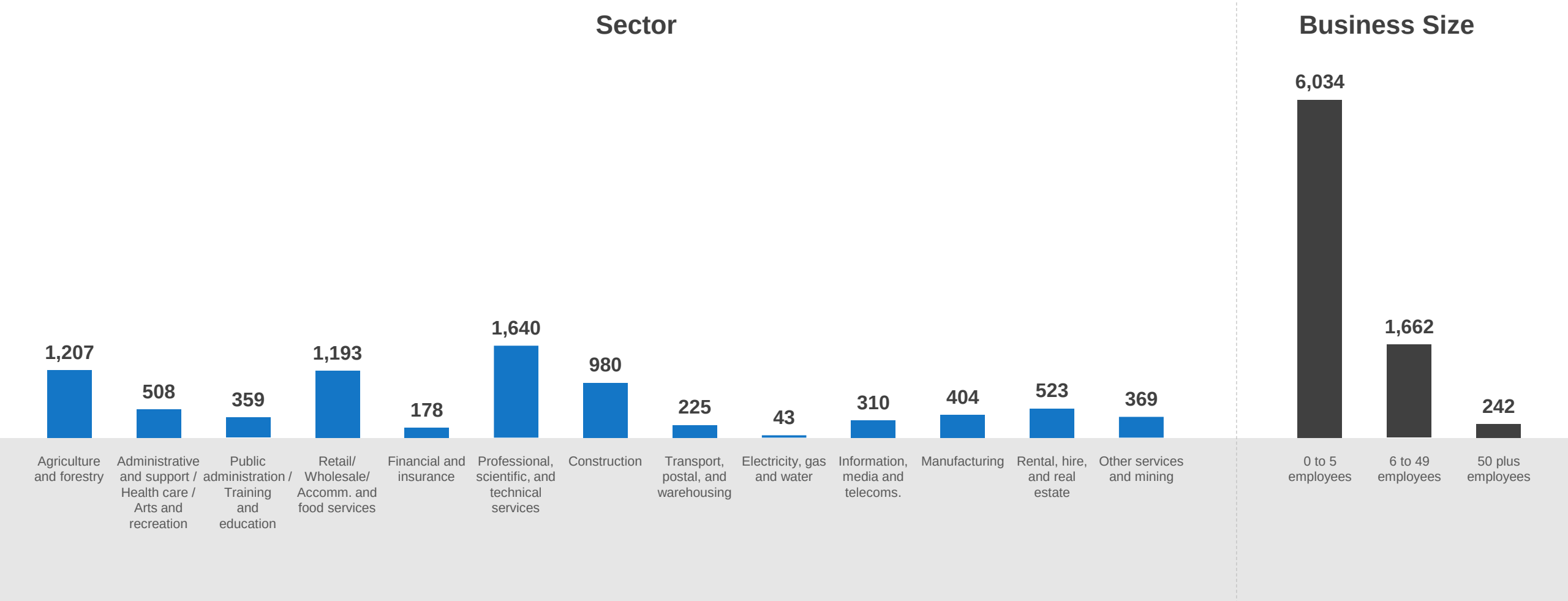
INCIDENCE OF DRONE USE BY SECTOR



Note. The industries that have been combined have a similar incidence to the others they've been combined with. Note 2. All public sector agencies are included in the 'Public administration / Training and education' category.
Source: S0a/b
Base: Commercial users (n=450)

However, when looking at the projected number of businesses using drones (which takes into account the total number of businesses in each industry), the Professional, scientific, and technical services industry has the greatest of number of businesses who use a drone.

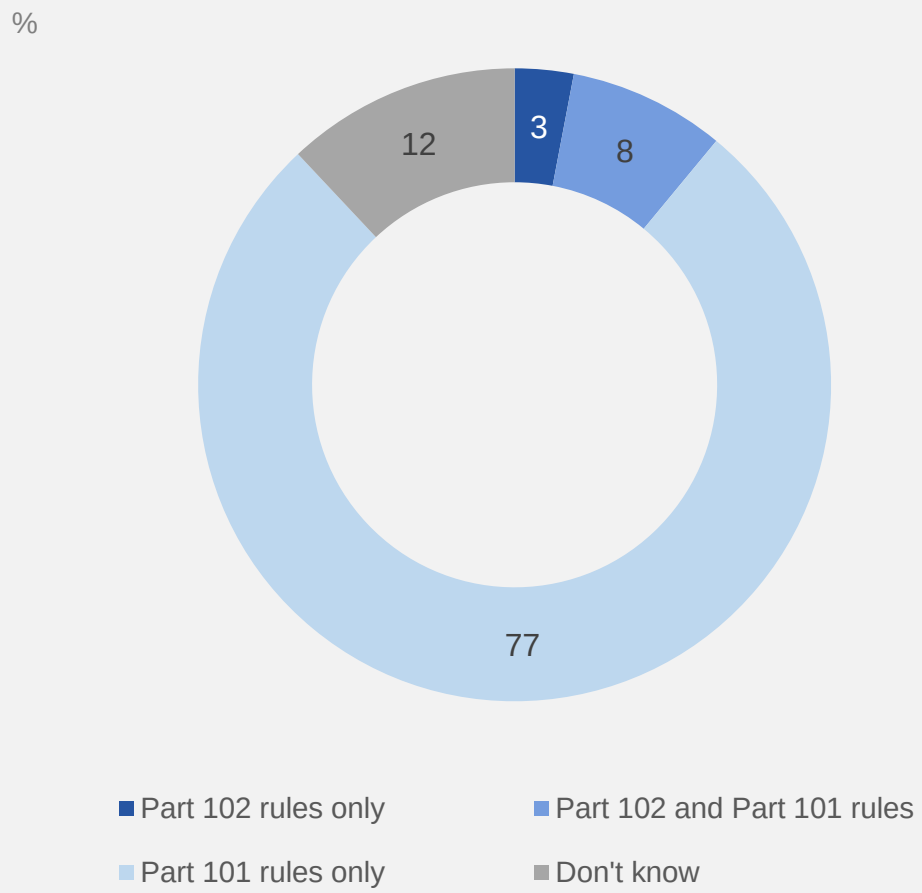
NUMBER OF BUSINESSES/ORGANISATIONS USING DRONES

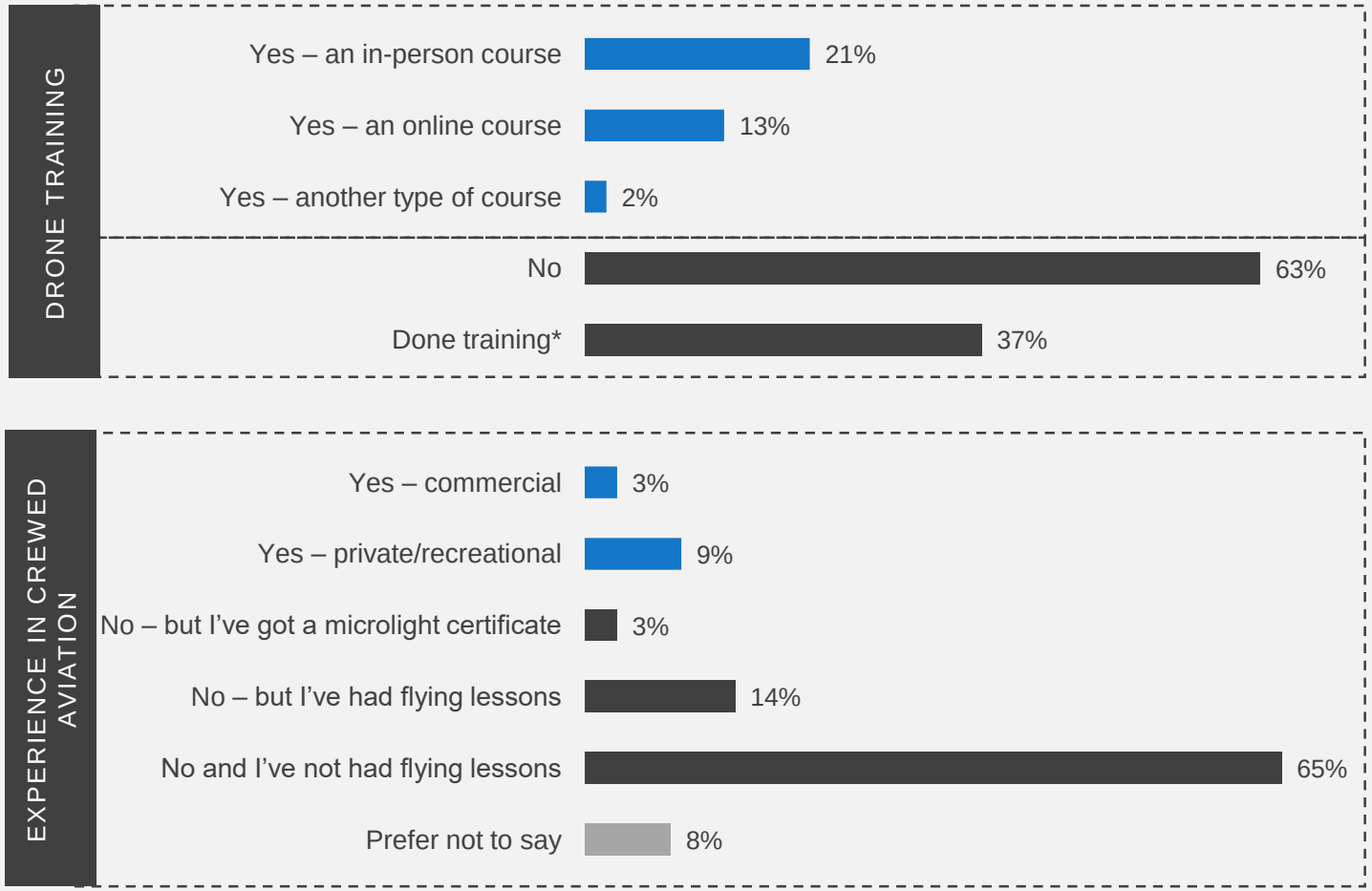


Note 1. The industries that have been combined have a similar incidence to the others they've been combined with. Note 2. For the purposes of this analysis businesses were assigned to only one sector, so that the total number of businesses using a drone matches the total number of businesses from the previous section.
Source: S0a/b
Base: Commercial users (n=450)

Most commercial users are flying under Part 101 rules.

COMMERCIAL USERS

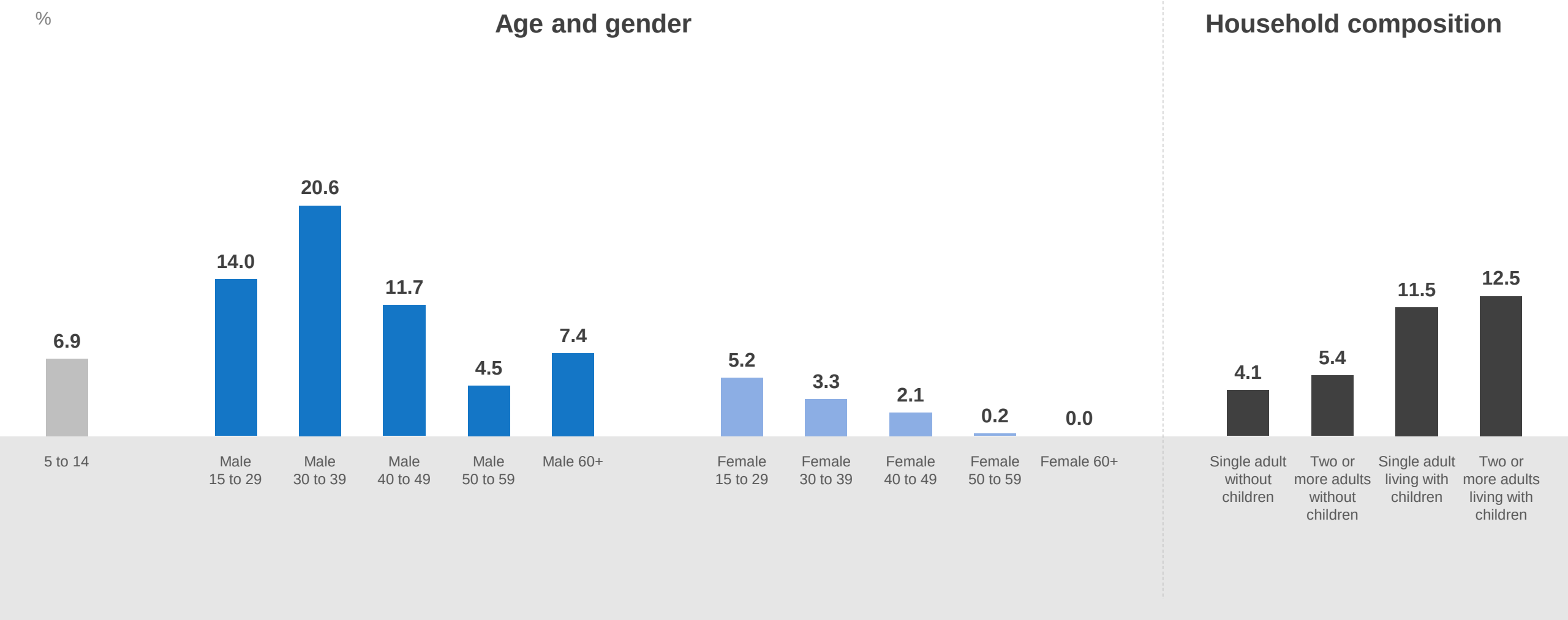




*Users were asked whether their **organisation** flys under Part 101 and/or Part 102 and whether they, **personally**, had done any training. Because of the different subjects of each question, we have not presented a training by type of rules analysis. However, all users who said that their organisation flys solely under Part 102 rules said they personally had done training (almost all said face-to-face).
Source: S16, C8, E8
Base: Commercial users (S16 n=450, C8 n=228, E8 n=450)

The incidence of drone use is highest amongst young men.

INCIDENCE OF RECREATIONAL DRONE USE IN EACH ADULT DEMOGRAPHIC GROUP

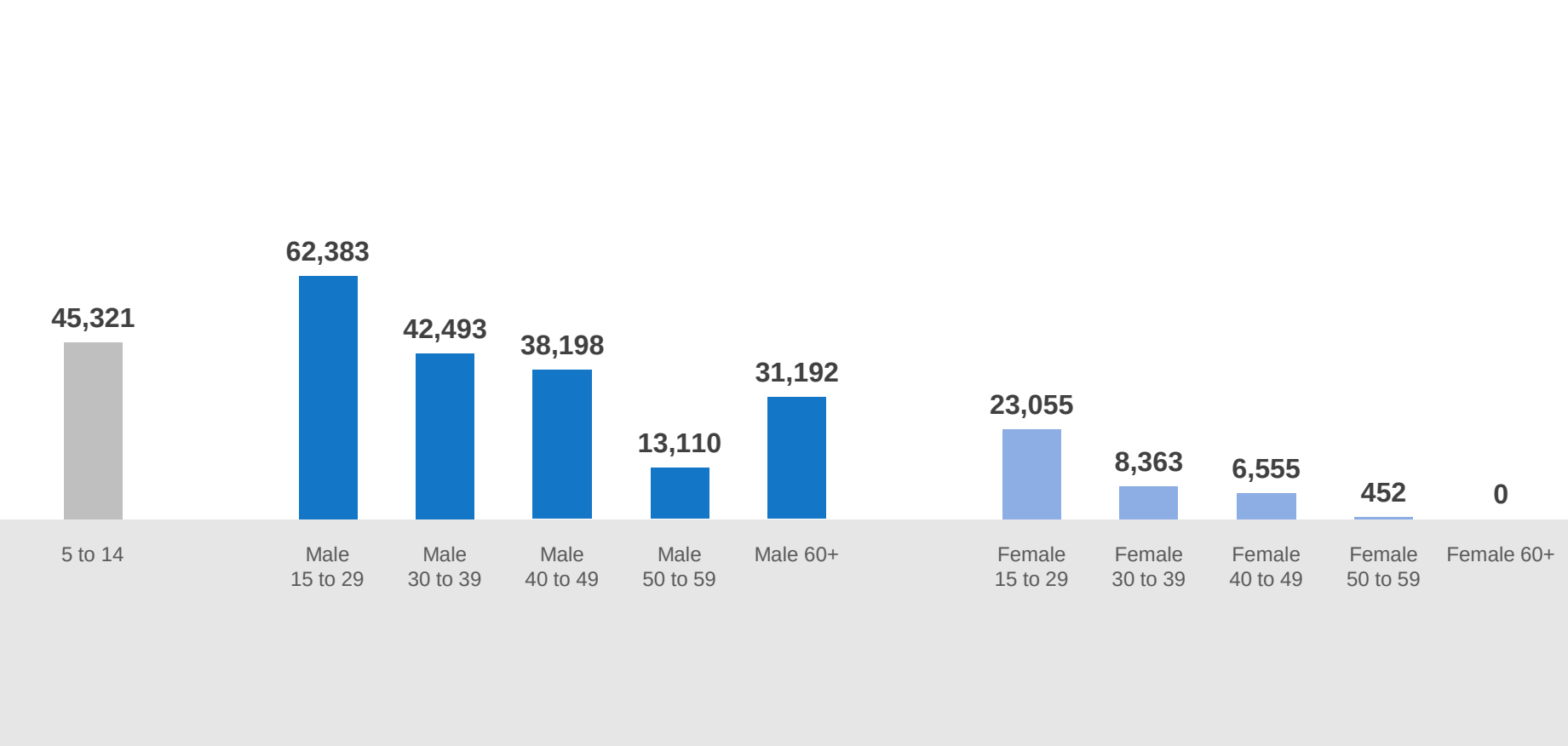


Note. 5 to 14 year olds were not included in the survey, their incidence is based on the household level reporting by the adult respondents.
Source: S8, S9, S10, E5.
Base: Recreational users (n=1,441), Non-users (n=1,038).

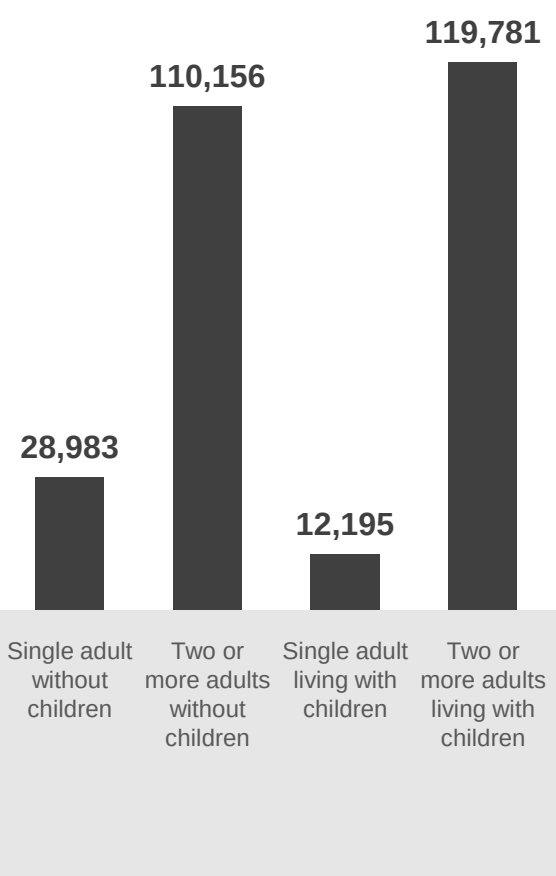
The incidence of recreational drone use is highest amongst young men.

NUMBER OF RECREATIONAL DRONE USERS IN EACH ADULT DEMOGRAPHIC GROUP

Age and gender



Household composition



Note. 5 to 14 year olds were not included in the survey, their incidence is based on the household level reporting by the adult respondents.
Source: S8, S9, S10, E5.
Base: Recreational users (n=1,441), Non-users (n=1,038).

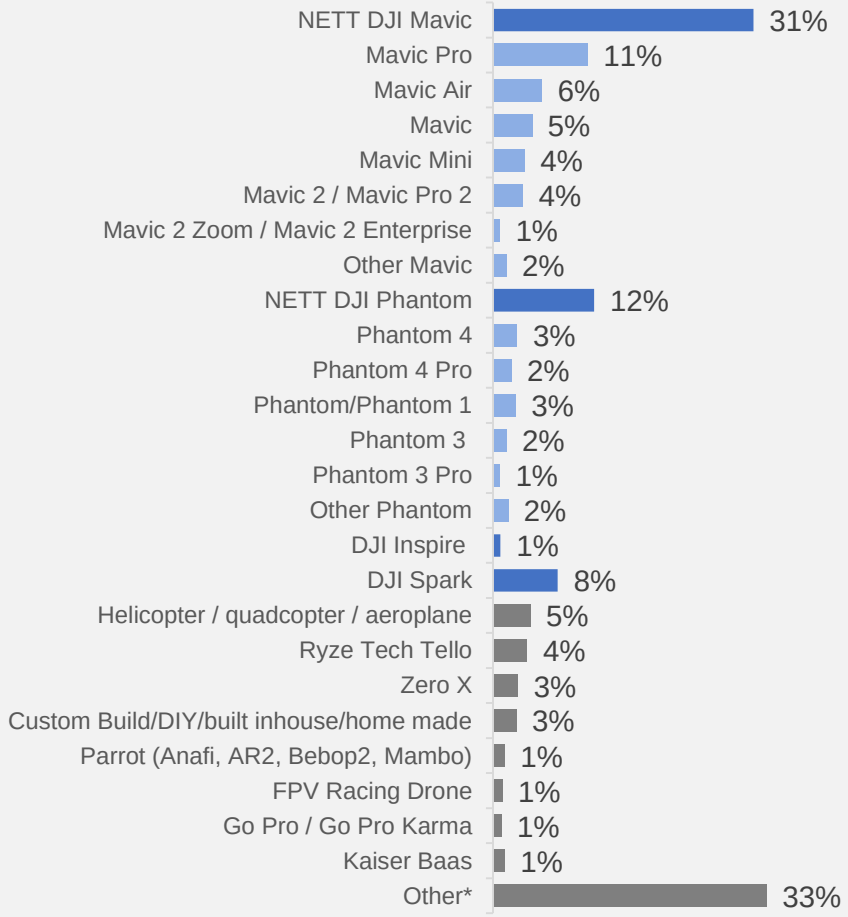
2

Types of drones owned and operated

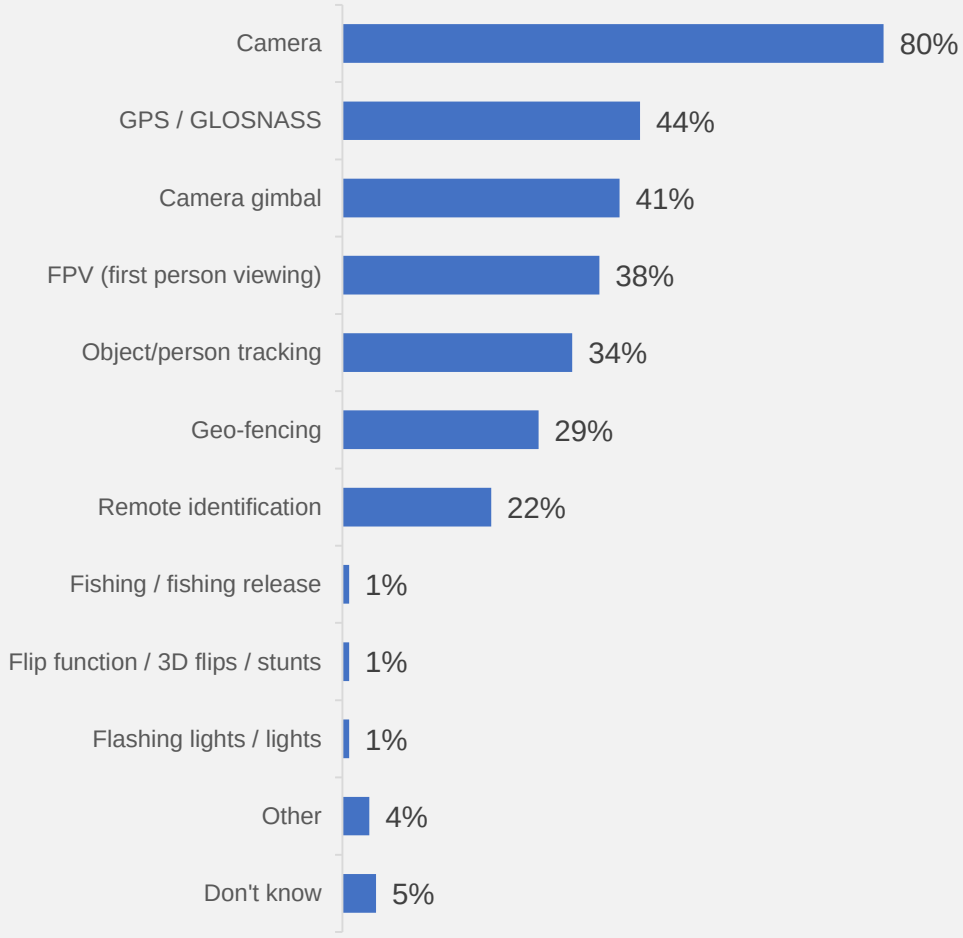
DJI Mavic is the most commonly used brand/model of drone.

RECREATIONAL DRONES

Make and model



Capabilities**

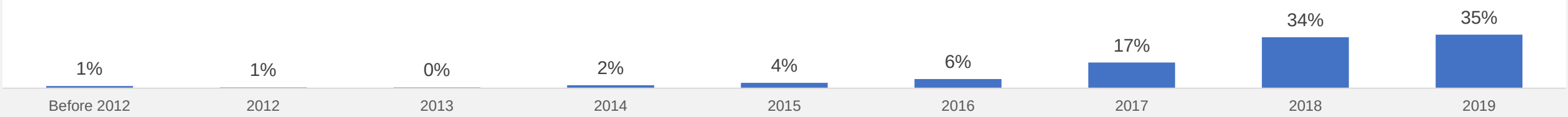


*The other category includes a mix of non-specific mentions (e.g., name of store where it was bought or a description of the quality (e.g., "just a cheap one) and a broad range of brands each mentioned by only a handful of people (e.g., Aero Kontiki, AeroQuest Storm Stinger, Alien, Andromeda, Bangor, Banshee, Blade, Comet Drone, Dragonfly, Eachine, Emax, Firefox, Gizmo DS Glider, Hangar 9, Heli 450, HobbyZone, Hyperlow, ImpulseRC, Kaiser Baas, Meteor, KiwiQuads, Koome, Lenoxx, MGG 50, Mosquito, Octocopter, Playsky, Quad Junky, RC Tech, SAB, Seagull Models, Seahorse, Skydio, T11 Helicopter, Tiny Whoop, Turbo Ace Matrix, Viper (X), Xplorer, Zamp).
**Users were presented with a list of capabilities and asked to select those they thought their drone has. They could also add additional features not included on the list. No explanation of the features was provided.
Source: A2. Base: Drones used mainly for recreational purposes (n=1,765). Note that the base is drones not users. Users who said that they don't know the make and model are excluded from the percentages.

