

As the Drone Flies: How to Think About Property Ownership, Federal Preemption, and Airspace Control in the Era of Remotely Piloted Aircraft

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Introduction

The emergence of affordable, scalable small uncrewed aircraft systems (“UAS” or “drones”) has the potential to transform numerous facets of everyday life. Because they are small, nimble, relatively easy to operate, and remotely piloted, drones offer significant opportunities that crewed aviation largely has not, including the ability to access hard-to-reach places and to sustain safe flight at very low altitudes—all at much lower price points and with much lower risk than traditional crewed aircraft. Practically, the benefits are unending: quick access to lifesaving medications in rural areas; better real-time image collection for purposes such as newsgathering, search and rescue, and monitoring of natural disasters; improved infrastructure inspection capabilities that obviate the need to put people in dangerous places such as on top of cell towers or compromised structures; and sophisticated home delivery systems that decrease wait times and reduce the number of heavy vehicles on the road, just to name a few. Drones have the potential to do a significant amount of good for us, our way of life, and our future.

Congress understands the numerous societal benefits that a robust drone ecosystem will bring, and has repeatedly passed legislation to foster the burgeoning industry. These legislative enactments include a 2012 mandate to the Federal Aviation Administration (“FAA”) to integrate drones into the national airspace system, as well as numerous provisions from 2012 onward giving the FAA the requisite authority and direction to enable the remote identification (“remote ID”) of drones in flight, to develop an uncrewed traffic management system (“UTM”) akin to air traffic control for piloted aircraft, and to establish a process for limiting drone flights over critical infrastructure facilities, among others.

The FAA, for its part, has made significant progress integrating UAS into the existing, complex regulatory framework that has given the U.S. the safest, most secure airspace in the world. The agency has adopted enabling regulations that allow for routine (but limited) UAS flights by commercial entities, expanded those regulations to permit routine operations at night and over people, and established remote ID requirements which, once fully implemented, will ensure that law enforcement and public safety around the country can identify UAS in flight and verify that they are safe actors authorized to be in the airspace. Although the pace has been measured, the FAA has a long-term regulatory vision that ends with full integration of all manner of UAS—including, ultimately, those that will carry human passengers.

Other stakeholders may not be as ready for the drone future, or, at a minimum, are raising questions as to their role in it. For instance, some property owners have asked questions like “Do I own the airspace above my property?” and “Can I shoot down a drone that flies over my house?” A number of state legislators and city councilmembers have asked whether they can or should pass laws that govern—and tax—drones operating in the airspace above their jurisdictions. And think tanks have speculated about how the drone industry could be confined to serve other interests, proffering ill-fitting solutions in search of problems such as “drone highways,” or even tollways, above the surface roads.

At the heart of these inquiries are fundamental legal questions about the scope of private rights in real property, the nature of the airspace, the scope of the federal government’s authority to regulate aviation—and, importantly, whether any of these long-established paradigms should be considered differently, altered, or even reimaged to accommodate an airspace that includes low-altitude, small UAS operating at scale.

This paper addresses the legal and policy issues that animate these questions, and puts forth a comprehensive vision for how airspace regulation and the exercise of property rights should work in an advanced aviation environment. At bottom, we argue that existing legal doctrines need not be changed to accommodate the arrival of the drone—and in fact, these doctrines can all work quite well together to establish a framework in which landowners have clear, understandable rights in their real property, and in which it is clear what role states and localities can play with respect to activity that occurs in the airspace above it.

We posit that there are two overarching legal questions that need to be answered to understand the path forward for airspace regulation in the era of advanced aviation: “What rights do individual property owners have in the airspace above their property?” and “What authority do states and localities have to regulate the aviation activities that occur in the

airspace above their jurisdictions?” While these questions are often conflated, it is important to take them—and understand the answers—in turn.

PART I of this paper addresses the rights of individual property owners, recounting the evolving legal understanding of real property rights following the advent of powered flight in the early twentieth century. It concludes that under current law the owners of real property possess a robust right in the surface of their property, but that it is a mistake to say they have an equivalent right in the air itself.

PART II addresses the authority of states and localities, tracing the history of federal occupation of the fields of air navigation and aviation safety, and concludes that non-federal sovereigns cannot regulate so as to infringe upon these areas.

Part II also offers the evolution of federal control over radiofrequency spectrum as a means to better understand the proper regulatory paradigm for control of the airspace. Both Part I and Part II also discuss the concept of “navigable airspace”—what it means, where it came from, and how it fits in with the legal theories of property rights (Part I) and federal preemption (Part II).

PART III addresses the implications of these foundational frameworks for drones and the low-altitude airspace that drones will occupy at scale.

Part III explains that once the primary concepts are understood—(i) real property rights as extending only to airspace activity that affects use of property on the ground, (ii) the federal government’s occupation of the fields of air navigation and aviation safety, and (iii) the concept of “navigable airspace” as both distinct from the property law concept of “immediate reaches” and insignificant as a purported legal barrier to federal regulation—layering these legal lenses atop one another presents a clear picture for stakeholder rights and responsibilities with respect to a drone-integrated airspace.

PART IV addresses alternative policy suggestions that others have made, including drone highways and toll roads, and explains why these types of solutions are unnecessary as a matter of law, likely preempted in their implementation, and misguided as a matter of policy.

PART V offers a roadmap—or, perhaps more fittingly, a flight plan—for how states and localities can put together legislative enactments that not only avoid unduly infringing upon federal law, but also help to promote the burgeoning UAS industry to the benefit of their constituents, all while safeguarding those constituents’ concerns.

The best such efforts will be those that leverage existing law to the extent possible, draw meaningful distinctions between air-based and land-based conduct, avoid direct or inadvertent regulation of airspace or aviation safety, and maximize consistency across the state.

Ultimately, this piece seeks to demonstrate that while the advent of drones may appear to pose an inflection point for a variety of traditional legal concepts, these supposed conflicts are, in actuality, easily resolved. Moreover, this piece emphasizes that understanding the interplay between technological development and legal doctrines is critical to our continued ability to *have* technological development. The debates occurring in the drone world are not new; more than 100 years ago the invention of the airplane and the recognition of aviation as central to societal progress challenged notions of what real property and the airspace even are under the law. Radio technologies did the same for the airwaves. Legal debates around UAS operations in the United States are history repeating itself, and we already have the answers. Drones have simply required us to get more precise in articulating the nature of the rights, interests, and assets that we seek to protect, and how existing legal doctrines can be understood to provide that protection. We can answer all these questions in a way that ensures that the rules are clear for all stakeholders, and all interests are adequately safeguarded.

Part I: Real Property Owners Have Robust Rights in the Surface, But Not the Airspace Itself

A. Ad Coelum as a Theory of Infinite Ownership

When early U.S. courts had to determine the scope of real property ownership, well before the advent of aviation, they often drew on an “ancient principle” known as the “*ad coelum*” doctrine. Observed in early English common law and “famously reiterated by Blackstone” in his 18th Century treatise *Commentaries on the Laws of England*, the phrase *ad coelum* is short for “[c]ujus est solum ejus est usque ad coelum”—roughly translated, “one who owns the soil owns to the heavens above.”¹ This was because, Blackstone observed, “[l]and ha[s] . . . in its legal signification, an indefinite extent, upwards as well as downward.”² In the early to mid-19th century, U.S. courts used the *ad coelum* maxim to conclude that titles to land included the structures that sat on the land,³ as well as to adjudicate trespass cases.⁴

In a 1906 case called *Butler v. Frontier Telephone Company*, the New York Court of Appeals affirmed an ejectment action against a telephone company that had strung a telephone wire in the air above the plaintiff’s property. Faced with the question of “whether ejectment will lie when the soil is not touched, but part of the space a few feet above the soil is occupied[,]”⁵ the court took a maximalist view of the *ad coelum* doctrine:

‘Usque ad coelum’ is the upper boundary, and while this may not be taken too literally, *there is no limitation within the bounds of any structure yet erected by man*. So far as the case before us is concerned, the plaintiff as the owner of the soil owned upward to an indefinite extent. He owned the space occupied by the wire and had the right to the *exclusive possession* of that space which was not personal property, but a part of his land. According to fundamental principles and within the limitation mentioned *space above land is real estate the same as the land itself*. The law regards the empty space as if it were a solid, inseparable from the soil, and protects it from hostile occupation accordingly.⁶

Consistent with this notion, a variety of courts throughout the 19th and early 20th centuries allowed trespass and similar claims to lie where the challenged conduct occurred wholly in the space above landowners’ real property. These cases dealt with the typical disruptions of the day, including overhanging branches, projecting eaves, projectiles, and similar disturbances.⁷

¹ 29 *Main St., LLC v. U.S. Postal Serv.*, No. 3:19-CV-2003 (SRU), 2022 WL 972412, at *14 (D. Conn. Mar. 31, 2022) (citing 42 A.L.R. 945).

² 2 William Blackstone, *Commentaries* 18; see also 1 Coke on Littleton *4a; 3 James Kent, *Commentaries* *401.

³ See *Powell v. Monson & Brimfield Mfg. Co.*, 19 F. Cas. 1218, 1225 (C.C.D. Mass. 1824); *United States v. Harris*, 26 F. Cas. 185, 187 (C.C.D. Mass. 1830).

⁴ See, e.g., *Markham v. Brown*, 37 Ga. 277, 280–81 (1867) (“Where two persons claim to have actual possession of the same land, he is deemed in possession who has the legal title, and the other is a trespasser. The owner of realty, having title downwards and upwards indefinitely, an unlawful interference with his rights, below or above the surface, alike gives him a right of action.”) (emphasis omitted).

⁵ *Butler v. Frontier Tel. Co.*, 186 N.Y. 486, 488, 79 N.E. 716, 717 (1906).

⁶ *Id.* at 491, 79 N.E. at 716 (emphasis added).

⁷ *Hannabalsen v. Sessions*, 116 Iowa 457, 458, 90 N.W. 93, 94 (1902) (holding in favor of a property owner for having the right to use “reasonably necessary” force upon his neighbor when she “leaned over [their shared] partition fence and attempted to interfere with the ladder” “in justifiable defense of his property”); *Grandona v. Lovdal*, 70 Cal. 161, 11 P. 623 (1886); *Tanner v. Wallbrunn*, 77 Mo. App. 262, 1898 WL 1859 (1898) (plaintiff brought suit to compel adjacent property owner to remove defendant’s tree overhanging plaintiff’s property and store near the property line claiming it was a nuisance and damaging plaintiff’s property); *Puerto v. Chieppa*, 78 Conn. 401, 62 A. 664 (1905) (plaintiff sued neighbor for building an addition to neighbor’s building, which obstructed/interfered with the plaintiff’s view; plaintiff also argued that the construction resulted in trespass to his property during construction and interfered with the plaintiff’s building); *Harrington v. McCarthy*, 169 Mass. 492, 48 N.E. 278 (1897) (property owner

B. The Early Limitations of Ad Coelum

While some courts, like the New York high court in *Butler*, endorsed a robust theory of *ad coelum* and its application to land ownership, other courts took a more measured view of the doctrine from the outset. For instance, in 1863, decades before *Butler*, a New York state trial court recognized that there are legally significant differences between air and land notwithstanding the *ad coelum* doctrine.⁸ The court there denied an ejectment action premised on overhanging eaves and gutters jutting out from a building on the adjacent owner's property, finding that because the defendant occupied "[c]learly nothing but an open space of air over the material land of the plaintiffs," it would be impossible to "put the plaintiffs in possession of that space," as ejectment would require.⁹

Courts during this period likewise expressed skepticism as to how far upward the *ad coelum* right extended. For instance, quoting legal scholar Hiram Jome, a U.S. federal district court observed in 1930 that Latin writers often used the word "coelum" to "refer to the *lower* airspace, the area in which the birds fly and the clouds drift and from which the rain falls and the lightning strikes."¹⁰ Because "[b]irds fly near the ground, [and] storm clouds sometimes hover at an altitude of a few hundred or a thousand feet[.]" it would follow that the landowner's rights would actually be quite limited, as "[i]t is only up to the beginning of this [coelum] which the landowner owns."¹¹ The court also discussed references in historical Latin texts in which "coelem" was used to describe a machine on a wall no more than 100 feet tall, as well as to the space just above the treetops and buildings.¹² Thus, even property ownership that extended to the *coelum* may have been far more limited than an indefinite extension upward.

Describing the *coelum* with reference to the height of buildings not only suggests that it is a finite concept, it also raises another important notion that may inform the doctrine's meaning—the link between the airspace and the *use* of the land itself. Indeed, even in expansively interpreting the *ad coelum* doctrine, the court in *Butler* conceded that the idea "may not be taken too literally," and "there is no limitation [as to where the *coelum* begins] *within the bounds of any structure yet erected by man[.]*" thus implying that the scope of a person's real property rights is coextensive with the owner's ability to build upward.¹³ It follows from this that the right *ad coelum* is describing is not a right to own the airspace itself, but a right to *use* the adjacent airspace in connection with use of the ground.

In 1936, the Ninth Circuit held just that. Eschewing the broad "from the center of the earth to the sky" conception of the *ad coelum* doctrine, the court asserted that the maxim was never meant to be taken literally and, more fundamentally,

complained that building owner's wooden building interfered with his/her rights in by projecting over the plaintiff's land); *Whittaker v. Stangvick*, 100 Minn. 386, 391, 111 N.W. 295, 297 (1907) (finding in favor of owner of a strip of land between two lakes called a "duck pass" who sought to prevent hunters from building hunting blinds on the lake because it would impair the land owner's "privileges" granted to the property owner and guests, as "[t]he defendants' right to properly use the navigable lakes did not give them any more right to shoot over plaintiff's land than a neighboring proprietor would have had to so shoot from his own premises"); *Peabody v. United States*, 231 U.S. 530, 538 (1913) (denying takings claim brought by resort owner based on the installation on nearby property of a temporary wartime military fort, but noting that "if the government had installed its battery, not simply as a means of defense in war, but with the purpose and effect of subordinating the strip of land between the battery and the sea to the right and privilege of the government to fire projectiles directly across it, for the purpose of practice or otherwise, whenever it saw fit, in time of peace, with the result of depriving the owner of its profitable use, the imposition of such a servitude would constitute an appropriation of property for which compensation should be made").

