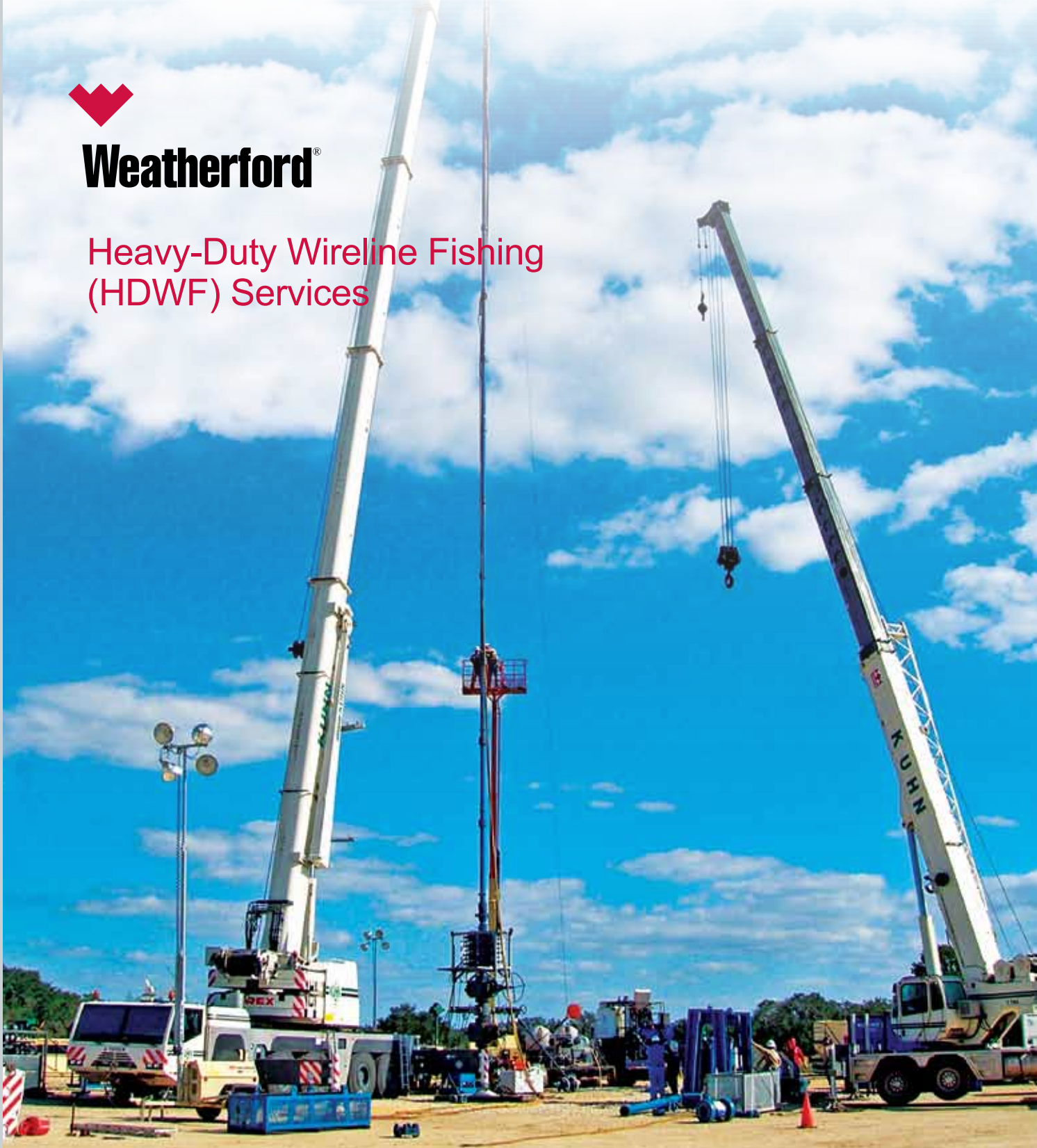
Weatherford®

Heavy-Duty Wireline Fishing (HDWF) Services



Drilling

Evaluation

Completion

Production

Intervention

Fishing services

- Abandonment services
- Fishing jars
- Fishing tools
- Heavy-duty wireline fishing
- Well repair

Wireline, not workover.