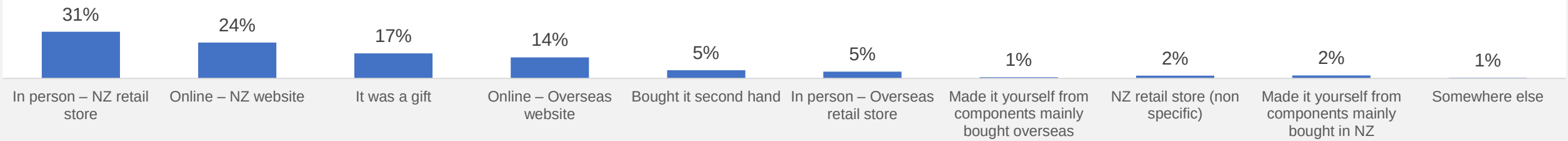
Most of the drones being used for recreation were bought in the last two years.

RECREATIONAL DRONES

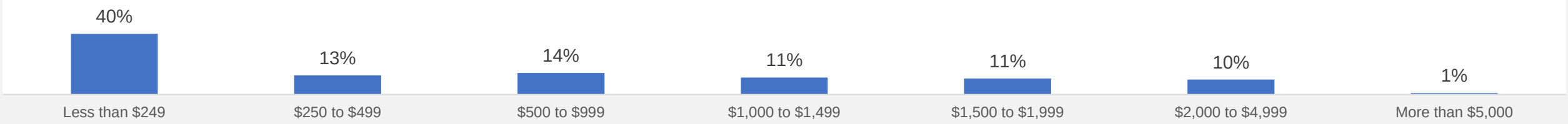
Year of purchase



Outlet



Purchase price

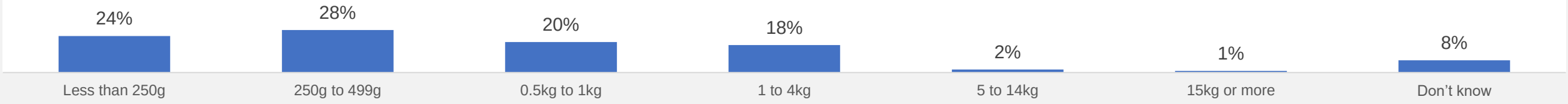


Source: A2
Base: Drones used mainly for recreational purposes (n=1,765). Note that the base is drones not users.

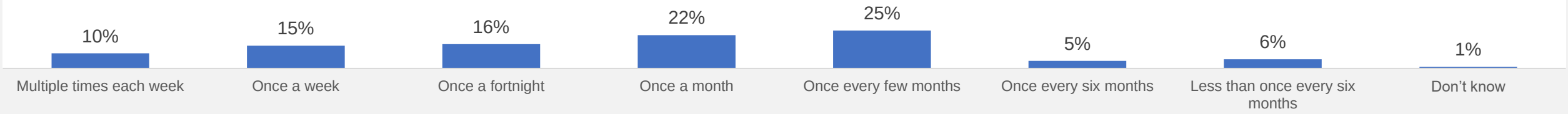
Drones are most commonly flown once a month or once every few months.

RECREATIONAL DRONES

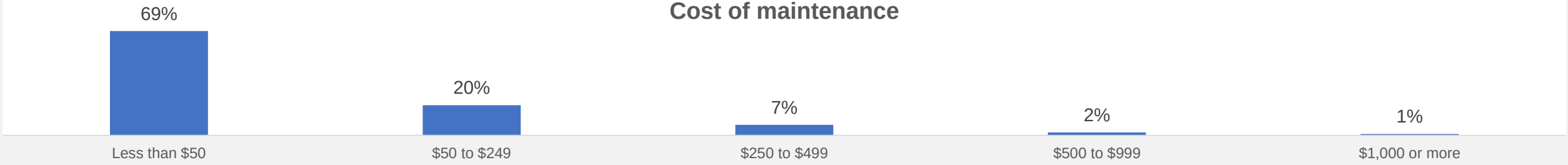
Weight



Flight Frequency



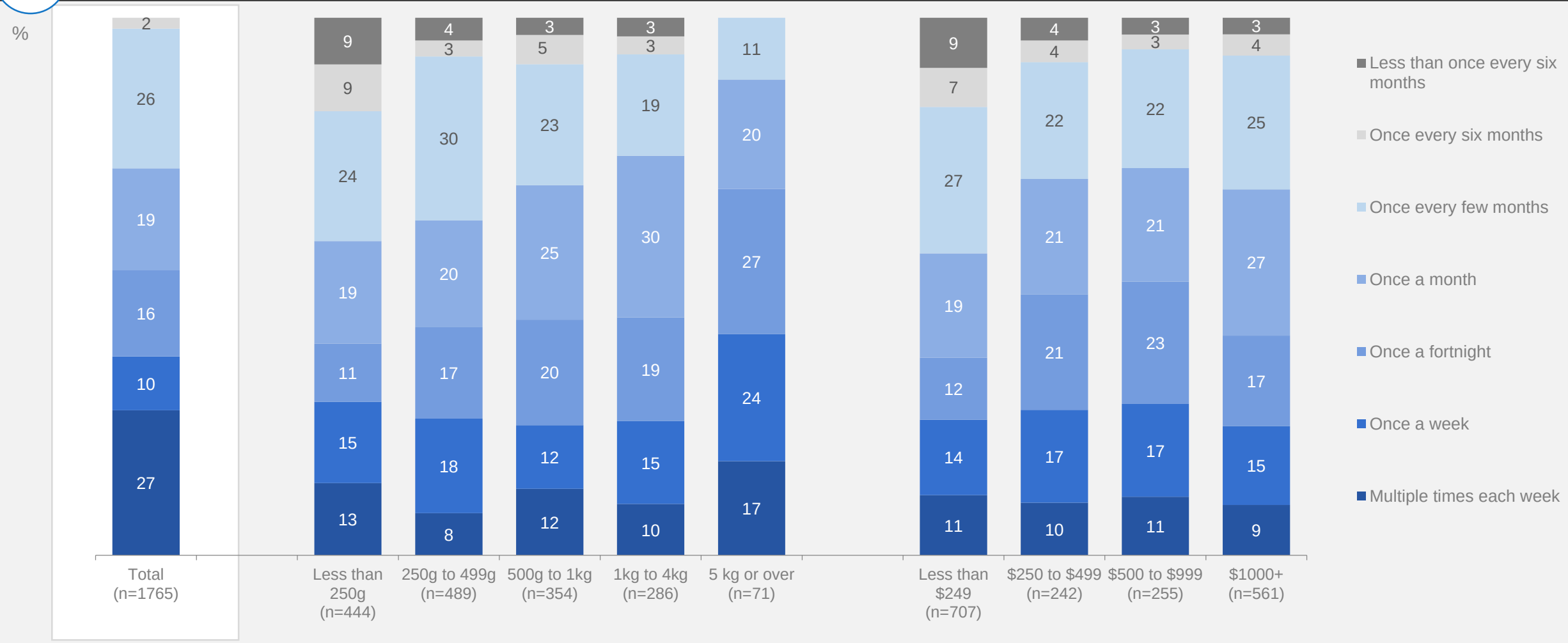
Cost of maintenance



Source: A2
Base: Drones used mainly for recreational purposes (n=1,765). Note that the base is drones not users.

Smaller and cheaper drones are flown less often than larger and more expensive drones.

RECREATIONAL DRONES

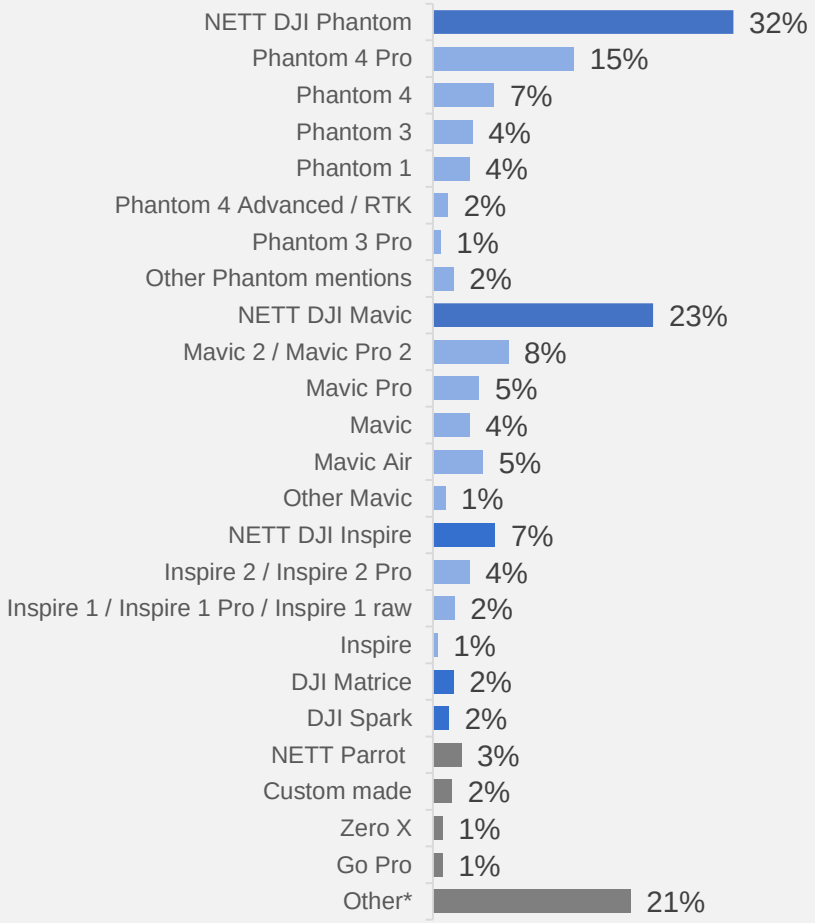


Source: A2.
Base: Drones used most frequently for recreational purposes. Note the analysis is based on drones rather than people.

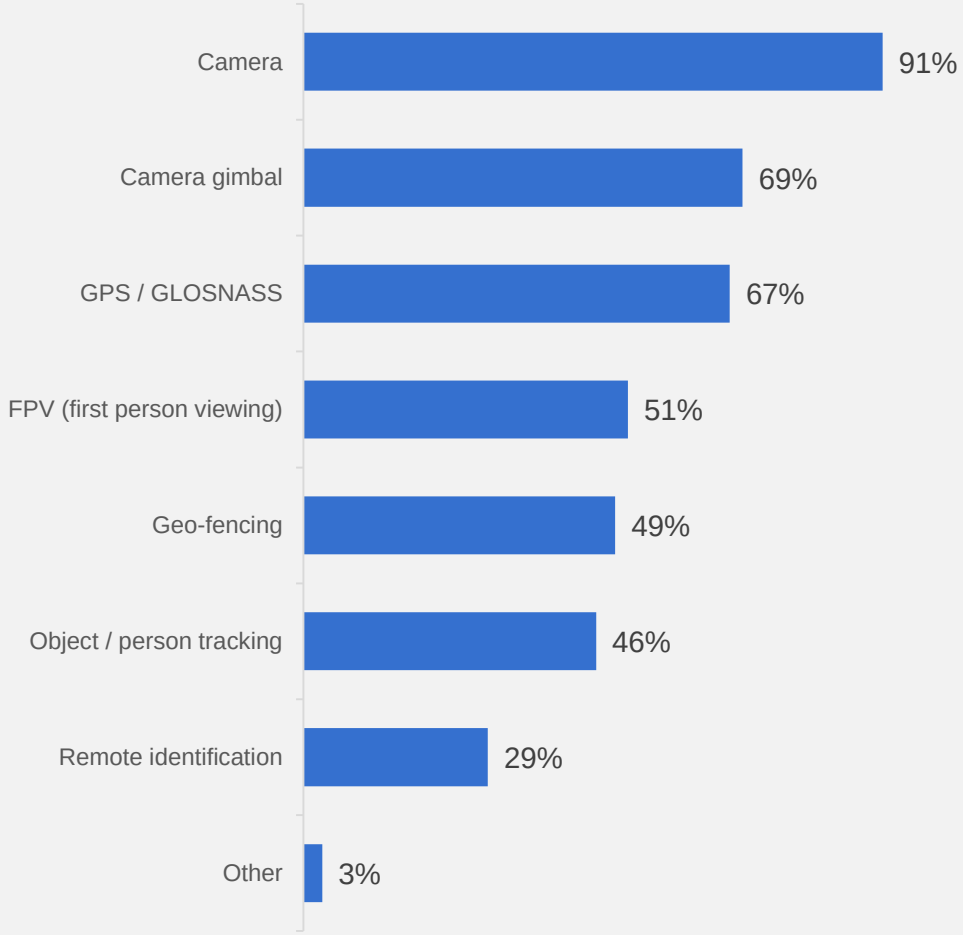
DJI Phantom and DJI Mavic are the most common brand/models.

COMMERCIAL DRONES

Make and model



Capabilities**

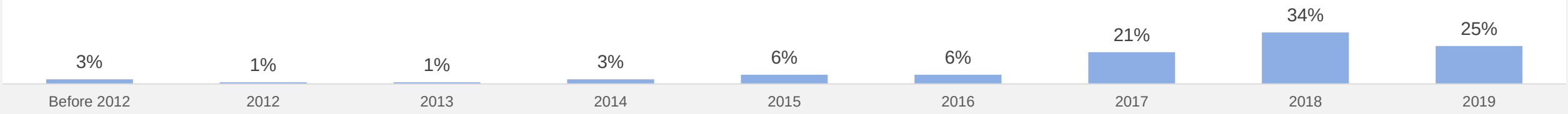


*The other category includes a mix of non-specific mentions (e.g., name of store where it was bought or a description of the quality and a broad range of brands each mentioned by only a handful of people. Examples include, but are not limited to: Aero Pro, Altus, Avensis, Eachine, Enduracopter, Hoshi, Hover, Lark, Lenoxx, Quadcopter RTF, Rondaful, SJRC F11, Solo #DR, Soniq, Zenith, Zero-X.
**Users were presented with a list of capabilities and asked to select those they thought their drone has. They could also add additional features not included on the list. No explanation of the features was provided.
Source: A7. Base: Drones used mainly for commercial purposes (n=690). Note that the base is drones not users. Users who said that they don't know the make and model are excluded from the percentages.

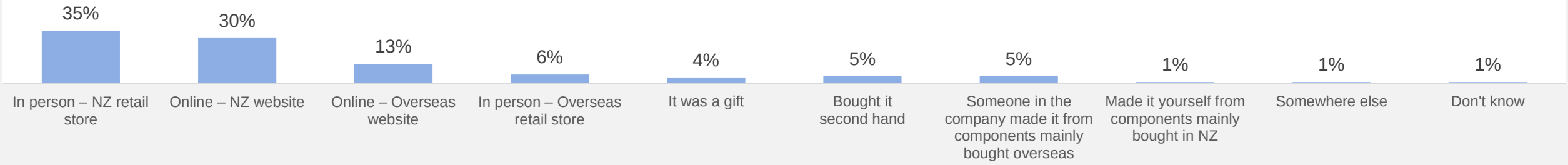
Most of the drones being used for commercial or scientific purposes were bought in the last three years.

COMMERCIAL DRONES

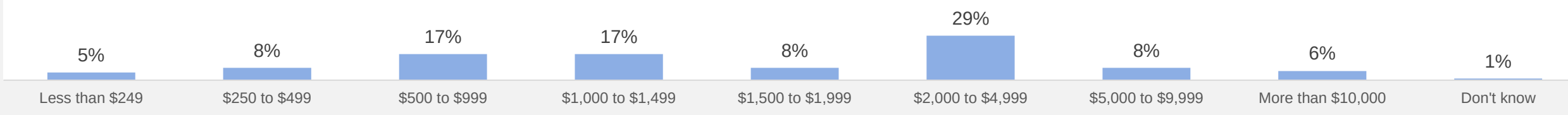
Year of purchase



Outlet



Purchase price

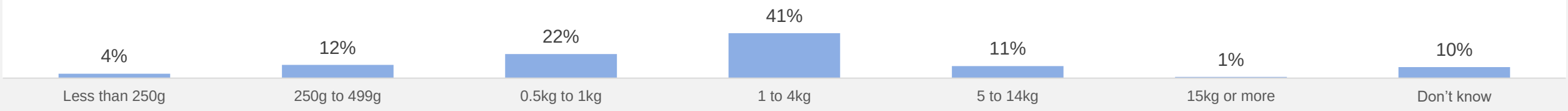


Source: A7
Base: Drones used mainly for commercial purposes (n=690). Note that the base is drones not users.

Half of the drones used for commercial or scientific purposes are used at least once a fortnight.

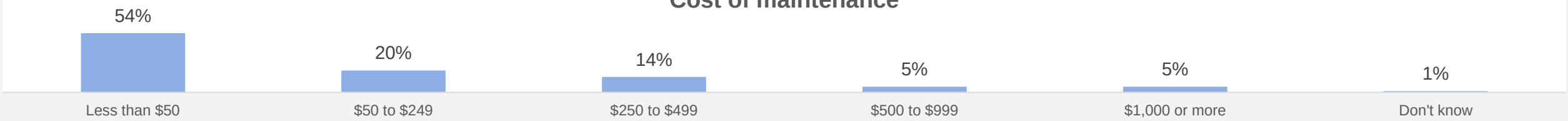
COMMERCIAL DRONES

Weight

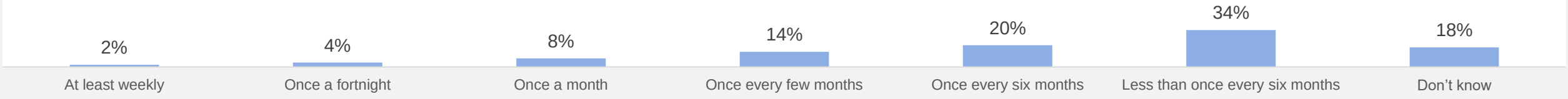


Flight frequency

Cost of maintenance



Frequency of maintenance



Source: A7
Base: Drones used mainly for commercial purposes (n=690). Note that the base is drones not users.

The number of drones recreational and commercial users are currently operating, is greater than the number of drones that are no longer in use.

There are **156,610** drones **currently** used solely or mainly for recreational purposes

There are **86,788** drones that **had been used** for recreational purposes but are no longer in use

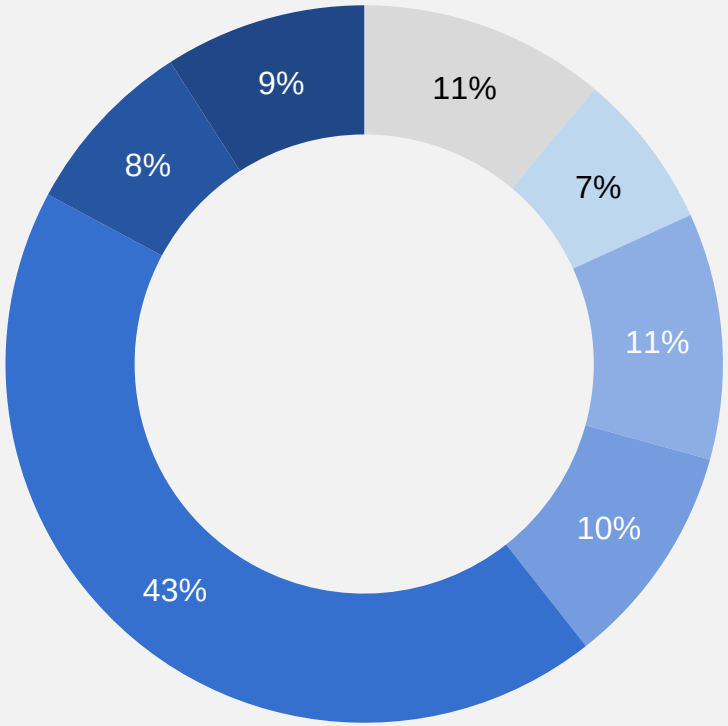
There are **15,322** drones **currently** solely or mainly for business or scientific purposes

There are **6,748** drones that **had been used** solely or mainly for business or scientific purposes but are no longer in use

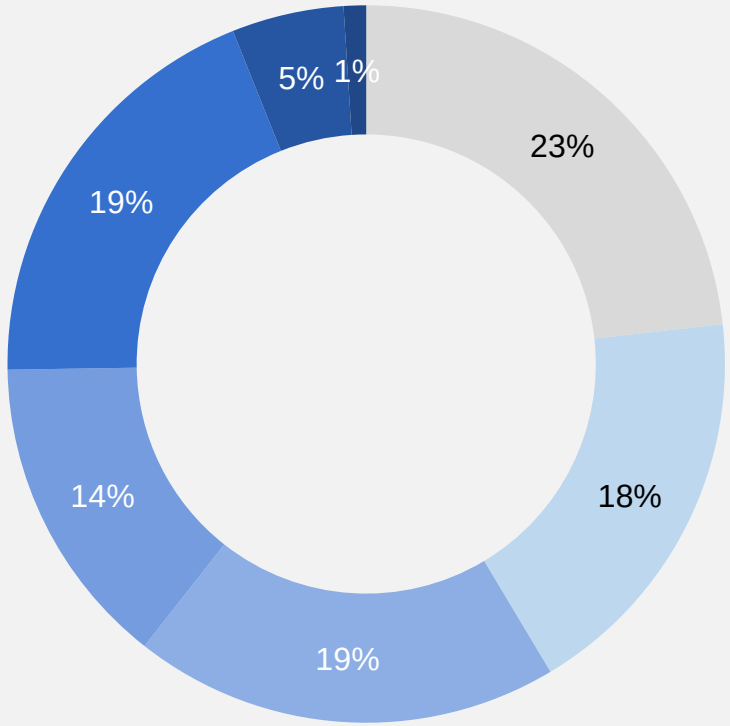
Note 1. The population projections are based on the number of New Zealanders aged 5 to 74 according to the 2018 census and the number of enterprises in New Zealand (excluding property operators) according to Statistics New Zealand as at February 2019. Note 2. The definition of 'recreational user' used to project to the population was narrower than the definition used elsewhere in this report – it was based on those who fly the drone their household owns more than once in the last six months.
Source: S3, S4, S5, S5a, S6, S7b, S15, A1a, A2.
Base: Recreational users (n=1,441), Commercial users (n=450)

To get a sense* of the life span of drones, users were asked how long they had used the drone that they had most recently stopped using. A high proportion of the unused drones had a life span of less than a year.

COMMERCIAL USERS



RECREATIONAL USERS

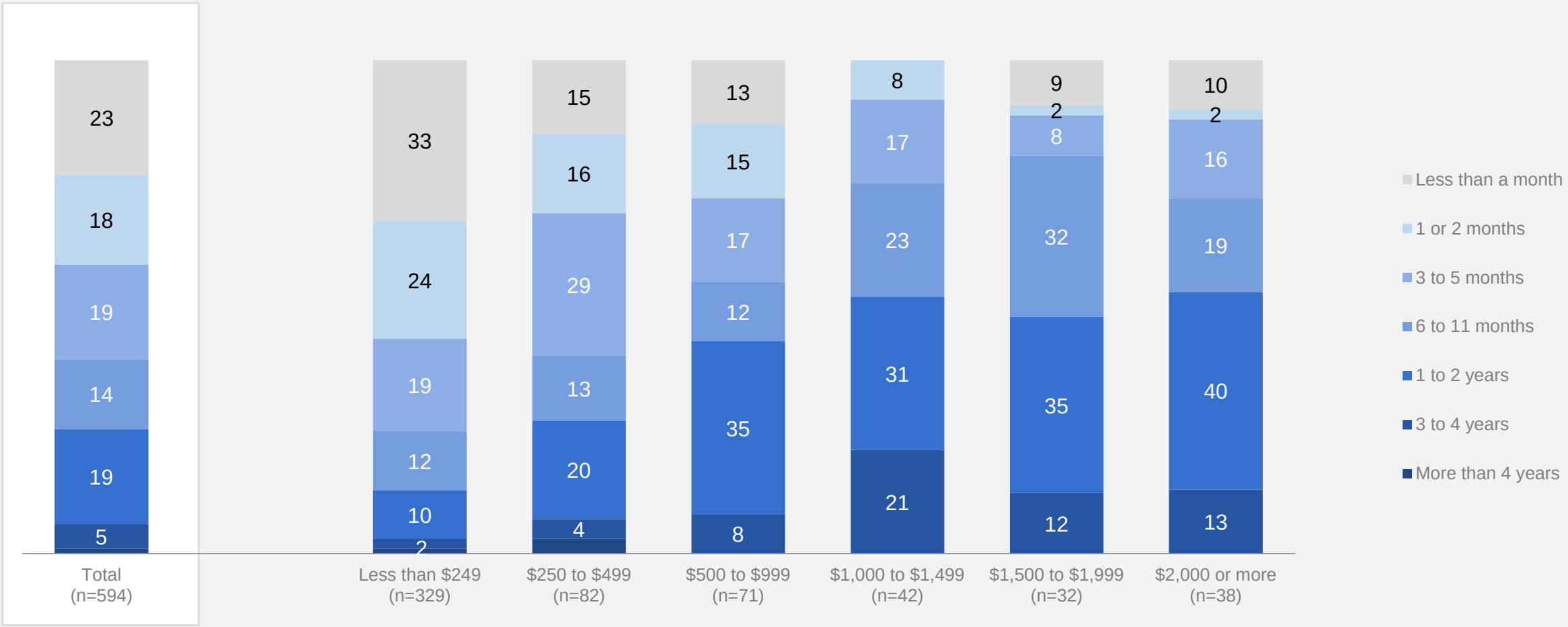


- Less than a month
- 1 or 2 months
- 3 to 5 months
- 6 to 11 months
- 1 to 2 years
- 3 to 4 years
- More than 4 years

*Please note that there is likely a difference in the quality of users' unused drones and the drones they are still using (e.g., 57% of recreational users' unused drones cost less than $250, compared to 43% of their drones currently in use) and as such this chart should only be taken as an indicative guide to the lifespan of drones.
Source: A8_2, A4_2
Base: Commercial users who have an unused drone (n=163), recreational users who have an unused drone (n=594)

Not surprisingly, the cheapest drones have the shortest life span.