⁸ *Aiken & Ketchum v. Benedict*, 39 Barb. 400, 1863 N.Y. App. Div. LEXIS 36.

⁹ *Id.* at 402, 1863 N.Y. App. Div. at *4.

¹⁰ *Swetland v. Curtiss Airports Corp.*, 41 F.2d 929, 937 (N.D. Ohio 1930) (emphasis added), *modified*, 55 F.2d 201 (6th Cir. 1932) (quoting Hiram L. Jome, *Property in the Air as Affected by the Airplane and the Radio*, 4 The J. of Land & Pub. Util. Econ. 257, at 261 (Aug. 1928)).

¹¹ *Id.* (emphasis omitted).

¹² *Id.*

¹³ *Butler v. Frontier Tel. Co.*, 186 N.Y. 486, 491, 79 N.E. 716 (1906) (emphasis added).

cannot be understood to create a possessory right to airspace.¹⁴ In the court’s view, *ad coelum* “was a figurative phrase to express the full and complete ownership of land and the right to whatever superjacent airspace was necessary or convenient to the enjoyment of the land.”¹⁵ As such, “[t]itle to the airspace unconnected with the use of land is inconceivable. Such a right has never been asserted. It is a thing not known to the law.”¹⁶

Ultimately, though, the true and proper meaning of *ad coelum* became moot. As one federal district court observed in 1955, “[w]hether the doctrine ever was the law in this jurisdiction need not be considered. There is no doubt that it is not now the law.”¹⁷ This is due to the arrival of aviation, which challenged traditional notion of property rights and led to the formal extinction of the *ad coelum* doctrine.

C. The Advent of Aviation

While courts relied on *ad coelum* to varying degrees to resolve disputes throughout the 19th and early 20th centuries, the Wright Brothers’ successful flights at Kitty Hawk in 1903 and the rampant technological development that followed ushered in an era of new challenges for understanding real property rights.

From the beginning of this period, courts understood that powered flight would test our understanding of real property rights, and that *ad coelum* could not be the proper framework for an airborne society. For instance, in 1932, the Sixth Circuit considered whether an entity should be enjoined from operating an airport on land next to the plaintiff’s property—a use that required aircraft to fly low over the neighboring parcel. Presented with case law that relied on the *ad coelum* doctrine, the court asserted that relying on such precedent “cannot be done consistently with the traditional policy of the courts to adapt the law to the economic and social needs of the times[]”—which at that time included the “new and rapidly growing business of aviation.”¹⁸ “From that point of view[,]” the court found, “we cannot hold that in every case it is a trespass against the owner of the soil to fly an aeroplane through the air space overlying the surface.”¹⁹ Rather than a right in the airspace above one’s property, “the owner of the surface . . . has a dominant right of occupancy for purposes incident to his use and enjoyment of the surface[.]”²⁰ With respect to the operation of aircraft, “there may be such a continuous and permanent use of the lower stratum which [the landowner] may reasonably expect to use or occupy himself as to impose a servitude upon his use and enjoyment of the surface.”²¹ The court held that the defendants should be enjoined from operating the airport, but, importantly, *not* because the planes entered into the airspace above the plaintiff’s property somewhere between the surface and the *coelum*. Instead, the court’s decision rested on its determination that the continuous operation of the airport would “unavoidably interfere with, if not destroy” the plaintiffs’ “use and enjoyment of the surface.”²²

A number of years later, in *Northwest Airlines v. Minnesota*, a case in which the Supreme Court upheld the state’s authority to tax aircraft, Justice Jackson’s concurrence recognized and articulated the limitation on *ad coelum* brought by the arrival of aircraft:

Aviation has added a new dimension to travel and to our ideas. The ancient idea that landlordism and sovereignty extend from the center of the world to the periphery of the universe has been modified. Today the landowner no more possesses a vertical control of all the air above him than a shore owner possesses horizontal control of all

¹⁴ *Hinman v. Pac. Air Lines Transp. Corp.*, 84 F.2d 755, 757 (9th Cir. 1936).

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Allegheny Airlines, Inc. v. Cedarhurst*, 132 F. Supp. 871, 878 (E.D.N.Y. 1955), *aff’d*, 238 F.2d 812 (2d Cir. 1956).

¹⁸ *Swetland v. Curtiss Airports Corp.*, 55 F.2d 201, 203 (6th Cir. 1932).

¹⁹ *Id.*

²⁰ *Id.*

²¹ *Id.*

²² *Id.* at 203-204 (emphasis added).

the sea before him. The air is too precious as an open highway to permit it to be ‘owned’ to the exclusion or embarrassment of air navigation by surface landlords who could put it to little real use.²³

And *Hinman*, the Ninth Circuit case discussed above in which the court characterized *ad coelum* as merely a “figurative phrase,” also dealt with aircraft. The court held that landowners had failed to state a claim for trespass where the suit rested solely on the overflight of aircraft at low altitudes above their property. Asserting that “[t]he solution is found in the application of elementary legal principles,” including that “[t]he air, like the sea, is by its nature incapable of private ownership, except in so far as one may actually use it,” the court found that a legal framework that allowed landowners to assert claims to unused air would be “utterly at variance with the reason of the law[,] . . . opposed to common sense and to all human experience.” Accordingly, the court sharply rebuked the notion that landowners could have cognizable trespass claims based on overflights that do not cause any injury. “We will not,” the court declared, “foist any such chimerical concept of property rights upon the jurisprudence of this country.”²⁴

This eventual recognition of the airspace as a common good did not occur uniformly, and sometimes courts went the other way. For instance, the Massachusetts high court considered “whether aircraft, in order to reach or leave an airport, may of right fly so low as 100 feet over brush and woodland not otherwise utilized, against the protest of the owner,” and held that such action “constitute[d] trespass to the land of the plaintiffs[.]”²⁵ Another state court in Pennsylvania concluded that “the noise, the dust, the crowds, and the apprehension of danger” due to flights from and operation of a nearby airport constituted nuisance, and that, given those elements, defendants in that case “have committed and are committing continuing trespasses . . . , in that their flights interfere with the proper enjoyment of a reasonable use of the surface of those premises[.]”²⁶

D. *Causby* and Its Progeny: The Official End to *Ad Coelum* and a New Era for Property Rights

In 1946, the Supreme Court picked up the threads woven by prior courts and put a formal end to the *ad coelum* doctrine. In *Causby*, a married couple sued the federal government on the grounds that low, persistent flights of heavy military aircraft to and from a nearby airfield constituted a taking of the couple’s chicken farm in violation of the Fifth Amendment. Although the Court agreed with the Causbys, and thus identified a taking that came from the government aircrafts’ impact on the Causbys’ land, the decision also recognized even greater limits on real property rights.

Specifically, the Court considered the *ad coelum* doctrine as a means to resolve the case, but rejected it, concluding that “that doctrine has no place in the modern world.”²⁷ Acknowledging the transformation that aviation had brought to the air and how it can be used, the Court observed that “the airspace is a public highway.”²⁸ Accordingly, private trespass claims must give way, otherwise such “private claims to the airspace would clog these highways, seriously interfere with their control and development in the public interest, and transfer into private ownership that to which only the public has a just claim.”²⁹ As the Court later observed, the *Causby* decision made clear that “[a]ncient doctrines of private ownership of the air as appurtenant to land titles had to be revised to make aviation practically serviceable to our society.”³⁰

²³ *Nw. Airlines v. Minnesota*, 322 U.S. 292, 302-303 (1944).

²⁴ *Hinman*, 84 F.2d at 757-58; see also *Thrasher v. City of Atlanta*, 173 S.E. 817, 826, 828 (Ga. 1934) (rejecting the alleged trespass and nuisance claims, holding that an “aircraft across the land of another” does not constitute a trespass without considering “the question of altitude,” and that the absence of any allegation that “the acts of low flying hav[ing] caused or [] causing any hurt, inconvenience or damage to the plaintiff” precluded a finding of nuisance) (citations omitted).

²⁵ *Smith v. New England Aircraft Co.*, 270 Mass. 511, 528, 530, 170 N.E. 385, 392 (1930).

²⁶ *Gay v. Taylor*, 19 Pa. D. & C. 31, 39, 41 (Com. Pl. 1932).

²⁷ *United States v. Causby*, 328 U.S. 256, 261 (1946).

²⁸ *Id.*

²⁹ *Id.* at 261, 264.

³⁰ *Chi. & S. Air Lines v. Waterman S.S. Corp.*, 333 U.S. 103, 107 (1948).

Having rejected the *ad coelum* theory of property ownership, the Court then turned to the takings claims at issue. The Court explained that, “[t]he airplane is part of the modern environment of life, and the inconveniences which it causes are normally not compensable under the Fifth Amendment.”³¹ Nonetheless, the Court held that the overflights of the Causbys’ property by military aircraft fell into one of those unusual circumstances in which a taking could occur. Importantly, that holding was based on the impact of the flights *on the land itself*, and not any intrusion into the air. Specifically, the Court followed the lead of the Ninth and Sixth Circuits and held that the challenged flights were “so low and so frequent as to be a direct and immediate *interference with the enjoyment and use of the land*.”³² These low, frequent flights had resulted in the disturbance and deaths of numerous chickens on the farm, requiring the Causbys to close down their commercial chicken farming business.³³

Causby drove the final nail into *ad coelum*’s coffin. In so doing, the Court expressly endorsed the view that how we conceptualize private rights can and should shift as technology develops and the needs of society change. After *Causby*, landowners definitively no longer owned a column of land up to the heavens. To have cognizable claims based on overflight of their property, they would need to show interference with their use of the surface.

Several subsequent developments enshrined the teachings of *Causby*. The doctrine of aerial trespass developed directly from this precedent, incorporating both the concept of low overflights and their impact on enjoyment and use of land, incorporating elements of both trespass and nuisance law. As set forth in the 1965 *Restatement (Second) of Torts*, “[f]light by aircraft in the air space above the land of another is a trespass if, but only if[:] (a) it enters into the immediate reaches of the air space next to the land, and (b) it interferes substantially with the other’s use and enjoyment of his land.”³⁴ In the decades that followed, courts applied this standard in evaluating trespass and takings claims based on aircraft overflights, and have continued to do so.³⁵ By contrast, courts appear to have completely abandoned the idea that an aircraft could “trespass” in the air by virtue of simply flying overhead.

At the same time, *Causby* also laid the groundwork for the development, or continuation, of legal regimes that could ensure the airspace was available for aviation without unduly infringing on the real property rights that remained. Indeed, while *Causby* and its progeny unequivocally demonstrated that landowners do not own the air, they also clarified that the right in the use and enjoyment of the surface is substantial. Landowners need to be able to make use of their land, to build structures on it, and—as *Causby* teaches directly—to be free from the surface impacts that can be caused by aircraft that are too loud and low. Accordingly, aviation easements developed to allow airport owners to solve the problem the Sixth Circuit addressed in *Swetland* and compensate the lost property rights caused by airport glidepaths, including the need for the landowner to refrain from building above a certain height or to be subjected to significant noise or disruption from

³¹ *Causby*, 328 U.S. at 266.

³² *Id.* (emphasis added).

³³ *Id.* at 259.

³⁴ Restatement (Second) of Torts § 159(2) (1965) (emphasis added).

³⁵ See, e.g., *Griggs v. Allegheny Cnty.*, 369 U.S. 84, 88 (1962) (applying *Causby* and holding that aircraft glidepaths over plaintiff’s property constituted a taking based on the impact on the surface); *E. Haven v. E. Airlines, Inc.*, 331 F. Supp. 16, 35 (D. Conn. 1971), *aff’d*, 470 F.2d 148 (2d Cir. 1972) (“Inasmuch as, in view of *Griggs*, the airlines are not liable for a taking of property over which they fly their planes on prescribed routes, they should not be liable for the trespass, *i. e.*, the invasion of the airspace over those properties which these flights entail.”); *Pueblo of Sandia ex rel. Chaves v. Smith*, 497 F.2d 1043, 1045 (10th Cir. 1974) (“liability for trespass to airspace does not exist absent interference with the landowner’s actual use, as distinguished from potential use or bare possession.”) (footnote omitted); see, e.g., *Chaves*, 497 F.2d at 1044-45 (granting summary judgment against plaintiff suing airport for trespass regarding airplanes regularly crossing over plaintiff’s land “at heights of 150 feet or less” because plaintiff failed to show “substantial interference with the actual use of [plaintiff]’s land”); *Bevens v. Gaylord Broad. Co., L.P.*, No. 05-01-00895-CV, 2002 WL 1582286, at *6 (Tex. App. July 18, 2002) (“Landowners have no right to exclude overflights above their property, because airspace is part of the public domain.”).

ascending or descending aircraft.³⁶ Outside the aviation context, negative easements are also used to protect scenic views and access to sunlight for solar energy purposes.³⁷ These arrangements do not secure a right to the airspace itself, but rather a promise from the servient landowner that they will not use the surface in a way that inhibits with the dominant owner's interests. Accordingly, contrary to what property rights advocates might suggest,³⁸ negative easement frameworks *do not* undermine *Causby*—they squarely endorse it.

Various federal legal frameworks likewise affirm the property rights paradigm established in *Causby*. For instance, the FAA requires notification of construction of structures above certain heights, and the Federal Communications Commission (“FCC”) requires towers housing communications antennas to meet lighting and marking requirements.³⁹ Neither federal agency purports to prohibit construction above a certain height; the regulations instead seek to identify structures that can pose a hazard to air navigation, and impose requirements such as marking and lighting to mitigate those risks.⁴⁰ These laws allow landowners to make full use of their property, but in a way that ensures aviation safety.

