No. 142, Original

In The
Supreme Court of the United States

STATE OF FLORIDA,
Plaintiff,

v.

STATE OF GEORGIA,
Defendant.

Before the Special Master

Honorable Ralph I. Lancaster

AMICUS BRIEF OF J.B. RUHL ON HIS BEHALF IN SUPPORT OF THE PLAINTIFF STATE OF FLORIDA

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INTRODUCTION

A river is more than water flowing downhill. It follows that equitable apportionment doctrine is about more than just how much water must flow downhill across a state line. While that quantum is often the end product of an interstate river equitable apportionment decree, the underlying question the doctrine must answer to designate such a quantum is, "What is being allocated, and on what basis?"

The purpose of this amicus brief is to present the case for using principles from the scientific discipline of "ecosystem services" to help answer that question, specifically in this proceeding but also more generally for the doctrine. Ecosystem services are the benefits humans receive from natural resources in the form of goods, such as water, fish, and timber, and of services, such as groundwater recharge, flood mitigation, and salinity regulation, many of which are public or quasi-public goods and thus not easily accounted for in markets.

It should come as no surprise that there are ecosystem services—that natural resources like rivers are not only ecologically important but also economically valuable to human communities. Nevertheless, a discipline centered on the study of ecosystem services did not emerge robustly until the mid-1990s, when ecologists, economists, geographers, and researchers from other traditionally siloed fields began coming together to focus on the identification and quantification of ecosystem services.

The composition, distribution, and human consumption of ecosystem services are among the attributes that make a river more than water flowing downhill. Water extracted from a river in its physical form is not the only ecosystem service humans consume from a river. They also consume flood mitigation services, estuarine salinity regulation services, habitat maintenance services for commercial fisheries, and a suite of other economically valuable benefits made possible in large part by the water flowing in its physical form down the river. The fact that some of these services seem "ecological" and are not easily monetized in commercial markets does not make them any less economically valuable when humans consume them. It follows that equitable apportionment doctrine ought to take into account *all* of the ecosystem services humans consume from a river and allocate the water flowing downhill so as to provide an equitable division of those services between the states.

Indeed, I argue in this brief that the Court's equitable apportionment doctrine already incorporates all of the key principles behind the concept of ecosystem services, though not in the language and metrics used in ecosystem services science. The language of equitable apportionment doctrine has lagged behind the science of ecosystem services for the simple reason that the Court has not had a proceeding like this one since the ecosystem services discipline emerged to synthesize and galvanize scientific research. But the spirit of the ecosystem services concept has been embedded in equitable apportionment doctrine for decades. Its spirit has taken material form in other legal domains from federal and state statutes to agency regulations and policies to judicial common law decisions. This

original jurisdiction proceeding presents the opportunity for the ecosystem services concept to become explicit and inform decisions in yet another legal domain—the Court's doctrine of equitable apportionment.

Part I of this brief provides the Court background on the discipline of ecosystem services. Part II traces developments in law and policy integrating ecosystem services principles, including a recent White House directive to federal agencies, to demonstrate that it has gained traction in legal domains related to equitable apportionment. Part III argues that it is fully consistent with the Court's equitable apportionment doctrine to incorporate ecosystem services principles to help resolve the apportionment decision. Finally, Part IV suggests ways in which doing so will help clarify resolution of the equitable apportionment issues presented in this proceeding regarding the Apalachicola-Chattahoochee-Flint River Basin ("ACF"). Indeed, there has perhaps been no equitable apportionment case in the Court's history that more starkly and imperatively makes the case for using principles of ecosystem services to guide the apportionment decision.

ARGUMENT

I. Background on Ecosystem Services

Although it is intuitive that humans depend to a large degree on the natural environment not only for physical survival, but also for economic and cultural well-being, exactly how so and by how much was not a driving focal point of research or policy until recently. In the early 1990s, economists, ecologists, geographers, and

researchers from related disciplines forged the concept of ecosystem services to capture and focus the idea that the benefits humans receive from natural resources are essential to human well-being and, more broadly, to thriving economies. Several path-breaking accounts of ecosystem services galvanized the emerging discipline in the mid-1990s. *See* NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS (Gretchen C. Daily ed. 1997); Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 NATURE 253 (1997).