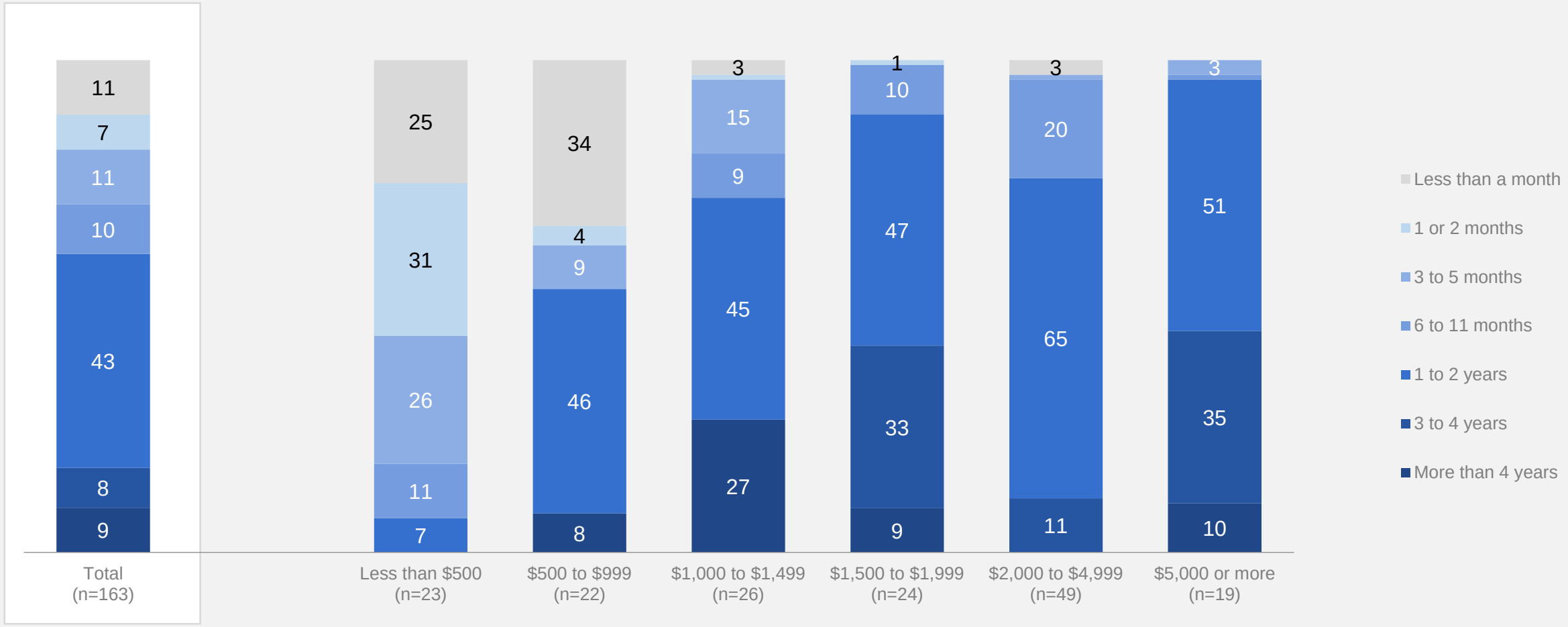
RECREATIONAL USERS



Source: A4_2, A4_3
Base: Recreational users who have an unused drone (see chart for bases)

Similarly for commercial users, the cheapest drones have the shortest life span.

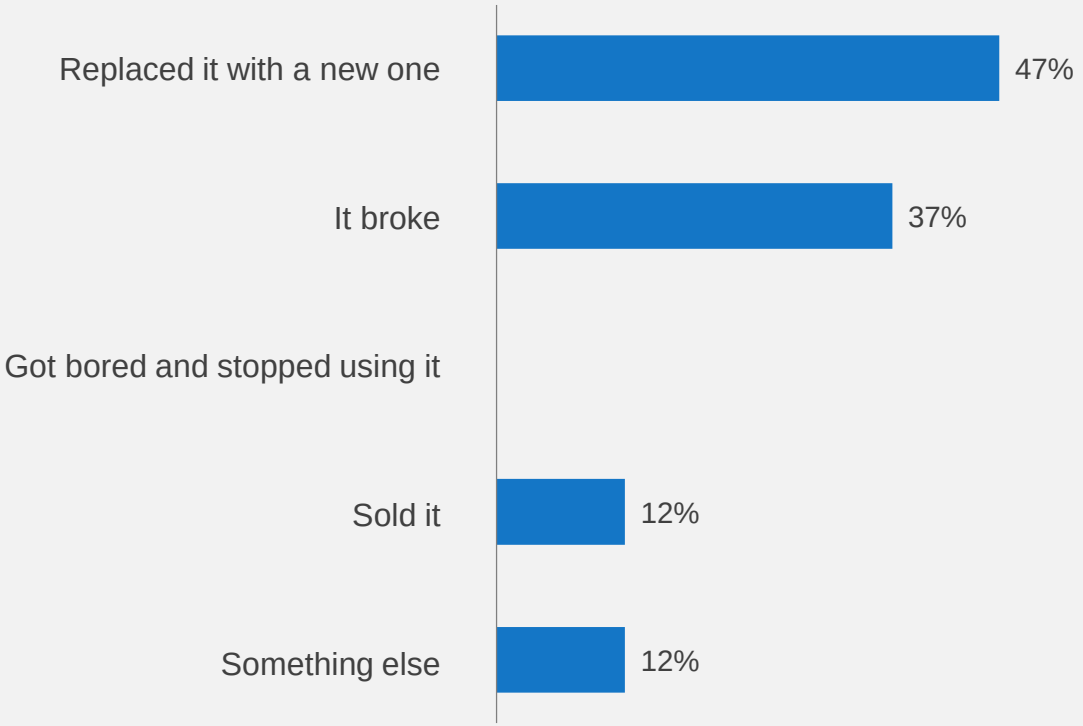
COMMERCIAL USERS



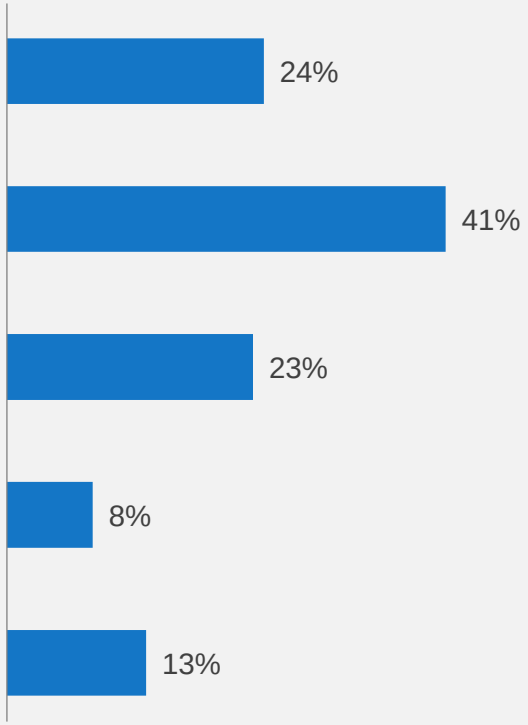
Source: A8_2, A8_3
Base: Commercial users who have an unused drone (see chart for bases)

Most commonly recreational users discarded drones because they broke. Commercial users discarded drones because they replaced them.

COMMERCIAL USERS



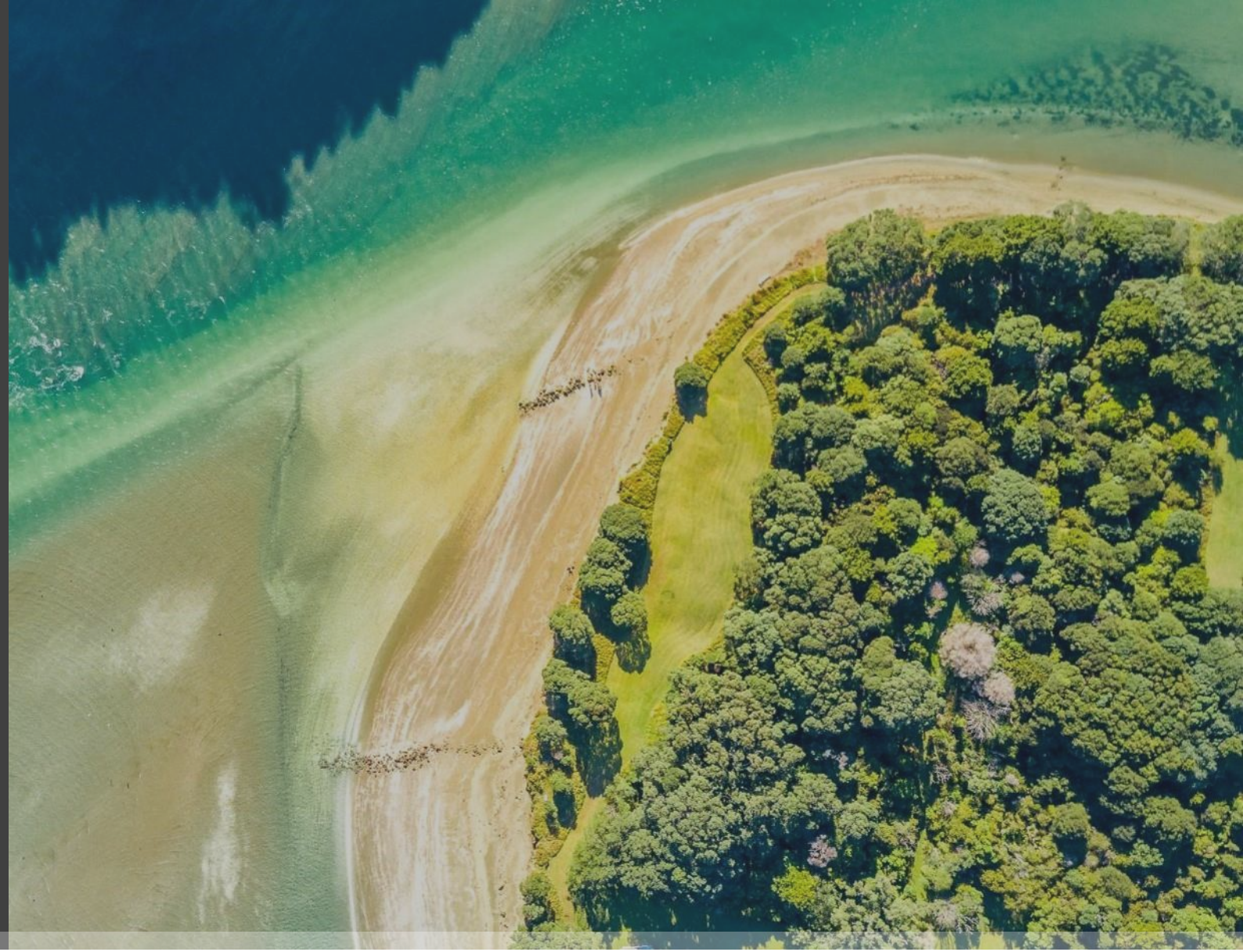
RECREATIONAL USERS



Source: A8_4, A4_4
Base: Commercial users who have an unused drone (n=163), recreational users who have an unused drone (n=594)

3

How drones are being used in New Zealand and potential future uses



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HĪKINA WHAKATUTUKI

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Most recreational users say they use a drone for fun or entertainment.

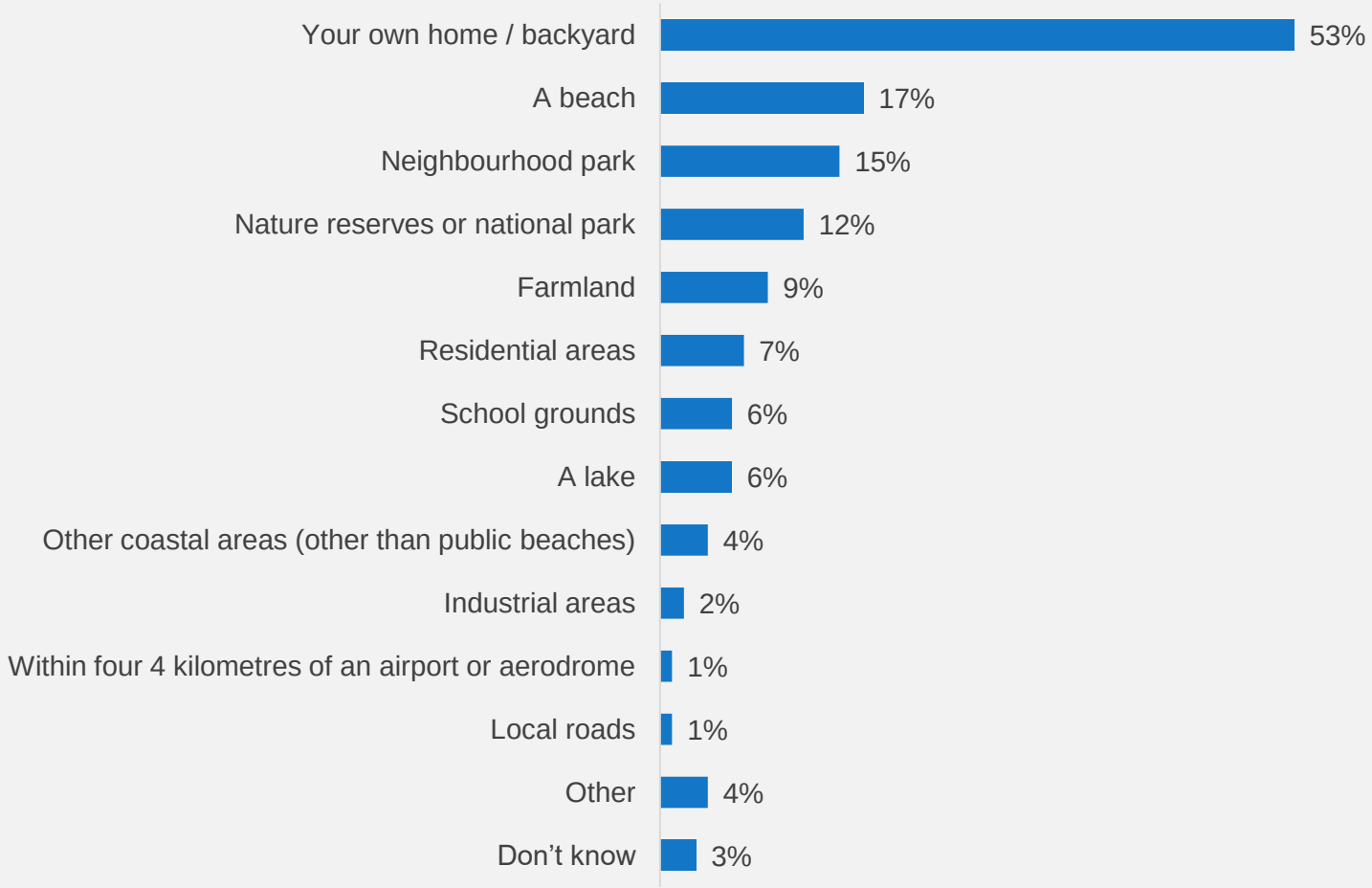
66% of recreational users said ‘fun’ or ‘entertainment’ was their reason for flying a drone

3% said ‘fishing’ was their reason for flying a drone

27% said ‘aerial photography’ was their reason for flying a drone

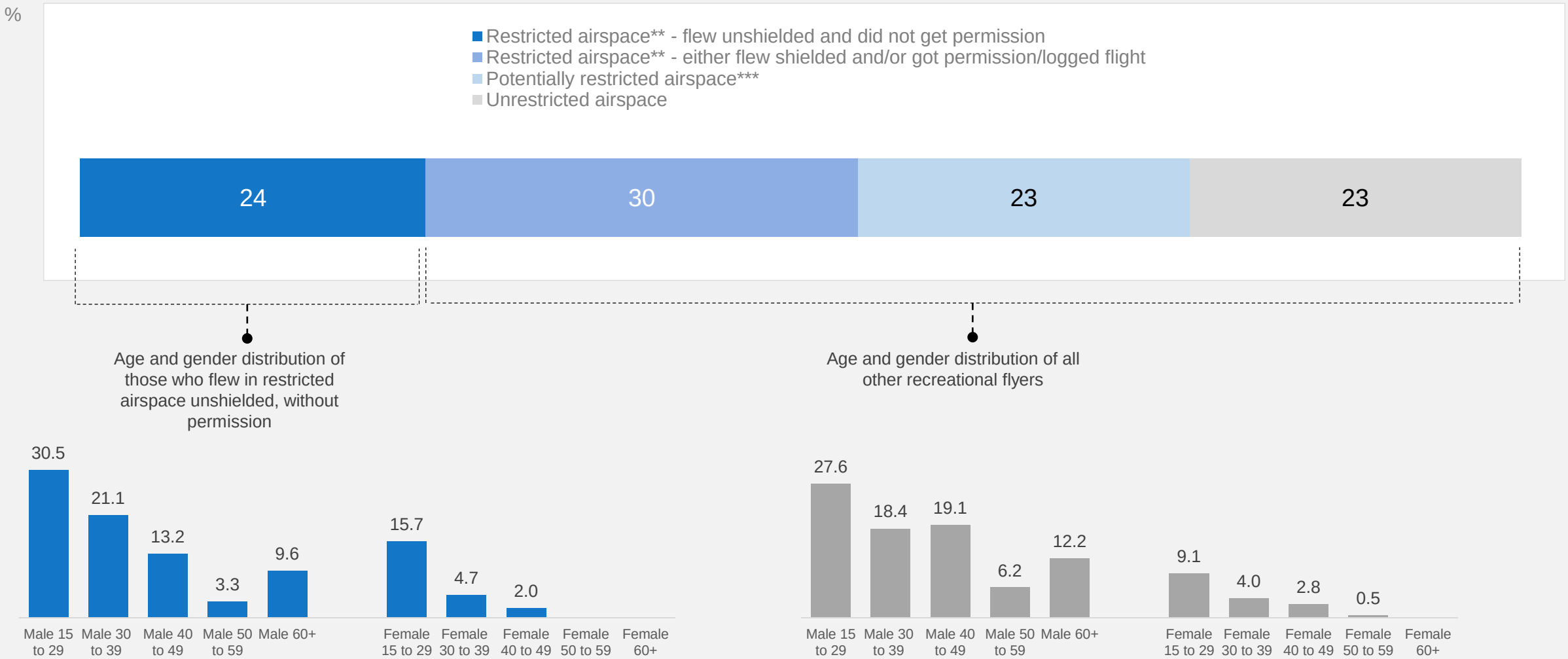
Source: A2
Base: Recreational users (n=1,279)

Recreational users typically fly over their own home or backyard.



Source: B4
Base: Recreational users (n=1,441)

More than one in five recreational flights may* be in restricted airspace, unshielded, and without permission. The recreational users operating these flights tend to be younger than other recreational flyers.



*Users were first asked which cities or districts their last two flights were over and then they were asked which suburbs (based on Statistics New Zealand's Statistical Area 2) within those cities or districts they flew over. It is possible that there may have been some mismatch in users' perception of the boundaries of a suburb and the actual boundaries based on Statistical Area 2. While we think that the effect this potential mismatch had on classifying flights as in restricted airspace or not is likely to be minimal, we have used 'may' in the title to indicate it is a possibility.
**'Restricted airspace' is defined as any of the following types of airspace identified on AirShare: low flying zone, military operating area, within 4km of an aerodrome, other authorities' areas, control zones, and no fly zones.
**'Potentially restricted airspace' are those suburbs which are partially in restricted airspace and partially outside.
Source: B3, B5a, B5b. Base: Recreational users (n=1,441)

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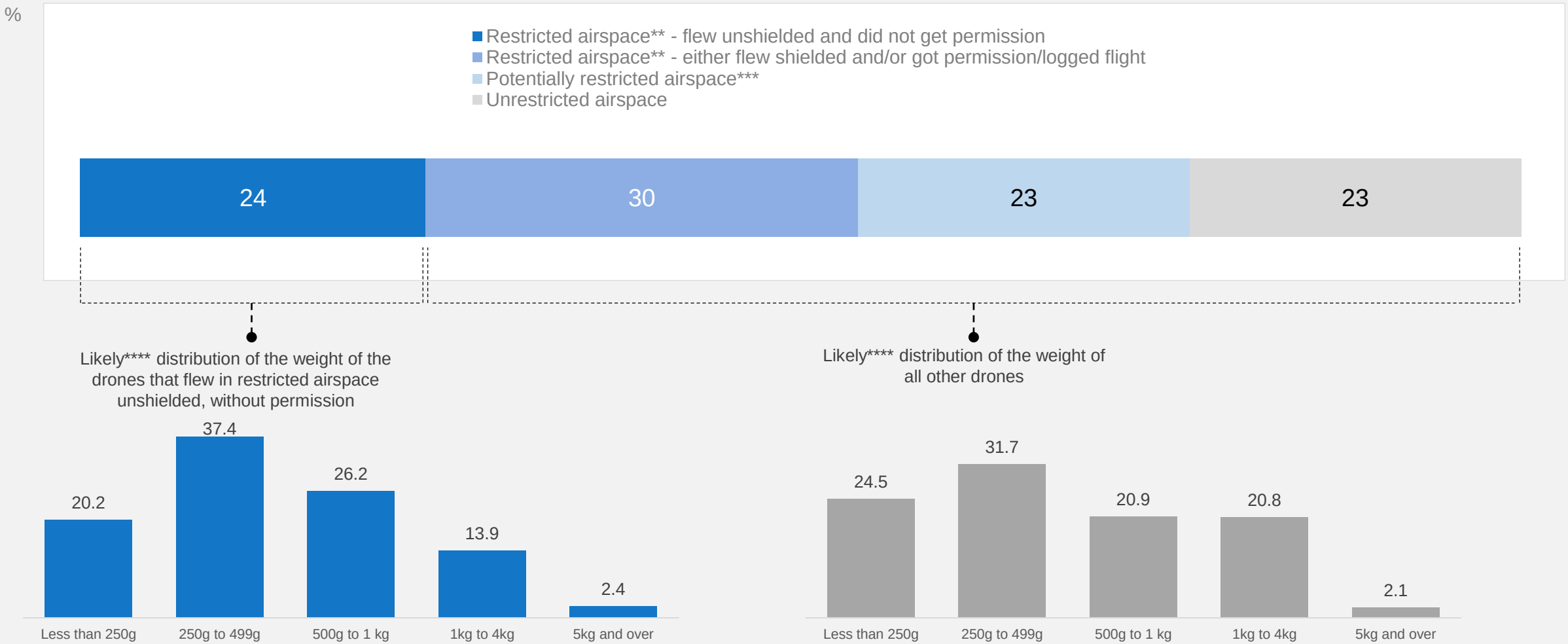
[CONT.] More than one in five recreational flights may* be in restricted airspace, unshielded, and without permission. The recreational users operating these flights are likely to be flying a drone which weighs less than one kilogram.



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***'Potentially restricted airspace' are those suburbs which are partially in restricted airspace and partially outside. ****The distribution is 'likely' because users with multiple drones were not asked which of their drones they flew. The analysis is based on the weight of the drone they listed first, when asked about the details of their drones.
Source: B3, B5a, B5b. Base: Recreational users (n=1,441)

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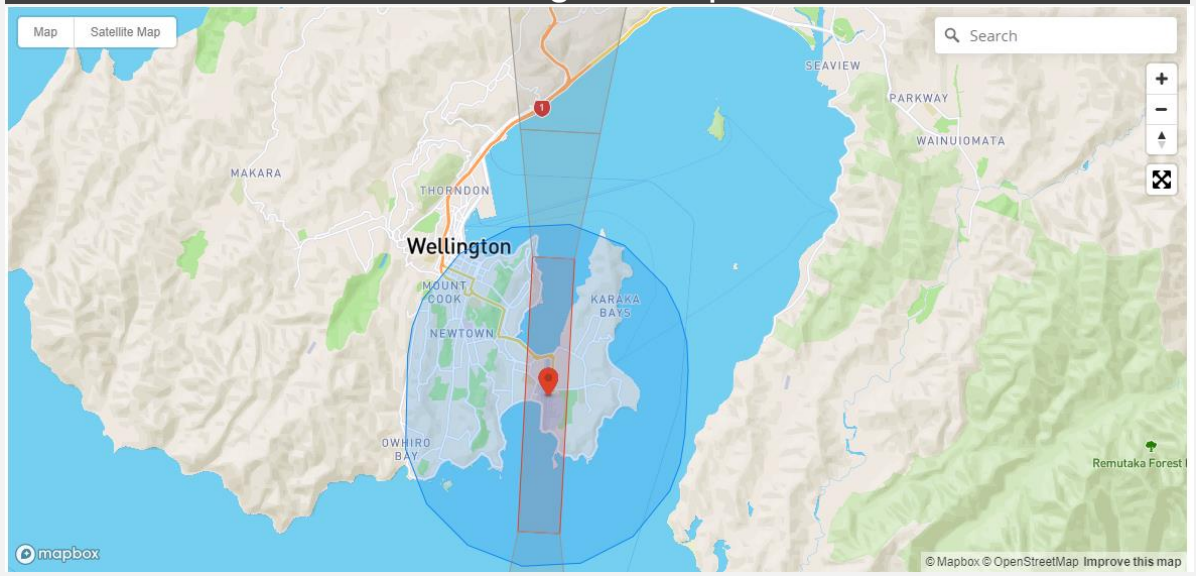
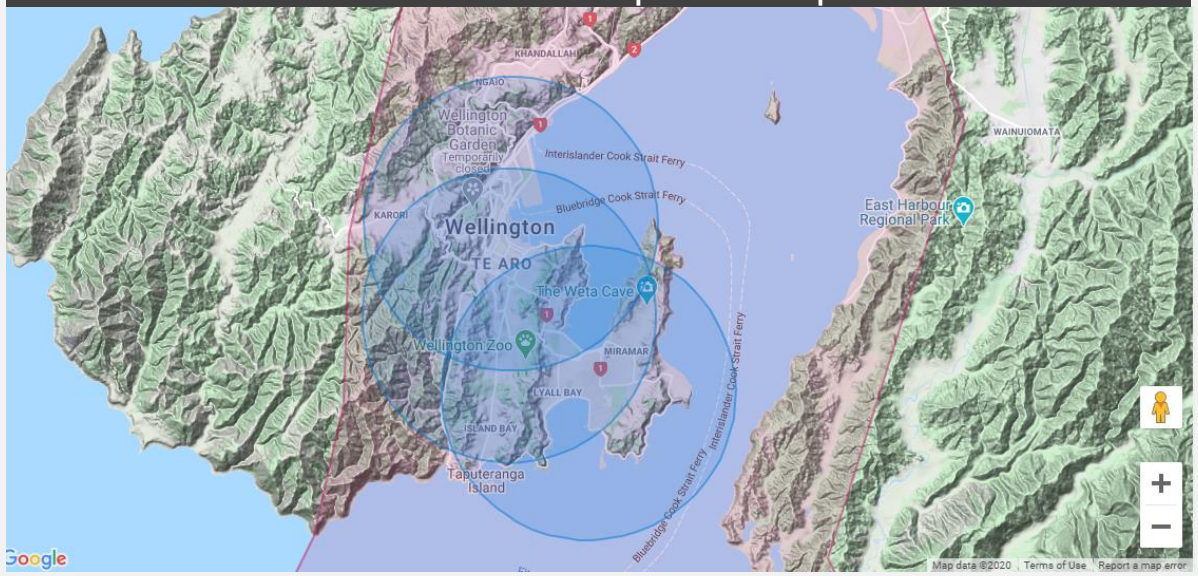
There are likely many reasons users are flying in restricted airspace, one we identified during analysis was a mismatch between DJI's geo-fenced areas versus actual restricted airspace. If DJI users are relying on the geo-fencing function of their drone, they may unwittingly be flying in restricted airspace.