Even condominium laws that purport to give rights to airspace itself are consistent with *Causby*. When the condominium emerged as a new living and home ownership concept in the 1960s, states across the country passed laws to enable parties to have protectable interests in these properties. Although these laws were broadly written to allow individuals to hold in “areas above the surface” or “airspace” all of the rights that an individual can possess in the surface,⁴¹ the plain intent of these laws was to enable “the stacking of fee simple interests in land in a vertical column.”⁴² Enabling rights in these subdivided horizontal tracts—and ensuring these rights could exist before a building was erected and after it was gone—was necessary for condominium owners “[d]ue to the risks inherent in such arrangements.”⁴³

³⁶ See FAA, U.S. Dep’t of Transp., AC 150/5100-17 CH, Land Acquisition and Relocation Assistance for Airport Improvement Program (AIP) Assisted Projects at 23 (Nov. 3, 2005), https://www.faa.gov/documentLibrary/media/advisory_circular/150-5100-17/150_5100_17_chg6.pdf.

³⁷ See, e.g., 40 Am. Jur. Proof of Facts 3d 347 (originally published in 1997) (“Restrictive covenants may seek to prevent obstructions of view from the affected real property. Courts will enforce view restrictions according to the intentions of the covenanting parties, as determined from the language of the covenant and the circumstances surrounding its creation.”); Tawny L. Alvarez, *Don’t Take My Sunshine Away: Right-to-Light and Solar Energy in the Twenty-First Century*, 28 Pace L. Rev. 535, 544 (2008) (explaining that courts and statutes alike have recognized the right of private parties to create easements protecting access to sunlight or solar energy).

³⁸ See, e.g., Brent Skorup, *Drones, Airspace Design, and Aerial Law in States and Cities*, 55 Akron L. Rev. 157, at 157-58 (2022); Troy A. Rule, *Airspace and the Takings Clause*, 90 Wash. U. L. Rev. 421, 428 (2012) (“[I]n the decades since *Causby*, courts’ frequent recognition of private airspace rights in the context of view easements, condominium laws, [] solar access easements ha[ve] left little doubt that rights in non-navigable airspace are a legitimate form of property and that sub-adjacent landowners inherently possess those rights.”) (footnotes omitted).

³⁹ See e.g., 14 C.F.R. § 77.9 (2021) (requiring notification to the FAA of any construction or alteration above certain height thresholds); *id.* §§ 77.13, 77.15 (discussing standards for determining obstructions to air navigation or navigational aids or facilities); 47 C.F.R. § 17.21(c), (e) (requiring antenna structures to be painted and lighted when the height exceeds obstruction standards requiring notifications to the FAA).

⁴⁰ In practice, a hazard determination under Part 77 of the FAA’s rules impacts the ability of a property owner to secure local permits and insurance, but the FAA does not purport to prevent construction by regulation.

⁴¹ See, e.g., Colo. Rev. Stat. Ann. § 38-32-103 (West) (“All of the rights, privileges, incidents, powers, remedies, burdens, duties, liabilities, and restrictions pertaining to estates, rights, and interests in land shall appertain and be applicable to such estates, rights, and interests in areas above the surface of the ground.”); N.J. Stat. Ann. § 46:3-19 (West) (“Estates, rights and interests in areas above the surface of the ground, whether or not contiguous thereto, may be validly created in persons or corporations other than the owner or owners of the land below such areas, and shall be deemed to be estates, rights and interests in lands.”).

⁴² See, e.g., Douglas C. Harris, *Condominium and the City: The Rise of Property in Vancouver*, 36 L. & Soc. Inquiry, 694-726 (2011); *United Masonry, Inc. v. Jefferson Mews, Inc.*, 218 Va. 360, 362, 237 S.E.2d 171, 172 (1977).

⁴³ *29 Main St., LLC v. U.S. Postal Serv.*, No. 3:19-CV-2003 (SRU), 2022 WL 972412, at *15 (D. Conn. Mar. 31, 2022).

And importantly, despite their facial breadth, condominium ownership laws are “distinguishable from rights in abstract parcels of airspace.”⁴⁴ While these laws enable the private negotiation and legal protection that allows condominiums to exist at all, a right in a horizontal subdivided tract of airspace is not actually equivalent to a right in real property. The Supreme Court made this clear in *Penn Central v. City of New York*, where it held that airspace rights were not property for purposes of a takings claim.⁴⁵ The Virginia Supreme Court reached a similar result when it clarified that Virginia’s broadly-worded Horizontal Property Act allowed the conveyance of horizontal tracts of airspace only insofar as those rights are consistent with *Causby* (i.e., only in the context of structures built up from the surface).⁴⁶ Looking to the broad language of condominium laws, standing alone, proves far too much.

A redevelopment law considered by a New Jersey court offers a similar lesson. There, a municipality had determined that a space above railroad property constituted a “blighted area” for purposes of a New Jersey redevelopment law.⁴⁷ Because “blighted area” was defined solely with reference to land, calling the space—which was legally distinct and separate from the railroad running beneath—a blighted area essentially required characterizing the airspace as land. The New Jersey high court upheld the municipal determination.⁴⁸ However, the court’s reasoning was not based on an assertion that air itself is equivalent to real property—in this regard, the court cited *Causby* principles about use of the surface as well as condominium laws, observing that “[t]he word ‘land’ itself may have different meanings depending on its context.”⁴⁹ Instead, the court was swayed by the expansive and lofty purposes of the redevelopment legislation. “It is true that the legislation contains no specific reference to airspace as such[,]” the court conceded, “but in view of its sweeping social objectives it is inconceivable that there was ever any purpose or intent to exclude airspace above railroad tracks and the like from the legislative grant of power.”⁵⁰ “When all is said and done,” the court explained, “the matter of statutory construction here will not justly turn on literalisms, technisms or the so-called formal rules of interpretation; it will justly turn on the breadth of the objectives of the legislation and the commonsense [sic] of the situation.”⁵¹ The context here is critical: the court sought to broadly construe a statute referring to “land” to include certain airspace to give effect to a legislative enactment. Importantly, the court was *not* characterizing the legal concept of land for the purpose of delineating a real property owner’s right to exclude overflights from the superadjacent airspace. Had the court been presented with that situation, its balance of whether to use “formal rules of statutory interpretation,” which legislative objectives to consider, and how to weigh those objectives, likely would have been far different.

Thus, where courts or state laws have recognized rights to air that is in some way separate from the surface, they have done so in specific contexts, parsing laws that either enable the development of land or provide for negative easements thereto. None of these legal regimes purport to allow a person to “own” the airspace to the exclusion of aircraft. And in fact, some state laws creating so-called airspace rights expressly acknowledge aviation and explain that those rights may not interfere with it.⁵² Despite occasionally clumsy or sweeping language in these state law regimes, they cannot be read to upset the apple cart of surface-based property rights that *Causby* created.

⁴⁴ *Conveyance and Taxation of Air Rights*, 64 Colum. L. Rev. 338, 341 (Feb. 1964).

⁴⁵ *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 126 (1978).

⁴⁶ *United Masonry, Inc.*, 218 Va. at 362, 237 S.E.2d at 171-73 (1977).

⁴⁷ *Jersey City Chapter of Prop. Owner's Protective Ass'n v. City Council of Jersey City*, 55 N.J. 86, 99, 259 A.2d 698, 705 (1969).

⁴⁸ *Id.* at 100, 259 A.2d at 706.

⁴⁹ *Id.* at 98, 259 A.2d at 705.

⁵⁰ *Id.* at 100, 259 A.2d at 706.

⁵¹ *Id.*

⁵² *See, e.g.*, Okla. Stat. tit: 60, § 802 (2022) (“Airspace as defined herein shall in no way be deemed to contravene, supersede, amend, modify or alter the existing powers, requirements, limitations or other provisions of statutory or common law pertaining to aviation, air transportation, air commerce, or air operations.”); 68 Pa. Stat. and Cons. Stat. Ann. § 802 (2020) (“Estates, rights and interests in air space above the surface of the ground shall be subject to the exclusive national sovereignty of the United States of America in the air space of the United States and the public right of transit and flight of aircraft granted by the United States of America and the Commonwealth of Pennsylvania.”).

Ultimately, *Causby* leaves us with the understanding that a landowner has a robust right *in the surface*. They can use that surface for a wide range of activities. They can sell rights to portions of a building erected on the surface at various heights; they can sell rights to such a building that does not exist yet. They can sell a promise not to develop the surface at all for the benefit of the neighbors. They have a right to build, which may alter the flight of aircraft. And aircraft operators, meanwhile, cannot tell them not to build. But none of these rights are equivalent to an absolute right to the air itself, a right that belongs only to the public.

E. Lingering Confusion After *Causby*

Although *Causby* and its progeny give us a workable framework to understand the airspace and to vindicate real property rights in the era of aviation, it would be an overstatement to call these cases perfectly clear. The areas of confusion, however, can relatively easily be reconciled.

Residual ownership in the airspace. Property rights advocates are quick to point to dicta in *Causby* that appears to acknowledge some type of ownership of the air, and assert that such a property right exists notwithstanding *Causby*'s dismantling of the *ad coelum* doctrine. For instance, the Court states that landowners “must have exclusive control of the immediate reaches of the enveloping atmosphere,” and that “the landowner, as an incident to his ownership, has a claim to [the superadjacent airspace] and . . . invasions of it are in the same category as invasions of the surface.”⁵³ However, read in context, it is clear the Court is talking about this airspace control in terms of being able to use the land.⁵⁴ The holding of the case—which rests the finding of a taking on the way in which the overflights impacted the land—further affirms that this dicta is not to be interpreted as suggesting an ownership interest in the airspace itself. Indeed, if the *Causbys* owned the air the same way they owned the surface, the entire remainder of the *Causby* decision, including the discussion of the frequency and intensity of the overflights, would be surplusage.

Property rights advocates' invocation of the “immediate reaches” concept fails for a similar reason. They claim that the *Causby* court's reference to need for “exclusive control of the immediate reaches” of one's property means that while a more searching inquiry about interference with the use of land may need to be made for higher altitude flights, the landowner has an absolute right to exclude any air transit occurring in the “immediate reaches.”⁵⁵ However, this reads *Causby* exactly backwards. As the aerial trespass standard makes clear, for a property owner to have any rights at all, an overflight must *both* occur in the immediate reaches *and* cause substantial interference with use of the surface. Above the immediate reaches, a property owner has no rights at all with respect to the flight of aircraft. And the Supreme Court never held that the *Causbys* had the right to *exclude* the governments' aircraft, even in the immediate reaches.

Nonetheless, some courts have picked up on some of the more ambiguous dicta in *Causby* and suggested that it leaves room for some type of property ownership in the air itself.⁵⁶ Many of these decisions, while suggesting a right in the air,

⁵³ *Causby*, 328 U.S. at 264-65.

⁵⁴ The first quote in full is: “[I]t is obvious that *if the landowner is to have full enjoyment of the land*, he must have exclusive control of the immediate reaches of the enveloping atmosphere.” *Id.* at 264 (emphasis added). The sentence that precedes the second quote is: “The superadjacent airspace at this low altitude is so close to the land that *continuous invasions of it affect the use of the surface* of the land itself.” *Id.* at 265 (emphasis added). In context, each of these often-cherry-picked quotes demonstrates that use of the surface is central to understanding real property rights, and the impact on the surface is necessarily part of the inquiry to determine whether that right has been compromised.

⁵⁵ Skorup, *supra* note 38, at 176, 184.

⁵⁶ See e.g., *Speir v. United States*, 202 Ct. Cl. 1020, 1024, 485 F.2d 643, 647 (1973) (referring to flights by military helicopters as “wrongful invasions into the airspace as to which the plaintiffs had a legally protected property interest”); *Walsh v. Avalon Aviation, Inc.*, 118 F. Supp. 2d 675, 678 (D. Md. 2000), *aff'd sub nom. Walsh v. Potomac Airfield Airport*, 31 F. App'x 818 (4th Cir. 2002) (“[N]otwithstanding the public's right of aviation, to the landowner is reserved the ‘exclusive control of the immediate reaches of the enveloping atmosphere.’ . . . If there is no easement, then invasions of very low airspace ‘are in the same category as invasions of the surface.’”) (quoting *Causby*, 328 U.S. at 265). A GAO report on federal, state, and local issues surrounding the integration of UAS into the airspace likewise used inartful language, interpreting *Causby* as saying “that private landowners still retained their

nonetheless continue to apply the test set forth in *Causby* and require substantial interference with use and enjoyment of the surface.⁵⁷

Aerial intrusion as a “physical taking.” While consistently applying the *Causby* framework, some courts, including the Supreme Court, have referred to aerial takings as “physical takings” or “physical invasions” that amount to takings.⁵⁸ Takings law is generally grouped into two buckets, with “physical takings” standing in contrast to “regulatory takings”—instances where regulation is so pervasive that it deprives the land of all economic value. Physical takings, by contrast, involve actual physical occupation of the land itself. To prevail on a physical takings claim, a litigant need only demonstrate that the occupation—however small—has occurred, and need not show any adverse effect on the land.⁵⁹ Analytically, it is clear that aerial trespass as conceptualized by *Causby*, with its focus on the impact of the flights on the use of the land below, lies somewhere between these two categories of takings. That fact that courts often group aerial takings in with “physical takings”—often imprecisely, in cases that do not involve aircraft at all⁶⁰—could imply that aerial takings should be held to a *per se* standard rather than needing to meet the two-pronged inquiry in *Causby*. Dicta in *Causby* may have contributed to this confusion, stating “continuous invasions of [the superadjacent airspace] are *in the same category* as invasions of the surface.”⁶¹ And the fact that the effects on the ground stem from the aircraft’s physical presence may heighten this conceptual confusion. Nonetheless, the fact that courts continue to require litigants to meet the substantial interference prong means that the characterization of aviation easements as “physical takings” is more of a semantic inconsistency than a legal one. Moreover, other courts have been abundantly clear on the distinction, recognizing that aerial intrusions under *Causby* are not *per se* takings.⁶²

“Navigable airspace” and “immediate reaches.” There is also confusion about the concept of “navigable airspace” and how (if at all) that concept affects landowners’ property rights. The military aircraft flights at issue in *Causby* took place in airspace that was, at the time, beneath the “navigable airspace” as that term was then defined by federal law.⁶³ The Court repeatedly refers to “the navigable airspace which Congress has placed in the public domain,” and later states, “[t]he airspace, apart from the immediate reaches above the land, is part of the public domain.”⁶⁴ Thus, the court appears to be equating the “public domain” of the airspace with the “navigable airspace,” and using those terms interchangeably to

constitutionally protected property interests in the ‘*immediate reaches* of the enveloping atmosphere’ above their land, where the landowner ‘must have exclusive control’ if he is to have full enjoyment of the land.” U.S. Gov’t Accountability Off., GAO-B-330570, Unmanned Aircraft Systems: Current Jurisdictional, Property, and Privacy Legal Issues Regarding the Commercial and Recreational Use of Drones – Appendices I-VI, at 29 (Sept. 2020).

