



Automatic Dependent Surveillance Broadcast (ADS-B)

101 INFORMATION | HISTORY | DEFINITIONS | RULES | OUTLOOK

KTRK SURVEILLANCE | MLAT | MISSING DATA | NAS

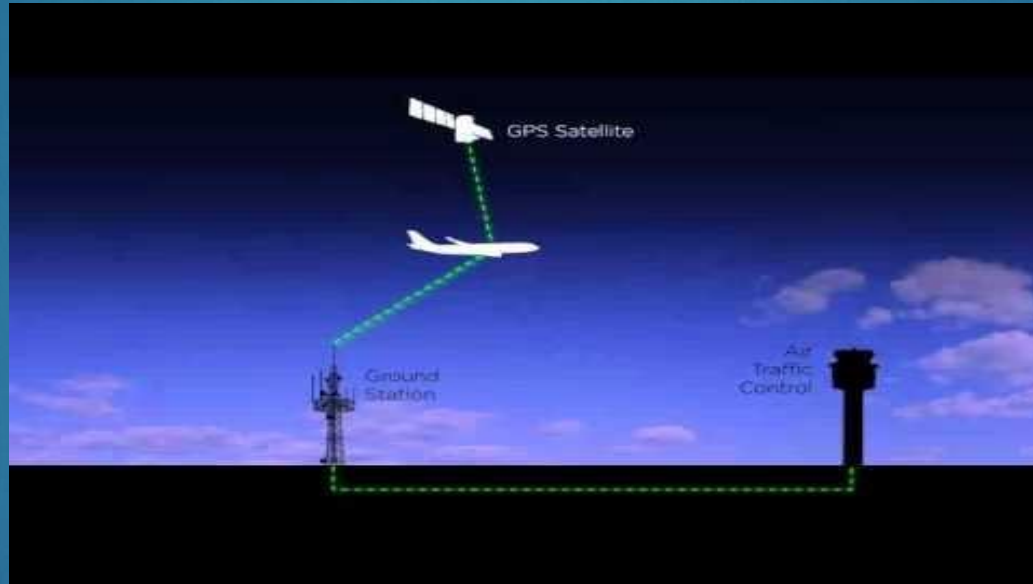
UNINTENDED CONSEQUENCES | BASICS | SURVEY | OUTREACH

NEXT STEPS | CONTRACT | OFF RAMPS | ROADBLOCKS

Staff Role in the ADS-B Initiative

- ▶ To provide the Board and Community unbiased, relevant, and factual information from informed sources regarding ADS-B.
- ▶ Use industry accepted guidance to understand what benefits ADS-B will bring to pilots, passengers, and the airport.
- ▶ Use regulatory guidance to understand how our airport will function with or without the pending mandatory ADS-B implementation.
- ▶ Understand the positive or negative safety implications of ADS-B.
- ▶ Exhaustively search for potential unintended consequences of an ADS-B installation at Truckee Tahoe Airport.

History: <https://www.youtube.com/watch?v=BDLFHdq540g>



Definitions

- ▶ **Radar**: Existing technology that provides guidance and separation for aircraft by a tower or center controller.
- ▶ **Traffic**: Pilot views other planes, altitude, heading, speed, distance.
- ▶ **Weather**: Pilot views radar, clouds, precipitation, icing reports, PIREPS.
- ▶ **Flight Information**: NOTAMS, runway closures, flight restrictions, hazards.
- ▶ **Situational Awareness**: Collective understanding of disparate information: traffic, weather, flight info, etc. that allows a pilot or air traffic controller to be fully informed regarding safety of flight.
- ▶ **IFR**: Flight under instrument flight rules or low visibility.
- ▶ **Cockpit Display**: A screen that provides info to the pilot from ADS-B.
- ▶ **MLAT**: Multi Lateration Tracking. Existing KTRK system, closed loop.
- ▶ **Flight Procedure**: A system of points the aircraft follows (lat./lon./vert.) to find the airport and transition from the enroute phase to the approach.
- ▶ **Terrain: Hills**: Mountains and obstructions that restrict aircraft operation.