Leveraging compact wireline units, innovative fishing tools and comprehensive expertise to remove wellbore obstructions with maximum efficiency and eliminate the need for costly workovers

Combining innovative equipment and expertise to optimize your fishing operations.

Weatherford offers heavy-duty wireline fishing services to remove a wide range of wellbore obstructions, including stuck flow-control devices, slickline and braided cable. HDWF presents a more efficient, cost-effective alternative to workovers and to coiled-tubing (CT) fishing.

To optimize your fishing operations, we offer:

Innovative equipment

Our HDWF toolkit enables us to enhance performance and efficiency, while minimizing surface footprint. We incorporate lightweight Dyform cable and innovative jars to deliver extremely high-impact forces—a key element of fishing—relative to the size and weight of our compact wireline units. Modular by design, our systems also offer a high degree of flexibility and can be modified as required to suit your specific operation.

Expertise

Drawing on Weatherford's more than 20 years of HDWF experience and extensive training, our highly qualified HDWF specialists provide support through all phases of your operation, including tool selection, mobilization, execution and return to production.

HDWF applications

- Retrieval of stuck flow-control devices
- Recovery of lost tool strings
- Recovery of slickline, braided cable and electric line lost in the wellbore
- Recovery of CT strings and bottomhole assemblies (BHAs)
- Installation and recovery of stackable perforating systems
- Large-bore sand bailing
- Setting of various flow-control devices
- Memory tool deployment

Providing a more efficient, cost-effective fishing alternative.

In addition to overcoming the performance limitations of slickline fishing, HDWF also offers many decided advantages compared to CT fishing and workovers, including:

- smaller surface footprint, especially critical on space-constrained platforms;
- faster rig up and running speeds;
- greater upward jar force, key to dislodging obstacles stuck in the wellbore;
- minimized operational, health, safety and environmental risk;
- elimination of CT fatigue, a common hazard on CT operations.

Comparison between HDWF and CT Fishing[1]

Property[1]	HDWF	CT
Overpull required to operate jars (lb/*kg*)	6,030 *2,735*	1,800 *816*
Hanging weight[2] (lb/*kg*)	2,994 *1,358*	15,795 *7,164*
Hanging weight plus overpull for jars (lb/*kg*)	9,024 *4,093*	17,595 *7,981*
Maximum allowable pull (lb/*kg*)	11,000 *4,990*	18,000 *8,165*
Jar impact (lb/*kg*)	**90,000** ***40,823***	**50,000** ***22,680***

[1]Assumes a wireline plug stuck in a wellbore at a depth of 13,500 ft (4,115 m). No buoyancy factors considered.
[2]Includes tool string on HDWF and assumes a hanging weight of 1.7 ft-lb (2.3 N•m) on the CT rig-up.

The hypothetical comparison shown in this table illustrates the key advantages of HDWF over CT fishing. The impact force of HDWF is 45 percent greater, significantly improving its capacity to dislodge the stuck fish. Also, CT fishing is conducted very close to its operating limit.

Enhancing performance with innovative, modular equipment.

Heavy-duty wireline units

Weatherford's fleet of compact, powerful HDWF units includes both onshore and offshore models. All come equipped with lightweight Dyform cable. Our offshore units are Zone II certified, closed-loop, hydraulic-based systems. The units' modular design offers a high degree of operational flexibility, especially relevant on space- or weight-constrained platforms.

Our land units also offer flexibility. They can be reconfigured in less than 45 minutes to accommodate different-sized cables in accordance with the specific needs of an operation. Our wireline units are available for rapid deployment throughout the United States and the Americas.