⁵⁷ See, e.g., *Speir*, 202 Ct. Cl. at 1024, 485 F.2d at 647 (stating that the military helicopter flights that it called “wrongful invasions” of plaintiffs’ airspace “did not amount to a taking of an aviation easement unless they interfered substantially with the use and enjoyment of the property.”) (citing *Adaman Mutual Water Co. v. United States*, 143 Ct. Cl. 921, 923, 181 F. Supp. 658, 659 (1958)).

⁵⁸ See, e.g., *Cedar Point Nursery v. Hassid*, 141 S.Ct. 2063, 2069-70, 210 L.Ed.2d 369, 378-79 (2021) (in a *per se* physical taking case involving intrusion on the ground, discussing *Causby* as one of several examples of where the “Court has [] treated government-authorized physical invasions as takings” and characterizing those examples as “physical takings”); *McCarran Int’l Airport v. Sisolak*, 122 Nev. 645, 665, 137 P.3d 1110, 1124 (2006).

⁵⁹ See, e.g., *Cedar Point Nursery*, 141 S.Ct. at 2071 (“When the government physically acquires private property for a public use, the Takings Clause imposes a clear and categorical obligation to provide the owner with just compensation. . . . These sorts of physical appropriations constitute the clearest sort of taking . . . and we assess them using a simple, *per se* rule: The government must pay for what it takes.”) (quotation marks and citations omitted).

⁶⁰ See, e.g., *id.* at 2069.

⁶¹ *Causby*, 328 U.S. at 265 (emphasis added).

⁶² See, e.g., *Brown v. United States*, 73 F.3d 1100, 1104 (Fed. Cir. 1996) (“[U]nlike a government invasion of the surface land itself, an invasion of airspace above surface land does not *per se* constitute a taking. However, under *Causby* and its progeny, once the surface owner proves that low-level overflights result in direct, immediate, and substantial interference with the enjoyment and use of the property, the owner establishes a taking for which the Constitution mandates just compensation.”).

⁶³ See *Causby*, 328 U.S. at 258.

⁶⁴ *Id.* at 266.

describe all airspace that is not the “immediate reaches”—making the navigable airspace and the immediate reaches mutually exclusive with one another. Indeed, the Court makes this even clearer when it hypothesizes that “if [the Civil Aeronautics Authority (the aviation regulator of the day)] prescribed 83 feet as the minimum safe altitude,” thereby establishing 83 feet and above as “navigable airspace” under federal law, “then we would have presented the question of the validity of the regulation.”⁶⁵

The challenge for those that would read too much into this dicta from *Causby*, however, is that this is precisely what the federal government went on to do. A number of years after the *Causby* decision, Congress revised the definition of “navigable airspace” to include glidepaths,⁶⁶ and thus redefined the term in a way that would have included the flights over the Causbys’ farm had the case been brought fifteen years later. And yet, when presented with another case in which a landowner asserted takings claims similar to those alleged by the Causbys, the Supreme Court did not “question . . . the validity” of the legislation that had allowed navigable airspace and immediate reaches to coexist where planes are taking off or landing. Instead, in *Griggs vs. Allegheny County*, the Supreme Court applied *Causby*, and reached the same result, finding that the low altitude flights—which now took place in what was legally navigable airspace—worked a taking because of their impact on the landowners’ ability to use the property.⁶⁷

Griggs teaches that notwithstanding the dicta in *Causby* suggesting that navigable airspace is the mutually exclusive counterpart of the immediate reaches, these legal concepts are not actually determined by or dependent on one another. This not only explains how the courts in *Causby* and *Griggs* reached the same result even though one case involved flights in navigable airspace and the other did not, it also is the only logical result when the nature of property rights is taken into account. As the Sixth Circuit has found, questions about whether private landowners’ rights have been violated are “unaffected by the regulation promulgated by the Department of Commerce . . . [setting a minimum safe altitude, and thus the lower bound of the ‘navigable airspace,’ for rural flights], for in [the court’s] view that regulation does not determine the rights of the surface owner, either as to trespass or nuisance.”⁶⁸ The alternative—that how the term “navigable airspace” is defined by an administrative agency could change whether or not the owner had a cognizable property right—would lead to confusion and inconsistency for landowners and aviators alike.

Accordingly, the best way to understand the concepts of navigable airspace and immediate reaches is as unrelated to one another. As will be discussed more in Part II, “navigable airspace” is a term of art used in aviation law that defines where it is *safe* to fly. “Immediate reaches,” by contrast, is a phrase cooked up by the Supreme Court in *Causby* to describe the area in which it is even possible to have a cognizable takings claim (or trespass, or other claim based on aerial intrusion) as a private property owner. The airspace defined by these concepts can be wholly separate, overlapping, or even coextensive. Rather than the opposite side of the same coin, these concepts are ships passing in the night; aircraft on separate routes, serving different functions. And for property owners, the pertinent question—the *only* pertinent question about the altitude of allegedly intrusive flights—is not whether the flights took place in navigable airspace, but whether they occurred in the immediate reaches of the property.

Reconciling these terms also means thinking critically about some of the case law that has applied *Causby*. For instance, in *Branning v. United States*,⁶⁹ the Court of Federal Claims appeared to adopt a separate test for flights that occur in

⁶⁵ *Id.* at 263.

⁶⁶ See Federal Aviation Act of 1958, Pub. L. No. 85-726, § 101(24), 72 Stat. 731, 739 (“[N]avigable airspace means airspace above the minimum altitudes of flight prescribed by regulations issued under this [Act,]” and shall include “airspace needed to ensure safety in takeoff and landing of aircraft.”).

⁶⁷ *Griggs*, 369 U.S. 84, 90, 92 (1962).

⁶⁸ *Swetland*, 55 F.2d, at 203 (citation omitted); see also, e.g., *Gay*, 19 Pa. D. & C. at 36 (finding that “[t]he pronouncement of [] a [‘navigable airspace’] definition [by the State Aeronautics Commission] does not take away from plaintiffs any property rights that they theretofore had[,]” as such a definition “does not say that planes may operate in any navigable air space in any locality and in, any manner without regard to the rights of other people.”).

⁶⁹ *Branning v. United States*, 28 Ct. Cl. 240, 253, 256, 654 F.2d 88, 97-98 (1981) (emphasis omitted).

“navigable airspace,” requiring takings claimants to demonstrate a higher level of impact to the surface. Specifically, the court required a showing of “unavoidable damage . . . so severe as to amount to a practical destruction or a substantial impairment” of the property.⁷⁰ In that case however, the court was considering flights at altitudes above 500 feet—well above what the *Causby* court recognized the “immediate reaches” to be with respect to the 83-foot flights at issue there.⁷¹ Accordingly, the court’s more searching review is better understood as one that was based on the fact that the flights occurred above the immediate reaches of the property. Because the first prong of the Restatement test was not met, something more than “substantial interference” would be necessary to result in a taking. Indeed, the *Branning* court’s test resembles the test adopted for *regulatory* takings, where no physical proximity is required at all. Understanding these issues in a more precise manner is critical because although the distinction—“in the navigable airspace” versus “above the immediate reaches”—was irrelevant for the *Branning* court’s purposes, it is critical in the era of drones, in which the navigable airspace and the immediate reaches overlap.

⁷⁰ *Id.* at 256 (citing *Aaron v. United States*, 160 Ct. Cl. 295, 311 F.2d 798 (1963)).

⁷¹ *Id.* at 244, 254, 654 F.2d at 97.

Part II: The Ability of States and Localities to Regulate the Airspace Is Significantly Limited by Federal Law

While courts wrestled with how to reconcile the airspace as a new technological frontier with traditional notions of real property rights, Congress was figuring out the level of oversight needed for the growing aviation industry, and how that authority should be balanced between federal and state sovereigns. The outcome was the most rational one: an airspace under centralized federal control, that displaced much of state and local authority to regulate both aviation as an activity and the airspace in which aircraft are authorized to operate.

A. Early U.S. Aviation Law and the Source of Federal Authority over the Airspace

By the 1920s, it had become clear that Congress would need to pass laws concerning the operation of aircraft in the United States. A lot had happened since the Wright Brothers' first powered flights at Kitty Hawk, including airspace legislation across Europe and significant advancement in aviation technology during World War I.⁷² Some states, including Connecticut and Massachusetts, even attempted their own aviation legislation to regulate the burgeoning aviation sector.⁷³ But all manner of stakeholders, including legal scholars and bar organizations, the insurance industry, and the aviation industry itself, clamored for a federal solution.⁷⁴ As the U.S. Court of Appeals for the Ninth Circuit would later observe, “[t]he uniqueness of the aviation industry [] mandates the need for a centralized authority. . . . Regulation on a national basis is required because air transportation is a national operation.”⁷⁵

Congress responded with the Air Commerce Act of 1926, which did several important things to facilitate growth in the aviation sector. First, it established a right to air navigation: specifically, the 1926 Act announced a “public right of freedom of interstate and foreign air navigation” in the “navigable airspace.”⁷⁶ The act further established the U.S. federal government’s sovereignty over the airspace, “declar[ing] that the Government of the United States has, to the exclusion of all foreign nations, complete sovereignty of the airspace over the lands and waters of the United States[.]”⁷⁷ The Act also delegated authority to the Secretary of Commerce to adopt regulations aimed at promoting aviation safety, including in the areas of aircraft registration, airworthiness rating, pilot certification, air navigation facility rating, and air traffic.⁷⁸

In 1938, Congress strengthened the right of air navigation by eliminating the “interstate” and “foreign” qualifiers that had been included in the 1926 Act. Specifically, the Civil Aeronautics Act of 1938 stated: “There is hereby recognized and declared to exist in behalf of [sic] any citizen of the United States a public right of freedom of transit in air commerce through the navigable air space of the United States.”⁷⁹ The 1938 Act also revised the sovereignty of the airspace provision, removing the direct reference to foreign nations, among other changes. The new sovereignty provision read: “[t]he United States of America is hereby declared to possess and exercise complete and exclusive national sovereignty in the air space above the United States, including the air space above all inland waters and the air space above those portions of the adjacent marginal high seas, bays, and lakes, over which by international law or treaty or convention the United States exercises national jurisdiction.”⁸⁰ And finally, because it was enacted in response to a series of high-profile

⁷² See, e.g., Stuart Banner, *Who Owns the Sky?: The Struggle to Control Airspace from the Wright Brothers On*, Cambridge, Mass.: Harvard University Press, 110-15, 144 (2008).

⁷³ *Id.* at 115-16.

⁷⁴ *Id.* at 146.

⁷⁵ *Montalvo v. Spirit Airlines*, 508 F.3d 464, 473 (9th Cir. 2007) (citations omitted).

⁷⁶ Air Commerce Act of 1926, Pub. L. No. 69-254, ch. 344, § 10, 44 Stat. 568, 574.

⁷⁷ *Id.* § 6.

⁷⁸ *Id.* § 3.

⁷⁹ Civil Aeronautics Act of 1938, Pub. L. No. 75-706, § 3, 52 Stat. 973, 980.

⁸⁰ *Id.* § 1107(i)(3).

crashes that had occurred earlier in the decade, the 1938 Act established an independent agency, the Civil Aeronautics Authority, to handle the aviation safety functions that were previously delegated to the Department of Commerce.⁸¹

Although these early aviation-focused legislative enactments contained statements of the U.S. government’s sovereignty over the airspace, the Supreme Court clarified in *Braniff Airways* in 1954 that it was the federal government’s commerce power that underpinned federal regulation of the aviation sector to the exclusion of the states.⁸² In so doing, the Court affirmed that the airspace itself is an instrumentality or channel of commerce—at a time when the commerce power of the federal government was already recognized as extremely broad.⁸³ This characterization is important (particularly considering that short-range drone flights will be central to the advanced aviation landscape), because “Congress is empowered to regulate and protect the instrumentalities of interstate commerce, or persons or things in interstate commerce, even though the threat may come only from intrastate activities.”⁸⁴

Courts also recognized that, if the right of air navigation were to have any meaning at all, centralized control over the airspace (to the exclusion of states) was a legal necessity given the nature of airspace as an asset. To this end, the *Braniff* Court likened the airspace, and the federal government’s control over it, to the nation’s waterways: “[t]he public right of flight in the navigable air space owes its source to the same constitutional basis which, under decisions of the Supreme Court, has given rise to a public easement of navigation in the navigable waters of the United States, regardless of the ownership of the adjacent or subjacent soil.”⁸⁵ In fact, as Justice Jackson explained in concurrence in a different case ten years earlier, “[a]ir as an element in which to navigate is *even more inevitably federalized* by the commerce clause than is navigable water.”⁸⁶ This is because “[l]ocal exactions and barriers to free transit in the air would neutralize its indifference to space and its conquest of time.”⁸⁷ In 1955, a federal district court applied this conclusion, holding preempted a local regulation that prohibited the flight of aircraft at an altitude of less than 1,000 feet.⁸⁸

Thus, even before the creation of the FAA and the pervasive federal regulatory frameworks that govern use of the airspace today, the legal foundations for federal preemption of the airspace and aviation were established.

B. The 1958 Federal Aviation Act, Field Preemption, and the Firm Rejection of a “Patchwork” of State and Local Laws

At this same time that courts were recognizing the “inevitable federalization” of the airspace, commercial aviation was beginning to scale up. With more aircraft than ever sharing the skies, challenges arose from the different rules and regulatory regimes governing civil and governmental aircraft. After “a series of fatal air crashes between civil and military aircraft operating under separate flight rules” in the 1950s,⁸⁹ including a major crash over the Grand Canyon resulting in the deaths of all 128 people aboard the two planes,⁹⁰ Congress enacted the 1958 Federal Aviation Act.