Over time the ecosystem services discipline developed a widely-adopted typology describing how ecosystem services flow to human communities in four types: 1) *provisioning services* are commodities such as food, wood, fiber, and water; 2) *regulating services* moderate or control environmental conditions, such as flood control by wetlands, water purification by aquifers, and carbon sequestration by forests; 3) *cultural services* include recreation, education, and aesthetics; and 4) *supporting services*, such as nutrient cycling, soil formation, and primary biomass production, make the other three service streams possible. *See* MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING: SYNTHESIS at vi (2005). Although more refined and granular classification systems have since been proposed, these four categories aptly describe the kind of benefits ecosystems provide humans. For example, aquatic resources provide bountiful supplies of ecosystem services to human populations, including water (provisioning), fish (provisioning), groundwater recharge (regulating), storm and flood mitigation (regulating), sediment control (regulating), water purification (regulating), soil

formation (supporting), and recreation (cultural). *See* MILLENNIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING: WETLANDS AND WATER (2005).

There are two important points to be made here of relevance to contexts like the ACF. First, in all four categories the core theme of the ecosystem services framework is that the benefits are valuable *to humans*. The ecosystem services framework is human-centric, not eco-centric; although, to be sure, it is about what benefits humans derive from ecosystems and thus the condition of ecosystems matters. To put it in perspective, ecological structures and processes make possible the ecosystem services "final products" that humans consume, hence the integrity of ecosystems is vital to the integrity of ecosystem services. *See* Hannah Birge et al., *Adaptive Management for Ecosystem Services*, 183 JOURNAL OF ENVIRONMENTAL. MANAGEMENT 343 (2016).

Second, the challenges the ecosystem services framework reveals for public policy and private markets are primarily with respect to *regulating* and *supporting* services. Provisioning services like water and timber are readily priced in markets, and thus their economic value is easily determined. Cultural services like recreation also can often be valued in markets and, even when not traded directly in markets, can be estimated through proxies such as park entry fees and distance travelled for access to amenities.

By contrast, regulating and supporting services are much closer to public goods and thus not are easily accounted for in markets. For example, it would be difficult for the owner of natural pollinator habitat to charge nearby farms for the

pollination benefits, and it would be difficult for a farmer who did pay the owner to control where the pollinators pollinate. Similarly, "many of the raw materials and ecosystem services provided by nature are non-excludable (also known as open access), which means that individuals cannot be prevented from using them whether or not they pay. The price mechanism cannot guide the allocation of [such] unowned resources." Joshua Farley & Alexey Voinov, *Economics, Socio-Ecological Resilience and Ecosystem Services*, 183 JOURNAL OF ENVIRONMENTAL MANAGEMENT 389, 392 (2016). The result is that neither the habitat owner nor the farmer is willing to invest in the pollinator habitat resource and, more than likely, it becomes depleted or developed for other uses. *See* Christopher L. Lant et al., *The Tragedy of Ecosystem Services*, 58 BIOSCIENCE 969, 970-71 (2008).

The discipline of ecosystem services is in large part aimed at identifying, describing, and quantifying the benefits humans receive from natural resources, particularly the benefits of regulating and supporting services, to provide a sense of value where markets cannot. Natural pollination services, for example, can be measured in terms of economic impact on crop production, and the price of domesticated bee pollination services can be used as a comparator. *See* Taylor H. Ricketts, *Tropical Forest Fragments Enhance Pollinator Activity in Nearby Coffee Crops*, 18 CONSERVATION BIOLOGY 1262 (2004). Through these kinds of analyses, researchers have amassed a vast and growing amount of knowledge about the value of ecosystem services. *See* Erik Gomez-Baggethun et al., *The History of Ecosystem Services in Economic Theory and Practice: From Early Notions to Markets and*

Payment Schemes, 69 ECOLOGICAL ECONOMICS 1209 (2010). Indeed, a scientific journal, aptly named *Ecosystem Services*, is singularly devoted to the subject. *See* http://www.journals.elsevier.com/ecosystem-services.