Wireline Units

Operating Environment	Configuration	Slickline Diameter (in.)	Slickline Length (ft/*m*)	Dyform Fishing Line Diameter (in.)	Dyform Fishing Line Length (ft/*m*)	Heaviest Lift (lb/*kg*)
Offshore	Double drum	1/8	30,000 *9,144*	1/4	30,000 *9,144*	13,500 *6,123*
Offshore	Single drum	—	—	5/16	40,000 *12,192*	18,500 *8,391*
Onshore	Double-drum skid	1/8*	30,000 *9,144*	1/4	30,000 *9,144*	—
Onshore	Single-drum skid	1/8*	—	5/16	28,500 *8,689*	—

*Supra 75 alloy

Jars

Integral to HDWF operations, jars are used to generate a mechanical impact on the tool string to enable retrieval of obstacles lost downhole. We manufacture and test the jars we use in HDWF operations.

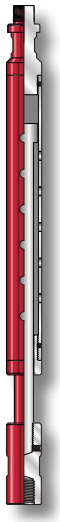
Our portfolio includes innovative jars designed to maximize impact force, as well as jars tailored to overcome challenges that would inhibit the performance of standard tools in HDWF operations, such as well deviation.

Power-assist jar (PAJ)

The PAJ leverages an elongated jar stroke to deliver an impact force up to 300 percent greater than that of a more conventional hydraulic jar. Highly durable, it also eliminates the risk of seal failure.

Easy-adjust jar (EAJ)

Ideally suited for highly deviated wells, the EAJ enables users to adjust impact force without removing it from the tool string, enhancing operational efficiency.



Heavy-duty tubular jar

The heavy-duty tubular jar is designed to withstand well conditions that would impede the performance of conventional-spang jars. Like the high-deviation tubular jar on which it is modeled, it can withstand extremely high-impact forces. Fluid bypass holes in its body maximize impact force. Its greater rigidity can increase impact forces further under certain conditions.

High-deviation tubular jar

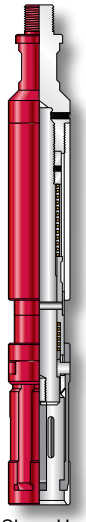
The high-deviation tubular jar helps overcome the limitations of standard jars in high-angle wells. Equipped with 0.079-in. (2-mm) fluid slots, it is well suited for fishing slickline and braided line. Its robust ball races help reduce jar friction and a full-diameter jar rod gives it a high-tensile rating.

Additional accessories

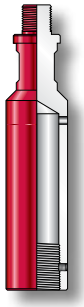
In addition to jars, we offer an array of other accessories designed to optimize HDWF operations, all of which we also manufacture.

Accelerator sub

The accelerator sub is used to boost mechanical jar performance. It is equipped with disk springs, which offer many performance advantages—rather than conventional helical springs. By storing energy from an overpull and releasing it when the jar fires, the accelerator sub increases jarring force. It significantly improves the effectiveness of PAJs at lower depths and acts as a shock absorber at shallow depths.



Shear Up Assembly



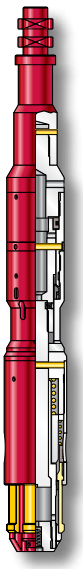
Shear Down Sub

Heavy-duty pulling tool

Compatible with the PAJ, the heavy-duty pulling tool is designed to withstand high-impact jarring forces. Its 320° circumference latch mechanism spreads loads evenly around the fishing neck. This feature, combined with its robust design, contributes to its five-fold strength increase compared to conventional pulling tools and minimizes the risk of damage to the fishing neck.

QLS® quick-lock system

An alternative to traditional sucker-rod, tool-string connections, the *QLS* system reduces tool-string makeup and breakout times. By eliminating the need for wrenches to make up tool strings, it also enhances safety.

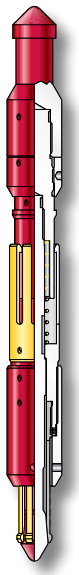


DU pulling tool

The DU pulling tool is designed to overcome limitations of conventional pulling tools. Retrieval of devices with internal fishing necks can require upward and downward jarring. With conventional pulling tools, two-way jarring can result in premature shearing of the shear pin, a mishap that could increase the expense of the fishing operation. The DU pulling tool, however, enables reliable bidirectional jarring without the risk of premature shearing. The final downward jar shears the release pin, enabling retrieval of the DU pulling tool. Its unique design permits shearing even when debris prevents the tool from shouldering out on the fishing neck.