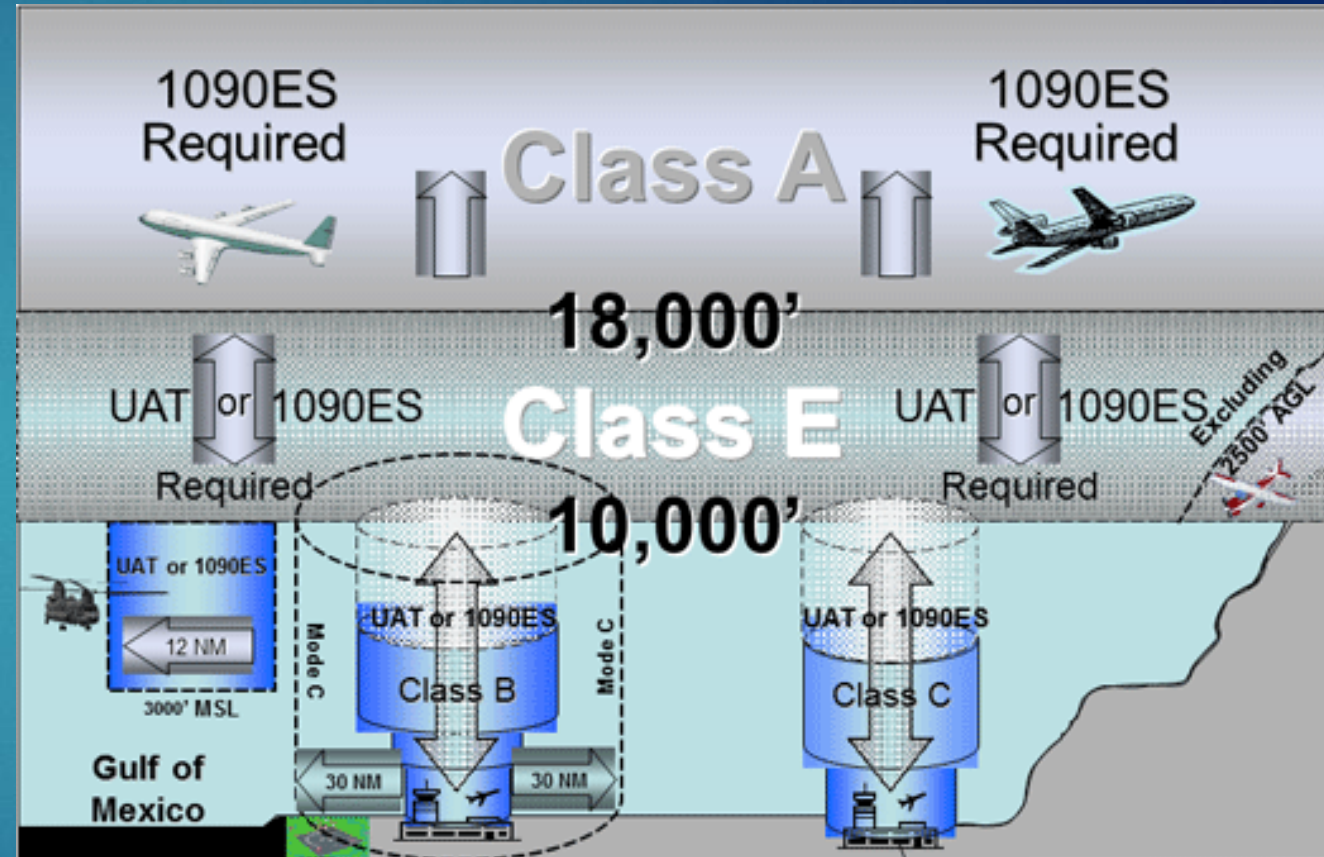
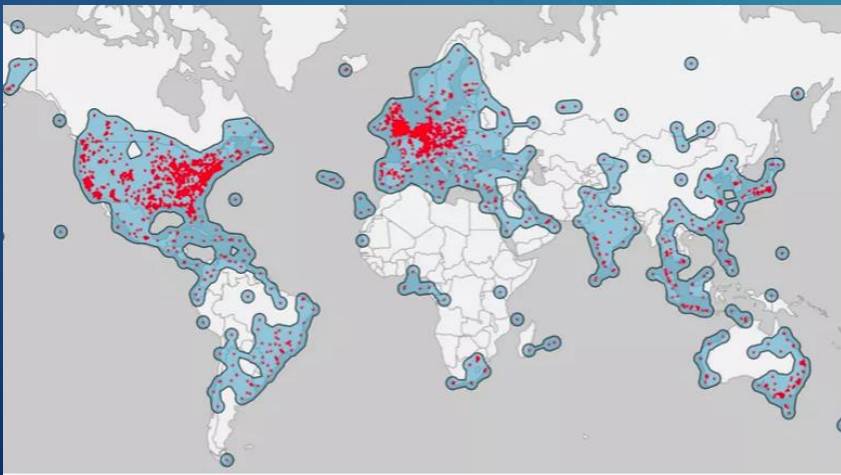
ADS-B System Points

- ▶ **“Out”**: Technology that transmits information about an aircraft and its location and altitude. (FAA mandate requirements explained next.)
- ▶ **“In”**: Technology that displays for pilots ADS-B information (Traffic, weather, etc.) (Not required by FAA mandate.)
- ▶ **Ground station**: Collects ADS-B data from nearby planes, adds weather, transmits a “complete picture” for all aircraft in the service area. (Not required by FAA mandate.)
- ▶ Note – Without the Ground Station, pilots in the Truckee area will **NOT SEE ADS-B “IN”** information reliably until they are above 10,900 feet, because of terrain that blocks ADS-B ground stations in Reno and the Bay Area.

Likewise, air traffic controllers (and our own tower personnel) will also be “blind” to aircraft below 10,900 feet in the area. The ground station eliminates this ADS-B “blind spot” in our area.

Rules for ADS-B “Out” on Aircraft

- ▶ All aircraft 10,000' or higher above sea level *and* 2,500' or higher above ground level
- ▶ All aircraft above or in Class C (Reno, Sac, Oakland, SJC); or above, in or within 30 miles of Class B (SFO)
- ▶ Some exemptions: balloons, gliders, experimental, etc.
- ▶ Most aircraft arriving/departing KTRK over terrain will require ADS-B
- ▶ Most of the world is covered