Of course, the point of this expanding body of research is not to have people think of all ecosystem services as commodities that can be priced and traded in markets. Knowing the value of natural pollinators cannot change the fact that natural pollination is more a public than private resource. Rather, the point of the ecosystem services discipline is to promote knowledge that will lead to better public and private decisions. The next section shows that this objective has gained considerable traction in public and private law, where in both domains it is becoming clear that the law "gets" ecosystem services.

II. The Integration of Ecosystem Services Principles into Related Legal Domains

Although policy makers were fairly quick to pick up on the idea of ecosystem services conceptually, even by the mid-2000s ecosystem services had not shown up in much hard law to apply. *See* J.B. RUHL, STEVEN E. KRAFT, AND CHRISTOPHER L. LANT, THE LAW AND POLICY OF ECOSYSTEM SERVICES (Island Press 2007); J.B. Ruhl & James Salzman, *The Law and Policy Beginnings of Ecosystem Services*, 22 J. LAND USE & ENVTL. L. 157 (2007). A sea-change in this respect began in 2008 and has continued unabated since then. Below I briefly trace some of this history in the federal regulatory sphere, provide example of ecosystem services concepts appearing in state judicial doctrine, and summarize a recent White House directive

to federal agencies regarding use of ecosystem services in their decision making processes.

A. Ecosystem Services in Federal Regulatory Contexts

1. Payment and Incentive Programs. Most prominently, the 2008 Farm Bill directed the U.S. Department of Agriculture to "establish technical guidelines that outline science-based methods to measure the environmental services benefits from conservation and land management activities in order to facilitate the participation of farmers, ranchers, and forest landowners in emerging environmental services markets." P.L. 110-246, the Food, Conservation, and Energy Act of 2008, § 2709. The USDA now explicitly recognizes ecosystem service values as a basis for payments under traditional farm conservation program payments. *See* 7 C.F.R. §§ 625.8(f) and 1467.20(b).

2. Land Use Regulation Programs. Pursuant to their authority under Section 404 of the Clean Water Act, in 2008 the Environmental Protection Agency and U.S. Army Corps of Engineers promulgated a new wetlands compensatory mitigation rule. *See* 33 C.F.R. §§ 325, 332; 40 C.F.R. § 230; *see also* 73 Fed. Reg. 19594 (Apr. 10, 2008). Significantly, the new rule explicitly requires that the agencies take into account the ecosystems service impacts to humans when approving impacts to jurisdictional wetlands and designating compensatory mitigation. *See* 33 C.F.R. § 332.3(d)(2); *see generally* J.B. Ruhl et al., *Implementing the New Ecosystem Services Mandate of the Section 404 Compensatory Mitigation Program—A Catalyst for Advancing Science and Policy*, 38 STETSON L. REV. 251 (2009).

3. Public Land Management Programs. The U.S. Forest Service put ecosystem services front and center in the agency's 2012 land and resources management planning rule for national forests. *See* 36 C.F.R. § 219.1 (purposes), 219.6 (assessment), 219.8 (sustainability), 219.10(a) (planning), and 219.19 (definition). The regulations require that plans identify and evaluate "benefits people obtain from the National Forest Service planning area (ecosystem services)." 36 C.F.R. § 219.6(7). Similarly, the Bureau of Land Management has recently developed guidelines on evaluating non-market environmental values for its land management programs. *See* Bureau of Land Management, Guidance on Estimating Nonmarket Environmental Values (2013), *available a*t http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2013/IM_2013-131__Ch1.print.html.