Heavy-duty releasable spear

The heavy-duty releasable spear is used to retrieve downhole devices that lack a serviceable fishing neck. Its release mechanism enables the operator to shear off and recover the spear, particularly useful when an unrecoverable fish must be pumped or flowed through at a later stage. Reliable and versatile, it can withstand high-impact jarring and comes in a wide variety of engagement sizes and reaches.



Complementing technology with expertise.

Just as our portfolio of specialized equipment plays a key role in our capability to optimize fishing operations, so do our HDWF personnel. Drawing on Weatherford's more than two decades of heavy-duty wireline fishing experience, our global HDWF team consists of HDWF and technical support specialists.

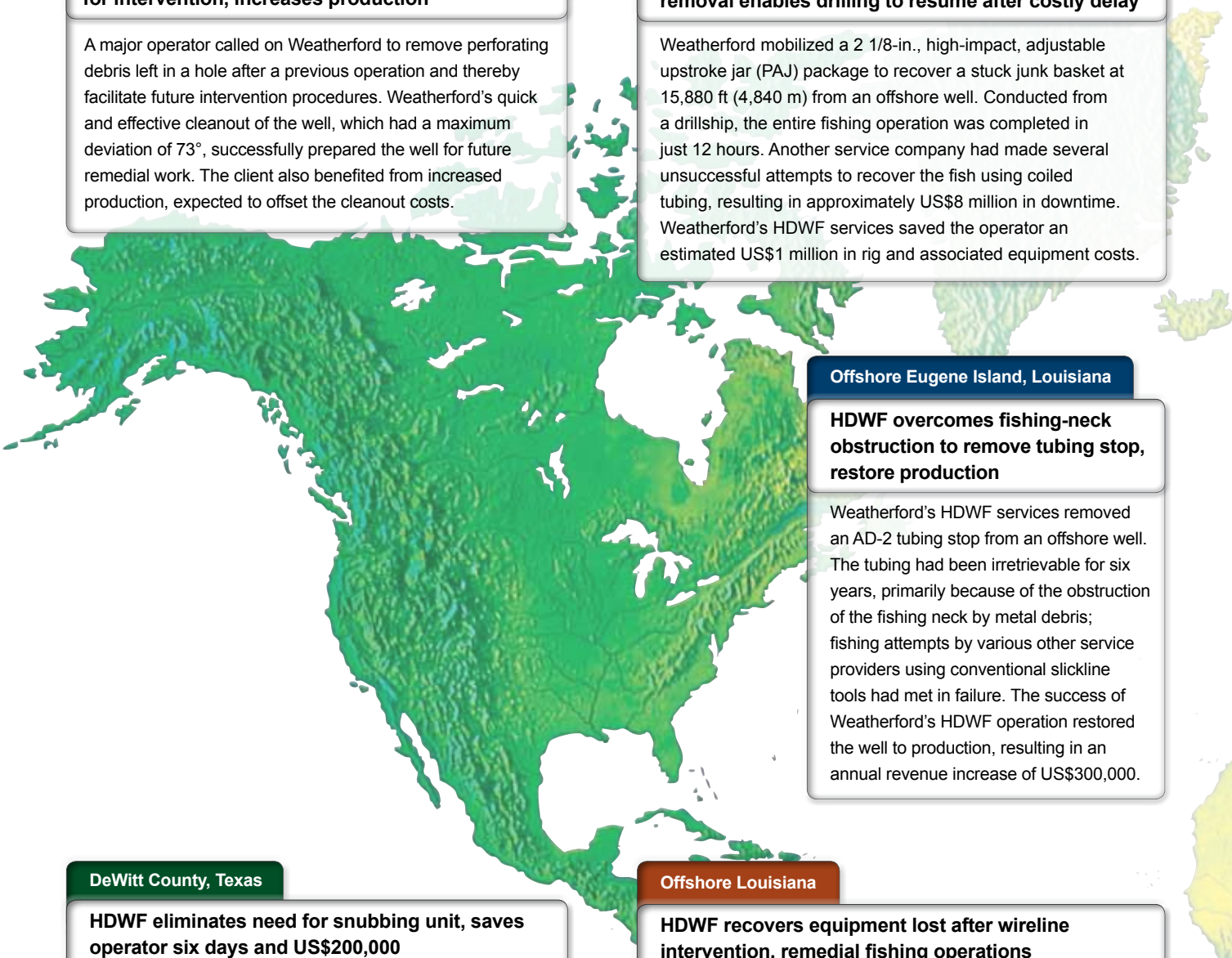
HDWF specialists provide operational support on-site and remotely. To meet the unique demands of HDWF operations, they are well versed in fishing, as well as wireline tools and techniques. Leveraging our global network of training facilities, we provide them with specialized classroom training before deploying them on live operations. Their training continues in the field, where they are paired with experienced HDWF personnel to further develop their skills. Our HDWF specialists are available for worldwide deployment.