⁸¹ *Id.* §§ 201-206, 301-308, 601-610. The Civil Aeronautics Authority would later be split into two agencies: the Civil Aeronautics Administration and the Civil Aeronautics Board. The former was situated back in the Department of Commerce.

⁸² *Braniff Airways, Inc. v. Neb. State Bd. of Equalization & Assessment*, 347 U.S. 590, 594-97 (1954).

⁸³ See, e.g., *NLRB v. Jones & Laughlin Steel Corp.*, 301 U.S. 1 (1937); *United States v. Darby*, 312 U.S. 100 (1941); *United States v. Wrightwood Dairy Co.*, 315 U.S. 110 (1942); *Wickard v. Filburn*, 317 U.S. 111 (1942).

⁸⁴ *U.S. v. Lopez*, 514 U.S. 5549, 559 (1995) (citing [Shreveport Rate Cases](#), 234 U.S. 342 (1914), [Southern R. Co. v. United States](#), 222 U.S. 20 (1911), *Perez v. U.S.*, 402 U.S. 146 (1971)); see also .e.g, *Filburn*, 317 U.S. at 128-129 (upholding on Commerce Clause grounds the application of federal agricultural laws to the production and consumption of homegrown wheat).

⁸⁵ *Braniff Airways, Inc.*, 347 U.S. at 596-97 (internal quotations and citation omitted).

⁸⁶ *Nw. Airlines v. Minnesota*, 322 U.S. 292, 303 (1944) (Jackson, J., concurring) (emphasis added).

⁸⁷ *Id.*

⁸⁸ *Allegheny Airlines*, 132 F. Supp. at 878-79.

⁸⁹ *United States v. Christensen*, 419 F.2d 1401, 1404 (9th Cir. 1969).

⁹⁰ See, e.g., *Air Line Pilots Ass’n v. Quesada*, 276 F.2d 892, 897 (2d Cir. 1960).

The 1958 Act created the Federal Aviation Agency (which would later become the Federal Aviation Administration) and transferred to the new agency much of the authority held by the Civil Aeronautics Authority. The FAA was charged with, among other responsibilities, “formulat[ing] policy with respect to the use of the navigable airspace”; “assign[ing] by rule, regulation, or order the use of the navigable airspace”; and, in so doing, ensuring “the safety of aircraft and the efficient utilization of such airspace.”⁹¹ The 1958 Act maintained the public right of transit in the navigable airspace, as well as the statement of U.S. sovereignty over the airspace of the United States.⁹² However, the definition of “navigable airspace” was expanded to include the “airspace needed to insure safety in take-off and landing of aircraft.”⁹³ The Act also contained a savings clause providing that “[n]othing contained in this Act shall in any way abridge or alter the remedies now existing at common law or by statute, but the provisions of this Act are in addition to such remedies.”⁹⁴ The savings clause served to allow litigants to continue to use causes of action arising under state law to bring claims against and seek relief from aircraft operators, subject to federal standards of care established by FAA regulation and in a manner consistent with federal law.⁹⁵

Courts have recognized the strong preemptive effect of the 1958 Act. The Third Circuit characterized the Act as “rest[ing] sole responsibility for supervising the aviation industry with the federal government[.]”⁹⁶ As the Second Circuit likewise observed, the 1958 Act “was passed by Congress for the purpose of centralizing in a single authority—indeed, in one administrator—the power to frame rules for the safe and efficient use of the nation’s airspace.”⁹⁷ Courts have often emphasized the legislative history for the Act, such as the accompanying Senate report’s observations that “[a]viation is unique among transportation industries in its relation to the federal government—it is the only one whose operations are conducted almost wholly within federal jurisdiction, and are subject to little or no regulation by States or local authorities.”⁹⁸ “Thus,” the report continued, “the federal government bears virtually *complete responsibility* for the promotion and supervision of this industry in the public interest.”⁹⁹

Naturally, courts understood this significant federal control over aviation and the airspace as establishing a broad field for the purposes of preemption of state and local enactments. In holding preempted state law on indemnity and contribution in a case involving a mid-air collision, the Seventh Circuit found a “predominant, indeed almost exclusive, interest of the federal government in regulating the affairs of the nation’s airways.”¹⁰⁰ In the years that followed, numerous U.S. Courts of Appeal held that the federal government has occupied the entire field of “aviation safety,” and defined that field broadly.¹⁰¹ This case law has resulted in the preemption not only of state laws that attempted to regulate aviation safety

⁹¹ Federal Aviation Act of 1958, Pub. L. No. 85-726, § 307(a), 72 Stat. 731, 749.

⁹² *Id.* §§ 306, 1108.

⁹³ *Id.* § 101(24).

⁹⁴ *Id.* § 1106.

⁹⁵ *Abdullah v. Am. Airlines, Inc.*, 181 F.3d at 375-376.

⁹⁶ *Id.* at 368.

⁹⁷ *Air Line Pilots Ass’n*, 276 F.2d at 894.

⁹⁸ S. Rep. No. 85-1811, 85th Cong., 2d Sess. (1958). *See, e.g., Abdullah*, 181 F.3d at 368 (quoting same); *Montalvo*, 508 F.3d at 473 (same).

⁹⁹ S. Rep. No. 85-1811, 85th Cong., 2d Sess. (1958) (emphasis added). The accompanying House Report is similarly explicit on this point, providing that the “principal purpose of [the 1958 Act] is to establish a new federal agency with powers adequate to enable it to provide for the safe and efficient use of the navigable airspace by both civil and military operations,” including by giving the FAA “full responsibility and authority for the advancement and promotion of civil aeronautics generally, including the promulgation and enforcement of safety regulations” as well as “charg[ing] [the FAA] with the management of the national airspace[.]” H. Rep. No. 85-2360, 85th Cong., 2d Sess. (1958), reprinted at 1958 U.S.C.A.N. 3741, 1958 WL 3975 (Leg.Hist.).

¹⁰⁰ *Kohr v. Allegheny Airlines, Inc.*, 504 F.2d 400, 404 (7th Cir. 1974).

¹⁰¹ *See Abdullah*, 181 F.3d at 367 (“[W]e hold that federal law establishes the applicable standards of care in the field of air safety, generally, thus preempting the entire field from state and territorial regulation.”); *Montalvo*, 508 F.3d at 470-74; *Goodspeed Airport LLC v. East Haddam Inland Wetlands & Watercourses Comm’n*, 634 F.3d 206, 208 (2d Cir. 2011) (“Congress has established its intent to occupy the entire field of air safety, thereby preempting state regulation of that field.”); *U.S. Airways, Inc. v. O’Donnell*, 627 F.3d

directly, but also laws that more indirectly intruded upon the field by regulating, for instance, runway length, airline alcoholic beverage service, and aerobatic activity above a local airport.¹⁰²

The FAA’s extensive authority over air navigation, aviation safety, and air commerce found throughout Title 49 of the U.S. Code—coupled with the very nature of the airspace as a contiguous resource—make clear that the federally occupied field must encompass how aircraft navigate the airspace and where they are permitted to fly. As the Supreme Court explained in a case holding preempted a local ordinance designed to limit aircraft noise, “[f]ederal control is intensive and exclusive. Planes do not wander about in the sky like vagrant clouds. *They move only by federal permission*, subject to federal inspection, in the hands of federally certified personnel and under an intricate system of federal commands.”¹⁰³ The Second Circuit endorsed this view in a separate case dealing with an aircraft noise ordinance, explaining that the “control of flights through navigable airspace” is an “area [] totally preempted.”¹⁰⁴

The alternative—that states and localities could make rules dictating where aircraft can fly and how they can navigate the airspace—is widely recognized as untenable. As the Ninth Circuit observed, “a patchwork of state laws in this airspace would create a crazyquilt effect[]” that would undermine the federal government’s “goal of establishing a single, uniform system of air safety.”¹⁰⁵ Absent robust federal preemption, another court found, “[t]he likelihood of multiple, inconsistent rules would be a dagger pointed at the heart of commerce—and the rule applied might come literally to depend on which way the wind was blowing.”¹⁰⁶

C. The 1978 Airline Deregulation Act and Express Preemption

In 1978, Congress passed the Airline Deregulation Act to “encourage, develop, and attain an air transportation system which relies on competitive market forces to determine the quality, variety, and price of air services[.]”¹⁰⁷ To prevent states and localities from filling the void created by the deregulatory legislation, the Act included an express preemption provision stating that “no State or political subdivision thereof . . . shall enact or enforce any law, rule, regulation, standard, or other provision having the force and effect of law relating to rates, routes, or services of any air carrier[.]”¹⁰⁸ Air carriers are aircraft operators that engage in “air transportation,” which is the foreign or interstate transportation of people or property, or the transportation of mail, by aircraft.¹⁰⁹ Notwithstanding the express preemption provision, the Act maintained the 1958 Act’s savings clause.

The express preemption clause in the 1978 Act is broad, preempting not just laws that directly regulate rates, routes, and services of air carriers, but all laws “related” thereto. Accordingly, courts have found that the 1978 Act expressly

1318, 1326 (10th Cir. 2010) (“[F]ederal regulation occupies the field of aviation safety to the exclusion of state regulations.”); *Greene v. B.F. Goodrich Avionics Sys., Inc.*, 409 F.3d 784, 795 (6th Cir. 2005) (“[F]ederal law establishes the standards of care in the field of aviation safety and thus preempts the field from state regulation.”); *French v. Pan Am Express, Inc.*, 869 F.2d 1, 5-7 (1st Cir. 1989).

¹⁰² See, e.g., *Tweed-New Haven Airport Auth. v. Tong*, 930 F.3d 65 (2d Cir. 2019); *U.S. Airways, Inc. v. O’Donnell*, 627 F.3d 1318; *Int’l Aerobatics Club Chapter 1 v. City of Morris*, 76 F. Supp. 3d 767, 780-83, (N.D. Ill. 2014); *Montalvo*, 508 F.3d 464; *Ventress v. Japan Airlines*, 747 F.3d 716 (9th Cir. 2015).

¹⁰³ *City of Burbank v. Lockheed Air Terminal, Inc.*, 411 U.S. 624, 633-34 (1973) (quoting *Nw. Airlines v. Minnesota*, 322 U.S. 292, 303 (1944) (Jackson, J., concurring)) (quotation marks omitted) (emphasis added).

¹⁰⁴ *British Airways Bd. v. Port Auth. of N.Y.*, 558 F.2d 75 (2d Cir. 1977).

¹⁰⁵ *Montalvo*, 508 F.3d at 473 (quoting *French v. Pan Am Express, Inc.*, 869 F.2d 1, 6 (1st Cir. 1989)) (quotation marks omitted).

¹⁰⁶ *British Airways Bd.*, 558 F.2d at 83.

¹⁰⁷ Airline Deregulation Act of 1978, Pub. L. No. 95-504, 92 Stat. 1705 (codified at 49 U.S.C. § 1371).

¹⁰⁸ *Id.* § 105(a)(1).

¹⁰⁹ 49 U.S.C. § 40102(a)(5).

preempts a broad range of state laws, including airline fare advertising standards,¹¹⁰ consumer protection laws,¹¹¹ negligence,¹¹² and slander and defamation,¹¹³ among others.

D. Drone Laws

More recently, Congress has adopted several pieces of legislation pertaining to UAS specifically. These enactments build on and underline the federal government's authority over the airspace that evolved over the 20th century, including the lower-altitude airspace that is well-suited for drone operations.

In 2011, as new electronics and communications technology were making small, remotely piloted vehicles more capable and accessible, a provision within the National Defense Authorization Act ("NDAA") for Fiscal Year 2012 directed the FAA to establish six test sites for UAS operations.¹¹⁴ This was followed in short order by the 2012 FAA Modernization and Reform Act ("FMRA"), comprehensive legislation that reauthorized the FAA for a 5-year period and contained numerous provisions related to drones. In particular, the FMRA required the FAA to develop a plan to integrate UAS into the national airspace system, to adopt rules to enable the operation of small UAS (those below 55 pounds), and to permit UAS operations on a case-by-case basis pending promulgation of the rules and implementation of the plan, among other provisions.¹¹⁵ The FMRA also divested the FAA of authority over hobbyist UAS, or "model aircraft," providing in Section 336 of the Act that the FAA "may not promulgate any rule or regulation regarding a [small] model aircraft" that is flown for hobby or recreational use and is operated in accordance with various criteria related to the safety of the operations.¹¹⁶ This provision was intended to draw a line between the new generation of drones, packed with modern sensors and relatively cheap and easy to fly, and the older hobby of building and flying model airplanes, which had been enthusiastically pursued by a small cadre of hobbyists for decades without serious incident.

In 2015, the FAA adopted regulations requiring owners of small UAS to register their aircraft with the FAA.¹¹⁷ In 2016, after a couple years of issuing exemptions on a case-by-case basis to enable limited drone operations by specific petitioners, the FAA adopted its Part 107 regulations.¹¹⁸ These rules allow small UAS operations to occur without prior authorization from the FAA, provided the operator satisfies various operating limitations, including that the aircraft remain within visual line of sight of the operator, that the aircraft not be operated over people, that the operations take place in Class G (uncontrolled) airspace absent authorization from air traffic control, and that the pilot in command

¹¹⁰ *Morales v. Trans World Airlines, Inc.*, 504 U.S. 374, 391 (1992).

¹¹¹ See, e.g., *Am. Airlines v. Wolens*, 513 U.S. 219 (1995); *Cannava v. USAir*, No. CIV.A. 91-30003-F, 1993 WL 565341 (D. Mass. Jan. 7, 1993); *Sam L. Majors Jewelers v. ABX, Inc.*, 117 F.3d 922 (5th Cir. 1997).