4. Impact Assessment and Planning Programs. Environmental impact assessment programs are probably where the ecosystem services framework is the most visible. The National Oceanic and Atmospheric Administration, for example, uses a service-based metric when making natural resources damages assessments under the Oil Pollution Act, s*ee* NOAA, http://www.darrp.noaa.gov/economics, and the Corps of Engineers has developed policy for integrating ecosystem services impacts in its water and navigation infrastructure project planning. *See* Denise Reed et al., Institute for Water Resources, U.S. Army Corps of Engineers, Using Information on Ecosystem Goods and Services in Corps Planning: An Examination of Authorities, Policies, Guidance, and Practices. (Sept. 2013), *available at*

http://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/EGS_Policy_Review_2013-R-07.pdf

Perhaps the most prominent application of the ecosystem services framework in impact assessment programs occurred in 2013 regarding national water resources. In the Water Resources Development Act of 2007, Congress directed that the 1983 Principles and Guidelines utilized by a variety of federal agencies for water resources planning and development be updated to reflect national priorities, including not only economic development also protection and restoration of natural system functions supporting economic sustainability. *See* http://www.whitehouse.gov/administration/eop/ceq/initiatives/PandG. In 2013, the White House released the updated Principles and Guidelines, which state that project assessments "should apply an ecosystem services approach in order to appropriately capture all effects (economic, environmental and social) associated with a potential Federal water resources investment." Principles and Guidelines for Federal Investment in Water Resources 6 (Mar. 2013), *available a*t http://www.whitehouse.gov/sites/default/files/final_principles_and_requirements_march_2013.pdf.

B. Ecosystem Services in State Common Law Doctrine.

Courts too have embraced the concepts underpinning ecosystem services, in some cases even before the federal regulatory agencies. One example is the remand decision from *Palazzolo v. Rhode Island*, 533 U.S. 606 (2001). In *Palazzolo* the Court ruled that a land developer's regulatory takings claim was subject to the *Penn*

Central traditional balancing test rather than the *Lucas* categorical rule for total losses. On remand, the state trial court held that because the development would degrade the ability of a marsh to "filter and clean runoff," it would constitute a public nuisance and therefore, under the nuisance exception to regulatory takings established in *Lucas*, the state's denial of the permit for the development did not constitute a taking. *See Palazzolo v. State*, 2005 WL 1645974 (R.I. 2005).

Similarly, the public trust doctrine came into play in a Louisiana Supreme Court decision upholding a fresh water diversion project against a regulatory taking claim by oyster bed lessees. *See Avenal v. State*, 886 So. 2d 1085 (2004). The court concluded that improving the coastal resources provides an important barrier for coastal populations against storms. In both cases the courts based the decision on recognition of the ecosystem services at stake the dispute.

More recently, the New Jersey Supreme Court changed the rules governing just compensation for takings of private property to account for ecosystem services. In *Borough of Harvey Cedars v. Karan*, 70 Atl. 3d 524 (N.J. 2013), a New Jersey shore homeowner couple complained that the state's post-Sandy dune restoration program, which placed higher dunes on shorefront properties, diminished their view of the ocean and claimed $375,000 in just compensation. The obvious response from the state was that they might not have such a great view, but at least they're going to have a house the next time a storm like Sandy hits. The lower court said that was not proper offsetting under the New Jersey judicial doctrine governing just compensation, which disallowed offsetting of private losses by public benefits, and

the jury awarded $350,000 to the homeowners. The state high court said, in essence, if that's how the doctrine works then the doctrine needs to change, because obviously the storm protection benefits the dune will provide to the homeowner should be taken into account. *Id*. at 540-41; s*ee* also Fla. Stat. § 161.141 (codifying this approach). The court remanded the matter to the trial court to require the jury to determine how much the protective services the dune is providing are worth to those home owners *in dollars*. Perhaps seeing the writing on the wall, the homeowners settled the case for $1.00 and attorney fees. See http://www.nj.com/ocean/index.ssf/2013/09/harvey_cedars_sand_dune_dispute_settled.html.