ADS-B “Out” mandate takes effect 1/1/2020

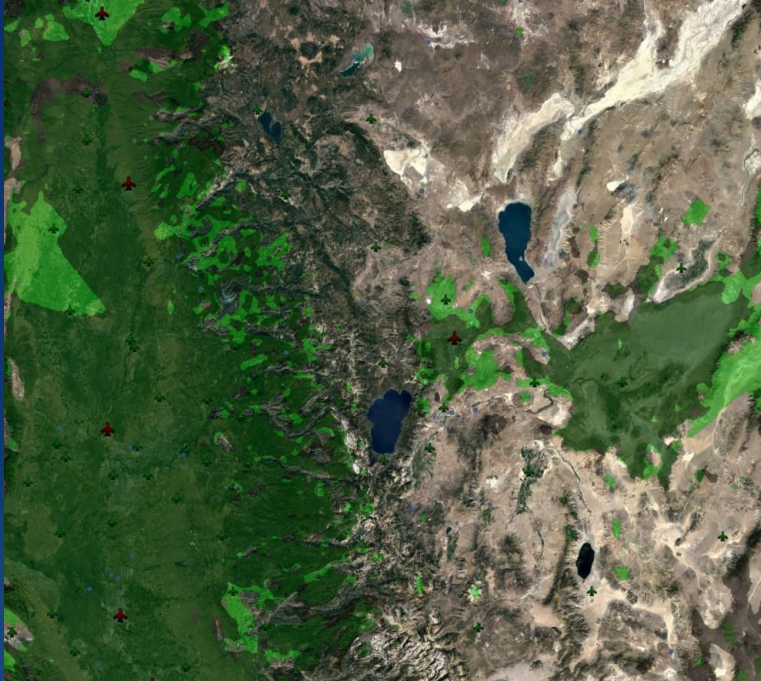
Outlook: https://www.faa.gov/nextgen/how_nextgen_works/new_technology/adsb/
FAA sees a connected, integrated and efficient system.



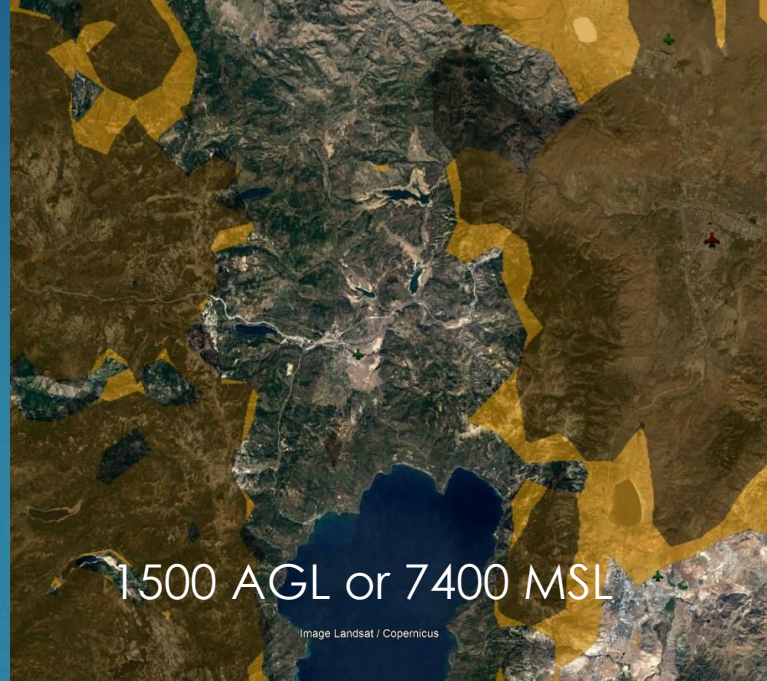
KTRK Surveillance (Multi-Lateration)

- ▶ MLAT built by the District and ERA Systems; installed in 2007; became operational in 2009 and has a service life of 15 years.
- ▶ Annual maintenance budget approximately \$250,000, including software, tech, ground leases, contractors and licenses.
- ▶ MLAT is closed loop, non-integrated, designed for annoyance reduction only, but safety benefits abound.
- ▶ MLAT is not/will never be accepted by the FAA.
- ▶ MLAT is approaching end of life.
- ▶ Tower controllers use MLAT as advisory guidance only.
- ▶ MLAT doesn't allow planes to see planes, weather, traffic or terrain.

Missing Data KTRK is a black hole...