¹¹² See, e.g., *Allen v. Spirit Airlines, Inc.*, 981 F. Supp. 2d 688 (E.D. Mich. 2013); *Mennella v. Am. Airlines, Inc.*, 824 Fed. App'x. 696 (11th Cir. 2020); but see, e.g., *Rodriguez v. Am. Airlines, Inc.*, 886 F. Supp. 967 (D.P.R. 1995) (state personal injury claims grounded on safety or lack thereof are not "related to" "services" for purposes of preemption by the ADA); *Trinidad v. Am. Airlines, Inc.*, 932 F. Supp. 521 (S.D.N.Y. 1996) (passengers' personal injury claims based on the alleged negligence of the defendant airline's pilot and other airline personnel did not relate to airline "services" and thus were not preempted by the 1978 Act).

¹¹³ See, e.g., *Chukwu v. Bd. of Directors British Airways*, 889 F. Supp. 12 (D. Mass. 1995), *aff'd sub nom. Azubuko v. Bd. of Directors, Brit. Airways*, 101 F.3d 106 (1st Cir. 1996); *Von Anhalt v. Delta Air Lines, Inc.*, 735 F. Supp. 1030 (S.D. Fla. 1990); but see, e.g., *Fenn v. Am. Airlines, Inc.*, 839 F. Supp. 1218 (S.D. Miss. 1993) (slander claim premised on airline employee's remarks in an airport were not preempted because they did not concern "services").

¹¹⁴ National Defense Authorization Act for Fiscal Year 2012, Pub. L. No. 112-81, § 1097 (2011) (codified at 49 U.S.C. § 40101 note).

¹¹⁵ FAA Modernization and Reform Act of 2012, Pub. L. No. 112-95, §§ 332(a)-(b), 333, 126 Stat. 11, 73-76 ("FMRA").

¹¹⁶ *Id.* § 336.

¹¹⁷ *Registration and Marking Requirements for Small Unmanned Aircraft*, Final Rule; OMB Approval of Information Collection, 80 Fed. Reg. 79,255 (Dec. 21, 2015) (codified at 14 C.F.R. pt. 11).

¹¹⁸ *Operation and Certification of Small Unmanned Aircraft Systems*, Final Rule, 81 Fed. Reg. 42,064 (June 28, 2016) (codified at 14 C.F.R. pt. 107, among other rule parts).

operate only one UAS at a time.¹¹⁹ In adopting Part 107, the FAA also created a new pilot certification for small UAS,¹²⁰ eliminating the requirement for drone pilots operating under Part 107 to hold traditional pilot's licenses designed for larger, crewed aircraft.

Also in 2016, Congress passed the FAA Extension, Safety, and Security Act, which contained several drone-specific provisions. Those provisions included directives to the FAA to develop standards for remote ID, to establish a process for emergency exemptions to allow UAS operations for disaster response, to create a research plan and pilot program for a UAS traffic management system ("UTM") to serve as the drone-specific counterpart to air traffic control, and to establish a process for limiting drone flights over "fixed site facilities" such as critical infrastructure, amusement parks, and other such locations.¹²¹ This critical infrastructure directive came to be known as the FAA's "Section 2209" mandate, named for its location in the 2016 Act.

In 2017, the U.S. Court of Appeals for the D.C. Circuit vacated the FAA's drone registration rules as applied to recreational UAS operators because of the divestment of FAA authority over model aircraft contained in Section 336 of the FMRA.¹²² Congress reinstated the registration rules as applied to hobbyists in the NDAA for Fiscal Year 2018.¹²³ In 2018, Congress passed the FAA Reauthorization Act, which significantly amended Section 336 to give the FAA authority to regulate recreational drone users in the interest of "maintaining the safety and security of the national airspace system."¹²⁴ In doing so, Congress recognized that its earlier attempt to regulate "hobbyist" model aircraft use differently than modern small UAS use had largely failed, and had had the unintentional effect of creating a category of small UAS operations that were all but statutorily immune from federal regulation.

The 2018 Act adopted numerous other drone provisions, including provisions related to the development of UTM and the Section 2209 process introduced by the 2016 Act.¹²⁵ The 2018 Act also required the FAA to "update regulations to authorize the carriage of property" by small UAS, thereby facilitating package delivery use cases under the preexisting air carrier regime.¹²⁶ In 2019, the FAA issued its first exemptions to UAS operators to allow air carrier operations.¹²⁷

In 2020, the FAA adopted additional regulations governing UAS, including new requirements on manufacturers and operators to implement broadcast-based remote ID.¹²⁸ Under these requirements, drone manufacturers must build, and pilots must operate, UAS that can broadcast at least once per second key information such as the location of the aircraft and control station, aircraft serial number or session ID, and aircraft velocity.¹²⁹ The FAA also revised Part 107 to allow operations at night under certain conditions, and to permit UAS flights over people by operators of remote ID-equipped

¹¹⁹ *Id.* at 42,210-11 (§§ 107.31, 107.39, 107.41, 107.35).

¹²⁰ *Id.* at 42,210 (§ 107.12).

¹²¹ FAA Extension, Safety, and Security Act of 2016, Pub. L. No. 114-190 §§ 2202, 2208, 2209, 130 Stat. 615 ("2016 FAA Extension Act").

¹²² *Taylor v. Huerta*, 856 F.3d 1089 (D.C. Cir. 2017).

¹²³ National Defense Authorization Act for Fiscal Year 2018, Pub. L. No. 115-91, § 1092(d), 131 Stat. 1283 (2017) ("2018 NDAA").

¹²⁴ FAA Reauthorization Act of 2018, Pub. L. No. 115-254, § 349(f)(4), 132 Stat. 3186 ("2018 FAA Reauthorization Act") (codified at 49 U.S.C. § 44809).

¹²⁵ *Id.* §§ 376, 369.

¹²⁶ *Id.* § 348 (codified at 49 U.S.C. § 44808).

¹²⁷ Press Release, U.S. Transportation Secretary Elaine L. Chao Announces FAA Certification of Commercial Package Delivery, FAA (Apr. 23, 2019) <https://www.faa.gov/newsroom/us-transportation-secretary-elaine-l-chao-announces-faa-certification-commercial-package>.

¹²⁸ *Remote Identification of Unmanned Aircraft*, Final Rule, 86 Fed. Reg. 4390 (Jan. 15, 2021) ("Remote ID Final Rule").

¹²⁹ 14 C.F.R. §§ 89.105, 89.515, 89.310.

drones that can demonstrate compliance with standards related to risk of injury posed by the aircraft.¹³⁰ The remote ID rules were appealed by hobbyist operators to the U.S. Court of Appeals for the D.C. Circuit, which upheld the rules.¹³¹

These drone-specific statutes and regulations, in conjunction with the comprehensive body of pre-existing aviation law, evince a pervasive federal scheme that necessarily includes UAS. The FAA has advocated forcefully (and successfully) in litigation that drones are “aircraft” for purposes of the agency’s jurisdiction.¹³² The agency has not spoken with the force of law on the specific question of federal preemption with respect to state and local drone laws. However, a “fact sheet” on this topic the agency issued in 2015 noted the agency’s view that “[a] navigable airspace free from inconsistent state and local restrictions is essential to the maintenance of a safe and sound air transportation system.” To that end, “[s]ubstantial air safety issues are raised when state or local governments attempt to regulate the operation or flight of aircraft.”¹³³ The agency observed that a “‘patchwork quilt’ of differing [state and local UAS regulations] could severely limit the flexibility of FAA in controlling the airspace and flight patterns, and ensuring safety and an efficient air traffic flow.”¹³⁴

E. Revisiting “Navigable Airspace”

To fully understand the scope of federal authority over aviation and the airspace, and the extent to which that authority preempts state and local control over aviation activities, we must once again analyze the concept of “navigable airspace.” Throughout all of the legislative enactments addressing and refining the public right of transit, that right is consistently characterized as existing in “navigable airspace.” Other parts of Title 49 (which contains the FAA’s organic statute) also refer to the navigable airspace, such as the FAA’s mandate to “prescribe air traffic regulations . . . for . . . using the navigable airspace efficiently.”¹³⁵ As currently defined in the U.S. Code, “navigable airspace” describes “airspace above the minimum altitudes of flight prescribed by regulations under [specific subparts of Title 49], including airspace needed to ensure safety in the takeoff and landing of aircraft.”¹³⁶

Understanding how navigable airspace fits in with the broader questions of the FAA’s authority and the preemptive scope of federal regulation is critical because some have questioned whether the airspace in which UAS fly today under FAA regulations is actually “navigable airspace” under federal law. Some commentators have suggested that because the FAA’s UAS regulations do not expressly define a “minimum altitude of flight,” the airspace in which drones are authorized to operate under Part 107 is not “navigable airspace.”¹³⁷ They further suggest that if that airspace is not “navigable,” then states and localities are free to regulate it on their own. Both assertions are incorrect.

“Navigable airspace” is wherever the FAA authorizes flight. First, the idea that the FAA *literally* needs to define a minimum safe altitude by reference to a specified height is too formalistic, and does not survive a careful examination of the FAA’s regulations or the purpose behind them. In fact, the FAA’s own regulation on “minimum safe altitudes” include *multiple* instances where crewed aircraft are not subject to specific numeric altitudes but nonetheless are subject to the rule. For instance, while aircraft operating under Part 91 must operate at an altitude of 1,000 feet above the highest

¹³⁰ See *Operation of Small Unmanned Aircraft Systems Over People*, Final Rule, 86 Fed. Reg. 4314 (Jan. 15, 2021) (codified at 14 C.F.R. Parts 11, 21, 43, and 107); 14 C.F.R. pt. 107, subpart D; *id.* § 107.29.

¹³¹ *Brennan v. Dickson*, 45 F.4th 48 (D.C. Cir. 2022).

¹³² See *Huerta v. Pirker*, 2014 WL 8095629 (NTSB 2014); *Huerta v. Haughwout*, No. 3:16-cv-358 (JAM) (D. Conn. Jul. 18, 2016).

¹³³ See Press Release, *FAA Issues Fact Sheet on State and Local UAS Laws*, FAA (Dec. 17, 2015), <https://www.faa.gov/newsroom/faq-issues-fact-sheet-state-and-local-uas-laws>; FAA, *State and Local Regulation of Unmanned Aircraft Systems (UAS) Fact Sheet*, Office of the Chief Counsel at 2 (Dec. 17, 2015), available at <https://www.dot.nv.gov/Home/ShowDocument?id=6834> (citations omitted).

¹³⁴ *Id.* While the FAA has continued to develop its positions in this area, an update or successor to the fact sheet has yet to be released as of publication of this article.

¹³⁵ 49 U.S.C. § 40103(b)(2)(C).

¹³⁶ *Id.* § 40102(a)(32).

¹³⁷ See, e.g., Lavi M. Ben Dor & Jonathan M. Hoffman, *The Emerging Airspace Economy: A Framework for Airspace Rights in the Age of Drones*, 2022 Wis. L. Rev. 953, 986-88 (2022).

obstacle in congested areas and 500 feet above the surface in non-congested areas, aircraft operating in non-congested areas are not required to adhere to the 500-foot minimum if the area is open water or sparsely populated; in that case, the only constraint is that the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.¹³⁸ Helicopters, meanwhile, are not subject to either of the minimum safe altitudes and instead can comply with “any routes or altitudes specifically prescribed for helicopters by the FAA.”¹³⁹ And powered parachutes and weight-shift-control aircraft are not subject to the minimum altitudes at all in non-congested areas.¹⁴⁰ Thus, before even looking to how the FAA has regulated drones, it is clear that “minimum safe altitude” is a flexible concept and not a static numeric value.

The notion that the FAA needs to promulgate a numeric minimum safe altitude to establish the “navigable airspace” for a specific type of aircraft is even more misguided when the purpose behind minimum safe altitudes is considered. From a safety perspective, the FAA sets minimum safe altitudes to ensure that if an aircraft’s power unit fails, the aircraft can conduct an “emergency landing without undue hazard to persons or property[.]”¹⁴¹ That is why the FAA’s Part 91 regulation on minimum safe altitudes requires all aircraft operating under that rule part to operate at an altitude that can meet that standard, separate and apart from the numeric minimum altitudes included in the rule. It is also the reason that helicopters *are not* subject to those numbers. As the FAA has explained, helicopters “have unique operating characteristics, the most important of which is their ability to execute pinpoint emergency landings during power-out emergencies.”¹⁴²

Small rotorcraft UAS, which do not require glidepaths to land and are orders of magnitude lighter than helicopters, are even more nimble and less dangerous in an emergency landing situation. Accordingly, it was both entirely appropriate and not at all surprising that in adopting Part 107, the FAA did not set a numeric minimum safe altitude. Instead, Part 107 ensures an equivalent level of safety by, for instance, prohibiting operations over people unless the operator can demonstrate that the risk of injury to a person posed by the aircraft is below a numeric threshold.¹⁴³ A UAS operating at 50 feet, 100 feet, or 200 feet is operating at a safe altitude under FAA regulations so long as it is otherwise in compliance with the FAA’s various Part 107 operating limitations.

Courts likewise have rejected an overly formalistic view of navigable airspace. For instance, prior to the 1958 Act, when the statutory definition of navigable airspace did not yet include glidepaths necessary for takeoffs and landings, a federal district court concluded that glidepaths *must* nonetheless be part of the navigable airspace. “It is plain that when aircraft descend for landing at an airport or take off therefrom, they must necessarily fly below an altitude of 1,000 feet and that landings and take-offs are part of the operation and flight of aircraft,” the court explained.¹⁴⁴ “The obvious meaning of the rule is that the minimum safe altitude for take-off or landing is *whatever altitude is necessary for those operations.*”

Even if low altitude airspace were “non-navigable,” states and localities do not have authority to regulate it. Second, irrespective of whether the low-altitude airspace authorized for use under Part 107 and other FAA enactments is technically “navigable airspace” under Title 49 of the U.S. Code, resolving this question has no bearing on the preemptive scope of either those regulations or the FAA’s regulation of air navigation and aviation safety more generally. Indeed, the statutes themselves support the notion that the FAA’s exclusive control over aviation extends to the entire airspace and not simply to “navigable airspace.” For instance, the FAA is empowered by statute to “assign by regulation or order the

¹³⁸ 14 C.F.R. § 91.119(b), (c).

¹³⁹ *Id.* § 91.119(d)(1).

¹⁴⁰ *Id.* § 91.119(d)(2).