C. The White House Initiative on Ecosystem Services

On October 7, 2015, the White House Office of Management and Budget, Council on Environmental Quality, and Office of Science and Technology issued their Memorandum for Executive Departments and Agencies on Incorporating Ecosystem Services into Federal Decision Making (the Memorandum), *available at* https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m-16-01.pdf. The Memorandum "directs agencies to develop and institutionalize policies to promote consideration of ecosystem services, where appropriate and practicable, in planning, investments, and regulatory contexts." *Id*. at 1. The goal of doing so is "to better integrate in Federal decision making due consideration of the full range of benefits and tradeoffs among ecosystem services associated with potential Federal Actions." *Id*. at 2. The scope of the policy goal is broadly stated to include all federal

programmatic and planning activities including "natural-resource management and land-use planning, climate-adaptation planning and risk-reduction efforts, and, where appropriate, environmental reviews under the National Environmental Policy Act (NEPA) and other analyses of Federally-assisted programs, policies, projects, and regulatory proposals." *Id.*

To facilitate agencies in achieving its policy goals, CEQ will prepare a guidance document outlining best practices for: (1) describing the action; (2) identifying and classifying key ecosystem services in the location of interest; (3) assessing the impact of the action on ecosystem services relative to baseline; (4) assessing the effect of the changes in ecosystem services associated with the action; and (5) integrating ecosystem services analyses into decision making. *Id.* at 4. In the interim, agencies were by March 30, 2016, to have submitted documentation describing their current incorporation of ecosystem services in decision making and establishing a work plan for moving toward the goals of the policy directive. *Id.* Meanwhile, the Memorandum directs CEQ to assemble a task force of experts from relevant agencies to craft the best practices implementation guidance, which will be subject to interagency review, public comment, and external peer review. Once the guidance is released, agencies are to adjust their work plans as needed.

III. Integrating Ecosystem Services into Equitable Apportionment Doctrine

While a river is more than water flowing downhill, it isn't much of a river if the water doesn't flow. The water, flowing, is the ecosystem services delivery mechanism for the run of the river. The water in its physical form can be extracted

from the river and consumed to support human well-being and a vast array of human economic activities. But that is not the only ecosystem service that can be consumed from a river, and most of the others require that the water *not* be extracted from the river ecosystem. Thus the apparent dilemma for equitable apportionment doctrine.

But this is a false dilemma. Indeed, although most of the Court's equitable apportionment jurisprudence focuses on development and consumption of water in its physical form, it has made clear that in interstate disputes *all* natural resources of the river are subject to its original jurisdiction. Thus, in *Idaho v. Oregon*, 462 U.S. 1017 (1983), the Court apportioned salmon runs in the Columbia-Snake River system between the two states, observing that "a dispute over the water flowing through the [river] system would be resolved by the equitable apportionment doctrine; we see no reason to accord different treatment to a controversy over a similar natural resource of that system." *Id.* at 1024.

Like fish flowing through the river system, ecosystem services do as well, delivering benefits to human communities in many different ways and locations. Injury to those economically valuable benefits ought, therefore, to count in the equitable apportionment "substantial injury" analysis. Likewise, once those ecosystem services are recognized for their economic value to human communities, equitable apportionment doctrine should include apportionment of those services.

These are not novel propositions; rather, they are the logical, incremental extensions of the Court's analysis in *Idaho v. Oregon*. The salmon and trout

involved in that case were the resource of interest for Idaho—they moved within the river system and were, for all practical purposes, what made the water valuable to the state. Ecosystem services, like the salmon, are economically valuable resources that flow within the water system of any river. Moreover, with each year we understand more about the nature and value of ecosystem services. To leave them out of the interstate water apportionment analysis would simply be to ignore the ecological and economic realities of river systems.

Why would equitable apportionment allocate interstate water, and interstate fish, but not interstate ecosystem services? What would be the point of leaving the latter out of the calculus? To be sure, water has value of its own in the consumptive sense—we drink it and use it for irrigation and other industrial applications. But water left in the river is also immensely valuable, not as a commodity but because of the ecosystem functions it performs and the services those functions support and produce. You can't have salmon without some water in the river. Wetlands aren't wet without water in the river. Riparian habitat isn't riparian if there is no water in the river. These are among the ecosystem functions of water left in the river, and they provide valuable services that equitable apportionment doctrine should take into account in the water apportionment calculus.