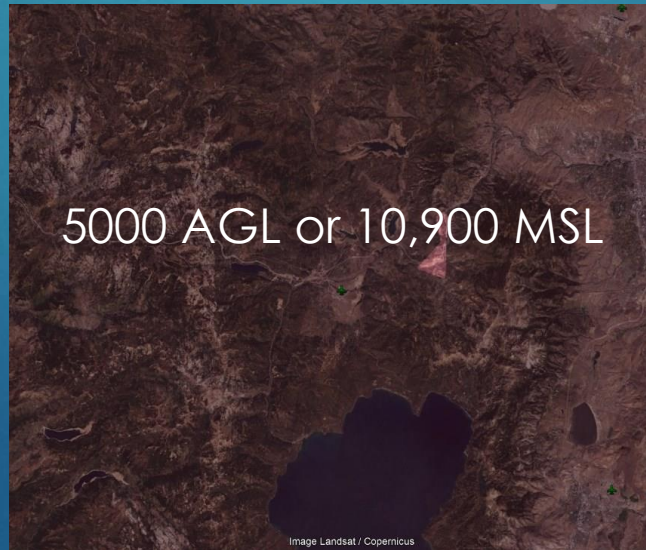
500 AGL or 6400 MSL



1500 AGL or 7400 MSL



3000 AGL or 8900 MSL



5000 AGL or 10,900 MSL

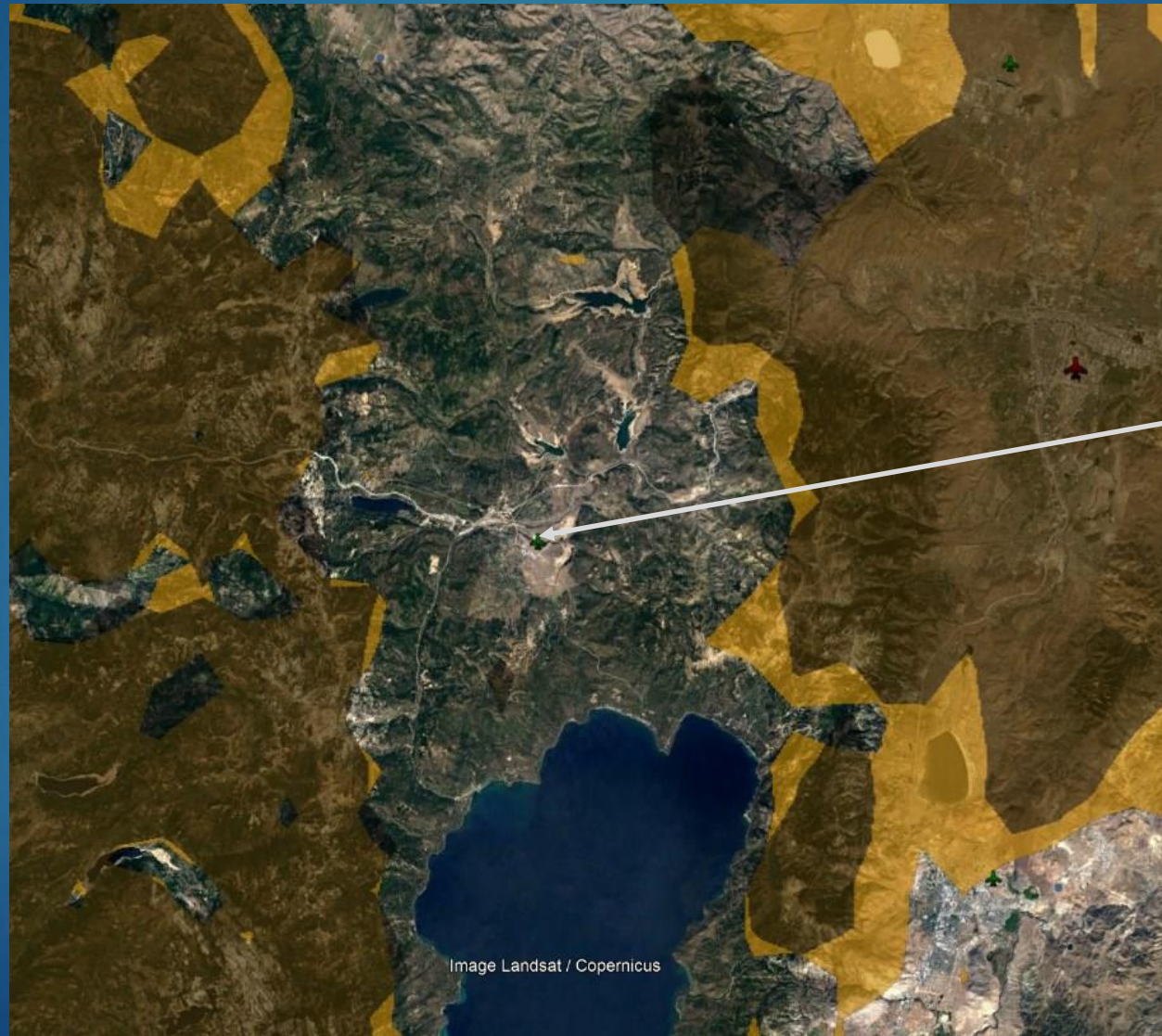
EXISTING CONDITION 500 AGL or 6400 MSL



**GREEN indicates
ADS-B Coverage**

KTRK

EXISTING CONDITION 1500 AGL or 7400 MSL