Technical support specialists provide many key services, such as helping determine the best tools for a job; confirming that HDWF equipment meets quality specifications, as well as the demands of a given operation; and testing equipment to ensure optimal performance in the field. They are also well equipped to custom design or modify tools quickly for unique applications, as needed. Many of our technical support specialists draw on actual field experience.

Planning for contingency

We can prepare and deliver standby fishing tool packages tailored for your specific well program to the site of your operations. These packages are assembled in advance of your planned workovers, completions, perforating programs and high-end well interventions. If you experience an unscheduled event requiring fishing services, our fishing packages offer multiple benefits, such as reducing mobilization time, and minimizing nonproductive time and associated costs.

Delivering real results.



Offshore California

Successful cleanout prepares highly deviated well for intervention, increases production

A major operator called on Weatherford to remove perforating debris left in a hole after a previous operation and thereby facilitate future intervention procedures. Weatherford's quick and effective cleanout of the well, which had a maximum deviation of 73°, successfully prepared the well for future remedial work. The client also benefited from increased production, expected to offset the cleanout costs.

Offshore Alabama

Performed from a drillship, stuck junk basket removal enables drilling to resume after costly delay

Weatherford mobilized a 2 1/8-in., high-impact, adjustable upstroke jar (PAJ) package to recover a stuck junk basket at 15,880 ft (4,840 m) from an offshore well. Conducted from a drillship, the entire fishing operation was completed in just 12 hours. Another service company had made several unsuccessful attempts to recover the fish using coiled tubing, resulting in approximately US$8 million in downtime. Weatherford's HDWF services saved the operator an estimated US$1 million in rig and associated equipment costs.

Offshore Eugene Island, Louisiana

HDWF overcomes fishing-neck obstruction to remove tubing stop, restore production

Weatherford's HDWF services removed an AD-2 tubing stop from an offshore well. The tubing had been irretrievable for six years, primarily because of the obstruction of the fishing neck by metal debris; fishing attempts by various other service providers using conventional slickline tools had met in failure. The success of Weatherford's HDWF operation restored the well to production, resulting in an annual revenue increase of US$300,000.

DeWitt County, Texas

HDWF eliminates need for snubbing unit, saves operator six days and US$200,000

An operator used Weatherford's HDWF services to retrieve a 92-ft (28-m) fish from an onshore gas well with hazardous downhole conditions. HDWF presented a safer, more cost-effective alternative to running a snubbing unit, saving an estimated six days and US$200,000.

Offshore Louisiana

HDWF recovers equipment lost after wireline intervention, remedial fishing operations

During wireline intervention operations, an operator lost 9,000 ft (2,743 m) of 0.108-in. slickline tool string, as well as cutter and weight bars in a well. Remedial fishing operations resulted in the additional loss of 6,500 ft (1,981 m) of 7/32-in. braided cable, cutter and weight bars. Weatherford's HDWF services recovered all material lost in the wellbore during the two operations.

Weatherford's Heavy-Duty Wireline Fishing (HDWF) Services

Wireline, not workover.

Weatherford provides worldwide service and support from approximately 800 locations in more than 100 countries. To find out more about our heavy-duty wireline fishing services, please contact an authorized Weatherford representative or **visit weatherford.com.**

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