Indeed, the Court did exactly that in 1931, in the pre-Clean Water Act case of *New Jersey v New York*, 283 U.S. 336, 345-48 (1931), when it ruled that New York must provide the downstream Delaware Basin states with sufficient minimum base flow in the river to dilute New York City's waste discharges. Dilution of pollution is

a valuable ecosystem service. Consider, for example, the cost the downstream states would have faced had they been deprived of that ecosystem service and had to use technological solutions to treat the water before using it for drinking supply, swimming, fishing, or other ecosystem services. With today's greater understanding of the role and value of ecosystem services that instream water flow provides, not only waste dilution but nutrient, temperature, and estuarine salinity regulation, riparian habitat support, and a suite of others, the time is ripe for the Court to update the language of equitable apportionment doctrine to recognize what the rulings in *Idaho v. Oregon* and *New Jersey v New York* already have embedded in the doctrine.

In short, the Court was well ahead of the times—it incorporated ecosystem services concepts into equitable apportionment doctrine long before Congress thought to put it in the 2008 Farm Bill, and the Corps of Engineers in its 2008 wetlands mitigation rules, and the Forest Service in its 2012 forest planning rule, and the White House in its 2015 directive to agencies. All that was missing in *Idaho v. Oregon* and *New Jersey v New York* was the terminology used today.

IV. Applying Ecosystem Services Principles to the ACF

I predicted in 2003 that "to the extent anyone suggests the Court's equitable apportionment jurisprudence is about only water quantity, [they] rely on an artificiality that must cede to ecological reality. The ACF may very well become the test case for that proposition, and potentially the dawn of a new era for the doctrine of equitable apportionment." J.B. Ruhl, *Equitable Apportionment of Ecosystem*

Services: New Water Law for a New Water Age, 19 J. LAND USE & ENVT'L LAW 47, 55 (2003). That day has come, but the question now is how to go from the general proposition that the Court's doctrine in fact always has embraced ecosystem services principles to applying the principles to the specifics of the ACF.

It worth noting at the outset that neither of the parties has attempted to frame its position to include ecosystem services as part of the apportionment analysis. Although somewhat a caricature, the parties have instead taken up classic "environment versus economy" stances. Georgia argues, for example, that "Florida readily admits, this is not a case of economic harm. Rather, Florida attempts to establish a series of ecological harms." Ga. Br. At 2. But ecological harms are also economic harms. Indeed, whether they say it or not, both states are arguing about ecosystem services. Georgia consumes ACF water primarily as provisioning and cultural services, whereas Florida consumes ACF water primarily as regulating and supporting services. Florida thus would be at a disadvantage in tagging dollar signs to their position, as monetizing regulating and supporting service values is much harder than calculating the value of water when it is coming out of the spigot or floating a pontoon boat. But we know they are there, and that they are valuable.

What I hope to offer in the following, therefore, are some guidelines for applying ecosystem services principles in the context of equitable apportionment when regulating and supporting services play a large role in the dispute. While it should be a matter of judicial notice that ecosystem service values are flowing through the ACF, I am in no position to offer evidentiary submissions calculating

their exact parameters and precise values to either of the parties. Instead, I propose several principles for taking explicit account of ecosystem services in case-specific equitable apportionment decisions.