**YELLOW indicates
ADS-B Coverage**

KTRK

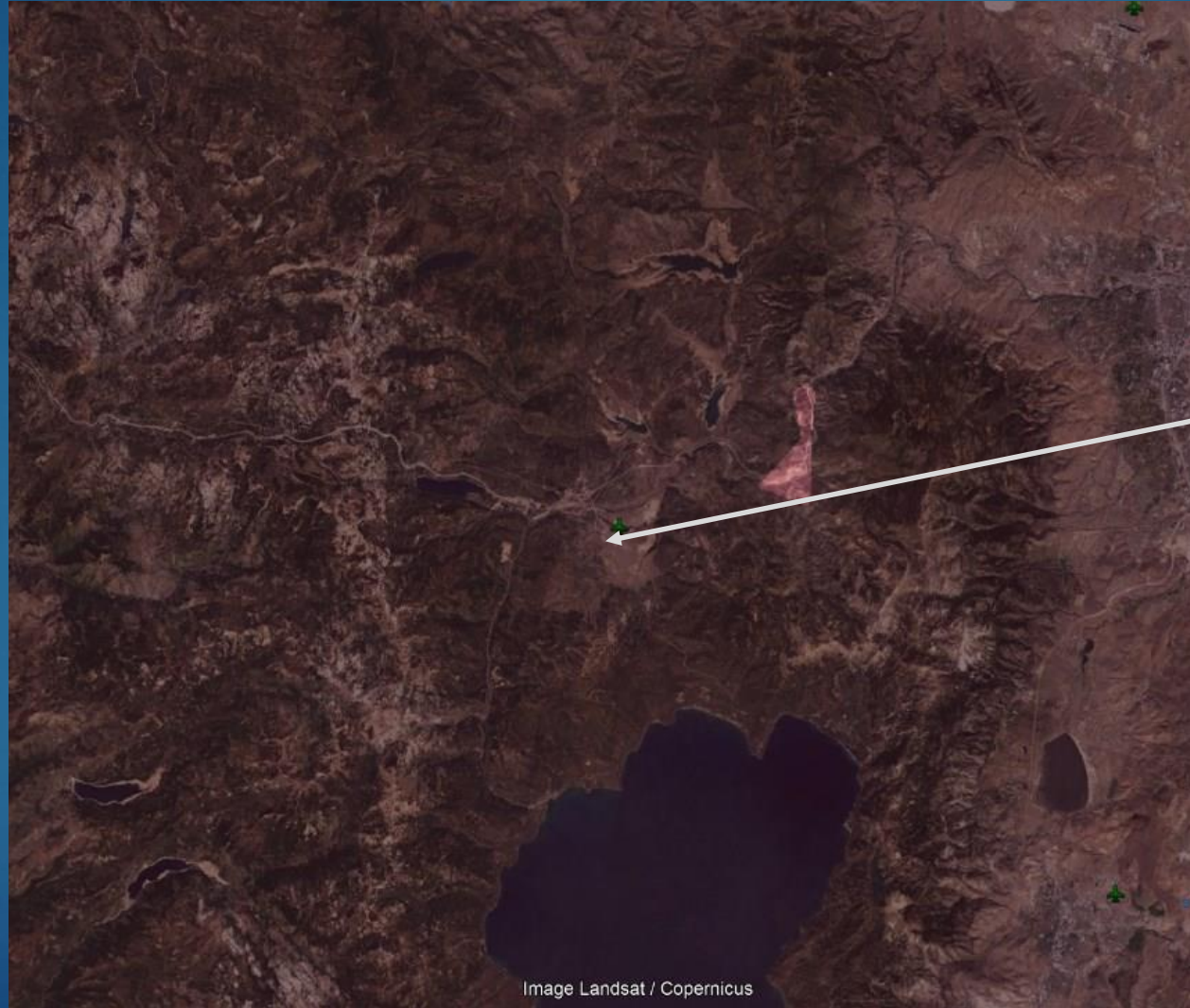
EXISTING CONDITION 3000 AGL or 8900 MSL



GREEN indicates
ADS-B Coverage

KTRK

EXISTING CONDITION 5000 AGL or 10,900 MSL



BROWN indicates
ADS-B Coverage

KTRK

National Airspace System (NAS)