DJI geo-map



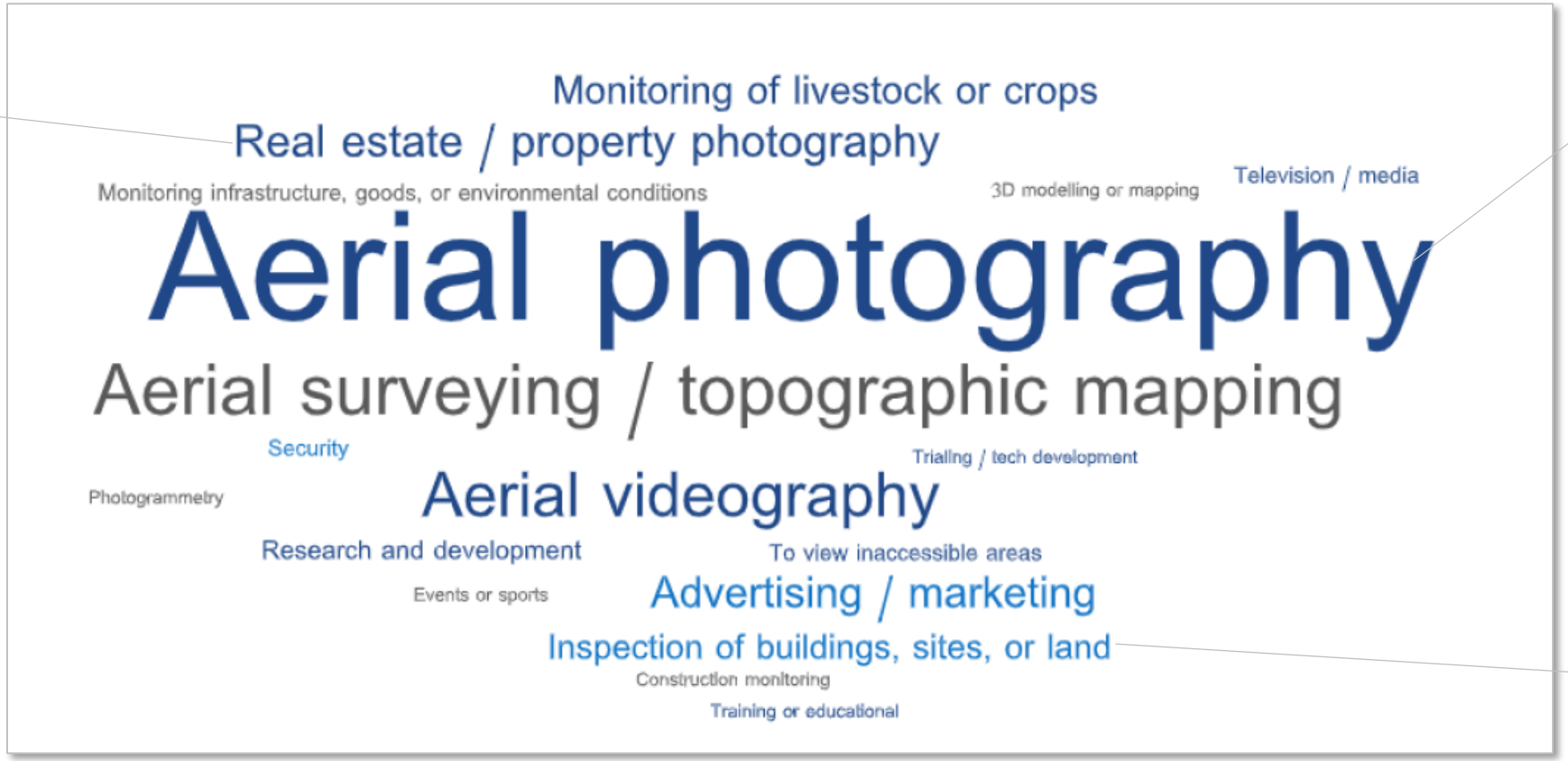
AirShare airspace map



DJI map retrieved from https://www.dji.com/nz/flysafe/geo-map and AirShare map retrieved from https://www.airshare.co.nz/maps both on 2/6/2020.
Also note that while Wellington was chosen as the example to illustrate the point, the same differences are evident throughout the rest of the country.

Aerial photography is the main reason businesses are using drones.

12% of commercial users said 'real estate photography' was the main reason their organisation used drones

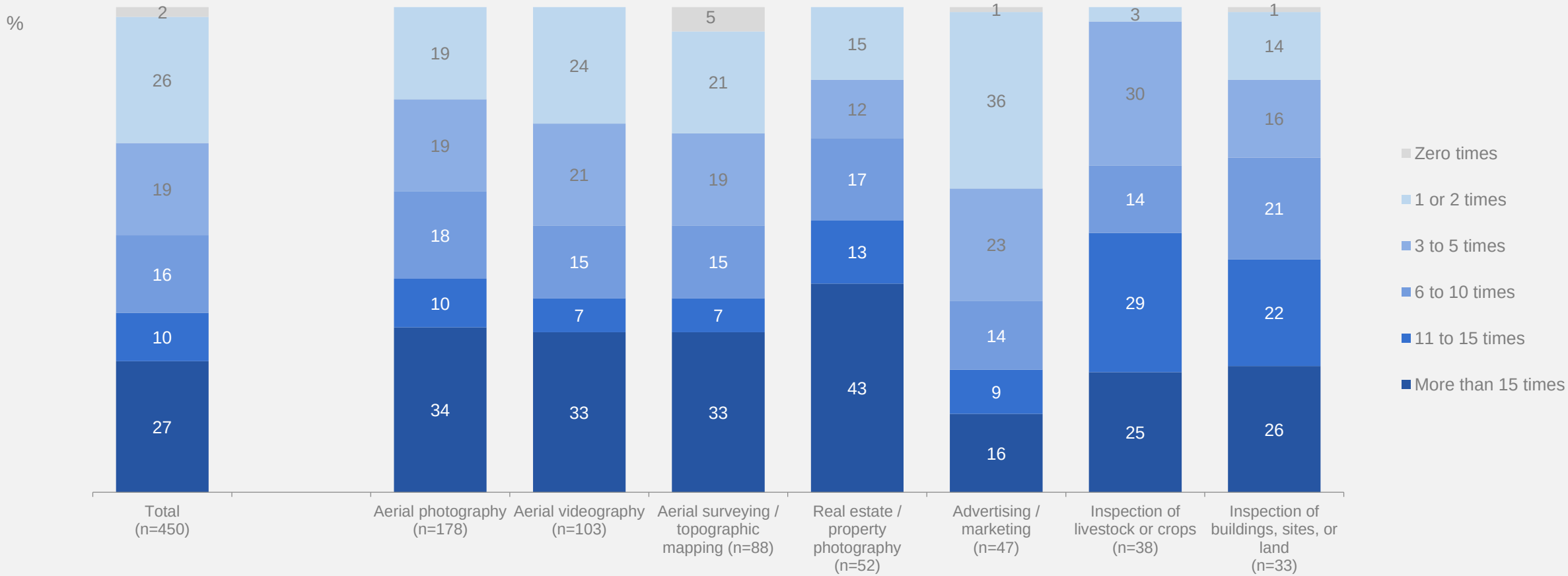


40% of commercial users said 'aerial photography' was the main reason their organisation used drones

7% of commercial users said 'building or site inspections' or 'land inspections' were the main reason their organisation used drones

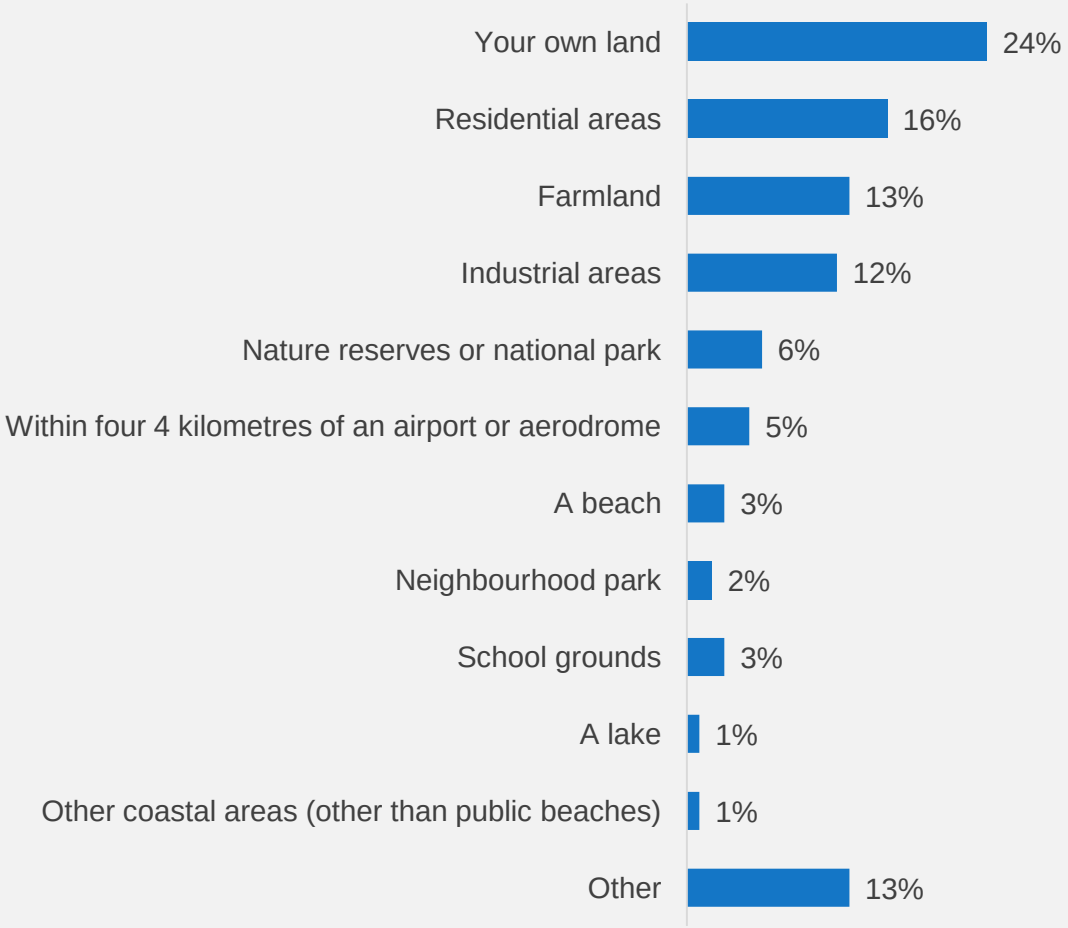
Source: A5a
Base: Commercial users (n=450)

Photography for real estate is undertaken more frequently than the other commercial activities.



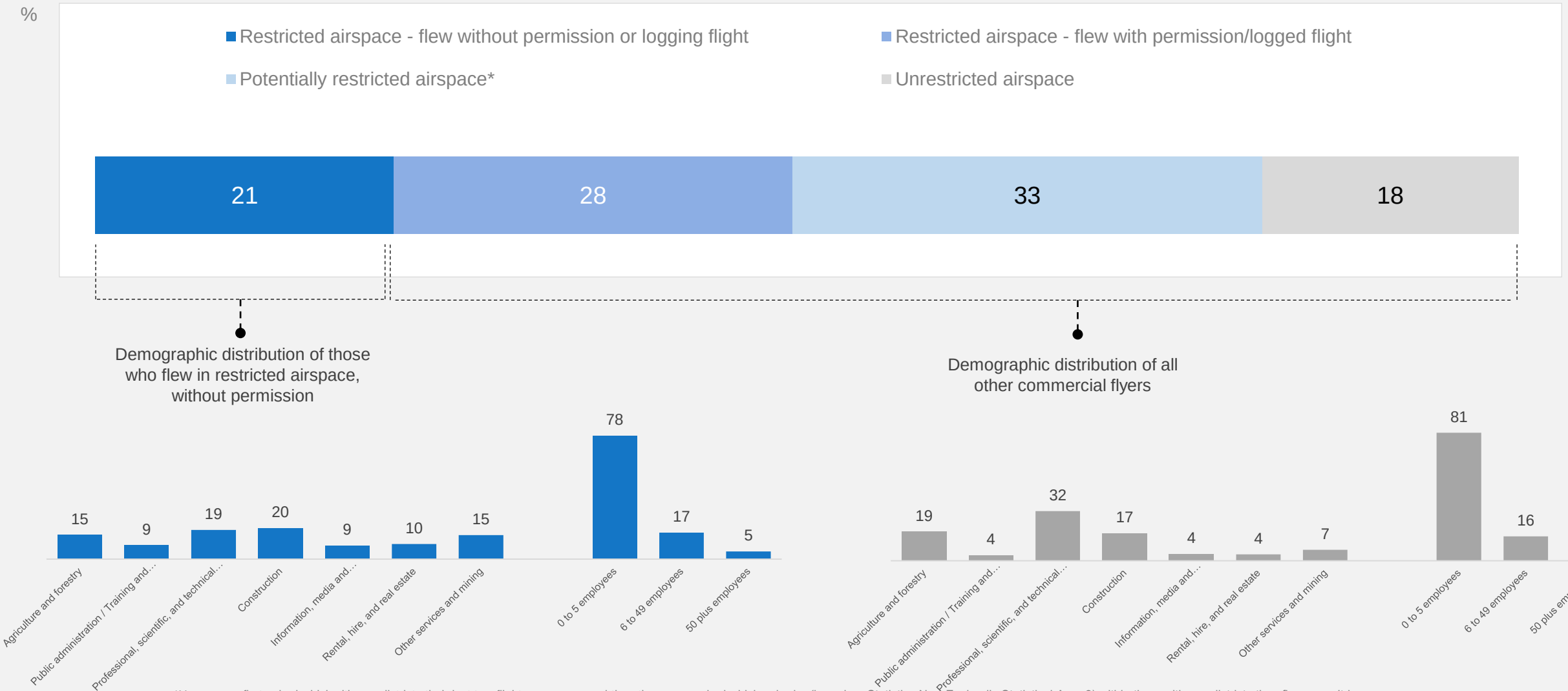
Source: A5b
Base: Commercial users (n=450)

Commercial users typically fly over their organisation’s own land, residential areas or farmland.



Source: B4
Base: Commercial users who fly the drones for their business (n=289)

One in five commercial flights may* have flown in restricted airspace, without permission.



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**'Potentially restricted airspace' are those suburbs which are partially in restricted airspace and partially outside.
Note. The sectors with smaller numbers of drones are not shown in the demographic analysis. Source: A5b, B5b. Base: Commercial users who fly the drones for their organisation (n=238)

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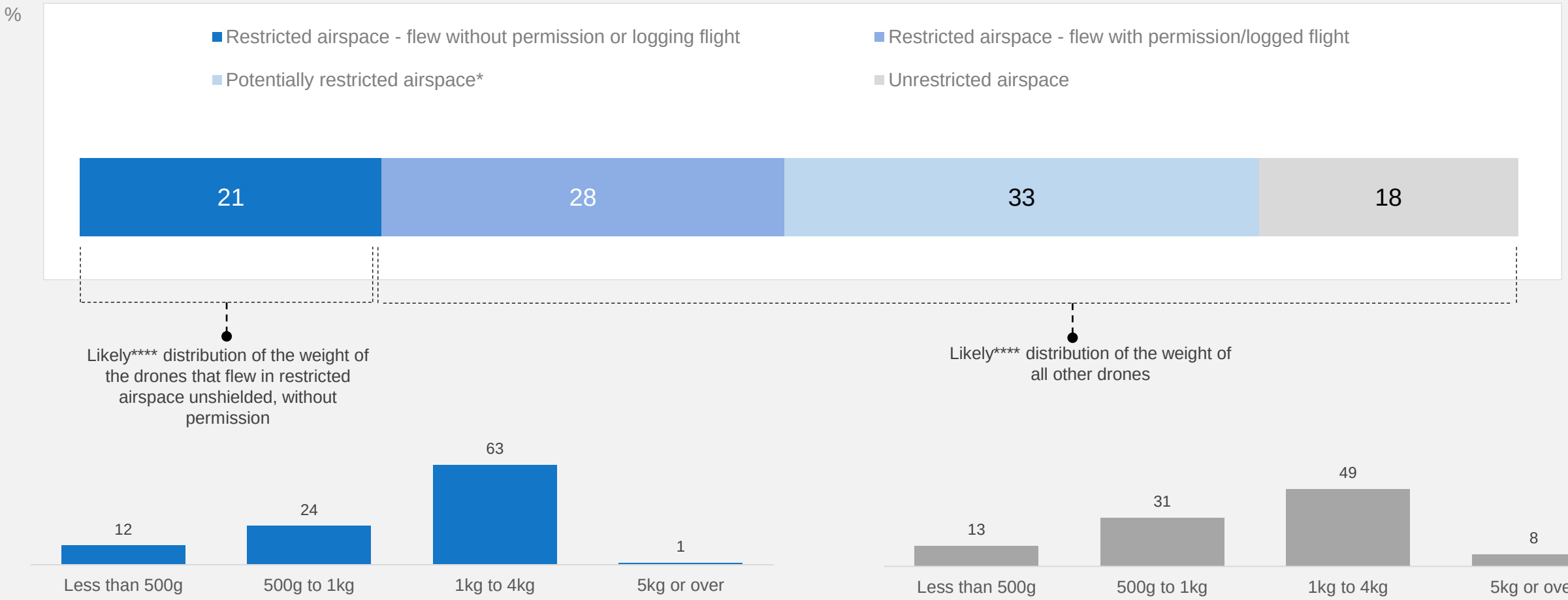
[CONT.] One in five commercial flights may* have flown in restricted airspace, without permission.



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Source: A5b, B5b. Base: Commercial users who fly the drones for their organisation (n=238)

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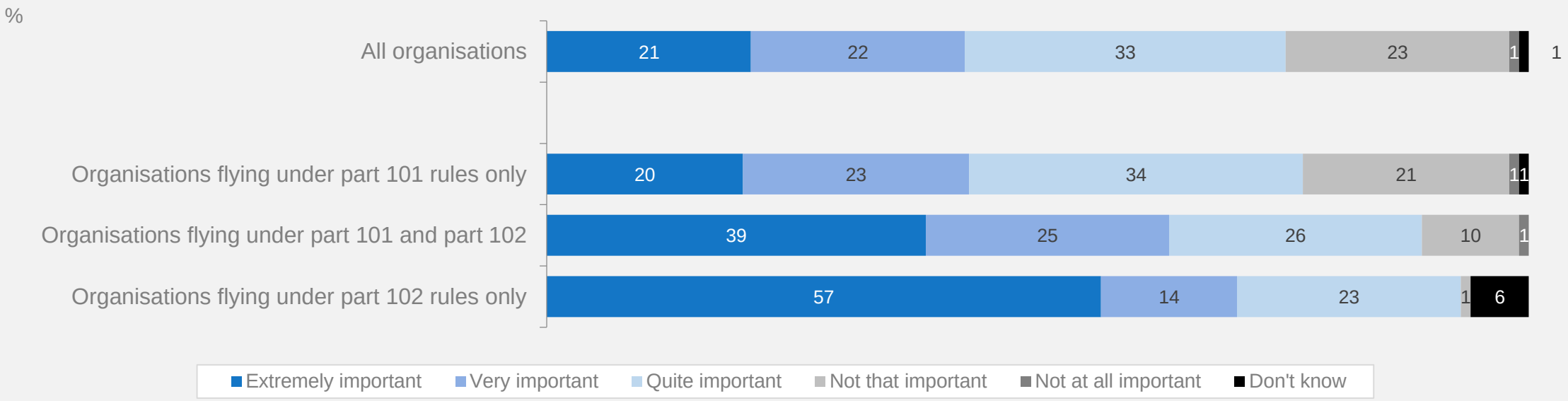
Three quarters of businesses and organisations that use drones consider them important to their profitability and productivity.

COMMERCIAL USERS

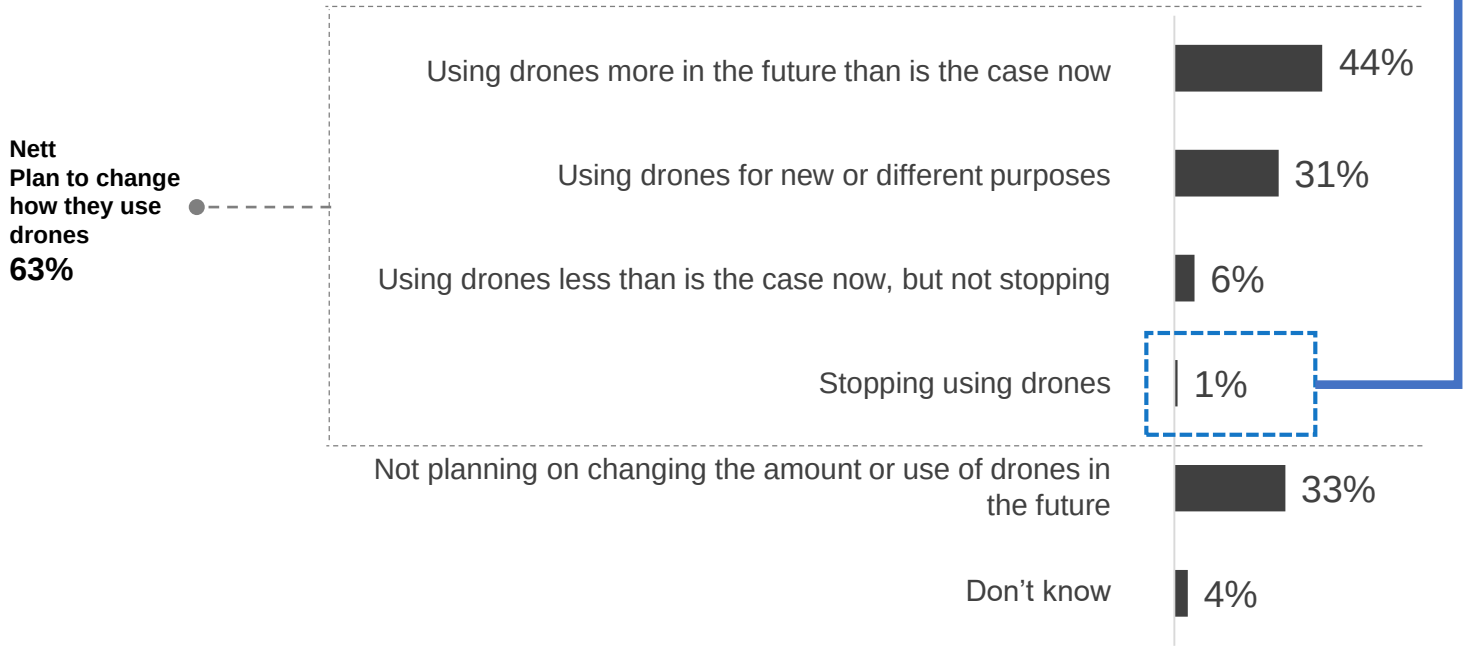


Source: A6
Base: All commercial users (n=450), users workings for an organisation flying under Part 101 rules (n=348), users working for an organisation flying under Part 101 and Part 102 rules (n=42), users working for an organisation only flying under Part 102 rules (n=31).

Businesses and organisations that use drones are more likely to plan on increasing their use in future than decreasing it. Few plan to stop using drones.