¹⁴¹ *Id.* § 91.119(a).

¹⁴² FAA Guide to Low-Flying Aircraft, Department of Transportation,

https://www.faa.gov/about/office_org/field_offices/fsdo/lgb/local_more/media/FAA_Guide_to_Low-Flying_Aircraft.pdf (last visited Dec. 28, 2022).

¹⁴³ 14 C.F.R. Part 107, subpart D.

¹⁴⁴ *Allegheny Airlines*, 132 F. Supp. at 882.

use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace.”¹⁴⁵ The FAA also is directed to “establish areas in the airspace” that are controlled or restricted “in the interest of national defense.”¹⁴⁶ The FAA’s drone-specific mandates, meanwhile, require integration of UAS into the “national airspace,” and do not reference “navigable airspace” at all.¹⁴⁷

But more fundamentally, it strains logic to think that the FAA’s authority hinges on a question as simplistic—and easily changeable—as whether the FAA regulations expressly define a “minimum safe altitude” for flights those regulations authorize. The reason the FAA’s enactments have the preemptive force that they do is because of “the need for one, consistent means of regulating aviation safety[.]” in the airspace of the United States.¹⁴⁸ A legal regime that allowed states and localities to regulate aviation in the shadows created by the “non-navigable airspace” would significantly threaten the safety of the airspace and wholly undermine this objective.

The Third Circuit recognized this principle in the related context of the federal government’s power to regulate intrastate flights under the Commerce Clause. The court reasoned that “[i]t is beyond dispute that Congress’s power over interstate commerce includes the power to regulate the use of the nation’s navigable airspace,” and that “airplanes constitute instrumentalities of interstate commerce[.]”¹⁴⁹ Accordingly, the court rejected the petitioner’s assertion that Congress lacked authority to regulate a wholly intrastate flight, finding that “any threat to [airplanes in interstate commerce], such as the one posed by [petitioner’s] flight . . . is properly subject to regulation even if the threat comes from a purely intrastate activity.”¹⁵⁰

The necessity of federal control over the airspace as a whole, irrespective of the supposed navigability of the airspace, flows naturally from the nature of airspace as a contiguous resource. The only way to separate air from the airspace is by erecting buildings and enclosures (thereby making that air part of the “indoors” and no longer “airspace” at all, and putting it altogether beyond the purview of the FAA¹⁵¹). “Non-navigable” airspace—that airspace below the federally-established minimum safe altitudes, whatever those may be in a given circumstance—remains contiguous with the navigable airspace. Just as a wholly intrastate flight has the power to affect flights in interstate commerce, a flight occurring wholly within non-navigable airspace necessarily impacts, and can pose threats to, the flights occurring in navigable airspace. As such, the federal government naturally has constitutional authority, and preemptive control, over the entire airspace—and the FAA’s authority under the Commerce Clause is not limited to navigable airspace.

This conclusion is further confirmed by the fact that what constitutes “navigable airspace” is an aviation safety determination, made by the FAA. Airspace is only “non-navigable” for a particular aircraft because the FAA has concluded that operation of that aircraft at that altitude is not sufficiently safe to navigate. Thus, by definition, there is no way for a state or local definition to conclude that aircraft operations in “non-navigable” airspace are safe—and the notion that there is some airspace below the “navigable airspace” where state and local jurisdictions *can* permit and regulate operations simply makes no sense.

UAS operations occurring in “non-navigable” airspace does not impact the property rights analysis. Finally, it is worth noting that the theory that the airspace currently authorized for UAS flight is not “navigable airspace” likewise does not impact the rights of landowners. As set forth at length in Part I, the relevant question for determining the rights of the

¹⁴⁵ 49 U.S.C. § 40103(b)(1).

¹⁴⁶ *Id.* § 40102(b)(3)(A).

¹⁴⁷ *See, e.g., FMRA* § 332.

¹⁴⁸ *Abdullah*, 181 F. 3d at 372.

¹⁴⁹ *Ickes v. FAA*, 299 F.3d 260, 263 (3d Cir. 2002) (citation omitted).

¹⁵⁰ *Id.*

¹⁵¹ *See, e.g., Remote ID Final Rule*, 86 Fed. Reg. at 4404 (“The FAA regulates the navigable airspace of the United States. Therefore, this rule does not apply to unmanned aircraft operations conducted entirely indoors, underground, or inside an enclosed space such as a netted enclosure.”).

landowner is whether the flight at issue occurred in the “immediate reaches,” a stagnant concept that is neither dictated nor impacted by what the FAA defines as “navigable airspace.” The fact that the “public right of transit” under federal law exists only in “navigable airspace” does not, and should not, change this analysis. Remember, the flights at issue in *Causby* took place in what was, at the time, “non-navigable” airspace, and when the Supreme Court evaluated similar flights in navigable airspace in *Griggs*, it reached the same result. *Causby* and its progeny underscore that it is the airspace itself that is the public domain—the identification of minimum safe altitudes does not change the rights of the property owner.

Ultimately, while the “navigable airspace” concept in aviation law raises interesting questions about the interaction of the relevant legal doctrines, it ends up being a red herring because of how those doctrines have evolved. The federal government’s preemptive control over air navigation and aviation safety spans the *entire* airspace, whether or not that airspace is defined by statute or regulation as “navigable,” and the property owner’s rights lie in the surface as that surface is impacted by flights in the immediate reaches, irrespective of whether allegedly disruptive overflights occurred in navigable airspace.

F. Sidenote: Spectrum as a Case Study

Airspace is not the only asset that by its nature demands centralized federal control. Radiofrequency spectrum is another example of this type of asset, and the development of legal doctrines surrounding its management provides support for the vision of the airspace endorsed here.

At the same time that powered flight was giving courts reason to question the *ad coelum* doctrine, the emergence of a commercial radio industry forced Congress and courts to confront similar questions about the electromagnetic waves that radio technology uses to transmit information. After several years of early radio licensing being handled by various offices within the Department of Commerce, Congress passed the Radio Act of 1927.¹⁵² The Radio Act created the five-member Federal Radio Commission to allocate spectrum for radio use, to issue licenses for radio stations, to regulate radio equipment, and to otherwise act to prevent harmful interference between stations.¹⁵³ In rejecting a challenge to a Radio Commission licensing decision in 1933, the Supreme Court observed that “[n]o question is presented as to the power of the Congress, in its regulation of interstate commerce, to regulate radio communications.”¹⁵⁴ The Court further commented on the inevitable federalization of the airwaves, observing that “[n]o state lines divide the radio waves, and *national regulation is not only appropriate but essential* to the efficient use of radio facilities.”¹⁵⁵

A year later, Congress passed the Communications Act of 1934, which created the Federal Communications Commission (“FCC”). The 1934 Act sought to meet similar national objectives, in a similar fashion, as the 1927 Act. As the Supreme Court explained, the 1934 Act “endowed” the new, successor commission “with comprehensive powers to promote and realize the vast potentialities of radio.”¹⁵⁶ Courts analyzing challenges to FCC authority and specific actions taken by the agency were quick to acknowledge the significant federal control in this area to the exclusion of state and local authority. In 1963, the Supreme Court observed that with respect to “the Commission’s jurisdiction over technical matters such as frequency allocation . . . federal control is clearly exclusive.”¹⁵⁷ Citing this and other Supreme Court precedent as well as legislative history for the 1934 Act, the FCC in 1985 found that because federal law “comprehensively regulates

¹⁵² Indeed, as with the airspace, federal control over radio spectrum has its roots in disaster. In 1912, the sinking of the Titanic and the attendant radio traffic—and radio interference—it caused prompted Congress to pass the Radio Act of 1912, which for the first time required that all radio operators be federally licensed. An Act to Regulate Radio Communication, Pub. L. No. 62-264, 37 Stat. 302.

¹⁵³ Radio Act of 1927, Pub. L. No. 69-632, § 4, 44 Stat. 1162.

¹⁵⁴ *Fed. Radio Comm'n v. Nelson Bros. Bond & Mortg. Co. (Station WIBO)*, 289 U.S. 266, 279 (1933).

¹⁵⁵ *Id.* at 279 (emphasis added).

¹⁵⁶ *Nat'l Broad. Co. v. United States*, 319 U.S. 190, 217 (1943).

¹⁵⁷ *Head v. N.M. Bd. of Exam'rs in Optometry*, 374 U.S. 424, 430 n.6 (1963) (citing 47 U.S.C. § 301).

interference, Congress undoubtedly intended federal regulation to completely occupy that field to the exclusion of local and state governments.”¹⁵⁸ Accordingly, both the FCC and courts held preempted state and local laws that sought to regulate in the areas of radiofrequency allocation and interference, as well as other technical aspects of radio transmission.¹⁵⁹

This broad federal preemption did not leave states and localities powerless to regulate in any way that impacts entities that use the airwaves. As the Supreme Court found, by way of example, “Congress intended the survival of certain ‘traditional’ state powers and remedies—particularly common-law tort and traditional criminal sanctions.”¹⁶⁰ However, the important thing, for the matters discussed in this paper, is the pervasive, and exclusive, federal control over the *asset*—the electromagnetic spectrum— and how that asset is *used* by the technologies that depend on it.

Just as states and localities cannot decide how spectrum should be allocated for use by parties within their jurisdictions, they cannot decide how aircraft can use the airspace above those jurisdictions. And importantly, because of the federal government’s exclusive control over spectrum allocation, a state or locality could not decide to make use of “white spaces” or “guard bands” (spaces in between channels or allocated frequency bands in which no one is authorized to operate) and authorize radiofrequency use in those frequency ranges. And as a matter of policy, this is for good reason: other sovereigns allowing operations in areas in which the FCC has not authorized transmission would pose an interference threat to the operations the FCC *has* authorized. The “non-navigable” airspace can be understood the same way. Like spectrum, airspace is contiguous—any use of it in the areas not authorized by federal governments poses safety risks to the rest.

Another key similarity between the development of radio spectrum and the regulation of the airspace is the notion that federal control is essential to technological progress. As the Supreme Court has observed: “Regulation of radio was [] as vital to its development as traffic control was to the development of the automobile. . . . Congress acted upon the knowledge that if the potentialities of radio were not to be wasted, regulation was essential.”¹⁶¹ “A unified and comprehensive regulatory scheme for the industry” was necessary “to protect the national interest involved in the new and far-reaching science of broadcasting.”¹⁶² Here too, the questions about state and local control over airspace not only raise concerns about the safety of the national airspace as a whole, but whether the drone industry will be able to develop and flourish at all. A “crazyquilt”¹⁶³ of regulations, resulting in different flight restrictions, requirements, or even outright bans across jurisdictions, poses a similar threat to UAS as an emerging technology that such a patchwork would have imposed on radio. The national interest inherent in protecting this type of technology—that is dependent on an “inevitably federalized” asset—calls for a similar solution.

¹⁵⁸ *Petition for Declaratory Ruling by 960 Radio, Inc., Licensee of Station KSJN (FM), Klamath Falls, OR*, Docket No. 85-322, Memorandum Opinion and Declaratory Ruling, FCC 85-578, at 3 (rel. Nov. 4, 1985).

¹⁵⁹ *See, e.g., id.; In re Mobilecomm of New York, Inc. Licensee of Pub. Land Mobile Serv. Station KPE256 on the Frequency 43.54 MHz at Wilton, Connecticut - Petition for Declaratory Ruling*, Memorandum Opinion and Declaratory Ruling, 2 FCC Rcd. 5519 (1987); *Sw. Bell Wireless, Inc. v. Johnson Cnty. Bd. of Cnty. Comm’rs*, 199 F.3d 1185 (10th Cir. 1999); *Freeman v. Burlington Broads., Inc.*, 204 F.3d 311 (2d Cir. 2000); *In re Petition of Cingular Wireless LLC for a Declaratory Ruling that Provisions of the Anne Arundel County Zoning Ordinance are Preempted as Impermissible Regulation of Radio Frequency Interference Reserved Exclusively to the Federal Communications Commission*, Docket No. 02-100, 18 FCC Rcd. 13126 (2003); *N.Y. S.M.S.A. Ltd. P’ship v. Town of Clarkstown*, 612 F.3d 97, 105 (2d Cir. 2010).

¹⁶⁰ *Head*, 374 U.S. at 443.

¹⁶¹ *Nat’l Broad. Co.*, 319 U.S. at 213.

¹⁶² *FCC v. Pottsville Broad. Co.*, 309 U.S. 134, 137 (1940).

¹⁶³ *Montalvo*, 508 F.3d at 473.

Part III: Applying the Legal Paradigms of the Airspace to Drones

Having retread the—somewhat weedy and overgrown, though ultimately direct and traversable—paths taken by Congress and the courts to develop workable frameworks for private property ownership and the balance of federal, state, and local authority in the era of powered flight, we now have the full picture that will allow us to follow those paths into the UAS universe.

Drones have emerged as a safe, cost-effective, agile, and maneuverable solution for activities previously conducted using manned aircraft or on foot. Drones, particularly those weighing less than 55 pounds, can be launched from anywhere and can be operated safely at low altitudes (indeed, per FAA regulations outlined above, generally must stay *below* 400 feet). They can be used to collect images and video footage, gather data or even physical samples, deliver payloads, and spray materials such as those used in agriculture or firefighting. The absence of a pilot on board the aircraft not only allows drones to undertake missions without putting a human at risk, but also creates opportunities for a single operator to conduct multiple simultaneous missions at significant distances from the control location. At the same time, the state of battery technology throughout the first quarter of the 21st century has imposed limitations on flight times, limiting operations to miles and minutes at a time rather than long-distance missions currently undertaken by larger aircraft that use petroleum-based fuels.