Airspace Capacity Reduces Annoyance & Emissions

Reduces Hold Times

Reduces Ground Delays

Allows less maneuvering prior to landing

Allows straightened paths

Enroute Controllers can't see KTRK

Aircraft sent to KTRK with 1 in 1 out

Aircraft held overhead or maneuver

Aircraft wait on the ground idling

ADS-B allows controllers to keep traffic moving

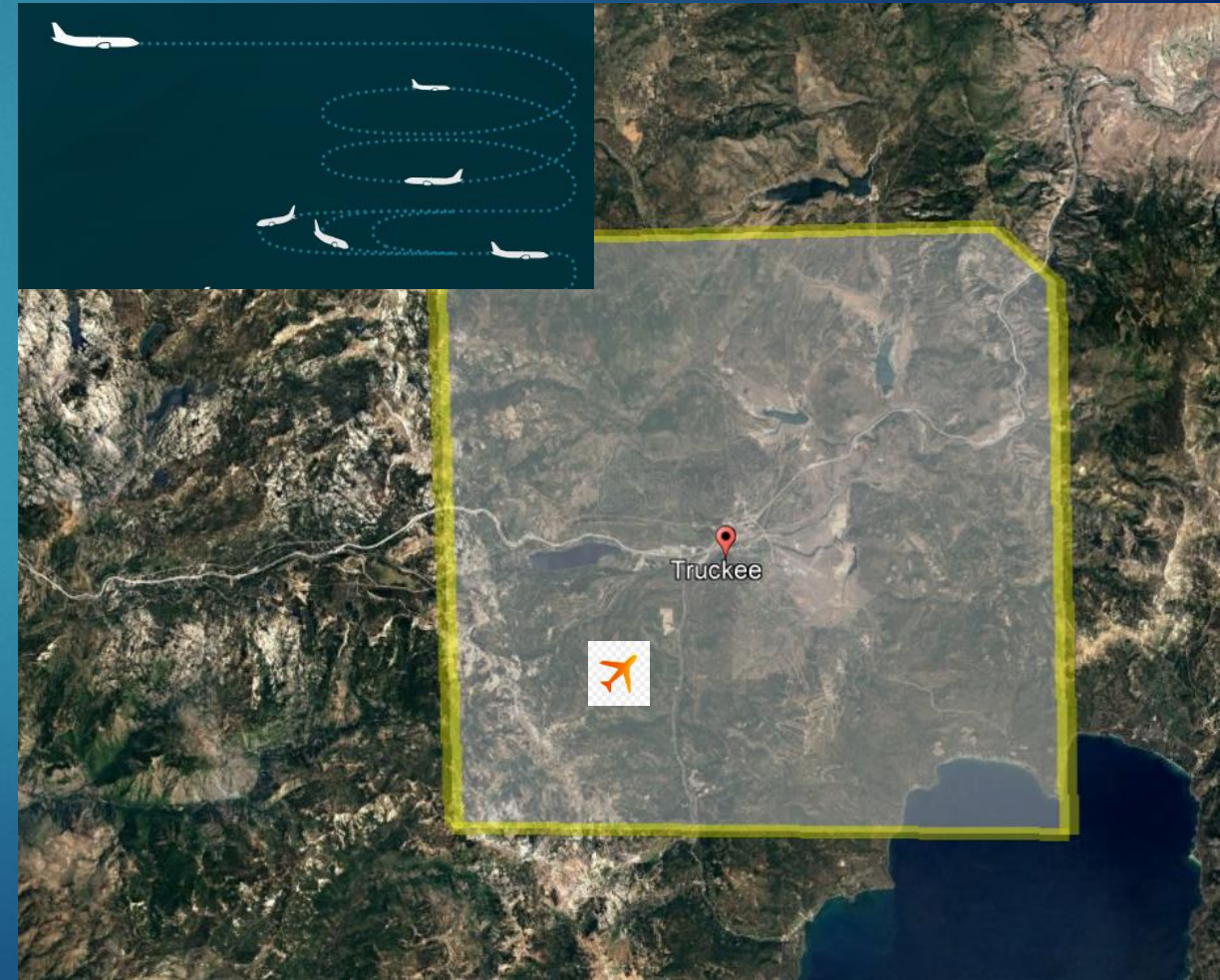
Permits takeoffs without ground delays

Reduces time over Truckee by straightening tracks

Reduces holding

Gives controllers and pilots awareness

Allows for faster arrival/departure sequences



Unintended Consequences

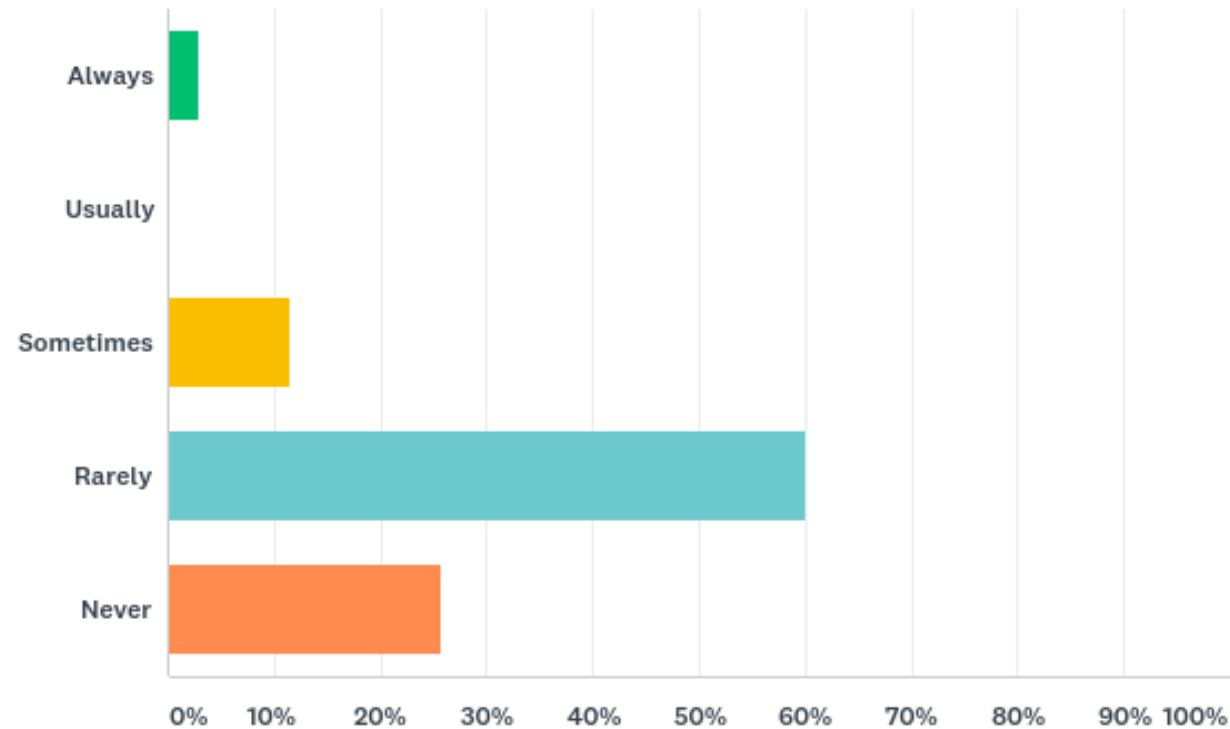
- ▶ **Will ADS-B drive additional traffic?** Demand Drivers Study 2015 states two major findings: (1) The major influencing factors driving activity of the airport are outside the airport's control. (2) These drivers are the **location of the airport** and the **strong national and regional economy**.
- ▶ **Will ADS-B drive night demand?** Aircraft can currently land and depart at KTRK 24 hours/day using GPS guidance and lighting in inclement weather to a height of 526'. Surveys indicate there is little demand for night operations.
- ▶ **Will ADS-B enable aircraft to operate in bad weather?** The weather criteria for KTRK will not change based on ADS-B. **But pilots will have better weather data**, which might affect a pilot's go/no-go decision.
- ▶ **Will ADS-B make our community unsafe?** All data indicates the contrary.

Aircraft Pilot & Operator Survey

- ▶ **Who:** NetJets, SurfAir, Wheels Up, Mt. Lion, Charter, Fractional, Part 91, turbo prop, jet, piston, home based, itinerant, hangar tenant et. all.
- ▶ **Why:** To identify potential changes in airport activity and demand, and to understand potential downsides or unintended consequences.
- ▶ **Other Sources:** What other sources provide information on ADS-B that Staff has investigated.
 - The FAA
 - The Airline Industry
 - Pilot Groups such as AOPA, EAA, NBAA, NATA, GAMA
 - National Academy of Science ACRP NextGen for Airports
 - Manufacturers of technology Harris Corp