Extent to which businesses and organisations plan to use drones in future

(Note this is multiple response)



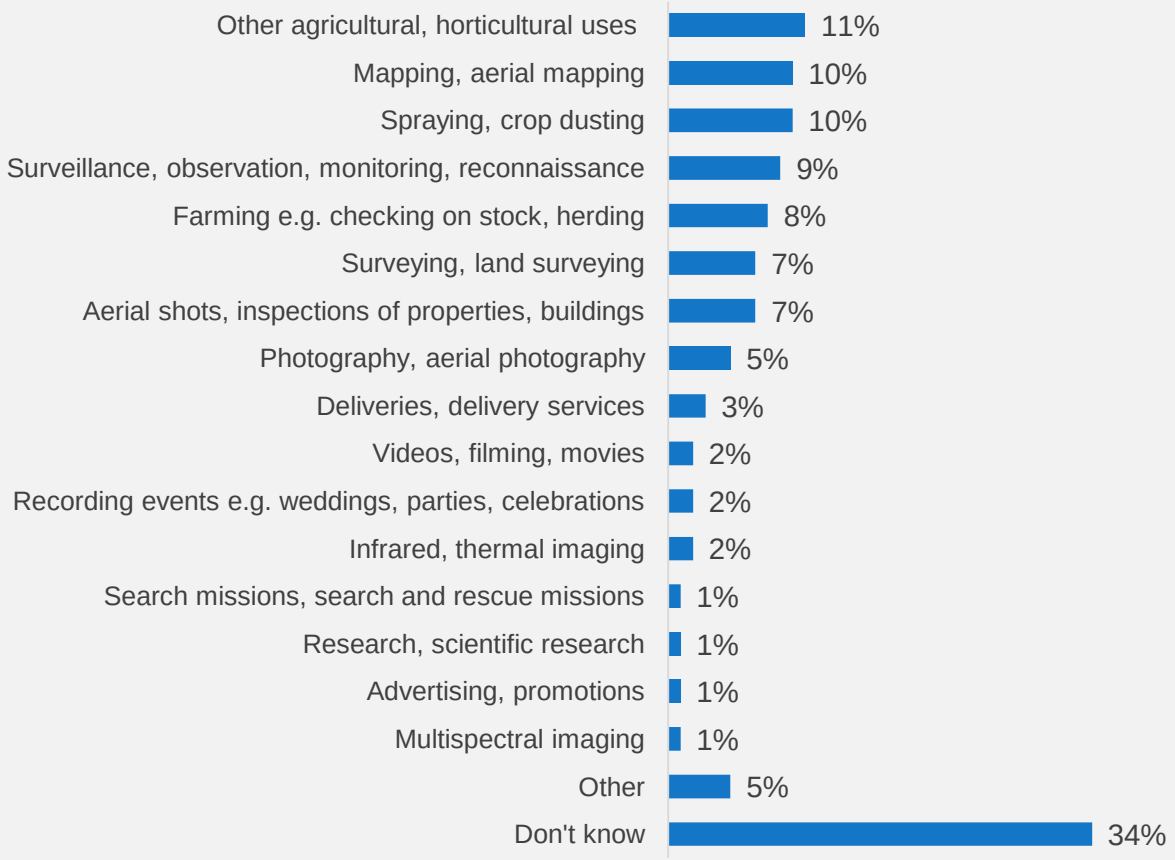
Why businesses and organisations plan to stop using drones

- *Expense and permission hassle.*
- *Too costly.*
- *[We now] use third party drones.*
- *It was just to try really.*
- *No need.*

Source: J1, J3
Base: Commercial users (n=450)

Businesses that plan to use drones in new or different ways in future commonly mention uses that apply to the primary industries, as well as mapping and surveying and general surveillance and monitoring uses.

NEW OR DIFFERENT WAYS DRONES WILL BE USED BY BUSINESSES

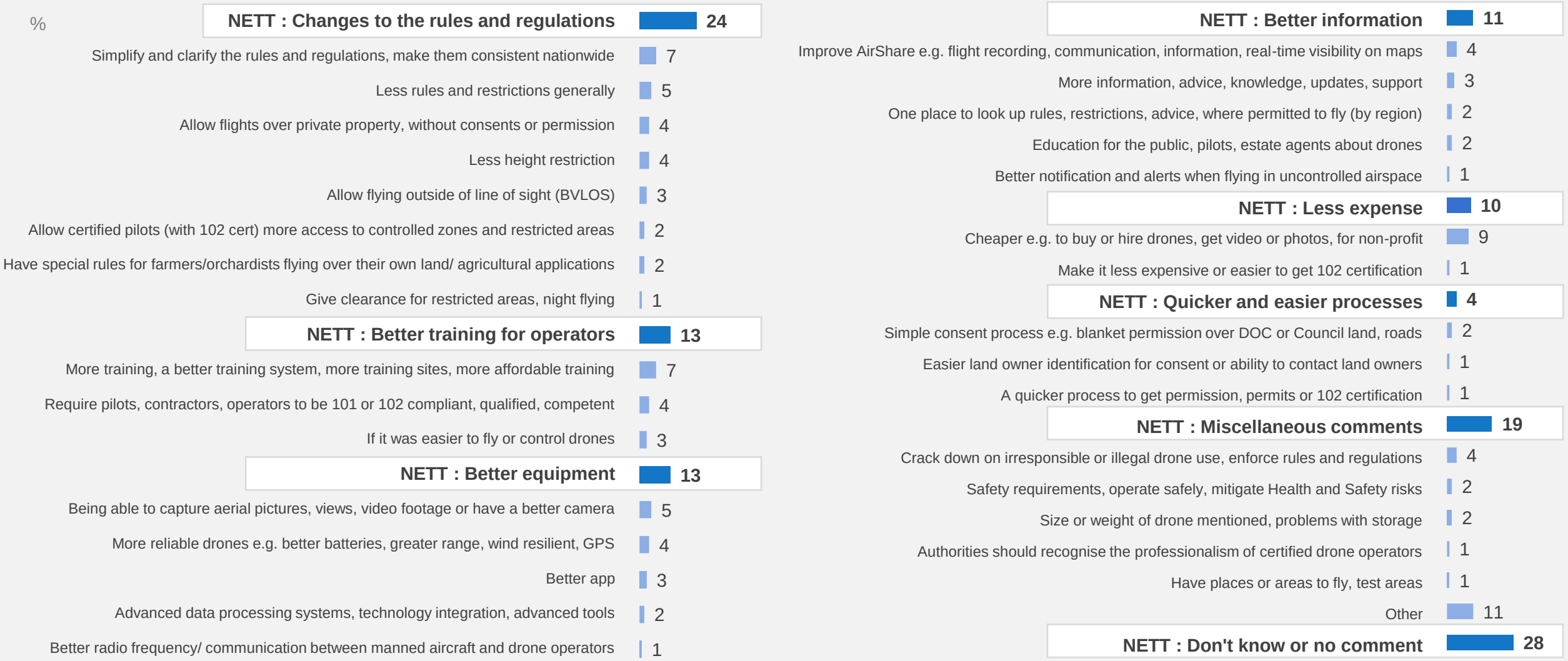


NOTE. The new or different ways businesses are planning on using drones are new or different for their business only, almost all the new/different ways mentioned are already being done by some businesses in New Zealand.

- *Monitoring the environment and encroachment of exotic trees on productive agricultural land.*
- *Aerial crop health monitoring.*
- *Multispectral imagery for agriculture.*
- *Tree counting/inventory.*
- *Spraying, stock moving.*
- *Mapping of sub-divisions and construction sites.*
- *Surveys of busy roads as it's safer than using ground crews.*

Source: J2a
Base: Commercial users who intend to use drones for new or different purposes (n=148)

Businesses and organisations that will continue to use drones say the main thing that would make it easier for them to do so is to change some of the rules and regulations.



Source: J5
Base: Commercial users whose business or organisation will continue to use drones in future (n=445)

Examples of how it could be made easier for businesses and organisations to use drones.

Changes to the rules and regulations

> *Easier rules and regulations surrounding drone use for registered companies. Easier to hold us accountable if an incident happens...*

> *Have each city council/regional council in NZ issue consistent rules for drone use in all public parks and places. Then make sure those rules are easy to access on websites and in advertisements.*

> *Allow us to fly over any property when above say 50 metres. You can't see or hear most drones at that height and certainty can't see inside any windows.*

> *Remove the blanket landowner permissions rule and replace it with a rule that requires permission for flights over active dwellings, active worksites, or active livestock use.*

> *To have a level somewhere between 101 and 102 for small commercial operations that operate in rural or residential areas. Or to bring down the costs for small operations to obtain a 102. I have been trained as a prime person and chief pilot for bigger 102 organisations but could not afford to carry that over to my own smaller business. Now I operate solely as a 101, which restricts me from some of the jobs I could take on if I still had a 102.*

Better training for operators

> *Setting up a training program to train operators as we currently only have a few people who can fly them.*

> *Training schemes with NZQA modules.*

> *Training modes built into the drone's software which can be locked in till sufficient training has taken place…*

> *…A commercial drone retailer that provides advice on what drones can do and on what type of drone to buy and also offers a full introductory training course in the usage of purchased drone would ideal in our circumstances…*

Better equipment, tools or information

> *1. Compact lightweight LIDAR.*
> *2. High res cameras capable of 5mm pixel ground resolution from 50m height.*
> *3. Advanced data processing systems*

> *An app to get approval from the airport to fly without having to pick up the phone and call several different numbers. It would be good just to fill out a form with the relevant information for that request and get either an approved or declined back..*

> *1) One app to give me all information to be compliant, i.e. controlled aerodromes, uncontrolled aerodromes, Doc, City council bylaws, so many different things that could make you non-compliant due to complexity.*
> *2) The amount of admin to be 102 compliant is too much to keep track of for auditing purposes.*

> *Make Air Share live with everyone's drone flights so everyone can see what everybody else is doing, where and when.*

> *Make it easier to inform neighbouring properties of intention/get permission to fly over their property.*

> *Templates provided for pre flight planning purposes, e.g. have we checked VNC charts, AirShare map, NOTAMs, etc, have we inspected all hardware, firmware updates, health and safety checks ...*

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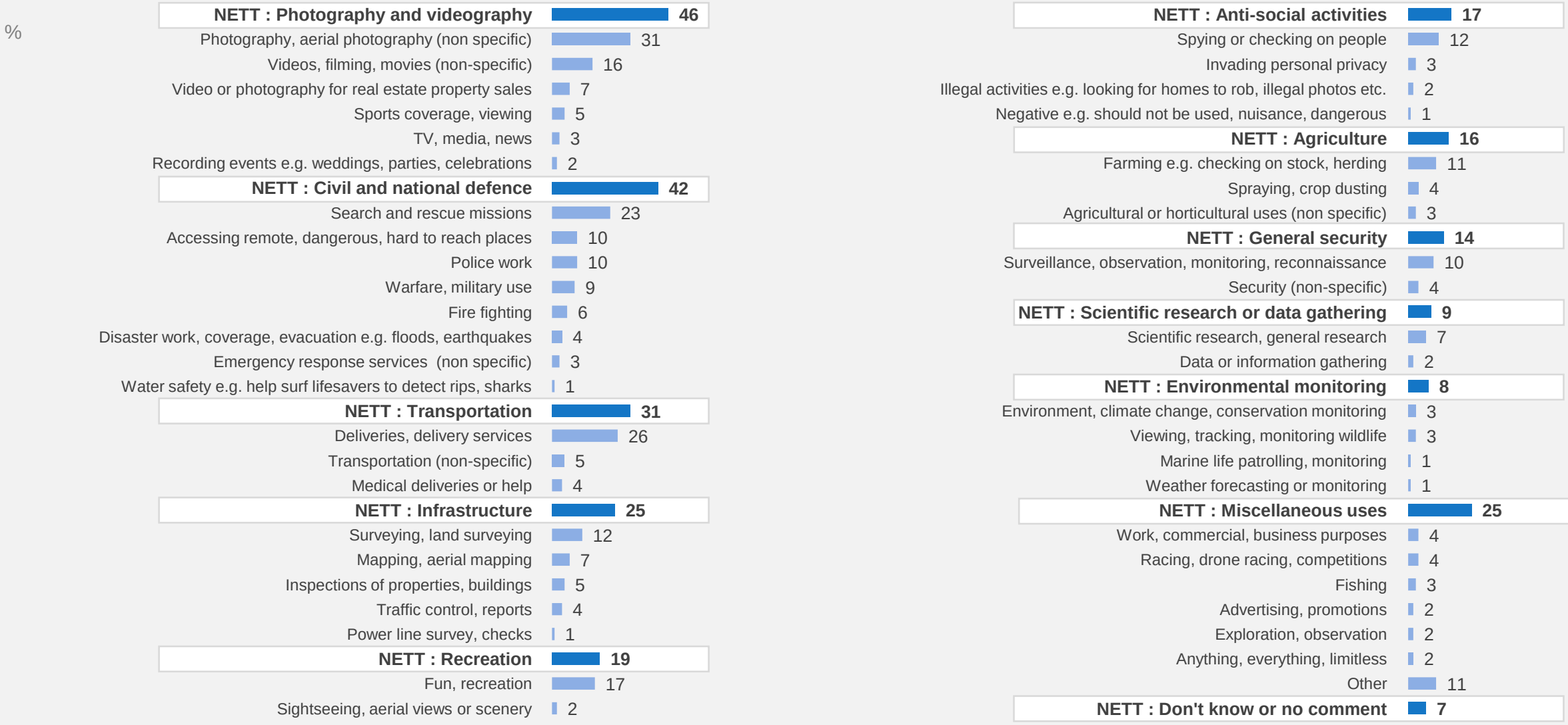
Source: J5
Base: Commercial users whose business or organisation will continue to use drones in future (n=445)

Non-users suggest a wide range of ways that drones could be used now or in future. The main uses include photography or videography, and civil and national defence; including emergency services.



Source: G1
Base: Non-users (n=1,038)

Examples of the different ways drones could be used in New Zealand.

Photography and videography

- *…Filming a wedding, parties, or fundraising event...*
- *Music videos, movie scenes, wildlife documentaries, YouTube videos, photography shots, google earth images, sports games…*
- *Filming houses for real estate sales…commercial film shoots, paparazzi journalists…*

Transportation

- *Delivering small packages and takeaways.*
- *Delivering goods and supplies from pizzas, to books, to medical supplies…*
- *…Transportation of freight and people…*

Civil and national defence

- *…Military use, search and rescue…checking for survivors or damage after major events like earthquakes, flooding, fires etc.*
- *…Police surveillance, tracking of vehicles and suspects…*
- *Locate swimmers in difficulty at beaches, higher observation of fires, locate those lost in bush or mountains…*

Infrastructure

- *…Checking the state of a roof without having to use ladders etc.*
- *Aerial survey of construction sites and infrastructure…*
- *…Visual surveys of power lines in difficult to access areas…*

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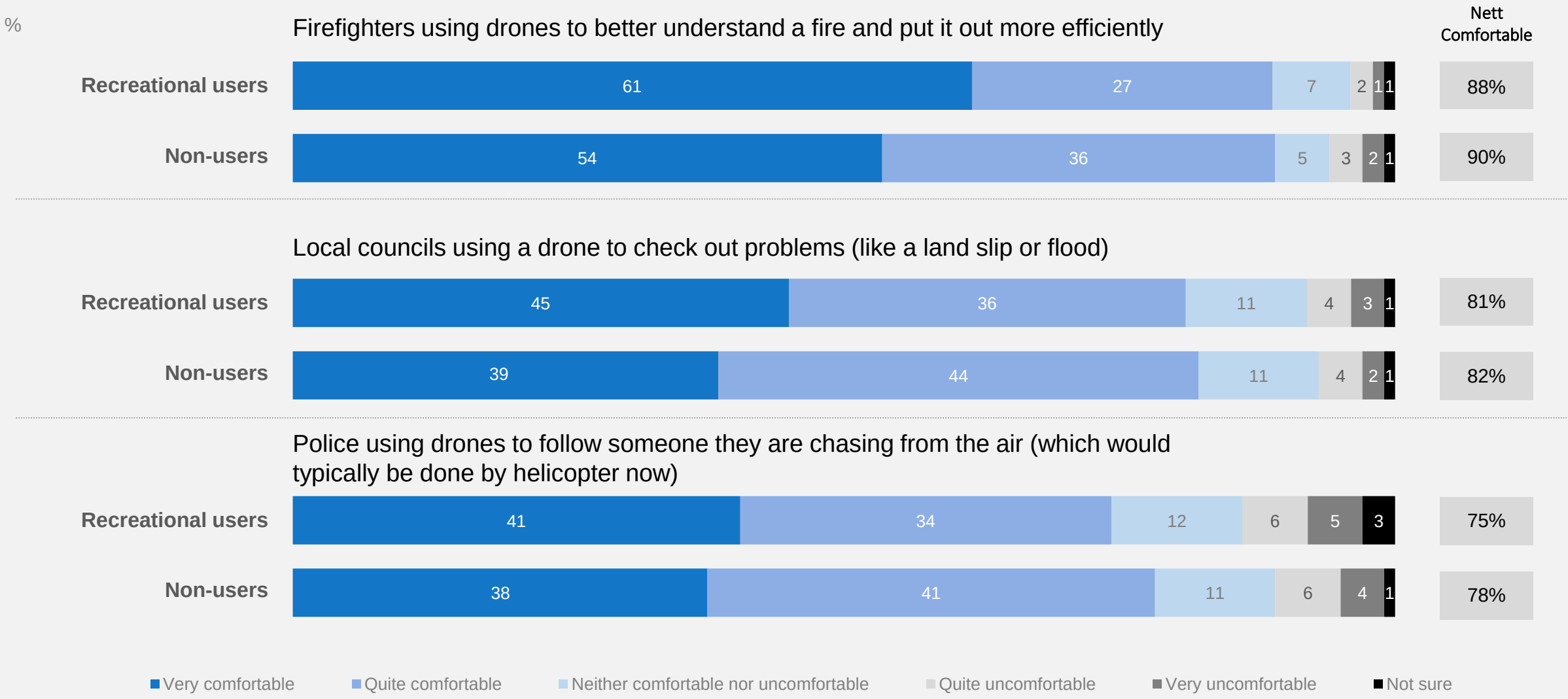
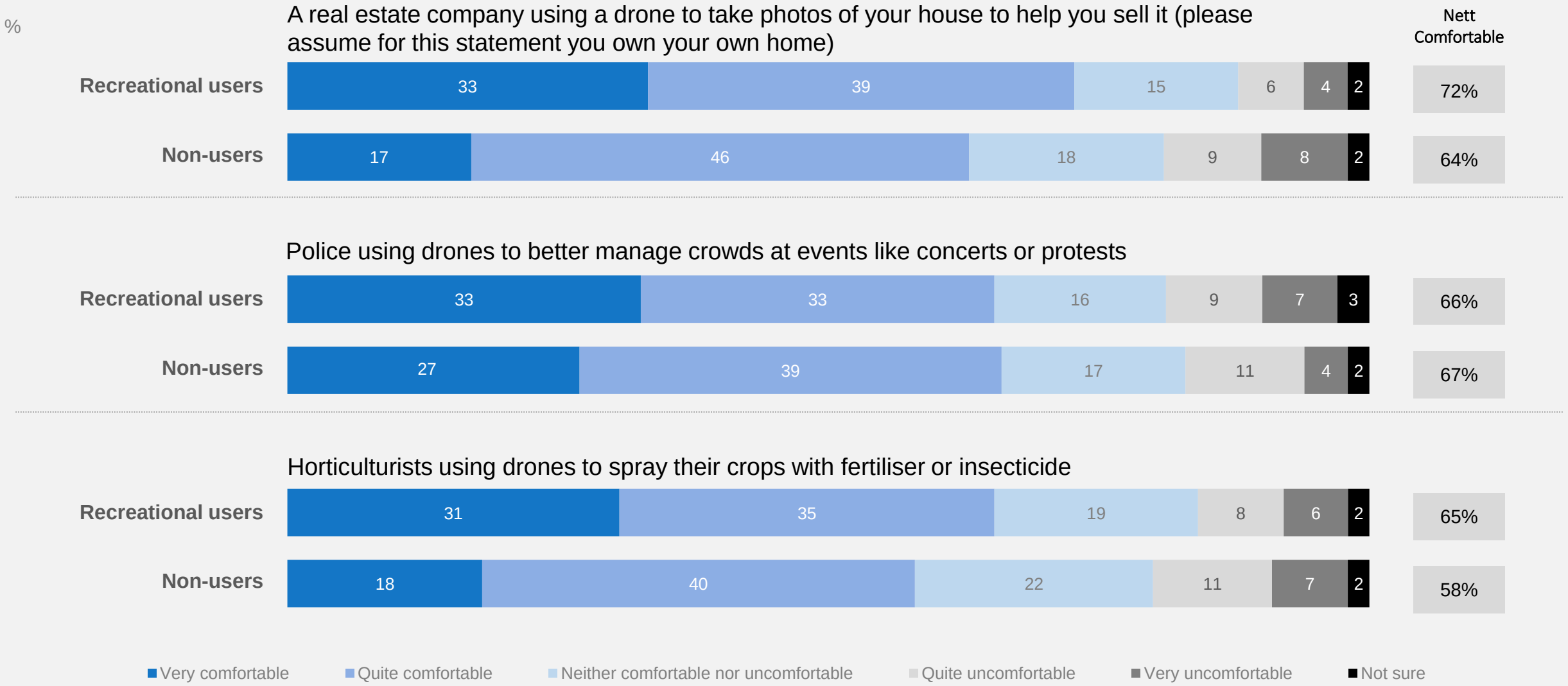
Source: G1
Base: Non-users (n=1,038)

When prompted, most recreational users and non-users are comfortable with drones being used by firefighters, by local councils for checking on problems, and by police in chases.



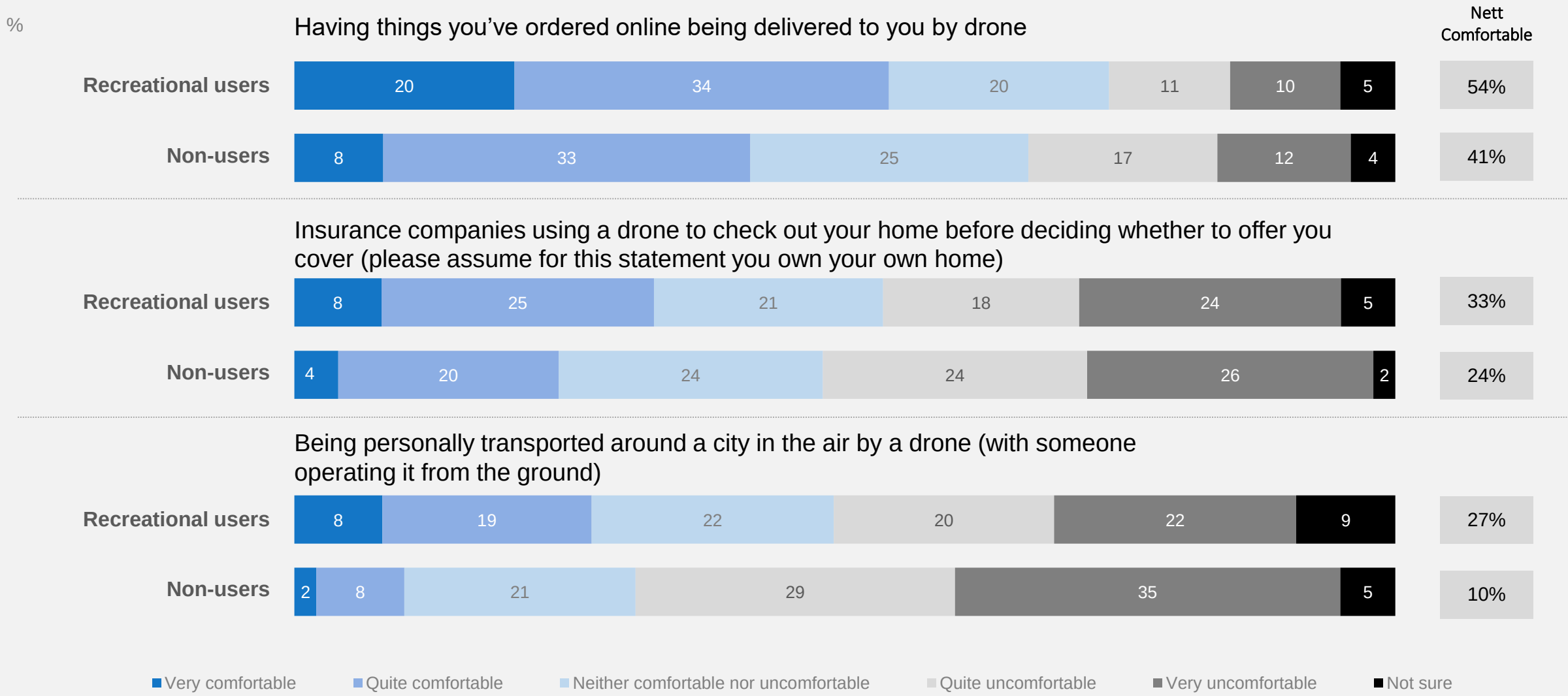
Source: G2
Base: Recreational users (n=1,441), non-users (n=1,038)

The majority of recreational users and non-users are also comfortable with drones being used by a real estate company to help sell their home, by police for crowd management, and horticulturists to spray crops.



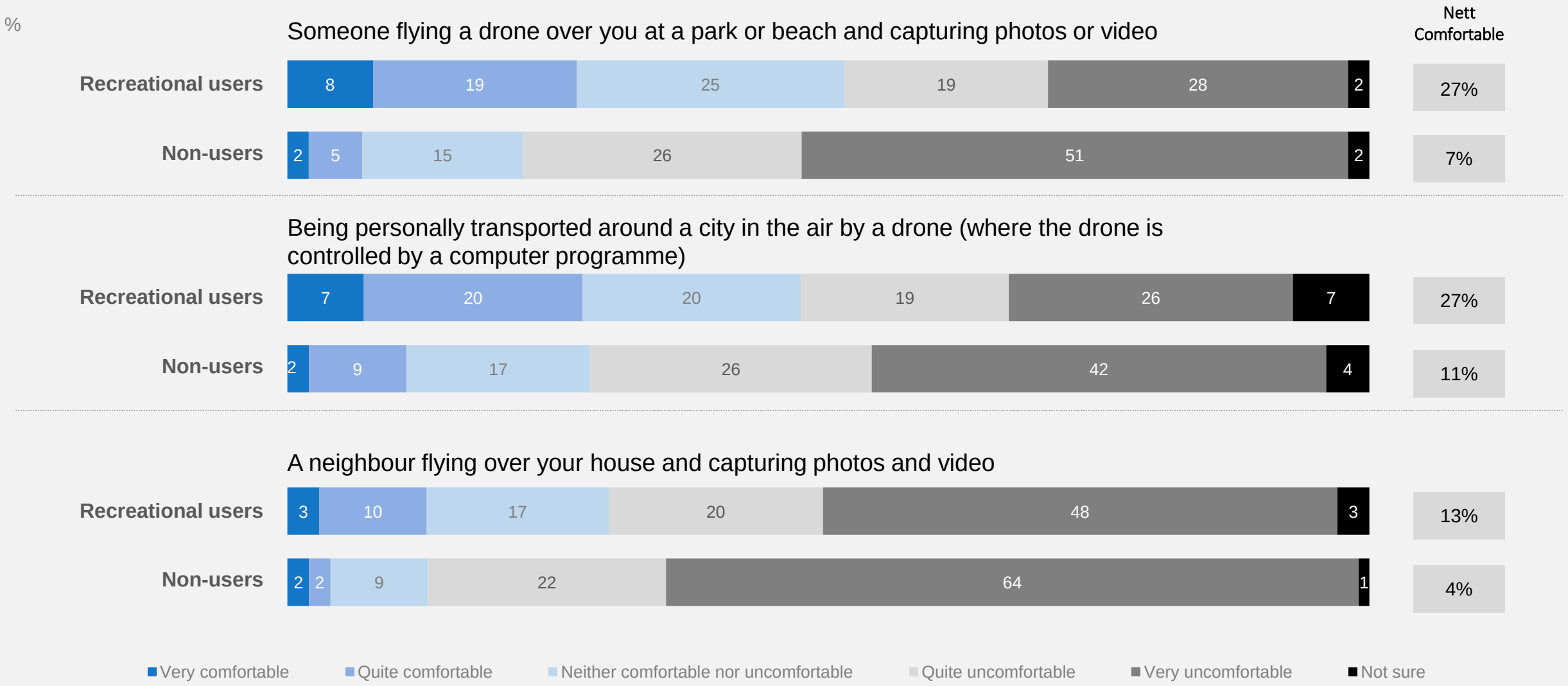
Source: G2
Base: Recreational users (n=1,441), non-users (n=1,038)

Recreational users and non-users are relatively less comfortable with drones being used to deliver their online purchases, for insurance companies to assess their home, or for personal transportation around a city by air with someone operating the drone from the ground. Non-users are particularly uncomfortable with these uses.