Drones in many ways operate differently than traditional crewed aircraft, and have different advantages and limitations. Although these differences may challenge the paradigms that have enabled a robust aviation industry, they do not break them. The law as it has developed provides not only clean, relatively straightforward answers for some of the common questions that arise in this area, it also provides a rubric for how to consider and adapt the frameworks for challenges that have yet to arise in the UAS era. To illustrate this, we offer several drone-focused principles that flow from the property rights and preemption regimes outlined above:

Individuals do not have a right to exclude drones from the airspace above their property. As *Causby* and its progeny make clear, landowners do not have a property right in the airspace itself. The airspace is a public good that is managed by the federal government. It is the FAA, and not individual property owners, that decide where and when aircraft can fly. This centralized federal control means not only that property owners cannot unilaterally declare the airspace above their land a “No Drone Zone,” but also that they cannot take matters into their own hands should they dislike that a drone is operating in that airspace. To that end, federal law unequivocally makes it a felony to shoot down an aircraft, including a drone, regardless of where it is operating.¹⁶⁴

Landowners do have a robust right in the use of the surface, and it is possible for drone flights to affect that right. At the same time, landowners are not powerless to stop aerial intrusions. While property owners do not own the airspace and cannot simply exclude aircraft, they do own the surface. With that ownership comes a robust, protectable right to use that property as the owner sees fit—including by building upward from the surface, operating various types of businesses from the property, or using the land as a place to relax. While drone operators have no ability to prevent a landowner from building on their property, *Causby* and its progeny suggest that low-altitude UAS operations *could* disrupt the landowner’s use of the property so as to permit legal relief.

There is no need to change the aerial trespass doctrine—but the relevant factors in a drone context may be different. The Supreme Court has already supplied the appropriate test for assessing alleged drone intrusions. The aerial trespass test, developed from *Causby* and currently codified in the Restatement of Torts, asks exactly the right questions: did the flight occur in the immediate reaches of the landowner’s property, and did it interfere substantially with the landowner’s use and enjoyment of the property? The potential need for adaptations in the drone context comes into play not with respect to the

¹⁶⁴ See 18 U.S.C. § 32 (making it a felony to damage, destroy, or disable an aircraft in flight); *id.* § 31(a)(1) (defining an “aircraft” as “a civil, military, or public contrivance invented, used, or designed to navigate, fly, or travel in the air[.]”); *id.* §§ 44802, 44807 (describing UAS as “aircraft”).

test itself, but the types of operational characteristics that could cause substantial interference. In *Causby* and *Griggs*, the issues presented were the noise and vibrations caused by large and heavy aircraft. The courts concluded that in the right circumstances operations of these large and loud aircraft could be sufficiently disruptive to the property to give rise to a cause of action. It is unlikely that a sub-55-pound aircraft could ever cause similar effects, but that does not mean they cannot “substantially interfere” with the use and enjoyment of the land in other ways. Factfinders will need to look to other aspects of the operations, and consider whether small, low-flying drones have impacts that prior courts have never had occasion to consider. It is at least theoretically possible that there are some drone operations that will always or nearly always constitute a trespass, if they interfere sufficiently with the ability to use property. But no new test, paradigm, conception of property, or legal theory is needed to reach that result—the aerial trespass doctrine provides an appropriate analytical framework.

Some applicable laws may have little to do with aviation at all. It is also possible that individuals have other, non-property based laws at their disposal to settle disputes between themselves and drone operators. While trespass and takings are rooted in an individual’s ownership of real property on the surface, myriad bodies of law govern human conduct and interaction and do not specifically involve property ownership or aviation. Nuisance, voyeurism, invasion of privacy, assault, harassment—all of this is conduct that theoretically *could* be perpetrated via drone. However, any application of such laws must be done consistently with the federally-occupied aviation fields. For instance, a harassment law that made the mere presence of a drone actionable almost certainly would be preempted. But as long as they are not applied in a way that interferes with federal prerogatives, these laws can help to ensure that UAS operators are not using their aircraft in a harmful, unlawful manner against others, and that victims of conduct perpetrated via UAS can vindicate their rights.

All airspace is usable. Another thing that the UAS era has thrown into stark relief is the versatility of the airspace. In the past, it was easy analytically to conceptualize higher altitudes as airspace used by aviators and closer altitudes as generally unused and unusable for aviation, with lower altitudes needed only for glidepaths to and from airports. But UAS can take off from, and operate, virtually anywhere without posing safety risks. While, as discussed above, courts sometimes made missteps such as characterizing “navigable airspace” and “immediate reaches” in a manner that suggested the concepts are mutually exclusive, the arrival of the drone actually makes it easier to avoid these types of analytic mistakes. All of the airspace is a public highway, and federal drone regulations have recognized that essentially all airspace is navigable, as long as your aircraft is small and light enough. And yet still, real property rights have not changed, and operate as set forth above. We have a simpler way to describe the airspace now, which frees up room to focus on the real issues—ensuring that laws that apply to UAS can meet the interests of all constituents while remaining consistent with the balance of authorities between federal and state sovereigns.

States and localities may not regulate UAS in a manner that interferes with the federally-occupied field of aviation safety, including air navigation. The same principles that have governed the issue of federal preemption in the aviation sector continue to apply as state and local law turns to drones. As set forth above, the federal field is broad, covering air navigation and all aspects of aviation safety. Federal law also expressly preempts state and local laws relating to the prices, routes, and services of air carriers—aircraft that carry people and property on an interstate basis—a category into which a growing number of UAS operators fit as drone applications expand and scale. States and localities are not immune from preemption simply because the aircraft they hope to regulate operate closer to the ground. A growing number of court decisions affirms this point.¹⁶⁵

Applying field preemption principles in the context of drones likely requires looking differently at traditional state and local roles. While the same preemptive principles continue to apply, the differences between drones and their traditional crewed counterparts mean that the contours of state and local authority may, and likely will, look different when it comes

¹⁶⁵ *Singer v. City of Newton*, 284 F. Supp. 3d 125 (D. Mass. 2017) ; Mem. and Order, *Xizmo Media Prods. LLC v. City of N.Y.*, No. 1:21-cv-02160-ENV-MMH (E.D.N.Y. Aug. 29, 2022) (ECF No. 24).

to laws that impact the drone industry. In some cases, the application of aviation-based field preemption will constrain states and localities *more* in the UAS context. For instance, airport siting historically has been a state and local function. While states and their political subdivisions may not regulate aviation or air navigation, their zoning power has allowed them to determine where aircraft can take off and land. However, because of the limited flight capacity of most modern drones, even modest takeoff and landing restrictions could altogether prevent the operation of UAS within a jurisdiction. Accordingly, while a law that limited the number of airports in a county likely would not be preempted, a law that cabined UAS takeoffs and landings to those airports very well could be.

By the same token, there are some areas where states and localities may have an outsized role as compared with the pre-drone status quo. Take for instance regulation of the pilot. The federal government will continue to have sole authority over pilot qualifications, licensing, and workplace obligations—nothing has changed there. But the unique thing about drones is that the pilot and aircraft operate separately from one another, with the pilot on the ground. This leaves room for commonsense state and local policy about where the pilot can be located while conducting operations, such as limiting drone piloting from public property. Of course, the same limitations on state and local authority continue to apply—for instance, such a law could not prohibit the drone overhead from transiting the park in accordance with federal aviation regulations and still pass muster under federal law, nor could a law that restricts pilot ground locations so significantly as to infringe the right to air navigation.

As technology continues to evolve, so will the application of the legal paradigms. Finally, history demonstrates that it will be important to continue evaluating the state of technology and refocusing the lenses of federal, state, and local control and individual rights as the picture moves out of focus or the edges grow fuzzy. Early twentieth century courts recognized this with respect to property rights and the advent of powered flight, and the *Causby* court underscored it when it observed that *ad coelum* “has no place in the modern world.”¹⁶⁶ Technological developments in aviation will continue to challenge these notions and may require refining the concepts or terminology that we use to understand the balance of authorities and to safeguard individual rights.

¹⁶⁶ *Causby*, 328 U.S.at 261.

Part IV: The Flaws in Drone Tollways and Similar Proposals

Notwithstanding the foregoing, some academics, think tanks, and others in the UAS stakeholder ecosystem have taken a heavily property rights and local control-focused view of the airspace in the drone context. Such advocates assert that landowners own some amount of airspace above their property, and that localities can regulate aviation activities within that airspace despite the FAA's role as the nation's sole aviation regulator.¹⁶⁷ Some of these advocates assert that the airspace can and should be monetized for the benefit of individuals and localities, and even go so far as to rate a state's "drone readiness" based on whether the state provides for slicing the airspace into drone highways and providing for tollway systems.¹⁶⁸

These theories and proposals stand entirely at odds with the last 100 plus years of development in aviation and the law, and everything we have explained in this paper so far. Legally, drone highways and tollways are unsound. As set forth above, individuals do not have rights in the airspace itself. Proponents of drone tollways argue there is such a right, often premised on things we already have debunked: imprecise dicta in *Causby*, state laws governing development rights, and the presence of aviation easements for airports. Because the vast majority of UAS flights, which merely transit over a property in accordance with FAA regulations, will not substantially impact the landowner's use of the property, the landowner has no grounds to demand a blanket easement from all drone operators in the form of a toll. Drone highway and tollway proposals are separately legally unsound because they are preempted by federal law. Where a state-mandated drone route applies to a UAS acting as an air carrier, it is preempted expressly under the Airline Deregulation Act of 1978. But for all drone operators, states and localities dictating where UAS can fly—and requiring them all to congregate in specific channels, no less—undoubtedly intrudes on aviation safety and air navigation.

These purported solutions are *even more troubling* as a matter of policy. First, a network of drone highways across the sky would be detrimental to the safety of people in aircraft and on the ground, both by creating congestion in the airspace and by turning states and localities into additional airspace managers and regulators. These regulators would simultaneously be operating *beneath* the FAA with respect to crewed aircraft, coextensively with the FAA in UAS-occupied airspace, and alongside *other* state and local drone regulators in adjacent jurisdiction. This is a "crazyquilt" in three dimensions, causing just the type of asynchrony that led to the creation of the FAA in the first place. Second, creating a separate transportation framework for UAS consisting of both state and local control and tollway management by individuals is entirely at odds with Congress's vision that drones be *integrated* into the national airspace. Third, drone highways are simply inconsistent with how the airspace as an asset is meant to be used. While policymakers designing surface transportation systems must make complex determinations of how the roads will connect, and route around, the homes, businesses, places of interest, community centers, and natural features that comprise society, the air is largely free of those complexities—and that is its greatest feature. A train cannot travel where there is no track, the driver of a car cannot cut through all their neighbors' property simply to take the most direct route to the city. But aircraft can travel as the crow flies, turning an invisible strip of air into a temporary expressway for that flight, and upon landing, leave the air exactly as it was. As Justice Jackson put it in *Northwest Airlines*, "[t]he air is too precious as an open highway to permit it to be 'owned' to the exclusion or embarrassment of air navigation by surface landlords who could put it to little real

¹⁶⁷ See Skorup, *supra* note 38, at 173 (claiming that *Causby* "formalized longstanding [legal] trends" by focusing on the "idea that there are two layers of airspace: a high-altitude layer" controlled by the government and "a low-altitude layer" mostly controlled by "landowners and U.S. state powers."); Hoffman, *supra* note 137, at 954 (advocating for the "division of airspace into four distinct regions" all operating independently "with different rights and responsibilities in each domain," so as to "establish a framework that balances the rights of federal, state, and local governments, landowners and drone operators to ensure the safety and full potential of the emerging airspace economy").

¹⁶⁸ See, e.g., Hoffman, *supra* note 137, at 983; Brent Skorup, *Is Your State Ready For Drone Commerce? The 2022 State-By-State Scorecard*, Mercatus Center (June 27, 2022), <https://www.mercatus.org/research/research-papers/your-state-ready-drone-commerce-2022-state-state-scorecard>.

use.”¹⁶⁹ Drone highways eviscerate the advantages of this asset by transforming it into nothing more than an elevated simulacrum of the surface beneath.

¹⁶⁹ *Nw. Airlines v. Minnesota*, 322 U.S. at 303.

Part V: What's Next?

If not by building a network of drone highways, how *can* a state update its existing property and aviation laws to get ready for advanced aviation? As we have explained, existing legal regimes do much of the work, and there is no real need to reinvent the wheel. At the same time, the public is often wary of new technology, and lawmakers rightly must be responsive to the concerns of their constituents. Moreover, even if the old legal frameworks apply, there are still affirmative things that legislators can do to make sure that all the paradigms are applied correctly.

At the outset, states should recognize the pervasive federal control over aviation and the airspace. Rather than seeking to regulate where UAS can fly, who can operate them, and the like, states should expand their “right to fly” statutes to expressly *include* UAS. They further should decline to adopt any laws that, directly or indirectly, regulate air navigation or aviation safety in the UAS context. Instead, they should look to the differences between UAS and traditional crewed aircraft to determine how (if at all) the traditional approaches to aviation should be changed. For instance, states and localities must ensure any restrictions on takeoff and landing do not unduly restrict uncrewed aviation, and should likewise carefully consider policies for remote pilot operations conducted from public spaces. To ensure consistency across the state in respecting the boundaries between federal and state authority, states also should adopt laws that preempt inconsistent regulation by lesser sovereigns such as cities and counties.

States and localities also should look to leverage existing law to the extent possible. Often, constituent concerns about UAS (e.g., that the aircraft is invading the constituent’s privacy) are concerns that have already been addressed by more general laws that prohibit unacceptable conduct. States should consider whether an “extension of self” law, making clear that a drone can be an instrumentality by which a person can break an existing law, could allay public concerns without adopting undue restrictions on aviation activities. Any such law should make clear that property-based violations of law, such as trespass, *cannot* be perpetrated via drone the same way they are committed by a person on foot. Instead, doctrines such as aerial trespass provide the appropriate test. Finally, to the extent a state finds that a drone-specific law is necessary in some context, the state should tread carefully to ensure that the law does not inadvertently intrude on the federal government’s regulation of aviation or aviation safety, and that the law is appropriate given the unique characteristics of UAS.

In our view, drone readiness is not about whether the state and locality has worked to monetize the airspace to near-certain rejection by the courts. Instead, drone readiness is about ensuring that individuals can continue to vindicate their rights in the face of new technology, that the aviation industry can continue to develop even as the aircraft get smaller and the pilots stay on the ground, and that we as a society can continue to encourage technological development, in the air and everywhere else. The states and localities that recognize how existing legal frameworks work to support these principles are the ones that will prove ready for the future of aviation, and they will reap its benefits.

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