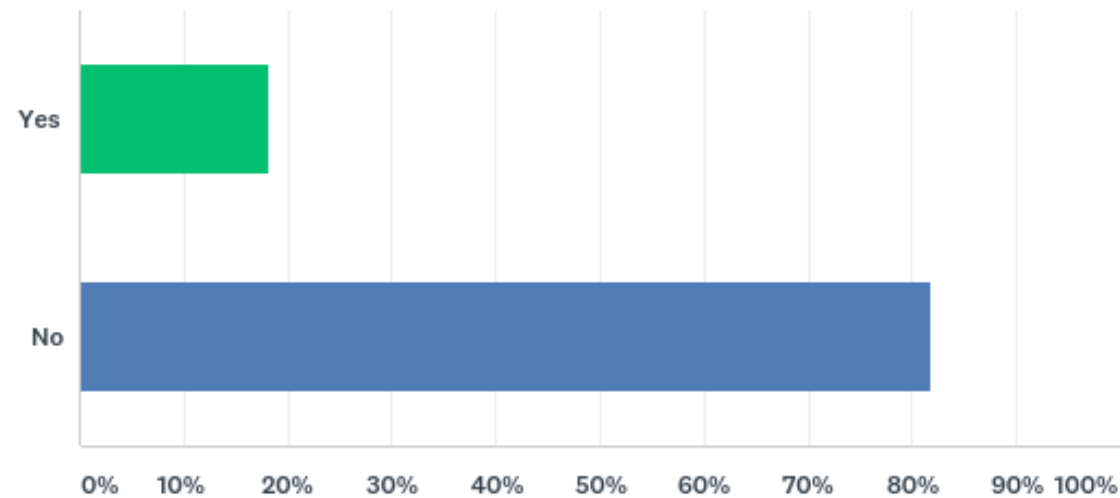
Survey Results

Q1 How much demand do you have at KTRK after 10PM or before 7AM



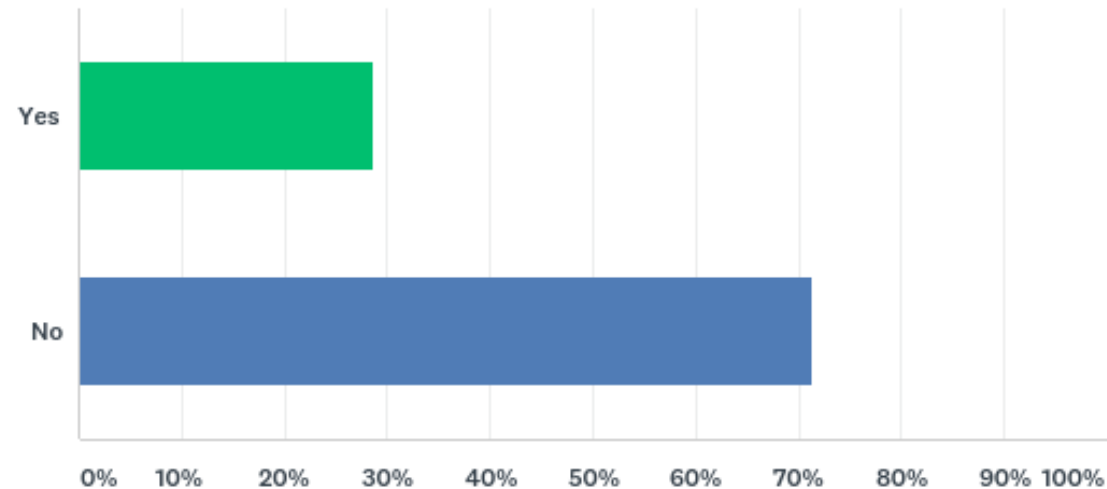
Survey Results

Q2 Would ADSB offer you additional flexibility to add capacity after 10PM or before 7AM that is currently unavailable due to airport infrastructure limitations?



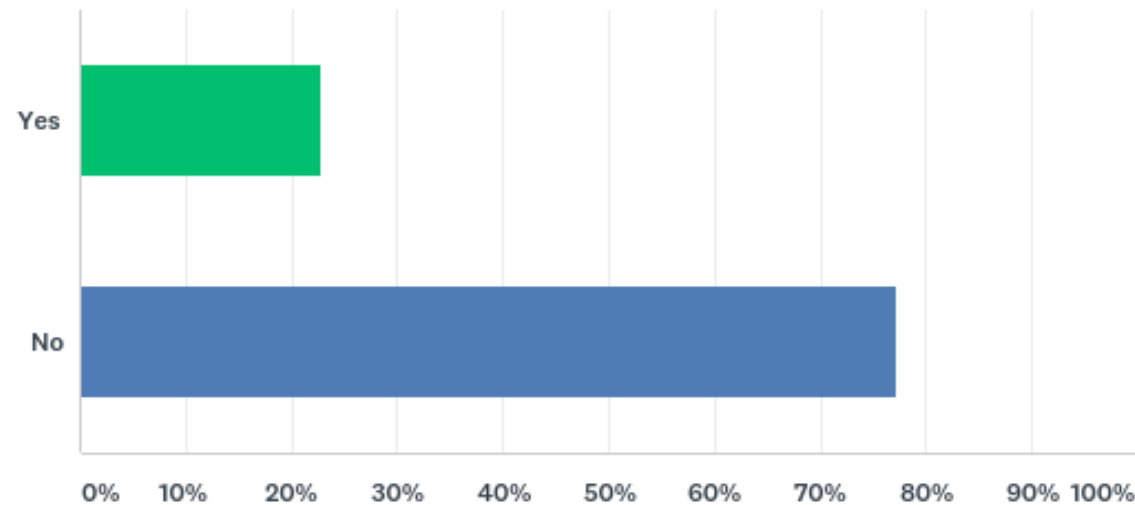
Survey Results

Q4 Would ADSB coverage allow you to operate in weather that traditionally prevents a flight from occurring at KTRK such as low visibility, ice, snow, or fog?



Survey Results

Q6 Do you fly to KRNO instead of KTRK because they have better surveillance?



Survey Results

Q5 What safety benefit if any does ADSB provide to pilots, passengers and the community?

aircraft separation **Situational awareness** ADS-B **Better**
avoidance **traffic** airport awareness location safety safer

Expert Testimony:

Chris Balle, Program Manager, Harris Corp.
650+ Site Installations across America. Paul Freeman, Deputy Program Manager,
ADSB Liaison (Garmin, AOPA, NATA, GAMA etc.).