Source: G2
Base: Recreational users (n=1,441), non-users (n=1,038)

Recreational users and non-users are most uncomfortable with drones being used for personal transportation around a city by air when it's controlled by a computer programme, or when members of the public fly drones over them at a park or beach or over their home to capture photo or video footage. Very few non-users are comfortable with drones being used in these ways.



Source: G2
Base: Recreational users (n=1,441), non-users (n=1,038)

4

Knowledge and attitudes towards drone use

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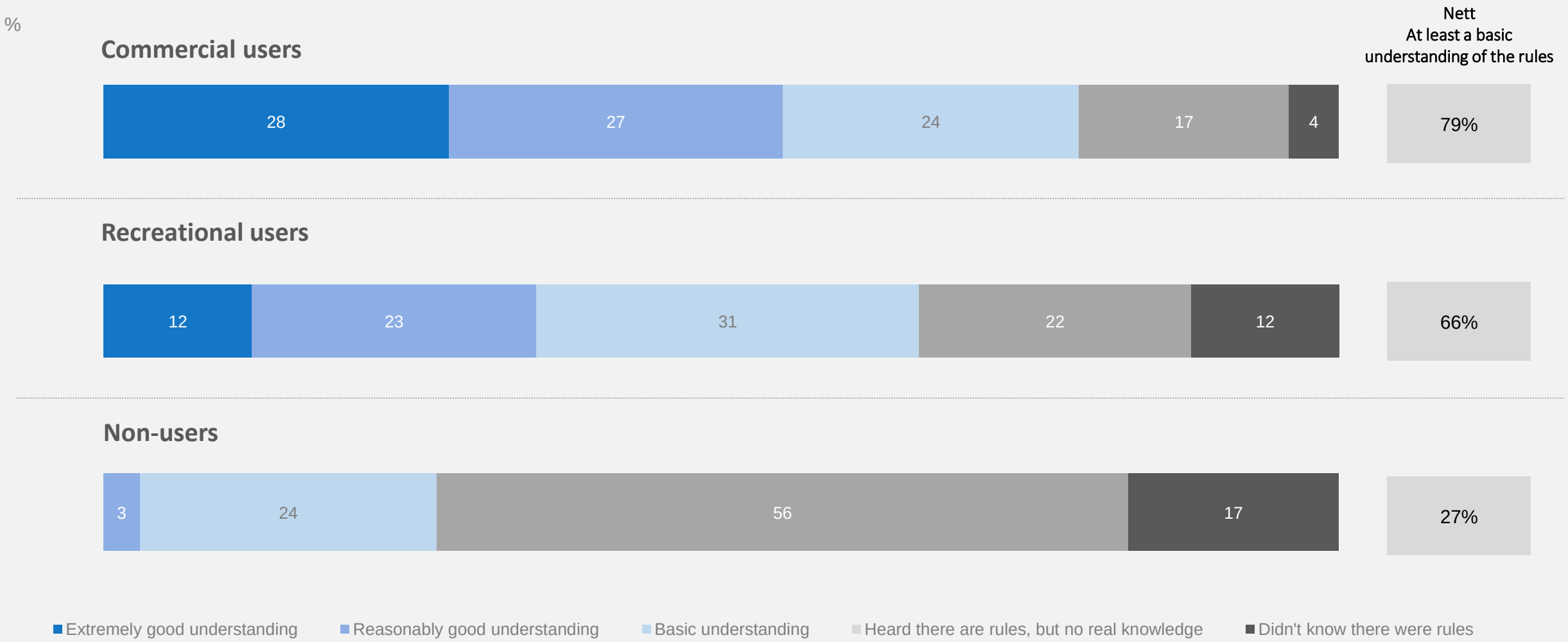
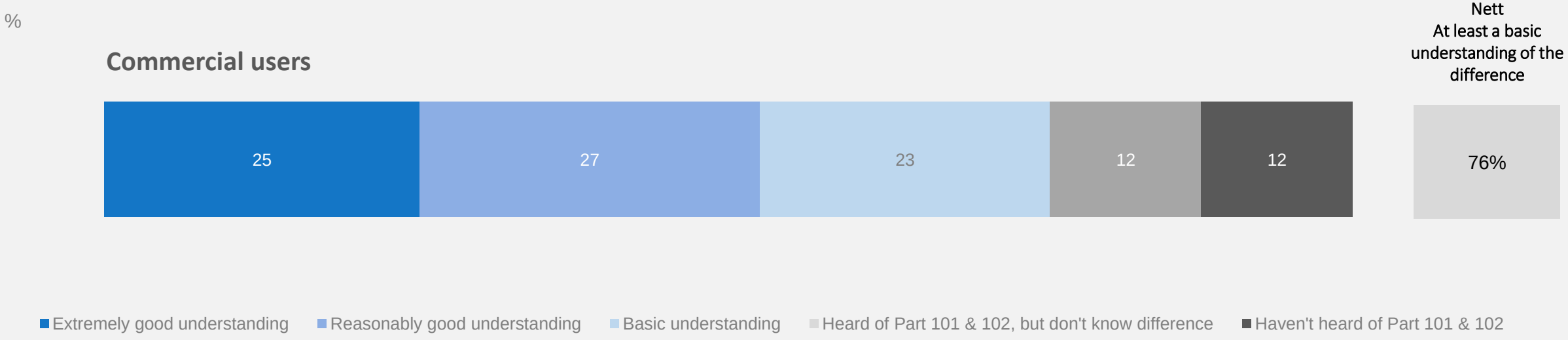
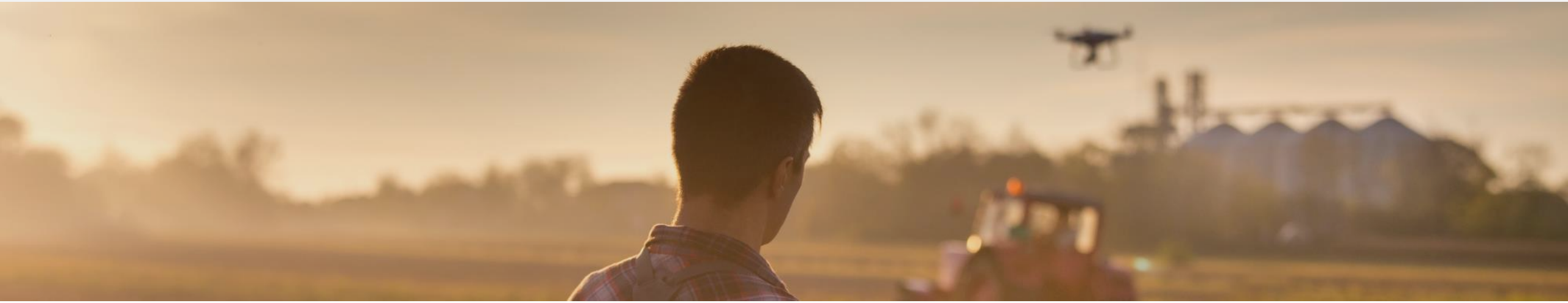
Commercial users are most likely to think they have a high level of knowledge about the drone use rules, followed by recreational users. Few non-users say they know the rules.



Source: C2
Base: Commercial users who were asked this question (n=412), all recreational users (n=1,441), all non-users (n=1,038)

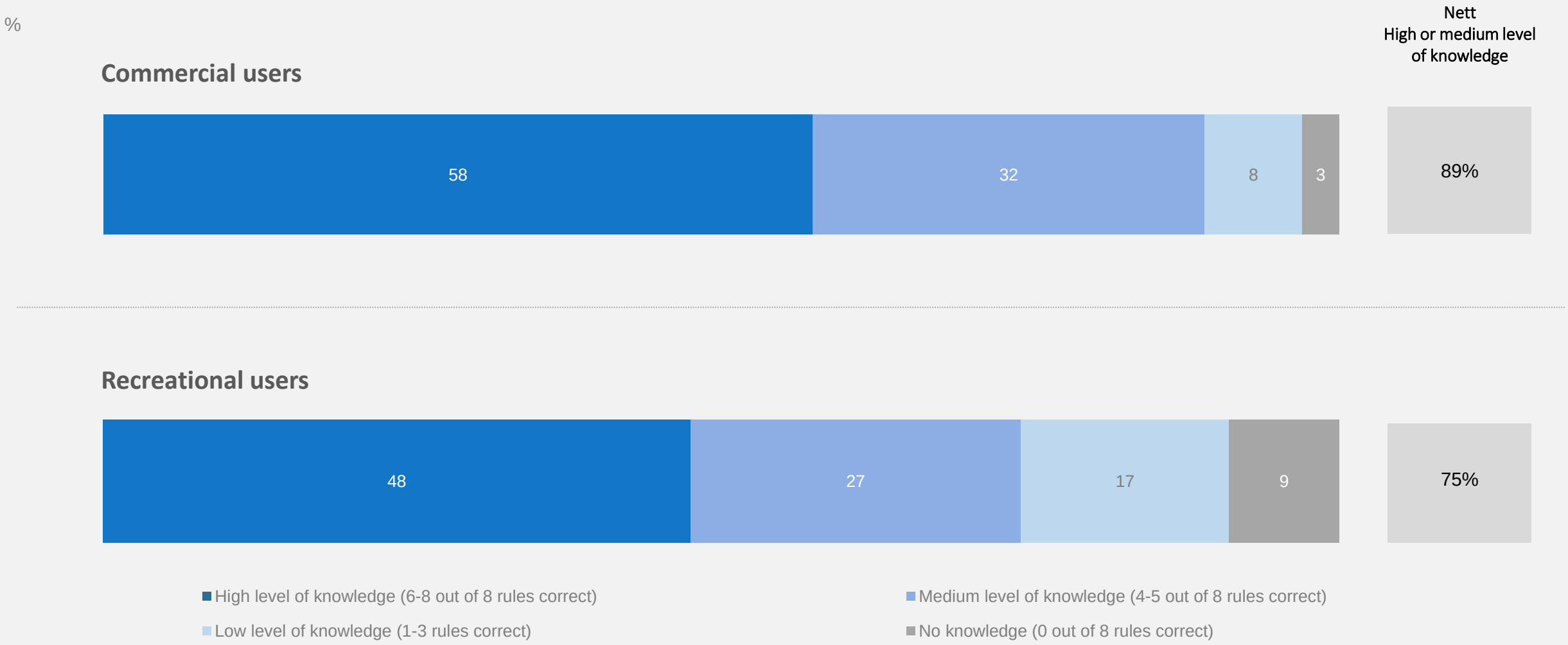
Most commercial users say they understand the difference between the Part 101 and Part 102 drone use rules.





Source: C2a
Base: Commercial users who were asked this question (n=404)

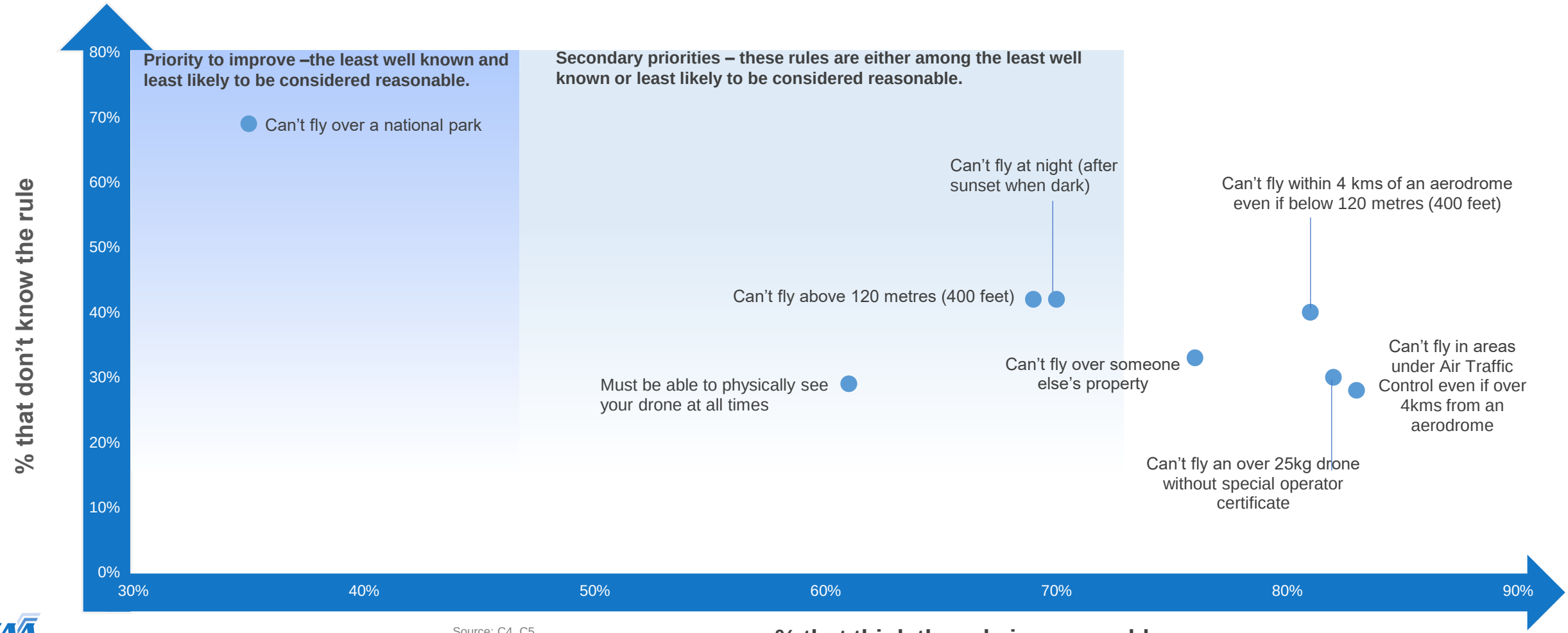
When tested on the rules, commercial users are proven to be more knowledgeable than recreational users. But the majority of recreational users do know at least half of the rules.



Source: C4
Base: Commercial users who were randomly selected to be tested on the rules (n=228), all recreational users (n=1,441)

Recreational users' awareness of the rules could improve. At least three in ten are unaware of individual rules.

Most think each rule is reasonable, particularly those with clear safety implications. There is relatively less agreement that it's reasonable to have to physically see your drone when flying, and remain below a certain height. The least well known and least reasonable rule, by far, is not being able to fly over a national park.



Source: C4, C5
Base: Recreational users (n=1,441)

Recreational users tend to be less convinced that each rule is reasonable than non-users, but both groups agree that not being able to fly over Department of Conservation land is the least reasonable rule.

PROPORTION THAT THINK THE RULE IS REASONABLE

Rules	Recreational users	Non-users
You can't fly in an area that is controlled by Air Traffic Control even if it is more than 4 kilometres away from an aerodrome, unless you have permission or are flying shielded	83%	90%
You can't fly a drone that weights more than 25kg without getting a special operator certificate	82%	84%
You can't fly a drone within 4 kilometres of an aerodrome unless you have permission or are flying shielded (under the height of buildings or natural features which are within 100 metres of your drone)	81%	87%
You can't fly over someone else's property without their permission	76%	89%
You can't fly at night unless you fly shielded	70%	77%
You can't fly above 120 metres (400 feet)	69%	82%
You have to be able to physically see your drone at all times (that means without the use of binoculars or a monitor)	61%	76%
You can't fly over Department of Conservation land	35%	47%

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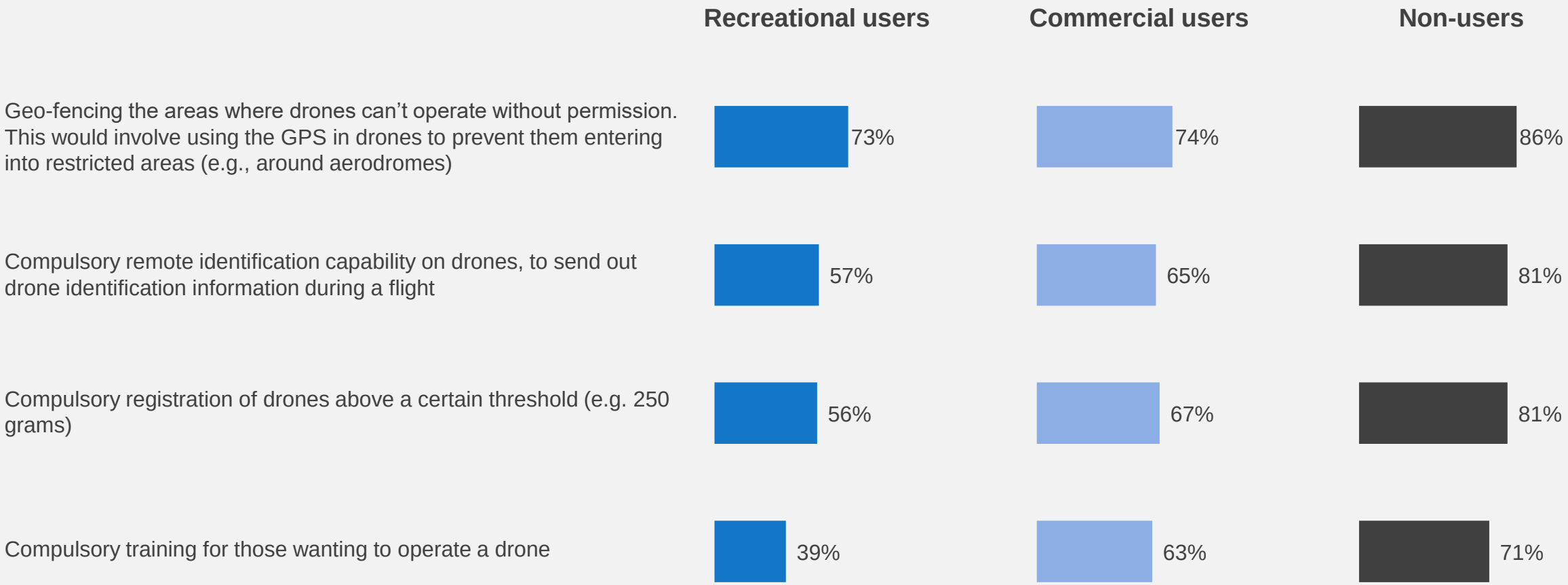
Source: C5
Base: Recreational users (n=1,441), non-users (n=1,038)

Non-users are more in favour of introducing the four new drone use rules they were shown, than drone users. Recreational users are the least supportive of these additional rules overall.

PROPORTION IN FAVOUR OF THIS RULE



Source: D1
Base: All recreational users (n=1,441), all non-users (n=1,038), commercial users who were asked this question (n=210).
Note that D1 was a prompted question in which respondents were shown these four potential new rules and asked whether or not they were in favour of each.

When asked if they would like to see any additional changes to the rules (additional to those presented on the previous slide), non-users provided more suggestions than recreational users. Non-users mainly suggested stricter rules, while recreational users suggested both stricter and more relaxed rules.

	Recreational users	Non-users
NETT : Additional suggestions for stricter rules	**8%**	**18%**
Age restrictions, limits for buying or operating	*	3%
Operators to be licensed or certified	1%	3%
Harsher or stricter penalties	1%	2%
Better privacy measures and rules	1%	2%
Operators to be registered	1%	2%
Rules or restrictions regarding use in crowds or public spaces e.g. beach, parks	*	2%
Vetting, fit for proper person assessment, police background checks	*	2%
Ban all personal or recreational use, leave it to specialists	*	2%
Enforcement, policing of the rules	1%	1%
Right to shoot drones down or confiscate if disobeying the law/trespassing	*	1%
Easier for them to be identified, identification number	1%	1%
Compulsory logging, monitoring, tracking, traceability	*	1%
Sensitive area protected e.g. animals, protected areas	*	1%
Restrictions, tighter regulations on the sale of drones	1%	*

	Recreational users	Non-users
NETT : Suggestions for relaxed rules	**8%**	**1%**
Allow flights, less restrictions over DOC, public land, national parks	3%	*
Less, more relaxed rules, too many restrictions or rules	1%	*
Allow flying over people's property, over property above a certain height	1%	-
Increased height allowance	1%	*
Change or relax the line of site rule	1%	-
Different rules for different classes of drones e.g. commercial based versus hobby based	1%	1%
NETT : Miscellaneous comments	**4%**	**2%**
Better education or information should be supplied	2%	1%
Clearer regulations are needed	1%	*
Be safe, careful, sensible, obey the rules	1%	1%
NETT : Other	**11%**	**7%**
NETT : No changes or satisfied with the current rules	**61%**	**50%**
NETT : Don't know or no comment	**11%**	**22%**

Source: D2
Base: Non-users (n=1,038), Recreational users (n=1,441)
Note that D2 was an open-ended question that allowed respondents to type in any other suggestions they had for rule changes (beyond the four potential new rules they were shown at D1, as displayed on the previous page).

* Means the result is less than 1% but not 0% e.g. 0.4%
- Means the result is 0%

Examples of rule change suggestions.

Stricter rules

- *There should be an age limit to who can fly drones. The person needs to be an adult and responsible.*
- *I think that people who want to operate a drone should have to pass a police check.*
- *Drone use needs to be regulated more seriously especially near people's homes and on other private property. Drones really need to be operated by someone who has a license and there needs to be a way to track a drone that is in the airspace. However, the main issue for me is privacy breaches.*
- *Not a fan of them at public places like parks or beach. Have them restricted in these areas.*
- *Harsher penalties for using drones near airports…*
- *Some sort of identification tag on the drone or something on it that can be electronically identified so that if it is used illegally you can track the owner of it and prosecute them..*
- *I hope there is a law that possessors of drones over a certain specification need to have them registered as well as a licence to operate them, just as we have for cars. And that licence both for the owner and the drone, is renewable periodically. Also, that there are penalties in place in case the rules and regulations are not followed or are broken.*

More relaxed rules

- *I believe the DOC requirements are too restrictive, arduous and expensive. Having travelled around NZ for 16 weeks recently, it was just too hard to get permission to video and photograph from my drone... I am all for safety and accountability but this should be balanced against the desire to use this new technology to capture the wonderful scenery in this land of ours. It is my opinion that many councils also go overboard with their restrictions. Perhaps designated drone areas could be one way to provide opportunity.*
- *Permission above property is one of the most unenforceable and not fit for purpose rules. Not above people makes sense, but over empty fields etc there is no risk.*
- *Line of sight rule is based on the old model planes, it is totally unnecessary for a drone with a quality camera. It is like saying a Cessna 172 needs a spotter…*
- *Fishing drones being separated off for rules i.e. their own set of rules. We currently live in an area where we are unable to use our drone very much, due to flying restrictions…Some drones do not fly above a certain height so maybe usage rules could be relaxed for these.*
- *There should be a differentiation in rules for model aircraft flown by members of a club verses a shop bought drone that becomes an intrusion on privacy and an annoyance to the public.*
- *Maybe a "middle" zone. The 2 tiers currently are miles apart, and 102 certification seems an enormous hurdle for someone using a drone recreationally. Driving analogy would be standard driving test vs advanced driver training vs professional licence.*

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Source: D2
Base: Non-users (n=1,038), Recreational users (n=1,441)

The first place recreational users and non-users say they'd go for the drone use rules is CAA's website.

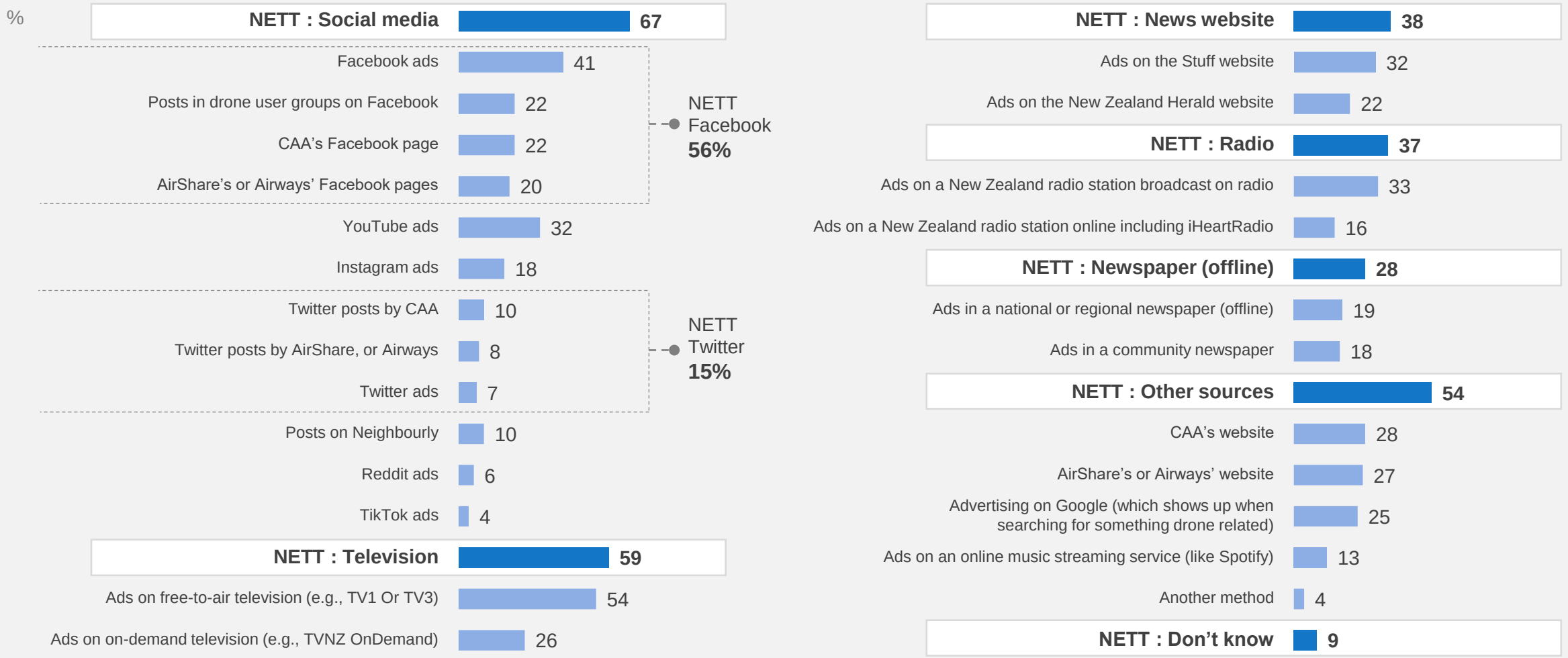
PLACES THEY WOULD GO FIRST FOR THE DRONE USE RULES

	Recreational users	Non-users
CAA's website	42%	40%
AirShare's website or app	39%	6%
FlyYourDrone.nz website	20%	26%
The information that came with my drone	11%	
Another drone user/ a drone user	8%	7%
Someone in a shop that sells drones	8%	11%
A different website to the ones mentioned above	6%	7%
Somewhere else	6%	8%
Don't recall	8%	15%

Source: C3
Base: Recreational users (n=1,441), non-users (n=1,038)

But when asked where they'd find out about rule changes just one in three recreational users mention a CAA source. Most will become informed via online channels, particularly social media sites like Facebook. Television could be another common source.