The first principle is that regulating and supporting ecosystem services need not be fully monetized to be reflected in the apportionment decision. To require their monetization with the same precision as can be accomplished for provisioning and cultural services, particularly the value of consumptive use of water as a provisioning service, would render them invisible from the decision process. Rather, regulating and supporting services can be recognized through qualitative identification and location and quantified through metrics other than dollars. In the ACF, for example, it is indisputable—truly a matter of judicial notice—that the flow of freshwater from the Apalachicola regulates nutrient and salinity levels in the Apalachicola Bay (regulating service), and that this service is essential to the production of fish and other commercially valuable marine species in the West Florida Gulf region (provisioning service) and supports a thriving recreational fishing industry (cultural service). *See* Fernando Gibbs et al., *New Evidence for the West Florida Shelf Plume*, 22 CONTINENTAL SHELF RESEARCH 2479 (2002); Steven L. Morey & Dmitri S. Dukhovsky, *Analysis Methods for Characterizing Salinity Variability from Multivariate Time Series Applied to Apalachicola Bay Estuary*, 29 JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY 613 (2012); U.S. Department of Commerce, Fisheries Economics of the United States 2011, NOAA Technical

Memorandum NMFS-F/SPO-128, at 125 (Dec. 2012) (West Florida Gulf fishery statistics).

The second principle is that, once all the ecosystem services supplied in the ACF system are identified and described, trade-offs between various ecosystem services are inevitable and should be explicitly recognized as central to the apportionment decision. For example, water consumed in Georgia as a commodity (provisioning service) necessarily presents a trade-off with flows into the Apalachicola Bay to regulate nutrients and salinity (regulating service). The point is that the apportionment is not of *water*, it is of *ecosystem services*. The volume of water at each location matters, but it should matter because of the different ecosystem services made possible.

The third principle is that the apportionment trade-off decision must recognize that, as a general proposition, regulating and supporting services are more dependent for their continued enjoyment on natural ecological conditions. Provisioning services such as water as a commodity, and cultural services such as boating, can often be enlarged by human interventions such as reservoir construction. In the case of a river system like the ACF, however, regulating services such as controlling salinity in an estuary are generally diminished by human intervention. Importantly, human interventions in river systems often modify natural flow regimes associated with the support of regulating services. A controlled constant flow regime might produce the same annual flow volume as the

natural regime and yet completely undermine the variable flow conditions needed for the regulating service to be delivered.

Florida's position at bottom is that the natural ecological conditions of the ACF should be an important factor in the Court's determination of harm and ultimate apportionment decision. Ecosystem services principles support that position not only because of the ecological values at stake (which are undoubtedly important to consider) but also for more human-centric reasons that Florida does not explicitly state in its appeal to eco-centric values. In short, seen through the lens of ecosystem services, Florida's position is as much about economics as it is about ecology.

Indeed, Florida's proposed consumption cap remedy, Fl. Br. At 37, is at heart an allocation of ecosystem services between the two states consistent with the principles proposed above. Georgia's consumption of the ACF's primary provisioning and cultural services—water as commodity and for recreation—necessarily presents a trade-off with Florida's primary interest in the ACF's regulating and supporting services made possible from a flow regime closer to natural conditions. Surely the ecosystem services Florida derives from the ACF are no less important than salmon or pollution dilution, two ecosystem services the Court has previously made the basis for an apportionment decree. They and all ecosystem services should be formally recognized as being at stake in the Court's equitable apportionment doctrine.

CONCLUSION

Justice O'Connor once observed in the context of the Clean Water Act that the distinction between water quantity and water quality is "artificial." *PUD No. 1 v. Washington Dep't of Ecology*, 511 U.S. 700, 701 (1994) ("Petitioners' assertion that the [Clean Water] Act is only concerned with water quality, not quantity, makes an artificial distinction, since a sufficient lowering of quantity could destroy all of a river's designated uses, and since the Act recognizes that reduced stream flow can constitute water pollution."). As suggested above, equitable apportionment doctrine has all too often been portrayed as just about water quantity. Yet, as shown, the Court has never accepted that artificiality. The Court has apportioned acre feet of water, but it has also fish and the dilution of pollution. This proceeding presents an opportunity for the Court to acknowledge those apportionment decisions and its doctrine in general for what it is about at heart—the apportionment of ecosystem services.

Respectfully Submitted,

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October 19, 2016

CERTIFICATE OF SERVICE

This is to certify that the Amicus Brief of J.B. Ruhl on His Behalf in Support of the Plaintiff State of Florida has been served on October 20, 2016, in the manner specified below:

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