- ▶ **Has any airport or community, city, or system reported negative impacts from ADS-B installation or coverage?** No, not to date, unaware of anything like that.
- ▶ **Has ADS-B been linked to an increase in airport traffic, flight congestion, or demand?** No correlation to additional flights, the opposite it allows balancing and avoids “one in/out”.
- ▶ **Has ADS-B emboldened pilots to behave unsafely in any way?** No not that we know of.
- ▶ **Has ADS-B promoted flying at night or is there any benefit that ADS-B offers to a night flying pilot that isn't available during the daytime?** No.
- ▶ “Symphony and other flight tracking products using ADS-B technology are helping communities track flights and actually reduce annoyance”.
- ▶ “11 years of ADSB operation, not one single example of more noise, or more traffic, or anything”.
- ▶ “I’m deeply imbedded in the industry, I have never seen, anywhere in the industry that ADS-B does anything except enhance safety”.

Expert Testimony:

David Gray, Surveillance & Broadcast
Services Program Manager FAA

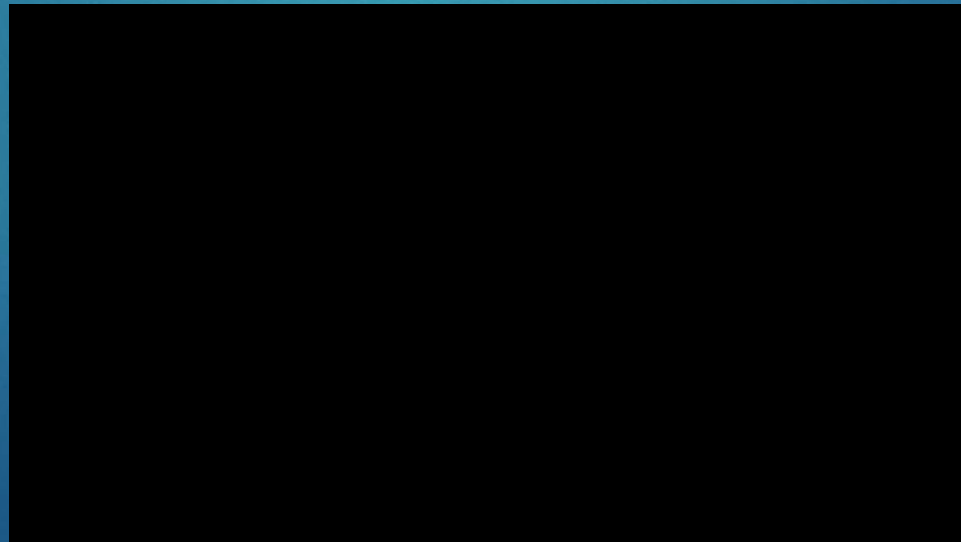
- ▶ **Has any airport or community, city, or system reported negative impacts from ADS-B installation or coverage?** No, not to date, unaware of anything like that.
- ▶ **Has ADS-B been linked to an increase in airport traffic, flight congestion, or demand?** I don't know how ADS-B would increase traffic...it will increase capacity and enhance throughput but not demand.
- ▶ ADS-B may prevent holding, loitering, and delays by allowing aircraft to see each other while controlled by the tower and the center controllers with more accurate flexibility.
- ▶ Colorado mountain airports used Wide Area Multi Lateration and had fears of additional impacts. What it provided was visibility and ultimately a more timely arrival and departure sequence.

Outreach to Date

- ▶ **Connected** – Winter 2018 mass mailer: feature article and graphic on ADS-B
- ▶ **Pilot News** - Fall 2018 edition: “Business of the Airport is Your Business” (~150 words)
- ▶ **TTAD “Community Open House”** – 6/13 & 7/9/2018: staffed station for public discussion of ADS-B with printed information available
- ▶ **Connected** – Summer 2018 mass mailer: radar surveillance mention in “Business of the Airport is Your Business”
- ▶ **Pilot News** – Spring 2018 edition: ½ page featured article and graphic about ADS-B
- ▶ **TTAD Website** – May, 07, 2018: ADS-B posting in Airport Community News “Airport Board looking at bringing ADS-B to KTRK”
- ▶ **TTAD Facebook** – March 1, 2018: ADS-B feature post
- ▶ **E-Blast** – December 2017: ADS-B 2020 mandate mentioned in “Enhanced MLAT Display at KTRK”
- ▶ **TTAD “Community Open House”** June and July 2016: Six meetings held throughout Truckee

Outreach in the Cue

- ▶ Splainers video: <https://vimeo.com/300875793>
- ▶ Weekly micro meetings
- ▶ “Go Flying and See for Yourself!” commercial operator flights
- ▶ Abby Agency outreach: social media, sponsored content
- ▶ News print, e-blast, Connected News, website, radio



Next Steps... A lot of Work

- ▶ Complete a service contract with Harris for design and construction. \$60K.
- ▶ Final Cost and Scope (Contract). Final cost estimates unknown.
- ▶ Approve final contract for service with Harris.
- ▶ Complete an integration plan with the FAA.
- ▶ Complete land leases and site agreements with Squaw and Northstar.
- ▶ Build a sensor array of 1, 2 or 3 sites on top of the mountain(s).
- ▶ Complete System Acceptance Testing and Flight Testing.
- ▶ Integrate tech and service agreements allowing towers use of the data.
- ▶ Integrate Oakland Center.
- ▶ Retrain airport users and the flying public on KTRK protocol.

Offramps

- ▶ Now, before \$60K for service contract design and construction
- ▶ After service contract, prior to final contract
- ▶ Prior to construction, by phase

Roadblocks

- ▶ Cost
- ▶ FAA cooperation
- ▶ FAA political climate, leadership, delays, etc.
- ▶ Oakland Center funding
- ▶ Tower contract and integration of data
- ▶ Tower certification
- ▶ Site and land leasing agreements, construction delays and environmental impact