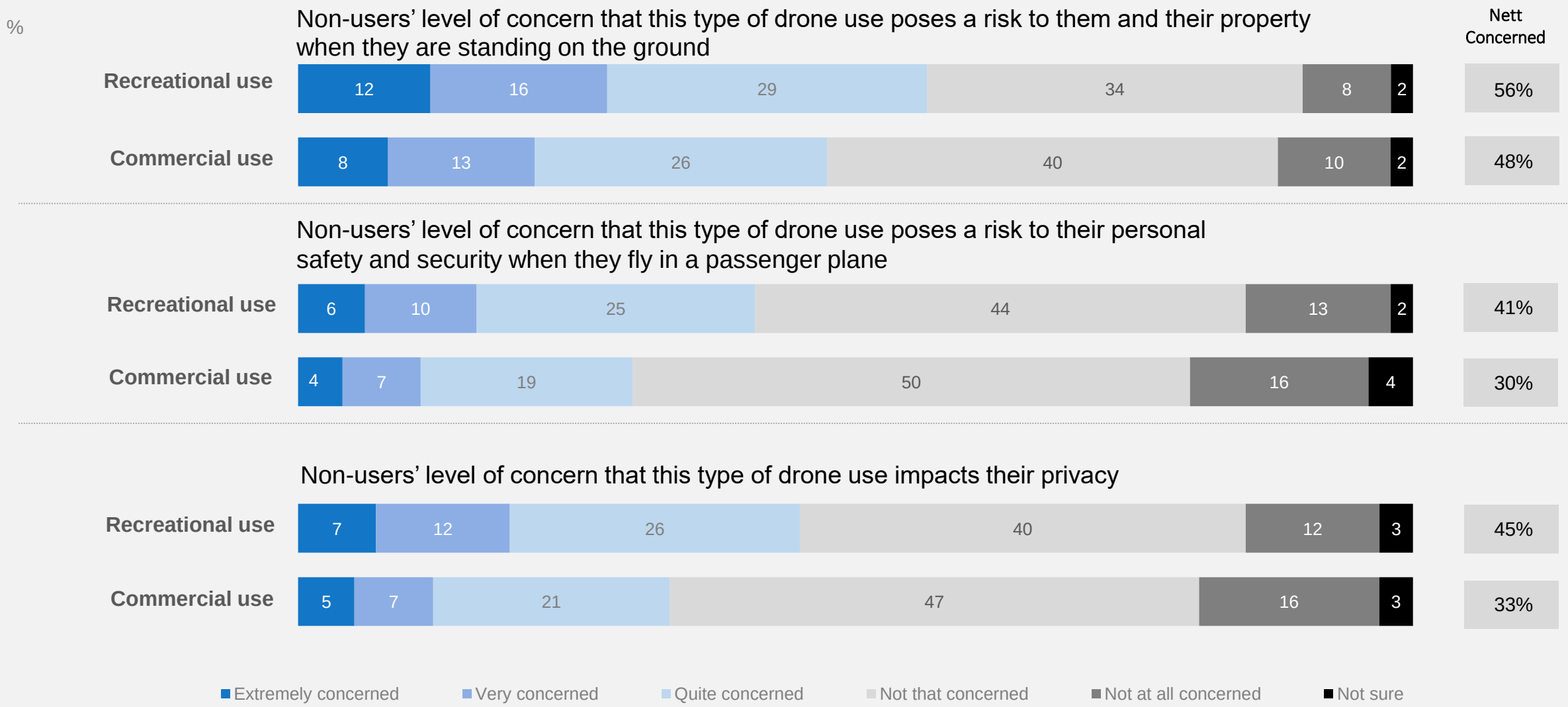
BEST COMMUNICATION CHANNELS FOR RECREATIONAL USERS



Source: D5
Base: Recreational users (n=1,441)

Nett CAA : 35%
Nett AirShare/Airways : 34%
Nett online : 83%

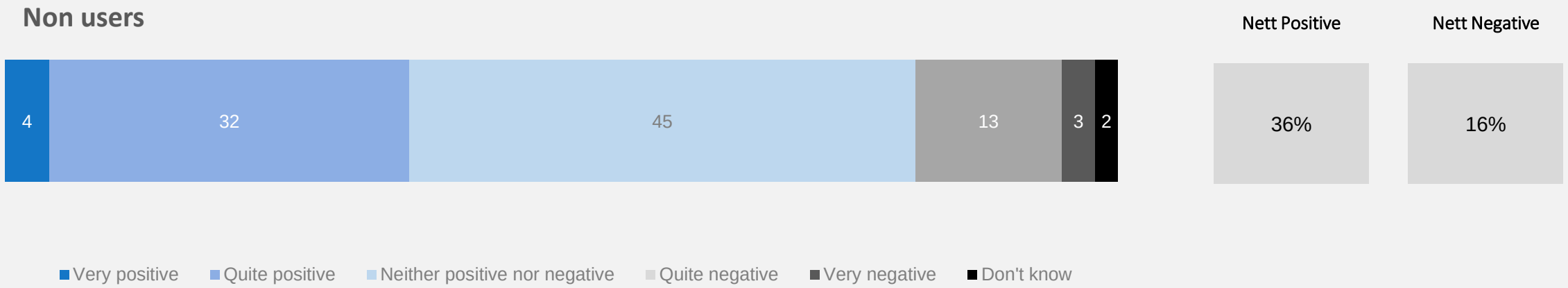
Non-users are more concerned about recreational drone use than commercial drone use in terms of the risk posed to their safety, and the impact on their privacy.



Source: F1, F2, F3
Base: Non-users (n=1,038)

Overall, non-users are twice as likely to feel positively about the way drones are being used in New Zealand than negatively.

%

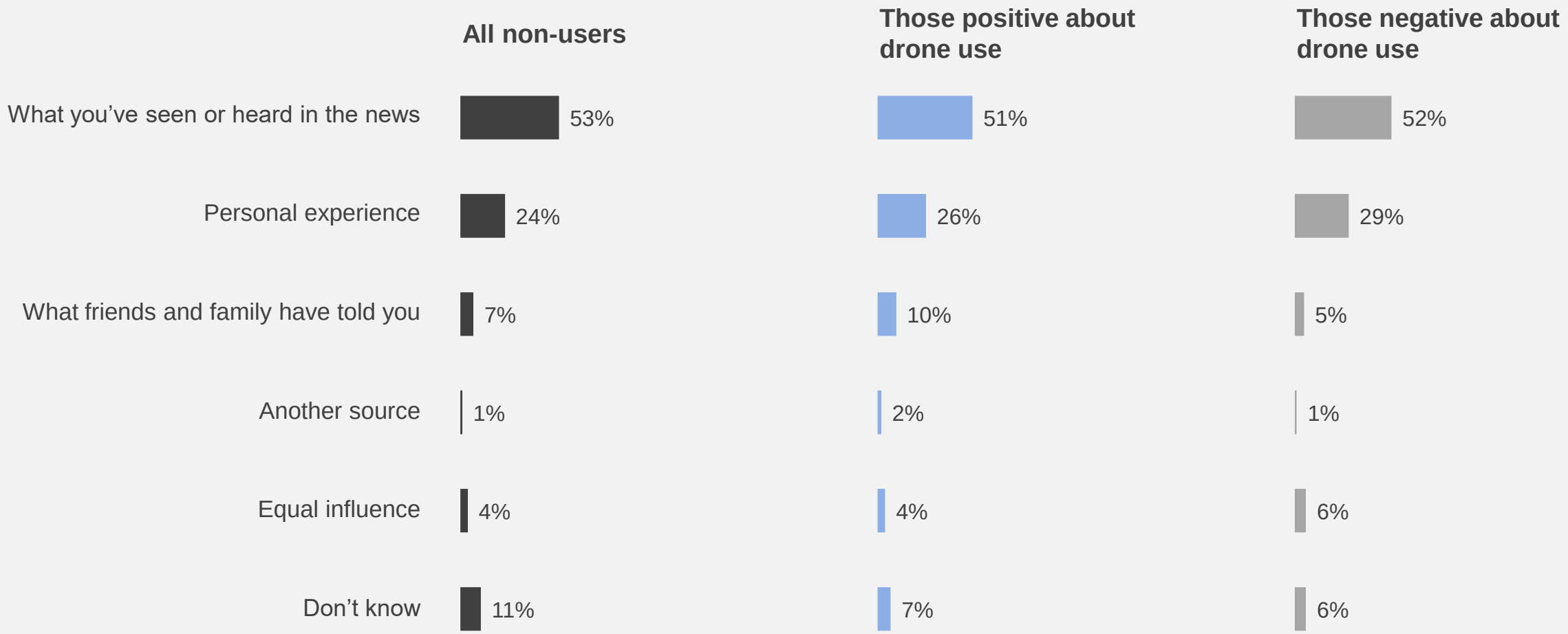


Nett Positive	Nett Negative
36%	16%

Source: H4
Base: Non-users (n=1,038)

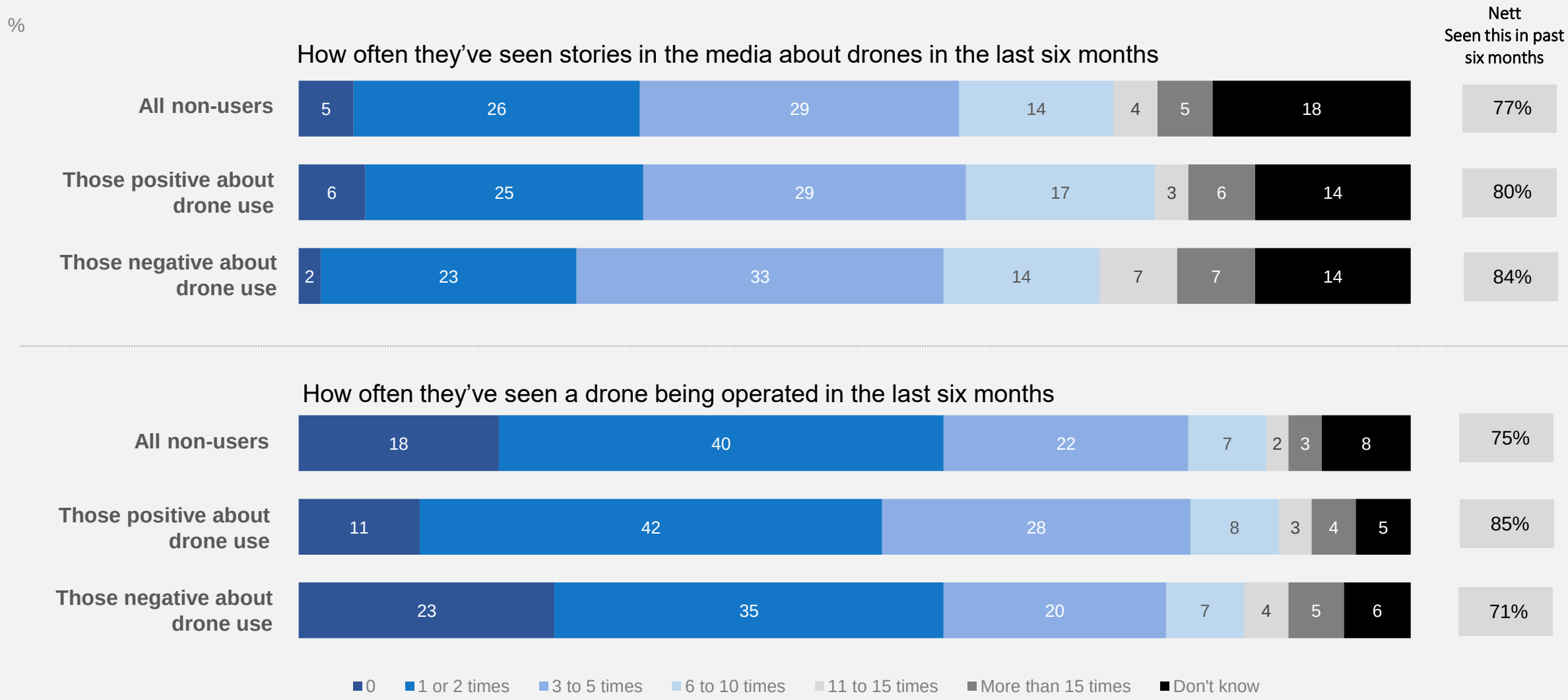
What they've seen or heard in the news has the most impact on their views of drone use in New Zealand.

WHAT HAS THE MOST IMPACT ON NON-USERS' VIEWS OF NZ DRONE USE



Source: H1, H2
Base: Base: All non-users (n=1,038), non-users who feel positively about drone use in NZ (n=374), non-users who feel negatively about drone use in NZ (n=169)

Most non-users have seen stories in the media about drones, and seen drones being operated in the past six months. Those who feel positively about drone use are more likely to have seen one being operated than those who feel negatively about it. Both groups are equally likely to have seen media coverage on drones.



Source: H3
Base: All non-users (n=1,038), non-users who feel positively about drone use in NZ (n=374), non-users who feel negatively about drone use in NZ (n=169)

Non-users who feel positively about drone use in New Zealand see many benefits. Notably drone use for civil and national defence including emergency services, and the ability to perform tasks in a safer and more efficient way.

Use for civil and national defence (including emergency services)

- *Aiding emergency services in completing their tasks on hand, i.e. search and rescue, firefighting, sorting criminals, etc.*
- *They can improve, enhance, better assist operations such as search and rescue operations…*
- *Depends on use. For personal use by others not too happy, for use by police, fire, scientific research, quite happy.*
- *Very good for police, fire crew, DOC, surf rescuers etc…*
- *At the moment I think people are seeing the potential in using drones to better protect and serve humans.*

Ability to perform tasks in a safe and efficient way

- *They are far more efficient than conventional methods and can reduce risks while surveying in difficult areas.*
- *Positive using technology for things that previously have been risky jobs for people.*
- *More efficient, economic and environmentally friendly way of carrying out delivery or surveillance activities which happen now anyway.*
- *I like that they are reducing the cost and improving the efficacy of a number of scientific studies, I like that they are reducing risk to human life with use by the police and civil defence forces.*
- *They give people a lot more freedom to do things without the hassle of using larger equipment and also more economically efficient.*

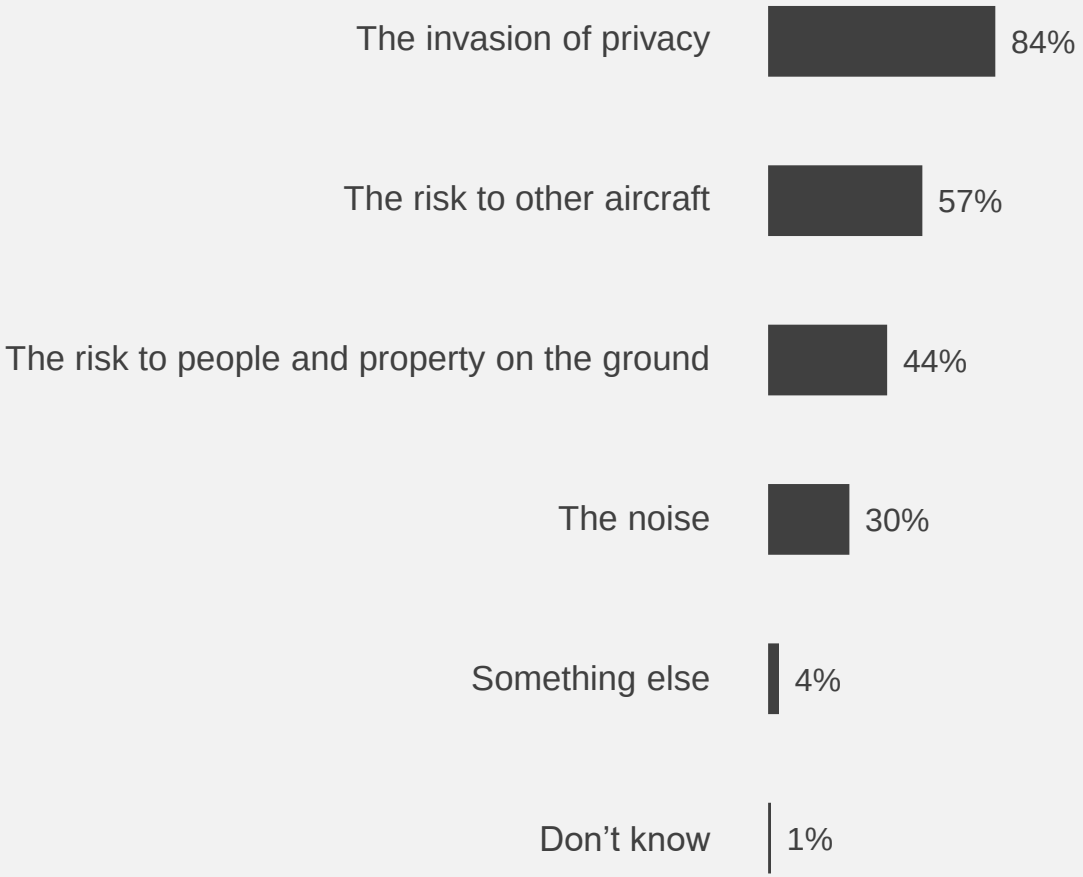
Other comments

- *I've only seen people using it for recreational purposes, so far it's been a positive experience.*
- *I like new technology, especially when it can improve things in life. I'm excited at the positives of drones. I have read a story about drone taxis being trialled and pizza deliveries being trialled - it feels futuristic.*
- *New technology that will improve quality of life. Like many thing they have pros and cons but there are more pros than cons.*
- *I like that there are strict aviation rules governing the use of drones, and that local Council bylaws are in place also which should be adhered to.*
- *I haven't seen too many crazy private operators invading privacy and tranquillity and so far commercial operators are not overwhelming. I think they have the potential to do a lot of good.*

Source: H5a
Base: Non--users who feel positively about drone use in NZ (n=374)

Non-users who feel negatively about drone use in New Zealand are most irritated or annoyed by privacy invasion.

WHAT NON-USERS FIND IRRITATING OR ANNOYING ABOUT DRONE USE



> *More to do with privacy, I've had one hover over me while sunbathing in my own private backyard, and I felt invaded. I would like to be able to identify that drone/person so I could press charges. Also if it happens again and I hit your drone with a broom or whatever, I shouldn't have to pay for damages.*

> *Please take seriously the potential danger these devices could have on the public. The events of 9/11 could easily be replicated with no way of intercepting the flight path.*

> *Drones can be useful, but the potential for accident is large and they must be subject to strict regulation and enforcement of those regulations.*

Source: H5b, D2, E9
Base: Non-users who feel negatively about drone use in NZ (n=169)

5

Problems encountered around drone use and what, if any, action is taken

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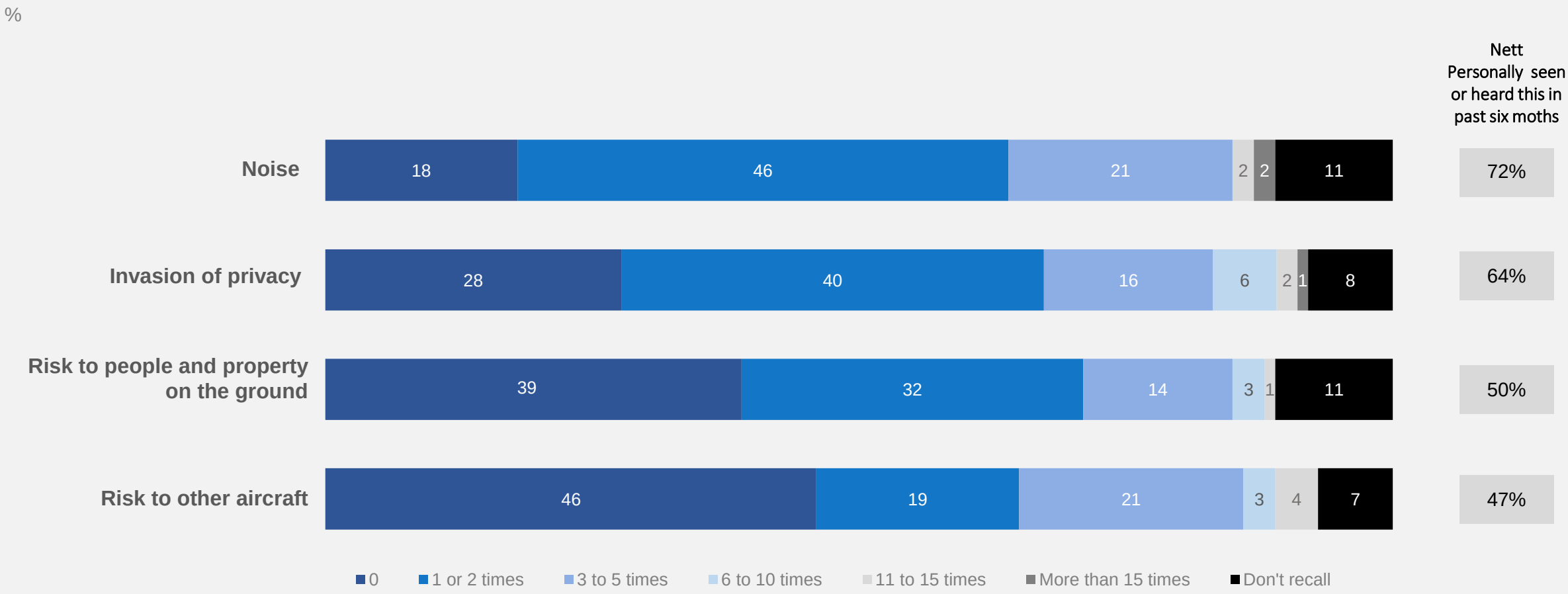
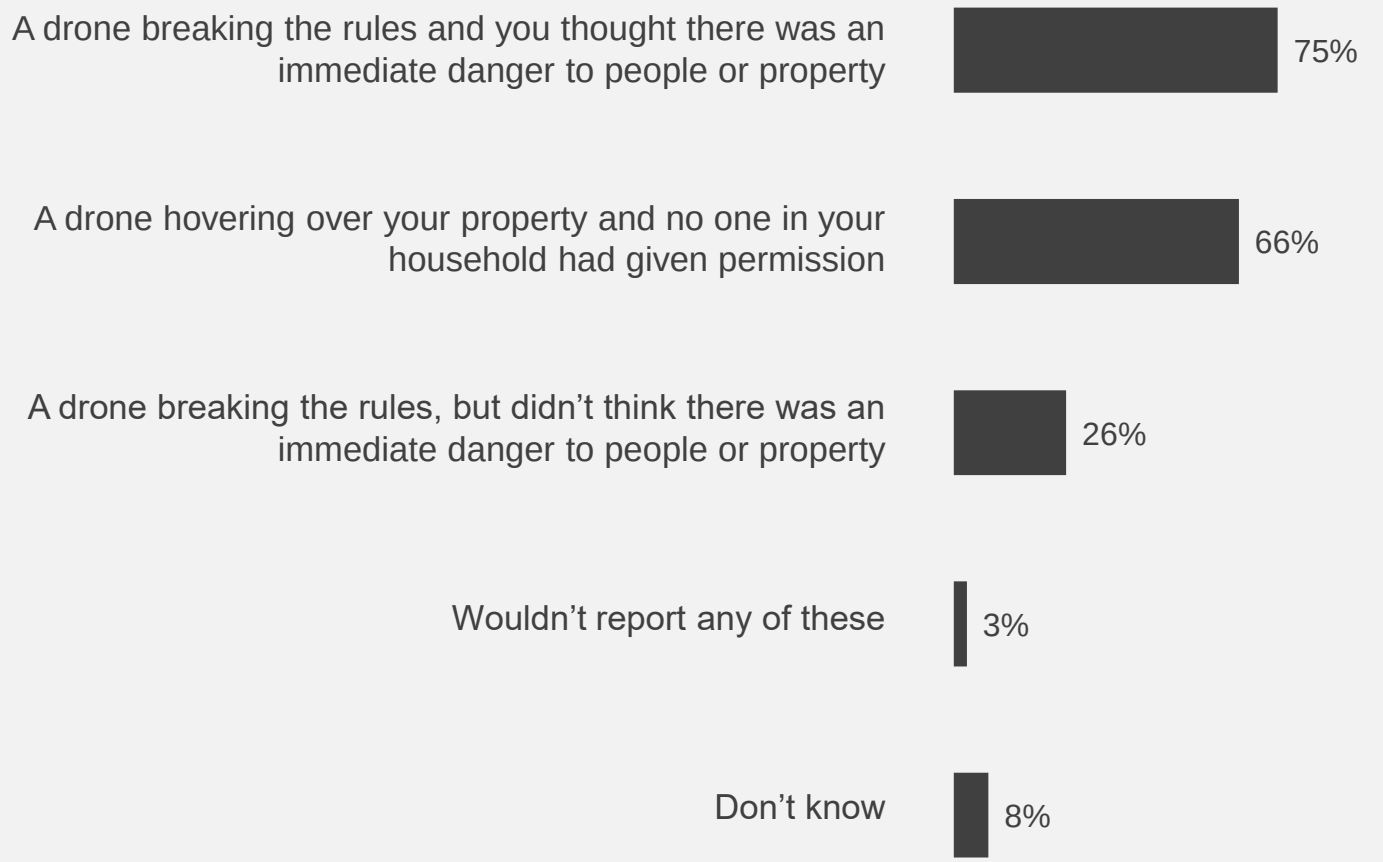
Non-users who are irritated by drones' invasion of privacy or noise are more likely to have personally experienced what annoys them in the last six months, than those who are annoyed by the risk drones pose to people or property or other aircraft.



Source: H6
Base: Non-users who are irritated or annoyed by this aspect of drone use, noise (n=51), invasion of privacy (n=142), risk to people and property on ground (n=76), risk to other aircraft (n=97)
Note: Only n=7 non-users mentioned 'other' nuisances

If non-users did see a drone operator breaking the rules and putting people or property in immediate danger most say they would report this. They are relatively less likely to say they would report privacy breaches, or rule breaking that is not immediately dangerous.

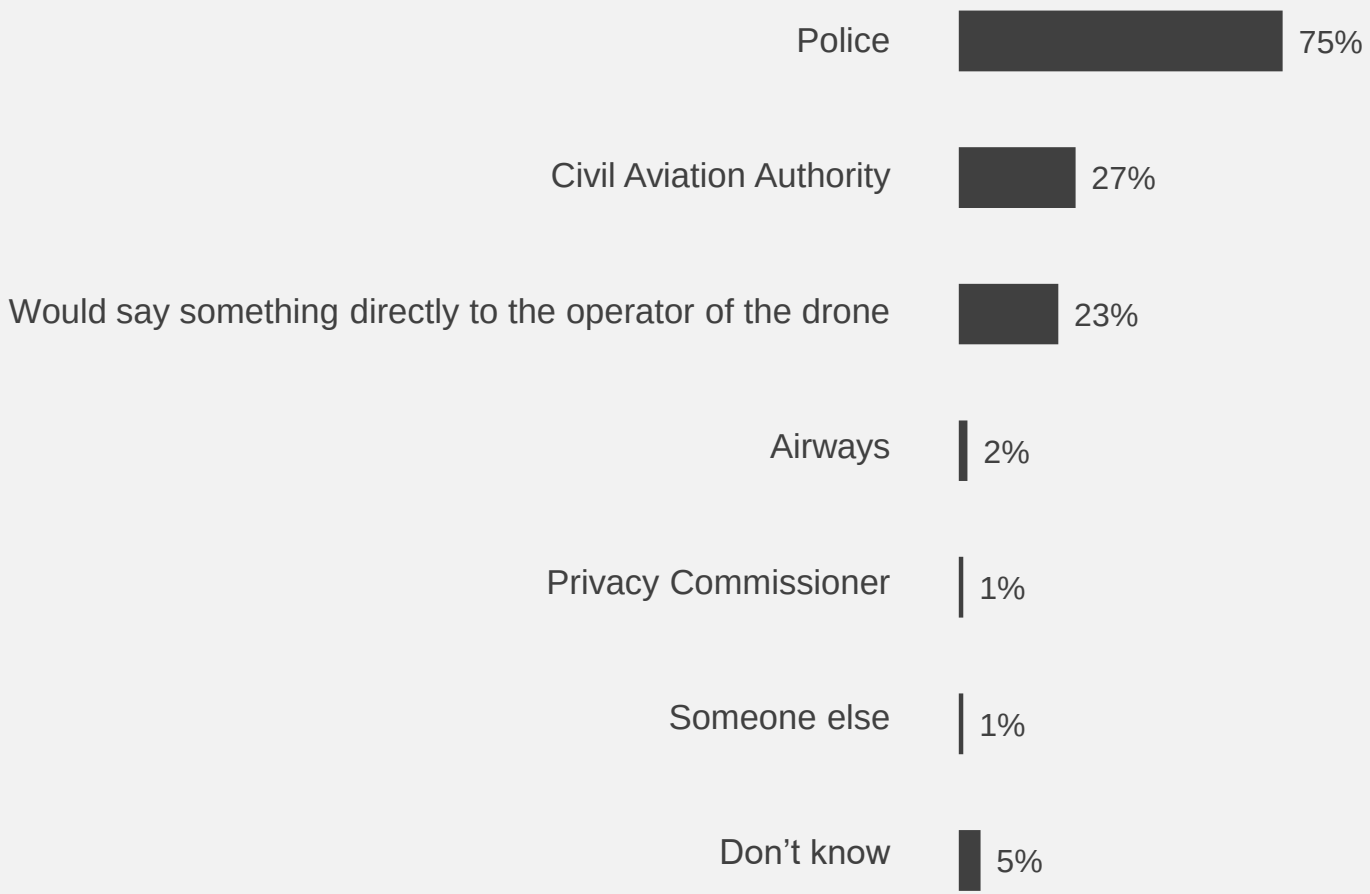
PROPORTION OF NON-USERS THAT WOULD REPORT THIS



Source: D3
Base: All non-users (n=1,038)

Non-users are nearly three times more likely to report inappropriate drone use to the Police than to the Civil Aviation Authority.

WHO NON-USERS WOULD REPORT INAPPROPRIATE DRONE USE TO



Source: D4
Base: Non-users who would report inappropriate drone use (n=931)

Few non-users say they've actually reported inappropriate drone use before.

AN EVEN MIX OF SAFETY AND PRIVACY ISSUES WERE REPORTED

Just **11%** of non-users say they have thought about **reporting inappropriate drone use** or actually **done** so in the past.

Only **2%** of non-users say they **did report** an incident.

About half of them **reported it to the Police**.

And **a quarter** of them **reported it to CAA and Airways**.

> *The drone was flying towards Queenstown airport.*

> *The drone was hovering low over an area causing a dangerous distraction where there were race vehicles moving to and from the racetrack, and where people were moving around on foot. The drone operator was amateur and unauthorised.*

> *Drone was hovering very low above a group of very young children. Drone was a large one. Turned out to be a council operated drone. It was removed from the site.*

> *Plane fell on ground, nearly hit the kid.*

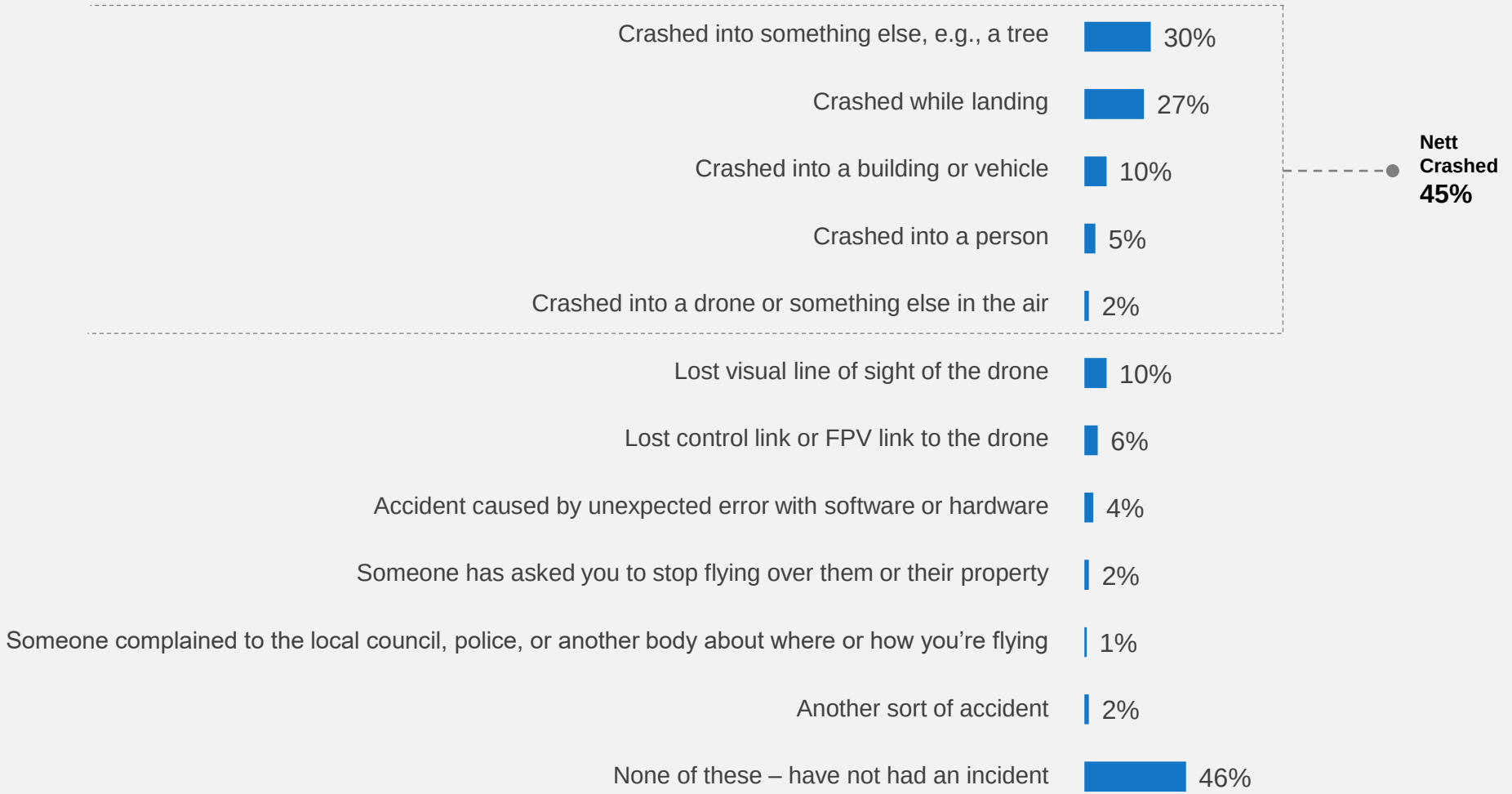
> *A drone flying over my property in the evening taking video footage of those of us outside.*

> *Invasion of privacy.*

> *It was flying over my property without my permission.*

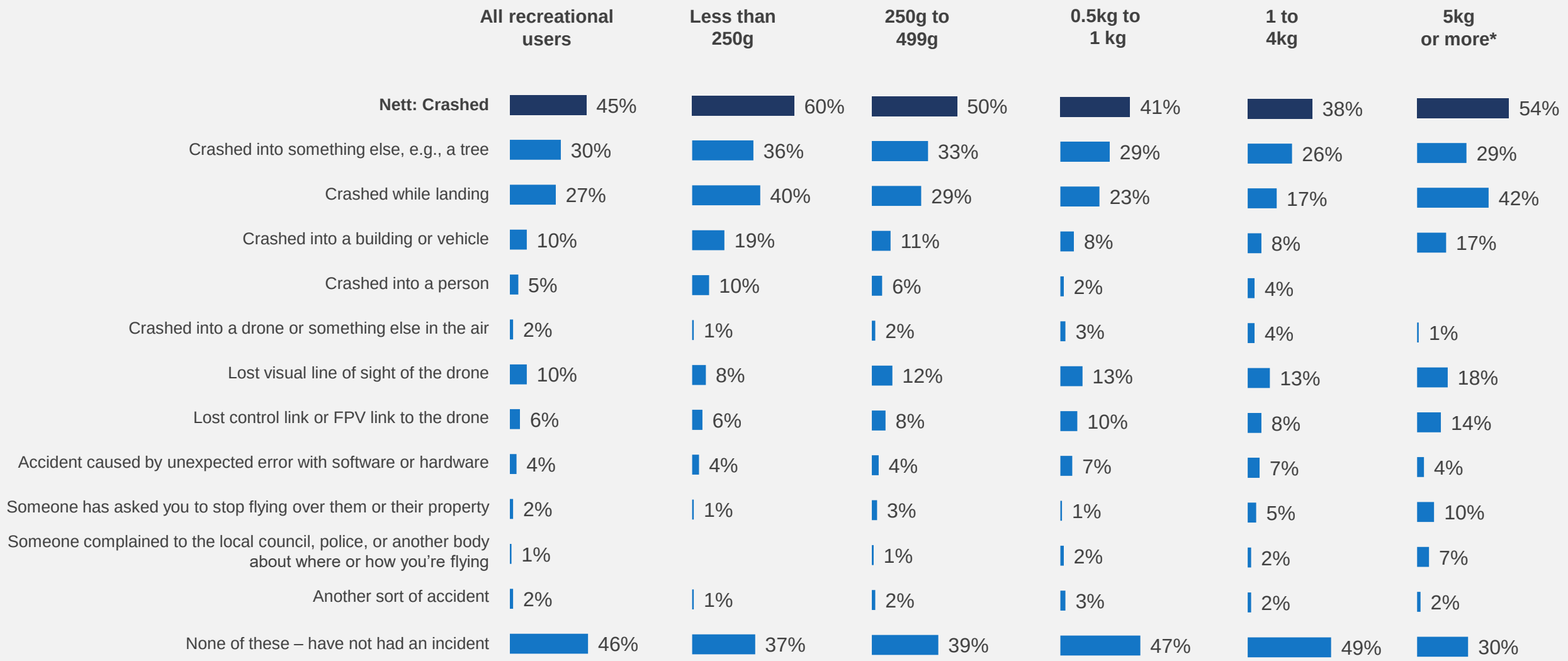
Source: D6, D7
Base: All non-users (1,038), and non-users who reported inappropriate drone use (n=21)

More than half of recreational users have had an incident when flying a drone. Crashing is the most common occurrence, but few say they've crashed into a person.



Source: B7
Base: Recreational users (n=1,441)

Recreational users with light weight drones are most likely to have crashed before, and the likelihood of having crashed appears to decrease as the weight of the drone increases.



Source: B7
Base: All recreational users who answered the question (n=1,441), those with a drone that weighs less than 250g (n=354), 250g to 499g (n=418), 0.5kg to 1kg (n=310), 1 to 4kg (n=254), 5kg or more (n=45)
* Note that findings for the 5kg+ drones are indicative only as a relatively small number of recreational users have those larger drones.

FOR FURTHER INFORMATION PLEASE CONTACT

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Appendix – Methodology

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Methodology

1,441 recreational drone users, 450 commercial drone users, and **1,038 non-users** took part in this research.

RESPONDENTS WERE INTERVIEWED IN ONE OF FOUR WAYS…

1

Online survey of recreational drone users, commercial drone users, and non-users aged 15+ years*.

- Sample was sourced from Colmar Brunton's online panel. This includes some younger respondents who were sourced via their parents who are panel members. These young people were offered entry in to a prize draw for one of two $100 cash prizes as an incentive.
- A 19% response rate was achieved.
- All interviews were completed during the period 14 November 2019 to 19 January 2020.

2

An open-source link to the online survey of recreational drones users and commercial drone users aged 15+ years*.

- The link was shared by CAA to AirShare and Model Flying New Zealand. Entry in to a prize draw for one of two $100 cash prizes was offered as an incentive.
- All interviews were completed during the period 27 November 2019 to 9 February 2020.

3

Online survey of commercial drone users.

- Sample was sourced from Colmar Brunton's business online panel.
- A 22% response rate was achieved.
- All interviews were completed during the period 11 November 2019 to 6 January 2020.

4

Telephone survey of commercial drone users.

- Sample was sourced from Equifax.
- A 56% response rate was achieved.
- All interviews were completed during the period 2 to 13 December 2019.

Maximum margin of error at the 95% confidence level for the total sample of recreational drone users is +/-2.6%, for commercial drone users it's +/-4.6% and for non-users it's +/-3.0%.

*The 15 and over year criteria was chosen by the CAA, MoT, MBIE, and Colmar Brunton working group.

Calculating the number of drone users and drones in New Zealand

ORGANISATIONS USING A DRONE

1. The contact details for a sample of New Zealand organisations was purchased from a commercial list provider (Equifax).
2. 1,690 of the organisations on the list were called and asked questions to determine whether anyone in their organisation had used a drone in the last 6 months.
3. The 1,690 organisations called were classified into 39 separate groups based on their industry and number of employees (groups included, for example, agriculture and forestry businesses with 0 to 5 employees and construction businesses with 50 or more employees).
4. The incidence of drones in each of the 39 separate groups was then individually calculated* (i.e., number of organisations who've used a drone in the last six months divided by the number of organisations in that group).
5. The incidence proportions, determined in step 4, were then multiplied by the total number of organisations in that group in New Zealand (based on Statistics New Zealand figures). The results were then summed to give a total number of New Zealand organisations who've used a drone in the last six months.**

COMMERCIAL DRONE USERS

1. The final commercial drone data was weighted to be representative of the organisations using drones for commercial or scientific purposes. The weights were based on the incidence of drones in the 39 industry/employee number groups and the number of organisations in those groups.
2. The average number of drone users per organisation (based on the weighted responses to a question in the survey and using the interquartile range method to remove outliers) was then multiplied by the total number of New Zealand organisations using a drone in the last six months, to give a total number of commercial drone users.

COMMERCIAL DRONES

1. The average number of drones flown in the last six months per organisation (based on the weighted responses to a question in the survey and using the interquartile range method to remove outliers) was multiplied by the total number of New Zealand organisations using a drone in the last six months, to give a total number of commercial drones flown in the last six months.

Please note that the explanation of the process has been simplified for clarity and brevity.

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*In the groups with smaller sample sizes, the telephone sample was supplemented with the online sample from Colmar Brunton's business panel.
**The method outlined was used because the initial sample of organisations was not selected to be a representative sample of New Zealand organisations. Instead the initial sample was a disproportionate sample, stratified by organisation size (number of employees) and industry. This was done to ensure we could understand drone usage across different industries and organisational sizes.

Calculating the number of drone users and drones in New Zealand

RECREATIONAL USERS

1. A demographically representative sample of New Zealanders aged 15 and over was selected from Colmar Brunton's research panel. The sample was structured to be representative of New Zealanders by age, gender, region, ethnicity, and household income.
2. The selected panellists were sent an invitation to complete a survey and were asked a series of questions to identify whether or not they had flown a drone more than once in the last six months.
3. The proportion of people who had flown a drone more than once in the last six months was then multiplied by the number of people in the New Zealand aged 15 to 74* to determine the number of adult users in New Zealand.
4. Adult drone users and non-users were asked how many people under 15 were in their household and how many had flown a drone more than once in the last six months. The number of users was divided by the total number of under 15s, to give the incidence amongst under 15s.
5. The incidence was then multiplied by the number of people in the New Zealand population aged 5 to 14** to give the total number of child users.
6. The number of adults users was added to the number of child users to calculate the total number of recreational users.

RECREATIONAL DRONES

1. People in households with someone who had flown a drone in the last six months were asked how many drones their household owns and how many of these had been flown in the last six months.
2. The average number of drones owned and flown in the last six months was calculated (using the interquartile range method to remove outliers) for four different categories of household (single adult living alone, single adult living with children, two or more adults living with children, two or more adults living without children).
3. The average number of drones in each household type was multiplied by the number of those types of households in New Zealand. The results were summed to give a total number of drones currently used in New Zealand.

Please note that the explanation of the process has been simplified for clarity and brevity.

CAA CIVIL AVIATION AUTHORITY OF NEW ZEALAND

*Incidence of drone use was negligible amongst the 75+ age group and so the projected number of adult users was based on the population 15 to 74.
**Five years was set as the age at which children would be cognitively capable of operating a drone.

Appendix – Differences from the 2017 survey

CIVIL AVIATION AUTHORITY OF NEW ZEALAND

Ministry of Transport
TE MANATŪ WAKA

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

COLMAR BRUNTON
A Kantar Company

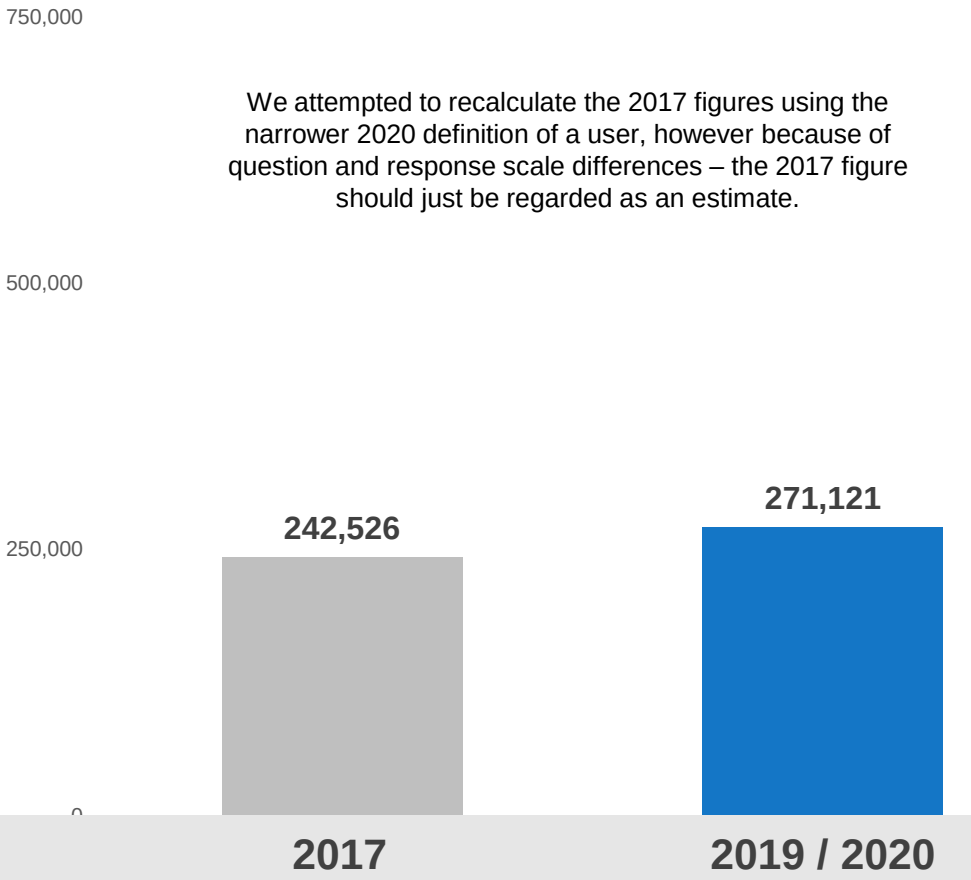
Colmar Brunton previously conducted drone research for the Civil Aviation Authority in 2017. This table summarises the similarities and differences between the current research and the 2017 research.

	2019 / 2020	2017
Primary focus	New Zealand based recreational users and commercial users	New Zealand based and overseas tourist recreational users (some commercial users included)
Drone user definition	Have flown a drone in the last six months	Fly or own a drone (no time frame specified)
Projected number of users based on	Recreational: % who have flown a drone more than once within the last six months, projected to 2018 census population aged 5 to 74. Commercial: organisation has flown a drone within the last six months, projected to number of enterprises (excluding property operators) in New Zealand in 2019	Recreational: fly or own a drone (no time frame specified), projected to 2013 census population.
Projected number of drones	Recreational: Household based Commercial: Business based	Asked, but not included in the report (profiling variable only)

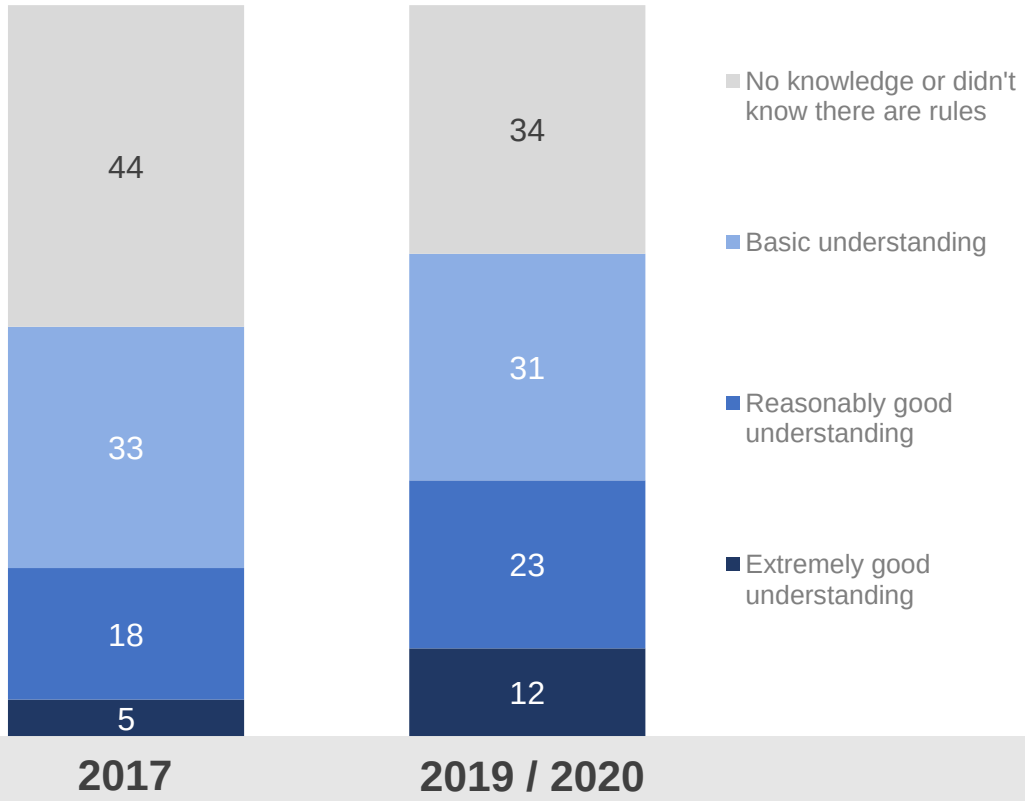
The 2017 and 2019 / 2020 questionnaires were so different, only two comparisons can be made between the 2017 and 2019 / 2020 results.

NUMBER OF RECREATIONAL DRONE USERS

We attempted to recalculate the 2017 figures using the narrower 2020 definition of a user, however because of question and response scale differences – the 2017 figure should just be regarded as an estimate.



KNOWLEDGE OF THE RULES



Base: Recreational users.